

potatoes yield in August about 10 lbs., in September 14½ lbs., in October 14½ lbs., in November 17 lbs., in March 17 lbs., in April 13½ lbs., in May 10 lbs. (De Candolle, *Phys. Vég.* p. 181.) Sugar is sometimes manufactured from potatoes. By fermentation potatoes yield a vinous liquid (*potatoe wine*) of good quality. (Loudon's *Encycl. of Agriculture*, p. 853.) By distillation this yields *potatoe spirit*, (Donovan, in Lardner's *Cyclopedia*), from which a volatile oil (*oil of potatoes*) has been extracted (see vol. i. p. 312). An *extract*, obtained from the stalks and leaves of potatoes, was declared by Dr. J. Latham (*Med. Trans.* vol. i. p. 92.) to possess narcotic properties, in doses of two or three grains; but the cases adduced are not satisfactory. Furthermore, his experiments were repeated by Dr. Worsham (*United States Dispensatory*), with very different results; for 100 grains produced no sensible effects. The observations of Nauche, however, tend to confirm Latham's statements. The tubers (potatoes), when boiled, are a valuable article of food, both for men and animals. Those of good quality are not only perfectly innocuous, but highly nutritious, and easy of digestion. In the raw state they have been found less nutritive for animals, while on man they are said to prove laxative and diuretic, and to excite, slightly, the nervous system. (Nauche, *Journ. de Chim. Méd.* t. vii. p. 373.) The process of cooking is probably useful in two ways; by rendering the starch digestible, and, secondly, by extracting some noxious matter. Nauche (*Journ. de Chim. Méd.* t. vii. p. 373), found the decoction of potatoes endowed with medicinal properties; and Otto, as already mentioned, detected solanina in them. Potatoes have been praised as useful antiscorbutics. (Julia-Fontenelle, *Ibid.* t. ii. p. 129.)

6. *CAP'SICUM FRUTESCENS*, Linn. yields the capsules sold by Druggists as *Guinea pepper* or *bird pepper* (*bacca capsici*), as I have satisfied myself by comparing the commercial article with the East Indian *Solanaceæ* belonging to the Linnean Society. These capsules do not exceed an inch in length, and are about two or three lines broad: their colour is orange red; their odour aromatic and pungent. Their properties are similar to those of chillies (see p. 324), than which they are much hotter and more fiery. Their powder is *Cayenne Pepper*, so extensively employed as a condiment. *Cayenne Lozenges* and *Essence of Cayenne* (an alcoholic tincture) are kept in the shops.

#### ORDER XXXIX.—BORAGINACEÆ, Lindley.—THE BORAGE TRIBE.

BORAGINÆ, Jussieu.

The plants of this order are harmless, and, for the most part, inert. Their prevailing constituent is mucilage. Nitre is also found in some species. The colouring principle (*anichusic acid* C<sup>17</sup> H<sup>10</sup> O<sup>6</sup>) of *Anchusa tinctoria*, or *Alkanet*, dissolves in fatty substances, and hence is employed to colour unguents and oil (as *lip salve* and *hair oil*). It becomes blue on the addition of an alkali.

#### ORDER XL.—CONVOLVULACEÆ, R. Brown.—THE BINDWEED TRIBE.

CONVOLVULI, Jussieu.

**ESSENTIAL CHARACTER.**—*Calyx* five-sepaled. *Sepals* persistent, equal, or unequal, in one- three rows; often becoming enlarged. *Corolla* monopetalous, hypogynous, regular; the *limb* five-plicate, or five-lobed; contorted in æstivation. *Stamens* five, inserted into the corolla. *Anthers* often contorted after the injection of the pollen. *Nectary* annular, often conspicuous. *Ovary* single, two to four-celled; or two to four ovaries. *Cells* one to two-seeded. *Style* one, entire or bifid. *Stigma* bilobed. *Fruit* dehiscing by the valves; rarely transversely. *Seeds* inserted into the base of the ovaries; *testa* black. *Cotyledons* foliaceous, corrugated. *Radicle* incurved, inferior.—Generally twining plants, with alternate, simple, entire, or lobed *leaves*. *Pedicels* bibracteate. *Stem* often filled with a milky purgative juice.

**PROPERTIES.**—The roots contain a milky purgative juice, which owes its essential properties to resin.

#### 1. CONVULVULUS SCAMMONIA, Linn. L. E. D.—THE SCAMMONY.

*Sex. Syst.* Pentandria, Monogynia.

(Gummi-resina, L. D.—Gummy-resinous exudation from incisions into the root, E.)

(Scammonium, U. S.)

**HISTORY.**—A purgative substance called *σχαμμώνια*, was known to the Greeks long before the time of Hippocrates. (Voigtels, *Arzneimittell.* Bd. i. S. 17; Bischoff, *Handb. d. Arzneimittell.* Bd. i. S. 40.) The father of medicine, who frequently employed it, says that it evacuates, both upwards and downwards, bile and mucus, and expels flatus. (*De Morb. Mul.* p. 597, ed. Fœs.) There is, however, some reason to believe that the ancients did not procure their scam-



mony from the same plant which yields ours. Dierbach (*Arzneimittel. d. Hippokrates*, S. 138,) thinks they procured it from *Convolvulus sagittifolius*, Sibthorp. But Dr. Sibthorp (*Fl. Græca*, t. 192,) refers the scammony of Dioscorides to the *Convolvulus farinosus*.

It deserves notice, that the term *scammonia* is applied by pharmacologists to purgative resinous substances obtained from *Convolvulaceæ* and *Asclepiadaceæ*. At present I confine myself to the scammony procured from *Convolvulaceæ*. The other kind will be described hereafter (see *Asclepiadaceæ*).

**BOTANY. Gen. Char.**—*Sepals* five. *Corolla* campanulate. *Style* one. *Stigmas* two, linear-cylindrical, often revolute. *Ovary* two-celled, four ovuled. *Capsule* two-celled, two-seeded. (*Bot. Gall.*)

**Sp. Char.**—*Leaves* sagittate, truncate behind. *Peduncles* rounded, about three-flowered.

*Root* perennial, tapering, three or four feet long, with an acrid, milky juice. *Stems* numerous, twining, herbaceous, smooth. *Leaves* on long petioles, acuminate, with pointed lobes at the base. *Peduncles* solitary, scarcely twice so long as the leaves. *Bracts* awl-shaped. *Sepals* obovate, truncated, with a reflexed point, coloured at the edge. *Corolla* pale yellow, with purple stripes. *Stamina* shorter than the corolla; *anthers* erect, sagittate. *Style* as long as the stamens: *stigmas* white.

**Hab.**—Hedges and bushy places in Greece and the Levant.

**PREPARATION.**—The method of procuring scammony is, according to Dr. Russel, (*Med. Obs. and Inq.* p. 13, 1776,) as follows:—Having cleared away the earth from the upper part of the root, the peasants cut off the top in an oblique direction, about two inches below where the stalks spring from it. Under the most depending part of the slope they affix a shell, or some other convenient receptacle, into which the milky juice flows. It is then left about twelve hours, which time is sufficient for the drawing off the whole juice; this, however, is in small quantity, each root affording but a few drachms. This milky juice from the several roots is put together often into the leg of an old boot, for want of some more proper vessel, when in a little time it grows hard, and is the genuine scammony. It is, however, very probable that the process now mentioned is not the only one employed, but that others, similar to those described by Dioscorides and Mesue, are also resorted to. Moreover, various substances are added to scammony while yet soft. Dr. Russel says, wheat-flour, ashes, or fine sand, are used for this purpose; and, I may add, chalk.

**DESCRIPTION.**—Scammony is usually imported from Smyrna. Occasionally it comes by way of Trieste. Still more rarely it is brought from Alexandria. It comes over in boxes and drums, which are frequently lined with tin. The finest kind is called *virgin* or *lachryma scammony*. Other varieties are denominated *seconds*, *thirds*, &c. Formerly the term *Aleppo scammony* was applied to the finer, and that of *Smyrna scammony* to the inferior kinds. No such distinction now exists in English commerce. The *scammony in shells*, and the *Antioch scammony*, described by Martius, (*Pharmacogn.*) are unknown by those names to our principal dealers; nor is any distinct kind known as *Smyrna scammony*. I am informed by a Turkey merchant, who formerly resided at Smyrna, that scammony is brought into Smyrna, in the soft state, on camels. Here it is mixed with various impurities by persons (Jews), who are denominated scammony makers, and who adulterate it, and thereby lower its value to suit the market. Formerly the demand in London was principally for second and third qualities; but now virgin scammony is more in request, and is met with in much greater abundance.

The characters of good scammony are as follows:—It readily fractures between the fingers, or by the pressure of the nail; its sp. gr. is about 1.2; its fracture is dark, glistening and resinous; its fractured surface should not effervesce on the addition of hydrochloric acid; the decoction of the powder, filtered



and cooled, is not rendered blue by tincture of iodine; 100 grains incinerated with nitrate of ammonia, yield about three grains of ashes (according to my experiments); sulphuric ether separates at least 78 per cent. of resin (principally dried at 280° F.

"Fracture glistening, almost resinous, if the specimen be old and dry; muriatic acid does not cause effervescence on its surface; the decoction of its powder, filtered and cooled, is not rendered blue by tincture of iodine. Sulphuric ether separates at least eighty per cent. of resin dried at 280°." *Ph. Ed.*

1. *Virgin Scammony* (*Lachryma Scammony*; *superior Aleppo scammony*, Guib.)—It usually occurs in amorphous pieces; but a careful examination of some large lumps has led me to believe that they formed portions of a mass, which, when in the soft state, had a rounded form. The whitish-gray powder, which covers some of the pieces, effervesces with hydrochloric acid; and I have no doubt, therefore, that the masses have been rolled in chalk. Virgin scammony is friable, easily reduced to small fragments between the fingers, or by the pressure of the nail, and has, according to my experiments, a sp. gr. of 1.210. Its fractured surface is resinous, shining, greenish-black; presents small air cavities, and numerous gray semi-transparent splinters, or fragments, when examined by a magnifying glass, and does not effervesce on the addition of hydrochloric acid. When rubbed with the finger moistened with ether, water, or saliva, it readily forms a milky liquid. If we examine thin fragments, or splinters, by transmitted light, we observe them to be semi-transparent at the edges, and of a gray-brown colour. In the same piece we sometimes find some portions shining and blackish, as above described, while others are dull-grayish. This difference depends, probably, as Dr. Russel has suggested, on different methods of drying. Virgin scammony readily takes fire, and burns with a yellowish flame. Its odour is peculiar, somewhat analogous to old cheese; its taste is slight at first, afterwards acrid. The decoction of its powder, when filtered and cold, is not rendered blue by tincture of iodine. When incinerated in a crucible, it leaves a minute portion only of ash.

2. *Scammony of second quality.* (*Seconds, Commerce.*)—A few years since this kind was considered to be of the first quality. It includes two sub-varieties:

a. *Second Scammony in amorphous pieces.*—In its external appearance, brittleness, odour, and taste, it resembles virgin scammony, from which it is distinguished by its greater sp. gr. (according to my experiments being 1.463), its fracture being dull, or very slightly shining; and by its colour, which is grayish. Hydrochloric acid causes effervescence when applied to a fractured surface. The decoction, when filtered and cold, is not rendered blue by iodine. This kind has been adulterated with chalk, but not with flour.

β. *Second Scammony, in large regular masses.*—This kind is imported either in boxes or drums, into which it seems to have been introduced when soft, and to have hardened subsequently: hence its form is that of the package in which it was imported. A sample of a circular cake (about twelve inches diameter, and several inches thick) presents a dull-grayish fracture. Its sp. gr., according to my experiments, is 1.359. Hydrochloric acid, applied to the surface, causes effervescence. The decoction, filtered and cooled, is rendered blue by iodine. This sub-variety, then, has been adulterated with both flour and chalk.

I have sometimes met with this kind of scammony having a soft or cheesy consistence.

3. *Scammony of third quality.* (*Thirds, Commerce.*)—Under this name I have received scammony in the form of circular flat cakes, about five inches in diameter, and one inch thick. They are heavy, dense, and much more difficult to fracture than the preceding kinds. The fractured surface, in some samples, is resinous and shining, in others dull; it has air cavities, and numerous small white specks (chalk); its colour is grayish to grayish-black. The sp. gr. varies, in different samples, from 1.276 to 1.543. Hydrochloric acid, applied to



a recently fractured surface, causes effervescence. The decoction, filtered and cooled, is rendered blue by tincture of iodine. Hence both flour and chalk have been used for adulteration. I have received portions of five cakes of this variety of scammony, on which were marked the actual quantity of chalk which had been intermixed in each sample. In 100 parts of the cakes the proportions of chalk were respectively as follows:—13.07, 23.1, 25.0, 31.05, and 37.54. These numbers were furnished by the importer to one of our most respectable wholesale druggists, from whom I received them.

The foregoing are the usual kinds of scammony found in commerce. I possess four other varieties:

*a. Factitious Scammony.* (*Scammonium Smyrnense factitium*, Gray).—I bought this as *Smyrna Scammony*, under which name I formerly described it. (*Lond. Med. Gaz.* vol. xx. p. 931.) It is in circular flat cakes, about half an inch thick. It is blackish, and has, externally, a slaty appearance; it breaks with difficulty; its fracture is dull and black. Its sp. gr. is 1.412. Moistened and rubbed it evolves the smell of guaiacum. Boiled with water it yields a turbid liquor (which is not rendered blue by iodine), and deposits a blackish powder; the latter, boiled with alcohol, yields a solution which becomes greenish-blue on the addition of nitric acid, showing the presence of guaiacum.

*β. Indian Scammony.*—From my friend, Dr. Royle, I have received a sample of scammony met with in the Indian bazaars. It is light, porous, of a greenish-gray colour; gritty under the teeth, as if containing a considerable quantity of sand, and having a balsamic olibanum-like odour.

*γ. Trebizon Scammony (?)*.—In 1832 a substance was imported from Trebizon, under the name of scammony, which was unsaleable here. The sample I received of it is a portion of cake apparently round, flat below, and convex above. Its colour is light-grayish or reddish-brown: when moistened the surface becomes glutinous and odorous; its taste is sweet, nauseous, and somewhat bitter. In its external appearance it has more resemblance to benzoin than scammony.

*δ. French or Montpellier Scammony.*—This is the produce of *Cynanchum monspeliacum*. (See ASCLEPIADACEÆ.)

COMMERCE.—In 1839 the quantity of scammony on which duty (2s. 6d. per lb.) was paid, amounted to 8,551 lbs.

COMPOSITION. *α. Of the Root.*—The dried root of *Convolvulus Scammonia* was analyzed, in 1837, by Marquart, (*Pharm. Central-Blatt für 1837*, S. 687), who obtained from it the following substances:—*Resin* 4.12, *sugar*, *convolvulin*, and *extractive* 13.68, *resin and wax* 0.55, *gum* 5.8, *extractive* 2.4, *starch* 7.0, *extractive* soluble in hot, but not in cold, water 1.4 [salts and woody fibre 65.05]. The resin, the wax, and a portion of the gum, are contained in the milky juice of the latex vessels (*vasa laticis*); while the sugar, gum, extractive, and salts dissolved in water, constitute the juice of the cells; and in this juice the starch globules float.

1. RESIN.—This is analogous to that of the scammony of commerce.

2. CONVULVULIN.—A substance supposed by Marquart to be a vegetable alkali. It reacts feebly as a vegetable alkali, and is precipitated from its watery solution by tincture of nutgalls. Marquart thinks it probably exists in jalap.

*β. Of Scammony.*—Bouillon Lagrange, and Vogel, (*Ann. Chim.* lxxii. p. 69,) analyzed two kinds; one called Aleppo, the other Smyrna scammony. Marquart (*op. supra. cit.*) analyzed twelve kinds; of these, eight he considers to be the produce of *Convolvulus Scammonia*, while the remaining four, which, he says, are in commerce called *Smyrna scammony*, he regards, though without any sufficient proof, as the produce of *Periploca Secamone*, Linn.



Marquart's Analyses.

	In shells, Sp. gr. 1.2.	Irregular pieces, Sp. gr. 1.230.		Round cakes, Sp. gr. 1.503.
Resin.....	81.25	78.5	Alpha resin with traces of wax .....	5
Wax.....	0.75	1.5	Beta resin .....	11
Extractive.....	4.50	3.5	Extractive taken up by alcohol .....	18
Extractive with salts.....	—	2.0	————— water .....	20
Gum with salts .....	3.00	2.0	Gum, with sulphate of lime .....	20
Starch.....	—	1.5	Mucilage .....	5
Starchy envelopes, bassorin, and gluten .....	1.75	1.25	Starch .....	2.5
Albumen and woody fibre.....	1.50	3.5	Colouring matter .....	2
Ferruginous alumina, chalk, and carbonate of magnesia.....	3.75	2.75	Woody fibre, oxides, extractive, &c. ....	11
Sulphate of lime.....	—	—	Inorganic salts, silica, &c. ....	4
Sand .....	3.50	3.5		
Aleppo Scammony.....	100.00	100.0	Smyrna Scammony .....	100

RESIN OF SCAMMONY (see p. 332).

**PHYSIOLOGICAL EFFECTS.** *a. On Animals generally.*—The experiments of Orfila (*Toxicol. Gén.*) lead us to infer that scammony is not poisonous. "We have," says he, "frequently administered four drachms of it to dogs who had the œsophagus afterwards tied, and have only observed alvine evacuations." On horses and other herbivorous animals its operation is very uncertain. Gilbert (Moiroud, *Pharm. Vét.* p. 271.) states, that six drachms killed a sheep in twenty days, without having caused purging. Viborg (Wibmer, *Wirk. d. Arzn. u. Gifte*, Bd. ii. S. 181.) says, half an ounce given to a dog caused several loose stools: the same dose had no effect on a badger. It is probable, however, that in all the experiments now referred to, adulterated scammony was employed.

*β. On Man.* The effects of pure scammony are those of a powerful and drastic purgative. As the greater part of the commercial drug is largely adulterated, practitioners are, I suspect, scarcely acquainted with the operation of the genuine article, which appears to me to possess nearly double the activity of that usually found in commerce. As the evacuant powers of scammony depend on its local irritation, it operates more energetically when there is a deficiency of intestinal mucus, and is then very apt to gripe; and *vice versa*, when the intestines are well lined with secretion, it passes through with much less effect. In its operation scammony is closely allied to jalap, than which it is more active, while its odour and taste are less nauseous. It is less irritant than gamboge.

**USES.**—Scammony is, of course, inadmissible in inflammatory conditions of the alimentary canal, on account of its irritant qualities. It is well adapted for torpid and inactive conditions of the abdominal organs, accompanied with much slimy mucus in the intestines. It is principally valuable as a smart purgative for children, on account of the smallness of the dose necessary to produce the effect, the slight taste, and the energy, yet safety, of its operation. When used for them, it is generally associated with calomel. Where a milder purgative is required, it may be conjoined with rhubarb, sulphate of potash, and an aromatic. It may be employed to open the bowels in constipation; to expel worms, especially of children; to act as a hydragogue purgative, on the principle of counter-irritation, as in affections of the head and dropsies; and for any other purpose for which an active cathartic may be required.

**ADMINISTRATION.**—For an adult the usual dose of commercial scammony is ten grs. to a scruple; but of virgin scammony from ten to fifteen grs. In order



to diminish its irritant and griping qualities, it should be finely divided. For this purpose it may be intimately mixed with some bland powder (as gum, starch, sugar, &c.), or made into an emulsion with milk.

1. **PULVIS SCAMMONII COMPOSITUS**, L. D.; *Compound Powder of Scammony*.—(The *London and Dublin Colleges* direct it to be prepared with Scammony; Hard Extract of Jalap, of each ℥ij.; Ginger ℥ss. Rub them separately to very fine powder; then mix them.—The *Edinburgh College* directs it to be made of equal parts of Scammony and Bitartrate of Potash, triturated together to a very fine powder).—The effects of scammony and of extract of jalap being very similar, little or no advantage can be obtained by the intermixture of these substances. The ginger is intended to correct the griping of the other ingredients. The bitartrate of potash, used by the *Edinburgh College*, can do little more than serve to divide the scammony. Compound powder of scammony is cathartic, and is used as a smart purge for children, especially where much mucous slime is contained in the bowels, and in worm cases.—The dose of the *London and Dublin* preparation for an adult is from grs. x. to ℥j.; for children under a twelvemonth old, from grs. iii. to grs. v. The dose of the *Edinburgh* preparation for an adult is from grs. xv. to ℥ss.

2. **PULVIS SCAMMONII CUM CALOMELANE**; *Powder of Scammony with Calomel*.—(Scammony, ℥j.; Calomel; Sugar, of each ℥ss. Mix.)—Though this preparation is not contained in any of the British pharmacopœias, yet the frequency of its employment in the diseases of children is a sufficient apology for its introduction here.—Dose, for an adult, grs. x. to grs. xx.; for children, from grs. iv. to grs. x. according to the age of the patient.

This preparation may be employed as a substitute for the old *Pulvis Basilicus* or *Royal Powder*, which consisted of equal parts of scammony, calomel, cream of tartar, and antimoniac acid.

3. **CONFECTIO SCAMMONII**, L.; *Electuarium Scammonii*, D.; *Confection of Scammony*.—Scammony, powdered, ℥jss.; Cloves, bruised; Ginger, powdered, each ℥vj.; Oil of Caraway, f℥ss.; Syrup of Roses, as much as may be sufficient. Rub the dry ingredients together to very fine powder, and preserve them; then, whenever the Confection is to be used, the syrup being gradually poured in, rub again; lastly, the oil of Caraway being added, mix them all, L.—The *Dublin College* orders the syrup to be dropped on the powders, the oil of Caraway then added, and all mixed together).—A warm or aromatic cathartic.—Dose, for an adult, ℥j. to ℥j.; for children, grs. iii. to grs. x. It is seldom employed.

4. **EXTRACTUM sive RESINA SCAMMONII**, E.: *Extract or Resin of Scammony*.—(Take any convenient quantity of Scammony in fine powder; boil it in successive portions of proof spirit till the spirit ceases to dissolve any thing; filter; distil the liquid till little but water passes over. Then pour away the watery solution from the resin at the bottom; agitate the resin with the successive portions of boiling water till it is well washed; and, lastly, dry it at a temperature not exceeding 240°.)—It is brownish, and in thin layers transparent: when heated it evolves a peculiar, not disagreeable, odour; it is fusible and combustible. It is soluble in alcohol, ether, and oil of turpentine. Its alcoholic solution is feebly acid; the addition of water causes a white precipitate (*hydrate of resin*). Precipitates (*metallic scammoniates*?) are also produced by alcoholic solutions of the acetate of lead and the acetate of copper. Caustic potash deepens the colour of the solution. (Marquart, *op. cit.*) Scammony resin may be decolorized by animal charcoal, without having its purgative qualities affected. (*Journ. de Pharm.* t. xiii. p. 589.) Its composition, according to Mr. Johnston, (*Phil. Trans.* for 1840, p. 341,) is C<sup>40</sup> H<sup>32</sup> O<sup>20</sup>. It is "remarkable for containing the largest quantity of oxygen of any resin hitherto analyzed" (Johnston). When pure or virgin scammony can be obtained, the resin is an unnecessary preparation. Scammony resin is a drastic cathartic.—Dose, grs.



vij. to grs. xij. When administered it should be intimately divided, either by some bland powder, or still better by an emulsion.

5. MISTURA SCAMMONII, E.; *Mixture of Scammony*.—(Resin of Scammony, gr. vij.; Unskimmed milk, fʒij. Triturate the resin with a little of the milk, and gradually with the rest of it till a uniform emulsion is formed).—This is an imitation of *Planche's purgative potion*, except that two drachms of sugar and three or four drops of cherry-laurel water are omitted. It is one of the most agreeable purgative draughts that can be taken.

2. IPOMÆA PUR'GA, Wenderoth, E.—THE JALAP IPOMÆA.

*Ipomœa Jalapa*, Nuttall, L.—I. Schiedeana, Zuccarini.

Sex. Syst. Pentandria, Monogynia.

(Radix, L. D.—Root, E.)

(Jalapa, U. S.)

HISTORY.—De Paiva (Voigtels' *Arzneimittell.* Bd. i. S. 117,) thinks that Jalap was known to Dodoens in 1552, to Monardes in 1568, and to Clusius in 1574. (See some remarks on this subject in *Pharm. Central-Blatt für 1834*, S. 955-6.) But Bauhin (*Prodromus*, p. 135,) (who calls it *Bryonia Mechoacana nigricans*) says it was brought from India, under the name of *Chelapa* or *Cepala*, about eleven years before the time he wrote (the date of the preface to his work is 1620): that is, about 1609 or 1610. Its name seems to be derived from Xalapa, a town of Mexico.

The *Convolvulus Jalapa* described and figured by Woodville (*Med. Bot.* p. 59,) and Desfontaines, (*Ann. Mus. d'Hist. Nat.* t. ii.) and adopted by the *Dublin College* as the source of the commercial jalap, is now well known to yield none of this drug. The real jalap plant was first described by Mr. Nuttall; (*American Journ. of Med. Sciences for Feb.* 1803,) but the name (*Ipomœa Jalapa*) he gave to it had been already applied by Pursh to another plant. In the same year Dr. Schiede (*Linnaea*, v. 3. Juli, 1830, p. 473,) and Dr. Wenderoth (*op. cit.* viii. 515,) noticed it; and in 1832 it was described and figured by Zuccarini. (*Acta Acad. Reg. Monacensis*, vol. x.)

BOTANY. Gen. Char.—*Sepals* five. *Corolla* campanulate. *Stamens* included. *Style* one. *Stigma* two-lobed; the lobes capitate. *Ovary* two-celled; cells two-seeded. *Capsule* two-celled (Lindley).

Sp. Char.—*Root* tuberose; incrassated, perennial. *Stems* annual, twining, branched, smooth. *Leaves* ovate, acuminate, cordate at the base, quite entire, and smooth on both sides. *Peduncles* one to three-flowered. *Sepals* unequal, obtuse, smooth. *Corolla* salver-shaped, with a subclavate, cylindrical tube, and a subpentagonal, horizontally-expanded limb. *Stamina* exerted (Zuccarini).

*Root* perennial, tuberose, irregularly ovate-conical, terminating inferiorly in some subcylindrical fibrous branches; covered by a very thin, dirty, blackish, epidermis; internally white and fleshy. *Stem* herbaceous. *Leaves* alternate, petioled. Tube of the *corolla* purplish violet (red lake).

Hab.—In the woods of the Mexican empire, near Chicanquiaco, at an elevation of near 6,000 feet above the level of the sea. Jalapa is the only market for the root, from whence it is exported to Europe by way of Vera Cruz.

DESCRIPTION.—The dried tubers (*radix jalapæ*) found in commerce rarely exceed a pound each in weight. They vary in size, from that of the fist to that of a nut. When entire they are usually more or less oval, and pointed at the two opposite extremities. The larger tubers are frequently incised, apparently to facilitate desiccation. They are covered with a thin, brown, wrinkled cuticle. They should be heavy, hard, and difficult to powder. When broken, good tubers should present a deep yellowish-gray colour, interspersed with deep brown concentric circles. The slices vary in their shape, colour, and other properties. Those of inferior quality are light, whitish, and friable; they usually appear to



be quarter segments of transverse slices: they are called *spurious jalap*, or, from their shape, *cocked-hat jalap*. The *light* or *fusiform jalap*, called in Mexico *male jalap*, described by Guibourt, (*Hist. des Drog.* i. 523,) is said to be the produce of *Ipomœa Orizabensis*. (Pelletan, *Journ. de Chim. Méd.* t. x. p. 10.) Jalap is very apt to become worm-eaten; but the insects which attack it devour the amylaceous matter, and leave the resin. Hence *worm-eaten jalap* is well adapted for the preparation of extract.

COMMERCE.—Jalap is imported, in bales, from Vera Cruz direct, or indirectly by way of New York, or other places. In 1839, duty (6d. per lb.) was paid on 37,211 lbs.

COMPOSITION.—Jalap was analyzed, in 1817, by Cadet de Gassicourt, (*Journ. de Pharm.* t. iii. p. 495,) and more recently by Gerber. (Gmelin, *Handb. de Chemie*, Bd. ii. S. 1299.) Other less complete analyses have been made by Henry, (*Bull. de Pharm.* t. ii. p. 87,) by Ledanois, (*Journ. de Chim. Méd.* t. v. p. 508,) and by Nees v. Esenbeck and Marquart. (*Pharm. Central-Blatt für 1834*, S. 695.) In 1835 Cannobio analyzed a variety of jalap called *giatlappone*. (*Ibid. für 1835*, S. 304.)

Gerber's Analysis.		Henry's Analysis.			
Hard resin.....	7.8				
Soft resin.....	3.2				
Slightly acid extractive.....	17.9				
Gummy extractive.....	14.4				
Colouring matter.....	8.2				
Uncrystallizable sugar.....	1.9				
Gum, with some salts.....	15.6				
Bassorin.....	3.2				
Vegetable albumen.....	3.9				
Starch.....	6.0				
Water.....	4.8				
Malic acid and malates of potash and lime.....	2.4				
Chlorides of calcium and potassium..	1.4				
Phosphates of magnesia and lime....	1.7				
Carbonate (?) of lime.....	3.0				
Loss.....	4.6				
Jalap.....	100.0				
		Light.	Sound.	Worm-eaten.	
		Resin.....	12	9.6	14.4
		Extractive.....	15	28.0	25.0
		Starch.....	19	29.4	20.6
		Woody fibre.....	54	42.0	40.0
		Jalap.....	100	100.0	100.0
		Nees v. Esenbeck and Marquart's Analysis.			
		Root of <i>Ipomœa Purga.</i>	Commer- cial Jalap.	False Jalap.	
		Extractive.....	29.416	27.50	6.66
		Resin.....	12.083	13.33	18.33
		Matters insoluble in alcohol.....	67.500	59.16	75.00
		Jalap.....	100.000	100.00	100.00

JALAP RESIN.—Obtained by mixing the alcoholic tincture of jalap (prepared by percolation or digestion) with water. The precipitated resin is to be washed with warm water, and then dissolved in alcohol. By evaporation the tincture yields the resin. Planche (Soubeiran, *Traité de Pharm.* t. ii. p. 28,) has proposed another process. By digestion with animal charcoal the alcoholic solution of the resin is rendered nearly colourless, and by evaporation yields an almost colourless resin (*resina jalapæ alba* of Martius). (*Pharm. Cent.-Blatt für 1835*, S. 557.) Jalap resin is soluble in alcohol, but insoluble in water. Triturated with milk, it does not form an emulsion, but its particles unite into a solid mass. By this it may be distinguished from scammony resin. (Planche, *Journ. de Pharm.* t. xviii. p. 181.5.) It is insoluble in the fixed and volatile oils. Its insolubility in oil of turpentine is a means of detecting the intermixture of some other resins, as of rosin. (*Pharm. Central-Blatt für 1832*, 837: and *für 1838*, S. 904.) Decolorized jalap resin is composed, according to Goebel, (*Pharm. Waarenk.* Bd. ii. S. 59,) of Carbon 36.62, Hydrogen 9.47, and Oxygen 53.91; but Johnston (*Phil. Trans.* for 1840, p. 343,) declares this analysis to be incorrect, and gives the following as the formula for the resin,  $C^{40} H^{34} O^{12}$ .

