

by Wackenroder (*op. cit.*); in 1824 by Mitouart (*Journ. de Pharm.* x. 352); and, in 1831, by Latour de Trie (*op. cit.* xvii. 503, 601.)

Watery extract of Pomegranate Rind.		Bark of the Pomegranate Root.		
REUSS'S ANALYSIS.		WACKENRODER'S ANALYSIS.		LATOUR DE TRIE'S ANALYSIS.
Resin .....	0.92	Rancid fat oil.....	2.46	Fatty matter.
Tannin.....	27.78	Tannin.....	21.92	Tannin.
Oxidized tannin .....	10.19	Starch with some mucilage		Gallic acid
Extractive.....	21.76	of lime .....	26.00	Granadin (Mannite).
Gum.....	34.26	Woody fibre with albumen.	45.45	Resin (copious).
Loss .....	5.09	Loss .....	4.08	Wax.
				Chlorophylle.
				[Insoluble matters].
Extract of the Rind....	100.00	Dried Bark.....	100.00	Bark of the Root.

1. MANNITE (*Granadin*).—The sweet substance which Latour de Trie considered to be peculiar, and called *granadin*, has been satisfactorily shown (*Journ. de Pharm.* xxi. 169.) to be mannite (described at p. 372).

2. TANNIC ACID.—On this the astringency of the fruit and root almost solely depends. It is this principle which enables the infusion, or decoction, of the rind and bark to produce precipitates (*tannates*) with a solution of gelatine, and with the ferruginous salts.

3. RESIN.—Latour de Trie describes this as being without any remarkable odour and taste. It is insoluble in water, slightly so in cold alcohol, and more so in hot alcohol, and in small quantity in ether.

PHYSIOLOGICAL EFFECTS.—All parts of the plant (root-bark, rind of the fruit, juice surrounding the seeds, and flowers) possess astringency, owing principally to tannic acid, and in some slight degree to a minute quantity of gallic acid. The bark of the root, taken in *small quantities*, occasions no remarkable effects. In *full doses*, however, it causes nausea, vomiting, and purging, and occasionally giddiness and faintness.

USES.—Rarely employed in medicine. The *root-bark* has been occasionally used as a vermifuge. Celsus, Dioscorides, Pliny, and other ancient writers, speak of its anthelmintic qualities. The Indians, also, were acquainted with them at a very early period. Of late years attention has been again drawn to this bark as a remedy for tape-worm, by the recommendation of Dr. Fleming, (*Asiatic Researches*, vol. xi.) Dr. Buchanan, (*Ed. Med. and Surg. Journ.* vol. iii. 22.) Mr. Breton, (*Med. Chir. Trans.* vol. xi. p. 301.) Gomes, (*Journ. Complém. des Scienc. Méd.* xvi. 24.) Deslandes, and others; (Bayle, *Bibl. de Thérap.* i. 313.) but in this country it has been almost entirely superseded by oil of turpentine. The *rind of the fruit* has been employed on account of its astringency, in the form of decoction, as a gargle, in relaxed sore throat; as an injection, in leucorrhœa; and, internally, in diarrhœa, dysentery, and colliquative sweats. The powder of the rind may be administered as a tonic. The *flowers* are mild astringents, but are not employed in this country. The *fruit* may be eaten to allay thirst, and as a refreshing refrigerant and astringent in febrile disorders, especially those called bilious. It contains an acidulous styptic juice, which is inclosed in a thin vesicle surrounding the seeds.

ADMINISTRATION.—The *root-bark* is given in decoction. This is prepared by boiling ʒij. of the fresh bruised bark in Oj. of water to Oj.: the dose is a wine-glassful every half hour till the whole is taken. It usually occasions slight sickness, but seldom fails to destroy the worm. The patient should be prepared for the remedy by the use of a dose of castor oil and a strict regimen the day previously. The *rind of the fruit* may be given, as an astringent and tonic, in doses of ʒss. to ʒj.

#### ORDER LX.—ROSACEÆ, *Jussieu*.—THE ROSE TRIBE.

ESSENTIAL CHARACTER.—*Calyx* generally of five sepals, cohering at the base to form a tube; therefore five-lobed, generally persistent, usually free, sometimes adherent to the ovary. *Petals* as many as the sepals, rarely by abortion none, inserted on the calyx, quincuncial in aestivation, generally regular. *Stamens* inserted with the petals, mostly indefinite; *filaments*



incurved in aestivation; *anthers* two-celled, dehiscing by a double chink. *Carpels* numerous, either solitary by abortion, or having the appearance of a single ovary, from their union, either together or with the tube of the calyx. *Ovaries* one-celled; *styles* simple, dilated at the apex into *stigmas* of variable shape, usually arising from the side of the ovary, either distinct, or, more rarely, coherent. *Seeds* in each carpel usually one or two, seldom numerous; erect or inverse, exalbuminous (*Hirtella* and *Neillia* excepted). *Embryo* straight; *cotyledons* either foliaceous or fleshy.—*Herbs, shrubs, and trees.* *Leaves* alternate, bistipulate at the base, simple or compound. *Inflorescence* various (De Cand.)

**PROPERTIES.**—The prevailing quality of Rosaceæ is astringency. This is especially obvious in the root. The tribe Amygdalæ is distinguished from other rosaceous plants by the poisonous properties of the kernels and leaves, which yield hydrocyanic acid when distilled with water, and by the gummy exudation from the stems.

## TRIBE I.—AMYGDALÆÆ.

## 1. AMYGDALUS COMMUNIS, Linn. L. E. D.—COMMON ALMOND.

*Sec. Syst.* Icosandria, Monogynia.

(*Var. α.* Nuclei. *Amygdala amara.* *Var. β.* Nuclei. *Amygdala dulcis.* Oleum ab alterutrisque nucleis expressum, L.—*Var. α.* Kernel; Bitter Almond. *Var. β* and *γ.* Kernel; Sweet almond, E.—Nuclei; *Amygdalæ amare.* *Amygdalæ dulces,* D.) (*Amygdala Amara.* *Amygdala communis,* U. S.)

**HISTORY.**—Almonds were well known to the ancients. They are mentioned in the earliest part of the Old Testament. (*Genesis*, xliii. 11.) Hippocrates employed both the sweet and bitter almonds, and their expressed oil, in medicine. (*Opera*, ed. Fœs. pp. 484, 669, and 413.) Dioscorides (lib. i. cap. 39,) describes the mode of expressing the oil.

**BOTANY.** **Gen. Char.**—*Drupe* pubescent, velvety; with a fibrous, juiceless cortex, which falls off irregularly; *putamen* (shell) pitted or smooth. *Young leaves* folded flat (conduplicate). *Flowers* somewhat sessile, solitary or in pairs, earlier than the leaves, arising from scaly buds. *Fruit* woolly (De Cand.)

**Sp. Char.**—*Leaves* oblong-lanceolate, serrulate. *Flowers* solitary. *Calyx* campanulate. *Fruit* ovoid-compressed, tomentose (De Cand.)

A small tree. *Leaves* on glandular footstalks, acuminate. *Flowers* moderately large, rose-red or white, nearly sessile, appearing before the leaves. *Calyx* reddish, campanulate, five-cleft; the segments blunt. *Petals* five, ovate, irregularly notched, rose-red. *Stamens* numerous (about thirty), shorter than the petals, inserted into the mouth of the calyx. *Ovarium* woolly; *style* simple; *stigma* round. *Drupe* ovoid, compressed, leathery, marked with a longitudinal furrow, where it opens when ripe; *epicarp* greenish-gray, tomentose; *mesocarp* (or *sarcocarp*) fibrous, cracking and dropping off; *endocarp* (*putamen*) woody or almost osseous, oblong or ovate, acute, marked with pits or furrows. *Seed* one (rarely two) in each drupe.

De Candolle (*Prodr.* ii. 530,) admits five varieties of this species:—

*α. Amara.* Bitter Almond.—*Styles* almost as long as the stamens, tomentose below. *Seeds* bitter.—*Flowers* larger; *petals* white, roseate at the base. It varies with a hard and brittle *putamen*.

*β. Dulcis.* Sweet Almond.—*Leaves* ash-green. *Flowers* earlier. *Styles* much longer than the stamens. *Fruit* ovate-compressed, acuminate. *Seeds* sweet. *Putamen* hard.

*γ. Fragilis.* Tender-shelled.—*Flowers* coetaneous. *Petals* broader, quite emarginate. *Leaves* shorter; *petioles* thick. *Fruit* acuminate, sweet. *Putamen* soft.—*Flowers* somewhat roseate.

*δ. Macrocarpa.* Large fruited.—*Leaves* broader, acuminate, scarcely ash-coloured. *Peduncles* shorter, turgid. *Fruit* larger, umbilicated, acuminate at the apex. *Putamen* hard.—*Flowers* white-roseate, large, appearing before the leaves. *Petals* broadly obcordate, undulate. It varies—1st, with a lesser fruit called the *Sultana Almond*; 2ndly, with a very small fruit termed the *Pistachio Almond*.

*ε. Persicoides.* Peach Almond.—*Leaves* like those of the peach. *Fruit* oval, obtuse. *Sarcocarp* succulent. *Putamen* yellowish-black. *Seeds* sweet.—On the same branch the fruit is sometimes ovate, obtuse, and somewhat fleshy; and dry, ovate-compressed, and acuminate.

**Hab.**—Barbary and Syria. Cultivated in the southern parts of Europe.

**DESCRIPTION.**—Almonds in the shell (*Amygdalæ cum putamine*) consist of



the seed, or kernel (*Amygdala*), enclosed in the endocarp (*putamen* or *shell*), which may be hard or soft. The seed is of an oval shape, compressed, rounded at one end, and somewhat pointed at the other. The outer covering of the seed (*epidermis seminalis*, Bischoff) is glanduliferous, bitter, of a reddish-brown colour, and veined by the ramifications of the *raphé*. At the pointed extremity of the seed is a small perforation (*foramen*), and on one side of this, at the edge, is the rugged line (*hilum*) which constitutes, botanically, the *base* of the seed. The seed is connected, at the hilum, with the shell by the *umbilical cord*. The large or round end of the almond is curiously enough termed its apex. That part of the internal seed-coat (*endopleura*, De Candolle) which corresponds to the blunt or rounded end of the almond, is dark-coloured, indicating the situation of the *chalaza*. By soaking almonds in warm water, the seed-coats (pellicle or skin) are easily removed. *Blanched almonds* (*amygdalæ decorticatæ*) consist of the *embryo* only, composed of the two large fleshy *cotyledons*, between which, at the pointed extremity of the seed, we observe the *plumule*, with the *radicle* pointing towards the foramen.

**1. Sweet Almonds (*Amygdala dulces*).**—These are odourless, and have a bland, sweetish, agreeable taste. Three varieties are known in commerce:—**1. Jordan almonds**, which are the finest, come from Malaga.<sup>1</sup> Of these there are two kinds; the one above an inch in length, flat, and with a clear brown cuticle, sweet, mucilaginous, and rather tough; the other more plump and pointed at one end, brittle, but equally sweet with the former.—**2. Valentia almonds** are about three-eighths of an inch broad, not quite an inch long, round at one end and obtusely pointed at the other; flat, of a dingy-brown colour, and dusty cuticle.—**3. Barbary and Italian almonds** resemble the latter, but are generally smaller and less flattened. Rancid, worm-eaten, and broken almonds should be rejected." (Brande, *Dict. of Pharm.* 55.) Sweet almonds are rarely employed for pressing, on account of their greater cost, and the less value of their residual *almond cake* (*placenta amygdalæ dulcis*). *Almond powder* (*farina amygdalæ*) is the ground almond cake, and is employed as a soap for washing the hands, and as a lute.

**2. Bitter Almonds (*Amygdala amara*).**—These are brought chiefly from Mogadore. In external appearance they resemble the sweet almond, but are somewhat smaller. They are distinguished by their bitter flavour, and, when rubbed with a little water, remarkable odour. They are extensively used for pressing. Their *cake* (*placenta amygdalæ amara*) is distilled with water to yield the *volatile oil of bitter almonds*, and is afterwards employed to fatten pigs, and for other purposes.

COMMERCE.—The following table shows the quantity of almonds (bitter and sweet) on which duty was paid during 1838 and 1839, (*Trade List.*):

	Duty per cent.	Quantity on which duty was paid.	
		In 1839.	In 1838.
Jordan.....	40s.	1596	1098
Not Jordan.....	20s.	3576	2200
Bitter.....	4s.	2145	1870

Almonds are imported in barrels, serons, boxes, bales, &c.

COMPOSITION.—*Sweet almonds* were analyzed by Proust (Gmelin, *Handb. d. Chem.*); in 1817 by Boullay, (*Ibid.* vi. 406,) and in 1825 by Payen and Henry fils. (*Journ. de Chim. Méd.* i. 436.)—*Bitter almonds* were analyzed by Vogel. (Gmelin, *Handb. d. Chem.* ii. 1268.)

<sup>1</sup> See Busby's *Journal of a recent Visit to the principal Vineyards of Spain and France*, p. 47. Lond. 1834.



<i>Boullay's Analysis.</i>		<i>Vogel's Analysis.</i>	
Fixed oil.....	54.0	Volatile oil and hydrocyanic acid } Quantity undetermined.	
Emulsin.....	24.0		
Liquid sugar.....	6.0	Fixed oil.....	28.0
Gum.....	3.0	Emulsin.....	30.0
Seed-coats.....	5.0	Liquid sugar.....	6.5
Woody fibre.....	4.0	Gum.....	3.0
Water.....	3.5	Seed-coats.....	8.5
Acetic acid and loss.....	0.5	Woody fibre.....	5.0
		Loss.....	19.0
Sweet almonds.....	100.0	Bitter almonds.....	100.0

## 1. FIXED OIL OF ALMONDS (see p. 530.)

2. EMULSIN (*Vegetable Albumen of Almonds*).—This remarkable constituent of almonds is white, and soluble in cold water: hence it is a constituent of almond emulsion. From its watery solution it is precipitated in thick white flocks by alcohol; these flocks dissolve in water, even if they have been previously dried. If the watery solution be heated to 212° F. the emulsin coagulates, and the liquor becomes thick, like starch mucilage. From ordinary vegetable albumen, emulsin is distinguished by its producing the decomposition of amygdalin, and yielding, among other products, the volatile oil of bitter almonds and hydrocyanic acid. When, however, emulsin has been coagulated by heat, it loses its power of acting on amygdalin. (Wöhler and Liebig, *Journ. de Pharm.* xxxiii. 391.) The composition of emulsin, according to Mr. Richardson, (*Thomson, Organ. Chemistry*, 683,) is as follows:—

	<i>Atoms.</i>	<i>Eq. Wt.</i>	<i>Per Cent.</i>	<i>Richardson.</i>
Carbon.....	24	144	48.81	48.835
Hydrogen.....	33	23	7.79	7.732
Nitrogen.....	4	56	18.99	18.911
Oxygen.....	9	72	24.41	24.722
Emulsin.....	1	295	100.00	100.200

Boiled with baryta, emulsin evolves ammonia, and yields a barytic salt containing a peculiar acid, which has been termed *emulsic acid*. It is probable, therefore, that emulsin is an *amide of emulsic acid* (i. e. emulsate of ammonia, minus an atom of water). Robiquet (*Journ. de Pharm.* xxiv. 196,) regards the emulsin of Wöhler and Liebig as a very complex product.

3. AMYGDALIN.—A crystallizable substance found in the bitter, but not in the sweet, almond. From four lbs. of bitter almonds Liebig obtained one ounce of pure amygdalin, (*Handwört d. Chem.* p. 330.) It is white, odourless, has at first a sweet, then a bitter taste, is very soluble in boiling alcohol and water, but is insoluble in ether. Crystallized out of an alcoholic solution it is in pearly scales, and is anhydrous. The crystals obtained from a watery solution are colourless, transparent, and prismatic, and contain six atoms of water of crystallization. The watery solution has a feebly bitter taste. Submitted to distillation with nitric acid, it yields hydrocyanic acid, oil of bitter almonds, formic acid, and some benzoic acid. Heated with an alkaline solution, it evolves ammonia, and yields an alkaline salt, which contains a peculiar acid, called *amygdalic acid*, composed of  $C^{40} H^{20} O^{24} + Aq.$ ; hence, perhaps, amygdalin is an *amide of amygdalic acid* (i. e. an amygdalate of ammonia, minus an atom of water). By the action of a solution of emulsin on a solution of amygdalin, we obtain, among other products, hydrocyanic acid and the volatile oil of bitter almonds (see *Volatile Oil of Bitter Almonds*). The following is the composition of amygdalin, according to Wöhler and Liebig (*op. cit.*; also *Journ. de Pharm.* xxiii.):—

	<i>Atoms.</i>	<i>Eq. Wt.</i>	<i>Per Cent.</i>
Carbon.....	40	240	52.516
Hydrogen.....	27	27	5.908
Nitrogen.....	1	14	3.064
Oxygen.....	22	176	38.512
Amygdalin.....	1	457	100.000

In the crystallized state it consists of, 1 atom of *Amygdalin* = 457, and 6 atoms of *Water* = 54.

## 4. VOLATILE OIL OF BITTER ALMONDS (see p. 531).

PHYSIOLOGICAL EFFECTS AND USES. *a. Of Sweet Almonds.*—Sweet almonds are nutritive and emollient; but on account of the quantity of oil which they contain, they are somewhat difficult of digestion, at least if taken in large quantities, or by persons whose digestive powers are weak. When rancid they are still more apt to disorder the stomach. The husk or pellicle of the almond has been known to occasion nausea, uneasiness in the stomach and bowels, increased heat, œdematous swelling of the face, followed by urticaria. Dr. Winterbottom



(*Med. Facts and Observ.* vol. v. p. 60,) suffered twice in this way from the use of unblanched sweet almonds, but blanched almonds caused no inconvenience.

For *dietetical* purposes, almonds are employed as a dessert for puddings, cakes, &c. On account of the irritant qualities of the husk, almonds for the table should always be blanched. Blanched and roasted they have been used as a substitute for coffee. (Murray, *App. Med.* iii. 25.) *Medicinally* they are used in the preparation of the *confection, emulsion, and oil.*

**β. Of Bitter Almonds.**—Bitter almonds are more or less poisonous to all classes of animals. As in the cases of other poisonous vegetable substances, the larger herbivora are much less powerfully affected by them. Thus, three-quarters of a pound of bitter almonds, given to a horse, caused merely dulness and a small pulse. (Viborg, quoted by Wibmer, *Wirk d. Arzneim. u. Gifte.* i. 157.) One drachm of bitter almonds has killed some of the smaller animals, as pigeons. (Wepfer, *Hist. Cicut. aquat.* p. 298, Lugd. 1733.) Twenty seeds have killed a small robust dog. (Orfila, *Toxicol. Gén.*) The symptoms which they induce in animals, are, trembling, weakness, palsy, convulsions (often of the tetanic kind), and, finally, coma. If vomiting occur early, the animal in that way may escape.

*In small doses* bitter almonds sometimes act on man as irritants to the digestive organs, and occasion nausea, vomiting, and purging. Owing to idiosyncrasy, some individuals are remarkably affected by them. On the late Dr. Gregory they caused, "first, sickness, generally tremors, then vomiting, next a hot fit, with an eruption of urticaria, particularly on the upper part of the body. At the same time the face and head swelled very much, and there was a general feeling like intoxication. The symptoms lasted only a few hours. The rash did not alternately appear and disappear, as in common nettle-rash" (Christison). *In large doses* bitter almonds have caused serious, or even fatal consequences. Pierer (quoted by Wibmer, *op. supra cit.*; also *Lond. Med. Review*, vol. ii. p. 286, Lond. 1800,) mentions that three children having eaten some of these seeds, were attacked in a few minutes with nausea, vomiting, loss of consciousness and of speech, and convulsions. Mr. Kennedy (*Lond. Med. and Phys. Journ.* lvii. 150,) has noticed the case of a stout labourer, who died after the use of a great quantity of bitter almonds. These, and other observations referred to by Wibmer, (*op. supra cit.*) Coullon, (*Recherches, &c. sur l'Acide Hydrocyan.* 1819,) and others, prove that poisonous effects of the bitter almond are similar to those of hydrocyanic acid (see vol. i. p. 382).

The *emulsion of bitter almonds* partakes of the properties of the seeds. Pouzire (quoted by Wibmer) states that a child of between four and five years of age suffered colic, head affection, grinding of the teeth, trismus, insensibility, and death, from the use of a strong dose of this liquid.

The *distilled water of bitter almonds* (*aqua amygdale amara*) possesses poisonous properties, when either swallowed or applied externally. (See Döltz's experiments in Wibmer, *op. supra cit.*) Sömmering states that half an ounce of concentrated bitter almond-water killed a dog. (Buchner, *Toxikolog.*)

*Macarooms* and *Ratafia* cakes, as well as *Noyau*, which owe their peculiar flavour to bitter almonds, act injuriously when taken in large quantities. (See Virey, *Journ de Pharm.* ii. 204, for the ill effects of the first of these.)

The effects of the *volatile oil of bitter almonds* will be noticed presently (see p. 533).

The principal consumption of the bitter almond is for pressing, flavouring, and scenting. For flavouring, the seeds, or their essential oil, are used by the cook and confectioner (see p. 533).

By the medical practitioners in this country, bitter almonds are rarely administered. They sometimes enter into the composition of the almond emulsion, (see *Mistura Amygdalarum*, Ph. D.) but usually as a flavouring ingredient only. They are applicable, however, to all the uses of hydrocyanic acid (see



vol. i. p. 385); as pulmonary affections, gastrodynia, hooping-cough, &c.; but the objection to their use is their varying and uncertain strength. Bergius, (*Mat. Med.* i. 433,) and subsequently Frank, Hufeland, (Richter, *Ausf. Arzneim.* ii. 541-2,) and others, have successfully administered them against intermittent fever. They have also been used to expel tape-worm, and, it is said, with good effect. (Hufeland's *Journ.* Bd. xi. St. 4, S. 179.) Pitschaft (Dierbach, *Neuest Entd. in d. Mat. Med.* Bd. i. 387, 1837,) prescribed bitter almond water to relieve painful menstruation. The emulsion has been employed as a wash to relieve irritation in various skin diseases; as herpes, prurigo, acne, impetigo, &c.

ADMINISTRATION.—Bitter almonds may be taken in substance or emulsion. Kranichfeld (Dierbach, *op. supra cit.*) employed the powder of the bitter almond cake (*farina amygdalæ amaræ*) in doses of one to six grs. As a substitute for the distilled water of bitter almonds (*aqua amygdalæ amaræ*), which is of variable strength, Wöhler and Liebig (*Journ. de Pharm.* xxiii. 415,) recommended the following emulsion (*emulsio amygdalæ cum amygdalinâ*) on account of its uniform strength:—Sweet almonds, ℥ij.; Water, and Sugar sufficient to make f℥j. of emulsion, in which, when strained, dissolve Amygdalin, grs. xvij. This quantity of amygdalin, when acted upon by the emulsion, yields one grain of anhydrous hydrocyanic acid, and eight grains of volatile oil.—The dose of this emulsion is grs. x. to f℥j. Almond paste is sold in the shops for softening the skin and preventing chaps. Dr. Paris (*Pharmacol.*) gives the following recipe for making it: Bitter Almonds, blanched, ℥iv.; the white of an Egg; Rose Water and Rectified Spirit, p. æ., as much as may be sufficient.

1. CONFECTIO AMYGDALÆ, L. *Conserva Amygdalarum*, E.; *Confectio Amygdalarum*, D.; *Almond Confection*.—(Sweet Almonds, ℥viii.; Powder of Gum Arabic, ℥j.; Sugar, ℥iv. The almonds being first macerated in cold water, and their pellicles removed, beat all the ingredients until thoroughly incorporated.—The process of the *Dublin College* is essentially the same.—The *London College* adds, that this confection can be preserved unaltered for a longer time, if the almonds, gum arabic, and sugar, are separately powdered, and afterwards mixed. Then, whenever the confection is to be used, beat all the ingredients together until they are thoroughly incorporated).—Almond confection, prepared without water, is not more apt to spoil or become rancid than when the ingredients are separately powdered, and subsequently mixed; but if, in order to soften the mass, a little water be added, it then soon becomes mouldy or rancid, or both. (Brande, *Dict. of Pharm.* 56). The only use of almond confection is in the preparation of the emulsion.

2. MISTURA AMYGDALÆ, L. (U. S.) *Mistura Amygdalarum*, E. D.; *Lac Amygdalæ*; *Almond Emulsion*; *Almond Milk*.—(Almond Confection, ℥ijss.; Distilled Water, Oj. Gradually add the water to the confection, while rubbing, until they are mixed; then strain through linen, L.—The *Edinburgh College* employs ℥ij. of the Confection to Oij. of Water, and strains the mixture through linen or calico; or they direct it to be prepared by the following process: "Sweet Almonds, ℥j. and ℥ij.; Pure Sugar, ℥v.; Mucilage, f℥ss.; Water, Oij. Steep the almonds in hot water and peel them, and proceed as for the *Mistura Acaciæ*."—The *Dublin College* prepares it as follows: Sweet Almonds, blanched, ℥iss.; Bitter Almonds, ℥ij.; Refined Sugar, ℥ss.; Water, Oijss. Rub the almonds with the sugar, adding gradually the water, then strain.)—Notwithstanding that the formulæ of the three Colleges are different, none of them precisely agree with that which is in common use. No one who wishes to procure good almond milk would prepare it with the confection, on account of the changes which this preparation suffers by being kept. Powdered gum arabic is, for ordinary purposes, a more convenient and ready ingredient than mucilage, and does not undergo any change by keeping. Lastly, the emulsion containing bitter almonds, though agreeable to most persons, and perhaps useful in



some cases, is not applicable to all the purposes for which the ordinary emulsion is employed, and is apt to disagree with some individuals. The following formula yields a preparation identical with that of the London College: Sweet Almonds, ℥iv.; Powdered Gum Arabic, ℥j.; White Sugar, ℥ij.; Water, f℥vjss. Having blanched the almonds, beat them with the sugar and gum, the water being gradually added.—(This is nearly the formula of the U. S. P., which orders of gum arabic ℥ss. and water ℥viii.) Almond milk agrees in many of its properties with animal milk. Thus it is white; when examined by the microscope it is seen to consist of myriads of oleaginous globules, suspended in water by the aid of an albuminous principle (emulsin) and sugar; and, lastly, it agrees with milk, in possessing nutritive and emollient qualities. It is used as a demulcent and emollient in pulmonary affections, to appease cough and allay irritation; and in inflammatory affections of the alimentary canal or of the urinary organs. It is an excellent vehicle for other remedies; as for the saline refrigerants (nitre, for example) in febrile cases, for expectorants and pectorics (squills, ipecacuanha, opiates, &c.) in pulmonary affections, for sudorifics (emetic tartar, for example) in febrile and inflammatory cases, for alkalis and their carbonates in affections of the urino-genital organs, and for hydrocyanic acid in gastrodynia and pulmonary disorders. Acids and alcohol (hence tinctures) coagulate the emulsin, and cause almond mixture to separate into a kind of curd and whey; a change which also takes place spontaneously when the mixture has been kept, and which is accompanied with the development of free acid. In cases where the hydrocyanic acid is admissible (see vol. i. p. 385), the bitter almond may be used, as in the formula of the Dublin College.—The dose of almond emulsion is f℥j. or f℥ij., or *ad libitum*.

3. OLEUM AMYGDALÆ, L. (U. S.) *Oleum Amygdalarum*, D.; *Almond Oil*; *Oil of Sweet Almonds*.—(Obtained by expression from either bitter or sweet almonds; usually from the former, on account of their cheapness as well as of the greater value of their residual cake).—The average produce is from 48 to 52 lbs. from 1 *cwt.* of almonds. When recently expressed it is turbid, but by rest and filtration becomes quite transparent. It usually possesses a slightly-yellow tinge, which becomes somewhat paler by exposure to solar light. It is inodorous, or nearly so, and has a purely oleaginous bland taste. It congeals less readily by cold, than olive oil. Braconnot states that at 14° F. it deposits 24 per cent. of *margarine* (*margarate of glycerine*) which fuses at 43° F. The residual *oleine* (*oleate of glycerine*) did not congeal at the greatest degree of cold. The accuracy of these statements has, however, been called in question. Its sp. gr. would appear to vary: Brandis found it 0.911, Brisson, 0.917, Saussure 0.920, at 53° F. Sulphuric ether dissolves it. Six parts of boiling, or twenty-five parts of cold alcohol, are required to dissolve one part of this oil.

Proximate Composition.		Ultimate Analysis.	
Braconnot.		Saussure.	
Oleine.....	76	Carbon.....	77.403
Margarine (Stearine of Braconnot).....	24	Hydrogen.....	11.481
		Oxygen.....	10.828
		Nitrogen [loss].....	0.288
Almond oil.....	100	Almond oil.....	100.00

The nitrogen mentioned in Saussure's analysis is probably an error.

Almond oil is said to be adulterated with *teel oil* (see p. 369).

It possesses the dietetical and medicinal properties of the other fixed oils (see vol. i. p. 81, and this vol. p. 369). Its local action is emollient (see vol. i. p. 191). Swallowed in moderate doses it is nutritive, but difficult of digestion. In large doses it acts as a mild laxative.

Almond oil may be employed for the same purposes as olive oil (see p. 204). Mixed with an equal volume of syrup of violets, or syrup of roses, it is given to new-born infants as a laxative. It is sometimes used with gum (in the form of



mucilage), alkalis, or yolk of egg, to form an emulsion, which is used in the same cases as the *mistura amygdalæ*. To assist in allaying troublesome cough it is not unfrequently administered in the form of linctus, with confection of dog-rose, syrup of poppies, &c.

4. **OLEUM AMYGDALÆ AMARÆ**; *Oleum Amygdalæ amaræ destillatum*; *Oil of Bitter Almonds*; *Essential Oil of Almonds*. (Obtained by submitting bitter almond cake [left after the expression of the fixed oil from bitter almonds] to distillation with water, either alone, or more usually with salt. To increase the quantity of volatile oil, Geiger recommended the cake to be macerated in the water for twenty-four hours before distillation).—The *theory* of this process is curious. Chemists formerly supposed that the volatile oil resided in the bitter almond, and that by distillation it was merely volatilized and subsequently condensed. But in opposition to this view may be urged the following facts:—

1. Neither bitter almonds, nor their residuary cake, yield any volatile oil by pressure, yet we know that the volatile oil is soluble in the fixed oil, and, therefore, when the latter was expressed it ought to contain traces of the volatile oil, if this existed in the bitter almonds.

2. They yield no oil when digested in alcohol or in ether, though the volatile oil is soluble in both of these liquids.

3. Alcohol extracts from bitter almond cake, sugar, resin, and amygdalin. When the latter substance has been removed, the cake is no longer capable of furnishing the volatile oil by distillation.

4. Ether extracts no amygdalin from bitter almond cake; and the cake left after digestion in ether, yields the volatile oil by distillation with water.

These facts, then, prove that the volatile oil does not reside in the bitter almond, but is formed by the action of water on some of the constituents of these seeds. Now, when bitter almonds are deprived of amygdalin, they are incapable of yielding the volatile oil: so that it is this principle which enables them to yield it. But amygdalin, with water only, produces no oil: hence the presence of some other substance is necessary. Wöhler and Liebig (*Journ. de Pharm.* xxiii.) have shown that this other substance is emulsin, and that, by the mutual reaction of amygdalin, emulsin, and water, we obtain the volatile oil of bitter almonds and hydrocyanic acid. But it appears that sugar, and some other substance (probably a compound of formic acid and altered emulsin) are simultaneously developed. These ingredients are, probably, all yielded by the amygdalin, the operation of emulsin on which has been compared to that of yeast on sugar and water. It will be seen by the following table (drawn up by Wöhler and Liebig), that amygdalin contains the elements of hydrocyanic acid, volatile oil of bitter almonds, sugar, formic acid, and water:

	Atoms of			
	Carbon.	Hydrogen.	Nitrogen.	Oxygen.
1 atom of Hydrocyanic acid.....	2	1	1	0
2 atoms Volatile Oil of Bitter Almonds.....	22	12	0	4
1 atom of Sugar.....	6	5	0	5
2 atoms of Formic acid.....	4	2	0	6
7 atoms of Water.....	0	7	0	7
1 atom of Amygdalin.....	40	27	1	22

The essential oil of bitter almonds of the shops possesses the following properties. It is highly poisonous, has a golden-yellow colour (by rectification it may be rendered temporarily colourless), an agreeable odour (usually compared to that of hydrocyanic acid, but which, in fact, bears but little resemblance to it), and an acrid, bitter, taste. It is combustible, and burns with a white flame. Its sp. gr., though always greater than that of water, probably varies somewhat. I find that a sample, which had been prepared for about eight months, has the sp. gr. of 1.0836. It is soluble in alcohol and ether. Oil of vitriol forms with it a magnificent crimson-red thick liquid, which, on the addition of water, yields a yellow emulsion.

Oil of bitter almonds, as found in commerce, is a mixture or compound of



*hydruret of benzule, hydrocyanic acid, a little benzoic acid, benzoine, benzi-  
mide, and probably other substances.*

α. **HYDRURET OF BENZULE.**—This is obtained by forming the oil into a thin paste with hydrate of lime, chloride of iron and water, and redistilling. It is a limpid colourless oil, whose sp. gr. is 1.043, and whose odour and taste are scarcely different from those of the ordinary oil. Robiquet found it innocuous, but Vogel, and more recently Liebig, declare that it still retains its poisonous properties. In some earlier experiments which I made on this subject, I found it to be highly poisonous, though I could not detect an atom of hydrocyanic acid in it. After the sample had been kept a few months, however, I readily detected the acid in it by the potash and iron test. By a second and third rectification I completely deprived it of all traces of the acid; and I then found that four drops of it, given to a small rabbit, had no more effect than the same quantity of any other volatile oil: that is, the animal appeared dull for a few minutes, and the respiration was quickened. Hydruret of benzule is composed of  $C^{14}H^6O^2$ . Now, certain changes which it undergoes are best explained by assuming that this oil is a compound of the base of benzoic acid and hydrogen. To this base, whose composition is  $C^{14}H^6O^2$ , the name of *Benzule* or *Benzoyl* has been given; so that the oil is the *hydruret of benzule*, and its proximate and ultimate composition is as follows:

Proximate Composition.			Ultimate Composition.			
	Atoms.	Eq. Wt.		Atoms.	Eq. Wt.	Per Cent.
Benzule.....	1	106	Carbon.....	14	84	79.24
Hydrogen.....	1	1	Hydrogen.....	6	6	5.66
			Oxygen.....	2	16	15.10
Hydruret of Benzule.....	1	106		1	106	100.00

By exposure to the air it absorbs 2 eq. oxygen, and is converted into hydrated benzoic acid  $C^{14}H^6O^3 + Aq$ .

β. **HYDROCYANIC ACID.**—The presence of hydrocyanic acid in the essential oil of bitter almonds may be detected by the usual tests, especially by potash and a salt of iron (vol. i. p. 379). The quantity of this acid is differently stated by different authorities, and is, probably, not uniform. Schrader (Quoted by Dr. Christison, *Treat. on Poisons*) got, from an old sample, 8.5 per cent., and from a new sample, 10.75; but Göppert obtained, from another specimen, so much as 14.33 per cent. Water in which the oil has been washed gives evidence of the presence of hydrocyanic acid by the potash and iron test before referred to.

γ. **BENZOIC ACID.**—This is formed by the action of the oxygen of the atmosphere on hydruret of benzule as above mentioned. It is more readily produced in the pure hydruret than in raw oil of bitter almonds.

δ. **BENZOIN; Camphor of Oil of Bitter Almonds.**—Liebig (Turner's *Chemistry*, 7th ed. p. 785) states that this is a constituent of oil of bitter almonds. It is a crystalline substance usually obtained by the action of alkalis on the oil. It cannot be procured from hydruret of benzule (with which it is isomeric) unless hydrocyanic acid be present. It is soluble in boiling alcohol. Oil of vitriol also dissolves it with a violet-blue colour; if the solution be heated it becomes brown, green, and at last black, with disengagement of sulphurous acid.

ε. **BENZIMIDE.**—This separates from oil of bitter almonds under certain circumstances. Its formula is  $C^{26}H^{11}O^4N$ . It is soluble in alcohol. Nordhausen sulphuric acid dissolves it, assuming a deep indigo colour: if moisture be present the colour is at first emerald green. By the action of potash and a little alcohol it evolves ammonia and forms benzoate of potash.

A *crystalline matter* is frequently deposited by oil of bitter almonds, when it has been kept for some time. Exposure to the air, by which the oil is enabled to absorb oxygen, and the removal of hydrocyanic acid from the oil, facilitate the deposition. In 1822, Grischow and Bahlmann, (*Berl. Jahrb. d. Pharm.* 1832, p. 158,) and, in 1823, Stange, (*Buchner's Repert.* xiv. 329; xvi. 82,) declared the crystals to be those of benzoic acid; a statement which was confirmed, in 1830, by Robiquet and Boutron. (*Ann. de Chim. et de Phys.* xlv. 364.) I have met with three kinds of crystalline deposit, differing essentially from each other, and from benzoic acid.

1st. One of these is characterised by the *emerald-green* colour which it produces when dropped into oil of vitriol. In a few minutes, however, the green changes to red. This deposit is orange-yellow, soluble in boiling water, alcohol, and ether; when the alcoholic or ethereal solutions cool, numerous white, light, pearly crystalline plates (resembling crystalline boracic acid) are deposited. If these white crystals be dropped into oil of vitriol they also become emerald green, but very slightly so: the mother liquor is rendered much more intensely green by oil of vitriol. Boiled with caustic potash they give out ammonia. By keeping for two years in a stoppered bottle, both the raw and purified crystals lost the property of becoming green by



oil of vitriol: they now became red on the addition of this liquid; and the crystals on being redissolved in alcohol and recrystallized were scarcely coloured on the addition of oil of vitriol.

From raw oil of bitter almonds washed with solution of potash I have obtained, at the end of twenty-four hours, crystals which, like the above, became green on the addition of oil of vitriol.

2d. A second crystalline deposit is characterised by the *cherry-red* colour which it assumes when dropped into oil of vitriol, and by its not evolving ammonia when boiled with caustic potash. Its appearance resembles solid oil of anise. When dissolved in boiling alcohol and recrystallized, it yields silky prismatic crystals somewhat similar to those of nitrate of ammonia. At the end of two years it had almost lost its quality of being reddened by oil of vitriol; but when boiled with this liquor it gave out a crystalline sublimate. Heated with solution of potash it evolved faint traces of ammonia.

3d. The third (for specimens of this, as well as of the first kind of deposit, I am indebted to Mr. Whipple,) kind of deposit I did not receive until after it had been digested in alcohol. A short notice of it has been given by Mr. Letheby. (*Lond. Med. Gaz.* xxvi. 67.) The crystals are small, acicular, and lemon-yellow; they dissolve in oil of vitriol, forming a *yellow* or *orange-coloured* solution. They are insoluble in water and alcohol. When heated they fuse, but, unlike the two preceding deposits, do not sublime. They do not evolve ammonia when heated with a solution of caustic potash. At the end of two years these crystals were unchanged. In all the cases in which they are found the oil had been put aside contaminated with water.

The *volatile oil of bitter almonds* is a most potent poison, acting as rapidly as the ordinary hydrocyanic acid of the shops, and giving rise to similar symptoms. A single drop has killed a cat in five minutes. (Brodie, *Phil. Trans.* 1811, p. 178.) Sir B. Brodie happening to touch his tongue with a probe which had been dipped in the oil, suffered, almost instantaneously, an indescribable sensation at the pit of the stomach, feebleness of the limbs, and loss of power over the muscles. These effects, however, were quite transient. Several cases of poisoning with it are recorded. The best detailed is that related by Metzdorff (quoted by Dr. Christison):—"A hypochondriacal gentleman, 48 years old, swallowed two drachms of the essential oil. A few minutes afterwards, his servant, whom he sent for, found him lying in bed, with his features spasmodically contracted, his eyes fixed, staring, and turned upward, and his chest heaving convulsively and hurriedly. A physician, who entered the room twenty minutes after the draught had been taken, found him quite insensible, the pupils immoveable, the breathing stertorous and slow, the pulse feeble, and only thirty in a minute, and the breathing exhaling strongly the odour of bitter almonds. Death ensued ten minutes afterwards." Another case of poisoning with this oil occurred a few years since in Aldersgate-street:—A lady, intending to take beech-nut oil, for worms, swallowed (by mistake) oil of bitter almonds, sold to her by a druggist, who supposed she inquired for peach-nut oil. Recovery has occurred, in one case, after about half an ounce (?) of the oil had been swallowed. (*Journ. Chim. Méd.* t. vi. II<sup>e</sup> Sér. p. 92.)

In this country, essential oil of bitter almonds is not employed in medicine. It is applicable in the same cases that hydrocyanic acid is employed in. But it must not be forgotten that, though its strength is somewhat variable, it is in general four times the strength of officinal hydrocyanic acid. The dose of it is a quarter of a drop to a drop and a half in an emulsion. It is extensively employed for flavouring by the cook and confectioner; and by the perfumer for scenting toilet soap, and for other purposes.

ESSENCE OF BITTER ALMONDS.—This term is sometimes applied to the essential oil, and sometimes to a solution of the oil in rectified spirit. Two fluidrachms of the oil and six fluidrachms of rectified spirit, form an useful essence for flavouring and scenting.



2. *PER'SICA VULGARIS*, Miller.—THE PEACH.*Amygdalus Per'sica*, Linn. D.

Sex. Syst. Icosandria, Monogynia.

(Folia, D.)

HISTORY.—Both Dioscorides (lib. i. cap. 164,) and Pliny (*Hist. Nat.* lib. xv. cap. 11, et seq. ed. Valp.) speak of the peach: the former terms it *περσικὸν μῆλον*; the latter *malum persicum*.

FIG. 218.



The Peach.

BOTANY. Gen. Char.—The same as *Amygdalus*, except that the *drupe* is very fleshy. *Epicarp* either velvety or quite smooth. *Putamen* (stone) extremely rugose, with furrows (De Cand.)

Sp. Char.—Fruit tomentose (De Cand.)

A small tree. Leaves lanceolate, serrate or crenate, with or without glands. Flowers roseate, large or small. (See Loudon, *Encyc. of Gardening*.) Both flowers and kernels exhale bitter-almond odour.

Two varieties of the peach are usually made. These are admitted by De Candolle:—

a. *Melters* or *Free-stones*.—Flesh separating from the stone.

β. *Cling-stones* or *Pavies*.—Flesh adherent to the stone.

The *Nectarine* (*Persica laevis*, De Cand.) is distinguished from the Peach by its smooth fruit. This trivial distinction leads many botanists to regard these two fruits as varieties of the same species.

Hab.—Native of Persia. Cultivated in gardens. Flowers in April or May.

DESCRIPTION.—*Peach leaves* (*folia persicæ*) have the peculiar odour and taste of the bitter almond. The *kernels* (*semina persicæ*) closely resemble the latter, both in appearance and properties, but are smaller. The *flowers* (*flores persicæ*) lose the greater part of their odour by drying.

COMPOSITION.—The leaves have not been analyzed. They yield, by distillation, a volatile oil (*oleum folii persicæ*), which is yellow, heavier than water, and contains hydrocyanic acid. (Gmelin, *Handb. d. Chem.* ii. 400.) After eight years a crystalline substance was found on the water. (Brugnatelli *Ann. Chem.* xcvi. 96.) The non-ligneous extremities of the *twigs* of the peach-tree yielded Gauthier (*Journ. de Pharm.*) 1.92 per cent. of very volatile oil, which was heavier than water. Berard (Thomson, *Org. Chem.* 890,) analyzed the juice of the peach, both in the ripe and unripe states: the constituents were, *colouring matter, sugar, gum, vegetable fibre, albumen, malic acid, lime, and water.*

PHYSIOLOGICAL EFFECTS.—The highly palatable *flesh* of the peach is nutritious (on account of its sugar, gum, &c.), and slightly refrigerant (from the malic acid which it contains). Taken in moderate quantities it is wholesome, but if eaten too freely is apt to disorder the bowels. The *kernels*, the *blossoms*, the *leaves*, and the *bark*, possess poisonous properties. The flowers, as well as the leaves, in the form of infusion, have been used to purge and destroy intestinal worms, especially in children, (Coste et Willemet, quoted by Murray, *App. Med.* iii. 245); but their employment has sometimes been attended with fatal results. Bertrand (Wibmer, *Wirk. d. Arzneim. u. Gifte.* Bd. iv. S. 190,) says, that a child, eighteen months old, experienced convulsions, vomiting, and bloody diarrhoea, from the use of a strong decoction of the flowers; and Coulton (Christison, *Treat. on Poisons*, p. 726,) states, that an elderly gentleman, having partaken of a salad of the flowers, was seized with giddiness, violent purging, convulsions and stupor, and died in three days. The irritation of the alimentary canal, manifested by vomiting and purging, and the slow death,



distinguished the operation of peach-flowers from that of hydrocyanic acid. The same author (Wibmer, *op. supra. cit.*) also states, that the peach-bark proved injurious to a cock, and caused difficulty of breathing, and purging.

**USES.**—The *fruit*, both fresh and preserved, is employed as a dessert. Its use is objectionable in gouty persons, and in those whose bowels are easily disordered. When stewed with sugar, it may be given as a mild laxative to convalescents. The *kernels* may be used as the bitter almond. The *blossoms* are scarcely ever administered in this country; but they have been recommended as a vermifuge. The leaves are sometimes employed by the cook and liqueur-maker, for flavouring. They have also been used as a substitute for China tea. (Murray, *App. Med.*) They have been recommended as a vermifuge, and more recently to allay irritation of the bladder and urethra. (See also *Lond. Med. Rev.* vol. iv. p. 81. Lond. 1800.)

**ADMINISTRATION.**—The dose of *peach-blossoms* is half an ounce of the fresh, or a drachm of the dried, flowers, infused in water. (Murray, *op. supra. cit.*) The dose of the *infusion of peach-leaves* (prepared by digesting ℥ss. of the dried leaves in Oj. of boiling water) is ℥ss. three times a day.

### 3. PRUNUS DOMESTICA, Linn. L. E. D.—THE PLUM-TREE.

*Sex. Syst.* Icosandria, Monogynia.

(*Drupæ exsiccatae*, L.—Dried fruit, *E.*—*Fructus-siccatus*, D.)

(*Prunum*, U. S.—Prunes.)

**HISTORY.**—Dioscorides (lib. i. cap. 174.) calls this tree the *κόκκυμηλέα*, while the fruit he terms *κοκκύμηλον*.

**BOTANY.** **Gen. Char.**—*Drupe* ovate or oblong, fleshy, quite smooth, covered with a pruinose powder. *Putamen* (stone) compressed, acute on both sides, somewhat furrowed at the edges, otherwise smooth. Young *leaves* convolute. *Pedicels* umbellato-fasciculate, one-flowered, evolved before or after the leaves (De Cand.)

**Sp. Char.**—*Flowers* almost solitary. *Leaves* lanceolate-ovate, convolute. *Branches* not spinous (De Cand.)—A small tree. *Flowers* white.

Gardeners cultivate several hundred varieties. (Don *Syst. of Gard.* ii. 499 mentions 270 varieties). De Candolle admits the following varieties:

- a. *Armenioides*, including the *Mirabelle Plum*.
- β. *Claudiana*, including the *Green Gage*.
- γ. *Myrobalana*, including the *Myrobalan Plum*.
- δ. *Damascena*, including the *Damask Plum*.
- ε. *Turonensis*, including the *Orleans Plum*.
- ζ. *Juliana*, yields the *Officinal Prune*.
- η. *Catharinea*, including the *St. Catharine Plum*.
- θ. *Aubertiana*, including the *Magnum Bonum*, or *Mogul Plum*.
- ι. *Prunelina*, including the *Damson*.

**Hab.**—South of Europe. Cultivated in gardens and orchards.

**DESCRIPTION.**—The dried fruits of the *prunus domesticus* are called *prunes* (*fructus siccatus pruni*; *drupæ siccatae pruni*). In warm countries they are dried on hurdles by solar heat; but in colder climates artificial heat is employed. In France both methods are adopted; the fruit being exposed to the heat of an oven and to that of the sun, on alternate days. *Table prunes* are prepared from the larger kinds of plum—as the Saint Catharine and the Reine-Claude (Green Gage): *Medicinal prunes* from the Saint Julien (*P. domestica*, var. ζ *Juliana*). The former have an agreeable, very sweet taste; the latter are somewhat austere. They are principally imported from Bordeaux. The part employed in medicine is the *pulp* (*pulpa pruni*).

**COMPOSITION.**—John (Gmelin, *Handb. d. Chem.* ii. 1269,) analyzed the Mirabelle plum, and Berard the Reine-Claude (Green Gage), both in the ripe and unripe states. (Thomson, *Org. Chem.* 890.) The constituents of the ripe fruit, according to the last-mentioned chemist, are, *sugar* 11.61, *gum* 4.85,



*albumen* 0.93, *malic acid* 1.10, *vegetable fibre* 1.21, *lime* a trace, *water* 80.24, [loss 0.06].—*Pectin* is also a constituent of these fruits.

**PHYSIOLOGICAL EFFECTS.**—Fresh ripe plums, taken in moderate quantities, are wholesome and nutritive; but in large quantities they readily disorder the bowels. The immature fruit still more easily excites ill effects. The medicinal prune is a mild laxative.

**USES.**—The finer kinds of plums are employed at the table as a delicious dessert: the inferior qualities are used in pies, tarts, preserves, and sweetmeats. The larger prunes are employed at the table as a dessert. The medicinal prunes are employed as an agreeable and mild laxative for children, and during convalescence from febrile and inflammatory disorders. They are sometimes added to cathartic decoctions or infusions (as *infusion of senna*), to improve the flavour, and promote the purgative effect. They enter into the composition of the *confection of senna*.

#### 4. CER'ASUS LAURO-CER'ASUS, *Loisel.*—COMMON OR CHERRY-LAUREL

*Pru'nus Lauro-cer'asus*, *Lin.* *D. E.*

*Ses. Syst.* Icosandria, Monogynia.

(Leaves, *E.*—Folia, *D.*)

**HISTORY.**—Belonius terms this plant the *Cerasus trapezuntina*. It was introduced into Europe, from Trebizonde, in 1576. (Sprengel, *Hist. Rei Herb.* i. 377.)

**BOTANY.**—**Gen. Char.**—*Drupe* globose or umbilicate at the base, fleshy, quite smooth, not covered with a pruinose powder. *Nucleus* (stone) somewhat globose, smooth.—*Young leaves* conduplicate. *Pediceles* one-flowered or ramosa (De Cand.)

**Sp. Char.**—*Racemes* shorter than the leaves. *Leaves* ovate-lanceolate, remotely serrate, with two or four glands beneath. *Fruit* ovate, acute (De Cand.) An evergreen *under-shrub*. Smooth in every part. *Leaves* short-stalked, coriaceous, shining. *Petals* roundish, spreading white. *Fruit* black, the size of a small cherry.

**Hab.**—Trebizonde. Common in gardens every where.

**DESCRIPTION.**—Cherry-laurel leaves (*folia lauro-cerasi*) have scarcely any odour until bruised, when they give out the characteristic or bitter almond odour of the plant. Their taste is very bitter, aromatic, and slightly astringent. By drying they lose their odour, but retain their flavour. Their watery infusion is rendered green by the sesquichloride of iron.

**COMPOSITION.**—I am unacquainted with any complete analysis of cherry-laurel leaves. They were imperfectly examined in 1797 by L. J. Spandaw du Cellié. (Pfaff, *Mat. Med.* Bd. v. S. 152.) In 1802, Schrader (*Ibid.* S. 151,) discovered hydrocyanic acid in the volatile oil obtained from them. The recent researches into the origin of the volatile oil of the bitter almond (see p. 531), render it probable that the volatile oil of the cherry-laurel does not pre-exist in the leaves. The supposed constituents of cherry-laurel leaves are *amygdalin* (probably, according to Wöhler and Liebig, though they failed to procure it), *resin* (Spandaw), *myricin* (the shining appearance of the leaves is, perhaps, owing to this), *chlorophylle* or green colouring matter, *extractive*, *tannic acid*, *ligneous fibre*, and *water*.

**VOLATILE OIL OF THE CHERRY-LAUREL** (*Oleum Lauro-cerasi*).—By distillation with water, cherry-laurel leaves yield a volatile oil and a distilled water (*aqua lauro-cerasi*). As the oil, like the volatile oil of bitter almonds, contains both hydrocyanic acid and hydruret of benzole, it is natural to suppose that the two oils are produced in a similar manner. And though they did not succeed in procuring amygdalin, MM. Wöhler and Liebig (*Journ. de Pharm.* xxiii. 411.) think its presence in cherry-laurel leaves highly probable, but what substance effects its decomposition has not yet been ascertained.

Cherry-laurel oil is pale yellow, and heavier than water. It attracts oxygen from the air,



and deposits benzoic acid. Oil of vitriol colours it red. It contains hydrocyanic acid, which may be detected by an alkali and a ferruginous salt (see vol. i. p. 379). The quantity, according to Schrader is 7.66 per cent.; but Göppert declares it to be only 2.75 per cent. (Christison, *On Poisons*, p. 722.) It appears, therefore, to be a weaker poison than the oil of bitter almonds, with which, according to Robiquet, (*Journ. de Pharm.* viii. 304,) it agrees in all its chemical properties.

**PHYSIOLOGICAL EFFECTS.**—Most parts of the plant, but more especially the leaves and seeds, possess poisonous properties.

*a. On Vegetables.*—The distilled water of the cherry-laurel destroys plants, like hydrocyanic acid. Göppert asserts, that its poisonous operation does not depend on the small quantity of this acid which it contains, but on some poisonous quality peculiar to it: for its activity is greater than that of water containing the same quantity of hydrocyanic acid. (De Candolle, *Phys. Veg.* 1358-9.)

*β. On Animals.*—The effects of cherry-laurel water on animals have been examined by a considerable number of observers. (See Wibmer, *Wirk. d. Arzneim.* Bd. ii. S. 81.) Of these it will be sufficient to mention the names of Madden, (*Phil. Trans.* for 1731,) Browne Langrish, (*Phys. Exp. upon Brutes*, &c. 1746,) Fontana, (*Treat. on the Venom of the Viper*, &c. 1787,) and Orfila. (*Toxicol. Gén.*) It appears, says Dr. Christison, that whether cherry-laurel water is introduced into the stomach or into the anus, or into the cellular tissue, or directly into the vein, it occasions giddiness, palsy, insensibility, convulsions, coma, and speedy death;—that the tetanic state brought on by the pure acid is not always so distinctly caused by cherry-laurel water; and that tetanus is most frequently induced by medium doses. (Christison, *op. cit.* p. 723.) Cherry-laurel oil acts on animals as a powerful poison in the dose of a few drops; the symptoms which it excites being similar, if, indeed, they be not identical, with those induced by the volatile oil of bitter almonds (see p. 533).

*γ. On Man.*—Liqueurs, sweetmeats, creams and puddings, flavoured with the cherry-laurel, have oftentimes acted injuriously, and even proved fatal. Where death occurred, the symptoms were similar to those caused by hydrocyanic acid; viz. painful sensation at the stomach, sudden insensibility, and death within a few minutes. Convulsions, however, have not been frequent. In the case referred to by Dr. Madden, (*Phil. Trans.* for 1731,) in which brandy, mixed with a fourth part of cherry-laurel water, proved fatal, there was no vomiting, purging, or convulsions. But in the instances mentioned by Fodéré, (Orfila, *Toxicol. Gén.*) the individuals expired in convulsions. The effects of medicinal doses of cherry-laurel water are stated to be similar to those of small doses of hydrocyanic acid.

**Uses.**—Cherry-laurel leaves are not unfrequently employed by the cook for flavouring. Though the distilled water of the cherry-laurel is contained in the Edinburgh and Dublin Pharmacopœias, yet it is rarely employed in medicine in this country. It is applicable to all the cases for which hydrocyanic acid has been used (see vol. i. p. 385). It has been used as a sedative narcotic in tic-douloureux, phthisis pulmonalis, spasmodic cough, and palpitation of the heart.

**AQUA LAURO-CERASI, D.**; *Water of Cherry Laurel*; *Laurel Water*. (Fresh Leaves of the Cherry Laurel, lb. j.; Water, Oijss. [Oij. wine measure, D.]; Compound Spirit of Lavender, ℥j. Chop down the leaves, mix them with the water, distil off one pint, agitate the distilled liquid well, filter it if any milkiness remain after a few seconds of rest, and then add the lavender spirit.)—The compound spirit of lavender is added, as a colouring ingredient, to prevent the preparation being mistaken for common water. Dose, ℥ss. to ℥j. The strength, and, therefore, the dose, are, however, liable to considerable variation. Fouquier (Richard, *Elem. d'Hist. Nat.* ii. 447) has, in some cases, given twelve ounces during the day, without any evident effect.



(6. CERASUS SEROTINA, *De Cand.*—WILD CHERRY.)*Sex. Syst.* Icosandria, Monogynia.*Prunus Virginiana*, U. S. Wild Cherry Bark.

[Not a little confusion has existed among botanists with respect to the name of this tree, from its having been confounded with a species closely allied to it, the *C. virginiana* of De Candolle, or Choke Cherry, which latter was described by Linnæus under the title of *Prunus virginiana*, but by which he was supposed to have designated the *Wild Cherry*, and hence the adoption of that designation for the plant under consideration; the name *P. serotina* being given to the other species. The transposition of names originated with Michaux, who mistook the *Wild Cherry* for the *P. virginiana*, and called it *Cerasus virginiana*. The error has been fully explained and corrected from De Candolle by Drs. Torrey and Gray in the *Flora of North America*. The authors of the last edition of the *United States' Pharmacopœia*, have not thought it expedient at present to change the officinal title for the bark of the tree, as it has been sanctioned by custom for so long a period, as to render it almost an impossibility to introduce a new one.

**BOTANY.** *Gen. Char.*—As in *Cerasus Lauro Cerasus*.

*Sp. Char.*—*Leaves* (rather coriaceous) oval-oblong or lanceolate-oblong, acuminate, glabrous, or bearded along the midrib beneath, smooth and shining above, finely serrate, with adpressed or incurved callous teeth; *petioles* (or base of the leaf) mostly with two or more glands; *racemes* elongated, spreading; *petals* broadly obovate; *drupes* globose, purplish black. (*T. & G. Flor. North Amer.* p. 411.)

*Hab.*—The *Wild Cherry* is an inhabitant of the United States, where it is disseminated from Canada to Florida, and through the Western States.

It varies in height from twenty-five to eighty or more feet, attaining its extreme proportions in the southwestern portion of the Union. The *leaves* are 2-4 inches long; *racemes* 2-5 inches in length, and nodding at their termination. *Flowers* white and fragrant, appearing in May. The bark of the tree is of a dark ashen hue on the trunk, where it is rough; smooth and dark upon the branches. The epidermis is readily separable, and peels off when detached circularly, leaving the green cellular tissue beneath. By this character it can be detected in the forests. The wood is hard, and valuable in the construction of furniture. The fruit has a sweet, somewhat prussic and slightly bitter taste. It is used for flavouring liquors.

The bark of the branches or of the root is employed for medicinal purposes. The latter is regarded as best. It is collected by the herb-venders, and brought into the market in pieces or fragments several inches long, and from half an inch to two in diameter. From drying it becomes somewhat curved laterally. It is destitute of the epidermis, of a reddish-brown colour, brittle and pulverizable; fracture short, and presenting grayish surfaces. When fresh the odour is prussic, which is in a measure lost by drying, but regained by maceration. The taste is aromatic, prussic and bitter.

*COMPOSITION.*—The first satisfactory analysis of this bark was made by Mr. Stephen Procter, (*Journal of Philad. Col. of Pharmacy*, vol. vi. p. 8), who found it to contain starch, resin, gallic acid, tannin, fatty matter, lignin, red colouring matter, salts of lime, potassa and iron. By distilling the bark with water, a volatile oil was obtained, associated with hydrocyanic acid. More recently (*op. cit.* vols. ix. p. 300 and x. p. 197) Mr. William Procter has shown that the volatile oil is composed of *Hydruret of Benzule* and hydrocyanic acid, like oil of bitter almonds, and that they do not pre-exist in the bark, but are products of the decomposition of *amygdalin*; the same principle that exists in the bitter almond, by the reaction of emulsin. (See p. 531.)

**OIL OF WILD CHERRY.** This oil has a light straw-colour, a pungent taste, and



an odour strongly resembling that of bitter almonds. When deprived of hydrocyanic acid by distillation with a mixture of proto-chloride of iron, potassa and water, it is without any poisonous properties. Its sp. gr. is 1.046.

It is presumable that bitter extractive matter exists in it, and it has been suggested that phloridzine is also a constituent. It yields its virtues to water and alcohol.

**MEDICAL PROPERTIES.**—Dr. B. S. Barton informs us, (*Collections*, p. 11,) that the leaves of this tree are poisonous to certain animals, as calves, and even the berries intoxicate different kinds of birds.

The bark is tonic and invigorating in its impression upon the stomach and the general system, but at the same time is regarded as exercising a sedative or depressing influence upon the circulation and nervous apparatus, which last effect is attributed to the action of the hydrocyanic acid.

From the experiments of Dr. Morris, who made it the subject of his inaugural dissertation (1802), it appears that the primary impression upon the pulse was an increase of rapidity, but that when it had been continued for some time the pulse fell below the original standard, and at the same time it became fuller and stronger; in cases where some previous excitement existed, the rise of the pulse was steady, and in all his experiments the medicine was pushed until drowsiness came on. Half drachm doses of powdered bark were exhibited. This primary stimulant operation is concurred in by Dr. Eberle, who states, however, that when taken in large quantities and repeated frequently, it weakens the digestive powers, and produces an effect upon the action of the heart and arteries the reverse of stimulant; that in his own person he several times reduced his pulse from seventy-five to fifty strokes in a minute, by copious draughts of the cold infusion, taken several times during the day, and continued for twelve or fourteen days. (*Treat. on Mat. Med.* vol i. p. 272.) There must certainly be considerable difference of action between the powdered bark, in which the astringent and bitter principle is concentrated, and the hydrocyanic acid with difficulty eliminated, and the cold infusion in which the latter principle has an opportunity of being fully generated.

**USES.**—From its little stimulating properties, but on the contrary, its power of allaying irritation particularly of a nervous kind, it has been employed in a number of diseases connected with a debilitated state of the system. As a commencing tonic in the convalescence from fever or inflammatory attacks, it may frequently be ventured upon, when other roborants are inadmissible. This is especially the case where the attack of the disease has been pulmonary, and where any excitement of the circulation cannot but be prejudicial, as in Pneumonia, Bronchitis, &c. To Phthisis it is regarded as being peculiarly adapted, and by several eminent writers is highly spoken of; thus, we are informed by Dr. Eberle, that “it lessens the frequency, tension, and irritated state of the pulse; moderates the cough and profuse nocturnal perspirations; checks the diarrhoea and sustains the general strength of the system;” the same also is the testimony of Dr. Chapman. In hectic fever from whatever cause proceeding, analogous results may be expected.

In dyspepsia, a quieting and at the same time invigorating impression is made, upon the stomach; it should, in this case, however, be but moderately employed, as large and repeated doses are prone to diminish the power of the organ. Prof. B. S. Barton declares (*Collections*, p. 11,) that the Wild Cherry Bark has been used with success in Intermittent Fever: this is confirmed by the statements of numerous physicians, who have been induced to try it. Dr. Eberle (*op. cit.* p. 272,) employed it while residing in the country, and in the majority of cases, with success. No comparison nevertheless can be instituted between it and cinchona.

If given in substance the dose is from ʒss. to ʒij. of the powder. A decoction



is decidedly objectionable as the easily volatilized prussic acid is driven off by the heat. For ordinary purposes the best form of exhibition is the infusion.

**INFUSUM PRUNI VIRGINIANÆ, U. S.** *Infusion of Wild Cherry Bark.* To prepare it. Take of Wild Cherry Bark, bruised, half an ounce; water, a pint. Macerate for twenty-four hours, and strain. This infusion may also be made by percolation. As cold water is in this preparation the vehicle, the volatile principle is not lost. It is a beautiful clear wine-coloured fluid, having a decided hydrocyanic flavour, and an aromatic pleasantly bitter taste. The dose is ℥ij. or more, repeated according to circumstances.

**SYRUP OF WILD CHERRY BARK.** This preparation has been recently introduced by Messrs. W. Procter, Jr. and J. C. Turnpenny, (*Am. Journ. of Pharm.* vol. xiii. 627,) and has been employed by the profession with advantage. The formula is the following. Take of Wild Cherry Bark, in powder, ℥iv; Water, ℥xij.; Sugar, in coarse powder, ℥xxiv. Macerate the bark in the water for forty-eight hours; and put the mixture into a displacement apparatus; return the fluid that passes several times, until it becomes transparent, and then add sufficient water to displace twelve fluidounces of infusion. Place the sugar in a displacement funnel, and pass and repress the infusion through it until it is all dissolved. Lastly, preserve in well-stopped bottles. This syrup is an agreeable preparation, pleasant to the taste and highly active. The dose is ℥ss. repeated.—J. C.]

(TRIBE II.—SPIRÆÆ.)

(7. GILLENIA TRIFOLIATA, Moench.—INDIAN PHYSIC.)

*Sex. Syst.* Icosandria, Pentagynia.

*Gillenia*, U. S.—The Root.

[**Gen Char.**—*Calyx*, sub-campanulate, border five-toothed. *Corolla*, partly unequal. *Petals* five lanceolate, attenuated, coarctate at the claws. *Stamina* fewer, included. *Styles* five, contiguous, stigmas, capitate. *Capsule* five-celled; cells two-seeded. (Nuttall.)

**Sp. Char.**—Leaves ternate, upper folioles lanceolate, serrate, subequal, lower folioles obtuse, with an abrupt, acute termination. *Stipules* linear, entire. *Flowers*, terminate, loosely paniculated, five gynous, petals linear, lanceolate, obtuse. *Calyx*, tubulose, campanulate, ventricose. *Stamina*, included. *Capsule* five-celled, many seeded.

This plant is the *Spiræa trifoliata* of Linnæus, but the generic name was altered by Moench to the present one. The common names are *Indian physic*, *Indian hippo*, *Dropwort* and *Bowman's Root*.

**Hab.**—This species is found scattered over the United States from Canada to Florida, on the eastern side of the Alleghany mountains, occurring in open hilly woods, in light gravelly soil. The period of flowering is May, and the fruit is matured in August. The flowers are white or of a rose tint.

The root is perennial, composed of a great number of fibres arising from a common rough and irregular dark-coloured tuber or head. These fibres are about the thickness of straws, many inches in length, irregular in thickness, with somewhat of an undulated form. When dried, the root is of a reddish brown colour, wrinkled, and composed of an easily separable cortical portion and an internal ligneous cord. The external part is readily reduced to powder. It has a feeble odour and a bitter taste.

**CHEMICAL COMPOSITION.**—Some experiments upon the root of *Gillenia trifoliata* have been made by Mr. Shreeve (*Am. Journ. of Pharmacy*, vol. vii. p. 28), who found that it contained, *starch*, *gum*, *resin*, *wax*, *fatty matter*, *red colouring matter*, *volatile colouring matter*, and a *peculiar principle* soluble in alcohol and the dilute acids, but insoluble in water and ether. It contains no *emetina* according to the statement of Dr. Staples.

**MEDICAL PROPERTIES.**—*Gillenia* is a safe emetic, operating without vio-



lence in the appropriate doses. In small doses it is a stimulant and tonic to the stomach. It is stated that a knowledge of its medicinal operation is derived from the aborigines.

**USES.**—Although the testimony is strong in favour of the decided medicinal action of the root under consideration, its claims to confidence have been shaken by the report of Dr. Baum, who experimented with it, and was led to the conclusion that too much power had been attributed to it. Dr. Griffith (*American Journ. of Pharm.* vol. iv. p. 181) remarks, however, that he does not think Dr. Baum's experiments are sufficient to induce us to reject an article which has received the united testimony of the members of the profession who speak of it in the highest terms, and recur to its use with as much confidence as to the true *Ipecacuanha*. The statements in its support are by Dr. B. S. Barton, (*Collections*, p. 27,) who says, "I can speak with more confidence of the *Spiræa trifoliata*. It is a safe and efficacious emetic in doses of thirty grains. Along with its emetic it seems to possess a tonic power." And Dr. W. P. C. Barton declares that country people have frequently used the plant so incautiously, as to be under the necessity of resorting to medical aid. (*Veg. Mat. Med. U. S.* vol. i. p. 69.) Dr. Eberle observes, "from my own experience with this plant, which has not been inconsiderable, I am led to regard it as very little inferior to the officinal *Ipecacuanha* as an emetic." To these may be added, Dr. Zollickofer and Professor Bigelow.

The cases to which it is applicable are intermittent and remittent fevers, in the commencing stages, and bowel affections, as diarrhœa and dysentery. It may also be beneficial in some forms of dyspepsia.

**ADMINISTRATION.**—The mode of administration is in the form of powder or strong infusion. The dose of the powder is gr. xxx. for its emetic effect, in doses of grs. ij. or grs. iv. it acts as a tonic.

The *Gillenia stipulacea* replaces the *G. trifoliata* on the western side of the Alleghany range. It is readily distinguished by the pinnatifid lower leaves, the upper being trifoliate, incised, serrate; and the foliaceous oblique jagged stipules. The root is analogous to the preceding, and may be used under the same circumstances.—J. C.]

### TRIBE III.—DRYADEÆ.

#### 8. GEUM URBANUM, Linn. D.—COMMON AVENS. HERB BENNET.

*Sex. Syst.* Icosandria, Polygynia.

(*Radix, D.*)

**HISTORY.**—Pliny (*Hist. Nat.* xxvi. 21, ed. Valp.) speaks of the medicinal properties of *Geum*.

**BOTANY.** **Gen. Char.**—Tube of the *calyx* concave; limb five-cleft, externally five-bracteolate. *Petals* five. *Stamens* numerous. *Carpels* juiceless, tailed, disposed in a head. *Style*, after flowering, articulate or barbed. *Seed* ascending.—*Herbs.* *Leaves* variously pinnatisect. (De Cand.)

**Sp. Char.**—*Stem* erect, branched, hairy. *Leaves* radical quinate-pinnatisect; caulinar ones ternate-palmatisect, with ovate broadly-toothed crenate-lobes; upper ones one-lobed, ovate. *Stipules* somewhat orbicular, large. *Petals* ob-ovate, as long as the *calyx*. *Carpillary head* spherical. *Ovaries* hairy, numerous. *Styles* smooth, with somewhat hairy appendices. (De Cand.)

*Root* of many brown fibres. *Stem* one or two feet high. *Leaves* grass-green, veiny, hairy. *Flowers* terminal, solitary. *Petals* bright-yellow.

**Hab.**—Indigenous. Growing in woods, hedges, and dry shady places.

**DESCRIPTION.**—The root (*radix caryophyllata*, seu *gei urbani*, vel *sana-munda*) consists of a rootstalk of from one to three inches long, from which issues a considerable number of cylindrical fibres. Externally it is brownish; internally, reddish. When recent its odour is aromatic and clove-like; but this



is greatly diminished by drying. Its taste is aromatic, astringent, and bitterish. It should be gathered in the spring.

**COMPOSITION.**—The root has been the subject of repeated chemical experiment. Thus it was examined by Meuhlenstedt, (Murray, *App. Med.* iii. 123) Anjou, (*ibid.*) Bouillon-Lagrange, (*Ann. de Chim.* liv. 287,) Melandri and Moretti, (*Bull. de Pharm.* ii. 368,) and Trommsdorff. (Pfaff, *Mat. Med.* vi. 255.) The latter chemist found the constituents of the dried root to be as follows: *volatile oil* 0.039, *resin* 4, *tannin* soluble in alcohol and water 10, *tannin* insoluble in alcohol and ether, with traces of *chlorides* 31, *gum* 15.8, *bassorin* 9.2, *ligneous fibre* 30 [excess 0.039].

**PHYSIOLOGICAL EFFECTS.**—Aromatic, tonic, and astringent.

**USES.**—Scarcely employed as a medicine in this country. It has been used in chronic diarrhoea and dysentery, leucorrhœa, chronic hemorrhages, and intermittents. It is put into ale, to communicate an agreeable clove-like flavour, and to prevent the liquor turning sour. Infused in wine it has been used as a stomachic.

**ADMINISTRATION.**—Dose, ʒss. to ʒj., in powder or decoction, three or four times a day.

[The root of the *Geum rivale*, (*Geum*, U. S. Sec. List;) Water avens, is employed in the United States. The plant closely resembles the preceding, and the root is analogous.—J. C.]

#### 9. POTENTILLA TORMENTILLA, *Sibthorp*, L. E.—COMMON TORMENTIL, OR SEPTFOIL.

*Tormentilla officinalis*, *Smith*, D.—*Tormentilla erecta*, *Linn.*

*Sex. Syst.* Icosandria, Polygynia.

(*Radix*, L.—*Root*, E.)

(*Tormentilla*, U. S. Sec. List.)

**HISTORY.**—Sprengel (*Hist. Rei Herb.* i. 43, 93, and 176) considers this plant to be the *πεντάφυλλον* of Hippocrates, Theophrastus, and Dioscorides. But Sibthorp (*Prodr. Fl. Græca*, i. 352) considers the latter plant to have been the *Potentilla reptans*.

**BOTANY.** **Gen. Char.**—Tube of the *calyx* concave; limb four or five-cleft, externally four or five bracteolate. *Petals* four or five. *Stamens* numerous. *Carpels* numerous. *Style* lateral. *Receptacle* procumbent, persistent, juiceless, capitate. *Seed* appended.—*Herbs* or *under-shrubs*. *Leaves* compound. *Stipules* adnate to the petioles. *Flowers* white, yellow, rarely red. (De Cand.)

**Sp. Char.**—Multiiform, hairy. *Root* tuberous. *Stem* ascending, dichotomous. *Leaves* ternate-palmatisect, the caulinar ones sessile; lobes ovate-wedge-shaped, more or less deeply toothed. *Stipules* none or three-toothed. *Flowers* axillary, solitary, with long peduncles. *Bracts* palmate-incised. Segments of the *calyx* lanceolate-linear, as long as the corolla. *Carpels* rugose. *Receptacles* villose. (De Cand.)

*Stems* weak, slender, often procumbent, branched. *Leaves* dark-green, somewhat hairy, especially the veins. *Flowers* bright-yellow.

**Hab.**—Indigenous; growing on barren pastures, heaths, and bushy places.

**DESCRIPTION.**—The root (*radix tormentillæ*) is large, compared with the size of the plant. Its external form is very irregular: sometimes it is more or less cylindrical, at others tuberculated and knobby. Its colour externally is dark-red brown, internally flesh-red or brownish. Its taste is astringent. Its watery infusion is coloured blackish-green (*tannate of iron*) by the sesquichloride of iron. A solution of gelatine causes a precipitate (*tannate of gelatine*) in it. By iodine, starch is detected in the root.

**COMPOSITION.**—Neumann (*Works*, by Lewis, p. 362) and Pfaff (*Mat. Med.* ii. 210) submitted tormentilla root to a chemical investigation. Meissner



(Gmelin, *Handb. d. Chem.* ii. 1269-70) made an analysis of it, and found the constituents to be as follows:—*volatile oil* a trace, *tannin* 17.4, *colouring matter* 18.05, *ditto* altered 2.57, *resin* 0.42, *cerin* 0.51, *myricin* 0.20, *gummy extractive* 4.32, *gum* (pectin?) 28.20, *extractive* 7.70, *woody fibre* 15.0, and *water* 6.45 (excess 0.52.)

**PHYSIOLOGICAL EFFECTS.**—Astringent and tonic (see vol. i. p. 188).

**USES.**—Employed in chronic diarrhœa and dysentery, passive hemorrhages, and intermittents. The decoction is also used as an astringent wash and injection; as in flabby ulcers, leucorrhœa, &c. In the dysenteries of cattle it is reputed efficacious. In the Feroe and Orkney islands it is used to tan leather; in Lapland as a red dye.

**ADMINISTRATION.**—Dose, ʒss. to ʒj., in powder or decoction, three or four times a day.

**DECOCTUM TORMENTILLÆ, L.;** *Decoction of Tormentilla.* (Tormentil, bruised, ʒij.; Distilled Water, Ojss. Boil down to a pint, and strain).—Astringent and tonic. Used internally in chronic diarrhœa.—Dose, fʒj. to fʒij. Sometimes employed as an injection in leucorrhœa.

[**RUBUS VILLOSUS, U. S. Sec. List.** The root of this plant constitutes the portion that is officinal. It is known as *blackberry root*. The plant is disposed to become shrubby, from three to six feet high, branching; stem furrowed and angulated, beset with sharp prickles. The leaves are ternate or quinate, leaflets ovate, acuminate, unequally and strongly serrate, pubescent on both sides, the footstalk and midrib prickly; stipules, linear or subulate. Peduncles many flowered, the flowers racemose; bracts many times shorter than the pedicels; sepals, with a linear acumination, much shorter than the obovate spreading white petals; fruit, large, black. It frequents the borders of woods and old fields, Canada, and throughout the United States, flowering in May and June. The berries contain malic acid, pectin, and tannin. The roots are branching, round, and differing in size from an inch in thickness to the size of straws. The exterior cortical substance is ashen brown, the internal ligneous cord is yellowish white. The odour is feeble, the taste astringent and bitterish. The virtues reside in the exterior portion, which is more abundant on the smaller pieces. Water and alcohol extract their virtues.

*Tannin* is the chief active constituent of this root. The medical properties are those of a tonic and astringent, and the affections in which it is used are those calling for this class of remedies. As a domestic medicine it has been long employed in bowel attacks. A *decoction* is acceptable to the stomach, and not disagreeable to the palate. It may be made in the proportion of ʒi. to water Oj.—Dose fʒi. to fʒij.

The taste may be improved by orange peel.

An *extract* might be prepared by using the coarsely powdered cortical part, and employing displacement.

**RUBUS TRIVIALIS, U. S. Sec. List.** The root of the Dewberry is also employed for similar purposes as the preceding. Indeed between the roots of the two plants it is difficult to discriminate. The stem of this plant is sarmentose procumbent, shrubby, armed with bristles and strong—at length uncinatè prickles, leaves persistent, three or five foliate; leaflets ovate, oblong, or almost lanceolate, acute, sharply serrate, nearly glabrous; stipules subulate; peduncles one-three flowered; flowers, large; petals, broadly obovate, more than twice the length of the reflexed sepals; fruit large, black.

This plant is plentifully spread over the country in waste fields from Canada to Carolina. The fruit comes before that of the preceding species, and is much esteemed from its superior sweetness and flavour.—J. C.]



## TRIBE IV.—ROSEÆ.

## 10. ROSA CANINA, Linn. L. E. D.—COMMON DOG-ROSE.

Sex. Syst. Icosandria, Polygynia.

(Fructus Pulpa, L.—Hip of *R. canina*, and of several allied species, deprived of the carpels, E.—Fructus, D.)

**HISTORY.**—The *κυνόροdon*, or *Dog-Rose*, of Hippocrates, (*Opera*, p. 587, ed. Fœs.) is, perhaps, *Rosa canina*, Linn. which, according to Sibthorp, (*Prodr. Fl. Græc.* i. 349,) is a native of Greece. Pliny (*Hist. Nat.* lib. xxv. cap. 6, ed. Valp.) speaks of the *Rosa sylvestris*, which he says is called *cynorrhodon* (i. e. *Dog-rose*); but as he describes the *sponge* as growing on it, he probably referred to *Rosa rubiginosa* (*Sweet Briar*, or *Eglantine*), on which it is more frequently found than on any other species.

**BOTANY. Gen. Char.**—Apex of the tube of the *calyx* contracted, the limb five-parted; segments during æstivation somewhat spirally imbricated at the apex, often pinnatisect. *Petals* five. *Stamens* numerous. *Carpels* many, inserted on the calyx, subsequently baccate, inclosed within the calyx, dry, indehiscent, somewhat crustaceous, bearing the style on the inner side. *Styles* exerted from the narrowed tube of the calyx, free or aggregated into a columnar style. *Seed* in an akenium, solitary, exalbuminous, inverted; *embryo* straight: *cotyledons* flat.—*Shrubs* or small trees. *Leaves* pinnate, with an odd one; *leaflets* serrate. *Stipules* adnate to the petiole. (De Cand.)

**Sp. Char.**—*Prickles* uniform, hooked. *Leaves* naked or slightly hairy; their disk eglandulose. *Calyx-segments* fully pinnate, deciduous. *Styles* not united. *Shoots* assurgent. (Hooker.)

The British roses answering to these characters are subdivided by Hooker (*British Flora*) as follows:

- a. *R. canina*, Woods, Smith. *Leaflets* carinate; serratures simple.
  - β. *R. sarmentacea*, Woods, Smith. *R. canina*, Curtis. *Leaflets* naked, carinate; serratures compound.
  - γ. *R. surculosa*, Woods. *R. canina* β, Smith. *Leaflets* naked, flat; serratures simple.
  - δ. *R. dumetorum*, Woods, Smith. *Leaflets* more or less hairy, flat.
  - ε. *R. Fosteri*, Smith. *R. collina*, Woods. *Leaflets*, more or less hairy, not flat.
- De Candolle (*Prodr.* ii. 613) admits no less than nineteen varieties of *R. canina*, Linn.

*Ramification* variable in denseness. *Shoots* more or less arched or erect, according to the vigour of the plant. *Prickles* not very numerous, hooked in various degrees, and compressed; their base considerably dilated. *Leaflets* variable in width; their serratures, although scarcely compound, except in β, are mostly irregular in size. *Bracts* variable in size. *Peduncle* and *calyx-tube* commonly naked; their setæ, when present, feeble and not numerous; *calyx-segments* free from glands, or more or less copiously fringed with them. *Styles* hairy. *Fruit* coral-red, or more scarlet [usually oblong, elliptical or ovate, rarely somewhat globose], soft and pulpy when ripe, with a pleasant somewhat acid taste. (Hooker.)

**Hab.**—Indigenous. Thickets, hedges, &c.; very common. Flowers in June and July. Perennial.

**DESCRIPTION.**—The fruit, used in medicine under the name of the *hip* or *hep* (*fructus rosæ caninæ* seu *f. cynosbati*), is oval, composed externally of the persistent calyx, whose sides have become thick, fleshy, beautifully red, shining; and internally, of numerous, hard, hairy akenia (commonly called seeds, but which, in fact, are the carpels, or real fruits), containing each an exalbuminous seed. The pulp or fleshy matter of the persistent calyx is sweet, acidulous, and pleasant to the taste, especially when mellowed by the frost. The hair surrounding the akenia act as mechanical irritants, like the hairs of the pods of the cowhage, and when swallowed are apt to occasion gastric uneasiness, vomiting, and pruritus about the anus; whence one of the French vulgar names for the fruit, *gratte-culs*.



**COMPOSITION.**—According to Bilz, (Gmelin, *Handb. d. Chem.* ii. 1270,) 100 parts of the dried ripe fruit, deprived of akenia and hairs, consist of the following substances:—*volatile oil* a trace, *fatty oil* 0.065, *myricin* of the scale 0.05, *soft resin* of the pulp 1.419, *reddish-yellow hard resin* 0.463, *tannin* 0.260, *incrySTALLIZABLE SUGAR* 30.6, *gum* 25.0, *epidermis* 4.552, *medullary fibre* 14.0, *citric acid* 2.95, *malic acid* 7.776, *citrates, malates, mineral salts, water* (and loss) 12.865.

**PHYSIOLOGICAL EFFECTS AND USES.**—The pulp is nutritive and slightly refrigerant and astringent. It is only employed in medicine in the preparation of a *conserve*.

**CONFECTIO ROSÆ CANINÆ, L; Conserva Rosæ Fructus, E.; Conserva Cynosbati; Conserve of Dog-Rose; Conserve of Hips.** (Dog-Rose [Pulp of the fruit], lb. j.; Sugar, powdered, ℥xx. Expose the pulp of the Rose to a gentle heat in an earthen vessel; then gradually add the Sugar, and rub together until they are thoroughly incorporated, L.—Take any convenient quantity of Hips, carefully deprived of their carpels; beat them to a fine pulp, adding, gradually, thrice their weight of white sugar, E.)—In the preparation of this conserve the akenia or carpels (commonly termed seeds), with their hairs, must be carefully separated, on account of the irritation they are apt to occasion (see above).—It is probable that the fruit of several varieties (or species?) are employed indiscriminately in the preparation of this conserve. The observation of Sir J. E. Smith deserves notice, that the flavour of the fruits, casually gathered late in the autumn, present a great diversity of flavour. (*Eng. Fl.* ii. 395.) This conserve, being saccharine and acidulous, is nutritive and refrigerant. It is usually employed as a convenient and agreeable vehicle for other remedies; as for a pill-basis, or for the making of electuaries or linctuses. A very agreeable pectoral linctus containing almond oil, and, sometimes, syrup of poppies, is made with this conserve, acidulated with dilute sulphuric acid. A drawback to the use of this conserve is its tendency to candy or concrete by keeping.

#### 11. ROSA GAL'LICA, Linn. L. E. D. (U. S.)—FRENCH OR RED ROSE.

*Sex. Syst.* Icosandria, Polygynia.

(*Petala, L. D.*—Petals, E.)

**HISTORY.**—Perhaps our red rose may be the *Rosa Mulesia* of Pliny, (*Hist. Nat.* lib. xxi. cap. 10, ed. Valp.) the colour of which, he says, was very warm [*ardentissimus*], and whose petals did not exceed twelve in number. The *Rosa Trachinia*, he adds, stands next to this, but is less red.

**BOTANY. Gen. Char.**—See *Rosa canina*.

**Sp. Char.**—*Prickles* unequal. *Stipules* narrow, straggling at the point. *Leaflets* five to seven, coriaceous, rigid, ovate or lanceolate, deflexed. *Flower-bud* ovate-globose. *Sepals* spreading during flowering. *Fruit* somewhat globose, very coriaceous. *Calyxes* and *peduncles* more or less very finely glandulose-hispid, somewhat viscous (De Cand.)

A small *shrub*. Very variable in *form*.—De Candolle (*Prodr.* ii. 603,) admits twelve distinct varieties. Mr. G. Don (*System of Gardening*,) enumerates more than two hundred sorts cultivated by gardeners. And we are told (*Journ. de Pharm.* xii. 443,) that the Dutch cultivators have more than five hundred varieties. The variety cultivated at Mitcham, where it is called the *Damask Rose*, appears to me to be *R. gallica*, var. *δ. officinalis*, De Candolle.

**Hab.**—South of Europe. Common in gardens. For medicinal purposes cultivated at Mitcham.

**DESCRIPTION.**—The dried petals of the unexpanded flowers, deprived of their white claws or heels (*ungues*), constitute the *red-rose leaves* (*flores rosæ rubre*) of the shops. The flower-buds are brought to market, when about the size of a



large nutmeg. The calyx and claws being cut off, the petals are speedily dried. At Mitcham this is effected in a stove. Slow desiccation impairs both their astringency and colour. The petals of the buds are much more astringent than of the full-blown flowers: hence they are preferred for medicinal use. When dried they are sifted to remove the stamens, insects, &c. Two thousand flowers yield about 100 lbs. of fresh petals, or 10 lbs. of dried ones. The dried petals have a velvety appearance: their colour is a purplish-red; their odour, which is principally developed during desiccation, is agreeable; their taste is bitterish and astringent. As they lose their fine colour when exposed to light and air, and are apt to become mouldy or worm-eaten, they should be carefully preserved in bottles or canisters.

COMPOSITION.—The petals were analyzed by Cartier, (*Journ. de Pharm.* vii.) who found the following substances:—*volatile oil, colouring matter, tannin, gallic acid, fatty matter, albumen, soluble potash salts, calcareous insoluble salts, silica, and oxide of iron.*

1. ASTRINGENT MATTER (*tannic and gallic acid*).—The presence of astringent matters is shown by the very dark colour (*tannate and gallate of iron*) produced in an infusion of red roses by the ferruginous salts, and by the slight precipitate (*tannate of gelatin*) caused on the addition of a solution of gelatine.

2. COLOURING MATTER.—Has not yet been isolated. A watery infusion of red rose leaves has a pale yellowish red colour: the alcoholic tincture is also pale coloured. On the addition of sulphuric acid an intense bright red colour is produced (*sulphate of the colouring matter*). Alkalis communicate a greenish tint to the watery infusion (probably by neutralizing the free acid to which, with the colouring matter, the red tint is owing). Sulphurous acid destroys the colour of the infusion of roses (*sulphate of colouring matter?*); but on the addition of sulphuric acid the intense bright red (*sulphate of ditto*) is produced with an evolution of sulphurous acid gas. Dr. Clarke and others had supposed that the red colour was owing to iron; but both Gay-Lussac and Cartier found more iron in white than in red roses. Thus 1000 grains of the white rose yielded the latter chemist 99 grains of ashes containing 12.4 of iron; while the like quantity of the red rose yielded 50 grains of ashes, in which were only 4 grains of oxide of iron.

PHYSIOLOGICAL EFFECTS AND USES.—Red rose leaves are mild astringents and tonics; but their power is exceedingly slight, and scarcely deserves notice. By the Arabian physicians, Avicenna and Mesue, as well as by more recent writers, Riverius, Krüger, and others, conserve of roses was esteemed a valuable remedy in phthisis. (Murray, *App. Med.* iii. 168.) At the present time red rose leaves are principally used for their colour and flavour. They yield several officinal preparations, which are valuable as forming elegant vehicles for the exhibition of other more active medicines. The full-blown flowers are said to be as laxative as those of *R. centifolia*. "Poterius relates, that he found a drachm of powdered red roses occasion three or four stools, and this not in a few instances, but constantly, in an extensive practice for several years." (Lewis, *Mat. Med.*)

I. INFUSUM ROSÆ COMPOSITUM, L. (U. S.); *Infusum Rosæ, E.*; *Infusum Rosæ acidum, D.* *Infusion of Roses*.—(Petals of *Rosa gallica* [deprived of their claws, *D.*], dried, ℥iij. [℥ss. *D.* (U. S.)]; Diluted Sulphuric Acid, ℥iiss. [℥iij. *D.* (U. S.)]; Sugar [pure, *E.*, refined, *D.*], ℥vj [℥iiss. *D.* (U. S.)]; Boiling Water [distilled, *L.*], Oj. [Oij. (U. S.) *wine measure, D.*] Pour the water upon the Rose petals in a glass vessel; then mix in the acid. Macerate for six hours [half an hour, *D.* (U. S.)], and strain the liquor [when cool, *D.*]; lastly, add the sugar to it, *L. D.*—The *Edinburgh College* infuses the petals in the water for four hours, in a vessel of glass or porcelain, not glazed with lead; then adds the acid, strains through linen or calico, and dissolves the sugar in the strained liquor.—The lengthened maceration of six, or even four hours, is unnecessary. An hour, or perhaps even half an hour, is quite sufficient. Infusion of roses is a mild, but very agreeable, refrigerant and astringent, and is a very pleasant drink in febrile disorders, hemorrhages, diarrhœa, and colliquative sweats. It forms a very elegant vehicle for other medicines; as for saline purgatives (espe-



cially sulphate of magnesia, the unpleasant taste of which it serves greatly to cover), for disulphate of quina (which is dissolved in the water by the free sulphuric acid, which also serves to prevent the tannic acid of the roses precipitating the quina), the mineral acids, bitter tinctures and infusions, alum, &c. It serves as a very useful gargle; for which purpose acids, nitre, alum, or tincture of capsicum, are usually conjoined. Of course the alkalis and the earths, as well as their carbonates, are incompatible with it; they neutralize the acid, and change the colour of the preparation to green. Sulphate of iron communicates a deep olive colour, and after some hours causes a precipitate. The sulphuric acid of the infusion of roses decomposes and destroys the activity of acetate of lead, by forming sulphate of lead. It is a common practice, however, though of course among ignorant practitioners only, to administer, in hemorrhages, a pill composed of acetate of lead and opium, and at the same time infusion of roses? (vol. i. p. 666). The dose of infusion of roses is ℥j. to ℥ij. Each ℥j. contains ℥ivss. of dilute sulphuric acid, which are nearly equivalent to three-sevenths of a minim of strong sulphuric acid.

2. CONFECTIO ROSÆ GALLICÆ, L. (U. S.); *Conserve Rosæ*, *Conserve of Red Roses*.—(Petals of the *Rosa gallica* [petals of the buds, rejecting the claws, *D.*], lb. j.; Sugar [refined, *D.*] lb. ij. Beat the rose petals in a stone mortar, then, the sugar being added, beat them again until they are thoroughly incorporated, *L. D.*—Beat the petals of the *Rosa gallica* to a pulp, gradually adding thrice their weight of white sugar, *E.*)—[The U. S. Pharmacopœia directs Red Roses in powder, four ounces; Sugar in powder, thirty ounces; Clarified Honey, six ounces; Rose Water eight fluid ounces. Rub the Roses with the Rose Water at a boiling heat, then add gradually the Sugar and Honey, and beat them together until thoroughly mixed.]—This preparation is slightly astringent. It was formerly much esteemed in phthisis (see p. 546). Its principal use now is as a vehicle for the exhibition of other medicines. Thus it is a common pill-basis for calomel, disulphate of quina, &c. *Pilule hydrargyri* (see vol. i. p. 600) are prepared with it. Alone or conjoined with the confection of dog rose (see p. 545) it forms the bases of some elegant pectoral linctuses or electuaries, containing almond oil, diluted sulphuric acid, syrup of poppies, &c. Over the confection of dog rose it has the advantage of having no tendency to candy. Furthermore, it does not ferment or become mouldy.—Dose, ℥j. to ℥ij. or more.

3. MEL ROSÆ, L. E. D.; *Honey of Roses*.—(Petals of *Rosa gallica* [Petals of the buds, deprived of their claws, *D.*], dried ℥iv.; Boiling Water, Ojss. [Oj. wine measure, *D.*]; Honey, lb. v. Macerate the Rose petals in the Water for six hours; then add the Honey to the strained [and decanted, *E.*] liquor, and boil down to a proper consistence, in a water bath [removing the scum, *E. D.*])—A mildly astringent and very agreeable preparation, principally employed in the diseases of children. It is used sometimes alone as a mild detergent in slight aphthous affections, or inflammatory conditions of the mouth and throat; or as an agreeable vehicle for the exhibition of other more powerful medicines. It is occasionally added to detergent or astringent gargles.—Dose, for children, ℥j.

4. SYRUPUS ROSÆ GALLICÆ, E.; *Syrup of Roses*.—(Dried Red Rose petals, ℥ij.; Boiling Water, Oj.; Pure Sugar. ℥xx. Proceed as for the syrup of damask rose.)—This syrup, though very slightly astringent, is principally valuable for its red colour, on account of which it is sometimes added to mixtures and electuaries (as the *Electuarium Catechu*, *E.*)



## 12. ROSA CENTIFOLIA, Linn, L. E. D. (U. S.)—THE HUNDRED LEAVED OR CABBAGE ROSE.

Sex. Syst. Icosandria, Polygynia.

(Petala, L. D.—Petals. Volatile Oil of the Petals, E.)

**HISTORY.**—Theophrastus (*Hist. Plant.* vi. 6,) speaks of a *Rosa centifolia* (Ῥόδον ἑκατονάφυλλα) which grew abundantly about Philippi. Herodotus (*Urania*, cxxxviii.) mentions a rose growing naturally in Macedonia, and which had sixty leaves, and more than ordinary fragrance. This perhaps was *R. centifolia*. Pliny (*Hist. Nat.* lib. xxi. cap. 10, ed. Valp.) also notices the *R. centifolia*.

**BOTANY. Gen. Char.**—See *Rosa canina*.

**Sp. Char.**—Prickles nearly straight, scarcely dilated at the base. *Leaflets* five to seven, ovate, glandular and flaccid at the margin, hairy beneath. *Flower-bud* ovate, short. *Sepals* during flowering, spreading, not deflexed. *Fruit* ovate, somewhat pulpy. *Calyxes* and *peduncles* glandulose-hispid, rigid, fragrant (De Cand.)

De Candolle admits seventeen distinct varieties. In gardens are found above eighty sorts. One of the best known of them is the *Mass Rose* (*R. Muscosa*). At Mitcham the sort cultivated for medicinal purposes, under the name of the *Provins* or *Cabbage Rose*, appears to me to agree with the var. *a. vulgaris* \* *foliacea* of De Candolle. Its *leaflets* are oval or rounded-oval. The larger *prickles* slightly falcate.

**Hab.**—Asia. Cultivated at Mitcham and other places for medicinal purposes.

**DESCRIPTION.**—The petals of the hundred-leaved rose (*flores rosea centifolia* seu *pallida*) are commonly termed in the shops *Provins* or *Cabbage-rose leaves*. They should be gathered when the flowers are full-blown, and before the petals begin to fall. Their odour is strongest when they are of a fine pale red, and before they begin to fade. When freed from the calyx cups and stamens they are to be dried in the air. Unlike the petals of *R. gallica*, desiccation diminishes their fragrance. Their odour is said to be singularly exalted by iodine. (Chereau, *Journ. de Pharm.* xii. 442.) Their taste is sweetish, though somewhat acidulous and bitter. To preserve them, rose leaves are frequently *pickled* or salted (*flores rosea saliti*) like elder flowers (see p. 464).

**COMPOSITION.**—I am unacquainted with any analysis of the petals of the *Rosa centifolia*. The following, however, may be regarded as the ascertained constituents:—*volatile oil*, *gallic* (and tannic!) *acid*, *colouring matter*, *a saccharine matter* (sweet extractive of Pfaff), *woody fibre*, *mineral salts*, and *oxide of iron*.

1. VOLATILE OIL (see p. 549).

2. LAXATIVE PRINCIPLE. (Sweet extractive of Pfaff).—The nature of the laxative principle of the hundred-leaved rose has scarcely been examined. Pfaff (*Mat. Med.* Bd. iv. S. 277,) declares it to be sweet extractive.

**PHYSIOLOGICAL EFFECTS AND USES.**—The petals are mildly laxative, and are employed, on this account, in the form of syrup (see *Syrupus Rose*.)

On account of its delightful fragrancy, this rose is in common use for nose-gays and scent-bags, and is employed for the distillation of *rose water*. Its odorous emanations, however, are not always innocuous; but on some persons have acted as a poison, (see Murray, *App. Med.* iii. 160; Orfila, *Toxicol. Gén.*) causing symptoms which, for the most part, are those indicating a disordered condition of the cerebro-spinal system—such as headache, fainting, and hysterical symptoms; and occasionally giving rise to local irritation, manifested by sneezing and inflammation of the eyes.

1. SYRUPUS ROSÆ, L. D.; *Syrupus Rosa centifolia*, E.; *Syrup of Roses*; *Syrup of Damask Rose*. (Petals of *Rosa centifolia* [*Damask Rose*, E.] dried, ℥vij. [lb. j. E.]; Sugar [pure, E.], lb. vj. [lb. iii., E.]; Boiling Water, Oij. [Oiv. wine measure, D.] Macerate the Rose Petals in the Water for twelve hours, and strain. [Evaporate the strained liquor, in a water-bath, to Oij. L.



D.] Then add the sugar [dissolve with the aid of heat, *E.*] and strain).—Gently laxative. Used only for young children. Dose, fʒij. to fʒj. Its red colour is heightened by acids; alkalis change it to green or yellow.

2. AQUA ROSÆ, L. E. D. (U. S.); *Rose Water*. (Petals of *Rosa centifolia*, lb. x.; Proof Spirit, fʒvij. [Rectified Spirit, fʒij. *E.*]; Water, *Cong.* ij. Let a gallon distil.—“The petals should be preferred when fresh; but it also answers well to use those which have been preserved, by beating them with twice their weight of muriate of soda,” *E.*—The *Dublin College* directs lb. viij. of the petals of *Rosa centifolia*, and a sufficient quantity of water, to prevent empyreuma. Distil a gallon.) (The U. S. P. directs fresh hundred-leaved Roses, eight pounds; Water, two gallons. Mix them and distil a gallon.)—Rose Water is prepared both from fresh and pickled rose leaves, but of course the former are preferable. During its distillation a solid volatile oil comes over with it, and floats on the water in the receiver. To prevent the water becoming sour it should be preserved in well-corked bottles, kept in cool places. Spirit of wine ought not to be mixed with it, for if a sufficient quantity be added to preserve the water, it renders it unfit for some medicinal purposes. Rose water is employed, on account of its odour only, as an addition to lotions, collyria, &c.

[UNGUENTUM AQUÆ ROSÆ, (U. S.) *Ointment of Rose Water*.—Take of Rose Water, Oil of Almonds, each two fluid ounces; Spermaceti half an ounce, White Wax a drachm. Melt together, by means of a water bath, the Oil, Spermaceti and Wax; then add the Rose Water, and stir the mixture constantly until it is cold.—U. S. P.]

3. OLEUM ROSÆ, E.; *Attar or Otto of Roses*.—Obtained in the East, by distilling roses with water. The attar concretes and floats on the distilled water when cold. (Polier, *Asiat. Research*. i. 332; Jackson, *Ed. New Phil. Journ.* xxviii. 326.) In Northern India, rose water and attar are distilled from *R. damascena*. (Royle, *Illustr.* 203.) The precise species of rose used at Ghazee-poor, in Hindostan, where the attar is extensively distilled, as well as at Shiraz, in Persia, has not been satisfactorily ascertained. At the latter place a rose with white flowers is said to be used. (Fée, *Hist. Nat. Pharm.* ii. 127.) Is it *R. moschata*? In the manufacture of rose water in England, from *R. Centifolia*, a crystalline volatile oil with the odour of the attar is frequently obtained (*English attar of roses*). Polier says, that to procure something less than three drachms of attar from 100 lbs. of rose leaves, in India, the season must be very favourable, and the operation carefully performed. Jackson states, that from one lac of roses it is generally calculated that 180 grains, or one tolah of attar, can be procured. Heber (*Narrative*, i. 266.) says 20,000 roses yield attar equal in weight to that of a rupee. According to Donald Monro (*Treat. on Med. and Pharm. Chym.* ii. 311.) the attar is procured without distillation, merely by macerating the petals in water. But Trommsdorff (Martius, *Pharmakogn.*) tried the method, and failed to procure any oil.

Attar of roses is imported from Constantinople and Smyrna. The duty on it is 1s. 4d. per lb. In 1838, 973 lbs.; in 1839, 745 lbs. paid duty. (*Trade List*.)

At temperatures below 80° F. attar of roses is a crystalline solid. It is usually almost colourless, but Polier says, colour is no criterion of its goodness, quality, or country. Undiluted, its odour is somewhat too powerful to be agreeable, but, when properly diffused through the air or some liquid, is most delicious. It is combustible, and with oxygen forms an explosive mixture. It fuses at between 84° F. and 86° F. Its sp. gr. at 90° F. is 0.832; water at 60° F. being 1.0. (Saussure, *Ann. Chim. et Phys.* xiii. 337.) At 57° F. 1000 parts of alcohol (sp. gr. 0.806) dissolve 7 parts, and at 72° F. 33 parts of attar.

Attar of roses has been analyzed by Saussure and Blanchett, but their results do not accord.



Blanchet's Analysis.				Saussure's Analysis.	
	Atoms.	Eq. wt.	Per cent.		Per Cent.
Carbon.....	23	138	74.59	Carbon.....	82.053
Hydrogen.....	23	23	12.43	Hydrogen.....	13.124
Oxygen.....	3	24	12.98	Oxygen.....	3.949
				Nitrogen.....	0.874
Attar of Roses.....	1	185	100.00		100.000

Sandal-wood oil, oil of rhodium, some of the fixed oils, and spermaceti, have been said to be occasionally employed for adulterating attar of roses. But as far as my observation extends the attar found in the shops of London is very pure.

Attar of roses consists of two volatile oils; one solid, the other liquid, at ordinary temperatures, in the proportion of about one part of the first to two parts of the second. To separate them the attar is to be frozen and compressed between folds of blotting paper, which absorbs the liquid and leaves the solid oil; or they may be separated by alcohol (of sp. gr. 0.8), which dissolves the liquid, but takes up scarcely any thing of the solid oil.

*a. Solid Oil of Roses (Rose-Camphor; Stéaroptène of Oil of Roses).*—Occurs in crystalline plates, fusible at about 95° F. It is composed, according to Saussure, of carbon 86.743, and hydrogen 14.889; or an equal number of atoms of carbon and hydrogen. Blanchet states its composition to be, carbon 85.86, hydrogen 14.46.

*β. Liquid Oil of Roses (Éléoptène of Oil of Roses).*—Has not been accurately examined. But from Saussure's analysis of the ordinary attar and of its stéaroptène, it would appear to contain oxygen and nitrogen, in addition to carbon and hydrogen. By calculation the proportions appear to be, carbon 80.56, hydrogen 12.42, oxygen 3.92, nitrogen 1.3. (Dumas, *Traité de Chim.* i. 494.)

Attar of roses is employed for scenting only. In the shops various perfumes are sold, which owe their odour to the attar. Thus *oil for the hair*, sold as *huile antique rouge à la rose*, is merely olive oil coloured by alkanet, (see p. 327), and scented with the attar. *Milk of roses* also contains the attar. Several compound scents owe a portion of their fragrance to this oil, as *lavender water*. The Edinburgh College, has very properly, as I conceive, introduced this oil into the pharmacopœia; for, as medicines frequently require to be perfumed, I cannot conceive why the most delicious perfume should be excluded from the *Materia Medica*. It may be employed as an addition to unguents, spirit washes, &c.

#### TRIBE V.—POMACEE.

##### 13. CYDO'NIA VULGA'RIS, Persoon, L. E.—COMMON QUINCE.

*Pyrus Cydo'nia*, Linn.

*Sex. Syst.* Icosandria, Pentagynia.

(Semina, D.)

**HISTORY.**—Hippocrates (*Opera*, 497, ed. Fœs.) employed the quince-apple (*κυδόνια*) as an astringent in diarrhœa. The Romans called this fruit *malum cotoneum*. (Pliny, *Hist. Nat.* lib. xv. cap. 11, ed. Valp.)

**BOTANY.**—**Gen. Char.**—*Calyx* five-cleft. *Petals* somewhat orbicular. *Stamens* erect. *Styles* five. *Pome* closed, five-celled; cells many-seeded, cartilaginous. *Seeds* enveloped with mucilaginous pulp.—*Small trees*. *Leaves* undivided, quite entire or serrate. *Flowers* large, solitary or few, somewhat umbellate. (De Cand.)

**Sp. Char.**—*Leaves* ovate, obtuse at the base, quite entire; their lower surface, as well as the *calyx*, tomentose. (De Cand.)—A small, much-branched, usually crooked tree. *Petals* pale rose-colour or white. *Pome* varying in shape, yellow, covered with a thin cottony down, very austere, but having a peculiar fragrance.

De Candolle admits three varieties:

*a. Maliformis.* Apple Quince—*Pome* almost globose. Cultivated.



β. *Lusitanica*. Portugal Quince.—Leaves broader. Pome larger. Cultivated.  
 γ. *Oblonga*. Oblong or Pear Quince.—Leaves oval or oblong. Cultivated and wild.

**Hab.**—South of Europe. Cultivated in gardens. Flowers in May and June.

**DESCRIPTION.**—Quince seeds (*semina cydonice*) are ovate-acute, flat on one side, convex on the other, and of a reddish-brown colour. The most external coat (*epidermis seminalis*, Bischoff) is composed of very fine cells, in which is lodged a large quantity of mucilage. When, therefore, these seeds are thrown into water, the mucilage swells up, distends, and ultimately bursts the tender cells. (See Bischoff, *Handb. d. bot. Termin.* tab. xlii. fig. 1859.)

**COMPOSITION.**—No analysis of either fruit or seeds has been made. The **Fleshy Pulp** of the fruit contains an *astringent matter*, *malic acid*, *sugar*, *pectine* or *vegetable jelly*, a *nitrogenous matter*, probably *volatile oil*, *water*, and *vegetable fibre*. The **Seeds** contain *colouring matter*, *tannic acid*, a large quantity of a *peculiar gummy matter* in their outer coat, probably *amygdalin* (as Stockmann obtained hydrocyanic acid from the seeds by distillation), *emulsin*, *starch*, *fixed oil*, and *woody fibre*.

**CYDONIN** (*Peculiar gum of Quince seed; Bassorin; Mucus; Quince Mucilage*).—One part of quince seed forms, with forty parts of water, a thick mucilage, which produces, with the following salts, gelatinous coagula or precipitates; acetate and diacetate of lead, protochloride of tin, nitrate of mercury, and sesquichloride of iron. Rectified spirit produces at first scarcely any effect; after some time partial coagulation is effected. Oil of vitriol communicates a pinkish tint, and causes the separation of a frothy coagulum, which floats on the mixture. Silicate of potash, infusion of nutgalls, and oxalate of ammonia, produce no change in the mucilage. Quince mucilage, usually termed bassorin, appears to me to be a peculiar substance: hence I propose to call it *cydonin*. It is distinguished from *arabine* (see *Gum Arabic*) by the effect on it of alcohol, silicate of potash, sulphuric acid, and oxalate of ammonia; from *bassorin* and *cerasin* (see below) by its solubility in water, both hot and cold; from *tragacanthin* (see *gum tragacanth*) by the effect of sulphate of iron, oxalate of ammonia, and alcohol; from *carrageenin* (see p. 36) by the effect of silicate of potash and acetate of lead. (For some experiments on mucilage of quince seed, see Bostock, in *Nicholson's Journal*, vol. xviii. p. 31.)

**PHYSIOLOGICAL EFFECTS.**—The *fruit* is not eatable in its raw state. Stewed in pies or tarts, along with apples, it is much esteemed. The expressed juice (*succus cydonice*) is said to be cooling and astringent. An excellent *marmalade* (*miva cydonia*) and *syrup* are prepared from the quince by the confectioner. The *mucilage of quince seed* is nutritive, demulcent, and emollient. The whole seeds, if taken in large quantity, would, perhaps, act like bitter almonds (see p. 533), as they are said to yield hydrocyanic acid.

**USES.**—Quince seeds are employed in medicine only an account of the mucilage which they yield.

**DECOCTUM CYDONIÆ**, L. *Mucilage of Quince Seed*. (Quince seed, ʒij.; Distilled Water, Oj. Boil with a gentle heat for ten minutes, and strain.)—Never used internally. Employed externally as an emollient and sheathing application to cracked lips and nipples; to the inflamed conjunctiva; to the skin when affected with erysipelas; to painful hemorrhoidal tumours, &c. Hair-dressers use it, as a cement, for dressing the hair in braids.

#### OTHER MEDICINAL ROSACEÆ.

1. **CHERRY TREE GUM.**—From the stems of the *Cherry* (*Cerasus avium*), *Plum* (*Prunus domestica*), and some other rosaceous trees, there exudes a mucilaginous liquor, which concretes into tears, forming the *gummi nostras*, *cherry-tree gum* (*gummi cerasi*), *plum tree gum* (*gummi pruni*), &c. It may be employed in medicine as a substitute for tragacanth gum. It consists of two gummy principles: one called *arabine* (see *Gum Arabic*), soluble in cold water, the other termed *prunin* or *cerasin*, insoluble in cold, but soluble in hot water.

2. **ALCHEMILLA ARVENSI**, *Field Ladies' Mantle*, or *Parsley Piert*, is a small, indigenous, herbaceous plant, with green flowers. It belongs to *Tetrandria*, *Monogynia*, in the sexual system. It is astringent (owing to tannic acid), and, perhaps, slightly mucilaginous. It was formerly eaten raw or pickled, and thought serviceable in cases of gravel or stone: hence it was called *break-stone*. Prout (*Inq. into the Nat. and Treat. of Diabetes*, &c. pp. 149 and 185,



2d ed.) regards it as a diuretic, and as producing, in particular states of the system, a large secretion of lithic acid. A strong infusion of it, taken frequently, sometimes gives great relief, he says, in the less severe cases of the phosphatic or earthy deposit, where the source of irritation is chiefly confined to the urinary organs, and where the constitution is sound, and the strength not remarkably reduced.

3. **BEDEGUAR.**—On various species of *Rosa*, perhaps most frequently on *R. rubiginosa*, the *Sweet Briar* or *Eglantine*, is found a remarkable gall, called the *Sweet Briar Sponge* (*Bedeguar* seu *Fungus Rosarum*). Pliny terms it, in one place, (*Hist. Nat.* lib. xxi. cap. 73, ed. Valp.), a *little ball* (*pilula*), in another (*Ibid.* lib. xxv. cap. 6) a *sponglet* (*spongiola*). It is produced by the puncture of several insect species; viz. *Cynips Rosæ* and *Brandtii* (both of which are elaborately described by Ratzburg), (*Mediz. Zoolog.* Bd. ii. S. 146, et. seq.) and a species of *Mesoleptus*. Other species (as those of *Diptolepis* and *Pteromalus*) are also found in these galls; but they are probably parasites, and not the true inhabitants. The Bedeguar is usually rounded, but of variable size, sometimes being an inch, or an inch and a half, or more, in diameter. Externally it looks shaggy, or like a ball of moss, being covered with moss-like branching fibres, which are at first green, but become afterwards purple. The nucleus is composed principally of cellular tissue, with woody fibre; and where the fibres are attached, bundles of spiral vessels are observed. Internally there are numerous cells, in each of which is the larva of an insect: if opened about August or September, maggots (*larvæ*) are usually found. It is inodorous, or nearly so; its taste is slightly astringent, and it colours the saliva brownish. It has not been analysed, but is suspected to contain tannic and gallic acids. Dried and powdered, it was formerly given in doses of from ten to forty grains, as a diuretic and lithontriptic. More recently it has been recommended as an anthelmintic, and as a remedy against toothache. Pliny says, the ashes mixed with honey were used as a liniment for baldness. In another place he speaks of the fungus being mixed with bear's grease, for the same purpose.

[The root of the *Spiræa tomentosa*, U. S. Sec. List, is sometimes employed in the United States. It is astringent and may be substituted for other medicines of this class.—J. C.]

#### ORDER LXI. LEGUMINOSÆ, Jussieu.—THE BEAN TRIBE.

FABACEÆ, Lindley.

**ESSENTIAL CHARACTER.**—*Calyx* of five (rarely of four) sepals, more or less united at the base, and, therefore, five-toothed, five-cleft, or five-partite; sepals unequal, in some cases almost equally coherent, in others concentered into two lips; the upper consisting of two sepals,

FIG. 219.



Papilionaceous flowers.

FIG. 220.



Legumes of *Ceratonia Siliqua*.

which are either free at the apex or united; the lower of three sepals generally distinct at the apex. *Petals* five, or, by abortion, four, three, two, one, or none; generally unequal, inserted usually into the base of the calyx, rarely on the torus; in general variously imbricated, rarely valved, almost always free, sometimes united into a gamopetalous corolla. [In the sub-order *Papilionaceæ*, the petals form a *butterfly-shaped* or *papilionaceous* corolla, composed of a large upper petal called *vexillum* or *standard*, two lateral ones termed *ala* or *wings*, and an inferior keel-shaped one denominated *carina* or *keel*, and which is, in fact, composed of two petals adherent to their margin.] *Stamens* inserted with the petals, generally double the number of the latter, rarely triple or quadruple or fewer; altogether free, or the filaments variously connected, being monadelphous, with the tube entire or cleft above, or diadelphous nine and one, or five and five, very rarely triadelphous: *anthers* two-celled. *Carpel* generally one, the others being abortive; or two to five. *Ovary* oblong or ovate, sessile or stipitate, free, or, very rarely, adnate by the stipe to the calyx. *Style* one, filiform, arising from the upper suture: *stigma* terminal or lateral. *Legumes* two-valved, membranous; coriaceous, rarely fleshy or drupaceous, dehiscent or indehiscent, one-celled; or by the folding in of one of the sutures, longitudinally two-celled; or by isthmi or articulations, transversely many-celled. *Seeds* two, or many, or by abortion (?) solitary, affixed to the upper suture, inserted alternately into each valve, frequently oval or reniform; *funiculus* various, rarely expanded into an arillus; *testa* smooth, frequently very much so, and stony; *endopleura* often tumid, simulating albumen. *Embryo* sometimes straight [*rectembria*], or curved [*curvembria*], the radicle being inflexed on the commissure of the lobes (*homotropal* or *pleurohorizous*); in either case the radicle directed towards the hilum: *cotyledons* foliaceous or fleshy; the first exsert, the



latter germinating within the spermoderm, under ground.—*Trees, shrubs, or herbs, with alternate, bistipulate, simple, or variously-compounded leaves.*—(Condensed from De Candolle, with additions within the square brackets).

**PROPERTIES.**—Exceedingly variable. Similar organs of different, though often closely allied, species are frequently found to elaborate most dissimilar principles; and, of course, the dietetical, medicinal, or poisonous properties vary in a corresponding manner. (For details, consult Dierbach, *Abhandl. u. d. Arzneikräfte der Pflanzen*; and De Candolle, *Essai sur les Propr. Méd.*)

FIG. 221.



Common Garden Bean.

a. a. Cotyledons or seed lobes.  
b. Plumule, and Radicle bent on the cotyledons (*curvembria*).

## SUB-ORDER 1.—PAPILIONACEÆ.

## I. MYROSPERMUM PERUVIFERUM, De Candolle, E.—THE QUINQUINO.

*Myroxylon peruiferum*, Linn. *L. D.*

*Sex. Syst.* Decandria, Monogynia.

(*Balsamum liquidum*, L.—Fluid balsamic exudation, E.—*Balsamum*, D.)

(*Myroxylon*, U. S.)

**HISTORY.**—This balsam was first mentioned by Nicholas Monardes under the name of *balsamum*. (Clusius, *Exot.* 303.) No accurate notions of the tree yielding it were entertained until 1781, when Mutis sent some branches of it to the younger Linnæus. (Murray, *App. Med.* vi. 111.) Ruiz (Lambert, *Illustr. of the Genus Cinchona*, p. 92) afterwards described it.

**BOTANY.** *Gen. Char.*—*Calyx* campanulate, five-toothed, persistent. *Petals* five, the upper one largest. *Stamens* ten, free. *Ovary* stipitate, oblong, membranous, with two to six ovules; *style* towards the apex filiform, lateral. *Legume*, with stalk naked at the base but winged superiorly, samaroid [legumen samaroidium De Cand.], indehiscent, one-celled, one or two-seeded, laterally pointletted by the style. *Seed* besmeared with balsamic juice: *cotyledons* thick, plane. (De Cand.)

*Sp. Char.*—*Leaves* coriaceous, persistent, smooth as well as the branches. Wing of the *legume* very thick, not veined. *Style* deciduous. (De Cand.)

A branching, elegant tree. *Bark* thick, very resinous. *Leaves* pinnated, alternate; leaflets two to five pairs, alternate ovate-lanceolate. *Racemes* axillary. *Petals* white. *Legume* somewhat coriaceous, straw-coloured, about four inches long including the stalk. *Seeds* reniform.

*Hab.*—Peru, New Grenada, Colombia, and Mexico. Grows in low, warm, and sunny situations.—Flowers from August to October.

**COLLECTION.**—Monardes (*op. cit.* p. 302) says, that there are two modes of procuring the balsam; viz. incision into the bark of the tree, and coction of the branches and trunk in water. The first method yields a *white liquid balsam*, the second a *blackish red liquid*. Ruiz (*op. cit.* p. 95) states, that the white liquid balsam is preserved for years in bottles, in the fluid state; but when deposited in mats or calabashes, which is commonly done in Carthagena, and in the mountains of Tolu, it, after some time, condenses and hardens into resin, and is then denominated *dry white balsam* or *balsam of Tolu*; while the extract made by boiling the bark in water is blackish, remains liquid, and is known by the name of *black Peruvian balsam*. There is, however, obviously some confusion in this statement; and several reasons have led pharmacologists to doubt whether the black balsam of the shops is obtained by coction. Ruiz does not speak from his own observation, but on the authority of Valmont de Bomare. Lastly, Hernandez (*Rev. Med. Nov. Hisp. Thes.* p. 51, 1651) says, the balsam



obtained by incision is yellowish-black (*e fulvo in nigrum*). Professor Guibourt has received, from M. Bazire, balsam of Peru, which he obtained in great abundance on the coast of Son Sonaté, in the state of San-Salvador (the republic of Guatemala) by incisions in the stem of a *Myrospermum*, whose fruit is very different to that of *M. peruvianum*. (*Hist. des Drog.* ii. 590, 3<sup>me</sup> ed.) Th. Martius (*Pharmakogn.*) suggests, that the black balsam of Peru is procured by a kind of *destillatio per descensum*; but the absence of pyrogenous products in the balsam seems to me to be opposed to this opinion.