According to Buchner and Herberger, (*Pharm. Cent.-Blatt für 1831*, S. 284,) jalap resin is composed of an electro-positive basic substance, which they term *jalapin*, and of an electro-negative, resinous acid, soluble in alkalis. The latter I shall call *jalapic acid*.

a. *Jalapin*.—Constitutes not quite nine-tenths of jalap resin. When an alcoholic solution of acetate of lead is added to an alcoholic solution of jalap resin, double decomposition occurs: acetate of jalapin remains in solution, while jalapate of lead precipitates. When the solution has been deprived of acetic acid, excess of lead, and alcohol, the jalapin remains. It is a transparent colourless resin; very soluble in alcohol, but insoluble in ether.—Is this the jalapin of Mr. Hume? (*Med and Phys. Journ.* for April, 1824, p. 346.)



*β. Jalapic acid.*—Constitutes thirteen one-hundredths of jalap resin. Obtained from the above-mentioned jalapate of lead by sulphuretted hydrogen. It is brown, acrid, bitterish, slightly soluble in ether, and more soluble in alkalis than jalapin.

**PHYSIOLOGICAL EFFECTS.** *a. On Animals generally.*—Jalap root in powder, as well as the resin obtained from it, is a local irritant. Its operation on the bowels is well seen in the *carnivora*. Cadet de Gassicourt (Wibmer, *Wirk. d. Arzn. u. Gifte*, Bd. iii. S. 181,) found that the resin applied to the pleura, peritoneum, or intestinal canal of dogs, caused fatal inflammation. Two drachms introduced into the stomach, the œsophagus being afterwards tied, killed a dog in a few hours. It is remarkable, however, that the same experimenter observed no particular effect from the application of a drachm of the finely-powdered resin to the cellular tissue of the back. Moreover, 24 grains, with the yolk of an egg, injected into the jugular vein, had, he says, a very slight effect: indeed, at first none was observed, but the two following days the animal had soft, pale evacuations, and lost his appetite, though he soon recovered from this state. In the *herbivora* it proves a very uncertain purgative. Gilbert (Moiroud, *Pharm. Vét.* p. 269,) gave two ounces to a sheep, without observing any effect. Donné (*Ibid.*) administered two or three ounces to horses, without observing any remarkable effect, except increased secretion of urine.

*β. On Man.*—In the human subject jalap acts as a powerful and drastic purgative, producing copious liquid stools, and when judiciously exhibited, is both safe and efficacious. Its objectionable effects are, that while in the stomach it causes frequently nausea, and sometimes vomiting; while, after it has passed into the intestines, it oftentimes gripes.

It is tolerably certain in its operation; more so, indeed, than many other purgatives. In the proper dose it may be given without the least hesitation to children, in any case requiring an active purge. It has an advantage over some other evacuants, that it does not stimulate or heat the system, its effect being confined, principally, to the alimentary canal—the peristaltic motion, secretions, and exhalations of which, it promotes; and it is said that constipation less frequently succeeds its use than of some other purgatives.

My own experience of jalap would lead me to regard it as a perfectly safe, though active cathartic. But Dr. Christison (*On Poisons*, p. 554) says, that “severe and even dangerous effects have followed its incautious use in the hands of the practical joker.” I am not acquainted with any cases, in the human subject, in which its employment has been followed by serious consequences. It is a more drastic purgative than senna. To scammony it is closely allied, not only by its effects, but also by botanical affinities and chemical properties. It is much less irritant to the intestinal mucous membrane than gamboge; and, therefore, is a much safer purgative. Vogt (*Pharmakodyn.* Bd. ii. S. 230, 2<sup>te</sup> Aufl.) regards it as exceeding the last mentioned substance, but as being inferior to aloes, in its stimulant influence over the abdominal and pelvic blood-vessels: and Sundelin (*Handb. d. spec. Heilmittel.* Bd. ii. S. 26, 3<sup>te</sup> Aufl.) observes that, while it is more irritant, it is less heating, than aloes or senna.

**USES.**—Daily experience proves the value of jalap, as an active purgative, in various diseases both of children and adults. Of course its irritant properties unfit it for exhibition in inflammatory affections of the alimentary canal, as well as after surgical operations about the abdomen and pelvis. Moreover, it is not an appropriate purgative in irritation of, or hemorrhage from, the uterus; or in piles and stricture, and prolapsus of the rectum. On the other hand, its use is indicated in torpid and overloaded conditions of the intestinal canal, as well as in constipation, attended with retention of the catamenia. When the object is to relieve cerebral congestion and dropsical affections, by a counter-irritant influence on the mucous membrane, jalap is well adapted to fulfil it, both by the energy and safety of its operation. The following are some of the cases in which it is employed:



1. *In Constipation.*—When this condition is not dependent on, or connected with, irritation or inflammation of the alimentary canal or pelvic organs, jalap is admissible. Its efficiency is much increased by association with calomel. It may be employed in febrile and inflammatory diseases (those above-mentioned excepted), as well as in chronic maladies.

2. *As a Vermifuge.*—The compound of jalap and calomel is a most efficacious anthelmintic, and may be used with the most happy effects in children, especially where there is an excessive secretion of mucus. "Jalap," says Bremser, (*Traité sur les Vers Intest.* p. 440,) "is, without contradiction, in verminous diseases, one of the best purgatives, and which, perhaps, possesses, at the same time, greater anthelmintic virtues than any others."

3. *In Cerebral Affections.*—Jalap, in combination with calomel, is used with the best effect, on the principle of counter-irritation, to relieve cerebral congestion. In inflammatory affections of the brain or its membranes, or in hydrocephalus, it is a valuable purgative.

4. *In Dropsies.*—In dropsical affections it is frequently desirable to promote watery stools. Jalap, especially in combination with cream of tartar, may be used for this purpose with the best effects. Marggrave (*Mat. Med. contr.* p. 40, ed. 2<sup>nd</sup>.) calls it a *panacea hydropicorum*.

5. *In Retention of the Catamenia, or of the Hemorrhoidal Flux,* jalap is one of the purgatives adapted, from their stimulant influence over the pelvic vessels, to promote these discharges.

ADMINISTRATION.—The dose of jalap, *in powder*, is, for an adult, from ten to thirty grains: a scruple usually acts smartly and safely: for children under twelve months old, the dose is from two to five grains. Fifteen grains of jalap and two or three grains of calomel, form an efficient, yet safe, purgative for an adult. It very readily produces salivation by repetition. From two to five grains of ipecacuanha are sometimes substituted for the calomel. To children jalap is sometimes exhibited in gingerbread cakes. *Purgative cakes* of this kind are kept in the shops. The *Biscuits purgatifs* (*Panes saccharati purgantes*) are composed of Jalap, ʒxx.; Flour, ʒij.; 24 Eggs; and Sugar, lbj. This quantity is sufficient for 60 biscuits. (Jourdan, *Pharmacopée Universelle*.)

1. PULVIS JALAPÆ COMPOSITUS, L. E. D. (U. S.) *Compound Powder of Jalap.*—(Jalap, ʒiij.; Bitartrate of Potash, ʒvj.; Ginger, ʒij. Rub them separately to powder; then mix them, *L.* The *Edinburgh* and *Dublin Colleges* use the same proportions of jalap and bitartrate of potash, but omit the ginger). [The same is the case with the U. S. P.]—Hydragogue purgative. Used in habitual costiveness, verminous diseases, and dropsies.—Dose for an adult, ʒj. to ʒj.

2. TINCTURA JALAPÆ, L. E. D. (U. S.) *Tincture of Jalap.*—(Jalap, bruised, ʒx. [ʒviij. *D.* (U. S.) in moderately fine powder, ʒvij. *E.*]; Proof Spirit, [Diluted Alcohol, U. S.] Oij. [*wine measure, D.*] Macerate for fourteen days, and strain, *L. D.* "This tincture may be prepared either by digestion or percolation, as directed for tincture of cinchona," *E.*)—An active cathartic. Rarely used alone: generally employed as an adjunct to purgative draughts, the activity of which it promotes—Dose, fʒj. to fʒiv. As an adjuvant to a cathartic draught, the dose rarely exceeds fʒij.

3. EXTRACTUM JALAPÆ, L. D. (U. S.) *Extractum sive Resina Jalapæ, E.* *Extract of Jalap.*—(Jalap root, powdered, lbiss. [lbj. *D.* (U. S.)]; Rectified Spirit, Cong. j. [Oiv. (U. S.) *wine measure, D.*]; Distilled water, Cong. ij. Cong. j. *wine measure, D.*] [a sufficient quantity, U. S.] Macerate the jalap root in the spirit for four days, and pour off the tincture. Boil down the residue in the water to half a gallon [two pints, *D.*]; afterwards strain the tincture and the decoction separately, and let the latter be evaporated, and the former distilled, until each thickens. Lastly, mix the extract with the resin, and [by a water-bath, *D.*] evaporate to a proper consistence, *L. D.* This extract should be



kept *soft*, which may be fit to form pills, and *hard*, which may be rubbed to powder, *L.* The directions of the *Edinburgh College* are the following:—"Take any convenient quantity of jalap, in moderately fine powder; mix it thoroughly with enough of the rectified spirit to moisten it well; put it for twelve hours into a percolator, and exhaust the powder with rectified spirit; distil off the greater part of the spirit, and concentrate the residuum over the vapour-bath to a due consistence." In this process the alcohol extracts the resin, and the water subsequently used by the London and Dublin Colleges takes up the gummy extractive: the alcoholic tincture is distilled to save the spirit, while the aqueous decoction is evaporated. The preparation of the *Edinburgh College* is the impure resin of jalap; whereas that of the *London* and *Dublin Colleges* is a mixture of resin with the gummy extractive. It was formerly, and indeed is now by many persons, supposed, that the combination of these ingredients was necessary for the full cathartic effect of jalap. It is, however, well known, that the watery extract is inert as a purgative, though it is said to be diuretic: the only advantage, therefore, that can attend the mixture of the two extracts (the watery and the alcoholic), is, that the resin is intimately divided, and thereby prevented from causing violent irritation and griping in any one part of the intestinal tube. But it is obvious that the same advantage can be obtained by mixing the resin with some mild agent (as almonds, sugar or saline matter, as sulphate of potash). Mr. Brande (*Dict. Mat. Med.* p. 331,) says, that jalap yields about 66 per cent. of extract; that is, 16 of alcoholic, and 50 of watery extract. According to this statement, therefore, the extract of the *Edinburgh College* possesses four times the activity of that of the *London* and *Dublin Colleges*.—The dose of the *resin* (*Ph. Ed.*) is from grs. iij. to grs. vj., in a minute state of division, as above directed; of the extract, *Ph. L.* and *D.*, from grs. x. to ℥j.

## OTHER MEDICINAL CONVULVULACEÆ.

Besides the species already noticed, the roots of several others have been employed in medicine on account of their purgative properties; as the root called MECHOACAN, and the root of IPOMÆA TURPETHUM. Their use is now obsolete.—[The root of the *Convolvulus panduratus* is officinal, *Sec. List*, U. S. P.]

## ORDER XLI.—GENTIANACEÆ, Lindley.—THE GENTIAN TRIBE.

## GENTIANÆ, Jussieu.

ESSENTIAL CHARACTER.—*Calyx* monophyllous, divided, inferior, persistent. *Corolla* monopetalous, hypogynous, usually regular and persistent; the limb divided, equal, its lobes of the same number as those of the calyx, generally five, sometimes four, six, eight, or ten; with an imbricated twisted aestivation. *Stamens* inserted upon the corolla; all in the same line, equal in number to the segments, and alternate with them; some of them occasionally abortive. *Pollen* three-lobed or triple. *Ovary* single, one or two-celled, many-seeded. *Style* one, continuous; *stigmas* one or two. *Capsule* or *berry*, many-seeded, with one or two cells, generally two-valved; the margins of the valves turned inwards, and in the genera with one cell, bearing the seeds; in the two-celled genera inserted into a central placenta. *Seeds* small; *testa* single; *embryo* straight in the axis of soft fleshy *albumen*; *radicle* next the hilum. *Herbaceous* plants, seldom *shrubs*, generally smooth. *Leaves* opposite, entire, without stipules, sessile, or having their petioles confluent in a little sheath, in most cases three to five-ribbed; very rarely brown and scale-like; sometimes alternate. *Flowers* terminal or axillary (Lindley).

PROPERTIES.—This order contains a bitter principle, which is especially abundant in the roots. On this substance depends the stomachic, tonic, and febrifuge properties of the different species.

## 1. GENTIANA LUTEA, Linn. L. E. D.—COMMON OR YELLOW GENTIAN.

*Sex. Syst.* Pentandria, Digynia.

(*Radix*, L. D.—*Root*, E.)

(*Gentiana*, U. S.)

HISTORY.—Gentian is said to owe its name and introduction into medical use to Gentius, king of Illyria, who was vanquished by the Romans about 160 or



169 years before Christ. It is, therefore, not noticed by either Hippocrates or Theophrastus, but is mentioned by Dioscorides, (Lib. iii. cap. 3,) who calls it Γεντιανή; and by Pliny. (*Hist. Nat.* lib. xxv. cap. 34, ed. Valp.)

**BOTANY. Gen. Char.**—*Calyx* [four-] five-cleft. *Corolla* tubular, campanulate, or funnel-shaped at the base; the limb four, five, or six-cleft; segments entire or ciliated, sometimes with interposed, distinct smaller ones. *Stamina* five, inserted on the tube of the corolla; anthers sometimes connate. *Style* two-parted; *stigmas* two. *Capsule* one-celled. (*Bot. Gall.*)

**Sp. Char.**—*Leaves* broad, ovate, nerved. *Flowers* whorled, pedicellate. *Calyx* membranaceous, unilateral. *Corolla* rotate, five to eight-cleft, acute. (*Bot. Gall.*)

*Root* perennial, cylindrical or spindle-shaped, simple or somewhat branched, ringed, wrinkled, externally brown, internally yellow and fleshy. *Stem* simple, erect, two to three feet high, roundish, hollow, smooth. *Leaves* pale-green, opposite, ovate, or oval, pointed, entire, smooth, five to seven-ribbed, plaited; lower ones on short, sheathing petioles; upper ones amplexicaul; those next the flowers becoming concave, yellowish-green bracts. *Flowers* on smooth peduncles of four to six lines long. *Calyx* yellow. *Corolla* yellow; segments five to seven, lanceolate. *Stamina* as long as the corolla. *Ovarium* conical, with five greenish glands at the base. *Capsule* conical, two-valved. *Seeds* numerous, roundish, albuminous, with membranous margins.

**Hab.**—Alps of Austria and Switzerland; abundant on Mount Jura.

**COLLECTION.**—The roots are collected and dried by the peasants of Switzerland, the Tyrol, Burgogne, and Auvergne. They are imported into this country in bales, from Havre, Marseilles, &c. In 1839, duty (4s. *per cwt.*) was paid on 470 *cwts.*

**DESCRIPTION.**—Gentian root (*radix gentiane*) is imported in cylindrical usually more or less branched pieces, varying in length from a few inches to a foot or more, and in thickness from half an inch to one or two inches. These pieces are marked by transverse annular wrinkles and longitudinal furrows. Externally the root is yellowish-brown, internally it is brownish-yellow; its texture is spongy; its odour, in the fresh state, peculiar and disagreeable; its taste is intensely bitter. The roots of other species of *Gentiana* are said to be frequently mixed with those of the officinal species; their effects, however, are analogous. Martius (*Pharmakogn.*) says, that the roots of *G. purpurea* have strong longitudinal furrows, and are of a darker brown colour internally, but want the transverse wrinkles. The roots of *G. pannonica* are similar to those of *purpurea*. Both kinds are met with in Bavaria, and serve in Switzerland for the preparation of a spirit. *Gentiana punctata* has roots which are just as bitter, but of a more yellow colour: they are dug up in great abundance in Moravia. The roots of both the last mentioned species are dug up at, and exported from, Salzburg: in the fresh state they are white when sliced.

**CHEMISTRY.**—Gentian root was analyzed, in 1815, by Schrader (Trommsdorff's *N. Journ.* Bd. iii. S. 281); in 1817, by Braconnot (*Journ. de Physiq.* lxxxiv. 345); in 1819, by Henry (*Journ. de Pharm.* t. v. p. 97); in the same year by Guillemin and Fœcquemine (*op. cit.* p. 110); and in 1821, by Henry and Caventou. (*Op. cit.* t. vii. p. 173.) In 1837 it was examined by Leconte. (*Op. cit.* t. xxiii. p. 465.) The constituents of Gentian root, according to Henry and Caventou, are—a volatile odorous matter, bitter crystalline matter (*gentianin*), fugaceous odorous principle (volatile oil?), yellow colouring matter, green fixed oil, gum, uncrystallizable sugar, matter identical with birchlime, a free organic acid, and woody fibre. But in 1837, H. Trommsdorff (*Berlin. Jahrbuch*, Bd. xxxvii. S. 182) and Leconte (*op. supra cit.*) showed, that under the name of gentianin two substances had been confounded,—the one crystalline and tasteless; the other bitter. The first has been called *gentisin*; the second *gentianite*. Furthermore, Leconte has shown, that the substance con-



sidered by Henry and Caventou as identical with birdlime, is a compound of wax, oil, and caoutchouc.

1. OIL OF GENTIAN.—By distillation with water gentian root yields a very small quantity of a butyraceous oil, which floats on water, has a powerful odour of gentian root, and is soluble in alcohol. A few drops of the melted oil were given to a rabbit without causing any remarkable effects. I have received from Mr. Whipple two samples of this oil, the one green, the other white like mutton fat. Three cwt. of the root yielded only about 3ss. of oil.

Planche (*Bull. de Pharmacie*, t. vi. p. 551) states the distilled water of gentian caused nausea and a kind of intoxication.

2. GENTISIN OR GENTISIC ACID.—Procured by washing the alcoholic extract of the root with water, and then treating with alcohol. The tincture obtained was evaporated, the extract treated by ether: the residue, by successive solutions and evaporations, yielded gentisin. It is pale yellow, crystallizable in needles, has a peculiar, but weak smell. When cautiously heated, it gives out some yellow vapours, which are condensed on the upper part of the tube. It is scarcely soluble in water, but dissolves in alcohol. With alkalis it unites to form salts. Its saturating power is about 438. Trommsdorff says, that a solution of gentisic acid is unaffected by acetate of lead, nitrate of silver, and most other tests. Chloride of iron and the salts of copper produced, in the alcoholic solution, the most characteristic changes.

3. BITTER PRINCIPLE OF GENTIAN (*Gentianite*).—This has not hitherto been isolated. By digesting the alcoholic extract of gentian in water, an acidulous intensely bitter solution is obtained. The acid may be thrown down by lead. When the excess of lead has been removed from the solution by sulphuretted hydrogen, a liquid is obtained, which, by evaporation, yields a sweet and very bitter extract, from which ether removes an aromatic fat, an odorous resin, and wax. The bitter matter has not been separated from the sugar.

4. PECTIN.—The existence of pectic acid (pectin) in gentian was ascertained, in 1836, by Denis. (*Journ. de Pharm.* t. xxii. p. 303.) To this substance is to be ascribed the gelatinization of infusion of gentian, which, under certain circumstances, is not unfrequently observed.

5. SUGAR.—To the presence of this matter in gentian is to be ascribed the capability of the infusion of gentian to undergo the vinous fermentation, and to form an alcoholic liquor (*gentian spirit*), much admired by the Swiss. (Biwald, in *Pfaff's Mat. Med.* Bd. ii. S. 29; and Planche, *Bull. de Pharm.* vi. 551.)

CHEMICAL CHARACTERISTICS.—The infusion of gentian is deepened in colour by the caustic alkalis. Sesquichloride of iron communicates a deep olive-brown tint. The acetate and diacetate of lead, the sulphate of copper, and the nitrate of mercury, cause flocculent or gelatinous precipitates (*metallic pectates*?)

PHYSIOLOGICAL EFFECTS.—Gentian is very properly regarded as a *pure or simple bitter*; that is, as being bitter, but without possessing either astringency or much aroma. It has, therefore, the usual tonic properties of medicines of this class, which I have before noticed (vol. i. p. 188).

Given in full doses it appears more disposed to relax the bowels than the other simple bitters, and in susceptible individuals it is more apt to disorder the digestive process. In such cases both Löseke and Voigtel (*Arzneimittell.* Bd. iii. S. 359) have seen it cause vomiting. Barbier (*Mat. Méd.*) says it quickens the pulse. It is somewhat less bitter, and therefore, I presume, somewhat less powerful, than quassia.

By continued use the sweat and urine acquire a bitter taste (Arnemann, *Prakt. Arzneimittell.* S. 188, 6<sup>te</sup> Aufl.); a sufficient proof that gentian, or its bitter principle, becomes absorbed.

As some of the vegetable bitter tonics (for example, quassia and calumba) have been found to exert a specific influence over the cerebro-spinal system, and to yield preparations of a poisonous quality, we are naturally led to inquire whether any analogous facts have been made out with respect to gentian. The reply is in the affirmative. Magendie, (*Formul.* p. 313, 8<sup>me</sup> éd.) indeed, discovered no poisonous operation in *Gentianin*; he threw several grains of this principle into the veins of an animal, without any obvious effect, and swallowed two grains dissolved in alcohol, but only observed extreme bitterness, and a slight feeling of heat in the stomach. Moreover, Hartl (quoted by Wibmer, *Wirk. d. Arzneim. u. Gifte*, Bd. ii. S. 308) inserted two grains of the extract of gentian into the inner side of the thigh of a rabbit, without any ill effects resulting: the wound was slightly inflamed, though it soon healed. These facts prove that the bitter extractive of gentian possesses no narcotic properties. But



if the narcotic principle of gentian be of a volatile nature, these experiments of Magendie and Hartl go for nothing, since, in the preparation of both the extract and the *Gentianin*, this principle would be dissipated by the heat employed. Now, Planche (*op. cit.*) has shown, as I have already mentioned, that the distilled water of gentian causes violent nausea, and, within three minutes, a kind of intoxication. Moreover, Buchner (*Toxikol.* S. 192) tells us, that some years ago a narcotic effect was produced in Prussia by the medicinal use of gentian root, although the presence of any foreign matter could not be detected. In the *Philosophical Transactions* for the year 1748, are mentioned some deleterious effects resulting from the use of gentian: but they were referred to a foreign root, said to have been intermixed with, and which greatly resembled, the true gentian root.

All these facts, then, support the opinion of Haller (quoted by Buchner), that gentian is not so innocuous as is generally supposed.

USES.—Gentian is adapted to most of the cases requiring the use of the pure or simple bitters (vol. i. p. 188). It agrees best with phlegmatic, torpid individuals, and is apt to disagree with irritable or susceptible persons. It is contra-indicated in febrile disorders and inflammatory conditions of the gastro-intestinal membrane. It is employed principally in the following cases:

1. In *dyspepsia*, and other gastric disorders, attended with debility or torpidity, and unaccompanied by any marks of inflammation or irritation, or great susceptibility, of the digestive organs. Sesquicarbonate of ammonia is a very valuable adjunct.

2. In *intermittent diseases* it may be used where cinchona is admissible; but it is much inferior to the last-mentioned substance. "Joined with galls or tormentil, in equal parts, and given in sufficient quantity, it has not failed," says Dr. Cullen, (*Mat. Med.* vol. ii. p. 72,) "in any intermittents in which I have tried it."

3. In many other diseases marked by weakness and debility, but unattended by fever or gastro-intestinal irritation, gentian is admissible and useful; as in some forms of gout, hysteria, uterine disorders, &c. It is a constituent of the *Duke of Portland's powder for the gout* (see p. 234).

4. *Against worms* it has been used as if it possessed some specific influence.

5. In surgery it has been used for discutient fomentations, also in the form of fine powder, as an application to issues, to promote their running, and as a tent, to enlarge and cleanse fistulous apertures. (Quincy, *Dispens.*)

ADMINISTRATION.—In the form of *powder*, the dose is from grs. x. to ℥ss. But the *infusion*, *tincture*, or *extract*, are the usual forms of exhibition.

1. INFUSUM GENTIANÆ COMPOSITUM, L. D., (U. S.) *Infusum Gentianæ*, E. *Infusion of Gentian*.—(Gentian root, sliced, ℥ij. [℥j. D.]; Orange Peel, dried, ℥ij. [℥j. D.]; Lemon Peel, fresh, ℥iv. [℥j. D.]; Boiling [Distilled, L.] Water, Oj. [℥xij. D.] Macerate for an hour in a vessel lightly covered, and strain. The directions of the *Edinburgh College* are as follow:—Gentian, sliced, ℥ss.; Bitter Orange Peel, dried and bruised, ℥j.; Coriander, bruised, ℥j.; Proof Spirit, ℥iv.; Cold Water, ℥xvj. [℥xij. U. S.] Pour the spirit upon the solids; in three hours add the water, and in twelve hours more strain through linen or calico.) The infusion of the London and Dublin Pharmacopœias is very apt to spoil by keeping; but as it can always be speedily procured, this is not a circumstance of much importance. However, to obviate it as much as possible, the Edinburgh College orders cold water to be used (by which less of the mucilaginous matter [pectin, &c.] is dissolved), and employs spirit to promote the solution of the bitter principle, while the quantity of gentian is much increased; so that, in fact, we have a weak tincture, rather than an infusion. Besides the objections which may arise out of these deviations, a very important one is the length of time required for the maceration. Infusion of gentian is stomachic and tonic. When prepared according to the London and Dublin Pharmacopœias, the dose is ℥j. to ℥ij.; when according to that of the Edinburgh, ℥ss. to ℥j.



2. *MISTURA GENTIANÆ COMPOSITA*, L.; *Compound Mixture of Gentian*.—(Compound Infusion of Gentian, f̄3xij.; Compound Infusion of Senna, f̄3vj.; Compound Tincture of Cardamoms, f̄3ij. Mix.)—Tonic and cathartic. Used in dyspepsia with constipation.—Dose, f̄3j. to f̄3ij.

3. *TINCTURA GENTIANÆ COMPOSITA*, L. E. D. (U. S.); *Tinctura amara*; *Tincture of Gentian*.—(Gentian, sliced and bruised, ʒiiss. [ʒij. U. S.]; Orange Peel, dried, ʒx. [ʒi. U. S.]; Cardamom [seeds], bruised, ʒv. [ʒss. U. S.]; Proof Spirit, Oij. L. The relative proportions used by the *Dublin College* are the same as those of the London. The *Edinburgh College* employs of Gentian, sliced and bruised, ʒijss.; Dried Bitter Orange Peel, bruised, ʒx.; Canella, in moderately fine powder, ʒvj.; Cochineal, bruised, ʒss.; and Proof Spirit, Oij. This tincture may be more conveniently prepared by percolation, as directed for the compound tincture of cardamom, *E.*)—A grateful cordial tonic and stomachic. Employed as an adjunct to the infusion, effervescing draughts, bottle soda-water, &c.—Dose, f̄3ss to f̄3ij.

4. *EXTRACTUM GENTIANÆ*, L. E. D. (U. S.); *Extract of Gentian*.—(Gentian, sliced, lb. ijss.; Boiling Distilled Water, Cong. ij. Macerate for 24 hours; then boil down to a gallon, and strain the liquor while hot; lastly, evaporate to a proper consistence, *L.* "Take of Gentian, any convenient quantity; bruise it to a moderately fine powder; mix it thoroughly with half its weight of distilled water; in twelve hours put it into a proper percolator, and exhaust it by percolation with temperate distilled water; concentrate the liquid, filter before it becomes too thick, and evaporate in the water-bath to a due consistence," *E.*)—(Gentian, in coarse powder, lbj.; water, a sufficient quantity. Mix with a pint of water; allow to stand for 24 hours; and then displace until the bitterness of the gentian is exhausted. Evaporate to the proper consistence. U. S.)—Good Gentian root yields, by the process of the London Pharmacopœia, about half its weight of extract, (Brande, *Dict. of Mat. Med.* p. 261.) Extract of Gentian is tonic. It is usually employed as a vehicle for the exhibition of the metallic substances (especially chalybeates) in the form of pill.—Dose, grs. x. to ʒss.

## 2. AGATHOTES CHIRAYTA, Don, E.—THE CHIRETTA OR CHIRAYTA.

*Gentiana Chirayita*, Fleming.  
*Sez. Syst.* Pentandria, Digynia.  
 (Herb and Root, E.)

**HISTORY.**—This plant seems to have been long in use among the natives of India. Professor Guibourt (*Journ. de Chim. Méd.* t. i. p. 229.) thinks that it is the *χάλαρος ἀρωματικός* of Dioscorides. (Lib. i. cap. 17.) Various circumstances, however, appear to me to be opposed to this opinion: one of the most conclusive is the absence of odour in the chirayta plant. (Fée, *Cours d'Hist. Nat.* t. ii. p. 395.) I have before stated (p. 76) that Professor Royle refers the *Calamus aromaticus* of the Greeks to his *Andropogon Calamus aromaticus* (*A. nardoides*, Nees ab Esenb.)

**BOTANY. Gen. Char.**—*Corolla* withering, rotate, in æstivation twisted to the right; with glandular hollows protected by a fringed scale upon the segments. *Anthers* not changing. *Stigmas* sessile. *Capsule* conical, one-celled, with spongy placentæ upon the sutures. *Seeds* indefinite, minute (Lindley).

**Sp. Char.**—*Stem* round. *Leaves* ovate-lanceolate. *Hollows* of the corolla nectariferous, oblong, distinct. *Squamulæ* capillaceo-fimbriate at the margin (Don) (*Trans. of the Linn. Soc.* vol. xvii. p. 522).