COMMERCE.—Balsam of Peru is imported in pear-shaped earthenware pots and in tin canisters, from Valparaiso, Islay, Lima, Truxillo, Callao, Iquique, Belize, &c. The duty (1s. per lb.) paid on it during the last six years, is as follows (*Trade List*):

In 1834 .....	1893 lbs.	In 1837 .....	1331 lbs.
1835 .....	213	1838 .....	1798
1836 .....	1880	1839 .....	825

DESCRIPTION.—Balsam of Peru (*balsamum peruvianum*) called also *black* or *liquid balsam of Peru* (*balsamum peruvianum nigrum*) is a transparent, deep, reddish-brown or black liquid, which has the consistence of treacle, a powerful but agreeable odour, somewhat similar to that of vanilla and benzoin, and which is increased by dropping the balsam on a red-hot coal, and a warm, acrid, bitter taste. It is inflammable, and burns with a fuliginous flame. It is soluble in alcohol; the solution, however, is not clear, but lets fall after some time a deposit. To boiling water it yields its acid, usually stated to be the benzoic, but according to Fremy and others, it appears to be the cinnamonic acid. Its sp. gr. is 1.150 to 1.160.

I have received from Professor Guibourt another balsamic substance under the name of *balsam of Peru in cocoa-nut shells* (*baume du Pérou en cocos*). The shell has the size and shape of a small lemon. The contained balsam is a deep brown, and has an odour very similar to that of balsam of Tolu. Guibourt says, "it appears to be formed of two kinds of matter: one more fluid, another more solid, grumous, and as it were crystalline. Its taste is mild and sweetish. It has a strong agreeable odour, between that of Tolu and soft liquidambar, but distinct from both."

The *white balsam of Peru* (*balsamum peruvianum album*) of Martius and other pharmacologists, is said, by Guibourt, (*op. cit.*) to be the *solid balsam of liquidambar* already described (p. 184).

ADULTERATION.—Balsam of Peru is said to be subject to adulteration; and the formulæ given by Gray (*Suppl. to the Pharm.*) for *making* as well as for *reducing* (*i. e.* adulterating) it, lends support to this opinion. The demand for the balsam being small, the supply equal to, or even exceeding the demand, and the price being moderate, are circumstances which appear to remove all motive for adulteration, which I do not think is at present practised in this country. The characters to be attended to in judging of its genuineness are, the purity of its odour, its complete solubility in, or miscibility with, alcohol (by which the absence of fixed oil is shown), and its undergoing no diminution of volume when mixed with water, (by which the absence of alcohol is proved). A sign of its purity is, that 1000 parts of it should saturate 75 parts of pure crystallized carbonate of potash. (Th. Martius, *Pharmakogn.*)

COMPOSITION.—Balsam of Peru has been elaborately investigated by several chemists, and the results obtained are somewhat curious. In 1806 it was examined by Lichtenberg. (*Berlin. Jahrb.* 1806, S. 22.) Stoltze, (*Journ. de Chim. Méd.* i. 139,) in 1825, published an analysis of it. Richter, (*Pharm. Cent.-Blatt.* für 1838, S. 346,) Plantamour, (*Ibid.* S. 825, and für 1839, S. 601,) and Fremy, (*Comptes-Rendus*, 1838, Sec. Sem. No. 20, and *Ann. Chim. et de Phys.* t. lxx. p. 180,) have since examined the nature of its constituents.



*Stollze's Analysis.*

Brown slightly soluble resin .....	24
Brown resin .....	20.7
Oil of Balsam of Peru [cinnaméine] .....	69.0
Benzoic [cinnamonic] acid .....	6.4
Extractive .....	0.6
Loss and moisture .....	0.9
Balsam of Peru .....	100.0

*Fremy's Analysis.*

1. An oily matter [cinnaméine], frequently containing, in solution, a crystalline substance (*metacinnaméine*; *hydruret of cinnamyle*).
2. Cinnamonic acid.
3. One or more resins (*hydrates of cinnaméine*).

Balsam of Peru.
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1. OIL OF BALSAM OF PERU. *Cinnaméine* of Fremy.—If an alcoholic solution of potash be added to an alcoholic solution of balsam of Peru, a compound of resin and potash (*resinate of potash*) is precipitated, while cinnamionate of potash and cinnaméine are left in solution. On the addition of water the latter separates, and floats on the surface. It is to be purified by solution in petroleum. Cinnaméine is a reddish-brown, acrid, odourless, oily fluid, heavier than water, soluble in alcohol and ether, insoluble in water, and inflammable. Its composition, according to Fremy, is (taking the average of five experiments), carbon 79.0, hydrogen 6.26, oxygen 14.74. His formula for it, which, however, scarcely accords with this statement, is  $C^{85} H^{26} O^3$  [ $C^{144} H^{25} O^{20}$  Liebig]. Caustic potash effects a change on it analogous to saponification, and converts it into two equivalents of cinnamonic acid (equal to  $C^{36} H^{14} O^6$ ) and a light oily fluid, which Fremy calls *peruvine*, whose composition is, carbon 79.6, hydrogen 9.3, oxygen 11.1, or  $C^{18} H^{12} O^2$  [ $C^{30} H^{23} O^4$  Liebig]. Cinnaméine frequently (but not invariably) contains in solution a crystalline substance, termed *metacinnaméine*, whose composition is, carbon 81.9, hydrogen 6.0, oxygen 12.1; its formula being  $C^{16} H^9 O^2$ , so that it is isomeric with *hydruret of cinnamyle*.

Richter asserts that oil of balsam of Peru is composed of two distinct oils;—one, called *myrospermine*, which is soluble in alcohol; the other, termed *myroxiline*, insoluble in alcohol. What relation these oils bear to cinnaméine and peruvine has not yet been made out.

2. CINNAMONIC ACID. *Cinnamic Acid* (see p. 239).—This constituent has usually been mistaken for benzoic acid. It is obviously formed in the balsam by the oxidation of the hydruret of cinnamyle, just as hydruret of benzule is transformed into benzoic acid (vol. i. 363). In those balsams of Peru which contain no *metacinnaméine*, this principle has been entirely converted into cinnamonic acid.

3. RESIN OF BALSAM OF PERU. *Hydrate of Cinnaméine*.—The quantity of resin in Balsam of Peru augments daily. It is formed by the union of cinnaméine with the elements of water; for its composition is, carbon 71.82, hydrogen 6.78, oxygen 21.40; or  $C^{54} H^{20} O^{12}$ . So that this resin consists of one equivalent of cinnaméine, and four equivalents of water. It is not, however, formed at once, but gradually undergoing different degrees of viscosity. Soft resin differs from the hard only in its elements of water. Sulphuric acid converts cinnaméine into resin.

Such are the general results of Fremy's analysis; but the correctness of some of them may be fairly called in question. His formulae do not always agree with his experimental results (see cinnaméine). Plantamour denies the accuracy of several of Fremy's statements.

PHYSIOLOGICAL EFFECTS.—Stimulant, slightly tonic, expectorant, detergent, and epulotic. Its action is similar to other balsamic substances (see vol. i. p. 184), and is closely allied to that of storax and benzoin. Topically it operates as a stimulant and mild acrid; and when applied to foul indolent ulcers, often cleanses them, and promotes their cicatrization. Taken internally, in full doses, it creates thirst, and quickens the pulse. Its stimulant influence is directed to the secreting organs, especially the bronchial mucous membrane. It is devoid of the powerful influence over the urinary organs, possessed by copaiva and the turpentine, and its tonic powers are not equal to those of myrrh.

USES.—Its supposed efficacy in curing external ulcers and healing wounds has led to its use in internal diseases, formerly apprehended to depend on ulceration, as in pulmonary affections supposed to be, or which really were, phthisis. But the observations of Dr. Fothergill (*Med. Obs. and Inq.* vol. iv. p. 231.) in part led to the discontinuance of the indiscriminate use of balsams and other heating substances in these cases. Yet it proves serviceable in some old asthmatic cases, chronic pulmonary catarrhs, winter coughs, &c. It seems to be principally adapted to *old standing chronic affections of the mucous membranes* (especially the bronchial mucous membrane), particularly in persons of a cold and torpid habit. Its stimulant influence is calculated only to aggravate acute cases.

Many other uses of balsam of Peru are now obsolete: as its employment in lead colic, as recommended by Sydenham; in gonorrhœa, and leucorrhœa, by



Hoffman (*Opera omn. Suppl.* p. 736. Genev. 1754); in convulsions from repressed perspiration: by Kirkland, (*Treat. on Childbed Fever*, p. 31, 1774,) and externally and internally in traumatic tetanus, by Dr. Kollock. (Thacher's *Dispensatory*.) It is said to be now and then used in chronic rheumatism. The beneficial effects ascribed by Trousseau and Pidoux to the balsams in chronic laryngitis have been before (vol i. p. 185) referred to.

As a topical remedy, balsam of Peru is occasionally employed. It is applied either alone, or in the form of ointment, to indolent ill-conditioned ulcers; it cleanses them, promotes healthy granulation, and assists cicatrization. I have used it in some obstinate ulcerations about the nose. Dr. Ainslie (*Mat. Ind.* i. 65 and 406,) speaks very highly of its powers of arresting the progress of sphacelous and phagedenic affections, so common and destructive in India. He recommends lint, soaked in the balsam, to be applied night and morning. In offensive discharges from the ear it is now and then dropped in after syringing. It is a constituent of some lip-salves. It was formerly esteemed as a vulnerary against wounds of the tendons and nerves. It is used by perfumers for *scenting*, and in the manufacture of *fumigating pastiles*.

ADMINISTRATION.—Dose, fʒss. to fʒj. It may be taken on sugar, or made into pills with some absorbent powder, or diffused through water by means of sugar, honey, gum, or yolk of egg.

## 2. MYROSPERMUM TOLUIFERUM, Richard, E.—THE BALSAM OF TOLU-TREE.

Tolui'era Bal'samum, Miller, D.

Sex. Syst. Decandria, Monogynia.

(Concrete balsamic exudation, L.—Resina, D.)

(Tolutanum, U. S.)

HISTORY.—The earliest notice of balsam of Tolu is that of Monardes. (Clusius, *Exot.* 304.) He tells us that the balsam had been recently imported.

BOTANY.—Gen. Char.—See *Myrospermum peruvianum*.

Sp. Char.—Branches and leaves smooth. Leaflets oblong, acuminate, equilateral, rounded at the base (De Cand.)

The tree which yields the balsam of Tolu was formerly called *Tolui'era Balsamum*. But Richard having carefully investigated the characters of the genus *Tolui'era*, found that, with the exception of those of the fruit, which Miller had imperfectly described, they were identical with those of the genus now called *Myrospermum*; and as Ruiz states that the balsams of Peru and Tolu are both obtained from one tree, the *Myrospermum peruvianum* has been adopted by several writers, and by the London College, as the source of both balsams.

Richard (*Ann. Scien. Nat.* t. ii. p. 168,) found specimens of the trees yielding these balsams in Humboldt's Herbarium; and though he at first mistook them for the same species, he has subsequently recognised them to be different. He therefore made a distinct species of the tree yielding the balsam of Tolu, and it is now called *Myrospermum toluiferum*. It differs from *M. peruvianum* in its having thin, membranous, obovate leaflets, which are lengthened and acuminate at their summits. Moreover, the terminal leaflet is larger than the lateral ones.

Hab.—Mountains of Tolu, Turbaco, and on the banks of the Magdalena, between Garapatas and Monpox.

PRODUCTION.—Balsam of Tolu is procured by making incisions into the bark of the tree, and receiving the liquid balsam in vessels made of a black wax. It is afterwards transferred into proper vessels. It only exudes from the tree during the heat of the day. (Monardes, *op. cit.* 304.)

COMMERCE.—Balsam of Tolu is sometimes brought direct from Carthagena, Santa Martha, and Savanilla; more commonly, however, it comes by way of New York or Jamaica. It is usually imported in cylindrical tin canisters; now and then in earthen pots or jars, still more rarely in small calabashes.

DESCRIPTION.—Balsam of Tolu (*Balsamum toluitanum* vel *de Tolu*), when first brought over, is generally soft and tenacious, but by age becomes hard and brittle, somewhat similar to resin, and has a granular or somewhat crystalline



appearance. Formerly it was imported in this hardened state, but is now usually met with in the soft state. It is transparent, has a reddish or yellowish-brown colour, a most fragrant odour, though less powerful than that of storax or Peruvian balsam, and a pleasant sweetish taste. It softens under the teeth; when heated, it readily melts, takes fire, and burns with an agreeable odour. It is very soluble in alcohol and ether, and gives out its acid to water. The soft balsam contains more oil but less acid than the dry balsam, the acid and the resin being formed at the expense of the oil. Balsam of Tolu hardens or resinifies with much more facility than balsam of Peru.

*Balsam of Tolu in calabashes* (*balsamum toluatum in cucurbitis parvis*, Dale) occurs in calabashes (the fruit of *Crescentia Cujete*, according to Sloane,) (*Hist. Nat. Jamaica*, ii. 174.) about the size of an orange; the large aperture by which the balsam has been introduced being closed with the rachis of the fruit of *Zea Mays*.

COMPOSITION.—According to Fremy, (*Ann. de Chim. et Phys.* t. lxx. p. 201.) the composition of balsam of Tolu is similar to that of balsam of Peru, its constituents being *cinnaméine*, *cinnamonic acid*, and *resin*. They differ, according to the same chemist, from those of balsam of Peru by the greater facility with which they become resinified.

RESIN OF BALSAM OF TOLU.—Is essentially the same as that of balsam of Peru, and, like it, also forms a fine red colour with sulphuric acid; but it is less fusible than the resin of the last-mentioned balsam. It consists of carbon 70.8, hydrogen 6.1, and oxygen 23.1; so that it contains a larger proportion of the elements of water.

PHYSIOLOGICAL EFFECTS AND USES.—The effects of balsam of Tolu are similar to those of balsam of Peru (see p. 555), and the other balsamic substances (vol. i. p. 184.) It is employed as a stimulating expectorant in chronic bronchial affections, unaccompanied with inflammatory action. It is, however, more frequently used as an agreeable flavouring adjunct to pectoral mixtures. The vapour of the ethereal solution of the balsam has been inhaled in chronic affections with benefit. *Tolu lozenges* form a popular and pleasant remedy for appeasing troublesome cough. The balsam is sometimes employed by confectioners to flavour *sweetmeats*, as marinalade. It is also used in *perfumery*; and is a constituent of some *fumigating pastiles* already described.

ADMINISTRATION.—The dose of the balsam is from grs. x. to ʒss. It may be taken in the form of an *emulsion*, made with gum or sugar. It is a constituent of the *compound tincture of benzoin*, L. D. (U. S.) before described.

1. TINCTURA BALSAMI TOLUTANI, L. D. *Tinctura Tolutana*, E. *Tincture of Tolu*. (*Tinctura Tolutani*, U. S.) (Balsam of Tolu, ʒij. [ʒj. D.; ʒijss. in coarse powder, E.]; Rectified Spirit, Oij. [Oj. *wine measure*, D.] Digest [with a gentle heat, E., in a close vessel. D.] until the balsam is dissolved [and filter, L. D.].—(Balsam of Tolu, ʒij. Alcohol, Oij. Macerate until the balsam is dissolved, and filter through paper, U. S.)—A stimulating expectorant, principally used as a flavouring adjunct to other pectorals. Its use is, of course, objectionable in inflammatory cases. Dose, fʒss. to fʒij. When mixed with water the resin is precipitated; hence it should be rubbed with mucilage, or some viscid liquor, before adding the water, to keep the resinous precipitate in suspension.

2. SYRUPUS TOLUTANUS, L. E. *Syrupus Balsami Tolutani*, D. *Syrup of Tolu*. *Balsamic Syrup*. (*Syrupus Tolutani*, U. S.) (Balsam of Tolu, ʒx.; Boiling Water, Oj.; Sugar lbs. ijss. Boil the Balsam in the Water for half an hour in a vessel lightly covered, frequently stirring, and strain the cooled liquor; then add the Sugar, and dissolve it, L.—Simple Syrup, lbij. [lbjss. D.]; Tincture of Tolu, ʒj. When the syrup has been recently prepared, and has not altogether cooled, add the tincture of Tolu by degrees, agitating briskly, E. D.)—(Tincture of Tolu, fʒi. Syrup, Oij. Mix the Tincture with the Syrup, and



by means of the water bath evaporate to the proper consistence. U. S.) Employed as an agreeable flavouring adjunct to pectoral mixtures.—Dose, ℥ʒj. to ℥ʒiv.

### 3. CYTISUS SCOPA'RIUS, *De Candolle, L. E.*—COMMON BROOM.

*Spartium scoparium, Linn. D.*

*Sex. Syst. Diadelphia, Decandria.*

(*Cacumina recentia, L.—Tops, E.—Cacumina, D.*)

(*Scoparius, U. S. Sec. List.*)

**HISTORY.**—It is uncertain who first mentioned this plant. The *σπάριον* of Dioscorides (lib. iv. cap. 158,) is *Spartium junceum* or *Spanish Broom*. (Smith, *Prodr. Fl. Græc.* ii. 53.) The *Genista* of Pliny (*Hist. Nat.* lib. xxiv. cap. 40, ed. Valp.) was probably the same plant, though the Roman historian was himself doubtful whether this plant was identical with that of the Greeks. Sprengel (*Hist. Rei. Herb.* i. 80,) considers that Theophrastus was undoubtedly acquainted with Common Broom.

**BOTANY. Gen. Char.**—*Calyx* two-lipped; the upper lip generally entire, the lower one somewhat three-toothed. *Vexillum* ovate, large; *keel* very obtuse, enclosing the stamens and pistils. *Stamens* monadelphous. *Legume* plano-compressed, many-seeded, without glands.—*Shrubs. Leaves* trifoliolate (De Cand.)

**Sp. Char.**—*Branches* angular, smoothish. *Leaves* trifoliolate, stalked. *Tops* simple. *Leaflets* oblong. *Flowers* axillary, stalked, solitary. *Legumes* hairy at the margin (De Cand.)

A *shrub*, three to six feet high. *Branches* long, straight, and green. *Leaves* deciduous; upper ones generally simple. *Flowers* large, bright yellow; *keel* broad; *vexillum* and *ale* much spreading. *Legumes* large, dark-brown, containing fifteen or sixteen seeds.

**Hab.**—Indigenous; growing on dry hills and bushy places. Flowers in June.

**DESCRIPTION.**—Broom tops (*scoparium; cacumina scoparii*) have a bitter, nauseous taste, and, if fresh, a remarkable odour when bruised.

**COMPOSITION.**—The flowers of broom contain, according to Cadet de Gassicourt, (*Journ. de Pharm.* x. 445) *concrete volatile oil, salty matter, wax, chlorophylle, yellow colouring matter, tannin, a sweet substance, mucilage, ozmazome, albumen, and woody fibre.* The ashes amounted to 5.75 per cent., and contained 29 per cent. of carbonate of potash, besides chloride of potassium, sulphate of potash, chloride of calcium, nitrate, phosphate, and sulphate of lime, carbonates of lime, magnesia, and iron, and silica.—*Salt of broom, or sal genisteæ,* is obtained by burning the whole plant. It contains a large portion of carbonate of potash. Hill (*Hist. of the Mat. Med.* 397,) says, that a pound of the green twigs, with the leaves and flowers, yields a drachm and a half of this salt.

**PHYSIOLOGICAL EFFECTS. a. On Animals generally.**—In some parts of Europe broom is employed as winter food for sheep; and Withering says that it prevents the disease called rot, and is salutary in dropsy, to which sheep are liable. According to Loudon, it is apt to produce disease of the urinary organs, to prevent which a plentiful use of water is recommended.

**β. On Man.**—*In large doses* broom-tops are an emetic and purgative. *In small doses* they are diuretic and mildly laxative. As a diuretic they have been celebrated by Mead and Cullen.—“Though very little in use,” says Dr. Cullen, (*Mat. Med.*) “I have inserted this in my catalogue from my own experience of it. I found it first in use among our common people; but I have since prescribed it to some of my patients in the manner following:—I order half an ounce of fresh broom-tops to be boiled in a pound of water till one-half of this is con-



sumed, and of this decoction I give two table-spoonfuls every hour, till it operates by stool and urine; and by repeating this exhibition every day, some dropsies have been cured." Having very frequently employed broom in dropsies, I can add my testimony to its powerful effects as a diuretic. I cannot call to mind a single case in which it has failed to act on the kidneys. In some cases it produced a most marked and beneficial effect on the dropsical effusion. According to my experience, it is more certain than any other diuretic in dropsies. Dr. Pearson (*Observ. on Broom-seed*, 1835,) terms broom a *tonico-diuretic*; and says it improves the appetite, and invigorates the whole system.

**USES.**—It has been principally or solely employed in dropsies, and, as already mentioned, sometimes with great benefit. Of course its chance of cure depends on the nature of the cause of the dropsical effusion. In acute inflammatory cases, as well as in diseased kidney, its use might be objectionable. It is said also not to be adapted to thoracic dropsy, especially when combined with pulmonary congestion, or any degree of inflammatory affection of the chest.

**ADMINISTRATION.**—Broom-tops are usually given in the form of *infusion* or *decoction*. The *seeds*, which keep much better than the tops, and on that account have an advantage over the latter, may be used in the form of powder, in doses of grs. x. to grs. xv. in mint water, or cold ginger tea; or in the form of tincture (see *Spartium junceum*). To promote the operation of broom, diluents should be freely used.

1. INFUSUM SCOPARII, L.; *Infusion of Broom; Broom Tea*. (Scoparium, ℥j.; Boiling Distilled Water, Oj. Macerate for four hours in a lightly covered vessel, and strain).—A *decoction* is to be preferred to the infusion.—Dose, as a diuretic in dropsy, ℥℥j. to ℥℥ij.

2. DECOCTUM SCOPARII COMPOSITUM, L.; *Decoction Scoparii*, E.; *Decoction of Broom*. (Scoparium, Juniper fruit, Dandelion, of each ℥ss.; Distilled Water, Oiss. Boil down to a pint, and strain, L.—Broom-tops, and Juniper-tops, of each ℥ss.; Bitartrate of Potash, ℥ijss.; Water, Oiss. Boil them down together to a pint, and then strain, E.)—Diuretic and laxative.—Dose, ℥℥j. to ℥℥ij.

3. EXTRACTUM SPARTII SCOPARII, D.; *Extract of Broom*. (Prepared by the evaporation of the decoction of the tops.)—Diuretic and laxative. Employed only as a diuretic in dropsy.—Dose, ℥ss. to ℥j. Rarely used.

#### 4. GLYCYRRHIZA GLABRA, Linn. L. E. D.—COMMON LIQUORICE.

*Sex. Syst.* Diadelphia, Decandria.

(Radix recens, L.—Root. Extract of the Root, E.—Radix, D.)

(Glycyrrhiza, U. S.—Liquorice Root. Extractum Glycyrrhize, U. S.—Liquorice.)

**HISTORY.**—The γλυκύριζα of Hippocrates, and that of Dioscorides, (Lib. iii. cap. 7,) are doubtless identical; the latter is supposed by Sprengel (*Hist. Rei Herb.* i.) and others to be our *Glycyrrhiza glabra*; by Dierbach (*Arzneim. d. Hippokrates*), to be *G. glandulifera*, but by Dr. Sibthorp (*Prodr. Fl. Græca*, ii. 77,) it is said to be the *G. echinata*, which is now termed in Greece γλυκύριζα. *Glycyrrhiza glabra* is called in the *Pharmacopœa Græca*, γλυκύριζα.

**BOTANY.** **Gen. Char.**—*Calyx* naked, tubular, five-cleft, two-lipped; with the two upper lobes united more than the others. *Vexillum* ovate-lanceolate, straight; *keel* two-parted or two-petalous, straight, acute. *Stamens* diadelphous. *Style* filiform. *Legume* ovate or oblong, compressed, one-celled, one to four-seeded.—Perennial herbs with extremely sweet roots. *Leaves* unequally-pinnated. *Racemes* axillary. *Flowers* blue, violet, or white (De Cand.)

**Sp. Char.**—*Leaflets* ovate, slightly retuse, viscid beneath. *Stipules* none. *Spikes* pedunculated [i. e. racemes], shorter than the leaves. *Flowers* distant. *Legumes* smooth, three or four seeded (De Cand.)



*Stem* erect, smooth, four or five feet high. *Leaflets* yellowish-green. *Flowers* papilionaceous, bluish or purplish.

*Hab.*—South of Europe. Cultivated at Mitcham in Surrey, and at other places, for medicinal use.

*DESCRIPTION.*—The underground stem is denominated *liquorice-root* (*radix glycyrrhizæ* seu *liquiritiæ* vel *liquoricæ*) or *stick liquorice*. It is in long cylindrical pieces, about the thickness of the finger. Externally it is grayish brown, internally yellow. Its odour is rather sickly and earthy: its taste remarkably sweet.

*COMPOSITION.*—Liquorice root (*G. glabra*) was analyzed by Robiquet in 1809, (*Ann. de Chim.* lxii. 143.) Trommsdorff (Gmelin, *Handb. d. Chem.* ii. 1261,) analyzed the root of *G. echinata*. The constituents of the fresh root of *G. glabra* are, according to Robiquet, *glycyrrhizin*, *starch*, *asparagin*, *resinous oil*, *albumen*, *woody fibre*, and *salts* (phosphate and malate of lime and magnesia).

1. *GLYCYRRHIZIN* (*Glycion* or *Liquorice Sugar*).—Belongs to the uncrystallizable sugars which are not susceptible of vinous fermentation (see vol. i. p. 77). It is characterized by its affinity for acids, with which it unites to form compounds which are very slightly soluble only in water. It is yellow and transparent, and has the sweet taste of the root. It is soluble in both water and alcohol. Acids precipitate it from its solution. It combines also with bases as well as with salts. It causes precipitates with many metallic solutions.

2. *RESINOUS OIL.*—To this constituent, liquorice root owes the slight degree of acidity which it possesses.

*PHYSIOLOGICAL EFFECTS.*—Liquorice root and its extract are emollient, demulcent, and nutritive.

*USES.*—Employed as an emollient and demulcent in catarrhal affections of the mucous membranes. It is also used as a flavouring adjunct to other medicines. Its powder is employed in the preparation of pills, either to give them a proper consistence, or to prevent their adhesion.

*ADMINISTRATION.*—For medicinal use the root should be *decorticated*, as the epidermis possesses a slight degree of acidity.

1. *DECOCTUM GLYCYRRHIZÆ*, D.; *Decoction of Liquorice*.—(Liquorice Root bruised, ℥ss.; Water, Oj. [*wine measure*]. Boil for ten minutes, and strain).—An agreeable demulcent: used as a vehicle for other medicines.

2. *EXTRACTUM GLYCYRRHIZÆ*, L. E. D. (U. S.); *Extract of Liquorice*.—(Prepared as Extract of Gentian, L. D.—Cut liquorice-root into small chips, dry it thoroughly with a gentle heat, reduce it to a moderately fine powder, and proceed as for extract of Gentian, E.)—Extract of liquorice is extensively imported under the name of *liquorice juice*, or, according to the countries from where it is brought, *Spanish* or *Italian juice*. *Solazzi juice* is most esteemed. The Spanish extract is prepared in Catalonia from *G. Glabra*; while the Italian extract is obtained in Calabria from *G. echinata*, (Fée, *Cours. d'Hist. Nat.* ii. 24.) In 1839 there were imported 4059 cwts. of foreign extract of liquorice, the duty on which is £3. 15s. per cwt. It comes in cylindrical or flattened rolls of five or six inches long, and about one inch in diameter, and enveloped in bay leaves. When pure it is black and dry, with a glossy fracture and a sweetish taste; and is completely soluble in water. As met with in commerce, however, it is rarely pure. Neumann (Works by Lewis, p. 425,) obtained 460 parts of watery extract from 480 of Spanish liquorice. It contains the soluble principles of the root, with some copper scraped off the boiler by the spatula employed to stir the extract during its preparation. Fée says, that four ounces of this extract yield two drachms and a half of metallic copper; but I suspect there must be some great mistake in this statement. If the foreign extract be dissolved in water, and the solution filtered and inspissated, we obtain *refined liquorice*. But I am informed that the *pipe refined liquorice* of the shops is a very adulterated article. The *Pontefract lozenges* are made of refined liquorice, and are much esteemed.



Another preparation has been recently introduced under the name of *quintessence of liquorice*. Extract of liquorice is dissolved slowly in the mouth, to appease tickling cough. It is a very agreeable flavouring adjunct to other medicines. As it easily becomes soft by warmth, it does not answer well as a pill-basis.

3. **TROCHISCI GLYCYRRHIZÆ, E.**; *Liquorice Lozenges*.—Extract of Liquorice; Gum Arabic, of each ʒvi.; Pure Sugar, lb. i. Dissolve them in a sufficiency of boiling water; and then concentrate the solution over the vapour-bath to a proper consistence for making lozenges.)—Employed in tickling cough and irritation of the fauces.

(4. **TROCHISCI GLYCYRRHIZÆ ET OPII, U. S.** *Troches of Liquorice and Opium*. Take of Opium in powder, half an ounce; Liquorice in powder, Sugar in powder, Gum Arabic in powder, each ten ounces; Oil of Anise, two fluidrachms. Mix the powders intimately; then add the Oil of Anise, and with water form them into a mass, to be divided into troches, each weighing six grains.—Employed in coughs and catarrhs, under the name of Wistar's Cough Lozenges. Two or three are the dose.)

5. **ASTRAGALUS, De Candolle.**—MILK VETCH.

*A. ve'rus*, Olivier, L.  
*A. gummifer* and probably *A. ve'rus* and other species, E.  
*A. cre'ticus*, Lamarek, D.

*Sex. Syst.* Diadelphia, Decandria.

(*Succus concretus*, L.—Gummy exudation, E.—Gummi, D.)  
(*Tragacantha*, U. S.)

**HISTORY.**—Dr. Sibthorp (*Prodr. Fl. Græc.* ii. 90,) states, that the *τραγάκανθα* of Dioscorides (lib. iii. cap. 23,) is the *Astragalus aristatus*, which in the Peloponnesus is still called *τραγάκανθα*, and whose gum is annually sent to Italy.

**BOTANY. Gen. Char.**—*Calyx* five-toothed. *Corolla* with an obtuse keel. *Stamens* diadelphous. *Legume* two-celled, or half two-celled by the lower [dorsal] suture being turned inwards.—*Herbs* or *shrubs* (De Cand.)

**Species 1. A. VE'RUS, L. E. (U. S.)**—*Flowers* axillary, in clusters of two to five, sessile. *Calyx* tomentose, obtusely five-toothed. *Leaflets* eight to nine pairs, linear, hispid (De Cand.)—A small *shrub*. *Branches* covered with imbricated scales and spines, the remains of former petioles. *Flowers* yellow, papilionaceous. Persia. According to Olivier the Tragacanth of Asia Minor, Armenia, and Northern Persia, forming the greater part of that of Europe, is yielded by this species.

2. **A. GUM'MIFER, E.**—*Flowers* three to five axillary, sessile. *Calyx* five-cleft, together with the legumes woolly. *Leaflets* four to six pairs, oblong-linear, smooth (De Cand.)—Lebanon. According to La Billardièrè this species yields Tragacanth (De Cand.) Dr. Lindley (*Botanical Register*, May 1840,) received this plant from Mr. Brant, English Consul at Erzeroum, as the tragacanth plant of Koordistan, which yields the white or best kind of tragacanth.

3. **A. CRE'TICUS.**—*Flowers* axillary, sessile, clustered. *Calyx* five-partite, with feathery, setaceous lobes rather longer than the corolla. *Leaflets* five to eight pairs, oblong, acute, tomentose (De Cand.)—Mount Ida, in Crete, where it yields Tragacanth, according to Tournefort.

4. **A. STROBILIF'ERUS, Lindley.**—*Flowers* capitate in an ovate, sessile, axil-

FIG. 222.



*Astragalus creticus.*



lary strobile.—*Bracts* imbricated, pointletted, tomentose. *Calyx* feathery, five-cleft. Segments of the *corolla* equal. *Leaflets* three-paired, woolly, oval, awned at the apex, narrow at the base (Lindley).—Koordistan.—This plant was sent by Mr. Brant as “the shrub from which the red or inferior species of gum tragacanth is produced.” (*Botanical Register*. Lond. 1840. Miscellaneous Notices, p. 38.)

**PRODUCTION.**—Tragacanth is a natural exudation from the stem of the before-mentioned plants. The cause of the exudation of this, as of other gums, is thus explained by De Candolle. (*Phys. Vég.* t. i.) The gummy matter resides in the bark and albumen; it is the nutritive juice of the plant; and its escape, therefore, is analogous to hemorrhage in animals: hence plants in whom it spontaneously occurs are always in a sickly state. The mechanical cause of the expulsion of this juice is dependent on the unequal hygrometric properties of the different parts of the stem. The wood absorbs more moisture from the air than bark, and hence it swells more. In consequence of its enlargement, it distends the bark, which, by the internal pressure of the wood, gives way, and the gummy matter escapes. This explanation is quite in conformity with facts mentioned by La Billardière,—that tragacanth flows only in abundance during the night, and a little after sunrise. A cloudy night, or a heavy dew, is, he thinks, necessary for its production; for the shepherds of Lebanon only go in search of this substance when the mountain has been covered during the night with thick clouds.

**DESCRIPTION.**—Tragacanth (*gunmi tragacantha*) is frequently called in the shops *gum dragon*.—It is white, yellowish, or yellowish-brown, hard, tough, odourless, tasteless, swelling considerably in water, and forming a thick, tenacious mucilage. Two kinds of it are known.

**1. Flaky Tragacanth:** *Smyrna Tragacanth* (Martius): *Tragacanth of the Astragalus verus?*—This is the tragacanth usually found in English commerce. It occurs in moderately large, broad, thin pieces, marked with arched or concentric elevations.

**2. Vermiform Tragacanth:**—*Morea Tragacanth* (Martius): *Tragacanth of the Astragalus creticus?*—This variety is rarely met with in this country, but is common on the continent. It occurs in small, twisted, filiform, spiral pieces. There is more starch in it than in the first variety.

**COMMERCE.**—Tragacanth is imported in cases and chests from Smyrna and other ports of the Levant. In 1836, duty (6s. per cwt.) was paid on 87 cwts.

**COMPOSITION.**—The *ultimate* analysis of tragacanth has been made by Hermann and by Guerin-Varry. (*Journ. de Chim. Méd.* vii. 742.)

Hermann's Analysis.			Guerin-Varry's Analysis.	
Atoms.	Eq. Wt.	Per Cent.	Soluble part.	Insoluble ditto.
Carbon.....	10	60	42.01	35.79
Hydrogen.....	10	10	6.42	7.11
Oxygen.....	10	80	54.57	57.10
Tragacanth gum 1	150	100.00	103.00	100.00

In 1805, Vauquelin (*Ann. Chim.* liv. 312,) made an examination of the *proximate* constituents of tragacanth. In 1815, Bucholz, (*Gmelin, Handb. d. Chem.* ii. 779,) and in 1831 Guerin-Varry, (*op. supra. cit.*) published proximate analyses of this gum.

Bucholz's Analysis.		Guerin-Varry's Analysis.	
Common gum.....	57	Arabin.....	53.30
Bassorin.....	43	Bassorin and starch.....	33.10
		Water.....	11.10
		Ashes.....	2.50
Gum Tragacanth.....	100	Gum Tragacanth.....	100.00

**1. TRAGACANTHIN.**—*Adragantin*. *Soluble gum* or *Arabin* of Tragacanth.—The soluble gum of Tragacanth is usually regarded as similar to gum Arabic, and hence it is called



arabine; but is distinguished by silicate of potash and perchloride of iron producing no change in it, and by a peculiar appearance of the precipitate produced with alcohol (the precipitate is flocculent, and collects in a simple opaque and mucous mass).—In common with arabine it produces precipitates with diacetate of lead, protochloride of tin, and protonitrate of mercury. Oxalate of ammonia detects in it a calcareous salt.

2. **BASSORIN.** *Insoluble gum of Tragacanth*.—The insoluble part of gum tragacanth is similar to that of gum Bassora, and hence is called *Bassorin*. It swells up in water.

3. **STARCH**.—Starch globules may be detected in the bassorin (when swollen up by water) both by the microscope and by iodine.

According to Guibourt (*Hist. des Drog.* ii. 477.) tragacanth contains neither arabin nor bassorin, but is essentially formed by an organized gelatiniform matter, very different to gum Arabic both in its physical and its chemical properties, and which swells and divides in water, so as in part to pass through a filter. The insoluble part of tragacanth is, according to the same authority, a mixture of starch and lignin, which has nothing in common with bassorin. De Candolle suggests that the insolubility and swelling of tragacanth in water may arise from the gummy matter being contained in cells.

**PHYSIOLOGICAL EFFECTS.**—Like other gums, tragacanth is emollient, demulcent, and nutritive; but difficult of digestion.

**USES.**—Tragacanth, in powder, is used rather as a vehicle for active and heavy medicines (as calomel), than on account of its own proper effects. It is occasionally, however, taken as a sheathing or demulcent agent in irritation of the mucous membranes.

**ADMINISTRATION.**—Dose of the powder, ʒss. to ʒij.

1. **PULVIS TRAGACANTHÆ COMPOSITUS, L. E.** *Compound Powder of Tragacanth*.—(Tragacanth, bruised; Gum Arabic, bruised; Starch, of each, ʒiiss.; Pure Sugar, ʒiij. Rub the Starch and Sugar together to powder, then having added the Tragacanth and Gum Arabic, mix them together.)—Employed as a vehicle for the exhibition of active and heavy powders to children.—Dose for an adult, ʒss. to ʒj.

2. **MUCILAGO TRAGACANTHÆ, E. (U. S.)** *Mucilage Gummi Tragacanthæ, D.* *Mucilage of Tragacanth*.—Tragacanth, ʒij.; Boiling Water, ʒix. "Macerate for twenty-four hours, then triturate to dissolve the gum, and express through linen or calico." *E.*—The *Dublin College* directs the powdered gum to be used, and employs ʒviiij. of water. Maceration is to be effected in a close vessel, until the gum is dissolved, and the mucilage then strained.)—[Tragacanth, ʒi.; Boiling Water, Oj. Macerate the Tragacanth in the water for twenty-four hours, occasionally stirring, then triturate it so as to render the mucilage uniform, and strain forcibly through linen, U. S.]—Employed in making pills and lozenges; also to suspend heavy powders, as the metallic oxides, in water. It has also been recommended as an application to burns.

6. **MUCUNA PRURIENS, De Candolle, L. E.**—COMMON COWHAGE OR COW-ITCH.

*Dol'ichos pru'riens, Linn. D.*—*Stizolo'bium pru'riens, Persoon.*

*Sex. Syst.* Diadelphia, Decandria.

(*Leguminum Pubes, L.*—Hairs from the Pod, *E.*—*Pubes Leguminis, D.*)

(*Mucuna, U. S. Sec. List.*)

**HISTORY.**—One of the earliest writers who mention this plant is Ray. (*Hist. Plant.* vol. i. p. 887.) It was long confounded with the *M. Prurita*, Hooker.

**BOTANY. Gen. Char.**—*Calyx* campanulate, two-lipped; the lower lip trifid, with acute segments, the middle one the longest; the upper lip broader, entire, obtuse. *Vexillum* ascending, shorter than the alæ and keel; alæ oblong, as long as the keel; keel oblong, straight, acute. *Stamens* diadelphous; *anthers* ten, of which five are oblong-linear and five ovate, hirsute. *Legume* oblong, knotted, two-valved, with cellular partitions. *Seeds* roundish, surrounded by a circularly linear hilum.—*Twining herbs or shrubs. Leaves* pinnately trifoliate. *Racemes* axillary. *Legumes* usually hispid and stinging, by the innumerable very brittle hairs which readily penetrate the skin (De Cand.)



**Sp. Char.**—Flowers in racemes. Legumes stinging, with somewhat keeled valves. Leaflets hairy beneath, acuminate; the middle one rhomboidal, the lateral ones dilated externally (De Cand.)—Root perennial. Stem herbaceous. Flowers with a disagreeable alliaceous odour; vexillum flesh-coloured; alæ purple or violet; keel greenish-white.

**Hab.**—West Indies.

**MUCUNA PRURITA**, Hooker. (*Bot. Miscell.* ii. 348.)—A native of the East Indies; has been usually confounded with the American *M. pruriens*; but is distinguished by its smaller leaves, its more obtuse (not acuminate) leaflets, the middle one being more truly rhomboidal; its flowers more constantly in threes, and by its legumes being greatly broader, compressed, free from any raised line on the back of the valve; whilst in the American *M. pruriens* the pods are much narrower, terete, and keeled in the valves.

**DESCRIPTION.**—Cowhage or Cow-itch (*siliqua hirsuta*) is the legume of the *Mucuna pruriens* (*legumen mucunæ, stizolobii vel dobichos pruriensis*). It is of a brownish colour, is shaped like the letter *f*, about four or five inches long, contains from four to six seeds, and is clothed with strong, brown, bristly, stinging hairs (*pubis leguminis; setæ siliquæ hirsutæ*), which, examined by the microscope, appear like porcupines' quills, but are slightly notched or serrated towards the point.

**COMPOSITION.**—The hairs contain tannin. (Martius, *Pharmakogn.*)

**PHYSIOLOGICAL EFFECTS.**—A decoction of the root or of the legumes is said to be diuretic, and was formerly used in dropsy. (Browne, *Jamaica*, p. 291.) The setæ applied to the skin produce intolerable itching, and, in some persons, pain, redness, swelling, and even an eruption. These effects, which are increased by rubbing, but diminished by the application of oil, are referrible to the mechanical properties of the setæ.

**USES.**—The setæ have been celebrated for their anthelmintic properties. Their action is supposed to be mechanical; that is, they are supposed to pierce and torment intestinal worms, and thereby to oblige them to let go their hold. In support of this explanation, Mr. Chamberlaine (*Pract. Treat. on Stizolobium or Cowhage*, p. 57, 9th edit. 1804,) tells us he sprinkled some of the hairs in a calabash full of very large round worms (*Ascaris lumbricoides*), and that in a little time the animals began to writhe and twist about, evincing thereby extreme torture. On examining them with a magnifying glass, the hairs were found sticking loosely in various parts of their bodies. Their usual want of action on the internal coat of the intestines is ascribed to the mucous secretion which defends the subjacent membrane from injury. In one case diarrhœa followed the use of a very large dose of the electuary, and in another instance enteritis came on, after taking this preparation once; but it is not certain that these were the consequences of the operation of the hairs. (Chamberlaine, *op. cit.* p. 65.)

Cowhage has been principally celebrated for expelling the large round worm (*Ascaris lumbricoides*), and the small thread-worm (*A. vermicularis*). It has not proved equally serviceable against the tape-worm (*Tænia Solium*).

**ADMINISTRATION.**—The best mode of exhibiting the setæ is in treacle, syrup, or honey. The quantity of hairs should be sufficient to give the syrup, or treacle, the consistence of honey, or of an electuary; and of this mixture a tea-spoonful may be given to children, and a table-spoonful to adults: this dose should be taken twice a day—namely, at going to bed, and in the morning an hour before breakfast. Chamberlaine says it usually operates more effectually where a gentle emetic has been premised. After continuing the electuary for three or four days, a brisk purgative of jalap, or senna, should be taken, which will in general bring away the worms.



## 7. PTEROCARPUS SANTALINUS, Linn. L. E. D.—THREE-LEAVED PTEROCARPUS.

Ser. Syst. Diadelphia, Decandria.

(Lignum, L. D.—Wood, E.)

(Santalum, U. S.)

HISTORY.—Avicenna (*Canon*. lib. ii. tract. ii. cap. 656,) mentions red sandal wood (*sandalus rubeus*). Garcias (Clusius, *Exot.* 173,) thinks the term *sandal* is a corruption of *chandama*, the name by which the wood is known in Timor.

BOTANY.—Gen. Char.—*Sepals* five, cohering to form a five-toothed calyx. *Petals* five, forming a papilionaceous corolla. *Stamens* ten; the *filaments* variously combined. *Legume* indehiscent, irregular, somewhat orbicular, surrounded by a wing, often varicose, one-seeded. *Cotyledons* thick, incurved; *radicle* somewhat inflexed at the base of the embryo.—Unarmed trees or shrubs. *Leaves* unequally pinnated (De Cand.)

Sp. Char.—Arboreous. *Leaflets* three (rarely four or five?), roundish, retuse, glabrous. *Racemes* axillary, simple or branched. *Petals* long-clawed, all waved or curled on the margins. *Stamens* combined into a sheath, split down to the base on the upper side, and halfway down on the lower. *Legume* long-stalked, surrounded by a broad, membranous wing, obtuse at the base, one or rarely two-seeded (Wight and Arnot).

A lofty tree. *Flowers* yellow with red veins.

Hab.—Mountains of Coromandel and Ceylon.

DESCRIPTION.—Red Sandal or Red Sander's wood (*lignum santali rubri*; *lignum santalinum rubrum*) is imported in roundish or somewhat angular billets, which are blackish externally, but of a blood-red internally. It is compact, heavy, of a fibrous texture, but is capable of taking a fine polish; almost tasteless, and inodorous, except when rubbed, when it emits a feeble smell. It scarcely communicates colour to water. Alcohol, as well as alkaline solutions, readily extract the colouring matter. The alkaline solution is violet-red, and forms a precipitate (*santalin*) on the addition of acids. The alcoholic solution produces precipitates with several metallic solutions: thus, violet with solutions of lead, scarlet with bichloride of mercury, and deep violet with sulphate of iron.

COMPOSITION.—Red sandal wood was analysed by Pelletier, (*Journ. Phys.* lxxix. 268,) who found in it a peculiar colouring matter, which he called *santalin* (about 16.75 per cent.), *extractive*, *gallic acid*, and *woody fibre*.

SANTALIN is dark red, with a resinous appearance; almost insoluble in water, but soluble in alcohol, alkaline solutions, ether, acetic acid, and slightly so in some of the volatile oils (as the oils of lavender and rosemary). The effects produced on its alcoholic and alkaline solutions by salts, &c. are similar to those above mentioned on the tincture of the wood. The composition of santalin is, carbon 75.03, hydrogen 6.37, oxygen 18.6; or  $C^{16}H^8O^3$ .

USES.—It is employed in medicine as a colouring agent. (See *Tinctura Lavandulae composita*.)

## 8. PTEROCARPUS ERINACEUS, Lamarck, L. E.—THE HEDGEHOG PTEROCARPUS.

Ser. Syst. Diadelphia, Decandria.

(Extractum, L.—Kino. Concrete exudation of this and other undetermined genera and species, E.—Kino [plant yielding it unnamed], D.)

(Kino, U. S.—Plant uncertain.)

HISTORY.—In 1757 Dr. Fothergill (*Med. Obs. and Inq.* i. 358, 4th ed. 1776) described an astringent gum, which he supposed (though on very loose evidence) to have been brought from the river Gambia; and hence he termed it *gummi rubrum astringens gambiense*. In 1774 it was introduced into the Edinburgh Pharmacopœia as *gummi kino*; and in 1787 into the London Pharmacopœia as *resina kino*. It was described under this designation in the



3rd edition of Lewis's *Exp. Hist. of the Mat. Med.*, by Dr. Aikin, in 1784. In 1794 Schenck (*Coll. Diss. Med. Marburg*, t. v.) published an inaugural dissertation on it. I have not been able to ascertain why it was called kino; nor can the precise nature of the substance referred to be now ascertained. Several years since I accidentally met with, in the warehouse of an old drug firm in London, a substance marked *gummi rubrum astringens*, which I was told had formerly fetched a very high price. It has subsequently proved to be *Butea gum*. I was at first inclined to believe that it was the original astringent gum of Fothergill, and it has been described by Professor Guibourt (*Hist. des Drogs.* ii. 428, 3<sup>me</sup> éd.) as *gomme astringente de Gambie*. But a more attentive perusal of Fothergill's paper has led me to doubt their identity (see *Butea gum*). It is somewhat remarkable, however, that the Hindu name for *Butea gum* is *kueni* or *kuenee*. Is this the source of the European term *kino*?

**BOTANY. Gen. Char.**—See *Pterocarpus santalinus*.

**Sp. Char.**—*Leaflets* alternate, elliptical, obtuse, smooth above, rufous-pubescent beneath. *Fruit* with a very short, lateral, straight point. (De Cand.)

*Middling-sized tree. Leaves* deciduous. *Flowers* papilionaceous, numerous, yellow.

**Hab.**—Woods of the Gambia; Senegal.

**EXTRACTION OF THE JUICE OF PTEROCARPUS ERINACEUS.**—"When an incision is made" in the trunk and branches of the tree, "the juice flows out, at first of an extremely pale-red colour, and in a very liquid state; but it soon coagulates, becoming of a deep blood-red hue, and so remarkably brittle, that its collection is attended with some difficulty." (Gray, *Trav. in Western Africa*, in Stevenson and Churchill's *Med. Bot.*)

**COMMERCE OF KINO.**—Two substances are met with in English commerce under the name of kino—one called *Botany Bay Kino*, which is the inspissated juice of the *Eucalyptus resinifera* (before described), the other, apparently an extract, imported from Bombay and Tellicherry, and which may be termed *East Indian Kino*. The latter is presumed to be the substance referred to in the British pharmacopœias, as it is always regarded in commerce as *genuine gum kino*. It is imported in boxes.

In my museum I have several other substances, apparently extracts, which I have received as *kino*, mostly from Professor Guibourt, who has described several of them in his *Hist. des Drogs.* ii. 428. One of these is, perhaps, *Jamaica kino*. A second I received as *Colombian kino*. A third I believe to be *foreign extract of rhatany*. I have never met them in English commerce, and therefore think it needless to describe them.

**DESCRIPTION.**—*East Indian kino* (*kino indicum* seu *ostindicum*), sometimes called *Ambayna kino* (*kino amboinense*), and usually known in the shops as *gum kino* (*kino*, Ph. L. E. D.) occurs in small, angular, glistening fragments, the larger of which appear almost black, the smaller being reddish. When entire they are opaque, but in thin laminæ are transparent and ruby-red. They are brittle between the fingers, soften in the mouth, stick to the teeth, and colour the saliva red. They are inodorous, but have a very astringent taste. Both water and alcohol acquire, by digestion on kino, a deep red colour. The aqueous decoction becomes turbid on cooling. The mineral acids and solutions of gelatine, emetic tartar, acetate of lead, sesquichloride of iron, nitrate of silver, &c. produce precipitates with the watery infusion.

The tree yielding East Indian kino is as yet unascertained. It is probably a native of the Malabar coast, for all the importations of East Indian kino which I can trace were from Bombay or Tellicherry; and an experienced East India broker assures me it is the produce of the Malabar coast. As *Pterocarpus erinaceus* is not known to grow in India, there is no ground for ascribing East Indian kino to that species. Is it the produce of *Pterocarpus marsupium*, which Dr. Roxburgh (*Fl. Ind.* iii. 235) says yields an astringent inspissated juice exceedingly like *Butea gum*? I am indebted to Mr. Edward Solly for a



sample of extract of *Pterocarpus marsupium*, which he received from Dr. Gibson. It is a dark red, tenacious, acidulous, moderately astringent substance. It differs, therefore, from the gummy resin which Dr. Roxburgh describes as being the product of this tree. This accurate naturalist describes it as being very brittle, and having a strong, but simply astringent taste; characters which apply to East Indian kino.

COMPOSITION.—East Indian kino was analyzed by Vauquelin, (*Ann. de Chim.* xlvi. 321,) who found its constituents to be as follows:—*tannin* and *peculiar extractive* 75, *red gum* 24, *insoluble matter* 1. A. W. Buchner (*Pharm. Central-Blatt für* 1833, S. 629 & 652,) has subsequently shown that *catechine* is a constituent of kino. To this substance, which has been before noticed, kino owes its power of communicating a green colour to the salts of iron.

PHYSIOLOGICAL EFFECTS.—Astringent (see vol. i. p. 188). Less effective, and less readily dissolved in the alimentary juices, than catechu, to which in its operation it is otherwise closely allied.

USES.—Employed in medicine as an astringent only; principally in obstinate chronic *diarrhœa*. In this disease it is usually given in combination with chalk, and frequently with opium. In *pyrosis* the compound powder of kino (*i. e.* opium and kino) has been found serviceable. Dr. Pemberton (*Diseases of the Abdom. Viscera.*) ascribes to kino a power of restraining the discharge of the mucous glands of the intestinal canal when they are secreting too much, and of contracting vessels already too much relaxed, without exerting any such power over the glands and vessels when they are acting naturally. It has been administered as an astringent in *leucorrhœa* and *sanguineous exhalations*, and as a tonic in *intermittents*. As a topical astringent it has been applied to flabby ulcers, and used as a gargle, injection, and wash.

ADMINISTRATION.—The dose of the powder is grs. x. to ʒss.

1. TINCTURA KINO, L. E. D.; *Tincture of Kino*. (Kino, bruised, ʒiijss. [ʒiij. D.]; Rectified Spirit, Oij. [Proof Spirit, Oij. wine-measure, D.] Digest for seven days [fourteen, L.], and strain. "This tincture cannot be conveniently prepared by the process of percolation," E.)—Astringent. Used in diarrhœa and hemorrhages, generally as an adjunct to the chalk mixture.—Dose, fʒj. to fʒij.—It is said that by keeping, this tincture has in some instances become gelatinous, and lost its astringency. Where this occurred, probably the *Botany Bay kino* (inspissated juice of the *Eucalyptus resinifera*) had been employed.

2. PULVIS KINO COMPOSITUS, L. D.; *Compound Powder of Kino*. (Kino, ʒxv.; Cinnamon, ʒss.; Hard Opium, ʒj. Rub them separately to a very fine powder; then mix them.)—Twenty grains of this powder contain one grain of opium.—This powder is employed as an astringent in chronic diarrhœa, pyrosis, &c.—The dose of it is grs. v. to ʒj.

#### SUB-ORDER II.—MIMOSEÆ.

##### 9. ACACIA, De Candolle.—VARIOUS SPECIES YIELDING GUM, E.

*Aca'cia ve'ra*, L.—*Aca'cia arab'ica* et *A. ve'ra*, D.

*Sex. Syst.* Polygamia, Monœcia.

(Gummi, L. D.—Gum, E.)

(Acacia, U. S.—Gum Arabic.)

HISTORY.—The Shittah tree, (*Isaiah*, xli. 19,) whose wood is mentioned in several parts of the Old Testament, (as *Exod.* xxv. 5,) is supposed to have been an *Acacia*. By some it has been thought to have been the *A. vera*, (Carpenter, *Script. Nat. Hist.*) by others the *A. horrida*. (*Picture Bible.*)

Hippocrates speaks of the *Acacia*, (*Ἄκανθα* or *Thorn*, p. 568, ed. Fœs.) which he sometimes calls the *Egyptian Acacia*, (*Ἄκανθα*, p. 671,) at other



times the *White Acacia* ("Α. λευκή, p. 632). He is usually supposed to refer to *Acacia Vera*; but Dierbach (*Arzneim d. Hippok.*) is of opinion that *A. Senegal* is meant; which, he observes, is distinguished by its white bark, white wood, and white flowers, and therefore the term *white* could apply to it only. Furthermore, the *white fragrant ointment* (Μύρον λευκὸν αἰγυπτίον, p. 265,) was probably prepared from the flowers of the *A. Senegal*, and not of *A. vera*, whose flowers would yield a yellow ointment, and have not such an agreeable odour as those of the former species. Hippocrates (pages 667 and 686,) also mentions *gum* (κόμμι), which he used in medicine. Delile (*Flore d'Egypte*, p. 286, fol.) considers the "Ακανθα δίψας (*Thirsty Thorn*) of Theophrastus (*Hist. Plant.* lib. iv. cap. 8,) to be *Acacia Seyal*, which Pliny (*Hist. Nat.* lib. xiii. cap. 1, ed. Valp.) calls *Spina siliens*.

**BOTANY. Gen. Char.**—*Flowers* polygamous. *Calyx* four to five-toothed. *Petals* four to five, either free or cohering to form a four to five-cleft corolla. *Stamens* varying in number, ten to two hundred. *Legume* continuous, juiceless, two-valved.—*Shrubs* or *trees*. *Thorns* stipular, scattered, or none. *Flowers* yellow, white, or rarely red, capitate or spiked (De Cand.)

**Species.** 1. *A. vera*, Willdenow, L. D. *Mimosa nilotica*. Linn. *Egyptian Thorn*.—*Spines* in pairs. *Branches* and *leaves* smooth. *Pinnæ* two pairs; *leaflets* eight to ten pairs, oblong-linear; with a gland between the pinnæ. *Flowers* in globose heads; heads about two together, stalked, axillary. *Legume* moniliform, (De Cand.)—Middling-sized tree. *Flower-heads* bright yellow.—A native of Arabia, and of Africa from Senegal to Egypt. Its fruit, termed *Egyptian and Senegal bablah* (*bablah d'Egypte et du Sénégal*, Guibourt), has been employed in tanning and dyeing. The *succus acacia verae* is the inspissated juice of the unripe fruit, and was formerly used as an astringent. *Acacia vera* yields *gum Arabic*, and also a portion of the *gum Sénégal*.

2. *A. arabica*, Willd. D. *Acacia nilotica*, Delile. *Mimosa arabica*, Roxburgh.—*Spines* in pairs. *Branches* and *petioles* pubescent. *Pinnæ* four to six pairs; *leaflets* ten to twenty pairs, oblong-linear, with a gland beneath the inferior and often between the last pinnæ. *Flowers* in globose, stalked, axillary, subternate heads. *Legume* moniliform. (De Cand.)—A small tree. *Flower-heads* yellow.—Considered by Ehrenberg to be a variety of the preceding species.—A native of Senegal, Egypt, Arabia, and India.—Its fruit, termed *Indian bablah* (*bablah de l'Inde*, Guibourt), is used for tanning and dyeing. Probably yields part of the *gum Arabic* and *East Indian gum*.



*A. arabica.*

3. *A. Karoo*, Hayne, Nees and Ebermaier.—Cape of Good Hope. Said to yield *Cape gum*.

4. *A. Gummifera*, Willdenow.—Arabia; Africa, near Mogadore. Said by Forskål (*Fl. Egypt.*

*Arab.* cxxiv.) to yield a gum, which is collected by the Arabs. Probably furnishes, in part at least, *Barbary gum*.

5. *A. Seyal*, Delile.—Egypt and Senegambia. Yields a gum which forms part of *gum Senegal*. The tears are white, hard, vitreous, and vermiform.

6. *A. tortilis*, Forskål, Nees and Ebermaier.—Arabia. Its gum is collected by the Bedouins of the desert.

7. *A. Ehrenbergii*, Hayne, Nees and Ebermaier.—Arabia. Its gum is collected by the Bedouins of the desert.

8. *A. Senegal*, Willdenow; *A. Verek*, Adanson.—Arabia and Africa, from Senegal to the Cape of Good Hope. Abundant in the forest of Sahel, near Senegal. Yields *gum Senegal* in vermiform, ovoidal, or spheroidal tears, which are wrinkled externally, but are transparent internally.



**PRODUCTION OF GUM.**—The gum of the Acacia trees flows, in the liquid state, from the trunk and branches, and hardens by exposure to the air. It usually exudes spontaneously (see some remarks on the cause of the exudation of gum, p. 562). In some instances, however, the discharge is facilitated by incisions. In Barbary the largest quantity of gum is procured during the hot and parching months of July and August. "The more sickly the tree appears, the more gum it yields; and the hotter the weather, the more prolific it is. A wet winter and a cool or mild summer are unfavourable to the production of gum." (Jackson, *Account of the Empire of Marocco*, p. 137, 3d ed.) In Senegal the gum begins to flow when the tree first opens its flowers (Adanson, *Mem. de l'Ac. d. Sc. d. Paris*, 1773, p. 8); and it continues during the rainy season till the month of December, when it is collected for the first time. Another collection of the gum is made in the month of March, from incisions in the bark, which the extreme dryness of the air at that time is said to render necessary. (Demanet, *Nouv. Hist. de l'Afrique Françoise*, t. i. p. 56, quoted by Woodville, *Med. Bot.* vol. ii. p. 188.)

**COMMERCE.**—Acacia gum is the produce of Africa principally, and of Asia. It is imported from the Levant and other parts of the Mediterranean, from Barbary, Senegal, the East Indies, the Cape, &c. It comes over in chests, casks, skins, serons, bags, &c. The duty on it is 6s. per cwt. The following are the quantities on which duty was paid in 1839 (*Trade List*):

Gum from the East Indies.....	7,869 cwts.
Senegal Gum.....	24,698
Other sorts of Gum.....	7,759
Total.....	40,326 cwts.

**DESCRIPTION.**—Acacia gum (*gummi acacie*) occurs in variable-sized tears, which are inodorous, more or less coloured, have a slightly sweetish taste, and a greater or less degree of transparency. Ehrenberg asserts that the characters of gum of the same species of plant are liable to considerable variation. Thus the same tree may yield a transparent or an opaque—a light or a dark-coloured, gum. The following are the most important varieties of Acacia gum:

**1. Turkey or Arabic Gum** (*Gummi turcicum* seu *arabicum*; *Gummi Mimosaë verum*, Martius; *Gomme arabique vraie*, Guibourt).—This is imported from Leghorn, Malta, Trieste, Gibraltar, Smyrna, Alexandria, Beyrout, Constantinople, &c. It is the produce of *Acacia vera*, and probably of other species, especially *A. arabica*. It occurs in rounded tears, or amorphous or angular pieces, varying in size from a pea to that of a walnut, or even larger than this; some of the pieces being transparent, others more or less opaque, from innumerable cracks extending through them. It has a glassy lustre, is white, yellow, or wine-yellow, and has no odour, or, if any, an acid one. Its specific gravity varies from 1.316 to 1.482. It may be readily broken into small fragments. It is entirely soluble in water, the solution having the property of reddening litmus, and being feebly opalescent. The latter property is said, by Guerin, to be owing to a small quantity of insoluble nitrogenous matter present. The white pieces constitute the *gummi electum* of our druggists. On the continent they are called *gum Turic* (*gomme Turique*), from *Tor*, the name of a seaport of Arabia, near the isthmus of Suez; while the red pieces are sometimes said to constitute the *gum Gedda* (*gomme Jedda*, or *Gedda*), so called after another port. Gum Gedda is occasionally imported into this country unmixed with other kinds of gum. In all the entries of it which I have been able to trace, it came from Alexandria in barrels.

**2. Barbary or Morocco Gum** (*Gummi Barbaricum*).—This is imported from Mogadore and Mazagan. In 1830, there were imported from Tripoli, Barbary, and Morocco, 2063 cwts. of gum. (*Parl. Return*.) Barbary gum is probably the produce of *Acacia gummifera*. Jackson says, it is obtained from a high



thorny tree, called *Attaleh*. The best kind is procured from the trees of Morocco, Ras-el-wed, in the province of Suse, and Bled-hummer, in the province of Abda:—the second qualities are the produce of Shedma, Duguella, and other provinces. I have two varieties of Barbary gum: one (the *Gomme de Barbarie* of Guibourt) is in roundish or irregular tears, mixed with many impurities, imperfectly transparent, and of a dull yellowish colour, with a faint tint of green.—It is imperfectly soluble in water, and has some analogy to Senegal gum. The other kind (called *Mogadore gum*) is in small, angular, broken, mostly yellow, pieces, which resemble fragments of Turkey gum.

**3. Gum Senegal** (*Gummi Senegalense*).—This gum is imported from St. Louis, St. Mary's, the river Gambia, Senegal, and Bathurst. In 1839, duty (6s. per cwt.) was paid on 24,698 cwt. Gum Senegal is probably obtained from several species of *Acacia*: but especially *A. Senegal*, *A. vera*, *A. Seyal*, and *A. Adansonii*, are said to produce it in part. It occurs in larger tears than those of Turkey or Arabic gum. On breaking them we frequently find large air-cavities in their centres. Occasionally we meet with whitish pieces, but for the most part they are yellow, reddish yellow, or brownish red. More difficulty is experienced in breaking or pulverizing this gum than gum Arabic, and its fracture is more conchoidal. The taste of this gum is similar to that of the last.

Guibourt distinguishes two varieties of this gum, one of which he terms *Gomme du Bas du Fleuve*, or *gum Senegal, properly so called*; the other the *Gomme du Haut du Fleuve*, or *Gomme de Galam*. The first is probably the produce of *Acacia Senegal*, while the second is procured from *A. vera*. There is but little difference between them: yet gum Galam has a greater resemblance to Turkey gum than Senegal gum has; the pieces are more broken, and therefore more brilliant, than those of gum Senegal, properly so called.

Those pieces of gum which have on some part of them a yellowish opaque skin or pellicle, constitute the *Gomme pelliculée* of Guibourt. The *Marrons de Gomme*, or *Gomme lignirode*, of the same pharmacologist, is also found in the Senegal gum of commerce: it consists of yellowish or dark brownish pieces, which are difficult to break, opaque and rough. Treated with water it partially dissolves, leaving, says Guibourt, a residue of gnawed wood (*bois rongé*). Guibourt states, that in most of the *marrons* he has found a large ovoid cell, which had been the habitation of the larvæ of some insect; from whence he concludes that this substance is the work of an insect.

**4. East India Gum** (*Gummi indicum ostindicum*).—This variety is imported principally from Bombay. In 1839, duty (6s. per cwt.) was paid on 7,869 cwts. It is probably the produce of various species. Many pieces agree in their physical and chemical characters with Turkey and Arabic gum, and are probably the produce of *Acacia arabica*, or some allied species (*yellow E. I. Gum*). Others, however, are larger, red or brown, and more difficult to pulverize than Turkey or Arabic gum (*brown E. I. gum*). Are these the produce of *Feronia Elephantum*?

I have received from Bombay three varieties of gum: one marked *Maculla best gum Arabic*, very similar to gum Galam; a second, marked *Mocha and Barbary gum*, in large reddish coloured, rough tears; and a third, denominated *Surat inferior gum Arabic*, in smaller dark-coloured tears.

**5. Cape Gum** (*Gummi Capense*).—This is imported from the Cape of Good Hope. In 1829 there was exported from the Cape 16,943 lbs. and two cases of gum. (McCulloch, *Dict. of Com.*) In 1830 the quantity imported into the United Kingdom was only 1 cwt. 3 qrs. 14 lbs. (*Parl. Ret.*); but since then the importation has greatly increased. Mr. Burchell (*Travels in the Inter. of South Africa*, 1822-4) says, Cape gum is obtained from a species of *Acacia* (which he has figured in vol. i. pp. 189 and 325) closely resembling *A. vera*, and which he calls *A. capensis* (*A. Karoo*, Hayne?). It is most abundant on



the banks of the Gariép, and between the Cape and the Gariép. Notwithstanding that he asserts the quality of Cape gum as no way inferior to that of *A. vera*, it is considered by our dealers as a very inferior kind. It is pale yellow; and its appearance resembles Mogadore gum (see p. 569), or small fragments of Turkey gum. It is collected by the Caffres.

Besides the preceding gums, there are several others described by continental pharmacologists, but which are almost unknown in English commerce. Such are the following:

α. GUM BASSORA. *Gummi Toridonense*.—This gum occurs in variable-sized pieces, which are whitish or yellowish, and opaque. When put into water it swells up, but dissolves only in part. The insoluble portion has been called *bassorin*. Its origin is unknown. Virey thinks that it is produced by a *Mesembryanthemum*; Desvaux and Damart, by a *Cactus*.

β. GUM KUTEERA.—Considered by Guibourt as identical with the preceding; but the sample given me by Professor Royle is very distinct. It has considerable resemblance to the flaky tragacanth (p. 562), for which it has been attempted to be substituted. (*Nicholson's Journal*, vii. 301.) It is probably the produce of *Sterculia urens*, a plant belonging to the family *Byttneriaceæ*. (Roxburgh, *Fl. Indica*, iii. 146.)

γ. Under the name of Hog Gum, I have met with, in commerce, an unsaleable gum, which greatly resembles a sample sent me by Professor Guibourt, as *gomme pseudo-adraganthe*, or *gomme de Sassa*. (See his *Hist. des Drog.* ii. 477, 3<sup>me</sup> éd.) It is in reddish yellow, somewhat transparent masses, many of which are twisted like a snail's shell or an ammonites. The *Rhus Metopium* yields a substance called *Hog gum*, (see Browne's *Nat. Hist. of Jamaica*, p. 177,) but I know not whether it be identical with the gum above referred to.

ADULTERATION.—The inferior and cheaper kinds of gum (as the Barbary, East Indian, and Senegal gums) are not unfrequently substituted for the Turkey or Arabic gum, especially in the form of powder. Flour (or starch) is sometimes mixed with powdered gum; the adulteration is readily recognised by the blue colour produced on the addition of a solution of iodine to the cold mucilage of suspected gum.

COMPOSITION.—Several *ultimate* analyses of gum have been made. The most important are those of Berzelius, (*Ann. de Chim.* xcv. 77,) Prout, (*Phil. Trans.* for 1827,) Guerin, (*Journ. de Chim. Méd.* vii. 742,) and Mulder (*Pharm. Central-Blatt für 1839*, S. 137.)

	Gum Arabic.			Gum Senegal.		Soluble pt. of Gum Bassora.
	BERZELIUS.	PROUT.	MULDER.	GUERIN.	MULDER.	GUERIN.
Carbon.....	41.906	41.4	45.10	43.59	44.92	43.46
Hydrogen.....	6.788	6.5	6.10	6.23	6.09	6.25
Oxygen.....	51.306	52.1	48.80	50.07	48.99	50.28
Nitrogen.....	a trace	0.0	0.0	0.11	0.00	0.0
Total.....	100.000	100.0	100.00	100.00	100.00	100.00

The formula  $C^{13} H^{13} O^{10}$  agrees with the analyses of Berzelius and Prout. Mulder gives, as the formula for gum Arabic,  $C^{19} H^{20} O^{10}$ . According to the first formula the atomic weight will be = 186; according to the second, = 162.

The *proximate* analysis of gum has been made by Guerin: (*op. supra cit.*)—

	Gum Arabic.	Gum Senegal.	Gum Bassora.
Soluble gum ( <i>Arabin</i> ).....	79.40	81.10	11.20
Insoluble gum ( <i>Bassorin</i> ).....	0.00	0.00	61.31
Water.....	17.60	16.10	21.89
Ashes.....	3.00	2.80	5.60
Total.....	100.00	100.00	100.00

1. SOLUBLE GUM OR ARABIN.—Is a colourless, inodorous, insipid, uncrystallizable solid, soluble in both hot and cold water, but insoluble in alcohol, ether, and oils. It combines with alkalis. Sulphuric acid converts it into a saccharine substance. 100 parts of arabin treated with 400 parts of nitric acid, yielded Guerin 16.88 of mucic acid, with a little oxalic acid. From *cerasin* or *prunin*, it is distinguished by its solubility in cold water. The characters by which it is distinguished from *tragacanthin*, *carrageenin*, and *cydonin*, have been already pointed out. According to Guerin, arabin consists of carbon 43.81, hydrogen 6.20 oxygen 49.85, and nitrogen 0.14.

2. INSOLUBLE GUM OR BASSORIN.—Is distinguished by its insolubility in water, both hot and



cold. It absorbs water, and swells up. It is insoluble in alcohol. 100 parts treated by 1000 of nitric acid furnished 22.61 of mucic acid, with a little oxalic acid. It consists, according to Guerin, of carbon 37.28, hydrogen 55.87, oxygen 6.85.

3. SALTS.—The ashes of gums Arabic and Senegal consist of carbonates of potash and lime, with minute portions of chloride of potassium, oxide of iron, alumina, silica, and magnesia. The carbonate of lime is formed by the decomposition of the malate of lime contained in the gum, while the carbonate of potash results from the decomposition of acetate of potash.

CHEMICAL CHARACTERISTICS.—*Gum Arabic* is soluble both in hot and cold water, forming mucilage. Alcohol precipitates the gum from its solution. Diacetate of lead causes a white precipitate (*gummate of lead*) with the solution. A solution of silicate of potash (prepared by fusing three parts of carbonate of potash with one part of silver sand) causes a white flaky precipitate. Oxalate of ammonia gives a white precipitate (*oxalate of lime*). When a concentrated solution of sesquichloride of iron is dropped into strong mucilage, the whole becomes, after some hours, a brown semi-transparent jelly. Nitrate of mercury produces a precipitate with a solution of gum.

PHYSIOLOGICAL EFFECTS. *a. On Animals generally*—The effects of injecting solutions of gum into the veins of animals (horses and dogs) have been examined by Viborg, Scheele, and Hertwich. (Wibmer, *Wirk d. Arzneim. u. Gift.* Bd. i. s. 3.) From their experiments it appears that small quantities only can be thrown into the circulation with impunity. From half a drachm to one or two drachms of gum, dissolved in one or two ounces of water, disorder the respiration and circulation of horses; while five or six drachms of gum give rise to an affection of the nervous system, manifested by stupor and paralysis, or convulsions. Some of these effects (namely those on the pulmonary and vascular system) may arise from the non-miscibility of mucilage with the blood, and its consequent mechanical influence in obstructing the capillary circulation of the lungs. The effects of a diet of gum on animals have been already pointed out (see vol. i. p. 78).

*β. On Man.*—Regnandot (*Ibid. op. supra cit.* S. 6.) injected three drachms of gum, dissolved in three ounces of water, into the veins of a man aged twenty years. In half an hour the patient was very chilly, his pulse was small and quick, and he had three liquid stools. The chilliness was succeeded by great heat, and after fifteen hours an eruption appeared on the skin.

The local action of a solution of gum is that of an emollient, and (by its sheathing properties) demulcent. It is not known to possess any action over remote parts, though some have supposed it to have the power of diminishing irritation in the urinary organs.

The dietetical properties of gum have been before noticed (see vol. i. p. 78.)

USES.—Gum is employed in medicine as an emollient and demulcent, but more frequently as a vehicle for the exhibition of other medicines. It is sometimes slowly dissolved in the mouth, to allay troublesome cough, and to diminish irritation of the fauces, by diluting the acrid secretions, and sheathing the parts from the action of the atmosphere. In inflammatory affections of the intestinal tube, as well as of the respiratory and urinary organs, gum is used as an emollient and emulcent. As a sheathing substance, a solution of gum may be employed in acrid poisoning; but of course its efficacy is mechanical merely. Powdered gum is occasionally applied to check hemorrhage from leech bites.

As a vehicle for the exhibition of other medicines, it is employed in the form either of powder or mucilage. The former is used to give bulk to active and heavy powders; as calomel, emetic tartar, &c., and in the preparation of lozenges. The latter is employed to suspend insoluble powders (as oxide of zinc, musk, &c.) in water, or to diffuse oily and resinous substances through aqueous fluids,<sup>1</sup> and to give form and tenacity to pills. Furthermore, the adhe-

<sup>1</sup> See *Experiments on mixing Oils, resinous and pinguous Substances, with Water, by means of a vegetable Mucilage*; in the *Medic. Observ. and Inq.* vol. i. p. 412, 4th ed. 1776.



sive qualities of mucilage renders it exceedingly useful for various other pharmaceutical purposes.

ADMINISTRATION.—The dose of powdered gum is from ʒss. to ʒj., or *ad libitum*.

1. MUCILAGO, E.; *Mistura Acaciæ*, L.; *Mucilago Gummi Arabici*, D.; *Mucilage*.—(Acacia, powdered, ʒx.; Boiling Water, Oj. Rub the Acacia with the water gradually poured in, and dissolve it, L.—The *Edinburgh College* uses only ʒix. of gum to Oj. of Cold Water, and directs the gum to be dissolved without heat, but with occasional stirring, and the solution to be strained through linen or calico.—The *Dublin College* employs ʒiv. of coarsely-powdered Gum to fʒiv. of Hot Water, and directs the mucilage to be strained through linen).—The process of the *Edinburgh College* is to be preferred, as being sufficiently strong, and made without heat (which causes gum to become somewhat acid, and thereby renders it somewhat acrid). The *Dublin* process yields a mucilage too thick to be strained. By keeping, mucilage readily becomes sour by the development of acetic acid. The pharmaceutical uses of mucilage have been above referred to. To render different substances miscible with aqueous vehicles, different proportions of mucilage are required. "Oils will require about three-fourths of their weight, balsams and spermaceti equal parts, resins two parts, and musk five times its weight." (Montgomery, *Observ. on the Dubl. Pharm.*)

2. MISTURA ACACIÆ, E.; *Acacia Mixture*.—(Mucilage, fʒiij.; Sweet Almonds, ʒj. and ʒij.; Pure Sugar, ʒv.; Water, Oij. Steep the almonds in hot water, and peel them; beat them to a smooth pulp in an earthenware or marble mortar, first with the sugar, and then with the mucilage; add the water gradually, stirring constantly; then strain through linen or calico.)—Demulcent and emollient. Applicable to the same purposes as *Mistura Amygdalæ*, already mentioned.—Dose, fʒj. to fʒij.

3. TROCHISCI ACACIÆ, E.; *Gum Lozenges*.—(Gum Arabic, ʒiv.; Starch, ʒj.; Pure Sugar, lbj. Mix and pulverize them, and make them into a proper mass with rose-water for forming lozenges.)—An agreeable pectoral. Employed to allay the tickling in the throat, which provokes coughing.

#### 10. ACA'CIA CATECHU, Willdenow, L. E. D.—THE CATECHU ACACIA.

Mimo'sa Cat'echu, Linn.

Sex. Syst. Polygamia, Monœcia.

(Ligni extractum, L.—Extract of the Wood, E.—Extractum ex ligno, D.)

(Catechu, U. S.)

HISTORY.—It is somewhat uncertain who first described catechu. Garcias ab Orto (*Clusii Exot. lib. i. cap. x. p. 163.*) was of opinion that it was the *Δύκιον Ινδικόν* of Dioscorides (*lib. i. cap. 132.*); but Dr. Royle, (*Linn. Trans. vol. xvii. p. 83.*) in a very elaborate and learned paper on this subject, has apparently proved that the preparation referred to by the latter author is the produce of the *Berberis Lycium* (Royle).

BOTANY. Gen. Char.—See *Acacia* (p. 568).

Sp. Char.—Arboreous. Branches armed with stipulary thorns, or occasionally unarmed. Young shoots, petioles, and peduncles, more or less pubescent. Leaves bipinnated; pinnæ ten to thirty pairs; leaflets thirty to fifty pairs; petiole sometimes armed on the under side with a row of prickles, with one large gland below the lowest pair of pinnæ, and between the extreme one to six pairs. Spikes axillary, one to four together, shorter than the leaves. Flowers numerous. Petals united. Stamens distinct, numerous. Legumes flat, thin, straight, linear, glabrous, four to eight-seeded (Wight and Arnott).

Tree from fifteen to twenty feet high. Bark brown and scabrous. Wood hard and heavy; the interior (*duramen*) brown, dark red, or blackish; the



exterior (*alburnum*) white, one or two inches thick. *Flowers* whitish or pale yellow.

**Hab.**—Various parts of the East Indies; now common in Jamaica.

**MANUFACTURE OF CATECHU.**—The manufacture of Catechu from the *Acacia Catechu*, as practised in Canara and Behar, has been described by Mr. Kerr (*Med. Obs. and Inq.* vol. v. p. 151.) and Dr. F. Buchanan Hamilton, (*Journ. from Madras through Mysore, Canara, and Malabar*, vol. iii. p. 177, 1807,) while Dr. Royle (*Illustr.* p. 182,) has explained the process followed in Northern India. According to the last mentioned gentleman, “the *Kutt* manufacturers move to different parts of the country in different seasons, erect temporary huts in the jungles, and selecting trees fit for their purpose, cut the inner wood into small chips. These they put into small earthen pots, which are arranged in a double row along a fire-place built of mud (*choola*); water is then poured in until the whole are covered: after a considerable portion has boiled away, the clear liquor is strained into one of the neighbouring pots, and a fresh supply of material is put into the first, and the operation repeated until the extract in the general receiver is of sufficient consistence to be poured into clay moulds, which, in the Kheree Pass and Doon, where I have seen the process, are generally of a quadrangular form. This Catechu is usually of a pale-red colour, and is considered there to be of the best quality. By the manufacturers it is conveyed to Saharunpore and Moradabad, whence it follows the course of commerce down the Ganges, and meets that from Nepal, so that both may be exported from Calcutta.”

**DESCRIPTION.**—The term *Catechu* (from *cate* a tree, and *chu* juice) is applied to various astringent extracts (sixteen of which I have in my collection) imported from India and the neighbouring countries. A few years ago the terms *Catechu*, *Terra japonica*, and *Cutch*, were employed synonymously; they are now, however, for the most part, used in trade somewhat distinctively, though not uniformly in the same sense. In the *Edinburgh Pharmacopœia* catechu is correctly stated to be the “extract of the wood of *Acacia Catechu*, of the kernels of *Areca Catechu*, and of the leaves of *Uncaria Gambier*; probably, too, from other plants.”

In 1837 (*Lond. Med. Gaz.* vol. xx. p. 103) I attempted to classify the varieties of catechu which I had met with, according to the plants from which they were procured; as far, at least, as I could ascertain this. But in the first edition of this work I did not adopt this classification, in consequence of some doubts which I entertained respecting its accuracy. Having, however, obtained further information on the subject, I shall now adopt it, with some modifications.

1. *Gambir Catechu*; *Catechu from Uncaria Gambir*.—The method of preparing Gambir, and the properties of the different commercial varieties of this extract, have been already described (see pp. 457-458). I may further observe, however, that the origin of these varieties of catechu I consider to be satisfactorily made out. They are imported under the name of Gambir from Singapore (where the *Uncaria Gambir* is cultivated, and an extract prepared from it), they agree with the published descriptions of gambir, and lastly, I find them to be identical with the gambir brought by Mr. Bennett from Singapore, and deposited in the Museum of the Medico-Botanical Society.

2. *Betel-nut Catechu*; *Catechu of the Areca Catechu*.—The mode of preparing Betel-nut Catechu, as described by Heyne, has been already stated (see p. 83). Two kinds of astringent extract are said by him to be prepared from these seeds: one called *Kassu*, which is black and mixed with paddy-husks; the other termed *Coury*, which is yellowish brown, has an earthy fracture, and is free from the admixture of foreign bodies. I have been able to identify *Kassu* among the extracts of commerce; but have not satisfactorily made out *Coury*.

**KASSU**; *Dark-brown Catechu in circular flat cakes*; *Colombo or Ceylon Catechu or Cutch* (*Cachou brun, orbiculaire et plat*. Guibourt). Imported from Ceylon. Cakes round, flat,



covered on one side with paddy husks (glumes of rice), from two to three inches in diameter, scarcely one inch thick, and weighing from two to three ounces. Internally they are dark, blackish brown and shiny, exactly resembling Pegu Catechu. Examined by the microscope it is found to contain numerous large crystals. Common. Quality excellent.—A decoction of this catechu becomes turbid on cooling, and frequently produces a blue colour with a solution of iodine, owing to the presence of the rice starch.

That this extract is Kassu, and is obtained from *Areca Catechu*, is proved by two facts:

α. It agrees with the Kassu of Heyne in its dark colour, and in being intermixed with paddy husks.

β. It is imported from Ceylon, in which island catechu is obtained from *Areca Catechu*. For this information I am indebted to a letter (in my possession) addressed by Mr. Lear, acting superintendent of the Botanic Garden in Ceylon, to my late friend Mr. F. Saner, assistant-surgeon in Her Majesty's 61st regiment, then stationed at Colombo. The letter is dated November 17, 1838, and contains the following passage. "Of kino and gambir I am quite unacquainted, and also of the trees which produce them. I should be glad [of] any information on the subject. An extract from *Areca Catechu* (specimens of which I will procure you) has been supposed to be the *Terra Japonica* of the shops; but it is generally supposed to be produced from *Acacia Catechu*, a plant not in Ceylon."

3. *Cutch; Catechu of the Acacia Catechu*.—It is probable that a considerable number of the astringent extracts brought from India as catechu are the produce of the *Acacia Catechu*. Hitherto, however, a small number only have been positively identified.

α. PALE, DULL CATECHU IN SQUARE CAKES; *Cachou terne et parallélipipède*, Guibourt; *Cachou en manière d'écorce d'arbre*, A. Jussieu. This perhaps is the *Bengal Catechu* of Davy.

It occurs in square cakes, usually about two inches long, two inches broad, and one in thickness. Usually these cakes are irregularly broken, so that it is difficult to trace their angular character. They are heavier than water. Externally their colour is dark brown or blackish; internally we observe darker and lighter layers, disposed in a schistose manner, like the bark of a tree. The darker layers are brown and somewhat shiny, the lighter ones are dull reddish white. Examined by the microscope it is found to consist principally of small crystals. A decoction of one part of this catechu and twelve parts of water lets fall, on cooling, a copious whitish precipitate of *catechine*.

I find this kind of catechu to be identical with the specimens brought by Dr. Royle from India, and which he saw prepared from *Acacia Catechu* (see his description of the process at p. 574). Moreover it probably is the kind, the manufacture of which Mr. Kerr described; for he says it is in square pieces, the finest being whitish. So that it is manufactured in Bahar, as well as in the more northern parts of India.

β. DARK SHINY PEGU MASSIVE CATECHU; *Pegu Catechu; Cutch; Cachou en masse, Cachou lucide, Cachou du Butea frondosa*, Guibourt. It is imported from Pegu in large masses weighing sometimes a *cwt.* each. These masses are made up of layers composed of prismatic pieces, each from six to ten inches long, and two or three inches broad and deep. Each piece is enveloped in the leaves of *Naucllea Brunonis*, a native of Tavoy, Wallich. *Cat.* (not of *Butea frondosa*, as formerly supposed). When fractured, these pieces present a dark blackish-brown shiny surface, free from all impurities; some of the pieces, however, having a more reddish tint than the others. Their taste is bitter and astringent. Fée states, though I know not on what authority, that this variety contains 57 per cent. of tannic acid. Pegu catechu is largely employed, I am informed, for dyeing. The greater part of that brought to this country is exported for continental use.

According to Herbert de Jæger (*Miscellanea curiosa* Dec. ii. Ann. iii. p. 9) the catechu of Pegu is obtained from the *Acacia Catechu*; and, he adds, that it is celebrated throughout India.

γ. DARK CATECHU IN BALLS.—I have two varieties of dark-coloured catechu in balls:

αα. *Enveloped in leaves*.—This agrees in its appearance with the Pegu Catechu above mentioned, and like the latter is enveloped in leaves, apparently of the *Naucllea Brunonis*. The balls are round and about the size of small oranges (*Pegu Cutch in balls?*).

ββ. *Covered with Paddy Husks*.—Balls more or less flattened, not exceeding the size of a small orange, and covered with paddy husks (glumes of rice). In other respects identical with the preceding. It agrees with the kind referred to by Dr. B. Hamilton, as being procured from *Acacia Catechu*. When the extract, he says, has acquired the thickness of tar, it is allowed to harden for two days, so that it will not run. "Some husks of rice are then spread on the ground, and the inspissated juice is formed into balls about the size of oranges, which are placed on the husks or on leaves."

4. *Catechu of unknown origin*.—The origin of the larger proportion of the catechus which I have met with, have not been able to ascertain.

α. BROWN CATECHU IN CONICAL MASSES FROM SIAM.—This variety has recently been im-



ported from Siam in bags. It is in masses shaped like a betelnut, or rather that of a mullar or truncated olive, each weighing about a pound and a half. The flattened base is marked with the impression of the leaf of *Nauclea Brunonis*. Internally this catechu is shiny and liver-coloured, strongly resembling hepatic aloes. In its other qualities it agrees with Pegu Catechu.

β. CATECHU IN FLAT CAKES.—Under the name of *Cutch* I have received a catechu in flat cakes like the Colombo Catechu but unmixed with rice glumes. The cakes have a rusty appearance externally.

γ. BLACK MUCILAGINOUS CATECHU. *Cachou noir et mucilagineux*, Guibourt.—In parallelepipeds of eighteen lines on the side, and an inch high. Internally black and shiny, somewhat similar to extract of liquorice. Quality bad.

δ. DARK-BROWN SILICEOUS CATECHU IN FLATTENED, CIRCULAR, OR QUADRANGULAR CAKES.—*Cachou brun siliceux*, Guibourt.—Formerly called by druggists *Terra japonica*. Perhaps the *Bombay Catechu* of Sir H. Davy. It is in round or flattened masses, varying in weight from two or three ounces to several pounds; externally it is of a dull dark-brown or rusty colour, internally being shiny and blackish brown. It is very heavy, and contains a large quantity of fine sand. Guibourt says, 100 parts of this catechu yielded him 26 parts of earthy matter. But some of the specimens contain a much less portion of earthy matter. Quality bad.

ε. DULL REDDISH CATECHU IN BALLS. *Cachou en boules, terne et rougeâtre*, Guibourt.—In the collection of the Medico-Botanical Society of London, it is marked *American Catechu*. Balls flattened, weighing three or four ounces, covered on one side with glumes of rice. Its fracture is dull, reddish, wavy, and often marbled. Quality good.

ζ. PALE OR WHITISH CATECHU IN IRREGULAR LUMPS. *Cachou blanc*, Guibourt.—I received this from Bombay, under the name of *Katha suffaid* (i. e. *pale or white catechu*). It is in lumps, which vary in size from that of a walnut to that of a small apple. The general form is rounded or oval, and somewhat flattened, the surface being very uneven, and of a dark or blackish brown colour. Internally this variety is dull, and of a very pale colour. Guibourt says, it is almost white; but it has a pale-yellowish or brownish-red tint. Its taste is bitter, astringent, and sweetish, with a smoky flavour. Hence, perhaps, the dark colour externally is derived from the masses being dried, or exposed to the smoke of a fire.

COMPOSITION.—Two kinds of Catechu were analysed by Sir H. Davy. (*Phil. Trans.* for 1803, p. 233.) In 1833, Buchner discovered in catechu a peculiar substance which has been denominated *Catechine*. (*Pharm. Central-Blatt.* für 1833, 629.)

Davy's Analyses.

	Bombay.	Bengal.
Tannin.....	54.5	48.5
Peculiar extractive.....	34.0	36.5
Mucilage.....	6.5	8.0
Insoluble matter (chiefly sand and lime).....	5.0	7.0
Catechu.....	100.00	100.0

1. CATECHINE.—This has been already noticed (see *Uncaria Gambir*).

2. TANNIC ACID.—The general properties of this acid have also been before described (see p. 192). It is this substance which renders catechu so valuable to the tanner. The peculiarities of the tannic acid of catechu have been studied by Berzelius, (*Traité de Chim.* t. v. 588,) but in consequence of the subsequent discovery of catechuic acid they require re-examination. The tannic acid of catechu is easily soluble in water and alcohol, but very slightly so in ether. The aqueous solution becomes coloured by exposure to the air. Its combinations with acids are very soluble. Alkalis do not precipitate it.

CHEMICAL CHARACTERISTICS.—The brown, filtered decoction of catechu reddens litmus, yields a blackish-green colour and precipitate (*catechuate and tannate of iron*) with the ferruginous salts, and a brownish-white one with acetate of lead. A solution of gelatine renders the cooled decoction turbid (*tannate of gelatine*). Alkalis deepen the colour of the decoction, but cause no precipitate. Sulphuric acid renders the decoction slightly turbid.

The filtered decoction of several kinds of catechu (especially *pale catechu in broken square cakes*) deposits, on cooling, catechine.

The decoction of *dark-brown catechu, in circular flat cakes*, when cold becomes blue (*iodide of starch*) on the addition of a solution of iodine.

PURITY.—The Edinburgh College states that “the finest qualities [of catechu] yield to sulphuric ether 53, and the lowest qualities 28 per cent. of tannin dried at 280°.” This proceeding, however, is not to be relied on as a test of



the astringency of catechu, which can only be determined in the usual way by gelatine. This College errs in supposing that the ethereal extract is necessarily either wholly or in great part tannin; for catechuic acid, which constitutes a large portion of some kinds of catechu, is soluble in ether.

**PHYSIOLOGICAL EFFECTS.**—Catechu produces the local and general effects of the astringents before described (see vol. i. p. 188). When of good quality it is more powerful than kino. In its operation it is closely allied to rhatany root (*Krameria triandra*).

**USES.**—Employed as an astringent in the following cases:

1. *In affections of the mouth and throat.*—In various affections of the mouth and throat I have frequently employed catechu, and found it a convenient and efficacious astringent. Thus, in relaxed uvula, and in that slight chronic inflammatory affection of the throat usually denominated the relaxed sore throat, and which is especially observed in delicate females, catechu, chewed or sucked, is a most useful remedy. The purer kinds of catechu should be selected, especially avoiding those that are gritty. Or catechu lozenges may be employed. The pale kinds of catechu (as *gambir*, before described,) are usually sweeter and more agreeable than the dark varieties. For public speakers or singers also it is a useful remedy; it prevents or diminishes hoarseness consequent on frequent use of the vocal organs. In slight ulcerations of the mouth also it is useful.

2. *As a stomachic in dyspeptic complaints.*—I have known catechu chewed with advantage in dyspeptic complaints. It should be used just before taking food: it promotes the appetite, and assists digestion.

3. *As an alvine astringent* it may be employed in old-standing diarrhœas and dysenteries, when there are no inflammatory symptoms present. It is often conjoined with the chalk mixture, and not unusually with opiates.

4. *As an astringent in hemorrhages* of an atonic character. A scruple of catechu, with grs. xij. of confection of opium, and a sufficient quantity of aromatic confection to make a bolus, was a favourite prescription of Dr. Babington, sen., in immoderate flow of menses. (*Ainslie Mat. Ind.* i. 590.)

5. *In lead colic* it was recommended by Grashius. (*De Colica Pictonum. Amsterd.* 1752.)

6. *In mucous discharges*, as gleet, fluor albus, chronic old-standing cystirrhœa, &c.

7. *As a topical application to ulcers.*—"An ointment composed of ℥iv. of catechu, ℥ix. of alum, ℥iv. of white resin, and f̄xx. of olive oil, with a sufficient quantity of water, is in great repute in India as an application to ulcers." (*Thomson, Lond. Dispens.*)

**ADMINISTRATION.**—Dose, grs. x. to ℥j. It may be administered in the form of bolus, or of mixture with sugar and gum Arabic. For gradual solution in the mouth, I have found a lump of the purer kinds of commercial catechu more agreeable than *catechu lozenges*, which I requested a manufacturer of lozenges to prepare for me.

1. **INFUSUM CATECHU COMPOSITUM**, L. D. (U. S.) *Infusum Catechu*, E.; *Infusion of Catechu*. Catechu, powdered, ℥vj. [*℥iiss. D.*]; Cinnamon, bruised, ℥j. [*℥ss. D.*]; [Syrup, f̄iij. *E.*]; Boiling [distilled, *L.*] Water, Oj. [*℥xxvij. E.* Oss. *wine measure, D.*] Macerate the Catechu and Cinnamon in the Water, in a lightly-covered vessel, for an hour [two hours, *E.*], then strain [through linen or calico, and add the syrup, *E.*]—[Catechu in powder, half an ounce; Cinnamon, bruised, a drachm; Boiling Water, a pint. Macerate for an hour in a covered vessel, and strain, U. S.]—Astringent. Adapted to diarrhœa. Dose, f̄j. or f̄iij. three or four times a day. Frequently given in conjunction with opiates. Sometimes used in the form of enema.

2. **TINCTURA CATECHU**, L. E. D. (U. S.) *Tincture of Catechu*. (Catechu, in moderately fine powder, *E.*), ℥iijss. [*℥iij. D.* (U. S.)]; Cinnamon, bruised,



[in fine powder, *E.*], ℥ijss. [℥ij. *D.* (U. S.)]; Proof Spirit, Oij. [Oij. *wine measure*, *D.*] Macerate for fourteen [seven, *E. D.*] days, and strain [and strongly express the residuum; filter the liquors, *E.*] "This tincture may be also prepared by the process of percolation, the mixed powders being put into the percolator without being previously moistened with the spirit," *E.*—Astringent. Usually employed as an adjunct to chalk mixture in chronic diarrhœas and dysentery; or occasionally to Port wine, with some aromatic (nutmeg or cinnamon).—Dose, ℥ʒj. to ℥ʒij.

3. ELECTUARIUM CATECHU, *E.* *Electuarium Catechu compositum*, *D.* (Catechu, ℥iv.; Kino, ℥iv. [℥ijj. *D.*]; Cinnamon, ℥j. [℥ij. *D.*]; [Nutmeg, ℥j. *E.*]; Opium, diffused in a little Sherry, ℥iss.; Syrup of Red Roses [Syrup of Ginger, *D.*], boiled to the consistence of honey, Ojss. [lb. ij½. *D.*] Pulverize the solids; mix the Opium and Syrup, then the powders, and beat them thoroughly into a uniform mass.—Astringent. Employed in chronic diarrhœa, dysentery, and hemorrhages. Dose, ʒj. to ℥ij. One ounce of this electuary, prepared according to the Dublin Pharmacopœia, contains two grs. and a half of opium.

#### 11. ANDIRA INERMIS, *Kunth.*—THE CABBAGE-BARK TREE.

*Geoffroya inermis*, *Swartz, D.*

*Ses. Syst.* Diadelphia, Decandria.

(*Cortex, D.*)

**HISTORY.**—The medicinal properties of the bark of this tree were first pointed out by Mr. Duguid. (*Edinb. Phys. and Lit. Essays*, vol. ii.) The first botanical description of the tree was published by Dr. Wright. (*Phil. Trans.* vol. lxvii. pt. ii. p. 507.)

**BOTANY.**—**Gen. Char.**—*Calyx* turbinate-campanulate, five-toothed; teeth almost equal, acute, erect. *Corolla* papilionaceous; the vexillum roundish, emarginate, larger than the keel. *Stamens* diadelphous (nine and one). *Ovary* containing three ovules. *Legume* stalked, somewhat orbicular, rather hard, one-celled, one-seeded; when ripe divisible into two valves, according to Swartz (*De Cand.*)

**Sp. Char.**—*Leaflets* thirteen to fifteen, ovate-lanceolate, acute, smooth on both sides. *Flowers* paniculate, with very short pedicels. *Calyx* urceolate, ferruginous-pubescent (*De Cand.*)

*Tree* of considerable height. *Leaves* pinnate. *Flowers* reddish-lilac.

**Hab.**—West Indies.

**DESCRIPTION.**—*Cabbage bark* or *worm bark* (*cortex andiræ inermis*, seu *geoffroyæ jamaicensis*) occurs in long, thick, fibrous pieces, having a brownish-ash colour, a resinous fracture, a disagreeable smell, and a sweetish, mucilaginous, bitter taste.

**SURINAM BARK** (*cortex geoffroyæ Surinamensis*) is the bark of *Andira retusa*, var. *β. Surinamensis*, *De Candolle*. *Huttenschmidt* (*op. infra cit.*) found in it a white crystalline substance, which he called *Surinamin*. *Surinam bark* has been used as a vermifuge, but I am totally unacquainted with it. (*Goebel, Pharm. Waarenk.* i. 201; *Murray, App. Med.* ii. 492.)

**COMPOSITION.**—*Cabbage-bark* was analysed in 1824 by *Huttenschmidt*, (*Gmelin, Handb. d. Chem.* ii. 1264,) who found in it the following substances:—*Jamaicina*, *yellow colouring matter*, *gum*, much *starch*, *wax*, *brown resin*, a small quantity of *mouldy matter*, a *nitrogenous substance* soluble in carbonate of soda, *oxalate of lime*, and *woody fibre*.—The *ashes* contained carbonate, phosphate, and sulphate of potash, chloride of potassium, carbonate and phosphate of lime, with magnesia, silica, and oxide of iron.

**JAMAICINA** is a brownish-yellow crystalline, fusible, very bitter substance, composed of *carbon*, *hydrogen*, *nitrogen*, and *oxygen*. It is soluble in water and alcohol, and possesses alkaline properties. Its watery solution forms, with tincture of nutgalls, a yellow precipitate. Two grains of the acetate of jamaicina, given to pigeons and sparrows, caused restlessness and trembling, and in half an hour violent purging.



**PHYSIOLOGICAL EFFECTS.**—Cathartic, emetic, and narcotic. In doses of thirty or forty grains the powder of this bark purges briskly, like jalap. In larger quantities it causes vomiting, fever, and delirium. Fatal accidents are said to have resulted from its imprudent use.

**USES.**—Formerly employed as an anthelmintic, especially against the large round worm (*Ascaris lumbricoides*), but its use is now obsolete.<sup>1</sup>

**ADMINISTRATION.**—Dose of the powder, ℞j. to ℥ss. As an anthelmintic the bark is usually given in the form of decoction.

**DECOCTUM GEOFFROYÆ, D.** *Decoction of Cabbage-tree Bark.* (Bark of the Cabbage-tree, bruised, ℥j.; Water, Oij. [*wine-measure*]. Boil down to a pint, and to the strained liquor add ℥ij. of Syrup of Orange Peel).—Cathartic and narcotic. Employed as an anthelmintic.—Dose, f℥ss. to f℥ij. for an adult.

**ANTIDOTES.**—In the event of an overdose, wash out the stomach, administer vegetable acids, and evacuate with castor oil.

12. HEMATOXYLON CAMPECHIANUM, L. E. D.—THE COMMON LOGWOOD.

*Sex. Syst.* Decandria, Monogynia.

(Lignum, L. D.—Wood, E.)

(Hæmatoxylon, U. S.)

**HISTORY.**—Monardes (*Clusii Exot.* cap. xxvii. p. 324,) calls the wood of this plant *lignum ad renium affectiones et urinæ incommoda*. Hernandez (*Rev. Med. Novæ Hisp. Thes.* 119,) terms the wood *lignum nefriticum*; and describes the plant under the name of *coatlî*.

**BOTANY. Gen. Char.**—*Sepals* five, united at the base into a somewhat persistent tube; the lobes deciduous, oblong-obtuse. *Petals* five, scarcely longer than the sepals. *Stamens* ten; *filaments* hairy at the base; *anthers* without glands. *Style* capillary. *Legume* compressed, flat, lanceolate, acuminate at both ends, one-celled, two-seeded; the sutures indehiscent; the valves bursting in the middle longitudinally. *Seeds* transversely oblong; *cotyledons* two-lobed.—*Tree*, with branches unarmed or spinous below the leaves. *Flowers* racemose, hermaphrodite (De Candolle).

**Sp. Char.**—The only species.

*Tree* forty or fifty feet high. *Leaves* pinnate or somewhat bipinnate by the conversion of the lowest pair of leaflets into two pair of pinnæ; *leaflets* obovate or orbiculate. *Flowers* yellow.

**Hab.**—Campeachy. Introduced into Jamaica, where it now grows in great abundance, wild.

**COMMERCE.**—The stems of the Logwood-trees are cut into logs or junks of about three feet long, the bark and white sap (alburnum) of which are chipped off, and the red part or heart (duramen) sent to England. (Wright, *Med. Plants of Jamaica*.) It is imported from Campeachy, Honduras, and Jamaica. In 1839 duty (3s. if from British possessions, 4s. 6d. if from other places) was paid on 15,867 tons. (*Trade List*.)

**DESCRIPTION.**—Logwood (*lignum hæmatoxyli seu campechianum*), as imported, consists only of the heartwood or duramen. The logs are externally of a dark colour; internally they are red. The wood is dense, has a sp. gr. of 1.057; admits of a fine polish, has a sweetish taste, and a pleasant odour. Large crystals of hæmatin are sometimes found in the wood. (Thomson, *Org. Chem.* 407.)

**COMPOSITION.**—Logwood was analyzed in 1811 by Chevreul, (*Ann. Chim.* lxxxi. 128,) who found its constituents to be *volatile oil, hæmatin, fatty or resinous matter, brown substance containing tannin, glutinous matter, acetic acid, woody fibre, various salts* (phosphate, sulphate, and acetate of lime, acetate of

<sup>1</sup> For further particulars respecting the use of Cabbage-bark, consult Dr. Wright's paper above referred to.



potash, and chloride of potassium) and the *oxides* of aluminum, silicium, manganese, and iron.

**HÆMATIN or Hæmatoxylin** is a red crystalline substance, of a slightly bitter, acrid, and astringent taste. It is soluble in alcohol and ether, and slightly so in water. Acids render the solution yellow or red; alkalis give it a purple or violet colour. Alum causes a violet precipitate, and several metallic solutions (as of tin and lead) a blue one. Gelatine produces a flocculent reddish precipitate.

**CHEMICAL CHARACTERISTICS.**—The decoction of logwood is deep red. Acids render it paler and brighter coloured. The alkalis give it a purplish or violet-blue colour. Acetate of lead causes a blue, alum a violet, precipitate. The salts of iron make it dark violet-blue. Gelatine forms a reddish precipitate with it.

**PHYSIOLOGICAL EFFECTS.**—Logwood is a mild astringent (see the effects of astringents, vol. i. p. 188). It does not constipate nor so readily disorder the digestive organs as some other astringents, and hence its use may be continued for a longer period. Its colouring matter becomes absorbed, and may be detected in the urine. Dr. Percival (*Works*, vol. iv. p. 386) states, that under the use of extract of logwood the urine of a female suddenly acquired a purplish-red colour, which was deepened by the sulphate of iron. After some hours the secretion returned to its natural colour. The stools sometimes acquire a purplish-red colour from the use of logwood.

**USES.**—In medicine logwood is employed as an astringent in old diarrhœas and dysenteries, in hemorrhages, (from the uterus, lungs, and bowels,) and leucorrhœa. It is well adapted to the diarrhœas of children. Dr. Percival employed it to restrain profuse sweating in phthisis.

1. **DECOCTUM HÆMATOXYLI**, E. D. (U. S.) *Decoction of Logwood.*—(Logwood, in chips, ℥j. [℥jss. D.]; Water, Oj. [Oij. wine measure, D.]; Cinnamon, in powder, ℥j. Boil the logwood in the water down to ten fluidounces [Oj. wine measure, D.], adding the cinnamon towards the end, and strain.)—[Logwood, rasped, an ounce; Water, two pints. Boil down to a pint, and strain. U. S.]—Employed as an astringent in diarrhœa.—Dose, for adults, ℥j. to ℥ij.; for children, ℥ij. to ℥jss.

2. **EXTRACTUM HÆMATOXYLI**, L. E. D. (U. S.) *Extract of Logwood.*—(Logwood, powdered [in chips, E.; raspings, D.], lb. ijss. [lb. j. E. (U. S.)]; Boiling [distilled, L.] Water, Cong. ij. [a gallon, E. (U. S.)]. Macerate for twenty-four hours, then boil down to a gallon [Oiv. E. (U. S.)], and strain the liquor while hot; lastly, evaporate [in the vapour-bath, E.] to a proper consistence.)—“For preparing this extract the logwood should not be powdered, but rasped, and it should be so far evaporated as to become brittle and pulverulent when cold. One *cwt.* of the wood yields about twenty lbs. of extract.” (Brande, *Man. of Pharm.*)—Astringent. Employed in old diarrhœas, dysenteries, &c. Dose, grs. x. to ℥ss. By keeping, extract of logwood becomes exceedingly hard, and pills made of it are said to have passed through the bowels undissolved. It is employed, I am informed, to colour snuff.

### 13. TAMARINDUS INDICA, Linn. L. E.—COMMON TAMARIND-TREE.

*Tamarindus indicus*, D.

*Sex. Syst.* Monadelphia, Triandria.

(*Leguminis pulpa*, L. D.—Pulp of the pods, E.)

(*Tamarindus*, U. S. *Tamarinds*.)

**HISTORY.**—The tamarind does not appear to have been known to the ancient Greeks; at least no mention is made of it in their writings. We are indebted for its introduction to the Arabians, who probably derived their knowledge of it from the Hindus. Mesue, Avicenna, and Serapion, are the earliest writers who mention it. It is said to have derived its name from *Tamar* (which, in Arabic, signifies *dates* or *fruit*), and *Indus*, in reference to its Indian origin.



**BOTANY. Gen. Char.**—*Calyx* tubular at the base; limb bilabiate, reflexed; upper lip three-partite; lower broad, two-toothed. *Petals* three, alternating with the segments of the upper lip of the calyx; two of them ovate, the middle one cucullate. *Stamens* nine or ten; seven very short and sterile, the others (two or three) longer, monadelphous, bearing anthers. *Style* subulate. *Legume* stalked, linear, more or less curved, slightly compressed, one-celled, three to twelve-seeded, the sarcocarp pulpy. *Seeds* compressed, bluntly four-angled, obliquely truncated at the hilum.—*Trees*. *Leaves* abruptly pinnated; *leaflets* many pair. *Flowers* racemose (Wright and Arnott).

**Sp. Char.**—The only species.—*Tree*, thirty to forty feet high. *Branches* spreading. *Leaves* alternate; *leaflets* twelve to fifteen pair, small, oblong, obtuse, entire, smooth. *Petals* deciduous, yellow, veined with red.

There are two varieties, which are considered by Gærtner, Roxburgh, and De Candolle, as distinct species. The only difference between them is in the pod.

*a. Orientalis*. *T. indica*, De Candolle. *East Indian Tamarind*.—*Legume* elongated, six or more times longer than broad, six to twelve-seeded.

*β. Occidentalis*. *T. occidentalis*, De Candolle. *West Indian Tamarind*.—*Legume* abbreviated, scarcely three times longer than broad, one to four-seeded.

**Hab.**—East and West Indies.

**PRESERVATION OF THE FRUIT.**—The usual mode of preserving tamarinds in the West Indies is, to remove the shell or epicarp from the ripe fruit, and to place layers of the shelled fruit in a cask, and pour boiling water over them. But Dr. Wright (*Med. Plants of Jamaica*) says, a better method is, to put alternate layers of tamarinds and powdered sugar in a stone jar. The drier and dark-coloured East Indian tamarinds are said to be preserved with sugar.

**DESCRIPTION.**—Tamarinds are imported both raw and preserved. *Tamarind pods* are from three to six inches long, more or less curved. Composed of a dry, brittle, brown, external shell (*epicarp*), within which is the acidulous, sweet, reddish-brown pulp (*sarcocarp*) penetrated by strong fibres. Still more internal is a thin membranous coat (*endocarp*) inclosing the oval brown seeds. *Preserved tamarinds (tamarindi conditi)* consist of the same parts, the shell (*epicarp*) excepted. The *pulp (pulpa tamarindi)* is the officinal part.

**COMPOSITION.**—Tamarind pulp was analysed, in 1790, by Vauquelin, (*Ann. Chim.* v. 92,) who obtained the following products:—*Citric acid* 9.40, *tartaric acid* 1.55, *malic acid* 0.45, *bitartrate of potash* 3.25, *sugar* 12.5, *gum* 4.7, *vegetable jelly (pectin)* 6.25, *parenchyma* 34.35, and *water* 27.55.

**PHYSIOLOGICAL EFFECTS.**—Tamarind pulp allays thirst, is nutritive and refrigerant, and, in full doses, laxative. From this combination of refrigerant and laxative properties it is commonly denominated a *cooling laxative*.

**USES.**—Tamarinds are adapted for febrile and inflammatory cases; in the former it is often taken with the double purpose of operating as a refrigerant and acting gently on the bowels. An infusion of tamarinds forms a very pleasant, cooling drink, as does also tamarind whey. Tamarinds are a constituent of several mild purgative preparations. It is frequently given in conjunction with senna (as in the *confection of senna* and the *infusion of senna with tamarinds*, Ph. D.) It is said, though I know not with what truth, that the addition of tamarinds to senna and resinous cathartics diminishes the operation of the latter.

**ADMINISTRATION.**—The dose of tamarinds is from ʒij. to ʒj. or more. *Tamarind whey (serum lactis tamarindatum)* is prepared by boiling ʒij. of tamarind pulp with Oij. of milk.



## 14. CAS'SIA, Linn.—SEVERAL SPECIES YIELDING SENNA.

*Cassia lanceolata*, De Cand. and *C. obovata*, De Cand. L.

Various Species of Cassia, probably *C. lanceolata*, Forskal, *C. acutifolia*, Delile, and *C. obovata*, Colladon, E. *Cassia elongata*, Lemaire-Lisancourt, E.

*C. Senna*, Linn. D.

Sex. Syst. Decandria, Monogynia.

(Folia, L. D.—Leaves, E.)

(Senna, U. S.)

HISTORY.—Reiske (*Diss. inaug. exhib. miscell. aliquot observ. Med. ex Arabum Monumentis*, Lugd. 1746) states, on the authority of an oriental work, (*De Medicina Prophetæ Arabici*,) that senna was employed by Mahomet. If this be correct (and we may reasonably entertain some doubt, since the Arabic word which he translates senna has been by other linguists, as Golius and Warner, rendered cumin), this purgative was in use some centuries before any mention of it is made in the works of pharmacological writers. Among the Arabians I may quote Mesue, Serapion, and Avicenna, who notice senna (sene), but they refer to the fruit, and not to the leaves. Mesue, in speaking of the decoction of senna, quotes Galen, and from this, as well as from other circumstances, it has been imagined that Dioscorides and Galen, and probably even Theophrastus, were acquainted with senna; but their known writings do not warrant this opinion, and hence the quotation is presumed to be erroneous. The earliest Greek writer, in whose works senna is mentioned, is Actuarius; but he, like the Arabians, referred to the fruit.

BOTANY. Gen. Char.—*Sepals* five, scarcely united at the base, more or less unequal. *Petals* five, unequal. *Stamens* ten, free, unequal; the three lower ones longer, the four middle ones short and straight, the three upper ones with abortive anthers. *Anthers* dehiscent at the apex. *Ovary* stalked, frequently arched. *Legume* various.—*Trees, shrubs, or herbs.* *Leaves* simply and abruptly pinnate. *Petioles* frequently glanduliferous. *Leaflets* opposite.

Species.—Some confusion still exists as to the species yielding the senna leaves of commerce. Linnæus made but one species, which he termed *Cassia Senna*, and considered the acute and obtuse-leaved plants as mere varieties. This error has been adopted by the *Dublin College*. The usually-accurate Woodville (*Med. Bot.* vol. iii. p. 446) has published a plate representing the leaflets of the acute-leaved Cassia, and the fruit of the blunt-leaved species. The following perhaps are distinct species, but their specific characters are not in all cases accurately ascertained.

1. *C. OBOVATA*, Colladon. (*Hist. des Casses*, 92.) *C. Senna* var  $\beta$ . Linn. *C. obtusa*, Roxb. (*Fl. Ind.* ii. 344.) *Sena belledy* (Wild Senna) *Egyptians* and *Nubians*. *Séné de la Thébaïde*; *Cassia Sena*, *Nectoux*. (Pl. i.) *Leaflets* six to seven pairs, obovate, obtuse; petiole glandless. *Legumes* plano-compressed, curved, tumid by the crests on the middle of each valve (De Cand.)—Perennial herb, one or two feet high. *Leaves* smooth; *leaflets* mucronate, unequal at the base. *Stipules* lanceolate, linear, spreading. *Flowers* yellow in racemes. *Legumes* oblong, falcate, smooth, rounded at each end, with an equally interrupted ridge along the middle of each valve.—Egypt (Bassà-Tine at the entrance of the valley of Egaremont, two leagues from Cairo; Karnak; Thebes; on the eastern bank of the Nile opposite Hermonthis; Esneh; Edfou; Daraou; Assouan) Nubia; Desert of Suez; Syria; India. Cultivated in Italy, Spain, Jamaica, &c.—Its leaflets form *Aleppo*, *Senegal*, and *Italic Senna*, and one of the constituents of *Alexandrian Senna*.

Nees and Ebermaier (*Handb. d. Med. Pharm. Bot.* ii. 207) follow Hayne in admitting two species of blunt senna, viz. *C. obovata*, Hayne, with obovate, very shortly pointed leaflets, and *C. obtusata*, Hayne, with more remote, obovate, truncated-emarginate leaflets. I think, with Th. Martius, (*Pharmakogn.*) that the latter are merely older leaflets than the former.



2. *C. ACUTIFOLIA*, Delile. (*Fl. Ægypt. Pl.* 27, fig. 1.)—*Stem* suffruticose. *Leaves* pinnate; *petiole* glandless; *leaflets* five to seven pairs, lanceolate, acute. *Legumes* flat, elliptical, naked on both sides, somewhat bent on the upper margin (Delile).—An *undershrub*, about two feet high. *Leaves* when young slightly silky or pubescent. *Flowers* yellow, in axillary racemes, at the top of the branches. *Petals* obovate. *Legumes* somewhat swollen by the seeds. *Seeds* six or seven in each legume.—Egypt, in the valleys of the desert to the south and east of Assouan.—Collected by the Arabs, and sold by them to merchants who convey it to Cairo.

3. *C. ELONGATA*, Lemaire-Lisancourt; (*Journ. de Pharm.* vii. 345,) *Fée*; (*Journ. de Chim. Méd.* vi. 234;) *C. lanceolata* Royle. (*Illustr.* t. 37.) Perhaps identical with the preceding species. Dr. Royle's specimens were raised from seeds picked out of *Mecca Senna*. Dr. Lindley thus describes the plant. "An *annual*, but, with care, it may be made to live through the year, and to assume a suffruticose habit. *Stem* erect, smooth. *Leaves* narrow, equal pinnated; *leaflets* four to eight pairs, lanceolate, nearly sessile, slightly mucronulate, smooth above, rather downy beneath, with the veins turning inwards, and forming a flexuose, intramarginal line; *petioles* without glands; *stipules* softly spinescent, semihastate, spreading, minute. *Racemes* axillary and terminal, erect, stalked, rather longer than the leaves; *pedicels* without bracts. *Sepals* linear, obtuse. *Petals* bright yellow. Of the *stamens* the five lowest sterile and small, the two next large, curved, and perfect, the three uppermost minute and glandlike. *Ovary* linear, downy, falcate, with a smooth recurved *style*. *Legumes* pendulous oblong, membranous, about an inch and a half long, and five-eighths broad, quite straight, tapering abruptly to the base, and rounded at the apex, deep-brown, many-seeded."—Grows in India, but probably only naturalized.—Yields *Tinnevelly* and *Mecca Senna*.

4. *C. ÆTHIOPICA*, Guibourt, (*Hist. des Drog.* 3d ed. ii. 219,) *C. ovata*, Mérat, (*Dict. Mat. Méd.* vi. 311,) Séné de Nubie; *C. lanceolata*, Nectoux, (*Voy. dans la Haute Égypte*, t. ii.) *C. Senna*, Stevenson and Churchill. (*Med. Bot.* i. fig. 30.)—*Leaves* of three to five pair of leaflets; *petioles* with a gland at their base, and another between each pair of leaflets; *leaflets* oval-lanceolate, pubescent. *Legumes* flat, smooth, not reniform, rounded, naked on both sides, containing from three to five seeds.—About eighteen inches high. *Leaflets* from seven to nine lines long, and from three to four broad, consequently less elongated and less acute than those of the two preceding species. *Legumes* from eleven to fifteen lines long, of a pale or fawn colour.—Nubia, Fezzan, to the south of Tripoli, and probably to Ethiopia. Yields *Tripoli Senna*. I think I have detected the leaflets in *Alexandrian Senna*.

5. *C. LANCEOLA'TA*, Forskal, (*Fl. Ægypt. Arab.* 85,) Lindley, (*Fl. Med.* 259.)—Dr. Lindley, who met with this species in a collection of Arabian plants made by Dr. S. Fischer, says, "the *leaflets* are in four or five pairs, never more; oblong, and either acute or obtuse, not at all ovate, or lanceolate, and perfectly free from downiness even when young; the *petioles* have *constantly* a small round brown gland a little above the base. The *Pods* are erect, oblong, tapering to the base, obtuse, turgid, mucronate, rather falcate, especially when young, at which time they are sparingly covered with coarse scattered hairs."—This species is therefore distinct from both *C. acutifolia*, Delile, and *C. elongata*, Lemaire. Forskal says it grows about Surdud, Mor, and Abuarish; and that it is the *true Mecca Senna*.

6. *C. MARILAN'DICA*, Linn.—*Leaflets* eight to nine pairs, ovate-oblong, mucronate, equal, with an ovate gland at the base of the *petiole*. *Racemes* axillary, many-flowered, shorter than the leaves. *Legumes* compressed, linear, hispid, subsequently smoothish (De Cand.)—From three to six feet high. *Flowers* golden yellow.—United States; common in all parts south of New York.—Yields the *American Senna*.

COMMERCE.—Senna is imported from the Mediterranean (either directly from Egypt, or at second hand from Italy), and from the East Indies (Madras and Bombay), usually in bales. The duty is 6d. per lb. The quantities on which duty was paid, during the two last years, are as follows:—



	1838.	1839.
From East Indies.....	72,576 lbs.	110,400 lbs.
From other places.....	69,538 lbs.	63,766 lbs.
Total imported.....	142,114 lbs.	174,175 lbs.

DESCRIPTION.—Senna (*folia sennæ*) has a peculiar, agreeable, tea-like odour, and a nauseous, bitter taste. Its colour should be bright and fresh. If largely mixed with extraneous matter, if it be much broken or very dusty it should be rejected. Boiling water extracts about a third of its weight. Proof spirit yields a brown—alcohol or ether a green tincture.

1. **Alexandrian Senna.** *Senna Alexandrina*; *Folia Sennæ Alexandrinæ*.—Called by the French *Séné de lu Palthe* (i. e. *Tribute Senna*) because it is obliged to be sold to the Egyptian government, who resell it to Europeans. It is imported in bales from Alexandria and other Mediterranean ports. It consists of the leaflets of two or more species of *Cassia* (*C. acutifolia*, *C. obovata*, and, I think, sometimes *C. æthiopica*) mixed always with the leaves of *Cynanchum Argel* (see p. 347), and sometimes with those of *Tephrosia Apollinea*. The flowers and fruits of these plants are usually present in greater or less quantity. Alexandrian senna is collected in Nubia and Upper Egypt, and is conveyed down the Nile to the great depôt at Boulak.