**Herbaceous.** *Root* branching. *Stem* round, smooth, jointed. *Leaves* opposite, amplexicaul, lanceolate, very acute, entire, smooth, three or five-nerved. *Flowers* numerous, peduncled. *Calyx* four-cleft; divisions linear, acute. *Corolla* yellow; limb four-parted.

**Hab.**—Mountains of Nepal and the Morungs.

**DESCRIPTION.**—The plant is pulled up by the root, about the time that the



flowers begin to decay and the capsules are well formed. (Roxburgh, *Fl. Ind.* vol. ii. p. 72.) The dried plant, with the root (*herba et radix chirette sive chirayta*) is met with in the shops. The root is fibrous; the stem is round, smooth, not jointed, marked with the cicatrices of leaves, has a yellowish pith; the leaves are as above described. The whole plant is without odour, but has an intensely bitter taste.

COMPOSITION.—The stems of this plant were analysed by MM. Lassaigne and Boissel, (*Journ. Pharm.* vol. vii. p. 283,) who obtained the following results:—*resin, yellow bitter matter, brown colouring matter, gum, malic acid [woody fibre], malate of potash, chloride of potassium, sulphate of potash, phosphate of lime, silica, and traces of oxide of iron.*

The BITTER MATTER is the most important constituent. No vegetable alkali has been detected in it. The substance sold as *sulphate of chiraytine* is sulphate of quina. (*Lond. Med. Gaz.* vol. xxi. p. 173.)

PHYSIOLOGICAL EFFECTS.—Chirayta is an intensely bitter substance, and produces the before (vol. i. p. 188) described effects of the *simple or pure bitters*. In its operation, as well as by its botanical affinities, it is closely allied to gentian. It appears to possess rather a relaxing than a constipating effect. (Baker, *Lond. Med. Gaz.* vol. ii. p. 685.)

USES.—It has long been employed by the natives of India in the same class of cases in which gentian has been used in Europe. As a stomachic it is especially serviceable in the dyspepsia of gouty subjects. It strengthens the stomach, obviates flatulency, and diminishes the tendency to acidity. (Fleming, *Asiat. Researches*, vol. xi. p. 167.) Combined with the seeds of *Guilandina Bonduc*, it is employed with success in intermittents. (Johnson, *Infl. of Trop. Climates*, p. 58, 3d ed.)

ADMINISTRATION.—It may be given in *powder*, in the dose of ℞j., or it may be employed in the form of *infusion, tincture* (prepared with cardamom and orange peel, like *compound tincture of gentian*), or *extract*.

INFUSUM CHIRETTÆ, E.; *Infusion of Chiretta*.—(Chiretta, ℥iv.; Boiling Water, Oj. Infuse for two hours, and strain through linen or calico.)—The dose of this is ℥j. to f℥ij.

### 3. ERYTHRÆA CENTAURIUM, *Persoon, L. E. D.*—COMMON CENTAURY.

*Sex. Syst.* Pentandria, Monogynia.  
(*Centaurium, L.*—The flowering heads, *E.*—Folia, *D.*)

HISTORY.—This plant was known to the ancients, and received one of its names (*Chironia Centaurium*) from Chiron the Centaur, who is said to have lived 1270 years before Christ. But the plant which Pliny (*Hist. Nat.* lib. xxv. cap. 30, ed. Valp.) says cured Chiron of a wound received by an arrow, which he dropped on his foot when examining the arms of Hercules, is supposed to be the *Centaura Centaurium*.

BOTANY. *Gen. Char.*—*Calyx* five-parted, equal. *Corolla* hypocrateriform with a cylindrical tube, withering over the capsule. *Stamens* five; anthers becoming spiral. *Stigmas* bilamellate. *Capsule* one-celled, or half two-celled (Lindley).

*Sp. Char.*—*Stem* nearly simple. *Panicle* forked, corymbose. *Leaves* ovate lanceolate. *Calyx* half the length of the tube; its segments partly combined by a membrane (Smith).

*Root* small, tapering. *Stem* about a foot high, leafy. *Radicle leaves* obovate; the rest acute, ovate, or elliptic-lanceolate; all three-ribbed, bright green. *Flowers* nearly sessile. *Bracts* opposite, awl-shaped. *Calyx* slender. *Tube of corolla* pale-greenish; limb brilliant pink, expanded only in sunshine, closing as soon as gathered.

*Hab.*—Indigenous: dry gravelly pastures. Annual. Flowers in July and August.

DESCRIPTION.—The herb or tops (*herba seu summitates vel cacumina cen-*



*taurii minoris*) of the common or lesser centaury are without odour, but have a very bitter taste. They are collected when in flower.

COMPOSITION.—According to Moretti, (*Journ. de Pharm.* t. v. p. 98,) common centaury contains *bitter extractive, free acid, mucous matter, extractive, salts* [and *woody fibre*].

BITTER MATTER (*Centaurin*).—The principal constituent of common centaury is the bitter extractive, called by Dulong d'Astafort (*Journ. de Pharm.* t. xvi. p. 502) *centaurin*. This, when combined with hydrochloric acid, is said to be an excellent febrifuge. Centaurin must not be confounded with *centaurite*, the bitter principle of *Cnicus benedictus*, De Cand.

PHYSIOLOGICAL EFFECTS.—Similar to those of gentian (p. 339), and of other simple or pure bitters (vol. i. p. 188).

USES.—Common or lesser centaury is rarely used by medical practitioners; yet it might be employed as an indigenous substitute for gentian.—Dose of the powder, ℞j. to ʒj. It may be also used in infusion.

#### 4. MENYANTHES TRIFOLIATA, Linn., L. E. D.—COMMON BUCKBEAN; MARSH TREFOIL.

*Sex. Syst.* Pentandria, Monogynia.

(*Menyanthes*, L.—Leaves, E.—Folia, D)

HISTORY.—Sprengel (*Hist. Rei Herb.* t. i. p. 82) considers this to be the plant referred to by Theophrastus (*Hist. Plant.* lib. iv. cap. 11) under the name of *μηνανθος*.

BOTANY. *Gen. Char.*—*Calyx* five-parted. *Corolla* funnel-shaped; the limb spreading, five-lobed, equal, hairy on the inside. *Stamina* five. *Style* one; *stigma* capitate, two to five-grooved. *Capsule* one-celled; the parietes seminiferous. (*Bot. Gall.*)

*Sp. Char.*—*Leaves* ternate. Disk of the *corolla* densely shaggy (Smith).

*Rhizoma* black, creeping, jointed. *Leaves* on long stalks, with broad sheathing stipules at base: they are trifoliate; leaflets nearly oval, smooth. *Scape* round, ascending, smooth. *Bracts* ovate. *Calyx* obtuse. *Corolla* white or flesh-coloured, elegant. *Anthers* yellow.

*Hab.*—Indigenous; watery meadows, ditches, &c.; frequently cultivated in ornamental aquaria, on account of the beauty of the flowers. Perennial. Flowers in June and July.

DESCRIPTION.—The whole herb (*herba menyanthis seu trifolii fibrini*) is odourless, but has a very bitter taste. Its infusion strikes a green colour (*tannate of iron*) with the sesquichloride of iron. The leaves (*folia menyanthis*) are the parts usually employed.

COMPOSITION.—Menyanthes was analysed by Trommsdorff, (*Ann. de Chim.* t. lxxii. p. 191,) who found that the fresh plant consists of 75 parts of moisture and 25 of solid matter, composed of *bitter extractive, vegetable albumen, green resin (chlorophylle), peculiar matter* precipitable by tannic acid, but soluble in water and in weak spirit, *brown gum, fecula (inulin or menyanthin), matic acid* and *acetate of potash*.

The BITTER EXTRACTIVE is the active principle. Brandes states that he procured a white bitter powder from menyanthes; but B. Trommsdorff (*Pharm. Cent.-Blatt. für 1832*, p. 458) repeated Brandes's experiments, and procured only a yellowish-brown bitter extract.

PHYSIOLOGICAL EFFECTS.—Tonic and astringent. In large doses, cathartic, and sometimes emetic.

USES.—This plant is used by the brewers of some parts of Germany, particularly Silesia and the adjacent provinces, as a substitute for hops. (*Yosy, Orig. and Progress of the Med. Bot. Soc.* p. 12.) It is rarely employed in medicine, but is applicable for the same purposes as the other bitter tonics (vol. i. p. 188). It has been esteemed efficacious as an antiscorbutic. (Murray, *App. Med.* t. ii. p. 34.)

ADMINISTRATION.—It may be given in *powder, infusion, or extract*.—The



dose of the powder is from ℥j. to ℥ss.; if given to the extent of ℥j. it generally purges. The dose of the *infusion* (prepared with ℥ss. of the dried herb, and ℥xvj. of boiling water) is ℥j. to ℥ij.; of the watery *extract*, grs. x. to grs. xv.

## OTHER MEDICINAL GENTIANACEÆ.

FRASERA WALTERI, (FRASERA, U. S. *Sec. List.*) or the *American Calumba*, is a native of the southern and western portion of the United States, and is very abundant in Arkansas and Missouri. The root is officinal in the Pharmacopœia of the United States. As met with in commerce, it is in transverse circular segments, about an inch in diameter, and an eighth of an inch, or more, in thickness. It contains no starch, and hence undergoes no change of colour when touched with iodine. Its infusion or decoction becomes blackish-green (*tannate of iron*) when treated with sulphate of iron, and lets fall a precipitate (*tannate of gelatine*) on the addition of a solution of isinglass. The effects, uses, and doses of *Frasera* are the same as those of gentian. The fresh root is said to operate as an emetic and cathartic. (*United States Dispensatory*.) Some years ago it was introduced into France, and sold for calumba; hence it got the name of *False Calumba*. The chemical characters above given, as well as the physical properties of the root, readily distinguish it. (Guibourt, *Journ. de Chim. Méd.* t. ii. p. 334.)

[SABBATIA ANGULARIS. *American Centaury*.—This plant is officinal with the U. S. P.—*Prim. List.* It is a handsome plant, from a foot to two feet high, with an upright quadrangular stem, ovate, amplexicaul leaves, and showy rose-coloured flowers,—the corolla more spreading than that of the *E. centaurium*. It is common in the United States. The herbaceous portion is employed, and is brought into the market in bundles, in the dried state. It is a mild pure bitter, agreeable to the palate, and agreeing with the stomach, and is used for the same purposes and in the same manner as that plant.

The ERYTHRÆA CHILENSIS is used in South America, and has the properties of the Lesser Centaury of Europe. The *Blue Gentian* (GENTIANA CATESBEI, U. S. *Sec. List.*) is a native of the southern states. It possesses the properties of a mild bitter.—J. C.]

## ORDER XLII.—SPIGELIACEÆ, Martius.—THE WORM-GRASS TRIBE.

ESSENTIAL CHARACTER.—*Calyx* inferior, regular, five-parted. *Corolla* regular, with five lobes, which have a valvate aestivation. *Stamens* five, inserted into the corolla, all in the same line; *pollen* three-cornered, with globular angles. *Ovary* superior, two-celled; *style* articulated with it, inserted; *stigma* simple. *Fruit* capsular, two-celled, two-valved, the valves turned inwards at the margin, and separated from the central placenta. *Seeds* several, small; *testa* single; *embryo* very minute, lying in a copious fleshy albumen, with the radicle next the hilum.—*Herbaceous* plants, or *under-shrubs*. *Leaves* opposite, entire, with stipules, or a tendency to produce them. *Flowers* arranged in one-sided spikes. *Pubescence* simple or stellate (Lindley).

PROPERTIES.—See *Spigelia*.

## SPIGELIA MARILANDICA, Linn. L. E. D.—CAROLINA PINK; PERENNIAL WORMGRASS.

*Sex. Syst.* Pentandria, Monogynia.

(Radix, L. D.—Root, E.)

(*Spigelia*, U. S.)

HISTORY.—The anthelmintic virtues of this plant were first learned from the Cherokee Indians, who became acquainted with them, according to Dr. Garden, about 1723: they were made known to the profession about 1740. (*Essays and Obs. Phys. and Lit.* vol. iii.)

BOTANY. *Gen. Char.*—*Calyx* five-parted. *Corolla* funnel-shaped, with a five-cleft equal limb. *Anthers* converging. *Capsule* didynamous, two-celled, four-valved, many seeded (Lindley).

*Sp. Char.*—*Stem* simple, herbaceous. *Leaves* opposite, sessile, ovate, acuminate.

*Root* perennial. *Stems* composed of numerous fibres, from a short, cylindrical rhizome. *Stems* several, erect, four-sided and winged (from the decurrent leaves). *Leaves* decussate, ovate-lanceolate, acuminate, entire, smooth, but somewhat slightly pubescent on the veins and margins. *Flowers* in simple, one-sided spikes (or racemes). *Corolla* much longer than the calyx, of a rich carmine colour externally, paler at the base, and orange-yellow within. *Capsule* obcordate, smooth. *Seeds* several in each cell.



**Hab.**—Southern States of North America; seldom found north of the Potomac.

**COLLECTION.**—“It is collected by the Creek and Cherokee Indians, who dispose of it to the white traders. By these it is packed in casks, or more commonly in large bales, weighing from three hundred to three hundred and fifty pounds. That contained in casks is to be preferred, as less liable to be damp and mouldy. Owing to the imperfect manner in which the plant is dried, it seldom happens that packages of it reach the market free from dirt and mouldiness, and having the stalks of a bright colour. Some parcels have been recently brought free from the stalks, and have commanded more than double the price of the drug prepared in the usual way.” (*United States Dispensatory*.)

**DESCRIPTION.**—The dried plant (*herba spigeliæ*), as usually met with in the shops, is of a grayish-green colour, a faint odour, and a bitter taste. The root (*radix spigeliæ*) consists of numerous, slender, branching, dark brown fibres, issuing from a short, dark brown rhizome.

**COMPOSITION.**—The herb and root have been analyzed by Wackenroder. (Gmelin's *Handb. d. Chem.* ii. 1298.) Feneuille (*Journ. de Pharm.* t. ix. p. 897) probably analyzed this plant under the name of *Spigelia anthelmintica*.

*Wackenroder's Analyses.*

Myricin.....	0.30	Fixed oil.....	a trace
Resin, with chlorophylle.....	2.40	Acrid resin, with some fixed oil.....	3.13
Peculiar resin.....	0.50	Peculiar tannin.....	10.56
Peculiar tannin.....	17.20	Bitter acrid extractive.....	4.89
Woody fibre.....	75.20	Woody fibre (which yields 16.74 of ashes).....	83.69
Malate of potash, and chloride of potassium..	2.10		
Malate of lime.....	4.20	Root of Spigelia.....	101.27
Herb of Spigelia.....	101.90		

1. BITTER EXTRACTIVE.—Feneuille ascribes the activity of Spigelia to a brown, bitter extractive, like that of the purgative Leguminosæ. Taken internally, it causes vertigo and a kind of intoxication. It is, I presume, identical with the bitter acrid extractive of Wackenroder.

2. RESIN. This is described, by Wackenroder, as having an acrid, nauseous taste. It is soluble in ammonia and in oil of vitriol. It evolves ammonia when heated.

**PHYSIOLOGICAL EFFECTS.**—The physiological effects of this root have not been accurately determined; but the observations hitherto made show them to be those of a local irritant (or acrid) and narcotic substance.

In the ordinary dose (one or two drachms for adults) it has very little sensible effect on the system, though it may act efficaciously as an anthelmintic. In larger doses it appears to operate as an irritant to the gastro-intestinal canal, and gives rise to purging and sometimes to vomiting, though its effects in this way are very uncertain. In poisonous doses it operates as a cerebro-spinant or narcotic, giving rise to “vertigo, dimness of vision, dilated pupils, spasms of the facial muscles, and sometimes even to general convulsions. Spasmodic movements of the eyelids have been observed among the most common attendants of its narcotic action. The death of two children, who expired in convulsions, was attributed by Dr. Chambers to the influence of spigelia. The narcotic effects are said to be less apt to occur when the medicine purges, and to be altogether obviated by combining it with cathartics. The danger from its employment cannot be great, as it is in very general use in the United States, both in regular and domestic practice, and we never hear at present of serious consequences. Its effects upon the system have been erroneously conjectured to depend on other roots sometimes mixed with the genuine.” (*United States Dispensatory*.)

**USES.**—Employed only as an anthelmintic. Its vermifuge properties were first made known to the profession by Drs. Lining (*Essay and Obs. Phys. and Lit.* vol. i. p. 386,) and Garden, (*op. cit.* vol. iii. p. 145.) Though scarcely used in this country, it stands at the head of anthelmintics in the United States of America.

**ADMINISTRATION.**—The dose of the powder, for a child of three or four years



old, is from grs. x. to grs. xx.; for an adult, ʒj. to ʒiij. This quantity is repeated, every morning and evening, for several days, and then followed by a brisk cathartic. It is frequently combined with calomel.

**INFUSUM SPIGELIÆ**, Ph. United States. *Infusion of Pink-root.* (Spigelia root, ʒss.; Boiling water, fʒxvj. Macerate for two hours in a covered vessel, and strain.)—The dose, for a child of two or three years old, is fʒss. to fʒj.; for an adult, from fʒiv. to ʒviiij., repeated morning and evening. A quantity of senna, equal to that of the spigelia, is usually added, to ensure a cathartic effect.

A preparation kept in the shops of the United States, and much prescribed by physicians, under the name of *worm tea*, consists of spigelia root, senna, manna, and savine, mixed together in various proportions to suit the views of different individuals. (*United States Dispensatory.*)

#### OTHER MEDICINAL SPIGELIACEÆ.

**SPIGELIA ANTHELMINTICA** is a native of South America and the West India Islands. Its action is similar to that of the last-mentioned species. So poisonous has it been regarded, that in France it is called *Brinvillière*, after the Marchioness de Brinvilliers, a woman famous for poisoning in the reign of Louis XIV., and who was executed on the 16th of July, 1676. (Guibourt, *Hist. des Drog.* t. ii. p. 227.) Its anthelmintic properties were noticed in 1751 by Dr. Browne. (*Gentleman's Magazine* for 1751.) This plant was analyzed by Ricord Madianna. (Gmelin, *Handb. d. Chem.* ii. 1297.) Dr. Brown (*Nat. Hist. of Jamaica*, p. 157,) says it procures sleep almost as certainly as opium.

#### ORDER XLIII.—ASCLEPIADACEÆ, Lindley.—THE SWALLOW-WORT TRIBE.

ASCLEPIADEÆ, R. Brown.

The plants of this order are for the most part acrids. In large doses they are emetic and cathartic: in small doses, expectorant, diaphoretic, and alterative. The roots are the parts usually employed in medicine.

Though none of the species are contained in the British pharmacopœias, yet several have attracted the attention of practitioners in this country.

1. **CALOTROPIS GIGANTEA**, R. Brown (*Asclepias gigantea*, Linn.) has been introduced from India under the name of *Madar* or *Madar*. It is said to contain a peculiar principle called *mudarine*, which coagulates by heat, and becomes again fluid on exposure to cold. (Wight, *Contrib. to the Bot. of India.*) The principle value of *Madar* is as an alterative and sudorific. It has been employed in venereal diseases, chronic cutaneous affections, and various other maladies. (Playfair, *Trans. of the Med. and Phys. Soc. Calcutta*, vol. i. p. 84.) Mr. Robinson (*Med. Chir. Trans.* vol. x. p. 27,) found it decidedly useful in a species of elephantiasis, which Mr. Playfair calls *jugara* or leprosy of the joints. The powder of the bark of the root is given in doses of from grs. iij. to gr. x. Dr. Ainslie (*Mat. Ind.* vol. i. p. 486, and vol. ii. p. 488,) considers the dried milky juice more efficacious.

2. The root of **HEMIDESMUS INDICUS**, R. Brown, (*Periploca indica*, Willd. *Asclepias pseudo-sarsa*, Roxb.) is used in India under the name of *country sarsaparilla*. The attention of practitioners in this country was drawn to it by Dr. Ashburner in 1831; (*Lond. Med. and Phys. Journ.* vol. lxx. p. 1, 1819,) and again in 1833. (*Lond. Med. Gaz.* vol. xii. p. 359.) It has been called *Indian* or *scented sarsaparilla*, *nannari*, or the root of *Smilax aspera*. How this last and erroneous appellation became applied to it I cannot tell; for I find from specimens of the root of *Smilax aspera* brought from the south of Europe, that no resemblance exists between the latter and the root of *Hemidesmus indicus*. The latter is brownish externally, and has a peculiar aromatic odour, and a feeble, bitter taste. It is long, tortuous, cylindrical, rugous, furrowed longitudinally, and has its cortex divided, by transverse fissures, into moniliform rings. The cortical portion has a corky consistence, and surrounds a ligneous medullium. Mr. Garden (*op. cit.* vol. xx. p. 800,) obtained from it a volatile, crystallizable acid (?) on which the taste, smell, and probably the medicinal properties depend. From an erroneous notion of the origin of the root, he called the acid the *smilaseric acid*, but it may with propriety be termed *hemidesmic acid*. *Hemidesmus indicus* has been employed as a cheap and efficacious substitute for *sarsaparilla* in cachectic diseases; but both its effects and uses require a more extended examination than has yet been devoted to them. Dr. Ashburner says it increases the appetite, acts as a diuretic, and improves the general health; "plumpness, clearness, and strength, succeeding to emaciation, muddiness, and debility." It has been used with benefit in venereal diseases. In some cases it



has appeared to succeed where the sarsaparilla had failed; and *vice versa* it has frequently failed where sarsaparilla succeeds. The Tamool doctors employ it in strangury and gravel. (Ainslie, *Mat. Ind.* vol. i. p. 382.) It may be administered in the form of *infusion* (prepared by steeping ℥ij. of the root in Oj. of boiling [or lime] water for twelve hours); a pint of which may be given in twenty-four hours, in doses of a wineglassful. The *decoction* may be substituted for the infusion. Carbonate of soda is frequently added to it. The *extract* is objectionable, as the heat used in preparing it must volatilize part at least of the hemidesmic acid. A *syrup* has also been employed. The *powder of the bark of the root* is used in India against the thrush. (Roxburgh, *Fl. Ind.* vol. ii. p. 40.)

3. The leaves, flowers, and fruit of CYNANCHUM AR'GEL are employed by the Egyptians to adulterate the senna of that country. I believe all the *Alexandrian senna* brought to England contains some portion of these leaves. (For their characters and effects see the Order LEGUMINOSÆ.)

4. The substance called FRENCH or MONTEPELLIER SCAMMONY (*scammonium gallicum*) is made in the southern part of France, with the expressed juice of *Cynanchum monspeliacum*, mixed with different resins and other purgative substances. It occurs in semicircular, blackish, hard, compact cakes, which frequently have the smell of balsam of Peru. The juice of this plant has been analyzed by Marquart. (*Pharm. Centr.-Blatt für 1837*, S. 693.)

5. A substance called SMYRNA SCAMMONY (*scammonium smyrneum*) is said to be obtained from the *Secamone Alpinii*, Römer and Schultes (*Periploca Secamone*, Linn.); and Marquart (*op. cit.* p. 696,) has analyzed some substances bearing this name (see p. 331).

[6. ASCLEPIAS TUBEROSA, U. S. Sec. List. *Pleurisy Root. Butterfly Weed.* The stem of this plant is erect, hairy, with spreading branches; leaves oblong, lanceolate, sessile, alternate, somewhat crowded; umbels numerous, forming terminate corymbs (Beck); flowers orange-yellow. This plant is found in all parts of the United States. The portion used in medicine is the root. It is large, and formed of irregular tubers or fusiform branches; externally of a yellowish-brown colour, internally white. When recent it has a somewhat acrid, nauseous taste; in the dried state the taste is bitter, but not unpleasant. The powder is dirty white. It yields its properties to boiling water.

The effects of this root upon the system are those of a diaphoretic and expectorant, it does not produce, however, any stimulating action. In larger doses, especially if recent, it acts upon the bowels. With a view to the effects mentioned, it is employed at the commencement of pulmonary affections; and sometimes by its use in combination with antiphlogistics an attack may be cut short. In rheumatism it has also proved serviceable. Dr. Chapman (*Elem. of Therap.* vol. i. p. 351,) speaks of its certainty and permanency of operation. Dr. Eberle employed it in dysentery. The dose of the powder is ℥i. to ℥i. The form of administration best adapted to produce perspiration is decoction, made by boiling ℥i. in a quart of water and administering ℥ij. every two hours.

The A. INCARNATA and A. SYRIACA have a place in the Sec. List of the U. S. P. The roots are employed and produce the same effects on the system as the previous species, but to less extent. They are seldom or never used.—J. C.]

#### ORDER XLIV.—APOCYNACEÆ, Lindley.—THE NUX-VOMICA TRIBE.

ESSENTIAL CHARACTER.—*Calyx* divided into five, persistent. *Corolla* monopetalous, hypogynous, regular, five-lobed, with contorted aestivation, deciduous. *Stamens* five, arising from the corolla, with whose segments they are alternate. *Filaments* distinct. *Anthers* two-celled, opening lengthwise. *Pollen* granular, globose, or three-lobed, immediately applied to the stigma. *Ovaries* two, or one to two-celled, polyspermous. *Styles* two or one. *Stigma* one. *Fruit* a follicle, capsule, or drupe or berry, double or single. *Seeds* with fleshy or cartilaginous albumen; *testa* simple; *embryo* foliaceous; *plumule* inconspicuous; *radicle* turned towards the hilum.—*Trees* or *Shrubs*, usually milky. *Leaves* opposite, sometimes whorled, seldom scattered, quite entire, often having cilia or glands upon the petioles, but with no stipules. *Inflorescence* tending to corymbose (Lindley).

PROPERTIES.—Extremely variable. An order which contains the Nux-vomica. Upas Tienté, the Wooraly, and the Tanghin poisons, cannot but be regarded with suspicion and dread. Yet it contains some harmless and edible species. (See Royle's *Illustrations*, p. 272.)

#### STRYCHNOS NUX-VOMICA, Linn., L. E. D.—THE POISON-NUT.

*Sex. Syst.* Pentandria, Monogynia.

(Semina, L.—Seeds, E.)

(Nux-vomica, U. S.)

HISTORY.—We became acquainted with Nux-vomica through the Arabian authors. In the Latin translation of one of the works of Serapion (*De Simplic. Med.* clxiii. p. 115, Argent. 1531,) we find the word nux-vomica, but it appears to have been applied to some other substance (probably to St. Ignatius's bean).



“Est nux,” says he, “cujus color est inter glaucedinem et albedinem, major avellana parum et sunt in ea nodi.” To which he afterwards adds, “movet vomitum;” from which I presume the name of *vomic* or *vomiting nut*, was originally derived. Mesue also mentions *nux-vomica*. Avicenna (lib. 2<sup>ndus</sup>, tract. 2<sup>ndus</sup>, cap. 509,) says, *nux-methel* “est similis nuci vomicae.” It is probable that the *nux-mechil* of Serapion is the substance which we denominate *nux-vomica*.

**BOTANY. Gen. Char.**—*Calyx* four to five-parted. *Corolla* tubular, with a spreading four to five-cleft limb, and a valvate aestivation. *Stamens* four to five, inserted into the throat of the corolla, which is either naked or bearded. *Ovary* two-celled, with indefinite ovules attached to a central placenta; *style* one; *stigma* capitate. *Berry* corticated, one-celled, many-seeded, or by abortion one-seeded. *Seeds* nidulant, discoidal. *Albumen* large, cartilaginous, almost divided into two plates. *Embryo* with leafy cotyledons (Lindley).

FIG. 202.

*Strychnos Nux-vomica.*

**Sp. Char.**—*Leaves* opposite, three and five-nerved oval, lucid. *Berries* many-seeded (Roxburgh).

Middling-sized tree. *Trunk* short, often crooked, pretty thick; the *branches* irregular; the *wood* white, hard, and bitter. *Leaves* opposite, oval, shining, entire, three to five-nerved. *Corymbs* small, terminal, *Calyx* five-toothed. *Corolla* funnel-shaped, greenish-white. *Stamina* five, inserted over the divisions of the corolla. *Ovarium* two-celled. *Style* the length of the corolla. *Stigma* capitate. *Berry* round, smooth, size of a pretty large apple, covered with a smooth, somewhat hard, *shell*, of a rich orange-colour when ripe, filled with white, soft, gelatinous *pulp*, which is greedily eaten by many sorts of birds. *Seeds* several, immersed in the pulp of the berry, and attached to a central placenta.

**Hab.**—Coromandel, and other parts of India; Ceylon.

**DESCRIPTION.**—*a. Of the Seeds.*—The *seeds* (*nucis vomicae*) of commerce are round, peltate, scarcely an inch in diameter, nearly flat, or very slightly convex on one side, and concave on the other, and are surrounded by a filiform annular stria. From their fancied resemblance to gray eyes, as well as from their being poisonous to crows, the Germans term them *Krähenaugen*, or *crows' eyes*. In the centre of the ventral surface of the seed is the orbicular hilum or umbilicus.

These seeds have two coats; the outer one, or *testa*, is simple, fibrous, and gives origin to short silky hairs, of an ash-gray, or yellowish colour, and which are directed from the centre towards the circumference: within this is the inner coat, or *endopleura*, which is simple, and very thin, and envelopes the nucleus of the seed.

This nucleus is composed of two parts—namely, albumen and embryo. The *albumen* is bipartite, cartilaginous, or horny; of a dirty-white colour, of an intensely bitter taste, and, has, in its interior, a cavity (*loculamentum verum*). Unlike that of most seeds, the albumen of *nux-vomica* is of a poisonous nature. The *embryo*, which is milk-white, is seated in the circumference of the seed, its locality being frequently indicated by a point somewhat more projecting than the surrounding parts. It consists of two large cordiform, acuminate, triple-ribbed, very thin cotyledons, a distinct cauliculus, and a centripetal radicle (*i. e.* a radicle directed towards the centre of the fruit).

***β. Of the Bark.***—The *bark* of the *Strychnos nux-vomica* (*nux vomica bark*; *cortex strychnos nucis vomica*; *cortex angustura spuria* seu *falsa*; *cortex pseudo-angustura* seu *virosa*) occurs in quills or flat pieces (*angustura falsa convoluta* seu *plana*), or in pieces arched backwards, having the twisted appear-



ance of dried horn. It is more compact and heavy than real angustura bark. The epidermis varies in its qualities; sometimes it consists of a dark fungoid, or spongy rust-coloured layer (hence the term *angustura ferruginea*, which is only the altered epidermis; at other times it is not thick, not fungous, but covered with numerous whitish prominences, formerly supposed to be some species of lichen (*Chiodecton*), but now known to be only an epidermoid alteration, a kind of leprous exuberance, the more advanced stage of which constitutes the rust-coloured layer already mentioned. (Fée, *Essai sur les Cryptog. des Ecorces exot.* p. 16, 1824.) The powder is intensely bitter, and of a yellowish-white colour.