For the following particulars I am indebted to the writings of Delile, (*Mem. sur l'Égypte*, vol. iii. p. 315, 1799, and *Fl. Ægypt.*) Rouillure, (*Ann. Chim.* lvi. 161.) Nectoux, (*Phil. Mag.* xv. 55, and *Voyage dans le Haute Égypte*, 1808,) and Burckhardt. (*Travels in Nubia*, pp. 22 and 49, 2d ed.)

Senna is collected by the Arabs of the tribe of Abaddeh. They make two crops annually,—the most productive is that after the rain in August and September; the second takes place about the middle of March. When cut the plants are spread out on the rocks, and dried in the sun (Nectoux).

Assouan is the first entrepôt for senna. It receives all that is gathered in the neighbourhood. Esneh is another entrepôt. It receives the acute-leaved senna from Abyssinia, Nubia, and Sennaar, from whence it arrives by the caravans which convey negroes to Egypt, and blunt-leaved senna, gathered in Upper Egypt (Rouillure). Daraou, between Assouan and Esneh, is also an entrepôt; but the great depôt is at Boulak, the port of Cairo. Here the monopoly of senna is farmed out by Mohammed Ali to Rosetti, an Italian, for about £3,500 per annum (Burckhardt). The senna arrives at Boulak from Assouan, not only by the Nile, but also by the way of Cossier, the Red Sea, and Suez. As, however, the latter is a more expensive route, it is not so frequently followed (Nectoux). Lastly, some senna is carried to Boulak by the caravans from Mount Sinai. The following are said by Rouillure to be the quantities brought from these places:

	Quintals.			
	<i>Acute-leaved Senna.</i>	<i>Obovate ditto.</i>	<i>Ethiopic ditto.</i>	<i>Argel leaves.</i>
From Assouan .....	7,000 to 8,000	500 to 600	.....	2,000 to 2,400
From Esneh .....	.....	800	2,000	.....
From Suez and Mount Sinai .....	.....	1,200 to 1,500	.....	.....
Total of each kind .....	7,000 to 8,000	2,500 to 2,900	2,000	2,000 to 2,400

So that the total amount of all kinds is, according to this statement, 13,500 to 15,300 quintals.

The mixture of the different leaves takes place at the entrepôts. Nectoux mentions those of Kénéh, Esneh, Daraou, Assouan, where it is effected. Rouillure says that at Boulak, 500 parts of acute leaves are mixed with 300 of obtuse leaves and 200 of Argel leaves.

From Boulak the senna is sent to Alexandria, and from thence is shipped to Europe.

Alexandrian senna has a grayish-green colour, an odour which somewhat resembles that of tea, and a viscid taste. It presents a broken appearance, and on examination is found to consist of the leaves, flowers, and fruits of the above-mentioned plants mixed with various extraneous matters (as seeds, date-stones, rabbit-dung, stones, &c.) The latter are in great part separated by hand-picking, sifting, &c. before the senna is fitted for use. It then constitutes *picked Alexandrian senna* (*folia sennæ alexandrinæ electæ*).



α. CASSIA LEAFLETS, FLOWERS, AND LEGUMES.—The leaflets of Cassia are readily distinguished from those of other genera found in senna, by being unequal-sided; that is, by two sides of the leaflet being unequal in size, shape, or length, and by the veins or nerves of their under surface being very conspicuous. The acute-leaved are very readily distinguished from the blunt-leaved species, by their shape. The dried flowers of Cassia may be easily detected; they are dull yellow. I have not been able to make out their species. The legumes of the obovate and acute-leaved Cassia are also found; they are distinguished by the botanical characters before described.

FIG. 224.



Legume and leaflet of Acute-leaved Alexandrian Senna.

FIG. 225.



Legume and leaflet of C. obovata.

β. ARGEL LEAVES, FLOWERS, AND FRUIT.—The Argel plants are collected by the Arabs, in the valleys of the Desert to the east and south of Assouan (Delile). The leaves found in Alexandrian senna are distinguished from the senna leaflets by their being equal-sided,—by the absence, or imperfect development of the lateral nerves,—by the paler colour, thicker and more coriaceous texture,—by a yellowish exudation frequently found on them, and generally, though not invariably, by their greater length. Under the name of heavy senna I have met with argel leaves, which were sold at a higher price than ordinary senna. These leaves were left in the fanning process, by which the real senna leaves were separated. By careful picking the flowers may be detected: they are white, and in small corymbs. In some recently-imported bales, argel flowers constituted nearly a fourth part. The fruit, as found in Alexandrian senna, seldom exceeds in size that of a good-sized orange-pip. It has an ovoid follicle, tapering superiorly, brown, shrivelled, and contains several seeds.

FIG. 226.



Argel leaf, flowers, and fruit.

γ. TEPHROSIA LEAFLETS AND LEGUMES.—The *Tephrosia Apollinea* (*Galega Apollinea*, Delile, pl.) grows in cultivated fields near the Nile, at Hermonthis, at Edfou, and in the Elephantine Island, opposite Assouan. The leaflets have a silky or silvery aspect; they are obovate-oblong, somewhat cuneiform, emarginate, equal-sided, tapering towards the base; lateral veins parallel, regular, and oblique to the midrib. These leaflets are usually found folded longitudinally, and are very apt to be over-looked. The legume is from an inch to an inch and a half long, not exceeding two lines broad, linear, slightly ensiform, and contains six or seven brownish seeds.

FIG. 227.



Legume and leaflet of *Tephrosia apollinea*.

2. Tripoli Senna. *Senna Tripolitana*; *Folia Sennæ Tripolitanae*.—It is carried to Tripoli in caravans, which go from Fezzan. In general appearance it resembles Alexandrian senna; but the leaflets are more broken, smaller, less acute than the acute-leaved Alexandrian senna, thinner, greener, and of a less herbaceous odour. They are the produce of *C. Æthiopica*, usually unmixed with any other species. But I have a sample which contains also the leaflets of *C. obovata* and argel leaves.

*Tunis senna* agrees with that of Tripoli.



3. **Aleppo Senna.**—Consists of the leaflets of *C. obovata*.

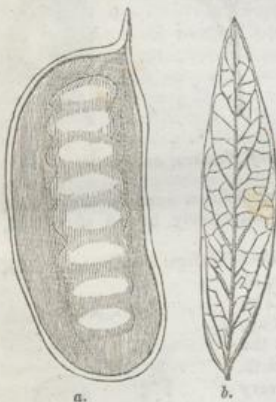
4. **Senegal Senna.** *Senna Senegalensis*.—Is a blunt-leaved senna, having a rougher and more glaucous appearance than the leaflets of *C. obovata*. Some years since a small bale of it was sent by the French *Ministre de la Marine* to M. Henry for examination. (*Journ. de Pharm.* xiv. 70.) I am indebted to the kindness of Professor Guibourt for a sample of it.

5. **Smyrna Senna.**—Very similar to Tripoli senna, but some of the leaflets resemble the acute-leaved Alexandrian senna.

6. **Mecca Senna.** *Senna Meccensis*; *Inferior* or *Second East Indian Senna*; *Séné Moka*, Guibourt; *Séné de la Pique*, or *Pike Senna*; *Sena Mukkee*, Royle.—Imported into England from India. It is the produce of Arabia, and finds its way into the interior of India by the ports of Surat and Bombay. Dr. Royle was informed that it was grown somewhere in the Agra and Muttra district, but was never able to prove the fact. (*Illustr.* 187.) It occurs in long narrow leaflets, of from one inch to an inch and a half long, narrower than those of Tinnevely senna, and of a yellowish colour; some of the leaflets being brownish, or even blackish. This change of colour is probably the result of the action of a moist atmosphere. Legumes are occasionally intermixed: they are from one and a half to three inches long, and from seven to eight lines broad; slightly curved, greenish in their circumference, blackish in their centre, with a smooth surface. Recently this senna in good condition has been imported from Turkey in casks. It appears to be fresh and fine, and approximates to Tinnevely senna in colour; but contains stalks and dust, with a few stones.

7. **Tinnevely Senna.** *Finest East Indian Senna*; *Séné de l'Inde*, Guibourt.—Cultivated at Tinnevely, in the southern part of India, by Mr. G. Hughes. It is a very fine unmixed senna, which is extensively employed, and fetches a good price. It consists of large, thin, unbroken leaflets, of a fine green colour, from one to two inches, or more, long, and sometimes half an inch broad at their widest part. When exposed to a damp atmosphere they are very apt to change colour, and to become yellow or even blackish.

FIG. 228.



a. Legume of Tinnevely Senna  
(*C. elongata*.)  
b. Leaflet of ditto (Royle).

8. **American Senna.** *Senna Americana*.—Is the produce of *Cassia Marilandica*, but never reaches this country as an article of commerce. That which I have received was prepared by the Shakers of the United States, and has been compressed into an oblong cake. The leaflets are oblong, lanceolate, from one and a half to two inches long, and from a quarter to half an inch broad, thin, pliable, and of a pale green colour. They have a feeble odour and a nauseous taste, like the other sennas.

**ADULTERATION.**—Senna is not, to the best of my belief, adulterated in this country. The leaflets of *Colutea aborescens* or *Bladder Senna* have, on the continent, been occasionally intermixed. They are elliptical, regular, and obtuse. Their regularity at the base would at once distinguish them from the leaflets of *Cassia obovata*.

Argel leaves, mixed with a few leaflets of *C. acutifolia*, I have known to be recently sold as *picked* or *heavy senna* at a higher price. It was done rather from ignorance than fraud.



A serious adulteration has been sometimes practised on the continent, by the substitution of the leaves of *Coriaria myrtifolia* for those of senna. (*Journ. de Chim. Méd.* i. 284.) They are ovate-lanceolate, grayish-green with a bluish tinge, three-nerved, with a strongly marked midrib; the two lateral nerves disappear towards the summit of the leaves. Chemically these leaves are distinguished by their infusion yielding, with gelatine, a whitish precipitate (*tannate of gelatine*); and, with sulphate of iron, a very abundant blue precipitate (*tannate of iron*). Furthermore, it forms precipitates with bichloride of mercury, emetic tartar, and chloride of barium.

COMPOSITION.—Three analyses of senna have been made; viz. one in 1797, by Bouillon La Grange (*Ann. Chim.* xxiv. 3); a second by Braconnot (*Journ. Phys.* lxxxiv. 281); and a third, in 1821, by Lassaigne and Fenuelle (*Ann. Chim. et Phys.* xvi. 16):

FIG. 229.



Leaf of *Coriaria myrtifolia*.

Senna Leaves.		Senna Pods.
Braconnot.	Lassaigne and Fenuelle.	Fenuelle.
Bitter matter of senna . . . . . 53.7	Cathartin.	Cathartin.
Reddish brown gum . . . . . 31.9	Yellow colouring matter.	Yellow colouring matter.
Matter similar to animal mucus, precipitable by acids . . . . . 6.2	Volatile oil.	Volatile oil.
Acetate of lime . . . . . 8.7	Fixed oil.	Fixed oil.
Malate (or some other vegetable salt) of lime . . . . . 3.7	Albumen.	Albumen.
Acetate of potash } . . . . . traces	Mucus.	Gum.
Chloride of sodium } . . . . . traces	Malic acid.	Malic acid.
Watery extract of Alexandrian senna . . . . . 104.2	Malate and tartrate of lime.	Malates of potash and lime.
	Acetate of potash.	Mineral salts.
	Mineral salts.	Silicic acid.
	[Insoluble matter (lignin, &c.)]	Lignin.
	Alexandrian senna.	Legumes of <i>Cassia nuctifolia</i> .

1. ODOUROUS PRINCIPLE; *Volatile Oil of Senna*.—Obtained by submitting the leaves, with water, to distillation. It has a nauseous odour and taste. The distilled water of senna, which contains some oil in solution, acts as a mild purgative only.

2. CATHARTINE; *Purgative Principle of Senna*.—Yellowish red, uncrystallizable, with a peculiar odour, and a bitter, nauseous taste; very soluble both in water and alcohol, but insoluble in ether; it attracts water from the air. Its aqueous solution is precipitated by infusion of galls and diacetate of lead. The sesquisulphate of iron and alkalis deepen the colour of the infusion: chlorine decolorizes it: iodine, acetate of lead, gelatine, and emetic tartar, cause no precipitates with it. It appears to consist of carbon, hydrogen, and oxygen only. Three grains caused nausea, griping, and purging.

CHEMICAL CHARACTERISTICS.—By boiling senna in water,—by the exposure of infusion of senna to the air, as well as by the action of the mineral acids and of chlorine on the infusion,—a precipitate is procured. Bouillon La Grange regarded this as a species of resin, formed by the union of oxygen with a peculiar kind of extractive found in senna. This extractive, he says, is inert, but becomes active when converted into resin; and hence, the cold infusion, according to this chemist, causes colic, but rarely purges. The carbonated alkalis, lime water, nitrate of silver, the acetates of lead, sulphate of iron, &c. form precipitates with the infusion of senna.

PHYSIOLOGICAL EFFECTS. *a. On Animals*.—In doses of five or six ounces it purges horses. Courten (Wibmer, *Wirk Arzneim. u. Gifte*, ii. 67,) threw an infusion into the veins of a dog; it quickened the respiration, and caused vomiting. The animal appeared weak, was dull, and had no inclination to eat.

*β. On Man*.—Regnardot (*Ibid. op. supra cit.*) injected half a spoonful of weak lukewarm infusion of senna into the left median vein of a young man affected with an herpetic eruption. The only effect produced was a slight temporary headache. Some days afterwards a spoonful was injected: in half an hour violent shivering and vomiting came on, which were followed by heat and purging. The febrile symptoms continued for several hours. Taken by the



stomach senna acts as a sure and safe purgative. Its ill effects are nausea, griping, flatulence, and, at first, depression, afterwards excitement of the pulse. It appears to stimulate the abdominal and pelvic vessels, thereby having a tendency to promote the hemorrhoidal and menstrual discharges. It is one of the mildest of the drastic purgatives. Unlike scammony, gamboge, jalap, and most other drastics, it does not rank among poisons, even when given in large doses. It is distinguished from the saline purgatives by its stronger and more irritant operation, by the heat, gripings, and increased frequency of pulse, which attend its purgative action. From rhubarb it differs in being more powerful and irritant in its operation, from being nearly or quite devoid of any tonic operation. It acts more speedily and powerfully than aloes and in a less marked manner on the large intestines. In its operation it appears to rank between jalap and aloes.

The petioles and stalks possess similar properties to the leaflets. Formerly the griping quality of senna was ascribed to the stalks, but both Bergius (*Mat. Med.* i. 354,) and Schwilgué (*Traité de Mat. Med.* ii. 410,) have proved the error of this notion. The legumes are much milder in their operation than the leaflets.

Good East Indian Senna is almost, if not quite, as active as the Alexandrian. Mr. Twining (*Trans. Med. and Phys. Soc. of Calcutta*, vol. v. p. 433,) after extensively trying it, declared it equal to the best he had ever seen. The obovate senna appears to be milder than the acute-leaved. The Senegal senna, before referred to, was found to possess less activity than ordinary senna. Part of the acrid and griping qualities of Alexandrian senna are referrible to the argel leaves, which, according to the observations of Rouillure, Delile, Nectoux, and Pugnet (quoted by Delile), possess greater activity than the true senna leaves. Rouillure says they purge and gripe, and are used by the Arabs of Upper Egypt, without the addition of senna. These effects might be expected from the known properties of the Asclepiadaceæ (before referred to). "American senna is an efficient and safe cathartic, closely resembling the imported senna in its action, and capable of being substituted for it in all cases in which the latter is employed." (*United States' Dispensatory*.)

If infusion of senna be given to the nurse, the suckling infant becomes purged, —a satisfactory proof that the cathartic principle of senna becomes absorbed, and is thrown out of the system by the excretories. Furthermore, as purging results from the injection of infusion of senna into the veins, this cathartic would appear to exercise a specific influence over the bowels, independent of its local action on these when it is swallowed.

USES.—Senna is well adapted for those cases which require an active and certain purgative, with a moderate stimulus to the abdominal and pelvic viscera. Thus, *in constipation* and *inactivity of the alimentary canal*, requiring the continued or frequent use of purgatives; *in worms*; *in determination of blood to the head*, and many other cases which readily suggest themselves, senna answers very well. The circumstances contra-indicating its use are,—an inflammatory condition of the alimentary canal, a tendency to hemorrhoids or menorrhagia, threatening abortion, prolapsus of the uterus or rectum, &c. The objections to its use are,—the large dose required, the nauseous and disgusting flavour, the tendency to gripe, and the irritant and stimulant operation. Thus, in inflammation of the mucous membrane of the bowels, the irritant action of senna makes it an objectionable purgative; while its tendency to increase the frequency of the pulse renders it less fit for exhibition in febrile disorder than the saline purgatives. It is a very safe purgative, and may be given to children, females, and elderly persons, with great security. Though it is not the most appropriate purgative to be employed after delivery, and operations about the abdomen or pelvis (as hernia and lithotomy), yet I have repeatedly seen it used, and rarely with any unpleasant consequences.

ADMINISTRATION.—Powder of senna may be given in doses of from ʒss. to



ʒij. for adults. There are two objections to its use,—the great bulk of the necessary dose, and the uncertainty of its operation, arising from its liability to decompose by keeping. To cover the unpleasant flavour of senna, Dr. Paris (*Pharmacologia*,) recommends the addition of bohea, (black) tea: coffee has been advised by others. Aromatics (especially coriander and ginger) are frequently added to prevent griping, and to improve the flavour.

1. INFUSUM SENNÆ, E. (U. S.); *Infusum Sennæ compositum*, L. D. *Infusion of Senna*; *Senna Tea*.—(Senna, ʒxv. [ʒiiss. E., ʒj. D.]; Ginger, bruised, ʒiv. [ʒj. D.]; Boiling [distilled, L.] Water, Oj. [*wine measure*, D.] Macerate for an hour in a vessel lightly covered, and strain [through linen or calico, E.]. (The U. S. P. directs Senna, an ounce; Coriander, bruised, a drachm; Boiling Water, a pint. Macerate for an hour in a covered vessel and strain.)—An ordinarily used purgative, employed frequently in the maladies of children as well as of adults. A saline purgative (sulphate of magnesia or of soda, or potash-tartrate of soda, or tartrate of potash) is usually given in conjunction with it; manna and tincture of senna being frequently added. A compound of this kind is called the *black draught*.—The dose of infusion of senna is from fʒij. to fʒiv. for adults.

2. INFUSUM SENNÆ COMPOSITUM, E.; *Infusum Sennæ cum Tamarindis*, D. *Infusion of Senna with Tamarinds*.—(Senna, ʒj.; Tamarinds, ʒj.; Coriander, bruised, ʒj.; Muscovado, ʒss. [Brown Sugar, ʒj. D.]; Boiling Water, fʒviii. Infuse for four hours, with occasional stirring, in a covered vessel, not glazed with lead; and then strain through linen or calico. This infusion may be likewise made with twice or thrice the prescribed quantity of senna, E.)—A vessel not glazed with lead is directed, lest the acid of the tamarinds should dissolve the metal of the glazing, and thereby give a noxious impregnation. This cathartic somewhat resembles Sydenham's *potio cathartica lenitiva*. The unpleasant flavour of the senna is agreeably covered by the tamarinds and sugar. This preparation is cathartic and refrigerant. It is employed as a cathartic in febrile disorders.—Dose, fʒij. to fʒiv.

3. ENEMA CATHARTICUM, E. D. *Cathartic Enema*.—(Olive Oil, ʒj.; Sulphate of Magnesia, ʒss.; Sugar, ʒj.; Senna, ʒss.; Boiling Water, fʒxvj. Infuse the senna for an hour in the water, then dissolve the salt and sugar; add the oil, and mix them by agitation, E. The *Dublin College* employs, of Manna, ʒj.; dissolve it in fʒx. of compound decoction of Chamomile, and add Olive Oil, ʒj.; Sulphate of Magnesia, ʒss.)—Employed as a laxative. It is a constituent of the fetid clyster.

4. TINCTURA SENNÆ COMPOSITA, L. E. D.; *Tincture of Senna. Elixir Salutis*.—(Senna, ʒiijss.; Caraway, bruised, ʒiijss.; Cardamoms, bruised, ʒj.; Raisins [stoned], ʒv.; Proof Spirit, Oij. Macerate for fourteen days, and strain, L.—Senna, lb. j.; Caraway, bruised, ʒjss.; Cardamom seeds, bruised, ʒss.; Proof Spirit, Cong. j. (*wine measure*). Macerate for fourteen days, and filter, D.—Sugar, ʒiijss.; Coriander, bruised, ʒj.; Jalap, in moderately fine powder, ʒvj.; Senna, ʒiv.; Caraway, bruised; Cardamom seeds, bruised, of each ʒv.; Raisins, bruised, ʒiv.; Proof Spirit, Oij. Digest for seven days, strain the liquor, express strongly the liquor, and filter the liquids. This tincture may be more conveniently and expeditiously prepared by percolation, as directed for the compound tincture of cardamom [155].—If Alexandrian Senna be used for this preparation, it must be freed from *Cynanchum* [Argel] leaves by picking, E.)—Carminative, cordial, stomachic, and purgative. Usually employed as an adjunct to the infusion of senna. If given alone as a purgative, the dose should be fʒss. to fʒj. It is useful in costiveness attended with flatulence.

[Another form of this is the *Tinctura Sennæ et Jalapæ*, U. S. It is made as follows: Take of Senna three ounces; Jalap, in powder, an ounce; Coriander, bruised; Caraway, bruised, each half an ounce; Cardamom, bruised, two drachms; Sugar, four ounces; Diluted Alcohol, three pints. Macerate for fourteen days, express and filter through paper.



This tincture may also be prepared by beating well together, the Senna, Jalap, and Aromatics, moistening them thoroughly with Diluted Alcohol, allowing them to stand for forty-eight hours, then transferring them to an apparatus for displacement, and gradually pouring upon them Diluted Alcohol, until three pints of filtered liquor are obtained.—J. C.]

5. SYRUPUS SENNÆ, L. E. (U. S.) *Syrup of Senna*.—(Senna, ℥ijss.; Fennel, bruised, ℥x.; Manna, ℥ijj.; Sugar, ℥xv.; Boiling Water, Oj. Macerate the Senna and Fennel in the Water, with a gentle heat, for an hour. Mix the Manna and Sugar with the strained liquor; then boil down to a proper consistence, L.—Senna, ℥iv.; Boiling Water, Oj. and ℥℥iv.; Treacle, ℥xlviij. Infuse the senna in the water for twelve hours; strain, and express strongly through calico, so as to obtain a pint and two fluidounces at least of liquid. Concentrate the treacle in the vapour-bath as far as possible, or till a little taken out upon a rod becomes nearly concrete on cooling; and, while the liquor is still hot, add the infusion, stirring carefully, and removing the vessel from the vapour-bath as soon as the mixture is complete.—If Alexandrian Senna be used for this preparation, it must be carefully freed of *Cynanchum* [*Argel*] leaves by picking it, E.) [Senna ℥ijj.; Fennel Seed, bruised, ℥i.; Boiling Water, a pint; Sugar, ℥xv. Proceed as directed by LOND. P. U. S.]—Cathartic. Given to children in doses of ℥℥j. to ℥℥ijj.

6. CONFECTIO SENNÆ, L. (U. S.); *Electuarium Senna*, E. D. *Electuarium Lentivum*; *Confection of Senna*; *Lentive Electuary*.—(Senna, ℥viiij.; Figs, lb. j.; Tamarind pulp; Cassia pulp; Prune pulp, of each lb. ss.; Coriander, ℥iv.; Liquorice, ℥ijj.; Sugar, lb. ijss.; Water, Oij. Rub the Senna with the Coriander, and by a sieve separate ten ounces of the mixed powder. Then boil down the Water, with the Figs and Liquorice added, to half. Evaporate the strained liquor in a water bath, until of the whole twenty-four fluidounces remain; then the sugar being added, let a syrup be made. Lastly, gradually rub the Pulp with the Syrup, and having thrown in the sifted powder, mix them all, L. (U. S.)—The *Edinburgh College* omits the Tamarind and Cassia pulps, but employs lb. j. of Prune pulp, and Oijj. of Water.—The *Dublin College* employs Senna leaves, in a very fine powder, ℥iv.; Pulp of Prunes, lb. j.; Pulp of Tamarinds, ℥ij.; Treacle, Oiss. [*wine measure*]; Essential Oil of Caraway, ℥ij. Boil the pulps in the syrup to the thickness of honey, then add the powder, and when the mixture has grown cold, add the oil; lastly, mix them all together, D.)—The preparation of this compound being troublesome and expensive, and sophistications of it not being readily detectable, it is rarely prepared, in commerce, as directed by the London and Edinburgh Colleges. Jalap is frequently substituted, partially or wholly, for the senna and cassia pulp. Dr. Paris mentions walnut liquor as a colouring ingredient in use; and adds, that a considerable quantity of this confection is made in Staffordshire, in which unsound and spoilt apples enter as a principal ingredient. When properly prepared, it is a pleasant, mild, and very effectual purgative, and is frequently employed by pregnant women, persons afflicted with hemorrhoids or diseases of the rectum. When given alone in a full dose it is apt to gripe.—Dose, ℥j. to ℥vj. It is frequently employed as a vehicle for the exhibition of other cathartics; for example, bitartrate of potash.

[*Fluid Extract of Senna*. This preparation was introduced several years ago, and gained favour with the public. Mr. A. Duhamel (*Amer. Journal of Pharmacy*, vol. xiii. p. 291) has given a formula for its preparation, as follows:—Take of Senna, coarsely powdered, ℥xxxij; Diluted Alcohol 16° Cartier, Oiv.; Water, Cong. i.; Sugar, ℥xx.; Oil of Fennel, gtt. lxiv. Hoffman's Anodyne, qs. Mix the senna in a covered vessel with the Alcoholic menstruum, and allow the mixture to stand over night. Then put it into the Boulay filter, and displace with the water until 1½ gallons have passed. Evaporate by a gentle heat to twenty fluidounces, and while hot add the sugar. Strain



to separate the mucilaginous matters evaporated by the heat, and when cold add the oil of fennel, dissolved in a small quantity of Hoffman's anodyne.

The Hoffman's anodyne serves also to prevent fermentation.

This preparation has several advantages over the infusion or confection of senna. It is not disagreeable to the taste and not nauseating in its effects upon the stomach, is less disposed to gripe, and is possessed of sufficient strength to render it an efficient cathartic. A fluidounce represents an ounce of senna. The dose is fʒss. to fʒi. when full cathartic effects are desirable—and fʒi. or fʒij. as a laxative.—J. C.]

(15. CASSIA MARILAN'DICA, *Linnaeus*.—AMERICAN SENNA.)

*Sex. Syst.* Decandria, Monogynia.  
*Cassia Marilandica*, U. S.—The Leaves.

[*Gen. Char.*—See Cassia.

*Sp. Char.*—Perennial, glabrous or somewhat pubescent, with scattered spreading hairs; leaflets twelve to eighteen, lanceolate, oblong, mucronate; gland near the base of the petiole, clavate; stipules linear subulate, caducous; racemes axillary, very short, somewhat paniculate at the summit of the branches; legumes linear, somewhat curved, at length nearly glabrous.

This is quite an ornamental plant, erect in its port, branching and beset towards the summit with clusters of showy yellow flowers. Introduced into the gardens, it thrives without difficulty.

*Hab.*—It is abundant throughout the middle and southern States of the Union, in alluvial soil along the course of streams and rivulets.

Wild senna is to be plucked at the time of flowering, which takes place in August. The leaves are to be separated from the stalks, and dried carefully. When dry it has a peculiar senna-like odour and a bitterish, mawkish taste. It yields its properties to water and to alcohol. The article prepared by the Shakers is liable to the same objection as all their drugs, which are put up in square packages, viz. mouldiness in the interior.

Among its constituents are, resin, mucilage, extractive, and a volatile substance. (U. S. Dispensatory.)

American senna is decidedly cathartic, so much so as to render it a substitute for the imported article. It is not as active, however, and has to be employed in larger quantity. By country practitioners it is in use throughout the United States. It is applicable to the same range of cases as the foregoing articles. The mode of administration is infusion.—J. C.]

16. CASSIA FISTULA, *Linn. L. E. D.* (U. S.)—THE PUDDING-PIPE TREE OR PURGING CASSIA.

*Cathartocar'pus Fist'ula*, *Perseon*.  
*Sex. Syst.* Decandria, Monogynia.

(*Leguminum Pulpa*, *L.*—Pulp of the Pods, *E.*—*Palpa Leguminis*, *D.*)

*HISTORY.*—The earliest writers in whose works we find the fruit of Cassia Fistula mentioned, are the Arabians, Mesue, Serapion, and Avicenna. The first Greek writer who notices it is Actuarius, who terms it *κασσία μέλαινα* or *black cassia*, (lib. v).

*BOTANY.*—*Gen. Char.*—See Cassia (p. 582).

*Sp. Char.*—*Leaflets* four to six pairs, ovate, somewhat acuminate, smooth; *petioles* glandless. *Racemes* lax, without bracts. *Legumes* terete, straight, somewhat obtuse, smooth (De Cand.)

*Tree* from twenty to thirty feet high. *Leaves* alternate, pinnate, from twelve to eighteen inches long; *leaflets* from two to six inches long, and from one and a half to three inches broad. *Stipules* minute. *Racemes* one to two feet long. *Flowers* large, bright-yellow, fragrant, on long footstalks. *Legume* cylindrical, ligneous, one to two feet long, externally blackish-brown; with three longitudinal bands or seams extending the whole length, two of which by their contiguity



appear to form a single one, the third being on the opposite side of the legume; internally divided into numerous cells by thin transverse partitions of phragmata, formed by the distension of the placenta, and therefore called spurious dissepiments. *Seed* one in each cell, surrounded by a soft blackish pulp, which appears to be a secretion of the endocarp or inner coat of the pod.

**Hab.**—East Indies, Egypt. Introduced into the West Indies.

**DESCRIPTION.**—The pods of Cassia Fistula (*cassia fistula*; *legumen cassie fistule*) are imported from the East Indies (Madras and Ceylon), from the West Indies (Barbadoes), and from South America (Carthage and Savanilla). Their botanical description has been above given. Their *pulp* (*pulpa cassie fistula*; *pulpa leguminis cassie fistule*) is reddish-black, with a sweetish taste. By exposure to the air it becomes acid, in consequence of undergoing the acetous fermentation. Those pods yield the most pulp which are heavy, and do not rattle when shaken.

*Cassia pulp* is directed by the *London College* to be prepared as follows:—“Pour boiling water upon the bruised Pods of Cassia, that the pulp may be washed out, which press through a coarse sieve, and afterwards through a hair one; then evaporate the water in a water-bath, until the pulp acquire a proper consistence.”

**SMALL AMERICAN CASSIA FISTULA.** *Petite Casse d'Amérique*, Guibourt.—Pods twelve to eighteen inches long, and six lines in diameter, pointed at the extremities. *Pericarp* thinner than the ordinary Cassia fistula. *Pulp* reddish-brown, acerb, astringent, sweet. Is this pod the fruit of *Cathartocarpus bacillaris*, a native of the Caribæan Islands, depicted in *Jacquin's Fragn. Bot. Tab. 85?*

The pulp of *CASSIA BRASILIANA* has been employed in America. The pods are from 18 to 24 inches long, ligneous, and rough, with very prominent sutures.

**COMPOSITION.**—Vauquelin (*Ann. Chim.* vi. 275,) and N. E. Henry (*Journ. Chim. Méd.* ii. 370,) have analyzed Cassia pulp.

Vauquelin's Analysis.		N. E. Henry's Analysis.			
Pericarp.....	35.15		Common or African.	American	
Phragmata.....	7.03				
Seeds.....	13.23				
Pulp. {	Sugar.....	14.83	Sugar.....	61.00	69.25
	Gum.....	1.36	Gum.....	6.75	2.60
	Extractive.....	0.51	Matter possessing many properties of tanning substances.....	13.25	3.90
	Vegetable jelly.....	0.13	Do. having some properties of gluten.....	traces	traces
	Glutinous matter.....	0.79	Colouring matter soluble in ether.....	small quantity	none
	Woody fibre.....	2.35	Loss, principally owing to water.....	19.00	24.25
Water.....	21.35				
Cassia pods.....	97.00	Watery extract of Cassia pulp.....	100.00	100.00	

**PHYSIOLOGICAL EFFECTS.**—Cassia pulp in small doses is a mild laxative, in larger ones a purgative; but it is apt to occasion nausea, flatulence, and griping. Manna is said singularly to exalt the purgative effect of Cassia pulp, (see *Paris, Pharm.* i. 271, 6th ed.) Thus Valisnieri states, that twelve drachms of this pulp are about equivalent in purgative strength to four ounces of manna; but that if we give eight drachms of Cassia pulp, in combination with four drachms of manna, we obtain double the effect! But the correctness of such an incredible statement is not to be admitted on any evidence yet adduced in support of it.

**USES.**—It is rarely or never given alone; but the cases for which it is well adapted are febrile and inflammatory affections. On account of its pleasant taste it would be a convenient purgative for children.

**ADMINISTRATION.**—Dose, for an adult, of the pulp, as a mild laxative, ℥j. to ℥ij.; as a purgative, ℥j. to ℥ij.

**CONFECTIO CASSIÆ, L.;** *Confection of Cassia*; *Electuarium Cassiæ, D.*—(Cassia pulp [recently expressed, *D.*] lb. ss.; Manna, ℥ij.; Tamarind pulp, ℥j.; Syrup of Rose, fʒviij. [Syrup of Orange Peel, lb. ss. *D.*] Bruise the Manna, then dissolve it in the Syrup; afterwards mix in the Cassia and Tamarind pulps,



and evaporate the moisture until a proper consistence is attained).—Laxative. Occasionally used for children, as a vehicle for some more active substance.—Dose, ʒij. to ʒj. for adults.

17. COPAIF'ERA, Linn.—VARIOUS SPECIES, E.

Copaif'era Langsdorffii, De Candolle, L.—Copaif'era officinalis, Linn. D.

Sex. Syst. Decandria, Monogynia.

(Resina liquida, L. D.—fluid resinous exudation, E.)

(Copaiba, U. S.)

HISTORY.—The first notice of Copaiva balsam, as well as of the tree yielding it, was given by Piso. (*Med. Bras. lib. iv. cap. 4, in Hist. Nat. Bras. Lugd. 1648.*) Hayne (Duncan, *Suppl. to the Edinb. New Disp. p. 45.*) is of opinion that the *Copaifera bijuga* is the species observed by Piso.

BOTANY. Gen. Char.—*Calyx* ebracteolate, of four spreading, small, equal sepals united at the base. *Petals* none. *Stamens* ten distinct, nearly equal; *anthers* oblong. *Style* filiform. *Legume* stalked, obliquely elliptical, coriaceous, somewhat compressed, two-valved, with two ovules, one-seeded. *Seed* elliptical, inclosed in a baccate aril. *Embryo* straight; *radicle* somewhat lateral.—*Trees*. *Leaves* abruptly pinnate. *Leaflets* coriaceous, somewhat unequal, ovate. *Flowers* paniculate (De Cand.)

Species.—1. *C. MULTIJUGA*, Hayne.—*Leaflets* six to ten pairs, ovate-lanceolate, acuminate, mucronate, with pellucid dots. *Petiole* slightly hairy.—In the province of Para the greatest quantity of the balsam is furnished by this species (Hayne).

2. *C. LANGSDORFFII*, Desf. L.—*Leaflets* three to five pairs, ovate or oval, blunt, equal-sided, with pellucid dots. *Petioles* and *peduncles* slightly downy.—This and the following species furnish the balsam collected by the natives of Santa Paulo.

3. *C. CORIACEA*, Mart.—*Leaflets* two to three pairs, elliptical, equal-sided, emarginate, coriaceous, not dotted, reticulated, smooth on both sides, somewhat glaucous beneath. *Petioles* and *peduncles* almost smooth.—Bahia. It yields balsam of copaiva in Santa Paulo.

4. *C. OFFICINALIS*, Linn. D.; *C. Jacquini*, Desf.—*Leaflets* two to five pairs, incurved, ovate, unequal-sided, obtusely acuminate, with pellucid dots.—Venezuela, near Calaboso, West Indies.—An inferior kind of balsam is said to be obtained from this species.

The following are species of *Copaifera* described by Hayne:

5. *C. BEYRICHI*, Hayne.—Mandiocca, in the Brazils.
6. *C. GUIANENSIS*, Desf.—Guiana, near Rio Negro.
7. *C. MARTII*, Hayne.—Para.
8. *C. BIJUGA*, Willd.—Brazils.
9. *C. JUSSIEUI*, Hayne.—Brazils.
10. *C. NITIDA*, Mart.—Brazils (Minas Geraes).
11. *C. LAXA*, Hayne.—Brazils.
12. *C. CORDIFOLIA*, Hayne.—Brazils.
13. *C. SELLOWII*, Hayne.—Brazils.
14. *C. OBLONGIFOLIA*, Mart.—Brazils (Minas Geraes).

EXTRACTION OF THE BALSAM.—The balsam is obtained by making incisions into the stems of the trees. It exudes so abundantly that, at the proper season, twelve pounds are sometimes obtained in the space of three hours. (Piso, *op. supra cit.* p. 56.) If, however, no balsam should flow, the wound is immediately closed with wax or clay, and reopened in a fortnight, when an abundant discharge takes place. Old trees sometimes furnish balsam two or three times in the year.

Langsdorff<sup>1</sup> in his account of Santa Catherina observes that “the tree which

<sup>1</sup> *Voyages and Travels in various Parts of the World, during the Years 1803, 1804, 1805, 1806, and 1807*, p. 43. Lond. 1813.



yields copaiva balsam or balsam of Tolu, *Copaifera officinalis*, is here called *oleo breto*, or black olive. It abounds in the forests, but very little use is made of it. I was assured, that when the incision is made in the tree to procure the balsam, which is done only in the very hot summer months, a strong sound is heard, and the sap or balsam rushes out in a stream, as when a vein is opened in the human arm."

COMMERCE.—Balsam of Copaiva is principally obtained from Para and Maranhão. This probably is yielded, for the most part, by *C. multijuga*. Carthagená, Maracaibo, and Savanilla, also furnish some. Is this form *C. officinalis*? Occasionally it is brought from Rio Janeiro, and is there probably procured from *C. Langsdorffii* and *coriacea*. Now and then some comes from the West Indies. But a considerable quantity is imported, at second hand, from New York. It is usually brought over in casks holding one cwt. or one and a half cwts. In 1839 duty (4s. per cwt.) was paid on 643 cwts.

DESCRIPTION.—Balsam of Copaiva (*balsamum copaivæ seu copaibæ*) is a clear, transparent liquid, having for the most part the consistence of olive oil. It has a pale yellowish colour, a peculiar, not disagreeable odour, and a bitter somewhat acrid and nauseous taste. Its sp. gr. is less than that of water, but is not constant. It is 0.95 according to Schönberg, while Stoltze says it is 0.966. By keeping it becomes considerably denser. Balsam of copaiva is insoluble in water, but is completely soluble in alcohol, ether, and the oils, both fixed and volatile. When acted on by alkalis it yields a kind of soap, which is insoluble in water.

Considerable variation exists in the colour, consistence, and sp. gr. of, as well as in the relative quantities of volatile oil and resin yielded by, balsam of copaiva. Even the odour and taste vary somewhat. The differences doubtless depend in great part upon the balsam being procured from different species. The smaller species, which grow in the interior of the Brazils, as in Bahia and Minas, yield, as we are told, less balsam, but it is more resinous and sharper. *Brazilian Copaiva* is thin, clear, and pale-coloured. *West Indian Copaiva* (probably by *C. officinalis*) is thick, golden-yellow, not transparent, and has a less agreeable smell, which is somewhat like that of turpentine.

ADULTERATION.—There is no reason to suppose that balsam of copaiva is adulterated in this country now; though the following fact, mentioned by Dr. Paris, (*Pharmacologia*, ii. 183, 6th ed.) proves that it formerly was. "A curious trial took place some time since, between the owners of certain premises that were burnt down, and the Governors of the Sun Fire-Office, in consequence of the latter refusing to indemnify the proprietor for his loss, because the fire had been occasioned by his *making* Balsam of Copaiva."—Gray (*Suppl. to the Pharm.*) has published formulæ for making a *balsamum copaivæ reductum*, as well as *copaiva factitia*.—The *Edinburgh College* gives the following characters of its purity:

"Transparent: free of turpentine odour when heated: soluble in two parts of alcohol: it dissolves a fourth of its weight of carbonate of magnesia, with the aid of a gentle heat, and continues translucent."

The turpentine odour may be recognised by dropping the suspected balsam on a heated iron (as a spatula).—The mixture of magnesia and copaiva here referred to, acquire, in several hours, the translucency, aspect, and consistency of very thick mucilage of gum arabic. This test was proposed by Blondeau. (*Journ de Chim. Méd.* i. 560; and ii. 41.) If one or two drops of suspected balsam be placed on unsized paper, and carefully heated over a lamp to expel the volatile oil, an homogeneous translucent spot is left, if the balsam be pure, but if it have been mixed with castor oil, the spot of resin is surrounded by an oily areola. (Chevallier, *Journ. de Chim. Méd.* t. iv. p. 619.) Planche (*Journ. de Pharm.* xi. 228,) has recommended ammonia as a test. If pure balsam be shaken with liquor ammoniæ (sp. gr. 0.965) it becomes clear and transparent in a few instants; not so when castor oil is present. Ebullition with water (to



expel the volatile oil and obtain the hard resin);—and the action of potash, and of sulphuric acid, have also been proposed as tests.

COMPOSITION.—F. Hoffmann (*Obs. Phys. Chym.* lib. i. Obs. vi. *Op. omn.* t. iv. p. 454. Gen. 1748,) submitted copaiva to a chemical examination. Afterwards Schönberg (Pfaff, *Mat. Med.* iv. 12,) analyzed it. In 1826, Stoltze, (*Berl. Jahrb.* xxvii. 2, 179,) and, in 1829, Gerber (*Journ. de Pharm.* xvi. 79 and 367,) submitted it to an analysis.

Stoltze's Analysis.		Gerber's Analysis.	
		Fresh Balsam.	Old Balsam.
Volatile oil .....	38.00	41	31.70
Yellow hard resin (copaivic acid) .....	52.75	51.38	53.68
Brown soft resin .....	1.66	2.18	11.15
Water and loss .....	7.59	5.44	4.10
Balsam of Copaiva .....	100.00	100.00	100.63

1. VOLATILE OIL (see p. 598).

2. RESIN OF COPAIVA (*Resina Copaivæ*).—After the balsam has been deprived of its volatile oil by distillation, a brownish resinous mass is left behind. This, when gently heated to expel the residual water, is sold as *resin of copaiva*. It consists of two resins—one called *copaivic acid*, the other the *viscid resin of copaiva*. They are separated by rectified spirit, which dissolves the acid resin, but leaves the viscid one.

*α. Copaivic Acid: Yellow Brittle Resin of Copaiva.*—One hundred parts of balsam yield, on an average, fifty parts of this acid. Copaivic acid is an amber-coloured, brittle, crystallizable resin, soluble in alcohol, rectified spirit, ether, and the volatile and fixed oils. It is decomposed by sulphuric and nitric acids. Its acid properties are proved by its alcoholic solution reddening litmus, and by the definite compounds (*copaivates*) which it forms with bases. Thus, if an alcoholic solution of nitrate of silver be dropped into the alcoholic solution of this resin, we obtain, on the addition of a little ammonia, a white crystalline precipitate (*copaivate of silver*), slightly soluble in alcohol, and composed of one atom copaivic acid, and one atom oxide of silver. In the same way we may form the analogous *copaivates of lead and lime*. The *copaivates of potash and soda* are soluble, and have a bitter taste and a disagreeable odour: they are easily decomposed by acids. The *copaivate of ammonia* is soluble in ether and alcohol, but not in water. The *copaivate of magnesia* is prepared by adding copaivate of potash to sulphate of magnesia.

Copaivic acid is isomeric with pinic acid (see p. 174); that is, its composition is  $C^{40}H^{32}O^4$ .

*β. Viscid Resin of Copaiva; Brown Soft Resin of Copaiva.*—When a hot alcoholic solution of copaiva cools, it retains in solution the acid resin already described, but deposits a brown viscid substance, which is termed the *viscid resin of copaiva*. As it is more abundant in old than in recent balsam, Gerber regards it as produced by some alteration of the acid resin. It is soluble in anhydrous alcohol and ether, and in the volatile and fixed oils. It has very little affinity for basic substances. One hundred parts of balsam contain from 1.65 to 2.13 per cent. of this resin.

PHYSIOLOGICAL EFFECTS.—Copaiva produces the general and topical stimulant effects of the oleo-resins, already described (see vol. i. p. 184). Taken in moderate doses it creates a sensation of warmth in the stomach, gives rise to eructations having the odour of the balsam, and not unfrequently occasions nausea, or even actual vomiting. The continued use of it often impairs the appetite, and disorders the digestive functions. These may be regarded as the local effects on the stomach. The constitutional effects, or those which result from the absorption of the balsam, or of its active constituent, the oil, are those of a stimulant whose influence is principally directed to the secreting organs, more especially to the mucous membranes and to the urino-genital apparatus. The oil passes out of the system in part by the lungs, and the odour of its vapour is readily detectable in the breath of persons taking it. The urine is increased in quantity, and altered in quality: thus its colour is heightened, its odour becomes balsamic, and its taste bitter; moreover, not unfrequently it is turbid, as if containing mucus. The influence of copaiva over the mucous membrane lining the urethra, is shown, even in the healthy state, by the warmth and tickling sometimes experienced in this part, both before and after evacuating the urine, as observed by König, a medical student, (Wibmer, *Wirk. d. Arzneim. u. Gifte*. Bd. i. 184.) in his experiments with this medicine; and also by the marked influence which the balsam has in mucous discharges from



this membrane—an influence familiar to every tyro in medicine. Furthermore, it is said occasionally to have produced unpleasant irritation of the testicles, though I have never observed this. It also acts as a stimulant, but in a less marked manner, to other mucous membranes; namely, the bronchial and gastro-intestinal membranes. The greater influence of copaiva over the urethral than over other mucous membranes is by some explained thus:—Besides the influence which this receives in common with the other membranes of the same class, by the general circulation, it is exposed to the local action of copaiva contained in the urine as this fluid is expelled from the bladder. If this hypothesis were correct, the influence of copaiva over the mucous lining of the bladder would be greater than that over the urethral membrane. Not unfrequently it gives rise to an eruption, usually of a scarlet colour, referrible to either urticaria or erythema, though some describe it as being miliary. Vesicular eruptions are also spoken of, but I have never seen them. Mr. Judd (*Pract. Treat. on Urethritis and Syphilis*. Lond. 1836,) has depicted two eruptions caused by the balsam:—one he calls *small puniceous patch eruptions*; the other was a *papular eruption*. Rheumatism has also been ascribed to the use of the balsam. (*Brit. and For. Med. Rev.* vol. viii. p. 280; and *Lancet*, vol. ii. for 1837-8, p. 826.)

*Large doses* of copaiva irritate the gastro-intestinal canal, and occasion a sensation of heat at the pit of the stomach, nausea, vomiting, loss of appetite, and purging, with, not unfrequently, griping pains of the bowels. The whole system becomes powerfully stimulated, the pulse is fuller and more frequent, the skin hotter, and thirst and headache are produced. Occasionally, hæmaturia and dangerous ischuria are brought on. "I saw," says Kraus, (*Heilmittellehre*, 621, Gött. 1831,) "a very dangerous case, of thirty-six hours' standing, almost instantaneously relieved by the application of a warm poultice (made of four ounces of the hyoscyamus plant) over the genital organs." The same author also says that the repeated use of large doses occasions, "in young marriageable subjects, a measles-like eruption over the whole body, which I have many times seen treated by pretended great diagnosticians (*Diagnostikern*) as true measles."

In one case (*Brit. and For. Med. Rev.* vol. ix. p. 270,) pain at the stomach, general uneasiness, and epileptic convulsions, followed, and were ascribed to, the use of copaiva. But the correctness of ascribing the convulsions to the use of the copaiva appears very doubtful.

When we compare the operation of copaiva with that of other agents possessing powers of a somewhat similar kind, we observe that both in local and constitutional effects it is more powerful than the balsams properly so called (that is, the native oleo-resins which contain benzoic acid), while its operation on the urino-genital organs is much more marked (see vol. i. p. 184 and vol. ii. p. 379). It forms an intermediate substance between the balsams and the turpentine, being less powerful, but more aromatic, than the latter: yet, observes Ribes, (quoted by Bayle, *Bibl. Thérap.* i. 363,) the turpentine are less successful in gonorrhœa. The same author considers it to be less powerful than balsam of Mecca, but more so than balsam of Canada.

*USES.*—The principal employment of copaiva is in *mucous discharges from the urino-genital organs*, more especially in gonorrhœa. There are two methods of treating this disease by copaiva: one is, not to exhibit the balsam until the inflammatory symptoms have subsided,—the other is to give it at the very outset, in order to cut short or suppress the disease.

The *first* method is that followed by the best English and German surgeons. It consists in employing, during the violence of the inflammatory stage, anti-phlogistic and soothing measures; and when the inflammation has quite or nearly subsided, or is of a very mild character, giving copaiva with the view of diminishing or stopping the discharge. This is the plan recommended by Hunter, (*Treat.*



on the Vener. Dis.) and the same practice is recommended in the published lectures of Sir Astley Cooper, (*Lancet*, vol. iii. p. 199,) and Mr. Lawrence, (*Lond. Med. Gaz.* vol. v. p. 813.) It is undoubtedly the safest method of treatment; for although copaiva may sometimes, or even frequently, be exhibited during the acute or inflammatory stage of gonorrhœa, not only with impunity, but even with advantage, there is no denying the fact that it has, occasionally at least, exasperated the symptoms. This, indeed, is admitted by Ansiaux, (*Mém. sur le Traitement de la Blennorrh.*, quoted by Bayle, *op. supra cit.* p. 348,) one of the principal supporters of the other plan of treatment. Many practitioners judge of the propriety of exhibiting the balsam by the quality of the discharge only, and refrain from administering this medicine until the discharge has acquired what is called a gleet character. I believe most prudent surgeons consider the existence of much pain or scalding in passing the water, an irritable condition of bladder, or violent chordee, as contra-indicating the use of copaiva; while the absence of these symptoms may be regarded as permitting or indicating it.

The second method of treating gonorrhœa by copaiva consists in exhibiting this medicine in large doses at the commencement of the disease; that is, in its acute stage, usually without adopting any preliminary antiphlogistic or soothing measures. In America the practice is not new; but in Europe it has been recommended or adopted to any extent only since the commencement of the present century, and principally by the recommendations of Ansiaux, Ribes, and Delpech. (Bayle, *op. supra cit.*)

Ansiaux candidly admits that in some cases the practice has been injurious; in one instance he saw it produce acute pain, irritable bladder, and discharge of blood by the urethra. The second of these writers seems to regard copaiva as a specific for gonorrhœa and all its consequences, including swelled testicle, dysury, ischury, cystitis, nephritis, &c. ! Delpech speaks of its use in a much more guarded manner: he employs leeches and the usual antiphlogistic measures, when the inflammatory symptoms are very severe; but when the inflammation is not excessive, he commences at once with the balsam. In fact, his practice approximates very much with that usually followed in this country and Germany. The partisans of this second method of treating gonorrhœa say, that both copaiva and cubeb cure more easily and promptly, and with less chance of relapse, the sooner they are exhibited after the commencement of the disease; in other words, old claps are less rapidly cured by them than recent ones.

It has been stated by Delpech and Ricord, and I believe the experience of most practitioners bears out their statement, that copaiva is less successful in the gonorrhœa of females than in that of males. Trousseau and Pidoux (*Traité de Therapeut.* t. i. p. 494,) have endeavoured to account for this by saying, that, in the female, gonorrhœa is not confined to the mucous lining of the urethra (on which the influence of copaiva is principally exercised), but extends to that of the vagina.

Velpeau (*Rech. sur l'Emploi du Baume de Copahu*) employs lavements of the balsam in gonorrhœa. By this mode of exhibition the nausea and vomiting which copaiva is apt to occasion, when taken by the mouth, are entirely obviated. Velpeau asserts, that by this mode of administration, blennorrhagic discharges of both males and females are almost always diminished, and frequently completely stopped. He found the same practice useful in non-venereal puriform discharges from other mucous membranes. Indeed, he asserts that copaiva lavements may in all cases be substituted for the administration of this liquid by the mouth.

In chronic inflammation of the bladder (commonly termed *cystirrhœa*, or *cattarrhus vesicæ*) copaiva has at times been found beneficial. (La Roche, *Am. Journ. of the Med. Sciences*, vol. xiv. p. 13.) Delpech relates a case of acute vesical



catarrh cured by it. But catarrhus vesicæ is for the most accompanied with considerable irritation, which is in general greatly increased by stimulants like copaiva.

In *leucorrhœa* copaiva has been employed with some advantage. Favourable reports of this practice have been published by Cuttet and Lacombe, (Bayle, *op. supra cit.*), Armstrong, (*Pract. Illustr. of the Scarlet Fever, &c.* 1818,) and others.

In *chronic pulmonary catarrh* its employment has been spoken favourably of. Armstrong, (*op. supra cit.*), Hallé, Bretonneau, and La Roche (quoted by Bayle,) have borne testimony to its good effects. It is only adapted for chronic, old-standing cases, and for torpid habits. Its stimulant influence is calculated to be very injurious where there is inflammation or febrile disorder. Dr. Fothergill (*Med. Obs. and Inq.* vol. iv. 231) has very properly reprobated the practice of administering it in pulmonary consumption, as recommended by Fuller and others.

In *chronic inflammation of the mucous membrane of the bowels*, especially of the colon and rectum, copaiva has been used. (La Roche, *Lond. Med. Gaz.* vol. ii. p. 31, N. S.) Dr. Cullen (*Mat. Med.*) spoke favourably of its use in *hemorrhoids*. "I have learned from an empirical practitioner," he says, "that it gives relief in hæmorrhoidal affections; and I have frequently employed it with success. For this purpose it is to be given [in doses of] from 20 to 40 drops, properly mixed with powdered sugar, once or twice a day."

It was formerly employed as a *topical application* to wounds and ulcers.

ADMINISTRATION.—Dose, from gtt. xx. to ℥j., or even more. It is sometimes taken on sugar, and this is said to be the most efficacious method of giving it, in affections of the urinary organs; but its nauseous taste is a great objection to its employment in this way. Some take it *swimming on half a wine-glassful of water*, to which a few drops of some bitter tincture have been added. Many persons employ it in the form of *emulsion* (made with mucilage, yolk of egg, or alkalis). If mucilage be employed, it should not be very thick, otherwise it will not mix well. Spirit of nitric ether is frequently added to cover the unpleasant flavour. Opium is sometimes conjoined to counteract purging, and acids (especially the sulphuric) to check nausea. *Syrup of Copaiva* (prepared by rubbing ℥iv. of balsam with 32 grs. of calcined magnesia, and then adding 64 drops of oil of peppermint and 62 ozs. of simple syrup) has been recommended. (*Lond. Med. Gaz.* vol. ii. p. 864, N. S.) Balsam of copaiva has also been taken in the form of *pills*; various powders (starch, gum, rhubarb, magnesia, &c.) being employed to give it a proper consistence. If magnesia be employed (as recommended by Mialhe), the copaivic acid unites with it, and thereby forms copaivate of magnesia, which has considerable consistence, and absorbs the volatile oil. In some cases the balsam acquires, by magnesia, a pilular consistence, but frequently it does not become thicker than honey. Bordeaux turpentine also possesses this property of solidifying with magnesia (see p. 165). The following is a formula for *copaiva pills* (Souberain, *Traité de Pharm.* i. 523):—Balsam of Copaiva, ℥j.; Calcined Magnesia, ℥vj. or 3vij. (or common Carbonate of Magnesia, ℥j.) Several hours are frequently required to effect the solidification of the balsam.—Velpeau's *copaiva lavement* is thus prepared:—Balsam of Copaiva, ʒij.; Yolk of one Egg; Distilled Water, ℥viiij. Make an emulsion, and to which add Tincture of Opium, gtt. xx. or gtt. xxx.

The *resin of copaiva*, which was much extolled a few years since, (Thorn, *Observ. on the Treatm. of Gonorrh.* by a new Prep. from the Bals. of Copiba, 1827.) is the least active part of the balm.

I. OLEUM COPAIBÆ, E. *Essential Oil of Copaiva*.—(Copaiva, ʒj.; Water, Ojss. Distil, preserving the water; when most of the water has passed over, heat it, return it into the still, and resume the distillation; repeat this process so long as a sensible quantity of oil passes over with the water.)—The directions



of the *Edinburgh College* make the process of obtaining the oil appear a more operose one than it really is. Mr. Whipple informs me, that from 249 lbs. of balsam he obtained 128 lbs. of volatile oil and 120 lbs. of resin. Ader (*Journ. de Pharm.* xv. p. 95) has published a method for procuring the oil without distillation; but the process is more expensive, while the oil obtained by it is impure, owing to the presence of a little resinous soap.

When oil of copaiva has been rectified, and afterwards freed from water by digesting it on chloride of calcium, it has a specific gravity of 0.878. It is colourless, and has an acrid taste, and an aromatic peculiar odour. Sulphuret of carbon and sulphuric ether dissolve it in all proportions; absolute alcohol dissolves two-fifths its weight of it: ordinary rectified spirit takes up less than this. Potassium may be preserved in it unchanged, showing the absence of oxygen. It dissolves sulphur, phosphorus, and iodine (by the latter it is coloured), and absorbs chlorine, with which it becomes turbid and viscid. When dropped on iodine, heat and hydriodic acid are suddenly produced.

Sulphuric and nitric acids convert it into a resinous substance. When hydrochloric acid gas is passed into this oil, crystals of the *hydrochlorate of the oil of copaiva* (or *artificial camphor of the oil of copaiva*) are deposited, while a fuming oily product, saturated with acid, remains. Hence, therefore, it is probable that oil of copaiva, like the oil of turpentine (see p. 168), consists of at least two isomeric oils; one, which forms the crystallizable compound with hydrochloric acid; the other, which does not form this crystalline matter.

Oil of copaiva is isomeric with oil of turpentine—that is, it consists of  $C^{10}H^8$ . For medicinal use I prefer the oil of copaiva to any other preparation of the balsam. The usual dose is from ten to twenty drops, which may be gradually increased; but I have known ℥ij. taken at one dose without any ill effects. It may be taken on a lump of sugar.

2. GELATINE CAPSULES OF COPAIVA, *Bacca Copaifera factitia*. Pharm. Castrensis Ruthenica.—(Prepared by dipping the bulbous extremity of a metallic rod into a concentrated solution of gelatine. When the rod is withdrawn it is to be rotated in order to diffuse the gelatine equally over the bulb. As soon as the gelatinous film has hardened, it is to be removed from the bulb and placed on pins furnished with heads, and fixed on a cork table. When dried, the capsules are placed in little cells in the cork table, the balsam is introduced into them by means of a glass tube, and they are then closed by dropping some concentrated solution of gelatine on the orifices.<sup>1</sup>) Desfontenelles (*Journ. de Chim. Méd.* t. vi. p. 103, 2d Sér., and *Lancet*, March 7, 1840) has described another method of making the capsules. Gelatine capsules are the invention of a Frenchman of the name of Mothe. They have been introduced with the view of avoiding the nauseous odour and taste of various medicines (as balsam or oil of copaiva, oil of cubebs, creasote, Dippel's oil, &c.) When swallowed the gelatinous capsule dissolves in the gastro-intestinal juices, and the liquid medicine escapes. The capsules found in the shops are olive shaped, and contain about ten grains of balsam. Ratier (*Dict. prat. de Méd.* t. xv. 288) has proposed to introduce them into the rectum. For this purpose they are to be conveniently greased.

#### OTHER MEDICINAL LEGUMINOSÆ.

1. SPARTIUM JUNCEUM, or *Spanish broom*, the *σπαρτίον* of Dioscorides, is occasionally employed in medicine. The seeds, in large doses, are emetic and purgative; in small quantities, diuretic. They have been employed by Dr. Eccles (Pearson, *Observ. on Broomseed*, 1835, Lond.) in dropsical affections. Their advantage over other diuretics is their tonic operation, in consequence of which they may be persisted in for an indefinite length of time (Pearson). They may be taken, in the form of powder, in doses from grs. x. to grs. xv., three times a-day,

<sup>1</sup> For further details consult Sir James Wylie's *Pharmacopœia Castrensis Ruthenica*, p. 681. Petropoli, 1840



in cold ginger-tea or mint-water; but the *tincture* (prepared by digesting ℥ij. of the bruised seeds in f℥viii. of proof spirit) is the best form of exhibition. Its dose is f℥j. to f℥iij.

FIG. 230.

*Butea frondosa.*

2. The BUT'EA FRONDOSA is a middling-sized tree, common in Bengal and in the mountainous parts of India. "From natural fissures and wounds made in the bark of this tree, during the hot season, there issues a most beautiful red juice, which soon hardens into a ruby-coloured, brittle, astringent gum. (Roxburgh, *Fl. India*, vol. iii. p. 245.) This is *gum butea*. It has been recently brought over by Mr. Becket, by whom samples were given to Dr. Royle. (*Proceedings of the Committee of Comm. and Agricult. of Royal Asiatic Soc.* 1838, p. 50, Lond.) On examination I found this gum to be identical with a substance which I had previously met with in an old drug firm of this city, marked *gummi rubrum astringens*, and samples of which I had sent to Professor Guibourt, who has described it under the name of *gomme astringente de Gambie*, (*Hist. des Drog.* ii. 428, 3<sup>me</sup> ed.) believing it to be the kind described by Fothergill. (*Med. Obs. and Inq.* i. 358, 4th ed.) But I have already expressed my opinion that it is not Fothergill's gum (see p. 566). *Butea* gum (called *Kuenee* in Northern India, and *Kinsuka* in Sanscrit) is in small elongated tears, which are blackish externally, and have pieces of bark adhering to them. Small fragments examined by transmitted light, are observed to be ruby-red. Its taste is astringent. It contains from 15 to 25 per cent. of impurities (wood, bark, small pebbles, and sand). According to Mr. E. Solly, the gum, when purified by simple solution of water, so as to separate the impurities, consists of *tannin* 73.26, *difficultly soluble extractive* 5.05, *gum* (with *gallic acid* and *other soluble substances*) 21.67. It is used by the natives of North Western India for precipitating their indigo, and in tanning. English tanners, however, object to its use on account of the colour which it communicates to the leather. (*Proceedings of the Committee of Commerce and Agricult. of the Royal Asiatic Society*, p. 144. Lond. 1841.)

3. INDIGO (*pigmentum indicum*; *νδίζον*, Dioscorides; *indicum*, Pliny) is a blue pigment obtainable from various plants by fermentation. The ancients also applied the term *νδίζον*, or *indicum*, to some other substances. (Beckmann, *Hist. of Invent. and Discov.* iv. 118.) The indigo of commerce is procured from the genus *Indigofera*. In India, *I. tinctoria* is commonly cultivated for this purpose. During the fermentation, the indigo deposits as a feculent matter. Lime-water promotes its separation. Blue indigo does not exist in the plants previous to fermentation: it is, therefore, a product, not an e duct, of them. Commercial indigo is principally brought from the East Indies, but a considerable quantity is imported from Guatemala, and other places. It usually occurs in cubical cakes of an intense blue colour. Rubbed with a smooth hard body (as the nail), it assumes a coppery or bronze hue. This distinguishes it from Prussian blue, the coppery hue of which is removed by friction with the nail. It is insoluble in water, cold alcohol, ether, diluted sulphuric or hydrochloric acids, weak alkaline solutions, and cold oils (both fixed and volatile). When heated to about 550° F. it evolves a reddish, violet vapour (vapour of *indigotin*), which condenses in minute crystals. Deoxidising agents (as protosulphate of iron, sesquisulphuret of arsenicum, the process of fermentation, &c.) destroy its blue colour by abstracting oxygen from the indigotin, and converting it into *indigogen* or *white indigo*; which, by exposure to the air, attracts oxygen, and becomes blue. Chlorine and the hypochlorites destroy the blue colour of indigo. Rubbed with oil of vitriol it yields a deep blue liquid, commonly termed *sulphate of indigo*, *Saxon blue*, or *liquid blue*. Commercial indigo consists of *indigo blue* (indigotin), *indigo brown*, *indigo red* and a *glutinous substance*. Indigotin consists, according to Dumas, of C<sup>10</sup> H<sup>5</sup> N<sup>1</sup> O<sup>2</sup>. Indigo has, of late years, been employed as a medicine. Its physiological effects, according to Dr. Roth, *Dis. Inaug. de Indico*, 1834, Berol.; and *Brit. and For. Med. Rev.* vol. ii. p. 244, are as follows:—Shortly after taking it the patient experiences a sense of constriction at the fauces, and the impression of a metallic taste on the tongue. These are followed by nausea, and frequently by actual vomiting. The intensity of these symptoms varies in different cases. In some the vomiting is so violent as to preclude the further use of the remedy. The matter vomited presents no peculiarity except in its blue colour. When the vomiting has subsided, diarrhoea usually occurs: the stools are more frequent, liquid, and of a blue or blackish colour. The vomiting and diarrhoea are frequently accompanied by cardialgia and colic. Occasionally these symptoms increase, and the use of the remedy is in consequence obliged to be omitted. Dyspepsia and giddiness sometimes succeed. The urine has a brown, dark, violet colour; but Dr.

FIG. 231.

*Indigofera tinctoria.*



Roth never found the respiratory matter tinged with it. After the use of indigo for a few weeks, twitchings of the muscles sometimes were observed, as after the use of strychnia. It has been employed principally in spasmodic affections—viz. epilepsy, convulsions of children, chorea, and hysteria. In epilepsy it has been tried by Von Stahly, Lenhossek, Grossheim, Ideler, Wolf, Leineweber, Dœpp, (Roth, *op cit.*; Dierbach, *Neuest. Entd. in d. Mat. Bd. 1, S. 222, 1837.*) and Noble, (*Lond. Med. Gaz.* vol. xvii. p. 1038.) with good effect. Some of the successful cases were of very long standing. Roth says, that at the commencement of the treatment, the frequency of the paroxysms was invariably increased. Idiopathic epilepsy is said to have been more benefited by it than the symptomatic epilepsy. I have tried it in a considerable number of epileptic cases at the London Hospital, but without deriving the least benefit from it. The dose of indigo should be as large as the stomach can bear. At the beginning it may be a few grains; afterwards this quantity should be increased to drachms, or even an ounce or more in the day. Some of the patients above referred to, took from ʒss. to ʒj. daily, for three or more months. The best mode of exhibiting it is in the form of an electuary, composed of one part of indigo and two parts of syrup, with a small portion of water. The powder is apt to cause spasm of the fauces. Aromatics, mild tonics, astringents, and opiates (as the *compound powder of ipecacuanha*), may be conjoined, according to circumstances.

## ORDER LXII.—TEREBINTHACEÆ, *Jussieu*.—THE TEREBINTH TREE.

BURSERACEÆ, XANTHOYLACÆ, CANNARACEÆ, AMYRIDACEÆ, and ANACARDIACEÆ, *Lindley*.

**ESSENTIAL CHARACTERS.**—*Flowers* hermaphrodite, polygamous, or diœcious, *Sepals* three to five, more or less united at the base, imbricated in æstivation, very rarely adherent to the ovary. *Petals* rarely none, generally distinct, as many as, and alternate with, the sepals, very seldom united at the base; imbricated in æstivation. *Stamens*, as well as the petals, arising from the lower part of the calyx, or from the calycine disk, rarely from the torus surrounding the ovary; either equal in number to, and alternate with, the petals, or double (very rarely quadruple) the number of the petals, and then placed alternately before and between the petals. *Carpels*, in some, numerous, distinct, with one style,—in others many, united by the ovaries; in either case some of them are frequently abortive, and hence the carpels in many appear solitary, one-celled, but the number of the styles and stigmas then usually indicates abortion. *Fruit* capsular or drupaceous. *Seeds* few, usually solitary, commonly exalbuminous. *Embryo* straight, curved, arched, or folded back; *cotyledons* various; *radicle* usually superior (*De Cand.*)

**PROPERTIES.**—The principles common to all the Terebinthaceæ, are:—1st, *Fixed oil* in the seeds; 2dly, *Volatile oil combined with resin* in the turpentine of the pistacias; 3dly, *Resin* which flows either naturally or from artificial openings in the stems of many of the species; 4thly, *Gum usually combined with resin*—as in olibanum, myrrh, tacamahaca, &c. (*Fée, Cours d'Hist. Nat. i. 619.*)

### 1. PISTACIA TEREBINTHUS, *Linn. L. E. D.*—THE TURPENTINE PISTACIA.

*Sex. Syst.* Diœcia, Pentandria.

(*Resina liquida, L.*—Liquid resinous exudation, *E.*)

**HISTORY.**—This tree is the Τέρευνθος or Τερέβινθος of the Greeks. Hippocrates employed the fruits, the buds, and the resin, medicinally.

**BOTANY. Gen. Char.**—*Flowers* diœcious, apetalous. *Males*: *Racemes* ammentaceous, with one-flowered scales [bracts]. *Calyx* five-cleft. *Stamens* five; *anthers* almost sessile, four-cornered. *Females*: *Racemes* more lax. *Calyx* three or four-cleft. *Ovary* one to three celled. *Stigmas* three, rather thick. *Drupe* dry, ovate, with a somewhat osseous nut, usually one-celled, one-seeded, sometimes bearing two abortive cells at the side. *Seeds* solitary in the cells, affixed to the side of the cell, exalbuminous. *Cotyledons* thick, fleshy, oily, with a superior lateral radicle.—*Trees* with pinnate leaves (*De Cand.*)

**Sp. Char.**—*Leaves* pinnate, with an odd one; *leaflets* about seven, ovate-lanceolate, rounded at the base, acute, mucronate (*De Cand.*)

A tree of thirty or thirty-five feet in height. Young leaves reddish, old ones dark-green. *Racemes* compound. *Fruit* almost round, purplish.

**Hab.**—Syria and the Greek Archipelago.

**EXTRACTION.**—*Tournefort (Voyage into the Levant, vol. ii. p. 62, Lond. 1741)* says, that the turpentine harvest in Scio is made, from the end of July to October, by cutting crosswise with a hatchet the trunks of the largest tur-



pentine trees. The turpentine runs down on flat stones placed under the trees, where it hardens. The quantity yielded by each tree is small, not exceeding eight or ten ounces.

FIG. 232.



*Pistacia Terebinthus* (the female plant.)

**PROPERTIES.**—Chian or Cyprus turpentine (*Terebinthina Chia seu Cypria*) has the general properties of the coniferous turpentines already described (see p. 163). Its consistency is that of honey, but more glutinous. Its colour is greenish-yellow. It has an agreeable turpentine-like odour, combined with the odour of fennel, or, according to some, of citron and jasmine. Its taste is very mild. By keeping it resinifies, and acquires a somewhat less agreeable odour. Genuine Chian turpentine is scarce; the coniferous turpentines being usually sold for it.

**COMPOSITION.**—I am unacquainted with any analysis of it; but its composition is doubtless similar to the coniferous turpentines.

**PHYSIOLOGICAL EFFECTS, USES, AND ADMINISTRATION.**—Exactly similar to the other coniferous turpentines (see vol. i. p. 184 and vol. ii. p. 166).

## 2. PISTA'CIA LENTIS'CUS, Linn. L. E. D.—THE MASTIC OR LENTISK TREE.

*Sex. Syst. Dioecia, Pentandria.*

(*Resina, L. D.*—Concrete resinous exudation, E.)

**HISTORY.**—This tree is the Σχίνος of the Greeks. Hippocrates employed the leaves, resin (*mastic*), and the oil prepared from the fruit, in medicine.

**BOTANY. Gen. Char.**—See *Pistacia Terebinthus*.

**Sp. Char.**—Leaves abruptly pinnate; leaflets about eight, lanceolate. Petiole winged. (De Cand.)

A mere bush. Leaves evergreen. Flowers very small. In var.  $\beta$ . *angustifolia* the leaflets are somewhat linear: in var.  $\gamma$ . *Chia* they are ovate.

FIG. 233.



*Pistacia Lentiscus.*

a. The male plant.  
b. The female plant.

**Hab.**—South of Europe, North of Africa, Levant.

**EXTRACTION.**—Tournefort (*Voyage into the Levant*, vol. ii. p. 60, Lond. 1741) says, that in Scio the extraction of mastic commences on the first of August. The bark is cut crosswise with huge knives. The mastic exudes and hardens partly on the stem, partly on the ground. The same incisions furnish mastic towards the end of September, but in lesser quantities. The mastic which concretes on the stem is called *mastic in the tear*, while that which falls to the earth constitutes *common mastic*.

**PROPERTIES.**—Mastic (*mastiche*) occurs in small spherical, flattened, or irregular, pale-yellow tears, which are externally farinaceous, owing to their

mutual attrition. Their fracture is vitreous. They have a mild, agreeable odour, and an aromatic taste.

**COMPOSITION.**—Mastic consists of a minute portion of *volatile oil*, about 90 per cent. of *resin* soluble in alcohol, and 10 per cent. of a resinous substance (*masticine*) insoluble in alcohol.

1. **SOLUBLE ACID MASTIC RESIN; Resin a.; Masticic Acid.**—This resin is soluble in alcohol. It possesses the properties of an acid, and combines with bases to form four series of salts. Its formula, according to Johnstone, is  $C^{40} H^{31} O^4$ .



2. **INSOLUBLE NON-ACID MASTIC RESIN; Resin  $\beta$ ;** *Masticine*.—This resin is insoluble in alcohol. It is white, elastic, tenacious, soluble in an alcoholic solution of resin  $\alpha$ , as well as in ether and oil of turpentine. Its formula, according to Johnstone, is  $C^{40}H^{31}O^2$ . To this resin mastic owes its toughness.

**PHYSIOLOGICAL EFFECTS.**—Analogous to rosin and the turpentine (see vol. i. p. 184, and vol. ii. p. 163).

**USES.**—Mastic is rarely employed as a medicine. It has been used to check excessive discharges from the mucous membranes, as leucorrhœa, gleet, chronic pulmonary catarrh, old diarrhœas, &c. Dentists occasionally employ it for filling up the cavities of carious teeth. The Turkish ladies chew it to sweeten the breath, and preserve the teeth and gums. Dissolved in alcohol it forms a very useful cement and varnish. A solution of it in oil of turpentine is a common varnish.

**ADMINISTRATION.**—It is exhibited as an adjunct only to other medicines. It is a constituent of the *dinner pills* (composed of aloes, ʒvj.; mastic and red roses, āāʒij.; syrup of wormwood, q. s.), in which it serves to divide the particles of the aloes. It is a constituent of the *tinctura ammoniac composita*, Ph. L.; formerly called *eau de luce* or *spiritus ammoniac succinatus*, which I have before described (see vol. i. p. 280).

### 3. RHUS TOXICODENDRON, Linn. L. D.—TRAILING POISON-OAK OR SUMACH.

*Sex. Syst.* Pentandria, Trigynia.

(Folia, L. D.)

**HISTORY.**—The attention of medical practitioners of this country was first drawn to the medical properties of this plant in 1793, by Dr. Alderson, of Hull. (*Essay on Rhus Toxicodendron*. 3d ed. 1804.) It was first described by Cornutus, in his *Plant. Canad. Hist.* Paris, 1635. (Busse, *Diss. Inaug. de Rhoe Toxicol.* Berol. 1811, p. 10.)

**BOTANY. Gen. Char.**—*Calyx* small, five-partite, persistent. *Petals* five, ovate, spreading. *Stamens* five, all fertile in the male and hermaphrodite flowers. *Ovary* one, somewhat globose, one-celled. *Styles* short, three, or *stigmas* three sessile. *Drupe* almost juiceless, one-celled; nut bony, perhaps by abortion one-seeded, and sometimes two or three-seeded. *Seed* exalbuminous, invested by the funiculus arising from the base of the nut; *cotyledons* foliaceous; *radicle* incumbent on the upper edge of the cotyledons (De Cand.)

**Sp. Char.**—*Leaves* pinnate with an odd leaflet, trifoliate; *leaflets* angularly incised, pubescent (De Cand.)

*Shrub*, one to three feet high. *Stems* many, branching, covered with a brown bark. *Flowers* greenish-white. *Fruit* a round drupe, about as large as a pea.—*Juice* acrid, milky, becoming black by exposure to the air, and forming an indelible ink when applied to cotton or linen.

*Rhus Toxicodendron* is considered by some botanists as a variety only of *Rhus radicans*. I have followed Nuttall and De Candolle in considering it a distinct species.

**Hab.**—United States of America.

**COMPOSITION.**—I am not acquainted with any detailed analysis of this plant. There are at least two substances in it worthy of investigation:—viz. *the volatile, acrid (narcotico-acrid?) principle*, and *the substance which blackens by exposure to the air*. *Tannic* and *gallic acids* are said to be constituents of it.

**PHYSIOLOGICAL EFFECTS. 1. Of the Emanations.**—When not exposed to the sun's rays, as when it grows in shady places, and during the night, this plant evolves a hydrocarburetted gas, mixed with an acrid vapour, which acts most powerfully on certain individuals exposed to its influence, and produces violent itching, redness, and erysipelatous swelling of the face, hands, or other parts, which have been subjected to its operation; these effects are followed by vesications, and desquamation of the cuticle. In some cases the swelling of the



face has been so great as to have almost obliterated the features; but all persons are not equally susceptible of its poisonous operation; so that some peculiar condition of the cutaneous organ seems necessary for the effect to be produced. (Orfila, *Toxicol. Gén.*)

2. **Of the Plant.** *a. On Animals.*—Orfila made several experiments with the watery extract of the *Rhus radicans* (whose operation is probably quite similar to that of *R. Toxicodendron*), and concludes that “internally administered, or applied to the cellular texture, it produces a local irritation, followed by an inflammation more or less intense, and that it exerts a stupifying action on the nervous system after being absorbed.” Lavina gave a few drops of the milky juice of *Rhus Toxicodendron* to guinea-pigs and birds, who were at first stupified by it, but gradually recovered without any other deleterious effect.

*β. On Man.*—In the human subject *small doses* of the leaves increase the secretions of the skin and kidneys, act slightly on the bowels, and, in paralysed persons, are said to have produced a return of sensibility and of mobility, with a feeling of burning and pricking, with twitchings, in the paralysed parts. *Large doses* occasion pain in the stomach, nausea, vomiting, giddiness, stupefaction, and an inflammatory swelling of the paralysed parts. These effects show that the poison-oak possesses a two-fold operation, of an acrid and narcotic.

**USES.**—It has been employed in old paralytic cases depending on a torpid condition of the nerves. It has also been given in chronic rheumatism, obstinate eruptive disorders, in some cases of amaurosis, and other nervous affections of the eyes.

**ADMINISTRATION.**—The *powder* of the leaves is given in doses of from half a grain to a grain, gradually increased until some obvious effect is produced.

#### 4. BOSWEL/LIA THURIFERA, Colebrooke.—OLIBANUM TREE.

*Boswel'lia serrata, L. D.*

*Sex. Syst. Decandria, Monogynia.*

(*Gummi-resina, L. D.*)

**HISTORY.**—Olibanum was the frankincense used by the ancients in their religious ceremonies. It is the *Lebonah* of the Hebrews, the *Lubán* of the Arabs; from either of which terms the Greeks, probably, derived their names for it, *Λιβανός, Λιβανωτός*. (Colebrook, *Asiat. Research.* ix. 377.) The earliest notice of it is by Moses. (Exod. xxx. 34.) Dioscorides (lib. i. cap. 81.) calls it *Λιβανός*.

**BOTANY. Gen Char.**—*Flowers* bisexual. *Calyx* small, five-toothed, persistent. *Petals* five, obovate-oblong, very patent, acute at the base, inserted under the margin of the disk; æstivation very slightly imbricative. *Stamens* ten, inserted under the disk, alternately shorter; *filaments* subulate, persistent; *anthers* caducous. *Torus* a cup-shaped disk, fleshy, larger than the calyx, crenulated on the margin. *Ovary* oblong, sessile; *style* one, the length of the stamens, caducous; *stigma* capitate, three-lobed. *Fruit* capsular, three-angled, three-celled, three-valved, septicidal: valves hard. *Seeds* solitary in each cell, surrounded by a broad membranaceous wing. *Cotyledons* intricately folded, multifold.—*Trees* producing balsam and resin. *Leaves* deciduous, alternate towards the top of the branches, unequally pinnated; *leaflets* opposite, serrated. *Stipules* none. *Racemes* terminal or axillary. *Flowers* on short pedicels, white (Wight and Arnott).

**Sp. Char.**—*Leaflets* oblong, obtuse, serrated, pubescent. *Racemes* axillary, single, shorter than the leaves (Wight and Arnott).

**Hab.**—Mountainous part of Coromandel.

**DESCRIPTION.**—*Olibanum, Indian Olibanum, or Olibanum of the Boswel'lia serrata (gummi-resina Olibanum; gummi Olibanum; Olibanum indicum*



seu *ostindicum*) is imported from India in chests. It consists of round, oblong, or ovate pale-yellowish, semi-opaque, fragile tears, having a balsamic resinous odour.

Mr. Johnstone states that it is a mixture of at least two gum-resins :

1. One variety of gum-resin consists of opaque, dull, hard, and brittle pieces, which, when introduced into alcohol, become almost immediately white and opaque, from a white powdery coating or crust left on their surface as the soluble portion is taken up. This variety constitutes the larger portion of the olibanum of commerce, and is the more fragrant when burned. It contains an acid resin and a volatile oil.

2. The second variety is in clearer, yellower, less brittle, and opaque pieces, generally in long tears (stalactitic?) as they have flowed from the tree. When introduced into alcohol, they become clear and transparent. They contain less gum. Their resin resembles colophony.

On the above statement I may remark, that all the tears of olibanum which I have tried became opaque when immersed in alcohol.

The substance called on the continent AFRICAN or ARABIAN OLIBANUM (*Olibanum Arabicum*) is rarely met with in this country. It consists of smaller tears than those of the Indian variety. They are yellowish or reddish, and intermixed with crystals of carbonate of lime. Some have supposed it to be the produce of *Juniperus*,—some of an *Amyris*,—others of *Boswellia glabra*, which Roxburgh says yields a substance used as an incense and a pitch in India.

COMPOSITION.—Olibanum (Indian?) was analysed by Braconnot, (*Ann. de Chim.* lxxviii. 60.) who found the constituents to be as follows:—volatile oil 8, resin 56, gum 30, matter like gum, insoluble in water and alcohol 5.2; loss 0.8.

1. VOLATILE OIL.—By distillation with water, olibanum yielded Stenhouse, (*Pharmaceutisches Central-Blatt für 1840*, p. 828,) colourless volatile oil, similar to oil of turpentine, but smelling more agreeably. Its formula is  $C^{25} H^{28} O$ , which is identical with that for oil of spearmint.

2. RESIN.—According to Johnston, (*Phil. Trans.* for 1839, p. 304-5,) olibanum contains two kinds of resin.

a. Acid Resin.—This is found in the rounded, opaque, dull, hard, and brittle pieces, which become covered with a white crust. Its formula is  $C^{40} H^{22} O^8$ .

β. Resin resembling Colophony.—This is found in the clearer, yellower, less brittle and opaque long tears (stalactitic?). Its formula is  $C^{40} H^{22} O^4$ .

PHYSIOLOGICAL EFFECTS.—Olibanum is regarded as a stimulant of the same kind as the resins or oleo-resins (see vol. i. p. 184).

USES.—It is rarely employed internally. Formerly it was used to restrain excessive discharges from the mucous membranes. Thus it was given in chronic diarrhœa, old catarrhs, but more especially in leucorrhœa and gleet. It was also administered in affections of the chest; as hemoptysis. It has been used as an ingredient of stimulating plasters. As a fumigating agent it is employed to overpower unpleasant odours, and to destroy noxious vapours.

ADMINISTRATION.—Dose, ʒss. to ʒj., formed into an emulsion by the aid of the yolk of an egg.

#### 5. BALSAMODENDRON MYRRHA, *Nees, L.*—THE MYRRH TREE.

Balsamodendron (Protium?) Myrrha, *E.*

*Sex. Syst.* Octandria, Monogynia.

(Gummy-resin, *L.*—Gummy-resinous exudation, *E.*—Myrrha, *D.*)

(Myrrha, U.S. Myrrh.)

HISTORY.—The earliest notice of myrrh occurs in the Old Testament, (*Gen.* xxxvii. 25,) from which it appears that this gum-resin was an object of trade with the Eastern nations more than 3,500 years ago. In the Hebrew language it is termed *Mur*, in allusion to its bitterness. The Greeks, who were well acquainted with it, called it *Σύμρα*; or, in the Æolic dialect, *Μύρρα*. Hippocrates (see Dierbach, *Arzneim. des Hippok.* p. 224) employed it in medicine in several diseases; and Dioscorides (lib. i. cap. 77) describes several kinds of it, the most esteemed being the *Troglodytica*. Some of the ancient poets tell us that the name of this gum-resin was derived from Myrrha, the daughter of Ciny-



ras, King of Cyprus, who fell in love with her own father, and after having had criminal intercourse with him, fled to Arabia, where she was changed into a tree which still bears her name.

Notwithstanding the early knowledge of, and acquaintance with, the uses of myrrh, we had no accurate account of the tree which yields it until the return of Ehrenberg from his travels with Hemprich, during 1820-25, in various parts of Africa and Asia, and who brought with him a specimen of the tree, which has been described and figured by Nees von Esenbeck (*Beschr. Offic. Pflanz.*) under the name of *Balsamodendron Myrrha*. The first notice of this discovery of these travellers which I have met with, is in Alex. Humboldt's "*Bericht über die naturhistorischen Reisen der Herren Ehrenberg und Hemprich*," &c., published at Berlin in 1826.

**BOTANY. Gen. Char.**—*Flowers* irregular. *Calyx* four-toothed, persistent. *Petals* four, linear-oblong; æstivation induplicate-valvate. *Stamens* eight, inserted under the annular disk; elevated warts between the stamens. *Ovary* one. *Style* one, short, obtuse. *Berry* or *drupe* ovate, acute, with four sutures, one to two-celled; cells one-seeded.—*Oriental trees* giving out balsam. *Leaves* pinnated; leaflets three to five, sessile, without dots (De Cand.)

**Sp. Char.**—*Stem* shrubby, arborescent; branches squarrose, spinescent. *Leaves* ternate; leaflets obovate, obtuse, obtusely toothletted at the apex, the lateral smooth. *Fruit* acuminate (Nees).

*Bark* pale ash-gray, approaching white. *Wood* yellowish white; both it and the bark have a peculiar odour. *Leaves* on short stalks. *Flowers* unknown. *Fruit* ovate, smooth, brown, somewhat larger than a pea; surrounded at the base by a four-toothed calyx, and supported on a very short stalk.

**Hab.**—Gison, on the borders of Arabia Felix.

This species is considered by Lindley (*Fl. Med.* 170) to be identical with the *Amyris Kataf* of Forskal, (*Fl. Egypt. Arab.* 80,) the *Balsamodendron Kataf*, Nees; *Protium Kataf*, Lindley. But the identity of the two plants is by no means satisfactorily demonstrated. *A. Kataf* is distinguished, 1st, by the absence of thorns; 2dly, by the leaves being four times larger, and the lateral leaflets agreeing both in form and size with the terminal ones; 3dly, the fruit (according to Forskal) is round, with a depressed umbilicus at the point.

FIG. 234.

*Balsamodendron Myrrha*.

a. A Leaf. b. The fruit.

**EXUDATION OF MYRRH.**—Myrrh, according to Ehrenberg, exudes like cherry-tree gum, from the bark of the tree. It is at first soft oily, and of a pale yellow colour; but, by drying, becomes darker and redder.

**DESCRIPTION.**—Myrrh (*gummi-resina myrrha*; *gummi myrrha*) is imported from the East Indies in chests, each containing from one to two hundred weight. Formerly the finest kind was brought from Turkey (*Turkey Myrrh*), and an inferior one from the East Indies (*East India myrrh*); but at the present time nearly the whole is brought from India. In 1839, duty (6s. per cwt.) was paid on 216 cwt. Sometimes the same chest contains myrrh of all qualities, which is then termed *myrrh in sorts* (*myrrha naturalis* seu *myrrha in sortis*): but commonly it is brought over more or less sorted.

Myrrh is only partially soluble in water, alcohol, or ether: the first of those liquids takes up the gum principally, the two latter the resin and oil. Water takes up more of the myrrh than alcohol does. Alkaline solutions are good solvents for myrrh. A few drops of nitric acid dropped on a small fragment of myrrh, or on a concentrated tincture, develops a red colour.

**1. Myrrh of first quality;** *Turkey myrrh* (*Myrrha turcica*; *M. vera* seu *rubra* vel *pinguis*).—It occurs in pieces, of irregular forms and of variable sizes, and



which consist of tears (either distinct or agglomerated), usually covered with a fine powder or dust. In a chest of it a few pieces of fine quality may sometimes be met with, nearly as large as a man's fist. The colour varies, being pale reddish-yellow, red, or reddish-brown. The pieces are fragile, semi-transparent, with a dull, in part splintery, fatty kind of fracture. In consequence of imperfect desiccation the largest and finest pieces often present internally, opaque, whitish or yellow striæ, or veins, which have been compared by Dioscorides, Pliny, and many others, to the white marks on the nails. The odour of myrrh is aromatic and balsamic, peculiar, but to most persons pleasant; the taste is bitter, acrid, and aromatic. The purest, palest, and most odorous pieces are sold as *picked myrrh* (*myrrha electa seu selecta*).

2. *Myrrh of second quality; Myrrh in distinct small tears or grains.*—Imported from the East Indies in chests. It consists of distinct tears or grains, which are rounded or irregular, and vary in size from that of a pin's head to a pepper-corn, none of them in my specimens being so large as a small pea. They are somewhat shiny, more or less transparent, and vary in colour from pale or whitish yellow to reddish brown. It consists of tears of myrrh intermixed with fragments of gum-arabic, and of some resin very like mastic, or juniper. Many druggists in this country regard it as merely the siftings of the finest kind, but I cannot agree with them in this opinion.

3. *Myrrh of third quality; East India Myrrh (Myrrha indica seu ostindica).*—Formerly this was the only kind imported from the East Indies. It occurs in pieces, which are darker coloured than those of the so-called Turkey myrrh, and whose average size does not exceed that of a walnut. It is often mixed with other substances, particularly with *Indian Bdellium* (the produce of *Amirys Commiphora*), and with a substance of similar appearance to dark red-coloured Senegal gum (*Opocarpasum?*).

COMPOSITION.—Myrrh was analysed, in 1816, by Pelletier, (*Ann. de Chim.* lxxx. 45,) and in 1819 by Braconnot (*Ibid.* lxxvii. 52) and by Brandes. (*Berl. Jahrb.* xxii. 275.)

	Brandes,	Braconnot.	Pelletier.
Volatile oil.....	2.60	2.5	
Resin { soft.....	22.24	23.0	34
{ hard.....	5.56		
Gum { soluble ( <i>Arabine?</i> ).....	54.38	46.0	66
{ insoluble.....	9.32	12.0	
Salts (benzoates, malates, phosphates, sulphates, and acetates of potash and lime).....	1.36	—	—
Impurities.....	1.60	—	—
Loss.....	2.94	16.5	—
	100.00	100.0	100

1. **VOLATILE OIL.**—Colourless, though by age it becomes yellowish. It is a thin fluid, heavier than water, having the odour and taste of myrrh, and being soluble in alcohol, ether, and the fixed oils. It partially evaporates in the air, the residue being a glutinous varnish-like substance. It readily distils over with water, but not with spirit. With sulphuric, nitric, and hydrochloric acids, it forms red solutions.

2. **RESIN.**—According to Brandes, this is of two kinds, both of which are soluble in alcohol.  
a. *Soft resin.*—Odorous, soft at ordinary temperatures, and soluble in ether. Unverdorben regards it as a mixture of hard resin and volatile oil.

β. *Hard resin (Myrrhic acid?).*—Inodorous, hard, insoluble in ether, soluble in caustic alkalis, forming resinates (*myrrhates?*). The resinates of baryta is soluble in water, but not in alcohol.

3. **GUM.**—Is also of two kinds: a. *Soluble* in water; the solution forming precipitates with alcohol and the salts of lead, silver, the protosalts of tin, and of mercury. β. *Insoluble* in water.

**PHYSIOLOGICAL EFFECTS.**—In *small* or *moderate* doses, myrrh, promotes the appetite, creates an agreeable warmth in the stomach, and occasions slight constipation. Its continued employment in these quantities assists the assimilative



functions, increases the muscular activity, gives greater firmness to the solids, and diminishes excessive secretion from the mucous membranes.

In *large doses* (as from half a drachm to a drachm) it excites a disagreeable sensation of heat in the stomach, and in irritable conditions of this viscus may even bring on a slight inflammatory state; it accelerates the frequency and increases the fulness of the pulse, gives rise to a febrile condition of the body, and creates a feeling of warmth in the mucous membrane (especially in the membrane lining the air-passages). It has been supposed to have a specific stimulant operation on the uterus, and has, in consequence, been termed emmenagogue; but it does not appear to have any title to this appellation.

The local operation of myrrh is that of a mild astringent and a moderate stimulant. Kraus (*Heilmittellehre*,) says it is very similar to that of cinchona. In its remote effects myrrh partakes of both the tonic and stimulant characters, and hence some have denominated it a *tonico-stimulant*; and as its stimulant powers are analogous to those of the balsams, it has also been called a *tonico-balsamic*.

Myrrh differs from the fetid gum-resins (asafœtida, galbanum, &c.) in not possessing that influence over the nervous system which has led to the use of the latter in various spasmodic diseases, and to their denomination of antispasmodics. From the balsamic substances it is distinguished by its tonic influence. It has some relation to cascarilla, but is more stimulant.

USES.—The employment of myrrh is indicated in diseases characterized by feebleness of the vascular action, by weakness of the muscular fibre, and by excessive secretion from the mucous membranes. Relaxed and leucophlegmatic constitutions best admit of its use. It is frequently associated with tonics, especially the chalybeates, or with aloes. Indeed it is rarely used alone. It is contra-indicated in inflammatory diseases, and in plethoric individuals. It is used in the following cases:

1. *In disordered conditions of the digestive organs* arising from or connected with an atonic condition of the alimentary canal, as in some forms of dyspepsia, apepsia, flatulence, &c.

2. *In disordered states of the menstrual functions* characterized by a lax and debilitated state of the system, as in many cases of amenorrhœa and chlorosis.

3. *In excessive secretion from the mucous membranes* unconnected with inflammatory symptoms, and accompanied by marks of debility. In chronic pulmonary catarrh, for example, it is sometimes admissible and useful. It has also been used to check puriform expectoration in phthisis pulmonalis, though it is now rarely employed for this purpose, as in most cases it proves either useless or injurious. In mucous discharges from the urino-genital organs, as well as from the alimentary canal, it has also been administered.

4. *As an external application*, myrrh is employed for various purposes. Thus it is used as a *dentifrice*, either alone or mixed with other substances; and in caries of the teeth, and in a spongy or ulcerated condition of the gums, is very serviceable. As a *gargle* in ulcerations of the throat, tincture of myrrh, diluted with water, is frequently employed. In *foul ulcers*, myrrh has been used to destroy unpleasant odour, to promote granulations, and to improve the quality and diminish the quantity of the secreted matters: for these purposes it has been applied in a pulverulent form, as an ointment, or as a wash.

ADMINISTRATION.—Dose, gr. x. to ʒss. It is given in the form of powder, pill, or emulsion. The aqueous infusion and extract, which have been recommended for their mildness, are seldom employed, and very rightly so as I conceive. Myrrh is a constituent of several pharmacopœial preparations; as *mistura ferri composita* (vol. i. p. 707), *pilule ferri compositæ* (vol. i. p. 708), *pilule aloës cum myrrha* (p. 113), *decoctum aloës compositum* (p. 113), *pilule rhei compositæ* (p. 272), and *pilule galbani compositæ* (p. 478).

TINCTURA MYRRHÆ, L. E. D. (U. S.); *Tincture of Myrrh*, (Myrrh, bruised



[in moderately fine powder, *E.*], ℥ij. [℥ijss. *E.*]; Rectified Spirit, Oj. [Oss. and Proof Spirit, Ojss. *wine-measure, D.*] Macerate for fourteen days [seven, *D.*], and filter, *L. D.* "Pack the myrrh very gently, without any spirit, in a percolator; then pour on the spirit; and when thirty-three fluidounces have passed through, agitate well, to dissolve the oleo-resinous matter which first passes, and which lies at the bottom. This tincture is much less conveniently obtained by the process of digestion for seven days," *E.*)—[Myrrh bruised, ℥iv. Alcohol, Oj. Macerate for fourteen days, and filter through paper, *U. S.*]—Tonic and stimulant. Seldom employed internally, and then usually as an adjunct.—Dose, ℥ss. to ℥j. It is applied as a stimulant to foul and indolent ulcers. Diluted with water (which renders it slightly milky by the separation of the resin, without any precipitate being formed), it is used as a wash for the mouth in ulceration and sponginess of the gums, and as a gargle in affections of the throat.

## OTHER MEDICINAL TEREBINTHACEÆ.

1. ELEMI.—The history and origin of *Elemi* is involved in great obscurity. It appears that the resinous products of various terebinthaceous trees have been described under this name. The Edinburgh College correctly, as I conceive, declare *elemi* to be the "concrete resinous exudation from one or more unascertained plants." The London and Dublin Colleges, on the other hand, call it the resin of *Amyris elemifera* of Linnæus. (See his *Mat. Med.*) But this distinguished botanist has confounded, under one name, two distinct plants; viz. *Icica icariba*, De Candolle (*Icicariba*, Pison), a Brazilian tree (yielding, according to Pison, a resin similar to the so-called *gum elemi*), and *Amyris Plumieri*, De Candolle, a native of the Antilles, which also yields a resin. To assist in determining the origin of *elemi*, I have taken much pains to ascertain its commercial route; and I find that all the importations of it, which I can trace, were from Amsterdam or Hamburg. Pomet also states, that true *elemi* was brought from Holland; whence I conclude that it is the produce of a Dutch settlement. But one of the importers expressed to me his belief (in which I do not coincide), that the *elemi* brought from Holland was spurious, being made of common frankincense (p. 166). It would appear that formerly it came from Ethiopia by way of the Levant. It is possible that it may be the produce of the *Canarium Zephyrinum sive sylvestre primum Conari Barat* of Rumphius, (*Herb. Amb.* lib. iii. cap. ii. p. 153.) which he says yields a resin so like *elemi* that it may be taken for it, and he puts a query, whether this tree may not be the source of it. I have received from Dr. Christison a specimen of the resin of *Canarium balsamiferum* of Ceylon, which in odour and general appearance strongly resembles *elemi*. I have met with three kinds of *elemi*:—1st. *Elemi in stag leaves*; *Résine elemi en pains*, Guibourt; *Resina Elemi orientalis*, Martius. This is imported from Holland in triangular masses, weighing from one to two pounds each, enveloped in a palm-leaf. It agrees in most of its properties with the next variety. Martius ascribes it to *Amyris zeylanica* (*Balsamodendron zeylanicum*, Kunth). But if this were correct, it would doubtless be imported direct from Ceylon to England, which it is not.—2d. *Elemi in the lump*. This differs from the following kind only in its much paler yellow colour.—3d. *Brazilian Elemi*; *Résine élémi du Brésil*, Guibourt. This variety I received from Professor Guibourt. If it be really brought from the Brazils, it is doubtless obtained from *Icica icariba* (De Candolle) by incisions into the stem, and is gathered twenty-four hours afterwards. "It is imported in cases containing two or three hundred pounds each. It is soft and unctuous, but becomes hard and brittle by cold and age. It is semi-transparent, of a yellowish white, mixed with greenish points; its odour is strong, agreeable, analogous to that of fennel, and owing to a volatile oil which may be obtained from it by distillation. As it owes its properties to this oil, it should be selected recent, not too dry, and strongly odorous" (Guibourt). It is soluble in alcohol, with the exception of its impurities, and a white, opaque, insipid, inodorous, crystallizable substance, called *elemine*, which is soluble in boiling alcohol. Martius describes *African Elemi* (the genuine *elemi* of the ancients) as being in small pieces like scammony, and having an acrid taste. Bonastre analyzed *elemi*, and found its constituents to be, *volatile oil* 12.5, *resin soluble in both hot and cold alcohol* 60.0, *resin soluble in hot but not in cold alcohol (elemine)* 24.0, *bitter extractive* 2.0, *impurities* 1.5. The resin *a.* (readily soluble in cold alcohol) consists, according to Johnston, of  $C^{40} H^{32} O^4$ ; while the resin *β.* (sparingly soluble in cold alcohol) is composed of  $C^{40} H^{32} O$ .

The physiological effects of *elemi* are similar to those of the terebinthinates. It is, however, never employed internally. Its principal or sole use is as a constituent of the *Unguentum Elemi*, *L. D.*, which is composed, according to the *London College*, of *Elemi*, lb. j.: *Common Turpentine*, ℥x.; *Suet*, lb. ij.; *Olive Oil*, ℥ij. The *Elemi* and *Suet* are melted together and then removed from the fire, and the *turpentine* and *oil* immediately added: the mixture is then expressed through linen. The *Dublin College* employs lb. j. of *Elemi*, lb. ss. of *White Wax*,



and lb. iv. of Prepared Hogslard.—Elemi ointment is stimulant and digestive. It is applied as a stimulant to old and indolent ulcers, and to promote the discharge from issues and setons. It is an imitation of the ointment recommended by Arcæus, in 1547. (*De recta curand Vulner. Ratione*, Amst. 1658.)

2. BALM OF GILEAD (*Balsamum gileadense*; *B. de Mecca*; *Opobalsamum*; *Balm of the Old Testament*; Βάλαμον of Theophrastus and Dioscorides) is procured from *Balsamodendron gileadense*, a middling-sized tree growing in Arabia. Mr. Bruce says it is obtained by cutting the bark of the tree with an axe, and receiving the juice in a small earthen bottle. The quantity obtained in this way is, however, very small; and none of it, it is said, reaches this country, that which occasionally comes here being obtained by boiling the branches and leaves in water. It is a whitish, turbid, thick, very odorous liquid, which resinifies, and becomes yellow by keeping. Trommsdorff (Thomson, *Org. Chem.* 523,) analyzed it, and found it to consist of *volatile oil* 30.0, *soft resin insoluble in alcohol* 4.0, *hard resin soluble in alcohol* 64.0, *extractive* 0.4, *loss* 1.6. Bonastre (*Journ. de Pharm.* xviii. 95.) also analyzed it. Its physiological effects are believed to be similar to balsam of copaiva and the liquid turpentine. The most wonderful properties were formerly ascribed to it. It is rarely or never employed by Europeans, but is adapted to the same cases as the terebinthines (see p. 166). The Asiatics use it for its odoriferous as well as medicinal qualities.

FIG. 235.



*Balsamodendron gileadense.*

3. The term **BDELLIUM** is applied to two gummy-resinous substances. One of these is the *Indian Bdellium*, or *false Myrrh* (the *Bdellium* of Scripture), which is obtained from *Amyris* (*Balsamodendron?*) *Commiphora*. Dr. Roxburgh (*Fl. Ind.* ii. 245,) says, that the trunk of this tree is covered with a light-coloured pellicle, as in the common birch, which peels off from time to time, exposing to view a smooth green coat, which in succession supplies other similar exfoliations. This tree diffuses a grateful fragrance, like that of the finest myrrh, to a considerable distance around. Dr. Royle (*Illustr.* p. 176,) was informed that this species yielded bdellium; and in confirmation of his statement I may add, that many of the pieces of this bdellium in my museum have a yellow pellicle adhering to them precisely like that procured from the common birch, and some of the pieces are perforated by spiny branches—another character serving to recognize the origin of this bdellium. Indian bdellium has considerable resemblance to myrrh. Many of the pieces have hairs (of the goat?) adhering to them. The other kind of bdellium is called *African Bdellium*, and is obtained from *Heudelotia africana*. (Richard and Guillemin, *Fl. de Sénégambie*.) It is a native of Senegal, and is called by the natives, who make toothpicks of its spines, *Niottout*. It consists of rounded or oval tears, from one to two inches in diameter, of a dull and waxy fracture. By age they become opaque, and covered, externally, by a white or yellowish dust. It has a feeble but peculiar odour, and a bitter taste. Pelletier (*Ann. de Chim.* t. lxxx. p. 39,) found it to consist of *resin* 59.0, *soluble gum* 9.2, *bassorin* 30.6, *volatile oil and loss* 1.2. Resin of bdellium [*African bdellium?*] consists, according to Johnstone, of  $C^{40} H^{31} O^2$ .

[4. The Berries of the *Rhus glabra*, U. S. *Sec. List*, are employed for their astringent effect in sore mouth, particularly in that from salivation. It is an inhabitant of the United States, in height from four to twelve feet, with a bent stem and straggling branches. The leaves are upon smooth petioles and are composed of many pairs of opposite leaflets, with a terminal one, lanceolate, acuminate and serrate, green above and whitish beneath. The flowers are greenish-red, in large, erect, compound thyrses. Berries crimson, with silky down. These berries have a sour, astringent, rather pleasant taste, and contain, according to Mr. Cozzens, malic acid, which is contained in the pubescence on their surface.

The mode of employing them is in infusion, which is acid and cooling, and may be used as a gargle.—J. C.]

#### ORDER LXIII.—RHAMNACEÆ, Lindley.—THE BUCKTHORN TRIBE.

RHAMNI, Jusieu.—RHAMNEÆ, De Candolle.

**ESSENTIAL CHARACTER.**—Tube of the calyx adherent to the ovary, lobes valvate in æstivation, definite in number, four or five. *Petals* as many as (rarely none), and alternate with, the lobes of the calyx; often squamiform with a concave limb. *Stamens* as many as the petals, and opposite to them; *anthers* two-celled. *Ovary* either adnate to the whole of the calyx, or adherent at the lower part or middle, two or four-celled; cells with one ovule each. *Style* one; *stigmas* two to four. *Pericarp* usually indehiscent, baccate, drupaceous, or samaroidæous, rarely capsular. *Seeds* erect, destitute of aril; *albumen* none, or usually fleshy; *embryo* straight in the axis of the seed, with an inferior radicle and somewhat foliaceous cotyledons.—*Shrubs* or *trees*. *Leaves* simple, alternate, rarely opposite, often with stipules. *Flowers* small, often greenish (De Cand.)

**PROPERTIES.**—Require further examination. The fruit of *Rhamnus* contains purgative and colouring matters: that of *Zizyphus* is acidulous, saccharine, and alimentary.



## RHAMNUS CATHARTICUS, Linn. L. E. D.—COMMON BUCKTHORN.

Sex. Syst. Pentandria, Monogynia.

(Baccæ, L. D.—Fruit, E.)

**HISTORY.**—According to Dr. Sibthorp, (*Prodr. Fl. Græcæ*, i. 155,) the *γαμνος* of Dioscorides is *Lycium europæum*. The earliest notice of *Rhamnus catharticus* is in *Tragus*. (See Sprengel, *Hist. Rei Herb.* ii. Præf. xi.)

**BOTANY. Gen. Char.**—*Calyx* four to five-cleft, often circumscissile in the middle after flowering; the base persistent under, and adherent with, the fruit. *Petals* alternate with the lobes of the calyx, or none. *Stamens* inserted opposite the petals. *Style* two to four-cleft. *Fruit* almost juiceless, or baccate, two to four-celled; *cells* in the juiceless fruit, inseparable, one-seeded (rarely two-seeded), dehiscing inwards by a longitudinal chink. *Seeds* oblong, marked at the external side by a deep groove, which is broader towards the base (De Cand.)

**Sp. Char.**—Erect. *Leaves* ovate, toothed. *Flowers* fascicled, polygamous-dioecious. *Berries* four seeded, somewhat globose (De Cand.)

A spreading *shrub* with terminal *spines*. *Leaves* with four to six strong lateral nerves parallel with the margin or rib. *Stipules* linear. *Flowers* yellowish green: the *males* with broader *petals*, four *stamens*, and one short *style*, without either ovary or stigma; the *females* smaller, with four *stigmas* projecting beyond the calyx, and rudimentary *stamens*. *Fruit* black, four-celled.

**Hab.**—Indigenous; in hedges, groves, and thickets.—Flowers in May. The fruit is ripe in September.

**COMPOSITION.**—The expressed juice of buckthorn berries has been examined, chemically, by Vogel, (*Bull. de Pharm.* iv. 64,) and by Hubert. (*Journ. de Chim. Méd.* vi. 493.)

## Vogel's Analysis.

Peculiar colouring matter.  
Acetic acid.  
Mucilage.  
Sugar.  
Nitrogenous matter.

Buckthorn juice.

## Hubert's Analysis.

Green colouring matter.  
Acetic and malic acids.  
Brown gummy matter.  
Sugar.  
Bitter substance (*cathartine*?)

Buckthorn juice.

**PURGATIVE PRINCIPLE.**—The nature of the purgative principle of buckthorn requires further elucidation. Hubert asserts that it possesses the properties of cathartine before described (see p. 587); but his experiments are not conclusive. As from 25 to 30 berries are sufficient to purge, while an ounce of the juice is required to produce the same effect, it is probable that the greater part of the purgative principle resides in the marc left after the expression of the juice.

2. **COLOURING MATTER.**—It is soluble in water, less so in alcohol, and insoluble in ether and oils. Acids redden it; whereas alkalis render it green. Vogel thinks its proper colour is green, and that it only becomes purple by the action of the acetic acid, which is developed in the ripe fruit. When the juice is evaporated to dryness with lime, it constitutes *sup-green*, or the *vert de vessie* of the French.

3. **MUCILAGE.**—The mucilage of buckthorn is of a peculiar nature. It disappears by fermentation. It is abundant in the recent juice, to which it gives consistence.

**PHYSIOLOGICAL EFFECTS.**—The berries, as well as their expressed juice, are powerful hydragogue cathartics; usually griping and causing great thirst, and sometimes operating with considerable violence. "Syrup of buckthorn," says Sydenham, (*Works*, by Dr. Pechey, p. 391, 4th ed.) "purges in a manner only water, and evacuates a great quantity of it, and does not disturb the blood, nor render the urine high coloured, as other purges usually do: and this syrup has but one ill property—viz. that whilst it is working, it makes the sick very thirsty. But if you give the greatest dose of it to those that are difficultly purged, it will not give many stools, nor bring away so much water from them as it ought."

**USES.**—Buckthorn berries were formerly employed as cathartics, but their violent operation, and the sickness, griping, and thirst occasioned by them,



have led to their disuse. "They be not meete to be ministered," says Do-  
doens, (*New Herbal*, by Lyte, p. 501, Lond. 1619,) "but to young and lustie  
people of the countrie, which doe set more store of their money than their lives."  
The syrup is the only preparation now in use.

ADMINISTRATION.—Dose of the *recent berries*, ℞j.; of the *dried ones*, ℞j.;  
of the *expressed juice*, ℥ss. to ℥ʒj.

SYRUPUS RHAMNI, L. E. D.; *Syrup of Buckthorn*.—(Fresh Juice of Buck-  
thorn Berries, Oiv. [Oijss. *wine measure*, D.]; Ginger sliced, Allspice bruised,  
of each, ℥vj. [℥ʒij. D.]; Pure Sugar, lb. iv. [℥xxxix. D.] Set by the juice for  
three days, that the dregs may subside, and strain. To a pint of the clear juice  
add the Ginger and Allspice; then macerate for four hours with a gentle heat,  
and strain; boil down the residue to a pint and a half; mix the liquors; add  
the sugar, and dissolve.)—Cathartic. It is employed as an adjunct to purga-  
tive and occasionally to diuretic mixtures. Sydenham found it, in one case,  
most beneficial in dropsy; and "with the juvenile confidence of an inexpe-  
rienced man, verily believed," as he tells us, that he "had got a medicine that  
would cure any manner of dropsy;" but he found his "mistake in a few  
weeks."—Dose, ℥ss. to ℥j.

#### ORDER LXIV.—SIMARUBACEÆ, Lindley.—THE QUASSIA TRIBE.

SIMARUBEÆ, Richard.

ESSENTIAL CHARACTER.—*Flowers* hermaphrodite, or rarely by abortion unisexual. *Calyx* four  
or five-partite, persistent. *Petals* four or five, hypogynous, erect, deciduous. *Stamens* equal  
in number, or twice as many as, the petals, inserted on an hypogynous disk, free. *Ovary*  
with lobes as numerous as the petals; *style* one, filiform, enlarged at the base. *Carpels* as  
many as the petals, articulated on the axis, capsular, bivalved, dehiscing inwardly, mono-  
spermous. *Seeds* exalbuminous, pendulous; *cotyledons* two, thick; *radicle* short, superior.  
—*Trees* or *shrubs* with a very bitter bark and milky juice. *Leaves* alternate, pinnate,  
without stipules. (De Cand.)

PROPERTIES.—Bitterness is the prevailing quality of the order (see *Quassia*).

##### 1. SIMARUBA AMARA, Aublet, E.—BITTER SIMARUBA OR MOUNTAIN DAMSON.

*Simaruba officinalis*, De Candolle, L.—*Quassia Simaruba*, Linn. D.  
*Sex. Syst.* Decandria, Monogynia.  
(*Radicis cortex*, L.—*Root*, E.—*Cortex radices*, D.)  
(*Simaruba*, U. S.)

HISTORY.—*Simaruba* bark was first known to Europeans in 1713, when  
some of it was sent to Paris from Guiana, as the bark of a tree called by the  
natives *Simarouba*, which they employed with great success in dysentery.  
The first authentic botanical account of the tree was given by Dr. Wright.  
(*Trans. Royal Soc. of Edinb.* vol. ii. part ii. p. 73.)

BOTANY. *Gen. Char.*—*Flowers* unisexual. *Calyx* small, cup-shaped, five-  
toothed or parted. *Petals* five, longer, spreading. *Males*: stamens nearly  
equal to the petals, arranged around a receptacle bearing at its apex five very  
minute lobes (rudiments of ovaries), or sometimes none. *Females*: ovaries five,  
placed on an even disk, surrounded at the base by ten short hairy scales (rudi-  
ments of stamens). *Styles* the same number, short, distinct at the base; there  
united into one, crowned by a broader five-lobed stigma. *Fruit* five drupes  
(Lindley).

*Sp. Char.*—Male flowers decandrous. *Stigma* five-partite. *Leaves* abruptly  
pinnate; *leaflets* alternate, somewhat stalked, pubescent beneath. (De Cand.)

A very tall tree. *Roots* long and creeping. *Stem* thick; *bark* bitter, inter-  
nally white, fibrous and tough, externally blackish and furrowed in the old  
trees, but smooth and gray, with yellow spots, in the young ones. *Leaves* al-  
ternate; *leaflets* alternate, two to nine on each side, oval, firm, mucronate.



*Flowers* small, yellowish-white, some male, others female, mixed, in panicles. *Fruit* of five, ovate, black, smooth capsules, placed on a fleshy disk.

*Hab.*—Guayana, Cayenne, Jamaica. □

*DESCRIPTION.*—The simaruba bark (*cortex simarubæ*) of the shops, is the bark of the root (*cortex radicis simarubæ*), and is brought from Jamaica in bales. It is odourless, but bitter, and occurs in broad, folded, very fibrous pieces, several feet long, which are externally rough, warty, and marked with transverse ridges. The epidermis is of a grayish or whitish yellow colour: beneath it the bark is darker, and yellowish brown. On the inner surface the bark is pale yellowish white.

*COMPOSITION.*—Simaruba bark was analyzed by Morin, (*Journ. de Pharm.* viii. 57,) who found in it the following substances:—*Quassite*, a brittle resin, an aromatic volatile oil having the odour of benzoin, woody fibre, ulmin, an ammoniacal salt, malic acid, traces of gallic acid, malate and oxalate of lime, oxide of iron, and silica. No notice is taken of the mucilage, which, according to Pfaff, (*Syst. d. Mat. Méd.* ii. 74,) constitutes nearly one-fourth part of the bark.

*PHYSIOLOGICAL EFFECTS.*—In small doses simaruba acts like the simple bitter tonics, whose effects have been already described (see vol. i. p. 188). In full doses, however, it causes vomiting and purging, and is said also to promote perspiration and urine. Dr. Wright states, that negroes are less affected by it than whites.

Desbois de Rochefort (*Cours Élément. de Mat. Méd.* i. 357) classed it among emetics; and Bichat proposed it as a substitute for ipecacuanha. It is, however, usually arranged with the tonics.

*USES.*—Simaruba may be employed in the same cases as other vegetable bitters (see vol. i. p. 188). It has been principally celebrated in *dysentery* (whence the Germans call it *Ruhrrinde*, or *dysentery-bark*) by Dr. Wright (*Account of Quassia Simaruba*) and others. It is, of course, only applicable in the latter stages of the acute and the asthenic and chronic forms of the disease. More recently Dr. O'Brien (*Trans. of the King and Queen's College of Phys.* vol. v. p. 237, Dublin) has borne testimony to its good effects, when given in conjunction with opium, in epidemic dysentery. It has also been employed in the advanced stages of *diarrhœa*. Like other vegetable tonics, it may be administered in *dyspepsia*, *anorexia*, and *intermittents*. It is a remedy, however, which is seldom used.

*INFUSUM SIMARUBÆ*, L. E. D. *Infusion of Simaruba bark.*—Simaruba bark, bruised, ℥ij. [℥ss. D.]; Boiling [distilled, L.] Water, Oj. [Oss. wine measure, D.] Macerate for two hours in a lightly-covered vessel, and strain [through linen or calico, E.]—Tonic; in large doses emetic.—Dose, as a tonic, ℥ʒj. to ℥ʒij.

## 2. PICRÆNA EXCELSA, Lindley, E.—THE LOFTY BITTER-WOOD TREE.

*Quassia excelsa*, Swartz, L. D.—*Picrania amara*, Wright.—*Quassia polygama*, Lindsay.

*Sci. Syst.* Decandria, Monogynia.

(*Lignum*, L. D.—Wood chiefly of *Picræna excelsa*, seldom of *Quassia amara*, E.)

(*Quassia*, U. S.)

*HISTORY.*—The wood of this tree has been introduced as a substitute for that of *Quassia amara*, with which it has often been confounded.

*BOTANY.*—*Gen. Char.*—*Flowers* polygamous. *Sepals* five, minute. *Petals* five, longer than the sepals. *Stamens* five, about as long as the petals, rather shaggy; *anthers* roundish. *Ovaries* three, seated on a round, tumid receptacle. *Style* three-cornered, bifid: *stigmas* simple, spreading. *Fruit* three, globose, one-celled, bivalved drupes, which are distant from each other, and placed on a broad hemispherical receptacle (Lindley).

*Sp. Char.*—The only species.



A tall, beautiful timber tree, sometimes 100 feet high. *Leaves* pinnate with an odd one; *leaflets* four to eight pairs, opposite, stalked, oblong, acuminate, unequal at the base. *Racemes* towards the ends of the branchlets, axillary, very compound. *Flowers* small, pale yellowish green. *Drupe* size of a pea, black, shining, round. (Lindsay, *Trans. Roy. Soc. Edin.* iii. 205.)

**Hab.**—Jamaica.

**DESCRIPTION.**—Quassia wood (*lignum quassie*)—sometimes called Jamaica quassia wood (*lignum quassie jamaicensis*) in order to distinguish it from the wood of Quassia amara—is imported from Jamaica in billets of various sizes (sometimes a foot in diameter, and several feet in length), covered externally with a smooth brittle bark. The wood is white, but by exposure to the air becomes yellowish; it has no odour, but a most intensely bitter taste. Floors made of quassia wood retain for many years their bitterness. An efflorescence of nitrate of potash is frequently observed on it. (Planche, *Journ. de Pharm.* xxiii. 542.)

**ADULTERATION.**—Quassia wood has recently been somewhat scarce, and, in consequence, its chips have been adulterated with the chips of other woods; but the intense bitterness of the genuine wood readily distinguishes it.

**COMPOSITION.**—Though quassia wood has been the subject of repeated chemical investigation, I am unacquainted with any complete analysis of it. But from the experiments of Pfaff (*Syst. d. Mat. Med.* ii. 21) and others, the following appear to me to be the principal constituents of it:—*volatile oil* a minute trace, a *bitter principle* (quassite), *gummy extractive*, *pectin*, *woody fibre*, and *various salts* (as oxalate, tartrate, and sulphate of lime, chlorides of calcium and sodium, an ammoniacal salt, and nitrate of potash).