NUX-VOMICA BARK was formerly confounded with angustura or cusparia bark: hence its name of *false angustura bark*. The history of the mistake is as follows:—In 1804, Dr. Rambach, a physician at Hamburg, observed that some specimens of angustura bark, said to be from the East Indies, acted as a powerful poison; and as repeated cases of poisoning occurred with the same substance, an order was issued, forbidding the use of angustura bark. On the 15th of October, 1815, the Commission of Health of the Grand Duchy of Baden ordered all the angustura bark in the possession of the apothecaries to be seized, and placed under a seal; the physicians at the same time receiving an intimation that they were not, in future, to prescribe this bark. Similar ordinances were issued in Austria, Bavaria, and Wirtemberg. (Schwartz, *Pharm. Tabell.* S. 95, 2<sup>e</sup> Ausg. 1833; *Hufeland's Journ.* Bd. xix. St. i. S. 181.)

The origin of the bark is said, by Batka, to be as follows:—A quantity of it was imported from the East into England, and not being saleable, was sent to Holland; and as no better means of getting rid of it offered, it was mixed with, and sold as, genuine angustura or cusparia bark. (Guibourt, *Hist. des Drog.* t. ii. p. 4, 3<sup>me</sup> ed. 1836.) Great obscurity long existed as to the tree which yielded it. At first it was attributed to the *Brucea ferruginea* or *anti-dysenterica*, a native of Abyssinia, belonging to the family Xanthoxylaceæ; but in 1831, Geiger had occasion to examine the bark of the *B. ferruginea*, and found that it had no resemblance to false angustura. (*Pharm. Central-Blatt für* 1831, S. 477.) Now, the composition and effects of this bark rendered it, in the highest degree, probable, that it was the product of some tree of the family Apocynaceæ, most probably of the genus *Strychnos*; Batka said of the *S. nux-vomica*, or some kindred species; an opinion which was confirmed by my examination of the specimens of the nux-vomica plant in Dr. Wallich's collection, in the possession of the Linnean Society. (*London Medical Gazette* vol. xix. p. 492.) In 1837, Dr. O'Shaughnessy (*Madras Journal* for April, 1837), established the identity of false angustura bark and the bark of the nux-vomica tree. Since then I have examined about 1 cwt. of the latter bark brought to this country, and find it to be identical with false angustura bark contained in my museum, and which I had purchased in Paris several years before.

COMMERCE.—In 1838 there were imported 1017 lbs. of nux-vomica; in 1839 only 478 lbs.; in 1840, 550 lbs. The duty is 2s. 6d. per lb.

COMPOSITION.—The seeds of *Strychnos Nux-vomica* have been analyzed by Rese, (Pfaff, *Syst. d. Mat. Med.* Bd. ii. S. 90,) Desportes, (*Bull. de Pharm.* t. i. p. 271,) Bracconot, (*Ibid.* t. iii. p. 315,) Chevreul, (Orfila, *Toxicol. Gén.*) and Pelletier and Caventou. (*Ann. Chim. et Phys.* t. x. p. 142.) The most important of these analyses is that made by the last-mentioned chemists; who also examined the bark of *Strychnos Nux-vomica*, under the name of *false angustura*. (*Ann. Chim. et Phys.* t. x. ii. p. 113.) The leprous coating of this bark they afterwards (*Journ. de Pharm.* t. v. p. 546,) submitted to a separate examination, under the idea of its being a lichen.

*Pelletier and Caventou's Analyses of the Strychnos Nux-vomica.*

1. Of the Seeds.	2. Of the Bark.
Strychnic, or iganuric acid. Strychnia } in combination with strychnic acid. Brucia } Wax (a small quantity). Concrete oil. Yellow colouring matter. Gum. Starch (a little). Bassorin. Woody fibre. Carbonate of lime and chloride of potassium in the ashes.	Gallate of brucia. Fatty matter (not deleterious). Gum (a considerable quantity). Yellow colouring matter and alcohol. Sugar (traces). Woody fibre.
Nux-vomica (false Angustura) bark.	
The leprous coating was composed of a greenish yellow oil, yellow colouring matter, reddish yellow colouring matter, [and woody fibre.]	

Nux-vomica seeds.

1. STRYCHNIA. (See p. 360.)
2. BRUCIA. *Brucina*; *Vomicina*, Guib., discovered in 1819, by Pelletier and Caventou,



exists in the bark and seeds of nux-vomica, and in St. Ignatius's bean: in the two latter substances it is associated with strychnia, and is in combination with igasuric acid; while in the bark of nux-vomica it is combined with gallic acid. Brucia in the anhydrous form, as obtained by fusing it, has a waxy appearance; but when combined with water, it is capable of crystallizing, the form of the crystals being oblique four-sided prisms; or sometimes the crystals have a pearly laminated appearance, something like boracic acid. Its taste is very bitter, though less so than that of strychnia. It is soluble in 850 parts of cold, or 500 parts of boiling water; but the presence of colouring matter, of which it is difficult to deprive it, promotes its solubility. It is very soluble in alcohol, but is insoluble in ether and the fixed oils, and is very slightly soluble only in the volatile oils. Nitric acid assumes a fine red colour when added to brucia: deoxidizing agents, as sulphuretted hydrogen and sulphurous acid, decolourize this solution. Iodic and chloric acids produce the same phenomena as nitric acid. Chlorine communicates a red colour to brucia. (Pelletier, *Journ. de Pharm.* xxiv. p. 159.)

The following is the composition of brucia (*Pharmaceutisches Central-Blatt für 1838*, p. 490; *Ann. d. Pharm.* xxvi. p. 10):

	Atoms.	Eq. Wt.	Per cent.	Regnault.		Liebig.
Carbon.....	48	288	70.76	70.60	70.85	70.88
Hydrogen.....	27	27	6.63	6.67	6.88	6.66
Nitrogen.....	2	28	6.88	7.05	7.09	5.07
Oxygen.....	8	64	15.72	15.68	15.78	17.39
Brucia.....	1	407	99.99	100.00	100.00	100.00

Regnault states, that 100 parts of crystallized brucia lose, by heat, 18.41 per cent. of water. Hence 1 atom of brucia, according to the above formula, combines with 10 atoms of water to form crystallized brucia.

More recently Regnault (*Pharmaceutisches, Central-Blatt für 1839*, p. 67; *Ann. d. Pharm.* xxix. p. 58) has given the following formula for anhydrous brucia:— $C^{40} H^{20} N^2 O^8$ .

According to Dr. Fuss, (*Berlinisches Jahrbuch für die Pharmacie*, Bd. xliii. S. 407, 1840,) brucia is not a peculiar alkaloid, but a compound of strychnia and resin [yellow colouring matter]. He has proved this both analytically and synthetically. The property of brucia to become reddened by nitric acid and by chlorine, he ascribes to the resin present. Prof. Erdmann, who examined the products of Fuss's experiments, has confirmed his statements.

The salts of brucia are readily formed by saturating dilute acids with brucia. They possess the following properties:—For the most part they are soluble and crystallizable, and have a bitter taste. They are decomposed by potash, soda, ammonia, the alkaline earths, morphia, and strychnia, which precipitate the brucia. They produce precipitates (*tannate of brucia*) on the addition of tannic acid. Both nitric acid and chlorine colour them as it does free brucia.

The effects of brucia on man and animals appear to be precisely similar to those of strychnia, though larger doses are required to produce them. Magendie (*Formul.*) considers it to possess only one-twelfth the activity of strychnia; while Andral regards it as having one-sixth the power of impure strychnia, and one twenty-fourth that of pure strychnia.—Dose, half a grain, which is to be gradually increased to five grains. It may be given in the same way as strychnia.

3. **STRYCHNIC OR IGASURIC ACID.**—Exists in the seeds of nux-vomica, St. Ignatius's bean, and snake wood. Dr. A. T. Thomson (*Lancet*, Sept. 16, 1837) thinks that igasurate of strychnia exists in *Arnica montana*. Igasuric acid is crystallizable, and has an acid, rough taste. It is soluble in water and alcohol. The salts of iron, mercury, and of silver in solution, are unaffected by it; but those of copper are rendered green; and after some time a light green precipitate is deposited.

4. **YELLOW COLOURING MATTER.**—Found in the seeds and bark of nux-vomica, in St. Ignatius's bean, and the *Upas Tieuté*. Also in *Strychnos pseudo-quina*, Casca d'Anta, and *Pereiru Bark* [see p. 364]. It is soluble in water and alcohol, and is reddened by nitric acid [and by chlorine].

5. **REDDISH YELLOW COLOURING MATTER.**—Resides in the rust-coloured epidermoid alteration of nux-vomica bark. Also in *Strychnos pseudo-quina* (see p. 364). It is insoluble in cold water and in ether, but dissolves with facility in alcohol. Nitric acid renders it deep green by combining with it.

6. **OTHER CONSTITUENTS.**—The wax mentioned in the above analysis is probably derived from the hairs with which the seeds are invested; it enables them to resist moisture. Resin is probably a constituent of the seeds; for tincture of nux-vomica is rendered milky by water. An odorous, non-acid, innocuous principle is obtained by submitting nux-vomica and water to distillation. Meissner detected copper in the ashes of nux-vomica; but I have several times repeated his experiment without recognizing this metal.

**CHEMICAL CHARACTERISTICS.** 1. **Of the Seeds.**—Powdered nux-vomica has a fallow gray colour, a bitter taste, and a peculiar odour analogous to that of liquorice. Thrown on burning coals it inflames when the temperature is very



high; but when lower, is decomposed, evolves a thick white smoke of a peculiar odour, and leaves a carbonaceous residuum. Concentrated sulphuric acid blackens it. Nitric acid communicates to it a *deep orange-yellow colour*. If the powder be digested with boiling water acidulated with sulphuric acid, the filtered liquor is turbid and slightly yellow. Nitric acid, after some minutes, reddens it; ammonia makes it brown, and precipitates blackish flocks. If the sulphatic solution be digested with finely powdered marble (to saturate the excess of acid), then evaporated to dryness, and the residue treated with boiling alcohol, we obtain a spirituous solution of sulphates of strychnia and brucia, with colouring matter. This has a bitter taste, is reddened by nitric acid, produces convulsions when given to birds or other small animals, and forms a flocculent coloured precipitate on the addition of ammonia. Sometimes crystals are deposited from the alcoholic liquor, on standing for two or three days. (Orfila and Barruel, *Arch. Gén. de Méd.* viii. 22; R. D. Thomson, *Brit. Ann. of Med.* i. 106.)

Ammoniacal-sulphate of copper added to the *infusion* or *decoction* of *nux-vomica*, produces an emerald-green colour, and gradually a greenish-white precipitate (*igasurate of copper*): ammoniacal sulphate of strychnia remains in solution. Sesquichloride of iron also produces an emerald colour, which disappears on the addition of hydrochloric acid: this coloration does not depend, according to Pelletier and Caventou, on the *igasuric acid*; nor can it depend on tannic acid, for gelatin gives no indication of this substance: if the decoction be boiled with animal charcoal, it loses the power of becoming green on the addition of a ferruginous salt. Nitric acid communicates an orange-red colour to the decoction, owing to its action on the brucia and yellow colouring matter. A solution of iodine communicates a yellowish-brown tinf to the decoction; but after a few minutes the colour disappears (owing, perhaps, to the formation of the hydriodates of strychnia and brucia), and the iodine is no longer detectable by starch, without the addition of nitric acid or chlorine. Tannic acid, or infusion of nutgalls, produces in the decoction a copious precipitate (*tannates of strychnia, brucia, and some other vegetable matter*). Alcohol also causes a precipitate (*gum.*) Acetate and diacetate of lead cause abundant precipitates composed of *gunnate and igasurate of lead, with colouring and fatty matter*.

2. *Of the Bark.*—An infusion of this bark reddens litmus, in consequence of the excess of acid present. Strong nitric acid added to this solution produces a red colour; and by dropping the acid on the inner surface of the bark, a blood-red spot is produced: in both cases the effect arises from the action of the acid on the brucia and yellow colouring matter. If nitric acid be applied to the external surface of the bark, it produces a deep green colour, in consequence of the action of the acid on the yellow colouring matter (see *Strychnos pseudoquina*, p. 364). Infusion of galls added to the infusion of this bark occasions a white precipitate (*tannate of brucia*). Sulphate of iron colours the infusion green, from its action on the yellow colouring matter. (For other characteristics see *ANGUSTURA BARK.*)

PHYSIOLOGICAL EFFECTS. 1. *Of the Bark. a. On Animals generally.*—The experiments of Pfaff, the Vienna faculty, Emmert, Meyer, Orfila, Magendie, and Jäger, (Wibmer, *Wirk. d. Arzneim. u. Gift.* Bd. i. S. 182,) have shown that it is a powerful poison to dogs, rabbits, wolves, and other animals. Thus eight, twelve, or eighteen grains of it, kill dogs, the symptoms being precisely the same as those of *nux-vomica* already detailed. Emmert (quoted by Christison) inferred, from experiments made on animals, that this bark acts on the spine directly, and not on that organ through the medium of the brain.

β. *On Man* it also acts as a powerful poison. Emmert (quoted by Wibmer, *Wirk. d. Arzneim. u. Gift.* Bd. i. S. 188,) mentions that a boy who had taken by mistake the decoction of this bark died therefrom. His intellectual powers were unaffected; he entreated his physician not to touch him, as violent convul-



sions were immediately brought on; he was powerfully sweated, but did not vomit. Prof. Marc was nearly poisoned by swallowing through mistake three quarters of a liqueur glassful of a strong vinous infusion. (*Journ. de Pharm.* t. ii. p. 507.)

2. *Of the Seeds.* a. *On Vegetables.*—Marcet (*Ann. Chim. et Phys.* t. xxix.) states, that a quarter of an hour after immersing the root of an haricot plant (*Phaseolus vulgaris*) in a solution of five grains of the extract of nux-vomica in an ounce of water, the petals became curved downwards, and in twelve hours the plant died. Fifteen grains of the same extract were inserted in the stem of a lilac tree, on July the 5th, and the wound closed. In thirteen days the neighbouring leaves began to wither.

β. *On Animals generally.*—Nux-vomica appears to be poisonous, in a greater or less degree, to all classes of animals. On the vertebrata its effects are very uniform, though larger quantities are required to kill herbivorous than carnivorous animals. Thus a few grains will kill a dog, but some ounces are required to destroy a horse. (Moiroud, *Pharm. Vét.* p. 266.) It occasions in all, tetanic convulsions, increased sensibility to external impressions, asphyxia, and death. (*Orfila, Toxicol. Gén.*)

γ. *On Man.*—Three degrees of the operation of nux-vomica on man may be admitted.

αα. *First degree: tonic and diuretic effects.*—In very small and repeated doses, nux-vomica usually promotes the appetite, assists the digestive process, increases the secretion of urine, and renders the excretion of this fluid more frequent. In some cases it acts slightly on the bowels, and occasionally produces a sudorific effect. The pulse is usually unaffected. In somewhat larger doses, the stomach not unfrequently becomes disordered, and the appetite impaired.

ββ. *Second degree; rigidity and convulsive contraction of the muscles.*—In larger doses, the effects of nux-vomica manifest themselves by a disordered state of the muscular system. A feeling of weight and weakness in the limbs, and increased sensibility to external impressions (of light, sound, touch, and variations of temperature), with depression of spirits and anxiety, are usually the precursory symptoms. The limbs tremble, and a slight rigidity or stiffness is experienced when an attempt is made to put the muscles into action. The patient experiences a difficulty in keeping the erect posture, and, in walking, frequently staggers. If, when this effect is beginning to be observed, he be tapped suddenly on the ham while standing, a slight convulsive paroxysm is frequently brought on, so that he will have some difficulty to prevent himself from falling. I have often in this way been able to recognise the effect of nux-vomica on the muscular system, before the patient had experienced any particular symptoms.

If the use of the medicine be still persevered in, these effects increase in intensity, and the voluntary muscles are thrown into a convulsed state by very slight causes. Thus, when the patient inspires more deeply than usual, or attempts to walk, or even to turn in bed, a convulsive paroxysm is brought on. The sudden contact of external bodies also acts like an electric shock on him. The further employment of nux-vomica increases the severity of the symptoms; the paroxysms now occur without the agency of any evident exciting cause, and affect him even when lying perfectly quiet and still in bed. The muscular fibres of the pharynx, larynx, cesophagus, and bladder, also become affected, and Troussseau and Pidoux (*Traité de Thérap.* t. i. p. 515,) say those of the penis are likewise influenced, and the nocturnal and diurnal erections become inconvenient, even in those who, for some time before, had lost somewhat of their virility. I am acquainted with two cases of paralysis, in which the use of nux-vomica caused almost constant nocturnal erection. Females also, say Troussseau and Pidoux, experience more energetic venereal desires; and “we have,” they add, “received confidential information on this point, which cannot be doubted.”



The pulse does not appear to be uniformly affected; for the most part it is slightly increased in frequency between the convulsive attacks, but Trousseau says he has found it calm even when the dose of the medicine was sufficient to cause general muscular rigidity. Previous to the production of the affection of the muscles, various painful sensations are oftentimes experienced in the skin, which patients have compared to the creeping of insects (formication), or to the passage of an electric shock; and occasionally an eruption makes its appearance.

It is remarkable that in paralysis the effects of nux-vomica are principally observed in the paralysed parts. Magendie (*Formul.* p. 7, 8<sup>me</sup> éd.) states he has observed sweating confined to the paralysed parts. "I have seen," says this physiologist, "the affected side covered with an anomalous eruption, while the opposite side was free from it. One side of the tongue is sometimes sensible of a very bitter taste, which is not perceptible to the other side."

*γγ. Third degree: tetanus, asphyxia, and death.*—To illustrate this third and most violent degree of operation I think I cannot do better than relate a case of poisoning by nux-vomica reported by Mr. Ollier. (*Lond. Med. Repos.* vol. xix. p. 448.)

A young woman swallowed between three and four drachms of this substance in powder, and in half an hour was seen by Mr. Ollier. She was sitting by the fire, quite collected and tranquil; her pulse about 80, and regular. He left her for about ten minutes to procure an emetic, and on his return found that she had thrown herself back in her chair, and that her legs were extended, and considerably separated. She was perfectly sensible, and without pain, but seemed in alarm, laid hold of her husband's coat, and entreated him not to leave her. A perspiration had broken out on her skin, her pulse had become faint, and much quicker, and she called frequently for drink. She then had a slight and transient convulsion. Recovering from it, she was in great trepidation, kept fast hold of her husband, and refused to let him go, even for the alleged purpose of getting her drink. In a few minutes after she had another, and a more violent attack, and shortly afterwards, a third: the duration of these was from a minute and a half to two minutes. In them she retained her grasp; her whole body was straightened and stiffened, the legs pushed out and forced apart. I could not (says Mr. Ollier) perceive either pulse or respiration, the face and hands were livid, the muscles of the former, especially of the lips, violently agitated, and she made constantly a moaning, chattering noise. She was not unlike one in an epileptic fit, but did not struggle, though, as she was forced out, it was difficult to keep her from falling on the floor.

In the short interval of these attacks she was quite sensible; was tormented with incessant thirst; perspired; had a very quick and faint pulse; complained of being sick, and made many attempts to vomit. (I should state she had swallowed some ipecacuanha powder to evacuate the poison.) She continued to refuse to let her husband move, and to the question whether she was in pain, replied, "No—no—no!"

A fourth and most vehement attack soon followed, in which the whole body was extended to the utmost, and she was rigidly stiff from head to foot, insomuch that, with all the force of the surgeon, he could not bend her thighs on the pelvis to replace her in her seat. From this she never recovered; she fell into a state of asphyxia, and never breathed again. She now relaxed her grasp; her discoloured hands dropped upon her knees; her face, too, was livid; the brows contracted; the lips wide apart, showing the whole of the closed teeth, and a salivary foam issued plentifully from the corners of her mouth. The expression of the whole countenance was at this time very frightful. On removal of the body, it was discovered that the urine had been discharged. She died in about an hour after taking the poison. Five hours afterwards, she was still as straight and stiff as a statue; if you lifted one of her hands, the whole body moved with it, but the face had become pale in comparison, and its expression more placid.

**Post-mortem Appearances.**—In the case just related the body was observed to be rigid after death, but in the lower animals the reverse is generally noticed. As in other cases where death takes place from obstructed respiration, venous congestion is observed. Occasionally there is redness or inflammation of the alimentary canal, and now and then softening of the brain or spinal cord.

**Modus Operandi.**—There are several points connected with the modus operandi of nux-vomica which require investigation:

1st. *Is this seed a local irritant?*—In medicinal doses it does not usually disorder the stomach, nor is it invariably irritant in its operation, even when swallowed as a poison. In some instances, however, the pain and heat in the stomach, the burning in the gullet, and the nausea and vomiting, are evidences of



its local action; and, in several cases, marks of inflammation have been observed in the stomach on examination of the body after death. Strychnia also is a local irritant.

2d. *On what part of the body does nux-vomica exercise a specific effect?*—The symptoms clearly indicate the nervous system to be specifically affected; and as the voluntary muscles are supplied with nervous influence from the cerebro-spinal portion of the nervous system, it is presumed that it is on this portion that nux-vomica exerts its principal or sole influence. Physiologists, however, have endeavoured to ascertain what part of the cerebro-spinal system was principally affected. Now the tetanic symptoms, and the absence of narcotism, have led to the conclusion that the spinal cord was the seat of the disease—a conclusion supported by the fact, that the division of this cord, nay, even complete decollation, will not prevent the poisonous effects of nux-vomica; whereas the destruction of the cord by the introduction of a piece of whalebone into the spinal canal, causes the immediate cessation of the convulsions; and if only part of the cord be destroyed, the convulsions cease in that part of the body only which is supplied with nerves from the portion of medulla destroyed. These facts, then, originally observed by Magendie, and which I have myself verified, lead to the conclusion, that the abnormal influence, whatever it may be, which causes the convulsions to take place, is not derived from the contents of the cranium, but from the medulla spinalis itself. Moreover, as the motor nerves seem principally affected, it has been presumed, that the disorder is seated in the anterior columns of the cord: but the white fibres of the nervous system are merely the conductors of nervous powers, the gray matter being apparently the source of it. (Grainger, *Struct. and Funct. of the Spinal Cord*, p. 17.) Hence, then, the seat of operation of nux-vomica is the seat of the reflex functions. (Dr. M. Hall, *Lect. on the Nerv. Syst.*) The increased susceptibility to external impressions produced by strychnia also depends, according to Dr. Stannius, (*Brit. and For. Med. Rev.* vol. v. p. 221,) on the primary action of this substance on the spinal marrow. The same physiologist concludes from his experiments on frogs, that the centripetal nerves receive, from the spinal cord, an increase of their excitability; and that, thus charged, they react upon the medulla, and occasion the peculiar convulsions.

M. Flourens (*Rech. Expér. sur les Fonct. du Syst. Nerv.* 1824,) asserted, that the part of the nervous system on which nux-vomica more particularly acted was the medulla oblongata. But MM. Orfila, Ollivier, and Drogartz, (*Arch. Gén. de Méd.* viii. 22,) in their report on a case of poisoning by this substance, particularly mention that they observed no traces of alteration in the condition of the medulla oblongata, the tuber annulare, or the crura cerebri; which is in opposition to Flourens' opinion; for he asserted, that the specific or exclusive action of each substance on each organ, always left, after death, traces of its action sufficient to distinguish the affected from other organs.

But it may be asked, is the cerebrum unaffected by nux-vomica? I think we are hardly justified in replying to this in the affirmative. It is, indeed, true that the intellectual functions are not usually much disordered by this drug, but the mental anxiety commonly experienced by persons under its use, the occasional appearance of stupor, and the observations of Andral and Lallemand on the injurious effects of it in some apoplexies, leave no doubt that, occasionally at least, the cerebrum is affected. Bally (*Brit. and For. Med. Rev.* vol. vi. p. 225,) has observed an appearance of stupor; vertigo, tinnitus aurium, sleeplessness, and turgescence of the capillaries of the face, result from the use of strychnia.

The cerebellum is said, by some, to be acted on by nux-vomica, but for the most part on hypothetical grounds, though it must be mentioned that MM. Orfila, Ollivier, and Drogartz, observed the cerebellum presented more evidences of lesions than the other parts of the nervous system. Another argument,



which probably would be advanced by phrenologists in favour of the affection of the cerebellum by this drug, is the observation of Trousseau, that the sexual feelings are usually excited by it.

Ségalas (quoted by Dr. Christison,) found, in his experiments on animals, that in some cases life could not be prolonged by artificial respiration, and that after death the heart could not be stimulated to contract. These and other reasons seem to show, that nux-vomica exhausts the irritability of the heart. But in all probability this viscus is affected only secondarily, the essential and primary action being on the nervous system.

3d. *What kind of action does nux-vomica set up in those parts of the nervous system on which it acts?*—As the muscles receive from the nervous system a preternatural stimulus to action, it is presumed that this system (or at least certain parts of it) is in a state of excitement or irritation. In one case mentioned by Mr. Watt, (Christison, p. 183,) there was observed softening of the lumbar portion of the spinal cord; and in the case reported by MM. Orfila, Ollivier, and Drogartz, the whole cortical substance of the brain, especially of the cerebellum, was softened. Andral and Lallemand have both observed that this remedy, in some forms of apoplexy, produced symptoms indicating ramollissement.

4th. *What is the reason that strychnia first displays its remarkable influence on paralytic limbs?*—Ségalas has offered the following explanation of this well-known fact: the muscles of the unaffected limbs being simultaneously subject to the government of the brain and the action of the poison, are better enabled to resist the latter than paralysed muscles, which, not being under cerebral influence, are more affected by the poison. To this hypothesis, however, insuperable objections present themselves. Under the influence of strychnia paralysed parts sometimes suffer violent pain, while the healthy parts are free from it. How, asks Ollivier, (*Traité de la Moëlle Epinière*, p. 841, Paris, 1827,) is this specific influence on paralysed parts only to be explained? Does it not show, moreover, that these parts are not so entirely isolated from the influence of the nervous centres as the hypothesis of Ségalas would lead us to infer?

Dr. Marshall Hall (*Méd. Chir. Trans.* 2<sup>nd</sup> Series, vol 4th. Lond. 1839,) has advanced a most ingenious explanation of the above-mentioned fact. Strychnia, he asserts, does not, in every case of paralysis, first display its influence on the paralytic limb. When the paralysis is cerebral, the irritability of the muscular fibre becomes augmented, from want of the application of the stimulus of volition; and in such cases, therefore, strychnia first affects the paralysed muscles, because these are more irritable than the sound ones. But in spinal paralysis, the irritability is diminished, and in such strychnia does not firstly and mostly affect the paralysed limbs. The augmented irritability of the muscles in cerebral paralysis, and the diminished irritability in spinal paralysis, he ascertained by voltaic electricity.

This explanation appeared to me so plausible and satisfactory that in the first edition of this work (pp. 911-12) I adopted it, believing it to present a clear and physiological elucidation of the facts before related. But in the summer of 1841 I made a number of observations on paralytic patients in the London Hospital, which convinced me that it does not correctly interpret the phenomena in question. The following is a brief abstract of one case, out of many similar ones:

A middle aged man was admitted into the hospital suffering with hemiplegia of two years' standing, and the consequence of apoplexy. He was put under the influence of the alcoholic extract of nux-vomica. In a few days the muscles of the paralysed limbs were powerfully affected by the remedy, but those of the sound side were unaffected by it. I then resolved to try the effects of voltaic electricity on the paralysed and healthy muscles. For this purpose I directed each hand to be placed in a separate basin containing a solution of salt. The two basins were then respectively connected with the electrodes of a magneto-electric machine, and a current of electricity thus simultaneously traversed the paralysed and healthy arms. To my great surprise the muscles of the paralysed arm were comparatively but slightly affected,



while those of the sound one were most powerfully convulsed. This experiment was tried repeatedly, and invariably with the same result.

In this case the paralysis was undoubtedly, I think, cerebral. On Dr. Hall's hypothesis the effects of strychnia on the paralysed limbs proved it to be so. Yet the paralysed muscles were less irritable than the sound ones, as manifested by voltaic electricity. I have observed the same effects in many other cases. Furthermore I may remark that in every case of paralysis, whether cerebral or spinal, I have found the muscles of the paralysed parts to be less irritable to voltaic electricity than those of the sound part. Nor have I met with a single exception to the statement that strychnia first displays its effects on the paralysed parts; a fact of which I cannot at present offer a satisfactory explanation.

5th. *Does nux-vomica or its active principles become absorbed?*—Several reasons, some of which have been before alluded to (vol. i. pp. 127 and 129,) may be adduced in favour of the affirmative of this question. Thus the blood of animals under the influence of this poison has been found to be poisonous (though Messrs. Morgan and Addison deny that this was the case in their before-mentioned experiment, (vol. i. p. 131). Moreover, the activity of this drug seems to be in the ratio of the absorbing power of the part.

6th. *Is any change produced in the blood-discs by strychnia?*—Muller (*Physiol.* by Baly, vol. i. p. 107) says, strychnia produces no change in them; and Dr. Stannius (*Brit. and For. Med. Rev.* vol. v. p. 222) was unable to detect, by means of the microscope, any alteration in the appearance of the blood of frogs poisoned by strychnia.

7th. *In what manner is death produced by nux-vomica?*—Frequently by the stoppage of respiration, in consequence of the spasmodic condition of the respiratory muscles (vol. i. p. 180). In other cases, death seems to arise from excessive exhaustion of the nervous power (see Cloquet's case, quoted by Christison).

USES.—The obvious indications for the use of nux-vomica, strychnia, or brucia, are torpid or paralytic conditions of the muscular fibre; while these agents are contra-indicated in spasmodic or convulsive diseases. Experience, however, has fully proved that when paralysis depends on inflammatory conditions of the nervous centres, these agents prove injurious, and accelerate organic changes.