**QUASSITE; Bitter Principle of Quassia; Quassin.**—Obtained by adding lime water to a concentrated aqueous decoction of quassia (to separate the pectin and other substances), evaporating and treating the residue with alcohol, which takes up the quassite, a brown colouring matter, and some salts. By repeated solution and evaporation in alcohol, with a little ether, the quassite is obtained pure. Quassite occurs in small, white, prismatic crystals, which are fusible, odourless, intensely bitter, readily soluble in alcohol, but very slightly so in water or ether. Its solubility in water is increased by several salts and vegetable principles. Its watery solution is precipitated (white) by tannin, but not by iodine, chlorine, corrosive sublimate, salts of iron, acetate, or diacetate of lead. It is a neutral body, though soluble in sulphuric and nitric acids. It consists of *carbon* 66.912, *hydrogen* 6.827, and *oxygen* 26.261; or  $C^{10} H^8 O^8$ . (Wiggers, *Ann. d. Pharm.* xxi. 40; *Brit. Ann. of Med.* for 1837, p. 561.)

**PHYSIOLOGICAL EFFECTS.** *a. On Animals.*—From recent experiments it appears that quassia wood acts on animals as a narcotic poison. Dr. Wright (*Med. Plants of Jamaica*) tells us that no insect will live near cabinet work made of it. It has been long known that an aqueous infusion of this substance was an excellent fly-poison; but Hartl, one of Buchner's pupils, has lately shown that it also possesses poisonous properties with respect to the larger animals. (Buchner, *Toxicol.* S. 266.) Thus he found that a rabbit, into a wound of whose thigh a grain of the alcoholic extract of quassia had been introduced, lost his strength and liveliness, and died on the third day. A second experiment made on an older and stronger animal was attended with the same results. No pain appeared to be experienced, nor were there any marks of irritation or inflammation observable after death. Kurtz (G. A. Richter, *Ausf. Arzneimittell.* Suppl. Bd. S. 42, 1832) mentions that complete paralysis of the hind extremities of a dog affected with the mange (*Fetträude*) was brought on by washing the ulcers with decoction of quassia: in seven hours, however, it disappeared.

These experiments seem to show that the bitter principle of quassia possesses properties somewhat like those of the *Amer* of Welther.

*β. On Man.*—In the usual medicinal doses, quassia operates as a stomachic and tonic—that is, it is bitter to the taste, promotes the appetite, and assists the digestive functions. It is devoid of all irritant, stimulant, and astringent pro-



erties; and has been, therefore, sometimes taken as a type of the simple or pure bitters. It is more powerful than, but in other respects analogous to, gentian in its operation. "We can find nothing in this wood," says Dr. Cullen (*Mat. Med.*), "but a pure and simple bitter;"—and he goes on to observe that he believes it to be an excellent substance, capable of doing all that any pure and simple bitter can do, but no more.

Does it act as a narcotic on man, as on other animals? I have employed, and seen others administer quassia most extensively, but never had grounds for suspecting any effect of the kind alluded to. Yet some have observed effects which certainly seem to favour the notion that quassia possesses a specific influence over the cerebro-spinal system. In females endowed with extreme susceptibility, I have seen, says Barbier, (*Traité Élém. de Mat. Med.* i. 250, 2d ed.) involuntary movements of the arms and legs, produced by the aqueous infusion of quassia. Kraus (*Heilmittell.* s. 412, 1831) says that the continued use of quassia brings on amblyopia (dimness of sight); and Kurtz asserts that the long-continued use of quassia has brought on amaurosis.

Like many other substances, quassia mixed with dead animal matter checks putrefaction; and hence it is termed antiseptic. Ebeling, (*Schlegel, Thes. Mat. Med.* t. ii.,) many years ago, performed some experiments to determine its power in this respect, compared with other bitters, and found it much superior to several of them.

USES.—Quassia is employed in the same cases as several other simple bitters, some of which have been already noticed (see vol. i. p. 188 and vol. ii. p. 339). Though I am not disposed to place much confidence in the above quoted statements of Barbier, Kraus, and Kurtz, yet a cautious practitioner would avoid employing it in amaurosis and cerebral affections. Quassia is principally employed in *dyspepsia*, *anorexia*, and other stomach disorders of a functional kind of an atonic character, more especially when occurring in a gouty subject. Though it has been beneficially employed in *intermittents*, few practitioners will, I suspect, use it, when they can procure cinchona, quina, or arsenic.

Kraus suggests that it may be useful in intolerance of light, and other diseases of the eye, accompanied with great sensibility without fever or congestion; yet only (he adds) as an adjuvant to hyoscyamus and belladonna.

An infusion of quassia has been proposed as a wash in compound fractures, wounds, and ulcers, to keep off insects. In its use, however, we should bear in mind the effect which Kurtz states was produced on the dog by a wash of this kind.

1. INFUSUM QUASSIÆ, L. E. D. (U. S.); *Infusion of Quassia*. (Quassia wood, in chips, ℥ij. [℥j. E.; ℥j. D.] (Rasped, ℥ij. U. S.); Boiling [distilled, L.] Water, Oj. (Water, Oj. U. S.) [Oss. wine measure, D.] Macerate for two hours in a lightly covered vessel, and strain [through linen or calico, E.]—Tonic. Generally employed in dyspeptic and other stomach affections. It has an advantage over some other vegetable bitter infusions, that chalybeates can be combined with it, without changing its colour.—Dose, ℥ʒj. to ℥ʒiij. It is in common use as a fly-poison.

2. TINCTURA QUASSIÆ, E. D. (U. S.); *Tincture of Quassia*. (Quassia in chips, ʒx. [ʒj. D.]; Proof Spirit, Oij. [wine measure, D.] Digest for seven days, and filter.)—[Quassia, ʒij.; Diluted Alcohol, Oij. Macerate for fourteen days and filter, or prepare by displacement, U. S.]—Dose, ℥ʒss. to ℥ʒij. This tincture possesses all the bitterness of the wood.

3. TINCTURA QUASSIÆ COMPOSITA, E.; *Compound Tincture of Quassia*. (Cardamom seeds, bruised, Cochineal bruised, of each ʒss.; Cinnamon, in moderately fine powder; Quassia in chips, of each ʒvi.; Raisins, ʒvij.; Proof Spirit, Oij. Digest for seven days, strain the liquor, express strongly the residuum, and filter. This tincture may also be obtained by percolation, as directed for the compound Tincture of Cardamom [see p. 155], provided the quassia be rasped or in powder.)—An aromatic tonic.—Dose, ℥ʒj. to ℥ʒiij.



[EXTRACTUM QUASSIÆ, U. S. Prepared from Quassia, rasped, lb. j. ; Water, a sufficient quantity. Prepare by displacement as directed for *Extract of Gentian*. This preparation is a powerful bitter tonic. It may be employed alone or in combination, and affords a good vehicle for the ferruginous preparations or other bitters, as the Sulphate of Quinine in pill. The dose is gr. v. to x.]

#### OTHER MEDICINAL SIMARUBACEÆ.

The wood of QUASSIA AMARA (Linn. E.) has been employed in medicine under the name of Surinam quassia wood, (*lignum quassia surinamense*). Fermin mentions that about the year 1714 the flowers of this shrub were highly valued at Surinam on account of their stomachic properties. In 1730, the root is said to have been found in the collection of Seba, a celebrated spice-dealer of Amsterdam. Haller tells us that a relative of his took quassia for an epidemic fever in 1742, and that it was then a well-known medicine. In 1763 Linnæus published a dissertation on this medicine, in which he states that he received specimens of the tree from one of his pupils, C. D. Dalhberg, a military officer and counsellor at Surinam, who had become acquainted with the medical properties of the root through a black slave named Quassia, who employed it as a secret remedy in the cure of endemic malignant fevers of that place. From this circumstance Linnæus named the tree in honour of the slave, *Quassia*. Rolander, who returned from Surinam in 1756, tells us he saw and conversed with this black, who was almost worshipped by some, and suspected of magic by others. Rolander found him to be a simple man, better skilled in old women's tales than in magic. (Murray, *App. Med.* iii. 433.) All parts of the plant are intensely bitter. The wood, as I have received it, is in cylindrical pieces (covered by a thin, grayish-white, and bitter bark), not exceeding two inches in diameter, very light, without odour, but having an extremely bitter taste. The chemical and medical properties are similar to the wood of *Simaruba amara*.

#### ORDER LXV.—RUTACEÆ, De Candolle.—THE RUE TRIBE.

ESSENTIAL CHARACTER.—*Sepals* three, four, or five; more or less adherent at the base, so that the calyx is dentate, cleft, or partite. *Petals* very rarely none, usually as many as the sepals, frequently unguiculate, distinct. *Disk* fleshy-glandular, surrounding the ovary, arising from the receptacle external to the petals, and bearing the stamens on the upper part. *Stamens* usually twice as many as the petals, and then either all fertile or the alternate ones barren. *Carpels* as many as the sepals, sometimes fewer by abortion, either distinct or united at the base, or perfectly connate. *Style* arising from the centre of the ovary, single, divided into as many stigmas as there are ovaries. *Carpels*, when ripe, generally distinct, one-celled, dehiscent, bivalved, coccolose within. *Seeds* affixed to the inner angle, inverse; *embryo* straight, compressed; *radicle* superior.—*Herbs* or *shrubs*, with opposite or alternate stipulate leaves. (Condensed from De Candolle).

PROPERTIES.—Volatile oil and bitter matter are the predominating constituents of this order. These confer stimulant, tonic, and, in some cases, narcotic qualities.

##### 1. RUTA GRAVEOLENS, Linn. L. E. D.—COMMON OR GARDEN RUE.

*Sez. Syst.* Decandria, Monogynia.

(Folia, L. D.—Leaves and unripe fruit, E.)

(Ruta, U. S. Sec. List.)

HISTORY.—This plant was highly esteemed by the ancients; and is frequently mentioned by Hippocrates under the name of *Ἰγγύων*. Pliny (*Hist. Nat.* lib. xx. cap. 51, ed. Valp.) says that Pythagoras (who died in the year 489 before Christ) fancied that rue was hurtful to the eyes: but, adds Pliny, he was in error, since engravers and painters eat it with bread or cresses to benefit their eyes. The ancients had a curious idea that stolen rue flourished the best; just as, says Pliny, it is said that stolen bees thrive the worst.

BOTANY. *Gen. Char.*—*Calyx* persistent, four, rarely three to five-partite. *Petals* as many as the segments of the calyx, unguiculate, somewhat cochleate. *Stamens* twice as many as the petals. *Nectariferous pores* at the base of the ovary, as many as the stamina. *Ovary* on a short, thick stalk. *Style* one. *Capsule* somewhat globose, divided into as many cells as there are petals. *Seeds* affixed by the internal angle; *albumen* fleshy; *embryo* curved; *radicle*



long; *cotyledons* linear.—Perennial or suffruticose, fetid *herbs*, of a sea-green colour. *Leaves* alternate. *Flowers* corymbose, yellow, central, often five-cleft (De Cand.)

**Sp. Char.**—*Leaves* supradecomposed; lobes oblong, the terminal one obovate. *Petals* entire or somewhat toothed (De Cand.)

A small, branching, hairless *undershrub*, with the lower part only of the stem woody. *Leaves* dotted, glaucous or bluish-green. *Flowers* in umbellate racemes. *Petals* four or five, unguiculate, concave, yellow. The first flower has usually ten stamens, the others eight. It is remarkable that the anthers move in turns to the pistillum, and, after having shed their pollen, retire. *Fruit* roundish, warted, four-lobed, each lobe opening into two valves.

**Hab.**—South of Europe. Commonly cultivated in gardens.

**DESCRIPTION.**—The herb (*herba ruta*; *herba ruta hortensis*) is readily recognised by its strong disagreeable odour, which it owes to volatile oil. Its taste is bitter and nauseous. One hundred lbs. yield by drying about 22 lbs. The dried herb is grayish-green, and has a less powerful odour. The *unripe fruit* (*fructus immaturus ruta*) is also officinal in the Edinburgh Pharmacopœia.

**COMPOSITION.**—Rue was analyzed, in 1811, by Mähl, (Pfaff, *Mat. Med.* iv. 339,) who found in it the following constituents:—*Volatile oil*, bitter extractive, *chlorophylle*, *peculiar vegeto-animal matter* precipitable by tincture of nutgalls, *malic acid*, *gum*, *albumen*, *starch*, and *woody fibre*.

1. VOLATILE OIL (see p. 618).

2. BITTER EXTRACTIVE.—Very bitter, insoluble in alcohol and ether.

**PHYSIOLOGICAL EFFECTS.** *α. On Animals generally.*—Orfila (*Toxicol. Gén.*) found that eighteen grains of oil of rue injected into the veins of a dog, acted as a narcotic, and caused staggering and feebleness of the posterior extremities; but in a few hours the animal had recovered. Six ounces of the juice of rue introduced into the stomach of a dog, killed him within twenty-four hours. The mucous membrane of the stomach was found inflamed.

*β. On Man.*—The topical action of rue is that of an acrid. When much handled it is apt to cause redness, swelling, and vesication of the skin. The following is an illustrative case from Buchner (*Toxikologie*, 265):—After some very hot days in June 1823, Roth, an apothecary at Aschaffenburg, cut down a considerable quantity of rue while in full bloom, and separated the leaves from the stalks. The next morning both his hands were red and hot, and, on the third day, appeared as if they had been exposed to hot aqueous vapour. They were besmeared with oil. Towards evening vesication commenced, and was most copious at the points of the fingers. On the fourth day the parts were still much swollen; and, between the blisters, the skin had assumed a dark red or purplish hue. On the fifth and sixth days the swelling extended up the back part of the arms as far as the elbow. Poultices (of chamomile and elder flowers) were applied, and the blisters cut. Within four weeks the skin had gradually peeled off. His children, who had played with the rue, suffered with swelling of the face and hands.

The constitutional effects of rue are those of a stimulant and narcotic. It has long been celebrated as an antispasmodic in epilepsy, hysteria, and flatulent colic. It is a very popular emmenagogue, especially in hysterical cases, and is sometimes resorted to for the purpose of procuring abortion. Its narcotic and reputed uterine influence seems to be proved by three cases of poisoning with it, taken for the purpose of causing miscarriage, published by Helie. (*Lond. Med. Gaz.* vol. xxiv. p. 171.) In these cases the rue produced the effects of an acro-narcotic poison—viz. epigastric pain, violent and continued vomiting, inflammation and swelling of the tongue, salivation, colic, fever, thirst, disorder of the muscular system (manifested by tottering gait, and irregular and convul-



sive movements of the body and limbs), giddiness, confused vision, contracted pupil, delirium, or rather revery, somnolency, and, after some days, miscarriage. During the stupor the pulse was feeble, very small, and slow (in one case beating only thirty times in the minute); there were great debility, faintness, and coldness of the skin. The general appearance was that of an intoxicated person. The ill effects lasted several days. In one case a decoction of three fresh sliced roots, as big as the finger, had been taken; in the second, a decoction of the leaves; in the third, a large dose of the expressed juice of the fresh leaves.

**USES.**—Rue is comparatively but little employed by the medical practitioner. It formerly enjoyed great celebrity as an antispasmodic and emmenagogue; a celebrity which it still retains among the public. The observations above made on the effects of rue prove that it is a much more active agent than is commonly supposed, and its remedial powers deserve to be more carefully examined than they have hitherto been. In the *flatulent colic*, especially of children, it is an exceedingly valuable remedy, and may be administered either by the stomach or, in infants, by the rectum, in the form of clyster. It may also be employed with benefit in some cases of *infantile convulsions*. It has been employed in *hysteria*, *amennorrhœa*, and *epilepsy*. In the two first of these maladies it will probably at times prove serviceable, and in them it deserves further trials. It has likewise been used as an *anthelmintic*. In former times it was eaten as a *condiment*, and was regarded as an universal *antidote* to poisons. It has been employed topically as an *antiseptic* in gangrene and foul ulcers, and likewise as a *local stimulant*, *rubefacient*, and *discutient*, in cold swellings, contusions, &c.

**ADMINISTRATION.**—Dose of the *powder* from ℥j. to ℥ss.; but this is not an eligible mode of preparation, as rue loses part of its activity (by the volatilization of its essential oil) by drying. An *infusion* (prepared by digesting an ounce of the fresh herb in ℥j. of boiling water), called *rue tea*, is a popular remedy. It is given in doses of ℥ʒj. to ℥ʒij. *Rue water* (*aqua rutæ*) may be prepared with the oil, as *mint water* (see p. 279); its dose is ℥ʒj. to ℥ʒij.

1. **CONFECTIO RUTÆ**, L. *Conserva Rutæ*, D. *Confection of Rue*. (Rue, dried; Caraway; Bay Berries, of each, ʒjss.; Sagapenum, ʒss.; Black Pepper, ʒij.; Clarified Honey, ʒxvj. Rub the dry ingredients into a very fine powder. The *London College* directs the honey not to be added until the confection is to be used: the *Dublin College*, however, mixes it with the dry ingredients at once.)—Carminative and antispasmodic. Employed in flatulent colic and infantile convulsions. Objectionable in inflammation of the intestinal mucous membrane. Dose, ℥j. to ʒj. Sometimes employed in the maladies of children in the form of enema, composed of gruel and a scruple of the confection.

2. **OLEUM RUTÆ**, D. E. *Oil of Rue*. (Obtained by submitting the herb, with water, to distillation.) From 12 lbs. of the leaves, gathered before the plant had flowered, Lewis (*Mat. Med.*) obtained only about ʒij. of oil; but the same quantity of herb, with the seeds almost ripe, yielded above ʒj.—It is pale yellow, has a bitterish acrid taste, and a sp. gr. of 0.911. It is somewhat more soluble in water than the other volatile oils. It is stimulant, antispasmodic, and emmenagogue. Used in spasmodic and convulsive diseases, and in amenorrhœa.—Dose, gtt. ij. to vj., rubbed down with sugar and water.

3. **SYRUPUS RUTÆ**. *Syrup of Rue*.—Though syrup of rue is not contained in any of the British pharmacopœias, it is a useful preparation, and is always kept in the shops. It is usually prepared extemporaneously by adding eight or ten drops of the oil to a pint of simple syrup. It is used by nurses to relieve the flatulent colic of children. Dose, one or two teaspoonsful.

4. **EXTRACTUM RUTÆ**, D. *Extract of Rue*. (A watery extract.)—A very useless preparation. The volatile oil, on which the stimulant and antispasmodic properties of the herb depends, is driven off in the process, leaving the bitter extractive. It is tonic, but inferior to extract of chamomile.—Dose, grs. x. to ℥j.



## 2. BAROS'MA, Willdenow.—VARIOUS SPECIES, E.

*Diosma crenata*, De Cand. L. D.

*Sex. Syst.* Pentandria, Monogynia.

(Folia, L. D.—Leaves, E.)

(*Diosma*, U. S.—*Buchu*.)

**HISTORY.**—The natives of the Cape of Good Hope employ several species of *Barosma*, on account of their odoriferous and medicinal properties. The Hottentots employ a powder, composed of the leaves of various odoriferous plants (principally *Barosmas*), under the name of *Bookoo* or *Buku*, for anointing their bodies. (Burchell, *Travels in Southern Africa*, vol. i. p. 479, and vol. ii. p. 59.) *Barosma crenata* was introduced into the botanical gardens of this country in 1774, but it was not employed in medicine till 1823.

**BOTANY.** *Gen. Char.*—*Calyx* five-cleft or parted; dotted. *Disk* lining the bottom of the calyx generally with a short, scarcely prominent, rim. *Petals* five, with short claws. *Filaments* ten; the five opposite the petals sterile, petaloid, sessile, ciliated, obscurely glandular at the apex; the other five longer, smooth or hispid, subulate, with the anthers usually furnished with a minute gland at the apex. *Style* as long as the petals. *Stigma* minute, five-lobed; *ovaries* auriculate at the apex, usually glandular and tuberculated. *Fruit* composed of five cocci covered with glandular dots at the back (*Lindley*).—*Shrubs*. *Leaves* opposite, flat, smooth, dotted. *Flowers* stalked, axillary.

**Species.**—The leaves of several species of *Barosma* constitute *Buchu* or *Bucku*.

1. *BAROS'MA CRENULA'TA*, Willd.; *Diosma crenulata*, Linn.; *D. odorata*, De Cand.; *D. latifolia*, Loddiges; *D. serratifolia*, Burchell.—*Leaves* ovate-oblong, crenate, smooth, glandular. *Pedicels* solitary, with two bracts immediately under the flower. (*De Cand.*)—Upright shrub, between two and three feet in height; branches brownish-purple. *Leaves* about an inch long, oval-lanceolate, on very short petioles, very obtuse, delicately and minutely crenated, quite glabrous, rigid, darkish-green, and quite smooth above, with a few very obscure oblique nerves, beneath paler, dotted with glands which are scarcely pellucid, while at every crenature is a conspicuous pellucid gland; there is also a narrow pellucid margin round the whole leaf. *Peduncles* about as long as the leaf. *Calyx* of five ovate-acuminate leaflets, green, tinged with purple. *Corolla* of five ovate petals, purple in bud, bluish-coloured when fully expanded. (Condensed from Hooker, *Bot. Mag.* t. 3413.)—Cape of Good Hope.

2. *BAROS'MA CRENA'TA*, Ecklon and Zeyher (*Enum. Pl. Afr. austr.* i. 102, 1805); *Diosma crenata*, De Candolle, Loddiges, L. D.—*Leaves* ovate [or obovate] acute, dotted, glandulose-serrate at the margin. *Pedicels* solitary, somewhat leafy (*De Cand.*)—*Flowers* pink, terminal, on short leafy branches.—Cape of Good Hope.

3. *BAROS'MA SERRATIFO'LIA*, Willd., De Candolle, Loddiges.—*Leaves* linear-lanceolate, serrulate, smooth, glandular. *Pedicels* solitary, bearing two leaflets above the middle (*De Cand.*) *Leaves* acuminate, three-nerved. *Flowers* lateral, white.—Cape of Good Hope.

**DESCRIPTION.**—The leaves of several species of *Barosma* are known in the shops as *Buchu* (*Bucku*, E.; *Folia Barosmæ* seu *Diosmæ*). They are intermixed with stalks and fruit. They are smooth, somewhat shining, sharply or bluntly serrated or crenated, and beset both on the edges, especially between the teeth, and on the under surface, with glands filled with essential oil. Their consistence is coriaceous: their colour pale or yellowish-green; their odour strong and rue-like (though some compare it to rosemary, others to cumin, or cat's urine), and their taste is warm and mint-like. They present considerable variety in shape. The most common are the following:

a. *Ovate* or *obovate* *Buchu*. *Leaves* of *Barosma crenata*, Eckl. and Zeyher.—*Leaves* ovate, oval, oblong, or obovate.



*b. Ovate-oblong Buchu.* Leaves of *Barosma crenulata*, Willd.—Leaves ovate-oblong or obovate-oblong or oval-lanceolate, obtuse.

*c. Linear-lanceolate Buchu.* Leaves of *Barosma serratifolia*, Willd.—Leaves linear-lanceolate or lanceolate, acuminate.

COMPOSITION.—Two analysis of buchu have been made: one, in 1827, by Brandes (Gmelin, *Handb. d. Chem.* ii. 1258); the other, in the same year, by Cadet de Gassicourt. (*Journ. de Chim. Méd.* iii. 44.)

## Brandes's Analysis.

Pale yellow volatile oil.....	0.88
Resin.....	2.34
Bitter extractive ( <i>Diosmin</i> ).....	3.78
Chlorophylle.....	4.77
Gum.....	12.71
Lignin.....	45.00
Brown substance extracted by potash.....	1.56
Nitrogenous matter extracted by potash.....	2.42
Albumen.....	0.53
Malic acid, and matter precipitable by tannin.....	1.56
Bassorin, with oxalate and phosphate of lime.....	4.53
Various salts of potash and lime.....	3.07
Water.....	12.94
Acetic acid and loss.....	3.80

Leaves of *Diosma crenata*..... 100.00

## Cadet's Analysis.

Volatile oil.....	0.665
Gum.....	21.170
Extractive.....	5.170
Chlorophylle.....	1.100
Resin.....	2.131
[Lignin, &c.....	69.744]

Leaves of *Diosma crenata*..... 100.000

1. VOLATILE OIL OF BUCHU (*Oleum Barosmæ seu Diosmæ*).—Yellowish-brown, lighter than water; odour that of the leaves.

2. BITTER EXTRACTIVE; *Diosmin*.—Brownish-yellow, bitter and somewhat pungent. Soluble in water, but neither in alcohol or ether.

PHYSIOLOGICAL EFFECTS.—Buchu is an aromatic stimulant and tonic. Taken in moderate doses it promotes the appetite, relieves nausea and flatulence, and acts as a diuretic and diaphoretic. Its constitutional effects appear referrible—first, to its action on the stomach; and, secondly, to the absorption of the volatile oil, which is subsequently thrown out of the system by the secreting organs, on which it appears to act topically in its passage through them. Buchu seems to have a specific influence over the urinary organs.

USES.—The natives of the Cape of Good Hope prepare a spirit of buchu (which they term *buchu brandy*), by distilling the leaves with the dregs of wine, which they employ in chronic diseases of the stomach and bladder.

In this country buchu has been principally employed in *chronic maladies of the urino-genital organs*. Dr. Reece (*Gazette of Health*, for 1821, 1822, 1823, and 1824) first drew the attention of practitioners and the public in this country to it in these cases; and in 1823, Dr. M'Dowell (*Trans. of the King and Queen's College of Physicians*, vol. iv. p. 131, Dublin, 1824) gave a most favourable account of its good effects. It has since been employed by a considerable number of practitioners, and its remedial powers fairly tried. It seems to be principally adapted to chronic cases attended with copious secretion. In *chronic inflammation of the mucous membrane of the bladder*, attended with a copious discharge of mucus, it frequently checks the secretion, and diminishes the irritable condition of the bladder, thereby enabling the patient to retain his urine for a longer period; but I have several times seen it fail to give the least relief, and in some cases it appeared rather to add to the patient's sufferings. In *irritable conditions of the urethra*, as spasmodic stricture, and in *gleet*, it has occasionally proved serviceable. In *lithiasis*, attended with increased secretion of uric acid, it has been given with considerable benefit by Dr. Carter, (*Lond. Med. Rep.* Apr. 1826, p. 348.) and others, and has appeared to check the formation of this acid. For the most part it should be given in these cases in combination with alkalis (as liquor potassæ). In *prostatic affections, in rheumatism, and even in skin diseases*, it has also been employed; and, it is said, with good effect. In *dyspepsia* Dr. Hulston has found it serviceable. (M'Dowell, *op. cit.*)

ADMINISTRATION.—The dose of buchu, in powder, is ʒj. or ʒss. It is usu-



ally taken in wine. But the *infusion* and *tincture* are more eligible preparations.

1. INFUSUM BUCHU, D. *Infusum Buchu*, E. *Infusum Diosmæ*, L. *Infusion of Buchu*.—(Buchu, ℥j. [℥ss. D.]; Boiling [distilled, L.] Water, Oj. [Oss. wine measure, D.] Macerate for four [two, E.] hours in a lightly-covered vessel, and strain [through linen, D., or calico, E.]—Tonic, sudorific, and diuretic.—Dose, fʒj. to fʒij.

2. TINCTURA BUCHU, D. *Tinctura Buchu*, E. *Tincture of Buchu*.—Buchu, ʒv.; Proof Spirit, Oij. Digest for seven days, pour off the clear liquor, and filter. This tincture may be conveniently and quickly made also by the process of percolation, E.—The proportions used by the *Dublin College* are essentially the same, and the tincture is directed to be prepared by maceration.—Dose, fʒj. to fʒiv.

3. GALIP'EA OFFICINA'LIS, *Hancock, E.*; and G. CUSPA'RIA, *De Candolle, L.*

*Bonplan'dia trifolia'ta, Willd. D.*

*Sex. Syst. Diandria, Monogynia.*

(*Cortex, L. D.*—Bark, E.)

(*Angostura, U. S.*)

**HISTORY.**—Mutis is said to have employed angostura bark in 1759: but it did not come to England until 1788, and was first publicly noticed in the *London Medical Journal* for 1789. Mr. A. E. Brande (*Exp. and Observations on the Angostura Bark*, Lond. 1793) says, that, in 1791, 40,000 lbs. or upwards had been imported. It was called *Cortex Angosturæ*, from Angostura, a place in South America, whence the Spaniards first brought it.

**BOTANY. Gen. Char.**—*Calyx* short, five-toothed. *Petals* five, united into a salver-shaped corolla, or closely approximating; tube short, pentagonal; lobes spreading, acute. *Stamens* four to seven, hypogynous, somewhat adherent to the petals, unequal, sometimes all fertile, commonly two antheriferous, two to five shorter, sterile. *Nectary* cupuliform. *Styles* five, afterwards combined into one, and forming a four or five-grooved *stigma*. *Carpella* five, or by abortion fewer, containing two ovules, obtuse, cocculiform, sessile, with a separable endocarp. *Seeds* solitary by abortion; *cotyledons* large, corrugated, bi-auriculate.—Smooth *shrubs*. *Leaves* alternate, simple, or plurifoliate; leaflets oblong, acuminate. *Peduncles* axillary, many flowered. (De Cand.)

**Species.**—Humboldt and Bonpland (*Pl. Æquinoct.* ii. 59, t. 57) state that *Galipea Cusparia*, De Cand. yields Angostura bark; whereas Dr. Hancock (*Trans. Med. Bot. Soc.* 1829, p. 16) asserts that it is a species which he calls *Galipea officinalis*. But it appears to me not improbable that both species may yield a febrifuge bark.

1. GALIP'EA CUSPA'RIA, *De Cand. L.* *Bonplandia trifoliata, Willd. D.* *Cusparia febrifuga, Humb. and Bonpl.*—*Leaves* trifoliate. *Racemes* stalked, almost terminal. *Calyx* five-toothed. *Sterile stamens* three (*De Cand.*)—A majestic forest tree, sixty or eighty feet high. *Leaves* two feet long, gratefully fragrant; petioles one foot long, or nearly so; leaflets sessile, unequal, ovate-lanceolate, acute. *Flowers* white, with fascicles of hairs seated on glandular bodies on the outside. *Stamens* monadelphous (Kunth); fertile ones, two; sterile ones, three, according to Roemer—four according to Kunth; *anthers* with two short appendages. *Stigmas* five. *Seed* solitary.—Forests of tropical America. Yields *Angostura bark* (Humboldt and Bonpland).

2. GALIP'EA OFFICINA'LIS, *Hancock, E.*—*Leaves* trifoliate. *Racemes* stalked, axillary, terminal. *Stamens* two. *Nectaries* (sterile stamens?) five (*Hancock*).—A tree, usually twelve or fifteen feet high, never exceeding twenty feet. *Leaves*, when fresh, having the odour of tobacco; leaflets oblong, pointed at both extremities, from six to ten inches long, on very short stalks: petioles as long as the leaflets. *Flowers* white, hairy. *Stamens* distinct; fertile ones,



two; sterile ones, five; *anthers* without appendages. *Stigma* simple, capitate. *Seeds* two in each capsule; one usually abortive. Neighbourhood of the Orinoko (Carony, Alta Gracia, &c.) Yields *Angostura* or *Carony bark* (Hancock).

**DESCRIPTION.**—*Angostura* or *Cusparia bark* (*cortex angosturae seu cuspariae*) is imported directly or indirectly from South America. “The most of what I have seen,” says Mr. A. E. Brande, “has been put into casks in the West Indies; but where the original package remains, it is very curious, and formed carefully of the large leaves of a species of palm, surrounded by a kind of network made of flexible sticks.” It occurs in flat pieces and quills, of various sizes, the longest pieces being from six to ten inches in length, covered with a yellowish-gray or grayish-white spongy epidermis, easily scraped off by the nail. The internal surface is brownish, not quite smooth, somewhat fibrous or splintery, easily separable into laminae; the fracture is short and resinous; the odour strong but peculiar, and somewhat animal; the taste bitter, aromatic, and slightly acrid.

**SUBSTITUTION.**—I have already (see p. 351) noticed the serious accidents which have resulted in consequence of the bark of the nux-vomica tree being substituted, either from ignorance or commercial cupidity, for *angostura bark*. Hence arose the distinction into *true* or *West India angostura*, and *false*, *spurious*, or *East India angostura*. Though the characters of the latter have been fully described (see p. 348), it may be as well to place them in contrast with those of the genuine *angostura*. In drawing up the following table of characteristics, I have been greatly assisted by the tables of Guibourt (*Hist. des. Drog.* ii. 6, 3<sup>me</sup> éd.) and Fée. (*Cours d'Hist. Nat. Pharm.* i. 588.)

	<i>Angostura Bark.</i>	<i>Nux Vomica (False Angostura) Bark.</i>
<i>Form</i> .....	Quills or flat pieces, straight or slightly bent.	Quills or flat pieces, short, often very much twisted like dried horns, arched backwards.
<i>Odour</i> .....	Disagreeable.	None, or very slight.
<i>Taste</i> .....	Bitter, afterwards somewhat acrid, persistent.	Intensely bitter, very persistent.
<i>Hardness and Density</i> .....	Bark fragile when dry, easily cut, light, tissue not very dense.	Broken or cut with difficulty, heavy, tissue compact.
<i>Fracture</i> .....	Dull and blackish.	Resinous.
<i>Epidermoid crust</i> .....	Whitish or yellowish, insipid, unchanged, or rendered slightly orange-red by nitric acid.	Variable; sometimes a spongy rust-coloured layer; at other times whitish, prominent spots, more or less scattered or approximated. Nitric acid makes it intensely dark green or blackish.
<i>Inner surface</i> .....	Separable into laminae; deepened by nitric acid.	Not separable into laminae; rendered blood red by nitric acid.
Infusion of the bark prepared by digesting one part of bark in 24 parts of water.	<i>Tint. of Litmus</i> .....	Slightly reddened.
	<i>Sesquichl. Iron</i> .....	Clear yellowish-green liquor.
	<i>Ferrocyanide of Potassium</i> .....	Slight turbidness not augmented by hydrochloric acid; liquor greenish.
	<i>Nitric Acid</i> .....	A small quantity makes the liquor clear and paler; a large quantity transparent red.

**COMPOSITION.**—*Angostura bark* has been the subject of repeated chemical investigation. Notices of the earlier attempts to analyse it are given by Meyer (*Diss. Inaug. de Cort. Angust.* Gotting. 1790,) and by Pfaff. (*Syst. der Mat. Med.* ii. 58.) The analyses which deserve quoting are those of Pfaff (*Ibid.*) and Fischer. (*Gmelin, Hand. d. Chem.* ii. 1258.)



*Pfaff's Analysis.*

Volatile oil.
Bitter extractive.
Bitter resin.
Acrid oily resin.
Tartaric acid (free).
Salts (sulphate and tartrate of potash, chloride of potassium, and sulphate of lime).
Lignin.

*Fischer's Analysis.*

Volatile oil.....	0.3
Peculiar bitter principle.....	3.7
Bitter hard resin.....	1.7
Balsamic soft resin.....	1.9
Elastic resin.....	0.2
Gum.....	5.7
Lignin.....	89.1

Angostura bark.

Angostura bark..... 102.6

1. **VOLATILE OIL; Odeorous Principle of Angostura.**—Obtained by submitting the bark to distillation with water. It is yellowish white, lighter than water, has the peculiar odour of the bark, and an acrid taste. To this, as well as to the resin, the bark owes its acrid, aromatic taste. (Pfaff, *op. supra cit.* Bd. ii. 61 and 69; Bd. vi. 191.)

2. **ANGOSTURIN; Cusparin, Saladin; Bitter extractive, Pfaff; Peculiar Bitter Principle.**—A neutral principle obtained by Saladin (*Journ. de Chim. Méd.* ix. 388,) in the form of tetrahedral crystals, by submitting the alcoholic tincture of the bark (prepared without heat) to spontaneous evaporation. When heated it fuses, loses 23.09 per cent. of its weight, and subsequently inflames, without giving any evidence of its being volatile or nitrogenous. It is insoluble in the volatile oils and in ether; but dissolves slightly in water, more so in alcohol. Alkaline solutions also dissolve it. Nitric acid renders it greenish-yellow; sulphuric acid reddish-brown. Tincture of nutgalls precipitates it from its aqueous and alcoholic solutions.

3. **RESIN.**—The *hard resin* is brown, bitter, soluble in potash, alcohol, and acetic ether; but insoluble in sulphuric ether and oil of turpentine. The *soft resin* is acrid, greenish yellow, soluble in alcohol, ether, oil of turpentine, and almond oil; but insoluble in a solution of potash, It is coloured red by nitric acid. (Pfaff, *op. supra cit.* vi. 191.)

**PHYSIOLOGICAL EFFECTS.**—A powerful aromatic or stimulant tonic (see the effects of the *aromatic bitters*, vol. i. p. 189). Its aromatic or stimulant properties depend on the volatile oil and resin; its tonic operation on the bitter principle. In its tonic and febrifuge powers it approximates to cinchona bark, but is devoid of astringency. It is less likely to irritate the stomach or to cause constipation than cinchona; but usually keeps the bowels gently open. In full doses it is capable of nauseating and purging. Dr. Hancock says the warm infusion causes sweating and diuresis. In its combination of tonic and aromatic properties, it is most allied to cascarilla. In its stomachic qualities it approaches calumba.

**USES.**—Angostura bark is but little employed by practitioners of this country. We may fairly ascribe this in part to the serious consequences which have resulted from the use of the false angostura, and in part to the belief that we have other remedies of equal, if not of superior, efficacy to it. In some of the continental states, its employment has been prohibited (see p. 349). It may be administered as a febrifuge *in intermittents and remittents*, especially in the worst forms of the bilious remittents of tropical climates. Drs. Williams, (*Lond. Med. and Phys. Journ.* 1798, part ii. p. 158,) Wilkinson, (*Ibid.* 1790, part iv. p. 331,) Winterbottom, (*Med. Facts and Obs.* vol. vii. p. 41,) and, more recently, Dr. Hancock, have spoken in the highest terms of its efficacy. In some of these cases it is said to have proved greatly superior to cinchona. It sits more readily on the stomach, and does not cause constipation like the latter, but keeps the bowels gently open. *In adynamic continued fever*, especially when complicated with great disorder of the digestive organs (manifested by vomiting or purging), it has been used with good effect. (Winterbottom; also Lettsom, *Mem. of the Med. Soc. of Lond.* vol. iv. p. 191.) As an aromatic tonic and stomachic, *in general relaxation and muscular debility*, and *in atonic conditions of the stomach and intestinal tube* (as some forms of dyspepsia, anorexia, &c.), it has been employed with great success. It has also been administered to *check profuse mucous discharges*. Thus in the latter stages and chronic forms of dysentery and diarrhoea, and in chronic bronchial affections attended with excessive secretion of mucus. In fine, angostura is applicable to any of the purposes for which other vegetable tonics, (especially cascarilla, calumba, and cinchona) are commonly employed.

**ADMINISTRATION.**—It may be given *in powder* in doses of from grs. x. to 3ss. But the *infusion* and *tincture* are more elegant preparations.



1. INFUSUM CUSPARIÆ, L. E. *Infusum Angusturæ*, D. (U. S.) *Infusion of Cusparia*. (Cusparia, bruised, ʒv. [ʒij. D.]; (ʒss. U. S.) Boiling [distilled, L.] Water, Oj. [Oss. wine measure, D.] Macerate for two hours in a lightly covered vessel, and strain [through linen or calico, E.]—Tonic, stomachic, and stimulant. Used in low fever, bilious diarrhœas and dysenteries, muscular debility, dyspepsia, &c.—Dose, fʒj. to fʒij. Tincture of cinnamon is an agreeable addition to it.

2. TINCTURA CUSPARIÆ, E. *Tinctura Angusturæ*, D. *Tincture of Cusparia*. (Cusparia, in moderately fine powder, ʒivss. [ʒij. D.]; Proof Spirit, Oij. [wine measure, D.] Macerate for fourteen days and filter, D.—This tincture is to be made like the tincture of cinchona, and most expeditiously by the process of percolation, E.)—Tonic, stimulant, and stomachic. Generally employed as an adjunct to bitter infusions.—Dose, fʒj. to fʒij.

#### OTHER MEDICINAL RUTACEÆ.

The root of *Dictamnus Fraxinella*, or *Bastard Dittany*, was formerly employed in medicine, but of late years has fallen into almost total disuse. There are two varieties of this plant: *α. purpurea* with purple flowers; and *β. alba* with white flowers. It is a native of the South of Europe. The root contains *volatile oil, resin, bitter extractive*, and probably *gum*. It is an aromatic tonic, and is reputed to possess antispasmodic, diuretic, and emmenagogue properties. It was formerly employed in intermittents, epilepsy, hysteria, amenorrhœa, chlorosis, and worms. The dose of it is from ʒj. to ʒj. Attention has been recently drawn to it by Dr. Aldis, (*Lond. Med. Gaz.* vol. xix. p. 142.) who states that it has been employed, during forty years, with great success, in the cure of epilepsy, by Baron A. Slet van Oldruitenborgh and family. (*Lond. Med. and Phys. Journ.* vol. xvi. p. 605.) I am acquainted with one patient (a young lady) who took it for six months without receiving any ultimate benefit from it.

#### ORDER LXVI.—ZYGOPHYLLACEÆ, Lindley.—THE BEAN CAPER TRIBE.

ZYGOPHYLLACEÆ.—R. Brown.

ESSENTIAL CHARACTER.—*Sepals* five, distinct, or scarcely coherent at the base. *Petals* five, alternate with the sepals, inserted on the receptacle. *Stamens* ten, distinct, hypogynous, five opposite to the sepals, and five to the petals. *Ovary* single, five-celled; *styles* five united into one, sometimes rather distinct at the apex. *Capsule* of five carpels, which are more or less adnate to each other and to the central axis; cells dehiscent at the superior angle, usually many-seeded, or one-seeded, neither coculiferous nor arilliferous. *Seeds* albuminous, or commonly exalbuminous; *embryo* straight; *radicle* superior; *cotyledons* foliaceous.—*Herbs, shrubs, or trees. Leaves* with stipules at the base, usually compound (De Cand.)

PROPERTIES.—The Guaiacums are resinous, and possess stimulant properties.

#### GUAIACUM OFFICINALE, Linn. L. E. D.—OFFICINAL GUAJACUM.

Sex. Syst. Decandria, Monogynia.

(Lignum. Resina, L. D.—Wood. Resin obtained by heat from the wood, E.)

(Guaiaci Lignum. Guaiaci Resina, U. S.)

HISTORY.—The Spaniards derived their knowledge of the medical uses of Guaiacum from the natives of St. Domingo, and introduced this remedy into Europe in the early part of the sixteenth century (about 1508). The first importer of it was Gonsalvo Ferrand, who, being infected with the venereal disease, and not obtaining any cure for it in Europe, went to the West Indies, to ascertain how the natives in that part of the world treated themselves, as the disease was as common with them as small-pox with Europeans. Having ascertained that Guaiacum was employed, he returned to Spain, and commenced practitioner himself. "I suppose," says Freind, (*Hist. of Physick*, part ii. p. 365, 2d ed.) "he might make a monopoly of it; for it appears that some time after it was sold for seven gold crowns a pound."

BOTANY. Gen. Char.—*Calyx* five-partite, obtuse. *Petals* five. *Stamens* ten; *filaments* naked, or somewhat appendiculate. *Style* and *stigma* one.



*Capsule* somewhat stalked, five-celled, five-angled, or by abortion two or three-celled. *Seeds* solitary in the cells, affixed to the axis, pendulous; *albumen* cartilaginous, with small chinks; *cotyledons* somewhat thick.—*Trees* with a hard wood. *Leaves* abruptly pinnate. *Peduncles* axillary, one-flowered (De Cand.)

**Sp. Char.**—*Leaves* bijugate: *leaflets* obovate or oval, obtuse (De Cand.)

A *tree* rising thirty or forty feet high. *Stem* commonly crooked; bark furrowed; wood very hard and heavy. *Leaves* evergreen. *Flowers* six to ten in the axillæ of the upper leaves. *Peduncles* an inch and a half long, unifloral. *Sepals* five, oval. *Petals* five oblong or somewhat wedge-shaped, pale blue. *Stamens* somewhat shorter than the petals. *Ovary* compressed, two-celled; *style* short, pointed. *Capsule* obovate, coriaceous, yellow.

**Hab.**—St. Domingo and Jamaica.

**DESCRIPTION AND COMPOSITION.**—In this country the *wood* and the *resin* only are officinal; but on the continent the *bark* also is used. They are imported from St. Domingo.

**1. Guaiacum Wood.** (*Lignum Guaiaci*). This is commonly termed *lignum vita*.—It is imported in large logs or billets, and is extensively used for making pestles, rulers, skittle-balls, and various other articles of turnery ware. On examining the transverse sections of these stems, hardly any traces of medulla or pith are observable, while the annual or concentric layers or zones are extremely indistinct. The wood is remarkable, says Dr. Lindley, (*Nat. Syst. of Bot.* p. 134, 2d ed.) “for the direction of its fibres, each layer of which crosses the preceding diagonally; a circumstance first pointed out to me by Professor Voigt.” This fact, however, was noticed by Brown (*Nat. Hist. of Jam.* p. 226,) above fifty years ago. The distinction between the young and the old wood is remarkable. The young wood (called *alburnum* or *sapwood*) is of a pale yellow colour; while the old wood (called *duramen* or *heartwood*) which forms the central or principal part of the stem, is of a greenish brown colour, in consequence of the deposition of resinous matter, first in the ducts and subsequently in all parts of the tissue. By boiling a thin shaving of the wood in nitric acid, the whole of the deposited matter is destroyed, and the tissue restored to its original colourless character.

*Shavings, turnings or raspings of Guaiacum* (*lignum Guaiaci raspatum seu rasum; rasura vel scobs guaiaci*) are prepared by turners for the use of druggists and apothecaries. They are distinguished from the raspings of other woods by nitric acid, which communicates to them a temporary bluish-green colour. A decoction of the shavings is yellowish, and does not change colour in the air, and very little even by nitric acid, though after some time it becomes turbid. Neither a solution of emetic tartar nor the tincture of nutgalls causes any precipitate. The ferruginous salts deepen its colour.

Trommsdorff (*Journ. de Chim. Méd.* vii. 430,) analyzed the wood, and found it to consist of *resin* 26.0, *bitter, piquant extractive* 0.8, *mucous extractive with a vegetable salt of lime* 2.8, *colouring matter* (?) similar to that of the bark 1.0, and *woody fibre* 69.4.

**GUAIACUM BARK** (*Cortex Guaiaci*) is gray, compact, very hard, heavy, and resinous. Its internal surface sometimes presents numerous, small, brilliant, apparently crystalline points, which Guibourt supposes to be benzoic acid. Trommsdorff (*op. cit.* vii. 429,) analyzed this bark, and found it to consist of the following substances: *peculiar resin* different from that of the wood 2.3, *peculiar, bitter, piquant extractive* precipitable by acid 4.8, *gum* 0.8, *brownish yellow colouring matter* 4.1, *mucous extractive with sulphate of lime* 12.0, and *lignin* 76.0.

**2. Guaiacum Resin** (*Resina Guaiaci*).—This is commonly, though very erroneously, denominated *gum guaiacum*. It is obtained from the stem of the tree by the following methods:

*a. By natural exudation.*—It exudes naturally from the stem, and may be seen on it at all seasons of the year. (Brown, *op. supra cit.* p. 226.) *β. By*



*jagging*.—If the tree be wounded in different parts, a copious exudation takes place from the wounds, which hardens by exposure to the sun. This operation is performed in May.  $\gamma$ . *By heat*.—Another method of obtaining it is the following:—"The trunk and larger limbs being sawn into billets of about three feet long, an auger hole is bored lengthwise in each, and one end of the billet so placed on a fire that a calabash may receive the melted resin which runs through the hole as the wood burns." (Wright, *Med. Plants of Jamaica*.)  $\delta$ . *By boiling*.—It is also obtained in small quantities by boiling chips or sawings of the wood in water with common salt. The resin swims at the top, and may be skimmed off. (Wright, *op. supra cit.*) The salt is used to raise the boiling point of the water.

Guaiacum occurs in tears and in masses. *Guaiacum in tears* (*Guaiacum in lachrymis*) occurs in rounded or oval tears, of varying size, some being larger than a walnut. Externally they are covered by a grayish dust. They are said to be produced by *Guaiacum sanctum*. (*Journ. de Pharm.* xx. 520.) *Lump Guaiacum* (*Guaiacum in massis*) is the ordinary kind met with in the shops. These masses are of considerable size, and are ordinarily mixed with pieces of bark, wood, and other impurities: they are of a brownish or greenish-brown colour, and have a brilliant, shiny, resinous fracture. Thin laminæ are nearly transparent, and have a yellowish-green colour. The odour is balsamic, but very slight, though becoming more sensible by pulverization. When chewed, guaiacum softens under the teeth, but has scarcely any taste, though it leaves a burning sensation in the throat. Its specific gravity is 1.2289. When heated guaiacum melts and evolves a fragrant odour. The products of the destructive distillation of guaiacum have been examined both by Mr. Brande and Unverdorben. Among the new substances obtained by the latter are *two empyreumatic oils of guaiacum* (one volatile, the other fixed), and *pyro-guaiacic acid*.

The characters of guaiacum resin, according to the *Edinburgh Pharmacopœia*, are as follows:—"Fresh fracture red, slowly passing to green: the tincture slowly strikes a lively blue colour on the inner surface of a thin paring of a raw potato."

In 1805, Mr. Brande (*Phil. Trans.* for 1806, p. 89) analyzed guaiacum. In 1806 it was examined by Bucholz, (quoted by Schwartz, *Pharm. Tabell.* 293, 2<sup>te</sup> Ausg.) and in 1828 by Buchner. (Gmelin, *Handb. d. Chem.* ii. 571.) Dr. Ure (*Dict. of Chem.*) has made an ultimate analysis of it.

Brande's Analysis.		Buchner's Analysis.		Ure's Analysis.	
Substance <i>sui generis</i> (guaiacum properly so called).....	91	Pure resin.....	79.8	Carbon.....	67.88
Extractive.....	9	Bark { Woody fibre.....	16.5	Hydrogen.....	7.05
		{ Tasteless gum.....	1.5	Oxygen.....	25.07
		{ Extractive.....	2.1		
Guaiacum.....	100	Guaiacum.....	99.9	Guaiacum.....	100.00

1. **GUAIACIC ACID; Guaiacin.**—Is insoluble in water, but is readily dissolved by alcohol, and is precipitated from its alcoholic solution by water, sulphuric and nitric acids, and chlorine. Ether dissolves the resin, but not so readily as alcohol. Solutions of the caustic alkalis (potash and soda) dissolve it, forming *alkaline guaiacates* (*guaiacum soaps; saponis guaiacini*). The mineral acids precipitate it from its alkaline solution. Various salts (as acetate of baryta, acetate of lime, acetate of lead, nitrate of silver, and chloride of gold) occasion precipitates (*guaiacates*) with the alkaline solution. Guaiacic acid is remarkable for the changes of colour it undergoes by the influence of various agents. Thus, its powder, and paper moistened with its tincture, become *green* in air or oxygen gas, but not in carbonic acid gas. This change, which seems connected with the absorption of oxygen, is influenced by the intensity and colour of the light. Various substances give a *blue* tint to guaiacum when in contact with air: thus gluten, but not starch. Hence powdered guaiacum has been proposed as a test of the goodness of wheat flour (which contains gluten), and of the purity of starch. Gum arabic, dissolved in cold water, has the same effect as gluten, but tragacanth gum has not. Milk, and various fresh roots and underground stems (for example, those of the horseradish, potato, carrot, colchicum, &c.) also possess this property. Certain agents change the colour of guaiacum successively to *green*, *blue*, and *brown*: thus, nitric acid and chlorine. Nitric acid colours the tincture of guaiacum green, then blue, and afterwards brown. If a piece of paper moistened with the tincture be exposed to the fumes of the acid, its colour is immediately



changed to blue. Spirit of nitric ether usually gives a blue colour to tincture of guaiacum (see vol. i. p. 384). Mr. Brande has conjectured, and I think with great probability, that these different-coloured compounds are combinations of oxygen with guaiacum,—the green compound containing the least, the brown the most, while the blue is intermediate. Mr. Johnston (*Proceed. of the Royal Soc.* June 18, 1840) says guaiacum resin consists of  $C^{60} H^{52} O^{10}$ ; its equivalent, therefore, is 343. According to Unverdorben, the resin of guaiacum is of two kinds: one readily soluble in a solution of ammonia,—and another which forms with ammonia a tarry compound. Pagenstecher has shown that tincture of guaiacum with hydrocyanic acid and sulphate of copper produces an intensely blue colour (see vol. i. p. 380.)

2. **EXTRACTIVE.**—This is obtained from guaiacum by the agency of water. The quantity obtained is liable to variation. It is a brown acrid substance.

These observations, then, show that guaiacum is essentially a *peculiar resin*, mechanically mixed with variable but small quantities of extractive and other impurities.

**ADULTERATION.**—Various adulterations are described as being practised on guaiacum. Though I have found this substance in the shops of this country of unequal degrees of impurity, I have never had reason to suspect that sophistication had been practised on it. The presence of turpentine resin might be detected by the peculiar odour evolved when the suspected resin is heated. Another mode of detecting this fraud is to add water to the alcoholic solution of the suspected guaiacum, and to the milky liquid thus formed a solution of caustic potash is to be added until the liquor becomes clear. If now an excess of potash cause no precipitate, no resin is present; for while *guaiacate of potash* is soluble in water, the salt produced by the union of potash and resin is not completely so.

**PHYSIOLOGICAL EFFECTS.** 1. **Of the Resin.**—Guaiacum resin is an acrid stimulant. Its acridity depends in a great measure on the extractive with which the resin is mixed, or which resides in the fragments of bark contained in the resin.

Under the use of *small and repeated doses* of guaiacum, various constitutional diseases sometimes gradually subside, and a healthy condition of system is brought about with no other sensible effect of the remedy than perhaps the production of some dyspeptic symptoms, and a slight tendency to increased secretion. We designate this inexplicable, though not less certain, influence over the system, by the term *alterative*.

When we give guaiacum in *moderately large doses*, or to plethoric easily-excited individuals, we observe the combined operation of an acrid and stimulant. The local symptoms are, the dryness of the mouth, the sensation of heat at the stomach, nausea, loss of appetite, and a relaxed condition of bowels. The stimulant operation is observed partly in the vascular system, but principally in the exhaling and secreting organs, especially the skin and kidneys. Dr. Cullen justly observes that it seems to stimulate the exhalants more in proportion than it does the heart and great arteries. If diluents be exhibited, and the skin kept warm, guaiacum acts as a powerful sudorific; whereas, when the surface is kept cool, perspiration is checked, and diuresis promoted. By continued use it has caused a mild salivation. (Burdach, *Syst. d. Arzneim.* Bd. ii. S. 283.)

The stimulant influence of guaiacum is extended to the pelvic vessels, and thus the hemorrhoidal and menstrual discharges are somewhat promoted by it. But there is no reason for supposing that the pelvic organs are specifically affected by it. In *very large doses* guaiacum causes heat and burning in the throat and stomach, vomiting, purging, pyrexia, and headache.

In its operation on the system guaiacum is allied to the balsams (see vol. i. p. 184). Dr. Cullen considered its resinous part to be very analogous to the balsams and turpentine.

2. **Of the Wood.**—The operation of the wood is similar to, though milder than, that of the resin. Any activity which the wood communicates to boiling water must depend on the extractive, as the resin is not soluble in this fluid.

Pearson (*Observations on the Effects of various articles of the Mat. Med.* p.



8, Lond. 1800) says, that the decoction excites a sensation of warmth in the stomach, produces dryness of the mouth, with thirst, increases the natural temperature of the skin, renders the pulse more frequent, and, if the patient lie in bed and take the decoction warm, it proves moderately sudorific; but if he be exposed freely to the air, it acts as a diuretic. Continued use occasions heartburn, flatulence, and costiveness. Kraus (*Heilmittellehre*, 612) mentions a measles-like eruption over the whole body, as being produced by large doses of the wood.

**3. Of the Bark.**—The bark acts in a similar way to the wood. Regnandot (Wibmer, *Wirk. d. Arztn. u. Gifte*, Bd. ii. S. 411) injected, at eight in the morning, three ounces of an aqueous infusion of it into the veins of a young man of twenty years of age. In half an hour a shivering fit came on, with colicky pains, followed by two stools: this shivering remained till five o'clock in the evening.

**Uses.**—In the employment of guaiacum the acrid and stimulant properties of this resin are to be remembered. The first unfits it for use in cases of impaired digestion, where there is irritation or great susceptibility of, or inflammatory tendency in, the alimentary canal: the second renders it improper in plethoric individuals, in all states of excitement or acute inflammation, and in persons whose vascular system is easily excited, and who are disposed to hemorrhages. It is admissible and useful, on the other hand, in atonic or chronic forms of disease, with retained secretions, especially in relaxed and phlegmatic constitutions.

The following are some of the diseases in which it has been employed:—

1. *In chronic rheumatism*, especially when occurring in scrofulous subjects, or in persons affected with venereal disease, guaiacum may be administered with considerable advantage under the conditions before mentioned. In cases of great debility, with coldness of surface, and in old persons, the ammoniated tincture may be employed.

2. *In gout.*—As a preventive of gout it was introduced by Mr. Emerigon, of Martinico. (*Journ. de Méd.* t. xlvii. p. 424.) His remedy (the *specificum antipodagricum Emerigonis*, as our German brethren term it) consisted of two ounces of guaiacum digested for eight days in three pints avoirdupois of rum. The dose was a tablespoonful, taken every morning fasting for a twelvemonth. Its stimulant qualities render it inadmissible during a paroxysm of gout; and with regard to its use in the interval, it is, of course, adapted for chronic atonic conditions only.

3. *In chronic skin diseases*, where sudorifics and stimulants are indicated, guaiacum may be serviceable, especially in scrofulous and syphilitic subjects.

4. *In obstructed and painful menstruation* not arising from any plethoric, inflammatory, or congested state of system, the volatile tincture of guaiacum has been employed with advantage. Dr. Dewees (*Treat. on the Diseases of Females* p. 81, 2nd ed. 1828) states he has long been in the habit of employing it in painful menstruation with good effect. Drs. Macleod and Jewell have also borne testimony to its emmenagogue qualities.

5. *As a remedy for venereal diseases*, guaiacum wood was at one time in the greatest repute. Nicholas Poll (Quoted by Pearson, *op. supra cit.*) tells us, that within nine years from the time of its introduction into Europe, more than three thousand persons had derived permanent benefit from its use. Experience, however, has taught us the true value of this remedy, and we now know that it has no specific powers of curing or alleviating syphilis. It is applicable, as an alterative and sudorific, for the relief of secondary symptoms, especially venereal rheumatism and cutaneous eruptions, more particularly of scrofulous subjects. Mr. Pearson found it serviceable after the patient had been subjected to a mercurial course. Under its use, thickening of the ligaments or periosteum subsided, and foul indolent sores healed. During its administration the patient should adhere to a sudorific regimen.



6. *In scrofula*, especially that form called cutaneous, guaiacum is used with occasional advantage.

7. *In chronic pulmonary catarrh*, especially of gouty subjects, it has also been used.

ADMINISTRATION.—The powder of guaiacum resin may be given in doses of from grs. x. to ʒss. It may be administered in the form of pill, bolus, or mixture (see *Mistura Guaiaci*). The resin is a constituent of the *pilula hydrargyri chloridi composita*, Ph. L., commonly termed *Plummer's Pills* (see vol. i. p. 616), and of the *pulvis aloës compositus* (see p. 113). The resin is also given in the form of alcoholic and ammoniated tincture. The wood is exhibited in decoction only. It is a constituent of the *decoctum sarzæ compositum*, L. (p. 131).

1. MISTURA GUAIACI, L. E. *Guaiacum Mixture*.—(Guaiacum, ʒij.; Sugar, ʒss.; Mucilage of Gum Arabic, fʒss.; Cinnamon Water, fʒxix. [fʒxixss. E.] Rub the Guaiacum with Sugar, then with the Mucilage, and to these, while rubbing, add gradually the Cinnamon Water.)—Dose, fʒss. to fʒij. twice or thrice a-day.

2. TINCTURA GUAIACI, L. E. D. (U. S.) *Tincture of Guaiacum*.—(Guaiacum in coarse powder, ʒvij. [ʒiv. D.]; Rectified Spirit, Oij. [*wine measure*, D.] Digest for fourteen [seven E. D.] days, and then filter). (Guaiacum in powder, lb. ss.; Alcohol, Oij. Macerate for fourteen days and filter through paper. U. S.)—Stimulant, sudorific, and laxative. Dose, fʒj. to fʒiv. As it is decomposed by water, it should be administered in mucilage, sweetened water, or milk, to hold the precipitated resin in suspension.

3. TINCTURA GUAIACI COMPOSITA, L. *Compound Tincture of Guaiacum*; *Tinctura Guaiaci Ammoniata*, E. D. (U. S.); *Volatile Tincture of Guaiacum*.—(Guaiacum, in coarse powder, ʒvij. [ʒiv. D. (U. S.)]; Aromatic Spirit of Ammonia, Oij. [lb. iss. D., Spirit of Ammonia Oij. E. (Oiss. U. S.)] Digest for fourteen [seven, E. D.] days [in a well-closed vessel, E.], and then filter.)—A powerfully stimulating sudorific and emmenagogue.—Dose, fʒss. to fʒij. May be taken as the preceding.

4. DECOCTUM GUAIACI, E. D. *Decoction of Guaiacum*.—(Guaiacum turnings, ʒij.; [Raisins, ʒij. E.]; Sassafras, rasped, ʒj. [ʒx. D.]; Liquorice Root, bruised, ʒj. [ʒijss. D.]; Water, Ovij. [Ox. *wine measure*, D.] Boil the Guaiacum [and Raisins, E.] with the Water, gently down to Ov., adding the Liquorice and Sassafras towards the end. Strain the decoction.)—This is the old *Decoction of the Woods*. The resin of guaiacum being insoluble in water, the extractive alone dissolves in this menstruum. The sassafras can confer but little activity to the preparation. Taken in doses of fʒiv., four times daily, and continued with a sudorific regimen, it acts on the skin, and has been thought to be useful as an alterative in old venereal, rheumatic, and cutaneous diseases.

#### ORDER LXVII.—OXALIDACEÆ, Lindley.—THE WOODSORREL TRIBE.

OXALIDÆE, De Candolle.

ESSENTIAL CHARACTER.—*Sepals* five, sometimes slightly cohering at the base, persistent, equal.

*Petals* five, hypogynous, equal, unguiculate, with a spirally-twisted aestivation. *Stamens* ten, usually more or less monadelphous, those opposite the petals forming an inner series, and longer than the others; *anthers* two-celled, innate. *Ovary* with five angles and five cells; *styles* five, filiform; *stigmas* capitate or somewhat bifid. *Fruit* capsular, membranous, with five cells, and from five to ten valves. *Seeds* few, fixed to the axis, enclosed within a fleshy integument, which curls back at the maturity of the fruit, and expels the seeds with elasticity. *Albumen* between cartilaginous and fleshy. *Embryo* the length of the albumen, with a long radicle pointing to the hilum, and foliaceous cotyledons.—*Herbaceous plants, undershrubs, or trees. Leaves* alternate, compound, sometimes simple by abortion, very seldom opposite or somewhat whorled (Lindley).

PROPERTIES.—Acidulous and refrigerant.



## OXA'LIS ACETOSEL/LA, Linn. L.—COMMON WOODSORREL.

Sex. Syst. Decandria, Pentagynia.

**HISTORY.**—Mr. Bicheno (*Phil. Mag.* vol. vii. p. 288, N. S.) declares this to be the genuine shamrock.

**BOTANY. Gen. Char.**—*Sepals* five, free or united at the base. *Petals* five. *Stamens* ten; *filaments* slightly monadelphous at the base, the five external alternate ones shorter. *Styles* five, pencilled at the apex or capitate. *Capsule* pentagonal, oblong, or cylindrical (De Cand.)—Perennial *herbs*. *Leaves* never abruptly pinnate.

**Sp. Char.**—*Leaves* all radical, ternate; *leaflets* inversely heart-shaped, hairy. *Scape* single-flowered. *Root* [rhizome] scaly (Hooker).

An elegant little plant. *Leaflets* delicate bright green, often purplish at the back, drooping at night. *Footstalks* slender, purplish. *Bracts* two, scaly. *Flowers* drooping, white, with purplish veins.

**Hab.**—Indigenous; woody and shady places. Flowers in May.

**DESCRIPTION.**—Woodsorrel (*herba acetosellæ*) is odourless. Its taste is agreeably acidulous.

**COMPOSITION.**—I am unacquainted with any analysis of this plant. Its expressed juice yields by evaporation *binoxalate of potash*. Payen (*Journ. de Chim. Méd.* t. i. p. 260, N. S.) analysed *Oxalis crenata*. From its stems he obtained *water*, *lignin*, *oxalate of potash*, *albumen*, *soluble nitrogenous matter*, *chlorophylle*, *oxalate of ammonia*, *free oxalic acid*, *oxides*, *salts*, *gum*, *an aromatic substance*, and *sugar*. The quantity of oxalate of potash was from 1.06 to 1.23 per cent.

**BINOXALATE OF POTASH; Salt of Woodsorrel.**—In Switzerland and some parts of Germany this salt is obtained on the large scale from woodsorrel, by evaporating the expressed juice, redissolving the residue, and crystallizing. 500 parts of the plant yield four parts of the crystallized salt. It crystallizes in white rhombic prisms. It consists of—

	Atoms.	Eq. Wt.
Oxalic Acid.....	2	72
Potash.....	1	48
Water.....	2	18
Crystallized binoxalate potash.....	1	138

In commerce the quadroxalate of potash is substituted for it.

**PHYSIOLOGICAL EFFECTS AND USES.**—Woodsorrel is refrigerant. Taken as a salad, it is considered a good antiscorbutic. Infused in milk, to form whey, or in water, it furnishes a grateful drink in fevers. A solution of the binoxalate of potash has been employed as a substitute for lemonade.

## ORDER LXVIII.—VITACEÆ, Lindley.—THE VINE TRIBE.

AMPELIDÆ, Kunth, De Candolle.

**ESSENTIAL CHARACTER.**—*Calyx* small, nearly entire at the edge. *Petals* four or five, inserted on the outside of the disk surrounding the ovary; in aestivation turned inwards at the edge, in a valvate manner, and often inflexed at the point. *Stamens* equal in number to the petals, and opposite them, inserted upon the disk, sometimes sterile by abortion; *filaments* distinct, or slightly cohering at the base; *anthers* ovate, versatile. *Ovary* superior, two-celled, *style* one, very short; *stigma* simple; *ovules* erect, definite. *Berry* round, often by abortion one-celled, pulpy. *Seeds* four or five, or fewer by abortion, bony, erect; *albumen* hard; *embryo* erect, about one-half the length of the albumen; *radicle* taper; *cotyledons* lanceolate, plano-convex.—Scrambling, climbing *shrubs*, with tumid separable joints. *Leaves* with stipules at the base, the lower opposite, the upper alternate, simple or compound. *Peduncles* racemose, sometimes by abortion changing to tendrils often opposite the leaves. *Flowers* small, green (Lindley).

**PROPERTIES.**—Acid leaves, and a fruit like that of the common grape, is the usual character of the order (Lindley).



## VITIS VINIFERA, Linn. L. E. D.—COMMON GRAPE-VINE.

Sex. Syst. Pentandria, Monogynia.

(Baccæ exsiccatæ demptis acinis, L.—Dried fruit, E.—Fructus siccatus, D.)

(Uva Passa, U. S. Raisins.)

**HISTORY.**—The grape-vine has been known and cultivated from the most remote periods of antiquity. The Sacred Historian tells us that Noah (*Gen.* ix. 20,) planted a vineyard and made wine. This was more than 2000 years before Christ. Among the most ancient of the profane writers, Homer, (*Od.* vii. 121, and xxiv. 342,) Hippocrates, and Herodotus, (*Euterpe*, lxxvii,) may be referred to as speaking of the vine.

**BOTANY. Gen. Char.**—*Calyx* somewhat five-toothed. *Petals* five, cohering at the point, separating at the base, and dropping off like a calyptra. *Stamens* five. *Style* none. *Berry* two-celled, four-seeded; the cells or seeds often abortive (De Cand.)

**Sp. Char.**—*Leaves* lobed, sinuated, toothed, smooth or downy (De Cand.)

A hardy, exceedingly variable shrub. *Leaves* more or less lobed, smooth, pubescent or downy, flat or crisp, pale or intensely green. [*Tendrils* opposite to each foot-stalk, solitary, spiral.] *Branches* prostrate, climbing or erect, tender or hard. *Racemes* loose or compact, ovate or cylindrical. *Fruit* red, pale, or white, watery or fleshy, globose, ovate or oblong, sweet, musky or austere. *Seeds* variable in number, or sometimes the whole of them abortive (De Cand.)—No less than 1400 varieties are cultivated at the Luxembourg gardens.



Vitis vinifera.

**DESCRIPTION.**—Grapes (*Uvæ*), considered with respect to their shape and colour, may be thus arranged (Thompson, in Loudon's *Encycl. of Gardening*.)

1. *Round, dark-red, purple, or black grapes*—The most remarkable variety of this division is the *black Corinthian grape*, which, when dried, constitutes the *currant* of the grocer.

2. *Oval, dark red, purple, or black grapes*.—To this division belongs the favourite *black Hamburgh grape*.

3. *Round and white grapes*.

4. *Oval and white grapes*.—The *Portugal grape* comes under this division. It is imported, packed in saw-dust and contained in earthen jars, from Portugal and Spain. The berries are large, fleshy, sweet, and slightly acidulous. They keep a long time after they have ripened. In 1822, the *ad valorem* duty of 20 per cent. on these grapes produced £1720. (M'Colloch, *Dict. of Commerce*.) The *white Cornichon* grape is remarkable for its elongated elliptical berry.

5. *Red, rose-coloured, grayish, or striped grapes*.

Various parts of the vine, some of which were formerly employed in medicine, are distinguished by peculiar names; thus, the leaves are termed *pampini*; the cirrhi or tendrils, *capreoli*; the tender shoots, *palmites*; the juice or sap, *lachryma*; and the juice of unripe grapes, *omphacium*, or commonly *agresta*. (Murray, *App. Med.* i. 444.) The twigs or cuttings of the vine are used for flavouring vinegar (see vol. i. p. 344).

**COMPOSITION.**—The juice of unripe and ripe grapes has been examined by several chemists. The following are the most important results. (Gmelin, *Handb. d. Chem.* ii. 1255.)







are apt to disagree with dyspeptics and children. Raisins are also used in various articles of pastry. Considered medicinally, *fresh grapes* prove valuable in febrile and inflammatory complaints. They allay thirst, and diminish febrile heat. They have been found serviceable in dysentery (Zimmermann, *Treat. of Dysent.* p. 87, 2d ed. Lond. 1774) and in phthical complaints. (Moore, *View of Society, &c. in Italy*, vol. ii. p. 254.) "The subjects of pulmonary affections who pass the summer in Switzerland," observes Sir J. Clark, (*The Sanative Influence of Climate*, p. 256, 3d ed. 1841,) "may try the effects of a course of grapes, 'Cure de Raisins,' a remedy in high estimation in several parts of the continent."

*Raisins* are employed in medicine principally as flavouring agents. They enter into several officinal preparations (as *Decoctum Hordei compositum*, p. 57; *Decoctum Guaiaci*, p. 629; *Tinctura Cardamomi composita*, p. 155; *Tinctura Sennæ composita*, p. 589; and *Tinctura Quassie composita*, p. 615), the flavour of which they improve, though they contribute nothing to the efficacy of these compounds.

1. POTASSÆ BITARTRAS. See vol. i. p. 448.

2. ACIDUM TARTARICUM. See vol. i. p. 359.

3. TROCHISCI ACIDI TARTARICI, E.; *Acidulated Lemon Lozenges* or *Acidulated Drops*.—(Tartaric Acid, ℥ij. ; Pure Sugar, ℥viii. ; Volatile Oil Lemons, ℥x. Pulverize the sugar and acid, add the oil, mix them thoroughly, and with mucilage beat them into a proper mass for making lozenges.)—Employed for coughs and sore throats. More commonly taken on account of their agreeable flavour, as articles of confectionary.

4. VINUM; *Wine*.—The necessarily confined limits of this work, and the great extent to which the preceding subjects have run, compel me to devote a much smaller space to the consideration of wine than its interest and importance otherwise demand.

In the British pharmacopœias the only officinal wine directed to be used is *Sherry* (*Vinum Xericum*, L.; *Vinum album*; *Sherry*, E.; *Vinum album Hispanum*, D.) For medicinal purposes, however, other wines are also used; so that it is necessary to take a general view of the properties of wines.

The *manufacture* of wine deserves a passing notice. Grape juice does not ferment in the grape itself. This is owing, not, as Fabroni (*De l'Art de faire le Vin*, Paris, 1801) supposed, to the gluten being contained in distinct cells to those in which the saccharine juice is lodged, but to the exclusion of atmospheric oxygen, the contact of which, Gay-Lussac (*Ann. de Chim.* lxxvi. 245) has shown, is necessary to effect some change in the gluten, whereby it is enabled to set up the process of fermentation. The expressed juice of the grape, called *must* (*mustum*), whose composition has been already stated (see p. 632), readily undergoes the vinous fermentation when subjected to a temperature of between 60° and 80° F. It becomes thick, muddy, and warm, and evolves carbonic acid gas. After a few days this process ceases, the thick part subsides, the liquid becomes clear, and is then found to have lost its sweet taste, and to have become vinous. I have already explained the theory of the process (see vol. i. p. 310; also, for some remarks respecting yeast). The wine is now drawn off into casks, where it undergoes further changes. It is then racked off into other casks, where it is subjected to the operation of *sulphuring* (*i. e.* exposed to sulphurous acid, either by burning sulphur matches in the cask or by the addition of wine impregnated with this acid), to render the glutinous matter incapable of re-exciting fermentation. After this, the wine is usually clarified, or *fined* (*i. e.* deprived of those matters which render the wine turbid, and dispose it to undergo deteriorating changes). Isinglass or white of egg (*i. e.* gelatine or albumen) is commonly employed for this purpose. The first forms with the tannic acid—the second with the alcohol, reticulated



coagula, which envelope and carry down the solid particles that endanger the safety of the wine.<sup>1</sup>

The peculiar qualities of the different kinds of wine depend on several circumstances; such as the variety and place of growth of the vine from which the wine is prepared—the time of year when the vintage is collected—the preparation of the grapes previously to their being trodden and pressed—and the various manipulations and processes adopted in their fermentation.

The wines of different countries are distinguished in commerce by various names. The following is a list of the wines most commonly met with, arranged according to the countries producing them :

1. FRENCH WINES.—*Champagne* (of which we have the *still, creaming, or slightly sparkling*—the *full frothing*—the *white*—and the *pink*); *Burgundy* (red and white); *Hermitage*; *Côte Rôtie*; *Rousillon*; *Frontignac*; *Claret* (the most esteemed being the produce of *Lafitte, Latour, Château Margaux, and Haut-Brion*); *Vin de Grave*; *Sauterne*; and *Barsac*.
2. SPANISH WINES.—*Sherry* (Xeres); *Tent* (Rota); *Mountain* (Malaga); *Benicarlo* (Alicant).
3. PORTUGAL WINES.—*Port, red and white* (Oporto); *Bucellas, Lisbon, Calcavalla, and Colares* (Lisbon). An inferior description of red Port Wine is shipped at Figuera and Aveiro.
4. GERMAN WINES.—*Rhine and Moselle Wines*. The term *Hock* (a corruption of *Hochheimer*) is usually applied to the first growths of the Rhine. The term *Rhenish* commonly indicates an inferior Rhine wine.
5. HUNGARIAN WINES.—*Tokay*.
6. ITALIAN AND SICILIAN WINES.—*Lachryma Christi*; *Marsala*; *Syracuse*; *Lissa*.
7. GRECIAN AND IONIAN WINES.—*Candian and Cyprus* wines.
8. WINES OF MADEIRA AND THE CANARY ISLANDS.—*Madeira and Canary* (Teneriffe).
9. WINES OF THE CAPE OF GOOD HOPE.—*Cape Madeira, Pontac, Constantia, red and white* (a sweet, luscious wine, much esteemed).
10. PERSIAN WINES.—*Shiraz*.
11. ENGLISH WINES.—*Grape, Raisin, Currant, Gooseberry, &c.*

Wines are also designated, according to their colour, *red or white*; according to their taste and other properties, *sweet, acidulous, dry, strong or generous, light, rough, sparkling, &c.*

The constituents of wine are, according to Gmelin, (*Handb. d. Chem.* ii. 1255,) as follows :—*Alcohol, an odorous principle* (volatile oil?), *blue colouring matter of the husk* (in red wine), *tannin, bitter extractive, sugar* (especially in the sweet wines), *gum, yeast, acetic acid* (from the commencement of the acetous fermentation), *malic acid, tartaric acid, bitartrate of potash, bitartrate of lime, sulphates and chlorides, phosphate of lime, carbonic acid* (especially in the effervescing wines), and *water*. To these may be added *paratartaric or racemic acid*.

1. BOUQUET OF WINE: *Odoriferous Principle of Wine*.—Every wine has a peculiar odour, which depends, doubtless, on a small quantity of volatile oil. The oil obtained from corn and potatoe spirit has been already noticed (see vol. i. p. 312). Liebig and Pelouze (*Ann. de Chim. et de Phys.* lxii. 438) have examined the oily liquid procured in the distillation of wine as well as by submitting wine lees to distillation, and found it to be *ananthic ether* (C<sup>18</sup> H<sup>16</sup> O<sup>2</sup>) mixed with *ananthic acid* (C<sup>14</sup> H<sup>12</sup> O<sup>2</sup>). From 22,000 lbs. (about 2200 imperial gallons) only two lbs. and one-fifth of oily liquid were procured.

2. ALCOHOL.—Mr. Brande (*Phil. Trans.* for 1811, p. 337; and for 1813, p. 82) has shown that alcohol exists ready formed in wine. He also ascertained the quantity of this substance which exists in different wines. The latter point has also been examined by several other chemists; as Geiger, (Gmelin, *Handb. d. Chem.* ii. 1256,) Julia-Fontenelle, (*Journ. de Chim. Méd.* iii. 332,) Prout, and Ziz, (Henderson, *op. cit.* p. 363,) and more recently by Dr. Christison, (Jameson's *Journal*.) Buris (*Journ. de Chim. Méd.* t. v. 2<sup>e</sup> Sér. p. 502) has ascertained the alcoholic strength of the wines of the Pyrénées-Orientales. Wines which contain a comparatively small quantity of spirit are denominated *light wines*; while those which have a much larger quantity are denominated *strong or generous wines*.<sup>2</sup>

<sup>1</sup> For further details consult Fabroni, *De l'Art de faire le Vin*, traduit de l'Italien par F. R. Baud, Par. 1801; Chaptal, *L'Art de faire le Vin*, 2e éd. Paris, 1819; also *Ann. de Chim.* t. xxxv. xxxvi. xxxvii.; Dr. Macculloch, *Remarks on the Art of Making Wine*, 1816; and Busby's *Journal* before quoted.

<sup>2</sup> For further details respecting wines the reader is referred to the works of Barry and Henderson already quoted, and to *The Topography of all the known Vineyards*, Eng. Transl. 1824; Redding's *History of Modern Wines*, 1833; and Busby's *Visit to the Vineyards of Spain and France*, Lond. 1834.



Table of the proportion of Alcohol (sp. gr. 0.825 at 60° F.) by measure, contained in 100 parts of Wine.<sup>1</sup>

	Brande.	Others.		Brande.	Others.
1. Lissa	.A. 25.41	15.90 P.	24. White Hermitage	17.43	
2. Raisin	.A. 25.12		25. Rousillon	.A. 18.13	
3. Marsala	.A. 25.09	18.40 P.	26. Claret	.A. 15.10	
4. Port	.A. 22.96	20.64 P.	27. Zante	17.05	
5. Madeira	.A. 22.27	21.20 P.	28. Malmsey-Madeira	16.40	
6. Currant	20.55		29. Lunel	15.52	18.01 F.
7. Sherry	.A. 19.17	23.80 P.	30. Sheraaz	15.52	
8. Teneriff	19.79		31. Syracuse	15.28	30.00 P.
9. Colares	19.75		32. Sauterne	14.22	
10. Lachryma Christi	19.70		33. Burgundy	.A. 14.57	12.16 P.
11. Constantia, white	19.75		34. Hock	.A. 12.08	
12. Constantia, red	18.92	14.50 P.	35. Nice	12.63	
13. Lisbon	18.94		36. Barsac	13.86	
14. Malaga	18.94		37. Tent	13.30	
15. Bucellas	18.49		38. Champagne	.A. 12.61	12.20 F.
16. Red Madeira	.A. 20.35		39. Red Hermitage	12.32	
17. Cape Muschat.	18.25		40. Vin de Grave	13.94	
18. Cape Madeira	.A. 20.51		41. Frontignac (Rivesalte)	12.79	
19. Grape Wine	18.11		42. Côte Rôtie	12.32	
20. Calceavella	.A. 18.65		43. Gooseberry	11.84	
21. Vidonia	19.25		44. Orange	.A. 11.26	
22. Alba Flora	17.26		45. Tokay	9.88	
23. Malaga	17.26		46. Elder	8.79	

According to the more recent experiments of Dr. Christison, the quantity of alcohol in wines has been somewhat overrated. The following are his results:

	Alcohol (0.7939) per cent. by weight.	Proof Spirit per cent. by volume.
Port { Weakest	14.97	30.56
Port { Mean of 7 wines	16.20	33.91
Port { Strongest	17.10	37.27
Port { White	14.97	31.31
Sherry { Weakest	13.98	30.84
Sherry { Mean of 13 wines, excluding those very long kept in cask	15.37	33.59
Sherry { Strongest	16.17	35.12
Sherry { Mean of 9 wines kept very long in cask in the East Indies	14.72	32.30
Sherry { Madre da Xeres	16.90	37.06
Madeira—All long in cask in East Indies { Strongest	16.90	36.81
Madeira—All long in cask in East Indies { Weakest	14.09	30.86
Teneriff, long in cask at Calcutta	13.84	30.21
Cercial	15.45	33.65
Dry Lisbon	16.14	34.71
Shiraz	12.95	28.30
Amontillado	12.63	27.60
Claret, a first growth of 1811	7.72	16.95
Chateau-Latour, first growth in 1825	7.78	17.06
Rosan, second growth 1825	7.61	16.74
Ordinary Claret, a superior "vin ordinaire"	8.99	18.96
Rivesaltes	9.31	22.35
Malmsey	12.86	28.37
Rudesheimer, superior quality	8.40	18.44
Ditto inferior quality	6.90	15.19
Hambacher, superior quality	7.35	16.15

Dr. Christison states that by keeping wines, as Sherry and Madeira, in casks, for a moderate term of years, the quantity of alcohol increases; but after a certain time it decreases; and it is probable that at the period when wines begin to lose alcohol they cease to improve in flavour.

3. FREE ACIDS.—All wines are more or less acidulous, as determined by litmus. They owe this property principally to malic acid, but in part also to citric and tartaric acids. The Rhenish and Moselle wines and claret are termed *acid wines*. The brisk, frothing, sparkling, or *effervescent wines* (as Champagne), which are bottled before fermentation is complete, owe their peculiar properties to the retention, and subsequent escape when the confining force is removed, of the developed carbonic acid gas. They are apt to become *ropy*,—a change which is prevented by pure tannic acid or powdered nutgalls. The tannic acid of some wines, especially the red wines (as Port), is derived, in great part, from the husk of the grape, but partly,

<sup>1</sup> .A. means average, F. Fontenelle, P. Prout.



perhaps, from the seeds. It gives to these wines their astringency and power of becoming dark-coloured with the ferruginous salts.

4. SUGAR.—This constituent varies considerably in quantity in different wines. Those in which it is abundant are denominated *sweet wines*, as Tokay, Tent, and Frontignac.

5. EXTRACTIVE.—Exists in all wines, but diminishes (by deposition) with their age.

6. COLOURING MATTER.—All wines contain more or less colouring matter. When grape juice, without the husks of the fruit, is fermented, the wine is pale, and is denominated *white wine*; but if the husk be present during fermentation, the wine is deep coloured, and is usually called *red wine*. Except in the *tintilla* or *teinturier* grape the purple colouring matter resides in the husk, and is dissolved by the newly-formed alcohol, and is reddened by the free acid. In the exception just mentioned, the colouring matter is diffused through the pulp. According to Nees von Esenbeck, the purple colouring matter of the grape resides on the inner side of the husk (epicarp). By exposure to the sun, as well as by age, the colour of wines is diminished; the colouring matter being precipitated. It may be artificially removed by milk, lime water, or charcoal.

7. TARTAR (*Bitartrate of Potash*).—The most important saline constituent of wine is tartar. It deposits, along with colouring and extractive matters, both in the cask and bottle, constituting *argol* (see vol. i. p. 449) and the *crust*. The deposition increases with the formation of alcohol. Red wines (especially the youngest, roughest, and most coloured) contain more than white wines.

ADULTERATION, &c.—Various impositions are said to be practised by dealers on the consumers of wines. These are almost entirely confined to the mixing of wines of various qualities. In some cases, however, the finest wines have been prepared by mixture. "From the gradual mixture of wines of various ages," observes Mr. Busby, (*op. supra cit.* p. 3,) "no wine can be further from what may be called a *natural wine* than sherry." In some cases inferior kinds of wine are substituted by fraudulent dealers for finer ones.

To augment the strength of wine, brandy is frequently added. This is done to sherry before it is shipped from Spain. To good wines, however, it is never added in greater quantities than four or five per cent. (*Op. supra cit.* p. 4.) By recent regulations, ten per cent. of brandy may be added to wines after their arrival in this country, and while in the bonded vaults; the increased quantity only paying the wine duty.

Colouring matters are also employed to deepen or change the tint of wine. In Spain, *boiled must* (of the consistence of treacle, and having a similar flavour, but with a strong empyreumatic taste) is employed, to deepen the colour of sherry. It is prepared by boiling down must to a fifth part of its original bulk. (*Op. supra cit.* pp. 4 and 11.) In this country, caramel (vol. i. p. 55) is said to be used for a similar purpose. In Portugal the juice of the elder berry has been employed to augment the colour of Port-wine, the produce of poor vintages. To such an extent was this, at one time, practised, that the Wine Company of Portugal rooted out the trees and prohibited their growth in the wine district.

Flavouring substances are also occasionally added to wines. Thus in Spain, *Amontillado* or *Montillado* (a very dry kind of sherry) is added to sherries which are deficient in the nutty flavour. Being very light in colour, it is also used to reduce the colour of sherries which are too high. Kino is said to be used in this country to augment the astringent flavour of Port-wine.

Lead, formerly used to sweeten wine, (See Beckmann, *Hist. of Invent.* vol. i. p. 396) may be occasionally detected, in very minute quantity, in wine (by sulphuretted hydrogen). It is usually to be traced to shot in the bottle, and rarely to fraud. (See a case in the *Phil. Mag.* liv. 229.)

EFFECTS.—The *physiological effects* of wine, next deserve our attention. Taken in moderate quantities, wine operates as a stimulant to the nervous and vascular systems, and the secreting organs. It quickens the action of the heart and arteries, diffuses an agreeable warmth over the body, promotes the different secretions, communicates a feeling of increased muscular force, excites the mental powers, and banishes unpleasant ideas. In a state of perfect health, its use



can be in no way beneficial, but, on the contrary, its habitual employment in many cases proves injurious, by exhausting the vital powers, and inducing disease (see some further remarks on the dietetical properties of wines, vol. i. 96). The actual amount of injury which it may inflict will of course vary with the quantity and quality of the wine taken, and according to the greater or less predisposition to disease which may exist in the system. Maladies of the digestive organs, and of the cerebro-spinal system, gout and dropsy, are those most likely to be induced or aggravated by it. Intoxication in its varied forms is the effect of excessive quantities of wine. It is remarkable, however, that though the effects of wine mainly depend on the alcohol contained in this liquor, yet they differ in several circumstances from those of the latter (described at vol. i. p. 318 et seq). In the first place, wine possesses a tonic influence not observed after the use of ardent spirit. Common experience proves to every one, that the stimulant influence communicated by wine is slower in its production and subsidence than that developed by spirit. In the second place, the intoxicating influence of wine is not equal to that of mixtures of ardent spirit and water of corresponding strengths, nor proportionate, in different wines, to the relative quantities of alcohol which they contain. This will be obvious from the following table, drawn up from Mr. Brande's results, before quoted:—

*Average quantities of Ardent Spirit and of Wine, containing four fluidounces of Alcohol*  
(sp. gr. 0.825 at 60° F.)

Brandy, about .....	8 fluidounces.
Port Wine .....	18½
Claret .....	26½
Champagne .....	32

Now it is obvious from this table that if the intoxicating power of vinous liquids was in proportion to the spirit contained in them, that a pint of Port-wine would be almost equal to half a pint of brandy, and that Claret would exceed Champagne in its influence over the nervous system; all of which we know not to be the case. It is therefore obvious, that the other constituents of the wine possess the power of modifying the influence of the alcohol. Furthermore, it is probable that they are enabled to do this by being in chemical combination with the spirit. For it is asserted by connoisseurs, that a brandied wine (*i. e.* wine to which brandy has been added) is more intoxicating than a non-brandied wine equally strong in alcohol. Hence dealers endeavour to obviate this by the operation of *fretting in*, and which, in a scientific point of view, may be regarded as effecting the chemical combination of the foreign spirit with the constituents of the wine, by a second or renewed fermentation. A third distinction between the operation of wine and ardent spirit is the greater tendency of the latter to induce disease of the liver. "It is well known," observes Dr. Macculloch, (*Op. cit.*) "that diseases of the liver are the most common, and the most formidable of those produced by the use of ardent spirits; it is equally certain that no such disorders follow the intemperate use of pure wine, however long indulged in. To the concealed and unwitting consumption of spirit, therefore, as contained in the wines commonly drank in this country, is to be attributed the excessive prevalence of those hepatic affections which are comparatively little known to our continental neighbours."

USES.—The uses of wines are threefold—dietetical, medicinal, and pharmaceutical. To persons in health, the *dietetical* employment of wine is either useful or pernicious. The least injurious are the light wines, especially Claret.

As a *medicinal* agent, wine is employed principally as a cordial, stimulant, and tonic; but some of the wines possess astringent and acid properties, for which they are occasionally resorted to. In the latter stages of fever, when languor and torpor have succeeded to a previous state of violent action, and in the low forms of this disease, wine is at times undoubtedly useful. It supports



the vital powers, and often relieves delirium and subsultus tendinum, and promotes sleep. But it is much less frequently and copiously employed than formerly. As a stimulating tonic and invigorating agent, it is given in the state of convalescence from fever, and from various chronic non-febrile diseases. In extensive ulceration, copious suppuration, gangrene of the extremities, and after extensive injuries or severe operations, or profuse hemorrhages, when the powers of life appear to be failing, wine is administered often with the best effects. It has been liberally employed in tetanus, and at times with apparent alleviation of the disease. If in any of the preceding cases it causes dryness of the tongue, thirst, quick pulse, restlessness, or delirium, it should of course be immediately laid aside. And it is obvious that in acute inflammation, especially of the brain or thoracic organs, in tendency to sanguineous apoplexy, and in the first or acute stage of fever, the employment of wine is objectionable, and calculated to prove highly injurious.

1. PORT-WINE (*Vinum seu Lusitanicum Portugallicum*) is applied to most of the purposes above mentioned for which a stimulant and tonic is required, and is the wine ordinarily employed in the public hospitals of this metropolis. On account of its astringency, it is particularly useful in those cases which are attended with a relaxed condition of the bowels; but it is apt to disagree with weak stomachs. A mixture of two-thirds Port-wine and one-third water is used as an injection for the radical cure of hydrocele.

2. BURGUNDY (*Vinum Burgundicum*) is a stimulant, and somewhat astringent wine; but is rarely used in this country for medicinal purposes.

3. SHERRY (*Vinum Xericum*, Ph. L.; *Vinum Album*, Ph. Ed.; *Vinum album Hispanum*, Ph. D.) is peculiarly valuable, on account of the small quantity of free acid which it contains; and it is, therefore, the wine best adapted for patients troubled with gout, or having acidity of stomach, or a deposition of lithic acid in the urine.

4. MADEIRA (*Vinum Maderaicum*) is a more stimulating wine than sherry, and is, therefore, better adapted for old persons and debilitated broken-down constitutions, where its slight acidity is not objectionable. It is an excellent wine for invalids.

5. CHAMPAGNE (*Vinum Campanicum*) is a diuretic and a speedy intoxicator. It excites lively and agreeable feelings, and, in consequence, is adapted for hypochondriacal cases. On account of the evolution of carbonic acid, it may be occasionally employed to allay vomiting. It is objectionable in gouty subjects.

6. THE RHINE WINES (*Vinum Rhenanum*), of which *Hock* (*Vinum Hochheimense*) is the most familiar example, and the *Moselle wine* (*Vinum Mosellanum*), are refrigerant and light wines. They prove diuretic and slightly aperient. Their acidity adapts them for use where phosphatic sediments are observed in the urine. They are used also in low fever, with at least less likelihood of doing harm than the stronger wines.

7. CLARET (*Vinum rubellum*) has been already mentioned as one of the least injurious of wines. It is adapted for the same cases as the Rhine and Moselle wines. Both are, of course, objectionable in gouty cases and lithic acid deposits, on account of their acidity.

As a *pharmaceutical agent*, wine is employed for the preparation of the *medicated wines* (*vina medicata*). *Sherry* is the kind employed by the British colleges; but for economy druggists often use Cape wine. Its efficacy resides essentially in the alcohol which it contains. In some cases, however, its acidity may increase its solvent power. But as the quantity of alcohol which it contains is variable, and as it is more liable to undergo decomposition than a tincture containing the same proportion of spirit, the medicated wines are objectionable preparations.

5. SPIRITUS VINI GALLICI, L.—See vol. i. p. 322.

6. MISTURA SPIRITUS VINI GALLICI, L.—See vol. i. p. 323.



ORDER LXIX.—GUTTIFERÆ, *Jussieu*.—THE MANGOSTEEN TRIBE.

CLUSIACEÆ, *Lindley*.

ESSENTIAL CHARACTER.—*Sepals* two or six, usually persistent, round, frequently unequal and coloured; aestivation imbricated. *Petals* hypogynous, four to ten. *Stamens* hypogynous, indefinite, or rarely definite, distinct or variously united to the base; *filaments* unequal; *anthers* adnate, introrse or extrorse, sometimes very small, sometimes unilocular, and sometimes opening by a pore. *Torus* fleshy, occasionally five-lobed. *Ovary* solitary, one or many-celled; *ovules* solitary, or several in each cell, erect or ascending, or numerous and attached to several placentæ; *style* usually none or very short, seldom conspicuous; *stigmas* peltate or radiate. *Fruit* capsular or fleshy, or drupaceous, one or many-celled, valvular and septical, or indehiscent. *Seeds* definite, in a pulp, apterous, often arillate; *testa* thin and membranous; *albumen* none; *embryo* straight; *radicle* small next the hilum; *cotyledons* large, thick and fleshy, often cohering.—*Trees* or *shrubs*, sometimes parasitical. *Juice* resinous. *Leaves* exstipulate, always opposite, coriaceous, with a strong midrib, and many oblique lateral parallel veins. *Flowers* articulated with their peduncle.—(*Wight and Arnott*.)

FIG. 237.



*Garcinia Mangostana*.

PROPERTIES.—The species all abound in a viscid, yellow, acrid, and purgative gum-resinous juice resembling Gamboge (*Lindley*). Several species of *Garcinia* yield edible fruits. The fruit *G. Mangostana* (fig. 237) is the most delicious of East Indian fruits, and is "the only fruit which sick people are allowed to eat without scruple."

1. HEBRADENDRON CAMBOGIOIDES, *Graham, E.*—THE GAMBOGE HEBRADENDRON.

*Cambogia Gutta, Linn.*—*Stalagmitis cambogioides, Moon.*

*Sex. Syst.*<sup>1</sup> Monœcia, Monadelphica.

(Gummy-resinous exudation, *E.*)

(*Gambogia*, U. S. Gamboge. The product of an uncertain tree.)

HISTORY.—The first notice of gamboge is by *Clusius* (*Exot. lib. iv. cap. viii. p. 82*) in 1605. He received this gum-resin in 1603 from *Peter Garet*, of Amsterdam. It had been brought from China by *Admiral van Neck* and his companions, and its oriental name was said to be *Ghittaiemou*.

FIG. 238.



*Hebradendron cambogoides*.

- A. Male flowering branch.
- 1. Back view of a flower.
- 2. Side view of the calyx and column of stamens.
- B. Fruit-bearing branch.
- 3. Section of fruit with its four seeds.

BOTANY. *Gen. Char.*—*Flowers* unisexual. *Males*: *sepals* four, membranous, permanent. *Petals* four. *Stamens* monadelphous, with a quadrangular column; *anthers* terminal, with an umbilicated circumscissile operculum. *Females* unknown. *Berry* many (four) celled; cells one-seeded; surrounded by a few abortive distinct stamens, and crowned by sessile-lobed muricated stigma. *Cotyledons* thick, consolidated; *radicle* central filiform.—*Trees* with entire leaves. (*Graham, Comp. to Bot. Mag. ii. 199.*)

*Sp. Char.*—*Male flowers* axillary, fascicled. *Sepals* when young nearly equal. *Leaves* obovate-elliptical, abruptly subacuminate (*Graham*).—A tree of moderate size. *Leaves* opposite, stalked. *Male flowers*: *sepals* four, imbricated, concave, yellow on the inside, yellowish-white on the outside. *Petals* spatulate-elliptical, crenulate, yellowish-white, red on the inside. *Berry* about the size of a cherry, round, with a firm reddish-brown external coat, and sweet pulp. *Seeds* large in proportion to the berry, reniform elliptical. (*Condensed from Graham.*)

<sup>1</sup> As the female flowers have not yet been examined, the true place of this plant in the sexual system must at present be doubtful. *Linnaeus* puts his genus *Cambogia* in *Polyandria, Monogynia*.



## Hab.—Ceylon.

Siam Gamboge, the Gamboge of the shops, is a "gum-resin from an unascertained plant, inhabiting Siam, probably a species of *Hebradendron*." E. The *Stalagmitis Cambogioides*, Murray, (*Comm. Gotting.* ix. 169.) L.; *S. Cambogia*, Persoon, D. does not really exist. The specimen, which has been described as such, is in the Banksian Herbarium, and was found by Mr. Brown (Graham, *op. supra. cit.* p. 197.) to consist of two plants (*Xanthochymus ovalifolius* of Roxburgh, and *Hebradendron cambogioides* of Graham), the union of which had been concealed by sealing-wax. As it appears, according to Dr. Christison, (*Comp. to the Bot. Mag.* vol. ii. p. 236.) that the gamboge of Siam is "as nearly as possible identical in composition and properties" with that of Ceylon, it is probable that both are obtained from the same, or some nearly allied species. Indeed it has been suggested, that the plant may have been carried from Siam to Ceylon: for the Bhoodist religion is supposed to have passed from the former to the latter country, and with it the practice of painting the temples and holy dresses with gamboge.

PREPARATION.—The only account which we possess of the method of obtaining Siam gamboge, is that given to König by a Catholic priest residing at Cochin-China. (Murray, *App. Med.* iv. 656.) According to this statement, when the leaves or branchlets are broken, a yellow milky juice issues *guttatim* (hence the origin of the term *Gummi Guttae* applied to gamboge), and is received either on the leaves of the tree, or in cocoa-nut shells, and from thence is transferred into large flat earthen vessels, where it is allowed to harden during the summer season, and is afterwards enveloped with leaves. The cylindrical or pipe variety receives its form by being run into the joints of the bamboo while it is in the liquid state. (White, *Voyage to the China Seas*, Boston, 1823, p. 250, quoted by Dr. A. T. Thomson, in the *Lond. Disp.*) A few years since there was an importation of gamboge in the bamboo cylinders (*gamboge in the bamboo*). Each cylinder or stem was about twenty-one inches long and one inch and a half in diameter, closed at the lower end by the transverse partition of the nodus, and at the upper by a piece of oil-skin.

In Ceylon, gamboge is obtained by wounding the bark of the tree in various places with a sharp stone, when the flowers begin to appear. The cream-like juice which exudes, hardens in the sun, (Murray, *op. cit.* pp. 108 and 657.) According to Mrs. Walker, the Cingalese method of collecting it is "by cutting pieces of the bark completely off, about the size of the palm of the hand, early in the morning. The gamboge oozes out from the pores of the bark in a semi-liquid state, but soon thickens, and is scraped off by the collectors next morning, without injury to the tree, the wounds in the bark readily healing, and becoming fit to undergo the operation again." (Graham, *op. supra. cit.* p. 196.)

DESCRIPTION.—Two kinds of gamboge (*cambogia*; *gummi guttae*) are described by pharmacological writers—viz. the Siam and the Ceylon. Of these the first only is known in commerce.

1. **Siam Gamboge.** (*Cambogia Siamensis*, Ph. Ed.)—This is the *gamboge* of the shops. It is brought to this country sometimes direct from Siam, at other times indirectly by way of Singapore, Penang, or Canton. It comes over in boxes, cases, or chests. In 1839, duty (4s. per cwt.) was paid on 15 cwts.; in 1838, on 40 cwts. It presents itself in commerce in three forms:—1st, *in rolls or solid cylinders*; 2dly, *in pipes or hollow cylinders*; 3dly, *in cakes or amorphous masses*. Both the solid and hollow cylinders are known in commerce as *pipe gamboge*. What is called *coarse gamboge* consists of the commonest pieces of the above.

a. *Pipe gamboge* consists of cylindrical pieces, varying in size from one to three inches in diameter. Some of them appear to have been formed by rolling, but many of them are striated, from the impression of the bamboo stems into the hollow of which the gamboge juice has been run, and not unfrequently portions of the stems are still adherent; and on one occasion, as above mentioned, the gamboge was imported in the stems (*gamboge in the bamboo*). The gamboge cylinders are sometimes distinct, and covered externally with a dirty greenish-



yellow dust; at others agglutinated, or even folded, so as to form masses of varying sizes and forms. Pipe gamboge occurs in all qualities,—the finest and the worst specimens of gamboge which I ever saw having this form. *Fine gamboge* is brittle and odourless: it has very little taste at first, but, after some time, it causes a sensation of acidity in the throat. Its fracture is conchoidal: its fractured surface is opaque, reddish yellow, with a glimmering lustre. It is completely dissolved by the successive action of ether and water. Mixed with a sufficient quantity of water, it forms a yellow emulsion, the films of which are excellent microscopic objects for observing the *active molecules* described by Mr. R. Brown. (*Phil. Mag.* for Sept. 1828 and 1829.) The powder of fine gamboge is bright yellow. The *Edinburgh College* gives the following characters of fine gamboge.

“Fracture somewhat conchoidal, smooth, and glistening: a decoction of its powder, cooled, is not rendered green by tincture of iodine, but merely somewhat tawny.”

The iodine is employed to prove the absence of starch. *Inferior qualities* of gamboge are harder, more earthy in fracture; the fractured surface is brownish or grayish-yellow, frequently with black spots, from the presence of foreign bodies which are intermixed. It is not completely dissolved by the successive action of ether and water. Iodine readily detects, in the cooled decoction, starch, by the green colour which it gives rise to.

β. *Lump or Cake Gamboge* occurs in masses of several pounds weight. Its quality is inferior to the finest pipe kind. Internally we observe fragments of wood, twigs, and air-cells. In most of its characters it agrees with the inferior qualities of pipe gamboge, and like this contains starch.

2. *Ceylon or Cingalese Gamboge* (*Cambogia Zeylanica*, Ph. Ed.)—I am unacquainted with this kind of gamboge, which is unknown in English commerce. Dr. Christison says, that, as he has seen it, it “is usually in small irregular fragments, but as originally collected, is in flattish round masses, as if moulded in shallow bowls, weighing about a pound or upwards; and it appears to be composed of aggregated irregular tears, with interspaces and cavities, which are lined with a dark powdery matter, or with a powder of an earthy appearance. Altogether it seems a very coarse article.” It forms, “with great ease, an emulsion nowise inferior in smoothness, and very little, if at all, in liveliness of tint, to that of the very best Pipe Gamboge of Siam.”

COMPOSITION.—Gamboge was analysed, in 1808, by Braconnot; (*Ann. de Chim.* lxxiii. 33, in 1813, by John, (Gmelin, *Handb. de Chem.* ii. 626); and in 1836, by Dr. Christison. (*Companion to the Botanical Magazine*, ii. 233.)

	Siam Gamboge.						Ceylon Gamboge.		
	Cylindrical or Pipe.		Cake or Lump.		Coarse.		First.	Second.	Third.
	First.	Second.	First.	Second.	First.	Second.			
Resin.....	74.2	71.6	64.3	65.0	61.4	35.0	68.8	71.5	72.9
Soluble gum.....	21.8	24.0	20.7	19.7	17.2	14.2	20.7	18.8	19.4
Woody fibre.....	trace.	trace.	4.4	6.2	7.8	19.0	6.8	5.7	4.3
Fecula.....	—	—	6.2	5.0	7.8	22.0	—	—	—
Moisture.....	4.8	4.8	4.0	4.2	7.2	10.6	4.6	{ not ascer- tained.	not ascer- tained.
Gamboge.....	100.8	100.4	99.6	100.1	101.4	100.8	100.9	96.0	96.6

1. **GAMBOGIC ACID;** *Gambogic Acid*, Johnston; *Resin*, Christison.—Obtained by evaporating to dryness the ethereal tincture of the pure gum-resin. It is brittle, in thin layers of a deep orange colour, in thicker masses of a cherry-red tint. It is insoluble in water, but soluble in alcohol, and still more so in ether. It communicates an appreciable yellowness to 10,000 times its weight of spirit. It is soluble in the caustic alkalis, forming dark-red solutions



(alkaline gambogiates), which yield, with acids, a yellow precipitate (*gambogic acid*); with acetate of lead, a yellow (*gambogiate of lead*); with the salts of iron, a dark brown (*gambogiate of iron*), and with sulphate of copper, a brown one (*gambogiate of copper*). The composition of gambogic acid, according to Johnston, (*Phil. Trans.* 1839,) is  $C^{40}H^{23}O^9$ . When heated to about 400° F. it undergoes partial decomposition, a resin soluble in cold alcohol being formed, and another insoluble in that liquid. The constitution of the latter seems to be represented by  $C^{40}H^{22}O^9$ .—In doses of five grains, gambogic acid occasioned profuse watery discharges without pain or other uneasiness. If the activity of gamboge depended solely on the resin, five, or five and a half, grains of the resin should be equal to seven of gamboge; but, according to Dr. Christison, this is not the case. Hence, either it is not the sole active ingredient, or it becomes somewhat altered in the process for procuring it: the latter supposition is the more probable.

2. GUM (*Arabine?*).—The gum of gamboge is soluble in water, like gum arabic.

3. STARCH or *Fecula*.—This substance, which is found in common gamboge, is doubtless an adulterating substance.

CHEMICAL CHARACTERISTICS.—Gamboge emulsion becomes transparent and deep red on the addition of potash, forming *gambogiate of potash*. Digested in alcohol or ether, gamboge yields orange-red tinctures (*solutions of gambogic acid*). The ethereal tincture dropped on water yields, on the evaporation of the ether, a thin, bright yellow, opaque film or scum (*gambogic acid*), soluble in caustic potash. The alcoholic tincture dropped into water yields a bright, opaque, yellow, emulsion, which becomes clear, deep red, and transparent, on the addition of caustic potash. The gambogiate of potash (obtained by any of the above processes) gives, if the alkali be not in excess, with acids, a yellow precipitate (*gambogic acid*); with acetate of lead, a yellow precipitate (*gambogiate of lead*); with sulphate of copper, brown (*gambogiate of copper*); and with the salts of iron, dark brown (*gambogiate of iron*).

The detection of gamboge in pills has become, on some occasions, an important object of medico-legal research. (*Trial of Joseph Webb, at York Summer Assizes, 1834, taken by Mr. Frazer, London, 1834.*) Spurious *extractum colocynthidis compositum*, and the *pill cochiae* of the shops, sometimes contain gamboge, (see p. 504). The mode of detection, in all these cases, is simple:—Digest one portion of the suspected substance in alcohol, and another in ether. Then subject the alcoholic and ethereal tinctures to the tests above mentioned.

In external appearance the resin of *Xanthorrhæa hastile* (see p. 121) is the only substance that could, by a remote possibility, be confounded with gamboge. But the above chemical characters readily distinguish gamboge. They would also prevent the yellow colouring matter of saffron (p. 136), and of turmeric (p. 146), and of rhubarb (p. 268), from being confounded with that of gamboge.

PHYSIOLOGICAL EFFECTS. *a. On Animals generally.*—The animals on which the effects of gamboge have been tried, are dogs, horses, oxen, sheep, and rabbits. From his experiments on dogs, Orfila (*Toxicol. Gén.*) inferred that it is a powerful local irritant: and that when applied to any of the animal tissues, its fatal operation depends, not on its absorption, but on its powerful local action, and on the sympathetic irritation of the nervous system. It appears to be an uncertain and dangerous medicine for herbivorous animals, and is, therefore, never employed by veterinarians. Daubenton states, that two drachms killed a sheep. (*Mem. de la Soc. Roy. de Méd. de Paris, t. iv. p. 261.*) Two ounces and a half have been found to produce very little effect on a cow; while twice that quantity caused dysentery, which continued seventeen days. On the horse, from six to twelve drachms have merely rendered the stools somewhat softer and more frequent, although shivering, loss of appetite, irregularity of pulse, great anxiety, and other alarming constitutional symptoms, were brought on. (Moiroud, *Pharm. Vét.* p. 267-8.) On the other hand, Viborg (Wibmer, *Wirk. der Arzneim. u. Gifte, ii. 389.*) has given an ounce to the horse without any remarkable effect.

*β. On Man.*—Taken in *small doses*, gamboge promotes the secretions of the alimentary canal and of the kidneys, and causes more frequent and liquid stools than natural. In *larger doses* it occasions nausea, oftentimes vomiting, griping pains of the bowels, watery stools, and increased discharge of urine. When the



action is very violent, there is great depression of the vascular system. In *excessive doses* it acts as an acrid poison. A drachm caused horrible vomiting and purging, followed by syncope and death. (Paullini, *Eph. Nat. Cur.* Dec. i. Ann. viii. p. 139.) The deaths which have occurred from the use of enormous quantities of Morison's pills (see *Lond. Med. Gaz.* vol. xiv. 612 and 759; xvii. 357, 415, and 623; xviii. 75 and 297; and xix. 976) are mainly ascribable to the gamboge contained in these medicines. In these cases the symptoms were, violent vomiting and purging, abdominal pain and tenderness, cold extremities, and sinking pulse. On *post-mortem* examination, inflammation, ulceration, and mortification of the intestines, were found.

Gamboge belongs to the active hydragogues and drastic purgatives. Its activity is inferior to elaterium and croton oil. In acidity it exceeds jalap, scammony, and even colocynth. In its mode of operation it is allied to, though scarcely so acrid as, euphorbium. It is exceedingly apt to irritate the stomach, and to occasion nausea and vomiting. This arises from its ready solubility in the gastric juices. As this action on the stomach is exceedingly objectionable, we sometimes endeavour to lessen it by conjoining aloe, or some other substance which diminishes the solubility of gamboge in aqueous fluids, and by giving the medicine in the form of pill. Sundelin (*Heilmittell.* ii. 28, 3<sup>te</sup> Aufl.) ascribes to gamboge an especial power of exciting the vascular system (arteries and veins) of the pelvic organs, in virtue of which, he says, it readily gives rise to the hemorrhoidal flux and uterine hemorrhage. Furthermore, he regards it as powerfully irritating and exciting to the abdominal nerves, especially the sacral and pelvic divisions.

USES.—From the foregoing account of the effects of gamboge, it is very evident that it is a remedy well adapted for acting as a stimulus to the abdominal and pelvic viscera, either to rouse them when in a torpid state, or to give them preternatural activity, and thereby to relieve some distant organ, on the principle of counter-irritation. On the other hand, the use of gamboge is highly objectionable when there is an irritable or inflammatory condition of the stomach or bowels, a tendency to abortion, or to uterine hemorrhage, and also when we do not want to promote or increase the hemorrhoidal discharge. The following are some of the cases in which we employ it:

1. *In constipation*, where an active cathartic of small bulk is required, gamboge is employed. It is, however, not given alone, as the necessary dose would be very apt to create nausea and vomiting. It is, therefore, usually conjoined with other and milder purgatives, the operation of which it increases and quickens, while they, by diminishing its solubility in the juices of the stomach, lessen its tendency to create nausea or vomiting. The *pilula cathartice compositae*, Ph. U. S. (see vol. i. p. 617), and the *pilula cambogice compositae*, L. D. may be referred to as preparations in which these objects have been kept in view.

2. *In cerebral affections*, as apoplexy, or a tendency thereto, gamboge, usually associated with other purgatives as above stated, is a highly valuable counter-irritant purgative. By stimulating and rousing the nerves, blood-vessels, and secretory apparatus of the abdomen, it is often calculated to relieve determinations of blood to other parts.

3. *In dropsies* gamboge has been employed, on account of its hydragogue operation, where the use of drastic purgatives is indicated. To its efficacy numerous practitioners have borne testimony. It is, however, rarely given alone, but usually in combination with other and milder remedies (as jalap and bitartrate of potash) of the same class. If it be desirable to act also on the kidneys, an alkaline solution of gamboge has been recommended. Gamboge has been thought more especially serviceable in those forms of dropsy connected with hepatic obstruction.

4. *As an anthelmintic*.—Gamboge has been frequently employed as a remedy



for tape-worm, and not unfrequently with considerable success. Several empirical anthelmintic remedies (see Murray, *App. Med.* iv. 121, et seq.) are said to owe their efficacy to this substance. It is an important constituent of Madame Nouffier's *specific* (see p. 49).

**ADMINISTRATION.**—On account of its tendency to occasion vomiting and griping, gamboge is usually given in small *doses*, as from one to three or four grains, in the form of pill, and repeated every four or six hours. In this way it may be given with safety and without inconvenience. The full dose of it is said to be from ten to fifteen grains. An alkaline solution of gamboge has been long known on the continent under the name of *tincture of gamboge* (*tinctura gummi guttae*), (in Voigtel's *Arzneim.* Bd. ii. Abt. ii. S. 203), and has been employed as a powerful diuretic in dropsy. It consists of gamboge, in powder, ℥ss.; carbonate of potash, ℥j. (intimately mixed with the gamboge); and brandy, ℥xij. Digest with a gentle heat for four days.—Dose, ℥ss. to ℥ʒj.

**ANTIDOTE.**—In poisoning by gamboge our chief reliance must be placed on the palliatives already mentioned for poisoning by euphorhium (p. 229) and elaterium (p. 512). I am acquainted with no well-ascertained antidote, though the alkalis (carbonate of potash, according to Hahnemann, *Hufeland's Journ.* Bd. v. S. 12), have been said to diminish the violence of the topical action of gamboge.

**PILULÆ CAMBOGIÆ COMPOSITÆ, L. D; Pilulæ Cambogiæ, E.; Gamboge Pills.**—(Gamboge, bruised, ℥j. [*one part, E.*]; Aloes, bruised, ℥ss. [East Indian or Barbadoes Aloes, *one part, E.*—Hepatic Aloes, ℥ss. *D.*]; Ginger, bruised, ℥ss. [Aromatic powder, *one part, E.*]; Castile Soap, ℥ij. [*two parts, E.*] Mix the powders together, then add the soap [and then a sufficiency of syrup, *E.*; treacle, *D.*] and beat them into one mass).—Cathartic, considerably more active than the *pilulæ alœs compositæ* (p. 113). Employed in obstinate constipation.—Dose, grs. x. to grs. xv.—The aloes, by diminishing the solubility of the gamboge, renders the latter less likely to irritate the stomach. The formula is said to be a simplification of one proposed by Dr. George Fordyce.

## 2. CANELLA ALBA, Murray, L. E. D.—LAUREL-LEAVED CANELLA OR WILD CINNAMON.

*Sex. Syst.* Dodecandria, Monogynia.

(Cortex, L. D.—Bark, E.)

(Canella, U. S.)

**HISTORY.**—The bark of this tree has been frequently confounded with that of *Drimys Winteri*, hereafter to be described. Clusius (*Exot. lib. iv. cap. i. p. 75*, and *cap. iii. p. 78*.) describes both barks, and notices two kinds of canella bark.

**BOTANY.**—**Gen. Char.**—*Sepals* five. *Petals* five. Somewhat coriaceous, glaucous-blue, contorted in æstivation. *Stamens* united to form a tube; *anthers* fifteen, resembling furrows. *Stigmas* three. *Berry* three-celled, or by abortion one-celled; cells one or two-seeded. *Embryo* (according to Gærtner, but perhaps an error) surrounded by fleshy albumen, curved, with linear cotyledons (*De Cand.*)

**Sp. Char.**—The only species.

A tree growing from ten to fifty feet high. *Leaves* alternate, shining, obovate, cuneate at the base, coriaceous and opaque when old, dotted when young. *Flowers* small, clustered, purple. *Berry* the size of a pea, fleshy, smooth, blue or black. (Swartz, *Trans. Linn. Soc. i. 96*).

**Hab.**—West Indies and continent of America.

**DESCRIPTION.**—The canella bark of the shops (*cortex canella albæ*), sometimes termed on the continent *costus dulcis*, *costus corticosus*, is the inner bark



of the stem and branches. It occurs in quills or broken pieces, which are hard, somewhat twisted, of a yellowish-white or pale orange-colour, somewhat lighter on the internal surface, and have an aromatic clove-like odour, an acrid peppery taste, and a white granular fracture.

J. Bauhin and others have confounded it with *Winter's bark*; hence it has been denominated *spurious Winter's bark* (*cortex Winteranus spurius*.) The pale colour of its inner surface is one out of several physical characters by which the two barks may be distinguished. Chemically they may be distinguished by nitrate of baryta and sulphate of iron, both of which cause precipitates in the infusion of Winter's bark, but not in that of canella. (*Journ. de Pharm.* t. v. p. 481.)

COMPOSITION.—Canella bark was analysed, in 1820, by Henry (*Ibid.*); and, in 1823, by Petroz and Robinet, (*op. cit.* vol. viii. p. 197).

Henry's Analysis.	Petroz and Robinet's Analysis.
Volatile oil. Aromatic resin. Brownish yellow colouring matter. Extractive. Gum. Starch. Albumen. Lignin. Salts.	Volatile Oil. Resin. Bitter extractive. Canellin. Gum. Starch. Albumen. Lignin. Salts.
Canella bark.	Canella bark.

1. VOLATILE OIL OF CANELLA BARK.—According to Cartheuser it is dark yellow, fluid, and heavier than water. It has an acrid taste.

2. RESIN.—Henry found this constituent to be aromatic, but not acrid.

3. BITTER EXTRACTIVE.—Brown, very bitter, not crystallizable. Soluble in alcohol, ether, and slightly in water.

4. CANELLIN (*Mannite?*)—A crystallizable, saccharine substance, incapable of undergoing the vinous fermentation.

PHYSIOLOGICAL EFFECTS.—Canella bark is an aromatic stimulant and tonic. Its aromatic qualities depend on the oil and resin; its tonic properties on its bitter principle. As an aromatic it ranks between cinnamon and cloves.

USES.—In this country it is employed principally as an aromatic addition to purgatives and tonics (see *pulvis aloës cum canellâ*, D., and *vinum aloës*, p. 114; and *tinctura gentiane composita*, E. p. 341, and *vinum gentiane*, E.); and is well adapted for debilitated conditions of the digestive organs.

By the Caribs (the ancient natives of the Antilles) and the negroes of the West Indies, it is employed as a condiment. It has been considered useful in scurvy.

ADMINISTRATION.—Dose of the powder, grs. x. to ʒss.

#### ORDER LXX.—AURANTIACEÆ, *Corrêa*.—THE ORANGE TRIBE.

ESSENTIAL CHARACTER.—*Calyx* urceolate or campanulate, somewhat adhering to the disk, short, three or five-toothed, withering. *Petals* three to five, broad at the base, sometimes distinct, sometimes slightly combined, inserted upon the outside of a hypogynous disk, slightly imbricated at the edges. *Stamens* equal in number to the petals, or twice as many, or some multiple of their number, inserted upon a hypogynous disk; *filaments* flattened at the base, sometimes distinct, sometimes combined in one or several parcels; *anthers* terminal, innate. *Ovary* many-celled; *style* one, taper; *stigma* slightly divided, thickish. *Fruit* pulpy, many-celled, with a leathery rind replete with receptacles of volatile oil, and sometimes separable from the cells; *cells* often filled with pulp. *Seeds* attached to the axis, sometimes numerous, sometimes solitary, usually pendulous, occasionally containing more embryos than one; *raphe* and *chalaza* usually very distinctly marked; *embryo* straight; *cotyledons* thick, fleshy; *plumule* conspicuous.—*Trees* or *shrubs*, almost always smooth, and filled everywhere with little transparent receptacles of volatile oil. *Leaves* alternate, often compound, always articulated with the petiole, which is frequently winged. *Spines*, if present, axillary (*Lindley*).

PROPERTIES.—In the bark, leaves, flowers, and rind of the fruit, are numerous vesicular or rounded reservoirs, which contain a highly fragrant volatile oil. Pulp of the fruit acidulous and refrigerant.