1. *In paralysis.*—Of all the diseases for which nux-vomica has been employed, in none has it been so successful as in paralysis; and it is deserving of notice, that this is one of the few remedies whose discovery is not the effect of mere chance, since Fouquier (Bayle, *Bibl. Thérap.* t. ii. p. 141) was led to its use by legitimate induction from observation of its physiological effects. That a remedy which stimulates so remarkably the muscular system to action should be serviceable when that system no longer receives its accustomed natural stimulus is, *à priori*, not astonishing. Paralysis, however, is the common effect of various lesions of the nervous centres, in some of which nux-vomica may be injurious, in others useless, and in some beneficial. It is, therefore, necessary to point out under what circumstances this remedy is likely to be advantageous or hurtful.

A very frequent, and, indeed, the most common cause of paralysis, is hemorrhage of the nervous centres. Blood may be effused on the external surface of these centres, into their cavities, or in their substance, the latter being by far the most common case—in the proportion, according to Andral, (*Path. Anat.* by West, vol. ii. p. 722,) of 386 out of 292 instances of cerebral hemorrhage. It is almost superfluous to add that the radical cure of these cases can be effected only by the removal (that is, absorption) of the effused blood. Now the process by which this is effected is almost entirely a natural one: art can offer no assistance of a positive kind, though by the removal of impeding causes she may be at times negatively useful. Nux-vomica can, in such cases, be of no avail; on the contrary, it may be injurious.



The part immediately surrounding the sanguineous clot is usually much softened, a condition formerly regarded as the effect of the effusions. But Lallemand has satisfactorily shown that it often, though not invariably, precedes the hemorrhage. This softening, or *ramollissement*, is, according to the same authority, a constant and necessary result of an acute or chronic irritation. But the facts at present known do not warrant this generalization, since cases occur which apparently are unconnected with irritation. For this softening art can do but little; we have, in fact, no particular or uniform treatment. If we can connect with it any increased vascular action, of course bloodletting and the other antiphlogistic means are to be resorted to; whereas, if the reverse condition of system exist, marked by great languor and debility, tonics and stimulants may be administered. Nux-vomica in these cases offers no probability of benefit; on the contrary, we might suspect that, as it irritates the spinal cord, it might probably have the same effect on the brain, and hasten the production of softening. Now experience seems to confirm our theoretical anticipations. Andral (Bayle, *Bibl. Thérap.* t. ii. p. 227) relates the case of a man who was hemiplegic, in consequence of an old apoplectic attack. A pill, containing only one-twelfth of a grain of strychnia (the active principle of nux-vomica), was given him, and it produced a strong tetanic stiffness of the paralysed members. The following day he complained of pain in the head, on the side opposite to that paralysed; his intellectual functions were weaker, and his hemiplegia was increased; in fact, he had all the symptoms characterizing softening of the brain. It is, therefore, probable that the strychnia set up an inflammatory condition of the nervous substance around the apoplectic deposit, and that this condition was the precursor of *ramollissement*. When, therefore, nux-vomica is employed in those cases of paralysis which are connected with inflammation of the brain or spinal marrow, it is very likely to increase the evils it is intended to mitigate. Lallemand (*Recherches anatomico-pathologiques sur l'Encephale*, p. 267, 1820) reports two cases in which this drug, administered against cerebral maladies, occasioned convulsive movements, which continued until death. On opening the bodies, the cerebral substance surrounding the sanguineous clot was found disorganized and exceedingly softened. These facts suggest some useful reflections as to the use of this powerful drug in paralysis, and prevent its indiscriminate use in all cases of this disease.

But there are cases in which paralysis, arising from cerebral hemorrhage, may be advantageously treated by nux-vomica. The blood which is poured out in the apoplectic cell has at first a gelatinous consistence, some of it still remaining fluid. "Somewhat later," says Andral, (*Path. Anat.* by West, vol. ii. p. 723.) "twelve or fifteen days after the attack, for instance, the coagulum is found to be firmer and more circumscribed; later still, it becomes white or yellow, and is surrounded by a brownish-red fluid. The walls of the containing cavity are smooth, and lined with a delicate membrane. The surrounding cerebral substance in some cases retains its natural appearance, and in others is altered both in colour and consistence. As the interval between the effusion and the examination increases, the coagula gradually disappear." The cyst is now found to contain a serous fluid, occasionally having a few cellular bridges running from one side to the other; and nature subsequently attempts to get rid of the cyst by producing adhesion of its sides, leaving only a linear cicatrix. Now it is well known, that by long disuse of some of the voluntary muscles, the power over them becomes gradually diminished; and it appears that occasionally in cerebral hemorrhage, after the absorption of the effused blood, the paralysis remains, as it were by habit. In these cases the cautious employment of nux-vomica, or of its active principle, may be attended with beneficial results, by favouring the return both of motion and sensation.

But paralysis, like some other diseases of the nervous system, may exist without our being able to discover after death any lesion of the nervous centres;



and it is then denominated a functional disorder, as if there were actually no organic lesion. To me, however, the fact of the lesion of action is a strong ground for suspecting that there must have been an organic lesion of some kind, though we see nothing. "It is highly probable," says Andral, (*Path. Anat.* by West, vol. ii. p. 709,) "that some organic lesions do exist in such cases, though they escape our notice." Be this as it may, experience has fully established the fact, that nux-vomica is more beneficial in those forms of paralysis usually unaccompanied by visible lesions of structure; such, for example, as paralysis resulting from exposure to the influence of lead and its various compounds. Thus, of ten cases of saturnine hemiplegia, treated by nux-vomica or its active principles, and which are mentioned by Bayle, three were cured, and three ameliorated.

As hemiplegia more frequently depends on cerebral hemorrhage than some other forms of paralysis, so it is, for the most part, less amenable to remedial means. Thus, while out of twenty-six cases of paraplegia, nineteen were cured by nux-vomica or its active constituents, yet in thirty instances of hemiplegia, only thirteen were cured. In six cases of general paralysis (that is, paralysis of both sides at once), four were cured by this remedy. In the paralysis which sometimes affects the muscles of certain organs, nux-vomica (or strychnia) has been employed with advantage. Thus a case of amaurosis, accompanied with paralysis of the eyelid, is said to have been cured by it; and several cases of incontinence of urine, depending on paralysis, or diminished power of the muscular fibres of the bladder, have also been benefited by the same means. In some cases of local paralysis strychnia has been employed endermically with benefit.

2. *Paralysis of the Sentient Nerves.*—The good effects procured from the use of nux-vomica in paralysis of the motor nerves, have led to its employment in functional lesions of sentient nerves, characterized by torpor, inactivity, and paralysis. That benefit may be obtained in these cases is physiologically probable, from the circumstance that one of the effects of this agent is an exaltation of the susceptibility to external impressions, as I have before mentioned. Hitherto, however, the trials have not been numerous, nor remarkably successful. In *amaurosis* benefit has been obtained in some few instances; and where no organic lesion is appreciable, this remedy deserves a trial. The endermic method of using it has been preferred. Small blisters, covered with powdered strychnia, have been applied to the temples and eyebrows. The remedy causes sparks to be perceived in both eyes, especially the affected one; and it is said, the more of these, the better should be the prognosis: moreover, the red-coloured sparks are thought more favourable than sparks of other colours. When the malady is complicated with disease of the brain, the remedy must be employed with extreme caution.

3. *Other Affections of the Nervous System.*—I have seen nux-vomica very serviceable in shaking or tremor of the muscles produced by habitual intoxication. A gentleman thus affected, who had for several weeks lost the power of writing, reacquired it under the use of this medicine. *Chorea* has been benefited by it. (Magendie, *Formul.*) In *tetanus* it has been tried at the London Hospital without any augmentation of the convulsions. Several cases of *epilepsy* are said to have been relieved by it (Bayle, *Bibl. Thérap.* ii. p. 135 and 230); but, judging from its physiological effects, it would appear to be calculated to act injuriously, rather than beneficially, in this disease; and in one case (*Ibid.* p. 233,) the use of strychnia apparently caused paralysis and death. It has also been employed in *hypochondriasis* and *hysteria*. (*Ibid.* p. 134.) It has also been used in *neuralgia* with good effect. (*Lond. Med. Gaz.* Aug. 7, 1840.)

4. *Affections of the Alimentary Canal.*—On account of its intense bitterness, nux-vomica has been resorted to as a tonic and stomachic in *dyspepsia*, espe-



cially when this affection depends on, or is connected with, an atonic condition of the muscular coat of the stomach.

In *pyrosis*, resulting from simple functional disorders of the stomach, Mr. Mellor (*op. cit.* xix. p. 851,) considers it to be almost a specific. Even when pyrosis is symptomatic of organic disease of the stomach, he says it is of essential service. In febrile states of the system, its use is contra-indicated. Dr. Belcombe (*op. cit.* p. 964,) has confirmed these statements, and also speaks of its good effects in *gastrodynia*. In *dysentery*, particularly when of an epidemic nature, nux-vomica has gained some reputation. Hagstrom says, he has proved its value in some hundreds of cases (Bayle, *op. cit.* p. 135); and his report has been confirmed by Hufeland, (*op. cit.* p. 136,) Geddings, (*Brit. and For. Med. Rev.* vol. i. p. 255,) and others. In *colica pictonum*, a combination of strychnia and hydrochlorate of morphia has been found by Bally, highly successful, (*op. cit.* vol. vi. p. 225.) In *prolapsus of the rectum*, Dr. Schwartz (*Lond. Med. Gaz.* vol. xvi. p. 768,) has recommended the use of this remedy, which he has employed for ten years, both in adults and children, with great benefit. One or two grains of the alcoholic extract are to be dissolved in two drachms of water; and of this solution he gives to sucking infants two or three drops; to older children from six to ten or fifteen drops, according to their age.

5. *In impotence*.—The excitement of the sexual feelings, which Trousseau has seen produced by nux-vomica, led him to employ this remedy against impotence, and he has found it successful both in males and females. In some cases, however, its good effects were observed only while the patients were taking the medicine. A young man, twenty-five years of age, of an athletic constitution, who had been married for eighteen months without having any other than almost fraternal communications with his wife, acquired his virility under the use of nux-vomica, though he again lost it soon after leaving off its employment.

The preceding are the diseases in which nux-vomica has proved most successful. It has, however, been used in several others (as *intermittent fevers*, *intestinal worms*, &c.) with occasional benefit.

ADMINISTRATION.—Nux-vomica is used in the form of *powder*, *tincture*, or *extract*. *Strychnia* and *brucia* may be regarded as other preparations of it. The *powder* of nux-vomica is administered in doses of two or three grains gradually increased. Fouquier has sometimes increased the quantity to fifty grains.

ANTIDOTE.—Evacuate the contents of the stomach as speedily as possible. No chemical antidotes are known. Probably astringents (as infusion of galls, green tea, &c.,) would be serviceable. Donné (*Journ. de Pharm.* t. xvi. p. 377,) regards chlorine, iodine, and bromine, as antidotes for strychnia and brucia; but further evidence is required to establish the correctness of his inferences. Emmert (Buchner, *Toxikol.* S. 235-6,) says that vinegar and coffee increased the poisonous effects of nux-vomica (false angustura) bark. To relieve the spasms, narcotics may be employed. Sachs and others have recommended opium. As conia is the counterpart of strychnia, it deserves a trial. I applied it to a wound in a rabbit affected with tetanus from the use of strychnia: the convulsions ceased, but the animal died. In the absence of conia, the extract of hemlock should be employed. Ether and oil of turpentine have been recommended. (Phæbus, *Hülfsleist bei acut. Vergift.* S. 14.) To relieve the excessive endermic operation of strychnia, acetate of morphia applied to the same spot has given relief.

1. TINCTURA NUCIS-VOMICÆ, D. *Tincture of Nux-vomica*.—(Nux-vomica, scraped, ℥ij.; Rectified Spirit, ℥viiij. Macerate for seven days, and filter.)—Dose, ℞v. to ℞xx. It is sometimes used as an embrocation to paralysed parts, and its good effects in this way seem to be increased by combining it with ammonia.

2. EXTRACTUM NUCIS-VOMICÆ, E. D. (U. S.) *Extract of Nux-vomica*.—



("Take of nux-vomica any convenient quantity; expose it in a proper vessel to steam till it is properly softened; slice it, dry it thoroughly, and immediately grind it in a coffee-mill; exhaust the powder either by percolating it with rectified spirit, or by boiling it with repeated portions of rectified spirit until the spirit comes off free of bitterness. Distil off the greater part of the spirit; and evaporate what remains in the vapour-bath to a proper consistence," *E.*—The *Dublin College* order of Nux-vomica, scraped, ℥vij. ; Proof Spirit, Oij. [*wine measure*]. Digest in a close vessel for three days, and express the residuum; consume the mixed liquors by distillation, to a fourth part, and reduce to a proper consistence. By the *Dublin process* the produce of extract is about 9 per cent.) (Barker and Montgomery, *Observ. on the Dubl. Pharm.*) (The U. S. P. direct nux-vomica a pound; alcohol, a sufficient quantity. The process is the same as that of the *E. College.*)—Dose, gr. ss., gradually increased two or three grains. The extract is given in the form of pill.

3. STRYCHNIA, L. E.; (U. S.) *Strychnine*; *Strychnina*; *Vauquelina*; *Tetanine*. This alkaloid was discovered in 1818 by Pelletier and Caventou. It has been found in *Strychnos Nux-vomica*, *S. Ignatia*, *S. Colubrina*, and *S. Tieutê*. In these plants it is frequently associated with brucia, and is always combined with an acid.

The directions of the *London College* for preparing this alkali are as follow:

"Take of Nux-vomica, bruised, lb. ij.; Rectified Spirit, Cong. iij.; Diluted Sulphuric Acid; Magnesia; Solution of Ammonia, each as much as may be sufficient. Boil the bruised nux-vomica with a gallon of the spirit for an hour in a retort, to which a receiver is fitted. Pour off this liquor, and again a third time boil what remains with another gallon of spirit and the spirit recently distilled, and pour off the liquor. Press the nux-vomica, and let the spirit distil from the mixed and strained liquors. Evaporate what remains to the proper consistence of an extract. Dissolve this in cold water, and strain. Evaporate the liquor with a gentle heat, until it has the consistence of syrup. To this, while yet warm, gradually add the magnesia to saturation, shaking them together. Set it aside for two days, then pour off the supernatant liquor. Press what remains wrapped in cloth. Boil it in spirit, then strain, and let the spirit distil. Add to the residue a very little diluted sulphuric acid mixed with water, and macerate with a gentle heat. Set it aside for twenty-four hours, that crystals may form. Press and dissolve them. Afterwards to these, dissolved in water, add ammonia, frequently shaking them, that the strychnia may be thrown down. Lastly, dissolve this in boiling spirit, and set it aside that pure crystals may be produced."

The directions of the *Edinburgh College* are as follows:

"Take of Nux-vomica, lb. j.; Quicklime, ℥ss.; Rectified Spirit, a sufficiency. Subject the nux-vomica for two hours to the vapour of steam, chop or slice it, dry it thoroughly in the vapour-bath or hot air-press, and immediately grind it in a coffee-mill. Macerate for twelve hours in two pints of water, and boil it; strain through linen or calico, and squeeze the residuum; repeat the maceration and decoction twice with a pint and a half of water. Concentrate the decoctions to the consistency of thin syrup; add the lime in the form of milk of lime; dry the precipitate in the vapour-bath; pulverize it, and boil it with successive portions of rectified spirit till the spirit cease to acquire a bitter taste. Distil off the spirit till the residuum be sufficiently concentrated to crystallize on cooling. Purify the crystals by repeated crystallization."

[The process of the U. S. P. differs from either of the above. It directs Nux-vomica, rasped, lb. iv.; Lime, in powder, ℥vj.; Muristic Acid, ℥iij.; Alcohol; Diluted Sulphuric Acid; Solution of Ammonia; Purified Animal Charcoal; Water, each a sufficient quantity. The first step in the operation is to convert the strychnia into a muriate by boiling, with water acidulated by the acid, and repeat twice. Next decompose the muriate by the lime, which separates the strychnia. Take this up by alcohol, and convert it into a sulphate by boiling with dilute sulphuric acid; decolour by the charcoal, and finally separate the strychnia by the solution of ammonia, and dry on bibulous paper.]

The following is the rationale of the process of the *London Pharmacopœia*: the watery solution of the alcoholic extract contains the *strychnate of strychnia*; the magnesia decomposes this, and by abstracting the strychnic acid sets free the strychnia.

MATERIALS.	PRODUCTS.
Magnesia	Strychnate of Magnesia.
Strychnate of Strychnia	Strychnic acid
	Strychnia



The strychnia is dissolved by the alcohol, and is left after distillation. Dilute sulphuric acid dissolves it, forming a sulphate, and from the sulphatic solution ammonia throws it down.

MATERIALS.	PRODUCTS.
Ammonia	Sulphate of Ammonia.
Sulphate of Strychnia	Strychnia.
Sulphuric acid	
Strychnia.....	

The strychnia is then dissolved in boiling spirit; and from the solution crystals are obtained, by cooling and evaporation.

In the process of the *Edinburgh Pharmacopœia*, a decoction of nux-vomica is prepared; this contains the strychnate of strychnia with gum. This salt is decomposed by the lime, and the strychnia abstracted by rectified spirit.

In the preceding account I have omitted, for the sake of perspicuity, all notice of the brucia which is associated with the strychnia.

Pure strychnia is a white, odourless, intensely bitter, crystalline substance, the form of the crystals being the octohedron or four-sided prism. When rapidly crystallized, it assumes the granular form. It is fusible, but not volatile; decomposing at a lower temperature than most vegetable bodies. Though so intensely bitter, it is almost insoluble in water, one part of strychnia requiring 6667 parts of water, at 50°, to dissolve it: that is, one grain needs nearly fourteen ounces of water to hold it in solution. It requires 2500 parts of boiling water to dissolve it. It is slightly soluble in boiling rectified spirit, but scarcely so in cold water. It acts on vegetable colours as an alkali, saturates acids forming salts, and separates most of the metallic oxides (the alkaline substances excepted) from their combinations with acids. In some cases, part only of the metallic oxide is precipitated, a double salt being formed in solution. Thus, when strychnia is boiled with a solution of sulphate of copper, a green solution of *cupreous sulphate of strychnia* is obtained, while a portion only of the oxide of copper is precipitated.

Commercial strychnia usually forms, with strong nitric acid, a red-coloured liquid, which afterwards becomes yellow. This change does not occur with pure strychnia, but depends on the presence of one or both of the two substances—viz. brucia and yellow colouring matter. As the red colour is destroyed by decolorizing agents (sulphurous acid and sulphuretted hydrogen), it appears to depend on the oxidization of the substance referred to. If potash be added to a very concentrated solution of a strychnian salt which has been reddened by nitric acid, an orange precipitate is formed; an excess of water dissolves this precipitate. With strychnia chlorine forms a white precipitate.

A solution of bichloride of mercury, added to a solution of strychnia in hydrochloric acid, causes a white clotty precipitate (composed of *bichloride of mercury and hydrochlorate of strychnia*).

According to the Edinburgh College, strychnia for medicinal use, which is declared to be "always more or less impure," possesses the following properties:

Intensely bitter: nitric acid strongly reddens it: a solution of 10 grains in four fluidrachms of water by means of a fluidrachm of pyroligneous acid, when decomposed by one fluidounce of concentrated solution of carbonate of soda, yields on brisk agitation a coherent mass, weighing when dry 10 grains, and entirely soluble in solution of oxalic acid.

The London College gives the following characters for crystallized strychnia:

Readily dissolves in boiling alcohol, but not so in water. It melts by heat, and if it be more strongly urged, it is totally dissipated. This being endowed with violent powers, it is to be cautiously administered.

The following is the composition of strychnia, (*Pharmaceutisches Central-Blatt für 1838*, p. 489):



	Atoms.	Eg. Wt.	Per Cent.	Regnault.	Mulder.	Liebig.
Carbon .....	44	964	76.08	75.73	76.721	76.43
Hydrogen .....	23	23	6.63	6.86	6.789	6.70
Nitrogen .....	2	28	8.07	8.43	6.186	5.81
Oxygen .....	4	32	9.22	8.98	10.304	11.06
Strychnia .....	1	347	100.00	100.00	100.00	100.00

More recently Regnault (*op. cit.* 1839, p. 68,) has given as the formula for the composition of strychnia:  $C^{40} H^{22} N^2 O^4$ . Crystallized strychnia is anhydrous.

The salts of *Strychnia*, when pure, are for the most part crystalline, white, and very bitter. They possess the following chemical characteristics:—1st. They are precipitated by the alkalis and their carbonates. 2dly. As usually met with in the shops, they are reddened by nitric acid. 3dly. They are precipitated by tannic, but not by gallic acid. 4thly. They are unchanged by the action of the persalts of iron.

*a. Sulphates.*—The *neutral sulphate* exists in the form of small cubes, soluble in ten parts of water at 59° F., and in a less quantity of boiling water. When heated, it fuses and loses three per cent. of its weight, probably water of crystallization. But Liebig detected no water in sulphate dried at 212° F. The *bisulphate* has an acid and bitter taste, and crystallizes in slender needles.

*β. Nitrate.*—The *neutral nitrate* crystallizes in pearly needles, grouped in stars. It is much more soluble in hot than cold water; is slightly soluble in alcohol, but does not dissolve in ether. When heated to a little above 212°, it decomposes and becomes yellow, swells up, detonates slightly (but without the disengagement of light), and leaves a carbonaceous mass behind. If the strychnia contain brucia, the nitrate has a reddish tint. The *binitrate* crystallizes in very fine needles. When heated, it decomposes, becomes red, and detonates with the disengagement of light.

*γ. Hydrochlorate or Muriate.*—This salt crystallizes in four-sided needles, which lose their transparency in the air. It is much more soluble in water than the sulphate. When heated, it is decomposed with the evolution of hydrochloric acid.

The effects of strychnia are of the same kind as those of nux-vomica, but more violent in degree. As ordinarily met with in the shops, it may be regarded as about six times as active as the alcoholic extract of nux-vomica. The following are a few examples of its poisonous operation:

Dr. Christison (*Treatise on Poisons*, p. 797, 3d ed.) says, “I have killed a dog, in two minutes, with the sixth part of a grain, injected, in the form of alcoholic solution, into the chest: I have seen a wild boar killed, in the same manner, with the third of a grain, in ten minutes.” Pelletier, (*Ann. de Chim. et Phys.* x. 172,) says, “half a grain, blown into the mouth of a dog, produced death in five minutes.” Half a grain, applied to a wound in the back of a dog, caused death in three minutes and a half. In all these and other instances death was preceded and accompanied by tetanus. The salts of strychnia act in the same manner.

Some individuals are more susceptible of the action of strychnia than others. Andral (Bayle, *Bibl. Thérap.* t. ii. p. 227,) has seen a single pill, containing one-twelfth of a grain, cause light trismus, and the commencement of tetanic stiffness of the muscles; while in other cases the dose may be gradually increased beyond a grain, with comparative little effect. The largest dose I have given is a grain and a half, and this was repeated several times before the usual symptoms, indicative of the affection of the system, came on.

The following case occurred on board the Dreadnought Hospital Ship, and was communicated to me by Mr. Cooper, Surgeon, of Greenwich:

A Swede, aged 50—60, was admitted about the year 1833 with general paralysis, one side being more affected than the other: he was also in some degree idiotic. Strychnia was given, at first in the dose of one-eighth of a grain three times a day, which was continued for several



weeks, without apparent effect. The dose was then increased to one-quarter of a grain three times a day, which was also continued for some time, and not producing any perceptible effect, the quantity was increased to half a grain twice or three times a day, and this dose was taken for many days before any influence of strychnia was manifested. But one morning, about 9 A. M., the apothecary was suddenly summoned by a message that the man was in a fit. When seen he was insensible; face and chest of a deep purple colour; respiration had ceased, and the pulsation of the heart nearly so. The whole body (trunk and limbs) was in a state of tetanic spasm. Trunk extended, and shoulders thrown back; muscles of chest and abdomen hard and rigid. In a short time the rigidity became less; the ribs could be compressed; and artificial respiration was kept up imperfectly by compression of the thorax. Circulation was restored in some degree, and the deep purple colour of the surface went off. Spontaneous respiration returned. The man sighed, and became apparently sensible: all spasm had ceased, for a minute or two; but as soon as circulation and consciousness were in some degree restored, the spasm recurred with extreme violence, again locking up the respiratory muscles. Respiration ceased; the surface again became purple; circulation went on, however, some time after respiration had ceased. Artificial respiration was kept up when the relaxation of the muscles would allow of it, but was this time ineffectual. The heart soon ceased to beat; the deep purple colour was instantaneously replaced by the pallor of death; and life was extinct.

The quick passing off of the purple colour of the surface was very remarkable; the change appeared to commence in the face, and passed downwards like the passing of the shadow of a cloud.

This case gives some colour to the idea that strychnia, like digitalis and some other potent remedies, accumulates in the system.

The local action of strychnia is that of an irritant. Applied to the naked dermis, it causes burning and pungent pain, lasting from half an hour to an hour; and where blisters have been applied, the raw surface inflames under the use of the remedy, and affords a copious suppuration. (Ahrensen, *Brit. and For. Med. Rev.* vol. v. p. 350.)

The uses of strychnia are similar to those of nux-vomica above stated.

The dose of strychnia or its salts (*acetate, sulphate, nitrate, or hydrochlorate*) is, at the commencement, one-sixteenth or one twentieth of a grain, which is to be gradually increased until its effects on the muscular system are observed. The largest dose I have ever seen attained is one grain and a half. Two scruples, taken to cause self-destruction, produced death in an hour and a half. (*Lancet*, Jan. 27, 1838, p. 647.) Strychnia is usually given in the form of *pill* (made with common conserve of roses) or it may be dissolved in *alcohol* or *acetic acid*. The *endermic* dose of strychnia should not, at the commencement, exceed half a grain, and of its salts one-fourth of a grain.

#### OTHER MEDICINAL OR POISONOUS APOCYNACEÆ.

1. The seeds of *STRYCHNOS IGNATIA* or *St. Ignatius's beans*, came into the Dutch shops, according to Alston, (*Lect. on the Mat. Med.* vol. ii. p. 38,) about the latter end of the seventeenth century. But there is some reason to suspect that they were known long before this, and are probably the substances which, in the Latin translation of Serapion, were denominated *nucis vomicae*. Dale (*Pharmacol.* p. 328,) gives, as one of their synonyms, "Igasur, seu Nux-vomica legitima Serapionis." They are obtained from the *Strychnos Ignatia* (called by some *Ignatia amara*), a tree indigenous to the Philippine Islands, whose fruit is smooth and pyriform, and contains about twenty seeds. These seeds, the *St. Ignatius's beans* of the shops, are about the size of olives, rounded and convex on one side, and somewhat angular on the other. Externally they are brownish, with a bluish gray tint. Within the envelopes of the seed is a very hard, horny, or cartilaginous albumen, in whose cavity is contained the embryo. These seeds have been analysed by MM. Pelletier and Caventou, (*Ann. de Chim. Phys.* x. 147,) who found their constituents to be the same as those of nux-vomica, though in somewhat different proportions. Their effects, therefore, are similar.

2. *STRYCHNOS TIEUTE*, the *Tshettik* or *Tjettek*, is a large climbing shrub, growing in Java. The aqueous extract of the bark of this tree is the poison called *Upas tieuté Tjettek*, or *Upas Radja*, and which must not be confounded with the poison of the *Antiaris toxicaria*, before described (see p. 201.) The *Upas tieuté* was analyzed by Pelletier and Caventou, (*Ann. de Chim. Phys.* xxvi. 44,) who found it to consist of *strychnia combined with an acid* (igasuric?), a reddish brown colouring matter, which becomes green when mixed with nitric acid, and a soluble yellow colouring matter, which is reddened by nitric acid. They could detect no brucia. The effects of this poison are precisely similar to those of the nux-vomica and strychnia. Thus,



when applied to wounds, injected into the serous sacs or blood-vessels, or applied to the mucous membrane, it produces tetanus, asphyxia, and death. Forty drops of upas dissolved in water, and injected into the pleura of an old horse, gave rise almost immediately to tetanus and asphyxia, and the animal died after the second attack.

3. *LIGNA COLUBERINA*, or *Snake-woods*.—In countries infested with poisonous serpents, the natives have usually some substance which is fancied to possess the power of preserving them from the bites of these poisonous animals; and thus we have various articles, seeds, roots, and wood, which have the word *snake* affixed to them.

In Asia there are several kinds of *lignum colubrinum*, or *snake-wood*, supposed to be possessed of the above-mentioned property. The specimens, however, met with in commerce, show that there are various substances to which this term is applied; some being the wood of a stem, others of a root. The most esteemed is the wood of the *Strychnos Colubrina*. The *S. ligustrina* yields the ancient *lignum colubrinum of Timor*. Pelletier and Caventou (*Ann. de Chim. Phys.* x. 170.) analyzed one of these woods, and found that it had the same constituents as the bean of St. Ignatius, though in different proportions. Thus it contained more fatty and colouring matter, less strychnia, and, in the place of bassorine and starch, a larger quantity of woody fibre. Its action, therefore, is precisely similar to the before-mentioned poisons.

4. *STRYCHNOS TOXIFERA*, Schomb. yields the basis of the celebrated *Wooraly Woorari*, *Ourari*, or *Urari* poison of Guayana, which produces paralysis with convulsive movements, death from, apparently, suspended respiration: hence artificial respiration is a most important means of relief. Dr. Hancock (*Lond. Med. Gaz.* vol. xx. p. 281.) used the bark of this plant as an application to foul ulcers.

5. The seeds of *STRYCHNOS POTATORUM*, or *clearing nuts*, are used in India to clear muddy water. (Roxburgh, *Fl. Ind.* vol. i. p. 575.)

6. The bark of the *STRYCHNOS PSEUDOQUINA*, called *Quina do Campo*, is employed in the Brazils as a substitute for cinchona bark. It does not possess poisonous properties. It was

analyzed by Vauquelin, (*Mem. du Muséum*, 1823, p. 452.) who discovered neither strychnia nor brucia in it. Mercadieu (*Journ. de Chim. Méd.* t. i. p. 236 bis.) also analyzed it, under the erroneous name of *copalehi* (see p. 230), and could not discover any vegetable alkali in it. The internal surface of the bark (liber), touched by nitric acid, becomes red, while the external surface becomes blackish green. (Guibourt, *Journ. de Pharm.* t. xxv. p. 709.) In these characters, then, it agrees with *nux-vomica* bark. Two other barks (also belonging to *Apocynaceae*)—viz. the *Pereira Bark* (obtained from a species of *Vallé'sia*) and the *Casca d'Anta* (procured from a *Rauwolfia*)—likewise become red by contact with nitric acid. Pfaff (*Berl. Jahrb.* Bd. xlii. S. 95.) had discovered a new alkali (called *Pereirin*) in the *pereira* bark.

7. *CERBERA TANGHIN*, or *Tanghinia venenifera*, is a native of Madagascar. The kernel is a most deadly poison, though not larger than an almond [with the shell], it is said to be capable of destroying twenty persons. It was analyzed by O. Henry and Ollivier. (*Journ. de Pharm.* t.

x. p. 49.) The active principle is a neutral crystalline principle, called *tanghicin* (*tangincamphor*, Gmelin.) The extractive (*tanginin*; *tanguine*, Gmelin) is also said to possess narcotic properties. The tanghin seed causes convulsions and violent efforts to vomit. It is (or was) used, in Madagascar, to ascertain the guilt of suspected persons: those who are able to withstand the ordeal are considered innocent; and, *vice versa*, those who die are said to be guilty. (Hooker, *Bot. Mag.* t. 2968.)

[Two species of *APOCYNUM* are used for medicinal purposes in the United States.

**Sex. System.**—PENTANDRIA DIGYNIA.

**Gen. Char.**—*Calyx* very small, five cleft, persistent. *Corolla* campanulate, half five-cleft, lobes revolute, furnished at base with five dentoid glands, alternating with the stamina. *Anthers* connivent, sagittate, cohering to the stigma by the middle. *Style* obsolete, stigma thick and acute. *Follicle* long and linear. *Seed* comose (Nuttall).

1. *A. ANDROSAEMIFOLIUM*.—Dogs-bane, U. S. Secondary List.

**Sp. Char.**—*Leaves* ovate, smooth, on both sides, cymes lateral and terminal, smooth; tube of the corolla longer than the calyx, (Beck.)

† Brodie, *Phil. Trans.* for 1811, p. 178; and Waterton, *Brit. and For. Med. Rev.* vol. viii. p. 397.

FIG. 203.



*Cerbera Tanghin.*



This is a common species, found in all parts of the country, from Canada to Georgia, on hill sides, and in open woods in barren soil. It is perennial herbaceous, generally four feet high, with a smooth stem, and covered with tough fibrous bark. The flowers are white, tinged with rose colour.

The part used is the root, which is large and lactescent, of a disagreeable bitter taste; of this the active portion is the bark, which forms about two-thirds of it. Its constituents are, *bitter extractive, colouring principle, caoutchouc* and volatile oil.

It yields its properties to water and alcohol. Dr. Zollickoffler obtained 198 grs. of alcoholic extract, and 28 grs. of watery extract, from 3240 grs. of the cortical part.

The properties of this root are emetic and diaphoretic. In doses of 30 or 40 grs. it promptly induces vomiting, with slight preceding nausea, on which account it may be used in cases where it is merely requisite to evacuate the stomach, as no relaxation is induced. It may be also used with a view to its diaphoretic action, in doses of 5 or 10 grs. in combination with opium, but is inferior to Ipecacuanha. (Griffith, *Med. Essays*, vol. ii. p. 200.) Dr. Zollickoffler states that it is tonic in doses of from ten to 20 grs. and is "admirably calculated to improve the tone of the digestive apparatus." (*Journ. of Pharm.* vol. v. p. 254, from *Am. Journ. of Med. Scienc.*)

APOCYNUM CANNABINUM.—*Indian Hemp*, U. S. *Secondary List*.

*Sp. Char.*—Stem upright, herbaceous. Leaves oblong, tomentose beneath, cymes lateral, longer than the leaves.

The Indian hemp is a perennial plant, usually about two or three feet in height, having a red or brown stem and oblong ovate, somewhat pubescent leaves. The flowers are small and of a greenish white colour externally, and pink internally in paniculate cymes.

This species is also found in most parts of the United States, in waste and neglected places.

The root is the portion used in medicine; it is horizontal, extending to a great distance, of a deep brown colour, becoming darker by age, and when wounded pours forth a thick lactescent juice. When fresh it is nauseous, somewhat acrid and permanently bitter, and possesses a disagreeable odour.

When dried it is brittle and easily reduced to powder, which resembles that of ipecacuanha. It is composed of two portions, an external cortical portion, which is brown without, and white within, and a ligneous cord, which is of a yellowish white colour.

Griscom, (*Journ. of Philada. College of Pharmacy*, vol. v. p. 136, from *Am. Journ. of Med. Science*.) found it to contain tannin, gallic acid (?), gum, resin, wax, fecula, bitter principle or *apocyryn*, colouring matter and woody fibre. Knapp, also examined it with similar results.

FIG. 204.

*Apocynum Cannabinum.*



The root of this plant is very potent in its effects on the animal economy. Dr. Griscom, (*op. citat.*) states "that its first effect when taken into the stomach is that of producing nausea, if given in sufficient quantity, which need not be large, and if this be increased, vomiting will be the result." It also acts upon the bowels, giving rise to copious discharges. These effects are attended with a reduced frequency of the pulse. A general relaxation of the skin and perspiration follow these effects. In some of the cases observed by the gentleman mentioned, diuresis took place, but not so marked in some cases as others. "In three or four cases related, the urinary secretion, although somewhat increased in quantity, was not such as to be commensurate with the effect produced upon the disease by the exhibition of the medicine. In other instances, its diuretic operation has been more manifest, causing very profuse discharges of urine, and in a short time relieving the overloaded tissues of their burden." The disease in which it has been found most useful is dropsy.

When the powder is taken into the nostrils, it acts as a sternutatory.

As an emetic the dose of the powder is from 15 to 30 grains. The best form of exhibition is in decoction, made by boiling an ounce of the root in a pint of water, the dose is ℥ij. to iv. two or three times daily. The watery extract will purge in doses of from 3 to 5 grs. In the treatment of cutaneous affections the juice of the root or plant may be made use of as an application.

The bark affords a fibre, which may be used in the place of hemp.—J. C.]

#### ORDER XLV.—OLEACEÆ, *Lindley*.—THE OLIVE TRIBE.

OLENÆE, *R. Brown*.

ESSENTIAL CHARACTER.—*Flowers* hermaphrodite, sometimes dioecious. *Calyx* monophyllous, divided, persistent, inferior. *Corolla* hypogynous, monopetalous, four-cleft, occasionally of four petals connected in pairs by the intervention of the filaments, sometimes without petals; aestivation somewhat valvate. [*Praxinus* is generally apetalous]. *Stamens* two, alternate with the segments of the corolla or with the petals; anthers two-celled, opening longitudinally. *Ovary* simple, without any hypogynous disk, two-celled; the cells two-seeded; the ovules pendulous and collateral; *style* 1 or 0; *stigma* bifid or undivided. *Fruit* drupaceous, berried, or capsular, often by abortion one-seeded. *Seeds* with dense, fleshy, abundant albumen; *embryo* about half its length, straight; *cotyledons* foliaceous, partly asunder: *radicle* superior; *plumule* inconspicuous.—*Trees* or *shrubs*. *Branches* usually dichotomous, and ending abruptly by a conspicuous bud. *Leaves* opposite, simple, sometimes pinnated. *Flowers* in terminal or axillary racemes or panicles; the *pedicels* opposite with single bracts (*R. Brown*).

PROPERTIES.—Not very remarkable. The barks of some species are tonic and astringent. Manna is obtained from several species.

##### 1. O'LEA EUROPÆA, *Linn. L. E. D.*—THE EUROPEAN OLIVE.

(*Sex. Syst.* Diandria, Monogynia.)

(*Oleum à drupis expressum, L.*—Expressed oil of the pericarp, *E.*—*Oleum ex fructu, D.*)

(*Oleum olivæ, U. S.*)

HISTORY.—Few vegetables have been so repeatedly noticed and enthusiastically described by the ancient writers as the olive-tree. In all ages it seems to have been adopted as the emblem of benignity and peace. It is frequently mentioned in the Bible (as in *Gen. ch. viii. v. 12*); the ancient Greeks (*Homer, Od. v. 477*) were well acquainted with it; and several products of it were employed in medicine by Hippocrates (*Dierbach, Arzneim. d. Hippokr. p. 77*); *Pliny (Hist. Nat. lib. xv. cap. 1—8; and lib. xxiii. cap. 34—37, ed. Valp.)* is most diffuse in his account of it.

BOTANY. *Gen. Char.*—*Calyx* small, four-toothed. Tube of the *corolla* short; limb four-cleft. *Stamens* two. Segments of the *stigma* emarginate. *Drupe*, with a two-celled, two-seeded—by abortion one-celled, one-seeded—nut. (*Bot. Gall.*)

*Sp. Char.*—*Leaves* lanceolate, quite entire; their surfaces differently coloured. *Racemes* paniced.



A long-lived tree of slow growth. Wood hard; used for cabinet-work. Leaves in pairs, shortly petiolated, lanceolate, acute, green above, hoary beneath. Flowers small and white. *Drupe* elliptical, dark bluish green; kernel (*pyrena*) hard, with usually only one ovule. The whitish character of the foliage gives a dull and monotonous appearance to countries where the olive is extensively cultivated, as Provence and Languedoc. (Sharp, *Letters from Italy*.)

FIG. 205.



Olea Europaea.

OLEA EUROPEA, var. *longifolia*, is the variety chiefly cultivated in the south of France and Italy. *O. europaea*, var. *latifolia*, is chiefly cultivated in Spain; its fruit is nearly twice the size of the common olive of Provence or Italy, but the oil is too rank for most English palates. (Loudon, *Encycl. of Plants*.)

**Hab.**—Levant, Barbary, South of Europe. Notwithstanding that the olive is now so common in the southern parts of Europe, it is supposed by many to have been derived from Asia. Pliny tells us, on the authority of Fenestella, that there were no olive-trees in Italy, Spain, and Africa, in the reign of Tarquinius Priscus, in the 173d year from the foundation of the city of Rome. The Phœnicians are said to have introduced the olive-tree into France 680 years before Christ. Near Terni, in the vale of the cascade of Marmora, is a plantation of very old trees, and supposed to be the same plants mentioned by Pliny, as growing there in the first century. (Loudon, *Encycl. Garden*.)

**DESCRIPTION.**—The products of the olive-tree deserving of notice are the resiniform exudation, the leaves, and the fruit.

1. **Resiniform exudation of the olive-tree** (*Lecca gum*).—The older writers speak of exudation from olive-trees, and which Dioscorides (lib. i. cap. 141) describes as the *tears of the Ethiopic olive*. In modern times it has been improperly termed *olive gum*. Pelletier (*Ann. de Chim. Phys.* iii. 105, li. 196) has analysed it, and found that it consists of a peculiar matter (*olivile*), brown resin soluble in ether, and benzoic acid. *Olivile* consists of  $C^6 H^4 O^2$ .

It was formerly employed in medicine.

2. **Olive leaves** (*folia olivæ*).—The leaves of the olive-tree have been analysed by Pallas, (*Journ. de Pharm.* xiii. 604,) who, among other products, found *tan-nic* and *gallic acids*. They have been employed externally as astringents and antiseptics; internally, as tonics in intermittents. (Richard, *Elém. d'Hist. Nat.* t. ii. p. 21.)

3. **Fruit of the Olive-trees; Olives** (*Olivæ*).—The *preserved* or *pickled olives* (*Olivæ conditæ*), so admired as a dessert, are the green unripe fruit deprived of part of their bitterness by soaking them in water, and then preserved in an aromatised solution of salt. Several varieties are met with in commerce, but the most common is the *small French* (*O. europæa*, var. *longifolia*) and the *large Spanish olive* (*O. europæa*, var. *latifolia*). Olives *à la picholine* have been soaked in a solution of lime or alkali. *Ripe olives* are remarkable from the circumstance of their sarcocarp abounding in a bland, fixed oil.

**EXPRESSION OF OLIVE OIL.**—The process of procuring olive oil is somewhat modified in different countries, though the principle is the same in all.

In Spain, the olives are pressed by conical iron rollers, elevated above the stage or floor, round which they move on two little margins to prevent the kernel being injured, the oil from which is said to have an unpleasant flavour. Spanish olive oil, however, is inferior to other kinds, from the circumstance of the time which elapses between the gathering and the grinding of the olives.



This arises from the number of mills not being in proportion to the quantity of fruit to be ground; so that the olives are placed in heaps to wait their turn, and in consequence often undergo decomposition. (Dillon, *Travels through Spain*, p. 343, 1782; Jacob, *Travels in Spain*, p. 149, 1811.)

In France, the finest oil is procured by bruising the fruit in the mill immediately they are gathered, and then submitting the paste to pressure. The first product has a greenish tint, and is termed *virgin oil* (*oleum olivarum virginicum*; *huile vierge*). The cake or *marc* is removed from the press, broken up with the hand, moistened with boiling water, and repressed. The products are water, and oil of a *second quality*: these separate by standing. The cake, which is left, is termed *grignon*, and is employed by some as fuel; others, however, ferment it, and, by the aid of boiling water, obtain a very inferior oil, called *gorgon*, which is employed either for soap-making or burning in lamps. (Duhamel, *Traité des Arbres Fruit.* t. ii. p. 71-2.)

With the view of increasing the quantity of oil, some persons allow the olives to undergo incipient fermentation, which breaks down the parenchyma of the fruit before they are pressed; but the quality of the oil is thereby injured. Guibourt (*Hist. des Drog.* t. ii. p. 339,) tells us that it is a yellow, but a mild and agreeable oil, and is much used for the table.

The machinery employed by the Neapolitan peasants in the preparation of the Gallipoli oil is of the rudest kind. The olives are allowed to drop in their maturity from the tree on the ground, where they are picked up chiefly by women and children, and carried to the mill. The oil when expressed is sent, in sheep or goat skins carried on mules, to Gallipoli, where it is allowed to clarify in cisterns cut in the rock on which the town is built. From these it is conveyed in uteri or skins to basins near the sea-shore, and from these basins the oil casks are filled. (M'Culloch, *Dict. Commerce.*)

According to Sieuve, (*De Candolle, Phys. Vég.* p. 299,) 100 lbs. of olives yield about 32 lbs. of oil; 21 of which come from the pericarp, 4 from the seed, and 7 from the woody matter of the nut (*pyrena*). That obtained from the pericarp is of the finest quality.

Recently-drawn olive oil deposits, by standing, a white fibrous matter, which the ancients employed in medicine, under the name of *amurca*. (Pliny, *Hist. Nat.* lib. xv. cap. iii. ed. Valp.)

**PROPERTIES OF OLIVE OIL.**—Olive oil (*oleum olivæ seu olivarum*; *sweet oil*) is an unctuous fluid, of a pale yellow or greenish-yellow colour. When of good quality, it has scarcely any smell. Its taste is bland and mild. Its sp. gr. at 77° F. is 0.9109, according to Saussure. When exposed to a temperature of 32° F. it deposits white globules (*margarine*, Lecanu; *stearine*, Chevreul). It is soluble in about 1½ times its weight of ether; but it is very slightly soluble only in alcohol. By exposure to the air it readily becomes rancid; thin layers of it become thick, but do not dry. Hyponitrous acid converts it into *elaidine*, which, by saponification, yields *elaidic acid*. When mixed with sulphuric acid, and kept cool, it yields *sulpho-margaric*, *sulpho-glyceric*, and *sulpho-oleic acids*. With the basic metallic oxides it forms *glycerine* and *soaps* (*oleo margarates*): *Spanish* or *Castile soap* is made with soda; *lead soap*, or *emplastrum plumbi* with oxide of lead.

**VARIETIES.**—*Provence oil* (*oleum provinciale*), the produce of Aix, is the most esteemed. *Florence oil* is a very fine kind of olive oil, imported from Leghorn, in flasks surrounded by a kind of net-work formed by the leaves of a monocotyledonous plant, and packed in half chests; it is used at the table, under the name of *salad oil*. *Lucca oil* is imported in jars holding nineteen gallons each. *Genoa oil* is another fine kind. *Gallipoli oil* forms the largest portion of the olive oil brought to England; it is imported in casks. Apulia and Calabria are the provinces of Naples most celebrated for its production: the Apulian is the best. *Sicily oil* is of inferior quality; it is principally produced at



Milazzo. *Spanish oil* is the worst. The foot deposited by olive oil is used for oiling machinery, under the name of *droppings of sweet oil*.

**ADULTERATION OF OLIVE OIL.**—Olive oil is said to be occasionally mixed with other vegetable oils (as poppy oil). Four methods have been proposed to detect the fraud :

1. *Beading.*—If we shake pure olive oil in a phial half filled with it, the surface of the oil soon becomes smooth by repose ; whereas when poppy oil is present, a number of air-bubbles (or *beads* as they are termed) remain.

2. *Freezing.*—Olive oil is completely solidified when cooled by ice ; poppy oil, however, remains in part liquid. Even two parts of olive oil to one of poppy oil will not completely congeal. (Guibourt, *Hist. des Drog.* t. ii. p. 603.)

3. *Electrical diurometer.*—Olive oil, according to Rousseau, (*Journ. de Pharm.* t. ix. p. 587,) conducts electricity 675 times worse than other vegetable oils. The addition of two drops of poppy or beech-nut oil to 154½ grains of olive oil is sufficient to quadruple the conducting power of the latter. To ascertain the conducting power of oil, Rousseau used the *electrical diurometer* (from *διαγω*, to conduct ; and *μετρεω*, to measure). It consists of one of Zamboni's dry piles, and a feebly-magnetized needle, moving freely on a pivot. The electricity developed by the pile produces a deviation in the direction of the needle ; but when any substance is interposed between the needle and the pile, the deviation is less in proportion to the bad conducting power of the interposed substance.

4. *Formation of elaidine.*—If recently-made nitrate of mercury (prepared by dissolving 6 parts of mercury in 7·5 parts of nitric acid, sp. gr. 1·36) be mixed with twelve times its weight of pure olive oil, and the mixture strongly agitated, the whole mass becomes solid in the course of a few hours ; this, however, does not occur with adulterated oil. We judge of the presence and quantity of foreign oils by the degree and quickness of solidification of the suspected olive oil.

"When carefully mixed with a twelfth of its volume of solution of nitrate of mercury prepared as for the Unguentum Citrinum, it becomes in three or four hours like a firm fat, without any separation of liquid oil."—*Ph. Ed.*

**COMPOSITION.**—In 1808, Gay-Lussac and Thénard (*Rech. Phys. Chim.* ii. 320) examined the ultimate composition of this oil. In 1815, Braconnot (*Ann. de Chim.* xciii. 240) ascertained the proximate constituents of it ; and subsequently Saussure (*Ann. de Chim. et Phys.* t. xiii. p. 349) examined the ultimate composition of these constituents.

Braconnot's Proximate Analysis.	Ultimate Analyses.		
	Gay-Lussac and Thénard's.	Saussure's.	
Elaine (Oleine)..... 72	Carbon..... 77·213	..... 76·034	..... 88·170
Margarine..... 28	Hydrogen..... 13·360	..... 11·545	..... 11·232
	Oxygen..... 9·437	..... 12·068	..... 6·302
	Nitrogen..... 0·000	..... 0·353	..... 0·296
Olive Oil..... 100	Olive Oil..... 100·000	Elaine.. 100·000	Margarine 100·000

1. **ELAINE OR OLEINE.**—Braconnot obtained it by exposing olive oil to a temperature of about 21° F. in order to cause the congelation of the margarine. The Elaine was a greenish yellow liquid ; at 14° F. it deposited a little margarine.

2. **MARGARINE.**—The solid matter of olive and other vegetable oils, obtained as above, is usually denominated *stearine*, but Lecanu (*Ann. de Chim. et Phys.* lv. 204) has pointed out several characters by which it is distinguished from that principle : thus, it is more fusible, and is much more soluble in cold ether. In most other respects it agrees with *stearine*.

**COMMERCE.**—The duty on olive oil is £4. 4s. per ton, except on that brought from Sicily, which is £8. 8s. In 1839, duty was paid on 12,374 tons.



**PHYSIOLOGICAL EFFECTS.** *a. On Vegetables.*—Olive oil, as well as other fixed oils, acts injuriously on the roots of plants, by obstructing their pores and meatus, and preventing the passage of water. (De Candolle, *Phys. Vég.* p. 1347.)

*β. On Animals.*—Injected into the veins, the fixed oils prove injurious by their mechanical operation. They obstruct the circulation in the capillary vessels, and in this way cause death. Both Courten and Hertwich (Wibmer, *Wirk. d. Arzneim. u. Gifte.* Bd. iv. S. 9) have destroyed dogs by injecting half an ounce of olive oil into the veins.

*γ. On Man.*—The fixed oils are extremely nutritious, but they are difficult of digestion, and hence are apt to disagree with dyspeptics (vol. i. p. 81). Some writers—as Dr. Dunglison—(*Elem. of Hygiène*, p. 289) are of opinion that, taken as a condiment, with salad, oil promotes the digestibility of the latter. Swallowed in large doses, olive oil acts as a laxative, in general, without occasioning pain.

**USES.**—In England, the *dietetical* uses of olive oil are very limited, being principally confined to its mixture with salads. In Spain and some other countries it is frequently employed as a substitute for butter. Dyspeptics should carefully avoid its use.

*Medicinally* it is not often administered by the mouth. As a *mild laxative* it may be used in irritation, inflammation, or spasm of the alimentary canal, or of the urino-genital organs. In irritant poisoning it is exhibited as an *emollient* and *demulcent*, to involve acrid and corrosive substances, and sheath the stomach from their action. At one time it was supposed to possess antidotal properties for arsenical poisons; and Dr. Paris (*Pharmacol.* vol. i. p. 97, 6th ed.) tells us, that the antidote on which the men employed in the copper-smelting works and tin burning-houses in Cornwall, rely with confidence, “whenever they are infested with more than an ordinary portion of arsenical vapour, is sweet oil; and an annual sum is allowed by the proprietors, in order that it may be constantly supplied.” There is, however, no reason to believe that its agency is more than mechanical, as already mentioned. Oil was formerly recommended as an antidote for cantharides, but the discovery of the solubility of cantharidin in oil has led to the suspicion, that, instead of alleviating, it might increase the patient’s danger. There is no just ground for supposing that oil, applied externally, or taken internally, has any particular influence in counteracting the operation or relieving the effects of the poison of venomous serpents, notwithstanding the high encomiums that have been passed on it. In pulmonary or bronchial irritation, and spasmodic cough, olive oil is sometimes taken in the form of emulsion (made with gum, albumen, or alkali) with benefit; but in such cases, almond oil is generally preferred. As an *antihelmintic*, olive oil is occasionally used.

Olive oil is a frequent constituent of *laxative enemata*, especially in dysentery, or irritation of the bowels or of the neighbouring viscera.

Externally it is used in the form of *liniment* (as the *linimentum ammoniac* and *linimentum ammoniac sesquicarbonatis*; (vol. i. p. 279 and 286). Smear'd over the body, it has been recommended by Berchtold and others (*Hufeland’s Journ.* Bd. vi. S. 437; and Bd. xii. St. iii. S. 153) as a safeguard against the plague. It may be employed also to relax the skin and sheath irritable surfaces. Frictions of olive oil have been employed in ascites and anasarca.

In *pharmacy*, olive oil has been employed in the preparation of *liniments*, *ointments*, *cerates*, and *plasters*. In *surgery*, it is used for besmearing surgical instruments, as bougies, &c.

**ADMINISTRATION.**—The dose of olive oil as a laxative is from ℥ʒj. to ℥ʒij.



2. ORNUS EUROPÆA, *Persoon, L.*—EUROPEAN FLOWERING ASH.*Fraxinus Ornus, Linn. D.**Sex. Syst. Diandria, Monogynia.*(Succus concretus, *L.*—Succus concretus, *Manna, D.*—Sweet concrete exudation, probably from several species of *Fraxinus* and *Ornus, E.*)

(Manna, U. S.)

**HISTORY.**—Actuarius is believed to be the earliest writer who mentions our manna. (Friend, *Hist. of Physick*, i. 271.) The nature of the substance called manna (*Manhu?* Hebr. *What is it?* Engl.) in our translation of the Old Testament, (*Exod.* ch. xvi. v. 14,) is quite unknown. (Carpenter, *Script. Nat. Hist.* p. 514, 1829; *Pictorial Bible.*) Under the names of *honey-dew*, *aerial honey*, and *honey-oil* (ὄρεσόμελι, and ἀιρόμελι, Galen; ελαιόμελι, Dioscor.; *elaomeli*, Pliny), the ancients have been supposed to include our manna; for it is difficult to believe they were unacquainted with it, since Theophrastus (*Hist. Plant.* lib. iii. cap. xi.) speaks of two kinds of ash (Μελια, *Fraxinus*), one of which (ταπεινότερα, *humilior*) is supposed to be *Ornus europæa*. (Sprengel, *Hist. Rei Herb.* i. p. 76.)

**BOTANY.** **Gen. Char.**—*Calyx* very small, four-cleft. *Corolla* divided to the base into linear segments. *Pericarp* a winged samara, not dehiscent (Lindley).

**Sp. Char.**—*Leaves* lanceolate, attenuated, stalked, serrated.

A small tree. *Leaves* opposite, large, pinnated in three or four pairs; *leaflets* ovate-long, pointed, large, irregularly-toothed. *Panicles* large, and many-flowered. *Flowers* small and polygamous. *Corolla* yellowish or greenish-white. *Fruit* flat, wedged-shaped, smooth, winged.

**Hab.**—South of Europe; especially Calabria and Sicily.

ORNUS ROTUNDFOLIA, considered by some as a variety of *Ornus europæa*, grows in Calabria, and also yields manna. Fée (*Cours d'Hist. Nat.* t. ii. p. 363,) says that manna is probably also procured from *Fraxinus excelsior* and *parvifolia*.

**EXUDATION OF MANNA.**—In Calabria, manna is obtained by making incisions in the stem of *Ornus europæa*. (Cirillo, *Phil. Trans.* vol. lx. p. 233.) In Sicily it is also procured in a similar manner. (Houel, *Voy. Pittoresq. de Sicile*, &c. t. i. 52-3, 1782; Sestini, in Murray, *App. Med.* t. iii. p. 547.) Houel, who has described and depicted the method of extracting it, as practised at Cinesi, near Palermo, says, the collection of manna commences about the 15th of August, and terminates at the end of September, when the rainy season sets in. The incisions are made with a hooked knife, first in the lower part of the stem, and are repeated daily, extending them perpendicularly upwards. Each incision is about two inches long. A limpid water (some describe it as a thickish white juice) exudes, and gradually concretes to form manna. Beneath the lowest incision is placed a leaf of the *Ornus*, to convey the exuded liquor into a receptacle formed of a leaf of the Indian Fig (*Opuntia*). In this way is obtained *manna in sorts*. The fine *cannulated manna* preferred by the English, is obtained during the height of the season, when the juice flows vigorously. (Houel, *op. cit.*) Murray (apparently on the authority of Sestini) states, that *Ornus rotundifolia* and *Fraxinus excelsior*, as well as *Ornus europæa*, afford manna in Sicily; and Fothergill (*Phil. Trans.* vol. xliii. No. 472, p. 86,) says, that while the *Ornus* yields it by artificial apertures, “it flows from the *Fraxinus* through every little cranny, and bursts through the large pores spontaneously.”—Manna has been supposed to be a natural product of the ash, but there are some difficulties in the way of this supposition. It is not produced in countries more northern than Calabria. Furthermore, the exudation of manna has been said not to occur naturally, but to be owing to a foreign action; either incision or the puncture of a little hemipterous insect (*Cicada Orni*) common on this tree. (De Candolle, *Phys. Vég.* p. 238-9.)



**DESCRIPTION.**—Several kinds of manna (*manna*) are described by pharmacologists. The finest of English commerce is called *flake manna* (*manna cannulata*). It is imported in deal boxes, having partitions, and frequently lined with tin-plate. It consists of pieces of from one to six inches long, one or two inches wide, and from half an inch to an inch thick. Their form is irregular, but more or less stalactitic; most of the pieces being flattened or slightly hollowed out on one side (where they adhered to the tree or substance on which they concreted), and on this side they are frequently soiled. Their colour is white, or yellowish-white; they are light, porous, and friable; the fractured surface presents a number of very small capillary crystals. The odour is somewhat like that of honey, and is to me rather unpleasant; the taste is sweet, but afterwards rather acrid. Under the name of *Sicilian Tolfá manna* I have received an inferior kind, corresponding to the *manna in sorts* (*manna in sortis*) of some pharmacologists. From its name I presume it to be brought from Sicily, and that it corresponds in quality to Tolfá manna, produced near Civita-Vecchia, and which Fée (*Cours d'Hist. Nat.* ii. 366,) states is but little valued. The Sicilian Tolfá manna occurs in small pieces, which seldom exceed an inch in length: some of these present the same appearances, with respect to consistence, colour, friability, and crystalline appearance, as the flake manna; others, however, are soft, viscid, brownish, and uncrystallized, like those of the next variety. The commonest kind of English commerce is called *Sicilian manna* (*manna siciliana*). It appears to me to be the *common* or *fatty manna* (*manna pinguis*) of some writers. It consists of small, soft, viscid fragments, of a dirty yellowish-brown colour, intermixed with some few dark-coloured small pieces of the flake variety. It contains many impurities intermixed.

**COMMERCE.**—Manna is imported into this country principally from Palermo and Messina. It is also occasionally brought from other parts of Sicily; viz. Licata, Girgenti, Catania, Terra Nova, and Marsala. Furthermore, Naples, Leghorn, Trieste, Genoa, and Marseilles, are other places of shipment of it. In 1839, duty (3d. per lb.) was paid on 13,493 lbs.

**COMPOSITION.**—Manna was analyzed in 1809 by Bucholz, (Gmelin, *Handb. d. Chem.* ii. 1295,) who found it to consist of *mannite* 60.0, *uncrystallizable sugar* (capable of fermentation) *with colouring matter* (purgative bitter matter?) 5.5, *sweetish gum* 1.5, *gummy extractive* 0.8, *fibro-glutinous matter* 0.2, *water and loss* 32.0.

**MANNITE (Manna Sugar).**—Is identical with *Grenadin*. It is extracted from manna by boiling alcohol; the mannite crystallizes by cooling the solution. Mannite is not peculiar to manna, being found in many vegetables. It is distinguished from common sugar by its incapability of undergoing the vinous fermentation (see vol. i. p. 77). It is white, crystalline, odourless, has a sweet and agreeable taste, and is very soluble in water and in boiling alcohol, but is very much less so in cold alcohol. Heated strongly it is decomposed like ordinary sugar. It consists, according to the analysis of Liebig, (*Pharm. Central-Blatt für* 1834, S. 589,) of *Carbon* 39.8532, *Hydrogen* 7.7142, and *Oxygen* 52.548: these numbers correspond with the formula  $C^6 H^7 O^6$ . Mannite possesses the laxative properties of manna, without the nauseous odour. The dose of it for children is ʒj. or ʒij.; for adults ʒss. or ʒj.

**PHYSIOLOGICAL EFFECTS.** *a. On Animals generally.*—In moderate doses manna is nutritive, and is greedily devoured by some animals. Thus Swinburn (*Travels in the Two Sicilies*, 1785,) tells us that vipers and martens are very fond of it. In large doses it acts as a mild laxative. The dose for carnivorous animals is about two ounces dissolved in broth or milk. (Moiroud, *Pharm. Vét.*) It is rarely given to horses, on account of the large dose required.

*β. On Man.*—It has an analogous operation on man—that is, in small doses it is nutritive, and in large ones mildly laxative. It acts on the bowels without exciting vascular irritation, and is, therefore, admissible in inflammatory cases. It is apt, however, to produce flatulence and griping. The fresher and less changed the manna, the feebler are said to be its laxative powers; and hence



the Calabrians are enabled to use it frequently as an article of food. When by keeping and partial decomposition it has acquired an increase of laxative powers, it is less easily digested, and is more apt to excite flatulence. Hence also, we are told, the commoner kinds of manna are more laxative and more apt to disagree with the stomach than the finer varieties. The older writers imagined that manna promoted the secretion of bile. Manna approaches tamarinds as a laxative, but it is more nutritive and less refrigerant, in consequence of possessing more mucilaginous and saccharine matter, and less free vegetable acids.

USES.—It is employed as a laxative, partly on account of the mildness of its operation, partly for its sweet flavour, in delicate persons, as females and children. Dr. Burns (*Principles of Midwifery*,) recommends it for new-born infants, if the meconium do not come away freely. On account of its sweetness, it is frequently added to flavour purgative draughts, and is used as a common laxative for children, who readily eat it.

ADMINISTRATION.—It may be taken in substance or dissolved in warm milk or water.—The dose, for an adult, is from ℥j. to ℥ij.; for children, from ℥j. to ℥iij.

#### ORDER XLVI.—STYRACEÆ, *Richard.*—THE STYRAX TRIBE.

ESSENTIAL CHARACTER.—*Calyx* inferior or superior, with five divisions, persistent. *Corolla* monopetalous, the number of its divisions frequently different from that of the calyx; with imbricated aestivation. *Stamens* definite or indefinite, arising from the tube of the corolla, of unequal length, cohering in various ways, but generally in a slight degree only; *anthers* in-nate, two-celled, bursting inwardly. *Ovary* superior, or adhering to the calyx, with from three to five-cells; *ovules* definite, the upper ascending, the lower pendulous, or *vice versa*; *style* simple; *stigma* somewhat capitate. *Fruit* drupaceous, surmounted by or inclosed in the calyx, with from one to five cells. *Seeds* ascending or suspended, solitary, with the embryo lying in the midst of the *albumen*; *radicle* long, directed towards the hilum; *cotyledons* flat, foliaceous.—*Trees* or *shrubs*. *Leaves* alternate, without stipules; usually toothed, turning yellow in drying. *Flowers* axillary, either solitary or clustered, with scale-like bracts. The *hairs* often stellate (Lindley).

PROPERTIES.—Storax and Benjamin, obtained from the genus *Styrax*, are balsamic. *Alstonia theiformis* is used at Santa Fè as tea. The properties of the other species are but little known.

#### I. STYRAX OFFICINALE, *Linn. L. E. D.*—THE OFFICINAL STORAX.

*Sex. Syst.* Decandria, Monogynia.

(Balsamum, L.—Balsamic exudation, E.—Resina, D.)

(Styrax, U. S.)

HISTORY.—Hippocrates, (*De Nat. Mul.* p. 575 and 587, ed. Fœs.,) Theophrastus, (*Hist. Plant.* lib. ix. cap. 7,) Dioscorides, (lib. i. cap. lxxix.,) and Pliny, (*Hist. Nat.* lib. xii. cap. 40 and 55, ed. Valp.,) speak of a substance which they term *Styrax* (στυράξ). Dioscorides says it is the produce of a tree like the quince, (*Styrax officinale*, Sprengel, *Hist. Rei Herb.* i. 173,) and that there are several varieties of it (all solid), and he mentions how it is adulterated. The best, he says, is unctuous, yellow, resinous, mixed with whitish lumps, and forms a honey-like liquid when melted; it comes, he adds, from Gabala [a Phœnician city], Pisidia, and Cilicia [countries of Asia Minor]. This is evidently the sort which more modern pharmacologists denominate *amygdaloid storax*. A worse variety, he says, is black, branny, friable, and covered with white mouldiness. This sort I presume to be very analogous to, if not identical with, the *common storax* of the shops, the "mouldiness" being the efflorescent benzoic acid; indeed the only character in which it differs is the colour; but as Pliny, who copies the description of Dioscorides, omits the word "*niger*," it is probable that the colour was inaccurately described. A third kind mentioned by Dioscorides is a transparent tear-like gum, and emulating myrrh; but it was very scarce. Probably this was the variety which in modern times has been termed *storax in the tear*. The substances employed to adulterate storax were ligneous dust (produced by eroding little worms), honey, the sediment of the iris, wax, fat, &c.



In modern times various substances have been met with in commerce under the name of *storax*. Some of these are certainly produced by the *Styrax officinale*, while others have been referred to a plant belonging to *Liquidambar* (see BALSAMACEÆ, p. 184).

**BOTANY. Gen. Char.**—*Calyx* rather campanulate, nearly entire or five-toothed. *Corolla* campanulate at the base, deeply three to seven-cleft. *Stamens* six to sixteen, seldom ten, exserted; *filaments* united to the tube of the corolla, sometimes adhering at the base of the ring; *anthers* linear, two-celled, opening by internal longitudinal slits. *Style* simple. *Stigma* obtuse, somewhat lobed. *Drupe* dry, splitting imperfectly into two or three valves, with one, two, or three stones. *Seed* solitary, erect, with a large, leafy, thin *embryo*, lying in the midst of fleshy *albumen* with an inferior *radicle* (Lindley).

**Sp. Char.**—*Leaves* ovate, beneath villous. *Racemes* simple, shorter than the leaf.

A small *tree*. *Stem* about twenty feet high; bark smooth. *Leaves* alternate, petiolated, ovate, blunt-pointed, entire; smooth and shiny above, whitish and downy beneath. *Raceme* of from four to six flowers. *Calyx* almost hemispherical, with five to seven short marginal teeth. *Corolla* white, externally hoary, with five, six, or seven segments. *Fruit* (*capsule*, Nees) coriaceous, downy, usually with one seed.

STORAX BARK is supposed to constitute the *cortex thymiamatis* of some pharmacologists. It is probably the *Νασσαφύριον* of Dioscorides. (Lib. i. cap. 22.) It is in thin, light, red, highly odorous fragments or shavings, frequently covered with an efflorescence of benzoic acid. I am indebted for a sample of it to Professor Guibourt.

**Hab.**—The Levant, Palestine, Syria, Greece. Cultivated in the southern parts of Europe.

**EXUDATION.**—If incisions be made into the stem of this tree, a resinous juice exudes, which, when somewhat hardened, constitutes one or more of the balsamic substances denominated in the shops *storax*. Some writers state that the exudation arises from the puncture of the stem by a little insect. Though this balsam exudes from the storax-tree in the south of France, (Duhamel, *Traité des Arbr.* t. ii. p. 288,) yet that of commerce is the product of Asiatic Turkey. (Murray, *App. Med.* t. ii. p. 107.) A liquid storax is obtained from the bark and young branches by pressure (see p. 375).

**DESCRIPTION.**—The substances termed *storax* (*storax* seu *styrax*) are very numerous. With the exception of the first kind, the following varieties I have met with :

1. **Storax in the Tear** (*Styrax in granis*).—Yellowish-white or reddish-yellow tears, about the size of peas. *White storax* (*styrax albus*) is formed of tears agglutinated so as to form masses somewhat resembling pale galbanum. Both sorts, however, are exceedingly rare, and are unknown to our drug-dealers. I have never met with a single specimen in English commerce. White storax is also scarce in Paris; for Professor Guibourt, to whom I wrote for a sample, says that there was one fine specimen at a druggist's in Paris, but it was not for sale. "I discovered it (says he) with great pleasure, having established the distinction of that variety only from a scrap of one or two drachms."

2. **Amygdaloid Storax** (*Styrax amygdaloides*).—It occurs in compact masses, having a very agreeable odour, analogous to that of vanilla, and a yellowish or reddish-brown colour. They are interspersed with white tears (giving the mass an amygdaloid appearance). This variety is very scarce. I have a fine sample, weighing nearly two ounces and a quarter: it cost me, in Paris, 24 francs per ounce. There is (or was a few years since) a magnificent piece, in the possession of a French pharmacien, who offered to sell it for 500 francs. Amygdaloid and white storax were formerly imported enveloped in a monocotyledonous leaf, under the name of *cane* or *reed storax* (*storax calamita verus*). A fine specimen (about the size and shape of half an orange) is in Dr. Burgess's collection, belonging to the Royal College of Physicians of London.



3. **Reddish-brown Storax** (*Storax rouge-brun*, Guibourt).—This differs from the preceding in the absence of the white tears, and in the presence of saw-dust. It is reddish-brown, and has a similar, but less powerful, odour to that of the amygdaloid kind. It is not found in the London drug-houses.

4. **Black Storax**.—Under the name of *Storax noir*, I have received from Professor Guibourt a very dark reddish-brown mass, which easily softens, and has the odour of vanilla. "It appears to be formed of a balsam, which has been melted and inspissated by heat with saw-dust. Its very characteristic odour leads me to consider it," says M. Guibourt, (*letter to the author*), "as different from storax calamita, storax liquida, and liquidambar." It is not found in the London drug-houses.

5. **Liquid Storax; Styraz liquidus**.—This has been already described (p. 184). On the authority of Petiver it is usually regarded as the produce of a species of *Liquidambar*. But Landerer (*Pharmaceutisches Central-Blatt für 1840*, p. 11), one of the editors of the *Pharmacopœa Græca*, has recently stated that storax liquidus (called *buchuri-jag* or *storax oil*) is obtained at Cos and Rhodes from the styraz officinalis which is there termed *βουχούρι*. By means of longitudinal incisions the bark of the stems is removed in the form of small narrow strips, which being pressed together easily adhere by means of their glutinous juice, and in this way they are made up into bundles, of about 2 lbs. each. These are subjected to pressure in warm presses (called *styraki*), by which liquid storax is obtained, having a butyraceous consistence, a gray colour, and a vanilla-like odour. Is this the liquid storax of English commerce?

6. **Scobs styracina**.—Under this name I include several substances sold as storax, but which are evidently fine saw-dust impregnated with a sufficiency of some resinous liquid (in some cases, perhaps, *styrax liquidus*) to give them cohesiveness.

a. **Common Storax** (*Styraz vulgaris* seu *Styraz calamita*, offic.)—This is imported in large round cakes, of a brown or reddish-brown colour and fragrant odour. It is brittle and friable, being very easily rubbed into a coarse kind of powder; yet it is soft and unctuous. When exposed to the air it becomes covered with an efflorescence of benzoic acid (which, to the superficial observer, looks like a whitish kind of mouldiness), and falls to powder. It appears to consist of some liquid resin mixed with fine saw-dust or bran. Boiled with rectified spirit, it yields a reddish solution, which becomes milky on the addition of water. The insoluble residue is a reddish saw-dust (of storax wood?). It seems probable, says Lewis, (*Chem. Works of C. Neumann*, by W. Lewis, p. 290, 1759,) "that the common storax is the juice received immediately in vessels, and mixed with saw-dust enough to thicken it; the shops requiring, under the name of storax, a solid or consistent mass, and evaporation being found to dissipate its fragrance. At least I cannot conceive for what other purpose the woody matter could be added; for it is too easily distinguishable to have been intended as an imposition.

β. **Solid or Cake Storax** (*Storax solide* ou *Storax en pain*, Guibourt).—Under this name I have received from Professor Guibourt a substance very analogous to the preceding; but the saw-dust obtained by digesting it in spirit is not so intensely red.

γ. **Drop or gum Storax**.—Under this name I have once met, in English commerce, a storax which was highly valued. It was a circular cake, about a foot in diameter, and four or five inches thick. It was blackish, with a greenish tint; had a pilular consistence, considerable tenacity, and a very agreeable odour. By keeping it became covered with an efflorescence of benzoic acid. Boiled in rectified spirit it gave an inky appearance to the liquid, and left a blackish saw-dust.

δ. **Hard, blackish Storax**.—Under the name of *brown Storax*, I purchased in Paris a solid, heavy, compact, hard, blackish substance, having the odour of



liquid storax. Boiled in rectified spirit it yielded an almost colourless liquid and a brownish saw-dust. Is this the *Storax brun noirâtre* which Guibourt (*Hist. de Drog.* ii. p. 595,) says is made at Marseilles?

COMMERCE.—I find, on the examination of the books of a wholesale druggist, that all the storax (solid and liquid) imported into this country during seven years, came from Trieste.

COMPOSITION.—Neumann (*Chem. Works*, by Lewis, p. 290,) submitted common storax (*styrax calamita*, offic.) to a chemical examination. More recently Reinsch (*Pharm. Central-Blatt für* 1838, S. 537 and 810,) analyzed three kinds of *styrax calamita*. In 1830, Bonastre (*Journ. de Pharm.* t. xvi. p. 88,) analyzed a storax from Bogota. The same chemist (*Ibid.* t. xvii. p. 338,) examined a fluid, which he termed *liquid storax*, but which was *liquidambar* (see p. 184).

Reinsch's Analyses.

	1. <i>Storax calamita</i> . Opt. 1785. Nestler.	2. <i>Brown granular</i> .	3. <i>Reddish compact</i> .
Volatile oil.....	?	0.5	0.4
Resin.....	41.6	53.7	32.7
Subresin.....	?	0.6	0.5
Benzoic acid.....	2.4	1.1	2.6
Gum and extractive.....	14.0	9.3	7.9
Matter extracted by potash.....	15.0	9.6	23.9
Woody fibre.....	22.0	20.2	27.0
Ammonia.....	traces.	stronger traces	strongest traces
Water.....	5.0	5.0	5.0
<i>Storax calamita</i> .....	100.0	100.0	100.0

1. VOLATILE OIL OF STORAX.—Obtained by digesting the distilled water of storax with ether. The solid oil was white, crystalline, and fusible; its odour was agreeable; its taste aromatic and warm. The fluid oil had not so penetrating an odour.

2. RESIN OF STORAX.—Is soluble in alcohol, but insoluble in water.

3. BENZOIC ACID.—See vol. i. p. 364.

Guibourt (*Hist. des Drog.* ii. 595) says that both white and amygdaloid storax, when treated by boiling alcohol, leave (independently of impurities) a small quantity of an insoluble white substance; and the filtered liquid becomes turbid on cooling.

PHYSIOLOGICAL EFFECTS.—Storax produces the before-described (vol. i. p. 184) effects of the balsamic substances. Its stimulant properties are more particularly directed to the mucous surfaces, especially to the bronchial membrane. Hence it is called a stimulating expectorant. In its operation it is closely allied to balsam of Peru and benzoin, but is less powerful than the latter.

USES.—Internally storax has been principally employed in affections of the organs of respiration. In chronic bronchial affections, admitting of the use of stimulants, it may be used as an expectorant. It has also been employed in chronic catarrhal affections of the urino-genital membrane. Applied to foul ulcers in the form of ointment, it sometimes operates as a detergent, and improves the quality of the secreted matter.

ADMINISTRATION.—Purified storax may be exhibited, in the form of pills, in doses of from grs. x. to ℥j.

1. STYRAX COLATUS, L.; *Extractum Styracis*, E.; *Strained Storax*. (Dissolve storax in rectified spirit, and strain; then let the spirit distil with a gentle heat, until it becomes of a proper consistence, L.—The directions of the *Edinburgh College* are essentially the same, except that the evaporation is ordered to be carried on by the vapour-bath, until the product have the consistence of a thin extract.)—This process is intended for the purification of *styrax vulgaris* (*styrax calamita*, offic.); but Mr. Brande says it is inefficient. The strained storax of the shops is usually produced from liquid storax (see p. 375). It is



used in perfumery and in the preparation of *tinctura benzoini composita*, and the *pilula styracis composita*.

2. PILULÆ STYRACIS COMPOSITÆ, L.; *Pilula Styracis*, E.; *Pills of Storax*. (Strained Storax [Extract of Storax, E.; Storax Resin, D.] ʒij. [two parts, E.]; [Hard, L.] Opium [powdered, L.], ʒj. [one part, E.]; Saffron, ʒj. [one part, E.] Beat them together until incorporated [and divide the mass into 60 pills, E.].—These pills are useful in chronic coughs, and some other pulmonary affections. They are valuable also in another point of view: they sometimes enable us to exhibit opium to persons prejudiced against its use; the saffron and storax concealing the smell and flavour of this narcotic, while the name of the pill cannot discover the harmless deception.—The dose is from grs. v. to grs. x.

2. STYRAX BENZOIN, *Dryander*, L. E. D.—THE BENJAMIN TREE.

*Benzoin officinale*, Hayne.

*Sex. Syst.* Decandria, Monogynia.

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

[Benzoinum, Benzoin, U. S.]

**HISTORY.**—As the ancients were acquainted with so many oriental vegetable products, we should have expected, *a priori*, that benzoin would have been known to them. But this does not appear to have been the case; at least we are unable to identify it with any of the substances described by the old writers. (See Garcias, *Arom. Hist.* in Clusius, *Exot.* p. 155.)

**BOTANY. Gen. Char.**—Vide *Styrax officinale*.

**Sp. Char.**—*Leaves* oblong, acuminate, tomentose beneath. *Racemes* axillary, compound, nearly the length of the leaves.

**Tree.** *Stem* thickness of a man's body. *Leaves* oval-oblong, entire. *Calyx* campanulate, very obscurely five-toothed. *Corolla* gray, of five petals, perhaps connate at the base. *Stamens* ten. *Ovary* superior, ovate; *style* filiform; *stigma* simple. (Condensed from Dryander.) (*Phil. Trans.* vol. lxxvii. p. 308.)

**Hab.**—Sumatra, Borneo, Siam, Java.

**EXTRACTION OF THE BALSAM.**—Benzoin is obtained in Sumatra as follows: When the tree is six years old, longitudinal or somewhat oblique incisions are made in the bark of the stem, at the origin of the principal lower branches. A liquid exudes, which, by exposure to the sun and air, soon concretes, and the solid mass is then separated by means of a knife or chisel. Each tree yields about three pounds of benzoin annually, for the space of ten or twelve years. That which exudes during the first three years is white, and is denominated *head benzoin*. The benzoin which subsequently flows is of a brownish colour, and is termed *belly benzoin*. After the tree is cut down the stem is split, and some benzoin scraped from the wood; but its colour is dark, and its quality bad, owing to the intermixture of parings of wood and other impurities: this sort is called *foot benzoin*. The relative values of head, belly, and foot benzoin, are as 105, 45, 18. Benzoin is brought down from the country in large cakes (called by the natives *tampang*s) covered with mats. In order to pack it in chests, these cakes are softened by heat; the finer by exposure to the sun, the coarser by means of boiling water. (Marsden, *Hist. of Sumatra*, p. 134, 3d ed.; Crawford, *Hist. of the Ind. Archipel.* vol. i. p. 518; and vol. iii. p. 418.)

**DESCRIPTION.**—Benzoin (*benzoinum*; *asa-dulcis*) is met with in commerce of various qualities: these are sometimes distinguished by the terms *firsts*, *seconds*, and *thirds*. Frequently the finer kinds are called *Siam benzoin*, while the commoner kind is termed *Calcutta benzoin*.

1. **Siam Benzoin**, offic. *Benzoin of first quality.*—There are two kinds of Siam benzoin of commerce; the one in tears, the other in masses.

a. *Benzoin in tears* (*Benzoinum in lachrymis*).—This kind seems to be identical with the *true benzoin in tears*, which Savary (Alston, *Lect. on the*



*Mat. Med.* vol. ii. p. 403.) says was brought in considerable quantity to Paris, by the attendants of the Siamese ambassadors. It consists of irregular flattened pieces, some of which are angular, and the largest of them barely exceeding an inch in length. Externally these pieces are shiny, or dusty from their mutual friction, and are of amber or reddish-yellow colour; they are brittle, and may be easily rubbed to powder. Internally they are translucent or milky, and frequently striped: they have a pleasant odour, but little or no taste.

β. *Lump Benzoin* (*Benzoinum in masses*).—The finest kind consists of agglutinated tears (*white lump benzoin*). More commonly we find the tears are connected together by a brown, resiniform mass, which, when broken, presents an amygdaloid appearance, from the white tears imbedded in the mass (*amygdaloid benzoin*; *benzoinum amygdaloides*).

γ. *Translucent Benzoin*.—From my friend, Dr. Royle, I have received a sample of Siam benzoin, whose properties are somewhat different to the preceding. The small masses consist of agglomerated tears, which, instead of being white, are translucent, or, in a few instances, almost transparent.

Crawford (*Journal of an Embassy to Siam and Cochin-China*, p. 407, 1828,) says that the benzoin of Siam is procured from Lao. He also says that a substance resembling, and hitherto confounded with, benzoin, produced in Lao, Raheng, Chiang-mai, and La-Kon, is abundantly found in Siam. The tree producing it cannot be, he thinks, the *Styrax Benzoin*, as it grows as far north as the twentieth degree of latitude.

2. *Calcutta Benzoin*, offic. *Benzoin of second and third quality*.—This is imported in chests from Calcutta. It occurs in large rectangular blocks, marked with the impression of a mat, and covered with white cotton cloth. When broken, we observe but few large white tears in it. The mass is principally made up of a brown resiniform matter, with numerous, white, small pieces or chips intermixed, which thereby give the broken surface a speckled appearance, somewhat like that of a fine-grained granite. This kind corresponds to the *common or brown benzoin* (*benzoinum commune seu in sortis*) of some writers.

COMMERCE.—Benzoin is usually imported into England from Singapore or Calcutta. Not unfrequently it is brought direct from Siam; occasionally from Sumatra, Penang, Bombay, Madras, Batavia, &c. The greater part of it is exported. In 1839, (duty 4s. per cwt.) was paid on 108 cwts. only.

COMPOSITION.—In 1811, Bucholz (quoted by Schwartze, *Pharm. Tabell.* S. 269,) published an analysis of benzoin. In 1816, John (*op. cit.*) made known a second; and in 1823, a third was published by Stoltze. (*Berl. Jahrb.* xxv. i. 55.) Moreover, Mr. Brande (*Nicholson's Journal*, x. 82,) and Unverdorben (*Poggendorff's Annal.* xvii. 179,) have examined this substance.

	Bucholz.	John.	Stoltze.		
			White.	Amygdaloid.	Brown.
Volatile oil (aroma, John) .....	—	—	traces.	traces.	traces.
Benzoic acid .....	12.5	12.0	19.80	19.42	19.0
Resin { yellow, soluble in ether .....	83.3	84.5	{ 79.83	27.10	8.80
{ brown, insoluble in ditto .....					
Matter like balsam of Peru .....	1.7	0	0	0	0
Aromatic extractive .....	0.5	0.50	0	0.25	0.15
Woody matter and other impurities .....	2.0	2.00	0	2.60	1.45
Water and loss .....	—	0.25	0.12	0.10	0.17
Salts (benzoates and phosphates) .....	—	0.75	—	—	—
<b>Benzoin .....</b>	<b>100.0</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

1. *VOLATILE OIL OF BENZOIN*.—Distilled with water, benzoin does not yield any essential oil; but when exposed to heat without water, benzoic acid and an empyreumatic oil are volatilized. This oil may be deprived of its empyreuma by redistillation with water, and then smells agreeably of benzoin. It may be regarded as a product of the decomposition of the resin. An oil of benzoin obtained by distillation, without any liquid, is used at Sumatra as a perfume. (Marsden, *Sumatra*, p. 184.)



2. RESIN OF BENZOIN.—It is soluble in all proportions in alcohol. On the addition of water to the tincture, a milky liquid (absurdly called *virgin's milk*) is formed, owing to the precipitation of the resin in the form of a white powder, which may be obtained quite free from benzoic acid, and then constitutes the *magisterium benzoës* of some old writers. The acids (acetate, hydrochloric, and sulphuric) also precipitate the alcoholic solution. Sulphuric acid strikes a fine red colour with resin of benzoïn. Benzoïn resin colours the chloride of iron green, but does not cause any precipitate. This property would lead to the suspicion of the presence of either gallic or tannic acid, but neither has been detected. Stoltze makes two kinds of resin in benzoïn: one of a *yellow* colour, and soluble in ether; the other *brown*, and insoluble in this liquid. Unverdorben, however, makes three varieties: one (*resina alpha*) is insoluble in carbonate of potash, but soluble in ether; a second (*resina beta*) is insoluble in both carbonate of potash and ether; and the third (*resina gamma*) is feebly electro-negative, soluble in carbonate of potash (forming a resinat of potash), and very slightly soluble in ether.

According to Johnston, (*Phil. Trans.* 1840, p. 383,) the colourless resin of benzoïn is rendered very approximately by the formula  $C^{90}H^{22}O^9$ . Heat, boiling water, caustic potash, carbonated alkalis, quicklime, and oxide of lead, effect a partial decomposition of this resin.

3. BENZOIC ACID.—The preparation, properties, and uses of this acid have been already described (vol. i. p. 363). Several circumstances lead to the conclusion that very little benzoïn acid exists, at least in the free state, in the natural resin of benzoïn, (*op. cit.* p. 380.) One of these deserves mention: dilute solutions of carbonate of soda in the cold readily dissolve crystallized benzoic acid; but trituration, or even boiling with such solutions, does not deprive benzoïn of the power of yielding this acid when subjected to heat.

PHYSIOLOGICAL EFFECTS.—Benzoïn produces the general effects of the balsams before mentioned (vol. i. p. 184). Its power of producing local irritation renders it apt to disorder the stomach, especially in very susceptible individuals. Its constitutional effects are those of a heating and stimulating substance, whose influence is principally directed to the mucous surfaces, especially of the air-tube. It is more acrid and stimulant, and less tonic than myrrh, to which some pharmacologists have compared it. It has appeared in some instances to act as a stimulant to the sexual organs.

USES.—As an internal remedy the employment of benzoïn is almost wholly confined to chronic pulmonary affections, especially those of the bronchial membrane. Its stimulant properties render it improper in all acute inflammatory complaints, and its acridity prevents its employment where there is much gastric irritation. Its use, therefore, is better adapted for torpid constitutions. Trousseau and Pidoux (*Traité de Thérap.* ii. 477) speak most favourably of the effects of the balsams in chronic laryngitis, as I have before noticed (vol. i. p. 184.) The mode of employing benzoïn in balsamic fumigations in this disease, has been before noticed (see vol. i. p. 184).

ADMINISTRATION.—Benzoïn is scarcely ever administered alone.—The dose of it in *powder* is from grs. x. to ʒss.—On account of the agreeable odour evolved when benzoïn is heated, this balsam is frequently employed for *fumigations*, as in the ceremonies of the Roman Catholic church.

1. TINCTURA BENZOÏNI COMPOSITA, L. E. D., (U. S. ;) *Balsamum Traumaticum*; *Compound Tincture of Benjamin*; *Wound Balsam*; *Balsam for Cuts*; *Friar's Balsam*; *Jesuit's Drops*; *The Commander's Balsam*.—(Benzoïn, ʒijss. [in coarse powder, ʒiv. E.] Storax, strained, ʒijss. L.; Balsam of Tolu, ʒx. [Peru-balsam, ʒijss. E.]; Aloes, ʒv. [East Indian Aloes, ʒss. E.]; Rectified Spirit, Oij. Macerate for fourteen [seven, E. D.] days, [pour off the clear liquor, E.] and strain. The ingredients used by the *Dublin College* are the same as, and the proportions nearly identical with, those of the *London College*.)—[The U. S. P. directs, Benzoïn, ʒij.; Purified Storax, ʒij.; Balsam of Tolu, ʒi.; Aloes in powder, ʒss.; Alcohol, Oij. Macerate for fourteen days, and filter.]—A stimulating expectorant: administered in chronic catarrhs.—Dose, fʒss. to fʒij. It is decomposed by water. A very pleasant mode of exhibiting it is in the form of emulsion, prepared with mucilage and sugar, or yelk of egg. Tinctura benzoïni composita is occasionally applied to foul and indolent ulcers, to excite the vascular action, and to improve the quality of the secreted matter. It is a frequent application to recent incised wounds. If applied to the cut surfaces it causes temporary pain, and cannot promote adhesion (or union by the



first intention), though by exciting too much inflammation it may sometimes prevent it. But when the edges of the wound have been brought together, the tincture may be carefully applied to the lint or adhesive plaster as a varnish and cement. Here it acts mechanically, excluding air, and keeping the parts in their proper position. In the same way, it may sometimes prove serviceable in contused wounds. *Court or Black Sticking Plaster* (*Emplastrum adhesivum Anglicum*, Ph. Bor.) is prepared by brushing first a solution of isinglass, and afterwards a spirituous solution of benzoin, over black sarcenet.

2. FUMIGATING PASTILES.—(Benzoin, in powder, sixteen parts; balsam of tolu; sandal-wood, in powder, of each four parts; true labdanum, one part; a light [linden] charcoal, forty-eight parts; nitrate of potash, two parts; tragacanth, one part; gum Arabic, two parts; cinnamon water, twelve parts. F. S. A. a soft and ductile mass, which is to be formed into cones, with a flat, tripod base. Dry at first in the air, afterwards by a stove. (Henry and Guibourt, *Pharm. Raison*. t. i. p. 402.)—By burning, these pastiles diffuse a very agreeable odour. They are employed to disguise or overpower unpleasant smells. (See vol. i. p. 210.)

The *Species ad suffiendum*, Ph. Bor., consists of benzoin and amber, of each lb. ss., and lavender flowers, ʒij.

#### ORDER XLVII.—PYROLACEÆ, *Lind.*—THE WINTER GREEN TRIBE.

ESSENTIAL CHARACTER.—*Calyx* free four, more frequently five-partite, persistent. *Petals* five, free or cohering, perigynous? with an imbricated æstivation. *Stamens* twice the number of the petals, to which they are not adherent; *anthers* bilocular, dehiscing by two pores. *Ovarium* three to five-celled, seated on a hypogynous disk. *Style* one. *Stigma* roundish or lobed, sometimes slightly indusiate. *Capsule* three to five-celled, three to five-valved, loculicidal-dehiscient. *Placenta* adherent at the centre. *Seeds* indefinite, minute, with a pellicle indusiate or winged. *Embryo* minute, at the base of fleshy albumen, with moderately distinct cotyledons.—*Herbs*, natives of the northern hemisphere, perennial or scarcely *under-shrubs*, smooth. *Stems* round, naked, or leafy. *Leaves* simple, entire or dentate. *Flowers* racemose, somewhat umbellated, rarely solitary, white or rose-coloured. (De Candolle, *Prodr.* vii. 772.)

PROPERTIES.—See *Chimaphila umbellata*.

#### CHIMAPHILA UMBELLATA, *Nuttall, E.*—PIPSISSEWA; UMBELLATED WINTER GREEN.

(*Chimaphila corymbosa*, *Pursh, L.*—*Pyrola umbellata*, *Linn. D.*)

(*Sex. Syst.* Decandria, Monogynia.)

(*Folia, L.*—*Herb, E.*—*Herba, D.*)

(*Chimaphila*, U.S.)

HISTORY.—The Pipsissewa was first employed medicinally by the aborigines of America. It was introduced to the notice of the profession, in 1803, by Dr. Mitchell. (*Inaug. Diss.* Philad. 1803.)

BOTANY. *Gen. Char.*—*Calyx* five-cleft. *Petals* five, spreading, deciduous. *Stamens* ten; two in front of each petal; *filaments* dilated in the middle. *Ovarium* rounded-obconical, obtusely angular, umbilicated at the apex. *Style* very short, concealed in the umbilicus of the ovary. *Stigma* orbicular, tuberculated, five-crenate. Cells of the *capsule* dehiscient at the apex; the valves not connected by tomentum. (De Candolle, *Prod.* vii. 775.)

*Sp. Char.*—*Filaments* smooth. *Bracts* linear awl-shaped. *Leaves* cuneate-lanceolate, of the same colour. (De Cand.)

A perennial *under-shrub*. *Rhizome* woody, creeping. *Stems* ascending, somewhat angular, marked with the scars of former leaves. *Leaves* in irregular whorls, evergreen, coriaceous, on short petioles, serrate, smooth, shining. *Flowers* nodding in a small corymb. *Corolla* white, tinged with red, having an agreeable odour.

*Hab.*—Woods of Europe, Asia, and more frequently North America.



**DESCRIPTION.**—The officinal parts are the leaves (*folia chimaphilæ seu pyrolæ*), or the leaves and the stems (*herba chimaphilæ seu pyrolæ*). The fresh leaves exhale a peculiar odour when bruised: their taste is bitter and astringent. The infusion of the dried herb is rendered green (*tannate of iron*) by sesquichloride of iron.

**COMPOSITION.**—The dried plant was analyzed, in 1817, by Elias Wolf. (*Diss. de Pyrola umb.* Goett. quoted by Geiger, *Hand. d. Pharm.* ii. 215.) It consisted of *bitter extractive* 18.0, *resin* 2.4, *tannin* 1.38, *woody fibre*, with a small portion of *gum* and *vegetable calcareous salts*, 78.22.

The active principle has not been isolated. It probably resides in the substance called *bitter extractive*. The *resin* and *tannin*, however must contribute to the medicinal effect.

**PHYSIOLOGICAL EFFECTS.**—The fresh leaves appear to possess considerable acidity, depending, probably, on some volatile constituent; for Dr. Barton says, that, when bruised, they produce rubefaction, vesication, and desquamation, if applied to the skin.

The infusion of the dried leaves, when swallowed, acts as a tonic, producing an agreeable sensation in the stomach, and assisting the appetite and digestive process. It promotes the action of the secreting organs, more especially the kidneys, over which, indeed, it has appeared to exercise a specific influence, increasing the quantity of urine, diminishing, as some have imagined, the quantity of lithic acid or lithates secreted, and beneficially influencing several forms of chronic nephritic disease. Indeed, this plant possesses, in its medicinal as well as in its natural-historical and chemical relations, qualities analogous to those belonging to *Uva-ursi*.

**USES.**—The following are the principal diseases in which it has been employed:

1. *In Dropsies*, accompanied with great debility and loss of appetite, it is useful as a diuretic, as well as on account of its stomachic and tonic qualities. It was introduced to the notice of practitioners in this country, as a remedy for this class of diseases, by Dr. W. Somerville. (*Med.-Chir. Trans.* v. 340.) Dr. Beatty (*Trans. of the King and Queen's Coll. of Phys., Ireland*, vol. iv. p. 23,) has also found it useful in this disease.

2. *In Chronic Affections of the Urinary Organs.*—*Pyrola* has been found serviceable in the various disorders of the urinary organs in which the *Uva-ursi* frequently proves beneficial; such as cystirrhœa and calculous complaints. It has also occasionally alleviated some cases of hæmaturia, ischuria, dysury, and gonorrhœa.

3. *In Scrofula.*—We can readily believe that, as a tonic, this remedy may be useful in various forms of scrofula. But it has been supposed by some to possess almost specific powers; and in America its reputation is so high, that in the provinces it acquired the title of "*King's Cure*." Dr. Paris (*Pharmacologia*,) says, that "an irregular practitioner, who has persuaded a number of persons in this metropolis that he possesses remedies, obtained from the American Indians, by which he is enabled to *cure* scrofula in its worst forms," relies for success on *chimaphila*. In some ill-conditioned scrofulous ulcers, *pyrola* is used in the form of a wash.

**ADMINISTRATION.**—*Chimaphila* is given in the form of *decoction* or *extract*: the latter has been employed in doses of ten or fifteen grains.

**DECOCTUM CHIMAPHILÆ**, L. (U. S.);—*Decoctum Pyrolæ*, D.; *Decoction of Umbellated Winter Green.*—(*Chimaphila*, ℥j.; [*Distilled, L.*] Water, Ojss. [*Oij. wine measure, D.*] Boil down to a pint, and strain, L.—The *Dublin College* macerates it for six hours in water, then bruises, and afterwards returns it to the water: the liquor is to be evaporated to a pint.)—Dose, ℥ʒj. to fʒij.



ORDER XLVIII.—ERICACEÆ, *Lindley*.—THE HEATH TRIBE.ERICÆ, *Juss.*—ERICÆÆ, *R. Brown.*

**ESSENTIAL CHARACTER.**—*Calyx* four or five partite, almost equal, entirely unadherent to the ovary, persistent. *Corolla* perigynous or somewhat hypogynous, gamopetalous, four or five partite, or with four or five distinct petals, regular or more rarely irregular petals imbricated by æstivation. *Stamens* definite, equal or double in number to the petals, entirely or almost free from the corolla. *Anthers* two-celled; cells hard, dry, separate either at the apex or base, often furnished with some appendage, dehiscing by a terminal pore. *Ovary* free, surrounded at the base by a disk, which is sometimes nectariferous. *Style* single, rigid. *Stigma* undivided, toothed, or three-lobed. *Fruit* capsular, many-seeded, many-celled; dehiscence varies. *Seeds* inserted in a central placenta, small, indefinite; the *testa* firmly adhering to the nucleus. *Embryo* round, in the axis of fleshy albumen; the radicle opposite to the hilum.—*Shrubs* or *under-shrubs*, rarely small *trees*. *Leaves* alternate, rarely somewhat opposite or verticillate, without stipules, usually rigid, entire, evergreen, articulated on the stem. (*De Candolle, Prodr. vii. 580.*)

**PROPERTIES.**—The plants of this order are astringent and diuretic. One or both of these properties they owe to the presence of tannic acid.

ARCTOSTAPHYLOS UVA-URSI, *Sprengel, L. E.*—THE BEARBERRY.Arbutus Uva-ursi, *Linn. L.**Sex. Syst.* Decandria, Monogynia.(Folia, *L. E.*—Leaves, *E.*)(Uva-ursi, *U. S.*)

**HISTORY.**—Some doubt exists whether this plant was known to the ancient Greeks and Romans. Bauhin (*Pinax*, p. 470,) and some others, think it is the ἰδαία ῥίζα of Dioscorides (lib. iv. cap. 44,) but the leaves are very unlike those of *Ruscus aculeatus* (ῥόζυμποςσίμη), to which he, as well as Pliny, (*Hist. Nat.* lib. xxvii. cap. 69, ed. Valp.) compares them. The ἀρκτος σταφυλή of Galen agrees better with the uva-ursi, though the short description of it applies also to *Ribes rubrum*. (*Murray, De Uva Ursi: Opuscula, 19-20.*)

**BOTANY.**—**Gen. Char.**—*Calyx* five-partite. *Corolla* ovate-urceolate; the mouth five-toothed, revolute, short. *Stamens* ten, inclosed; *filaments* somewhat dilated at the base, hairy-ciliate; *anthers* compressed, with two pores at the point, laterally two-awned, awns reflexed. *Ovarium* globose-depressed, surrounded with three scales; *style* short; *stigma* obtuse. *Berry* (or berried drupe) globose, five, rarely six, seven, or ten-celled; cells one-seeded (*De Cand.*)

**Sp. Char.**—Procumbent. *Leaves* coriaceous, persistent, obovate, quite entire, shining. *Flowers* disposed in terminal small racemes. *Bractlets* beneath the pedicles, obtuse, small. (*De Cand.*)

*Stems* woody, round, and trailing. *Leaves* alternate, stalked, evergreen: convex and wrinkled above; concave and paler beneath. *Bractlets* coloured. *Sepals* pale-reddish, permanent. *Corolla* rose-coloured, smooth. *Berry* globose, scarlet, mealy within, very austere and astringent. *Seeds* seldom more than four or five, though there are the rudiments of eight or ten.

**Hab.**—Indigenous. Northern parts of Europe, Asia and America. On dry, stony, and alpine heaths.

**DESCRIPTION.**—The dried leaves (*folia uva ursi*) are of a dark, shining, green colour, and have a bitter astringent taste, but no odour. Their under surface is reticulated. The leaves of *Vaccinium Vitis Idæa* (*Red Whortleberry*) are said to be occasionally substituted for those of Uva-ursi; the fraud (which is unlikely to occur in this country) may be detected by the edges of the leaves being minutely toothed, and the under surface dotted; whereas the edges are entire, and the under surface reticulated, in the genuine leaves. Furthermore, the false leaves are deficient in astringency; and their watery infusion is coloured green by sesquichloride of iron, but does not form any precipitate with gelatine; whereas the true ones are highly astringent, and their watery infusion forms a blackish-blue precipitate with the sesquichloride of iron. (*See*



Braconnot, *Bull. de Pharm.* iii. 348; and Bouillon-Lagrange, *Ann. de Chim.* iv. 46.)

COMPOSITION.—Uva-ursi leaves were analysed, in 1809, by MM. Melandri and Moretti, (*Bull. de Pharm.* i. 59,) and in 1827 by Meissner. (Gmelin, *Hand. d. Chem.* ii. 1294.) The constituents in 103 parts are, according to the last-named chemist, gallic acid 1.2, tannic with some gallic acid 36.4, resin 4.4, oxidized extractive, with some citrate (?) of lime, 0.8, gum with supermalates of lime and soda, and traces of tannin and common salt, 3.3, chlorophylle, 6.3, gum (pectic acid ?) extracted by potash 15.7, extractive obtained by potash 17.6, lignin 9.6, and water 6.0 (excess 1.3).

TANNIC ACID is the active principle of the leaves. An aqueous infusion produces a bluish-black precipitate (tannate of iron) with the ferruginous salts, and a yellowish-white one (tannate of gelatine) with a solution of isinglass. Gallic acid also contributes to the astringency of the leaves.

PHYSIOLOGICAL EFFECTS. *a. On Animals generally.*—Most animals refuse to eat this plant: there are, however, some few exceptions to this statement. Birds, it is said, will eat the berries; and Murray (*Opuscula*, p. 98,) tells us that two kinds of insects feed on the plant, one of which (a species of *Coccus*) yields a crimson dye. Girardi (*De Uva Ursina* [Sandifort, *Thesaurus*, ii. 453,] Patavi, 1764,) found that an infusion of the leaves might be injected into the urinary bladder of animals with impunity; but when taken internally it excited vomiting, and contraction, and inflammation of the stomach.

*β. On Man.*—The most obvious effects of Uva-ursi are those of the vegetable astringents before described (see vol. i. p. 188). But the remarkable benefit frequently obtained by the use of it in affections of the urinary organs—a benefit not equally procurable by the use of other vegetable astringents—leads to the belief that it has some particular influence over these organs; though the only effects observable in healthy persons is an alteration of the colour of the urine (showing that the colouring matter of the plant is absorbed), and a slight increase in the quantity of this secretion. Alexander (*Exp. Essays*, p. 151,) found that ʒss. of the powder acted as a mild diuretic (see vol. i. p. 197). In large doses, the powder readily nauseates. As the astringent principle of Uva-ursi has been detected in the urine, it is not improbable that part of the beneficial effects which this plant produces in affections of the kidneys and of the mucous membrane lining the urinary organs, may be owing to the local action of the tannin, in its passage through and from the kidneys.

USES.—As an astringent it is applicable to all the purposes for which the vegetable astringents generally are used (see vol. i. p. 188). It has been employed as an antidote in poisoning by ipecacuanha (see *Ipecacuanha*). But the principal use of this remedy is in *chronic affections of the bladder*, attended with increased secretion of mucus, and unaccompanied with any marks of active inflammation. Thus, in the latter stages of *catarrhus vesicæ*, the continued use of Uva-ursi is frequently most beneficial. Combined with hyoscyamus, says Dr. Prout, (*On Affect. of the Urinary Organs*, pp. 185 and 268, 2d ed. 1825,) and persevered in steadily for a considerable time, it seldom fails to diminish the irritation and quantity of mucus, and thus to mitigate the sufferings of the patients. “It undoubtedly possesses,” he adds, “considerable powers in chronic affections of the bladder, for which only it is adapted, its operation being slow, and requiring perseverance.” Sir Benjamin Brodie, (*Lond. Med. Gaz.* vol. i. p. 300,) on the other hand, observes, that “Uva-ursi has the reputation of being useful in some cases of chronic diseases of the bladder, and in this [inflammation] among the rest. I must say, however, that I have been disappointed in the use of Uva-ursi, and that I have not seen those advantages produced by it which the general reputation of the medicine had led me to expect. I have seen much more good done by a very old medicine”—the root of the *Cissampelos Pareira*. Such are the opposite statements of the effects of this remedy, made



by two of the most eminent writers on diseases of the urinary organs. My own experience of it amounts to this: that in some cases the relief obtained by the use of it was most marked; whereas, in other instances, it was of no avail. It is to be remembered, that its astringent operation unfits it for acute cases, and that the alteration which it produces in the condition of the urinary organs is effected very slowly; so that to be beneficial, it requires to be exhibited for a considerable period. In *calculous affections* it has occasionally given relief. De Haen (*Rat. Med.* t. ii. p. 63.) and Van Swieten (*Commentaries*, t. xvi. p. 300.) speak of the good effects of it in these cases. It alleviated the pain, checked the purulent and mucous secretion, and restored the urine to its natural condition. These effects seem to have arisen from its influence over the kidneys and bladder, for it did not appear to affect the calculus. In *chronic bronchial affections*, with profuse mucous or purulent secretion, it may occasionally prove serviceable. Dr. Bourne (*Cases of Pulmonary Consumption, &c. treated with Uva-ursi*, 18.) gave it in powder (in doses of from 8 to 20 grs.) three times daily, in milk, with success.

**ADMINISTRATION.**—The dose of the *powder* is from ℥j. to ʒj. But the “powdered leaves of this plant are so bulky and disagreeable, that few stomachs will bear to persevere long enough in the use of the requisite quantity; and the same is pretty much the same with the *infusion* and *decoction*.” (Prout, *op. cit.* p. 185.) On this account the *extract* is frequently preferred.

1. **DECOCTUM UVÆ URSI**, L. *Decoction of Bearberry.* (Uva-ursi, bruised, ʒj.; Distilled Water, ℥jss. (Water, ℥xxx. U. S.) Boil down to a pint, and strain).—Dose, fʒj. to fʒij., three times a day.

2. **EXTRACTUM UVÆ URSI**, L. (U. S.) *Extract of Bearberry.* (Uva-ursi, bruised, lb. ijss.; Boiling Distilled Water, Cong. ij. Macerate for twenty-four hours; then boil down to a gallon, and strain the liquor while hot; lastly, evaporate to a proper consistence.) Dose, grs. v. to grs. xv., twice or thrice daily.

#### OTHER MEDICINAL ERICACEÆ.

**GAULTHERIA PROCUMBENS**, or the *Partridge Berry*, is a native of the United States of America. It combines the properties of an aromatic and astringent. Its aromatic qualities reside in a volatile oil, its astringency in tannin. It is used in America as a flavouring ingredient, and also as an emmenagogue. The volatile oil of partridge berry (*oleum gaultheria*) has been sold in England under the name of *oil of winter green*. It has a pinkish yellow colour. Its sp. gr. is 1.17. It is used to cover the unpleasant flavour of other medicines (see *Syrupus Sarsaparilla*, p. 131). In the dose of a fluidounce it has caused fatal gastritis. (*United States Dispensatory*.)

#### ORDER XLIX.—LOBELIACEÆ, *Jussieu*.—THE LOBELIA TRIBE.

**ESSENTIAL CHARACTER.**—*Calyx* five-lobed, more or less adherent to the ovary. *Corolla* persistent, more or less gamopetalous; *lobes* or petals five, usually irregular, sometimes almost regular; *tubes* entire or cleft longitudinally. *Æstivation* somewhat valvular. *Stamens* five, alternate with the lobes of the corolla, usually free, but sometimes adherent to the tube of the corolla; *filaments* free, or more or less connate; *anthers* cohering, bilocular, dehiscing longitudinally; *pollen* ovoid. *Ovary* inferior or semi-superior, two or rarely one-celled, then with parietal placentæ; *style* one; *stigma* surrounded with a ring of hairs. *Fruit* usually dehiscing at the apex by two valves, rarely from above by an operculum or laterally by three valves, or indehiscent. *Seeds* indefinite; *albumen* fleshy; *embryo* straight.—Lactescent *herbs* or *under-shrubs*, rarely small *trees*. *Leaves* alternate, without stipules. *Flowers* usually axillary, solitary, racemose. (Condensed from De Cand.)

**PROPERTIES.**—Dangerous or suspicious plants; mostly acrids or acro-narcotics.

#### LOBELIA INFLATA, Linn. L. E.—BLADDER-PODDED LOBELIA; INDIAN TOBACCO.

*Sex. Syst.* Pentandria, Monogynia.

(Herb. E.)

(Lobelia, U. S.)

**HISTORY.**—This plant was employed by the aborigines in America; and after having been for some time used by quacks, was introduced to the notice of the



profession by the Rev. Dr. Cutler, of Massachusetts. (Thacher's *Amer. New Dispensatory*, p. 258, 2d ed.) It was introduced into England in 1829, by Dr. Reece. (*Pract. Treat. on the Anti-asthmatic Properties of Bladder-podded Lobelia*, 1829.)

**BOTANY.**—**Gen. Char.**—*Calyx* five-lobed; the tube obconical, ovoid or hemispherical. *Corolla* cleft longitudinally from above, bilabiate; the tube cylindrical or funnel-shaped, straight; the *upper lip* usually smaller, and erect; the *lower* generally spreading, broader, three-cleft, or more rarely three-toothed. The two inferior, or occasionally all, of the *anthers* barbed at the point. *Ovary* inferior or semi-superior, and (in species very much alike) somewhat free. (De Cand.)

**Sp. Char.**—*Stem* erect, the lower part simple and shaggy; the upper part ramose and smooth. *Leaves* irregularly serrate-dentate, hairy; the lower ones oblong, obtuse, shortly petioled; the middle ones ovate-acute, sessile. *Flowers* small, racemose. *Pedicels* short, with an acuminate bract. *Calyx* smooth, the tube ovoid; the lobes linear-acuminate, equal to the corolla. *Capsule* ovoid, inflated. (De Cand.)

Annual; height, a foot or more. *Root* fibrous. *Stem* angular. *Leaves* scattered: segments of the *calyx* linear, pointed. *Corolla* delicate blue. *Anthers* collected into an oblong, curved body, purple; *filaments* white. *Style* filiform; *stigma* curved, and inclosed by the anthers. *Capsule* two-celled, ten-angled, crowned with the calyx. *Seeds* numerous, small, brown.

**Hab.**—North America, from Canada to Carolina, and the Mississippi. Begins to flower in July. The plant should be collected in August or September.

**DESCRIPTION.**—The herb (*herba lobelie inflatæ*) is usually imported into this country, prepared by the Shaking Quakers of New Lebanon, North America. It has been compressed into oblong cakes, weighing either half a pound or a pound each, and enveloped in blue paper. The dried herb is pale greenish-yellow; its smell is somewhat nauseous and irritating; its taste burning and acrid, very similar to that of tobacco. Its powder is greenish.

**COMPOSITION.**—No accurate analysis of lobelia has hitherto been made. Dr. Colhoun (*Journ. of the Philadelphia Coll. of Pharm.* p. 300) has announced the existence of a peculiar principle of this plant. From a few experiments which I have recently made on lobelia, I find that it contains a *volatile acrid principle* (oil?), an *acid* (peculiar!), *resin*, *chlorophylle*, *gum*, *extractive*, *woody fibre*, and perhaps *caoutchouc*.

[The chemical constitution of Lobelia has been more extensively investigated by William Procter, Jr., (*American Journ. Pharm.* vols. ix. and xiii.)]

1. **VOLATILE ACRID PRINCIPLE** (*Volatile Oil of Lobelia? Lobelianin?*)—Water distilled from lobelia has the peculiar smell and the nauseous acrid taste of the plant. In one experiment I obtained a thin film of what appeared to be a solid volatile oil. The distilled water of lobelia is unaffected by acids, sesquichloride of iron, and tincture of nutgalls. [Mr. Procter, after a careful repetition of his experiments, was unable to obtain any evidence of the existence of a volatile acrid principle in lobelia, but admits the existence of a volatile oil. He found the distilled water of lobelia to possess none of the peculiar acrimony of the plant.]

2. **LOBELINA (?)**.—The substance described by Colhoun is said to resemble the *nicotin* of Berzelius. It is soft, brown, and deliquescent; and has the acrid taste of lobelia. It is soluble in alcohol, scarcely so in ether; with acids it forms salts (Colhoun). [According to Mr. Procter, the substance obtained by Dr. Colhoun was not lobelina, but an impure hydrochlorate of that base. Lobelina in a nearly pure state, has a light yellow colour, semifluid consistence and somewhat aromatic odour. Its sp. gr. is less than that of water; it is very soluble in ether and alcohol, but less soluble in water. It is precipitated from its aqueous solution as a white tannate by tannic acid, but is not disturbed by gallic acid. It has a decided alkaline reaction, neutralizes acids and forms crystallizable salts. A striking peculiarity of this principle is its ready decomposition by a heat of 212° F., when in a pure state, whilst in combination with an acid it remains unchanged at the boiling temperature.] By evaporating the tincture of lobelia, and digesting the residue in dilute hydrochloric acid, I have obtained a yellowish-brown extract (*impure hydrochlorate of lobelina?*), soluble in alcohol, insoluble or nearly so in ether, and having an acrid taste, like that of lobelia, but stronger. Tincture of nutgalls added to the aqueous decoction of lobelia causes slight cloudiness (*tannate of lobelina?*).



3. AN ACID (*Lobelia? acid*).—A decoction of lobelia reddens litmus, and becomes, on the addition of sesquichloride of iron, dark, olive brown; and in a short time a precipitate is formed (*lobeliate? of iron*). A solution of isinglass produced no obvious change in the decoction, showing the absence of tannic acid. Sulphate of copper give rise to a green precipitate (*lobeliate? of copper*). Nitrate of silver caused a slight precipitate (*lobeliate? of silver*) soluble in nitric acid. The effect produced by the salts of iron on decoction of lobelia is analogous to that caused by the same agents on aloes (see p. 110), and cebadilla (see p. 99). [Lobelic acid may be obtained by washing the precipitate resulting from the addition of sulphate of copper to a concentrated decoction of lobelia, until it ceased to affect litmus, afterwards suspending it in water and precipitating the copper by a current of hydrosulphuric acid. The liquor by filtration and evaporation yields the impure acid, which by treatment with ether and evaporation is obtained in a yellow semi-crystalline mass. It is not precipitated by chloride of barium (Procter).]

4. RESIN.—By gently evaporating the tincture of lobelia (prepared with proof spirit) a resinous substance separates and floats on the surface of the liquid. It has an exceedingly acrid taste.

[5. FIXED OIL.—The seeds of lobelia contain 30 per cent. of a limpid fixed oil; sp. gr. .940, and possessing the properties of a drying oil (Procter).]

CHEMICAL CHARACTERISTICS.—A strong decoction of lobelia dropped into rectified spirit deposits a precipitate (*gum*). Acetate, and especially diacetate of lead, form yellow precipitates with the decoction. Protonitrate of mercury also forms a copious precipitate. (For other chemical characteristics, see above.)

PHYSIOLOGICAL EFFECTS.—An accurate account of the effects of this plant on man and animals is yet wanting. But from the observations hitherto made its operation appears to be very similar to that of tobacco (see p. 317); and from this circumstance, indeed, it has been called the *Indian Tobacco*. I have before remarked, that both in its taste and in the sensation of acridity which it excites in the throat, it resembles common tobacco. This analogy between nicotiana and lobelia, originally noticed by the American practitioners, is confirmed by Dr. Elliotson. (*Lancet*, April 15, 1837, p. 144.)

*a. On Animals generally.*—Horses and cattle have been supposed to be killed by eating it accidentally. (Thacher, *American New Dispensatory*, p. 2.) An extraordinary flow of saliva is said to be produced by it on cattle. (*Lancet*, May 13, 1837, p. 299.)

[Mr. Procter administered a grain of lobelina in solution to a cat. In less than two minutes it produced violent emesis, and much prostration, from which the animal fully recovered in three hours. Again, one grain of the substance in an ounce of water was administered directly into the stomach of the animal by an elastic tube. Immediate and total prostration was the consequence, which in half an hour rendered the animal almost motionless; the pupils of the eyes were much dilated. The animal gradually recovered its strength, but the effects of the prostration were evident for fifteen hours afterwards. No emetic or cathartic effects resulted. (*Am. Journ. of Pharm.* vol. xiii. p. 10.)—J. C.]

*β. On Man.*—*aa. In small doses* it operates as a *diaphoretic* and *expectorant*. Mr. Andrews, (*Lond. Med. Gaz.* vol. iii. p. 260,) who speaks from its effects on himself, says, it has “the peculiar soothing quality of exciting expectoration without the pain of coughing.”

*ββ. In full medicinal doses* (as ℞j. of the powder) it acts as a powerful, nauseating *emetic*. Hence it has been called the *emetic weed*. It causes severe and speedy vomiting, attended with continued and distressing nausea, sometimes purging, copious sweating, and great general relaxation. These symptoms are usually preceded by giddiness, headache, and general tremors. The Rev. Dr. M. Cutler, (Thacher, *op. cit.*) in his account of the effects on himself, says, that taken during a severe paroxysm of asthma, it caused sickness and vomiting, and a kind of prickly sensation through the whole system, even to the extremities of the fingers and toes. The urinary passage was perceptibly affected, by producing a smarting sensation in passing urine, which was probably provoked by stimulus on the bladder. It sometimes, as in the Rev. Dr. Cutler's case, gives almost instantaneous relief in an attack of spasmodic asthma. Intermittent pulse was caused by it in a case mentioned by Dr. Elliotson. Administered by



the rectum, it produces the same distressing sickness of stomach, profuse perspiration, and universal relaxation, which result from a similar use of tobacco.

γγ. *In excessive doses, or in full doses too frequently repeated*, its effects are those of a powerful *acro-narcotic poison*. "The melancholy consequences resulting from the use of *Lobelia inflata*," says Dr. Thacher, (*op. cit.*) "as lately administered by the adventurous hands of a noted empiric, have justly excited considerable interest, and furnished alarming examples of its deleterious properties and fatal effects. The dose in which he is said usually to prescribe it, and frequently with impunity, is a common teaspoonful of the powdered seeds or leaves, and often repeated. If the medicine does not puke or evacuate powerfully, it frequently destroys the patient, and sometimes in five or six hours." Its effects, according to Dr. Wood, (*United States Dispensatory*), are, "extreme prostration, great anxiety and distress, and ultimately death, preceded by convulsions." He also tells us that fatal results (in America) have been experienced from its empirical use. These are the more apt to occur when the poison, as is sometimes the case, is not rejected by vomiting.

USES.—*Lobelia* is probably applicable to all the purposes for which tobacco has been used (see p. 319). From my own observation of its effects, its principal value is as an antispasmodic.

1. *In asthma* (especially the *spasmodic* kind) and other disorders of the organs of respiration.—Given in full doses, so as to excite nausea and vomiting, at the commencement of, or shortly before, an attack of *spasmodic asthma*, it sometimes succeeds in cutting short the paroxysm, or in greatly mitigating its violence; at other times, however, it completely fails. Occasionally it has proved serviceable in a few attacks, and, by repetition, has lost its influence over the disease.

To obtain the beneficial influence in asthma, it is not necessary, however, to give it in doses sufficient to excite vomiting. Dr. Elliotson (*Lancet*, April 15, 1837, p. 144.) recommends the use of small doses at the commencement, and says that these should be gradually increased, if neither headache nor vomiting occur; but immediately when these symptoms come on, the use of the remedy is to be omitted. Given in this way, I can testify to its good effects in spasmodic asthma. It has also been used in *croup*, *hooping-cough*, and *catarrhal asthma*, but with no very encouraging effects.

2. *In strangulated hernia*, Dr. Eberle (*Treat. of the Mat. Med.* vol. i. p. 48, 2d ed.) employed it effectually, instead of tobacco, in the form of enema.

3. *As an emetic*, it has been employed by Dr. Eberle (*op. cit.*) in *croup*; but its operation is too distressing and dangerous for ordinary use.

ADMINISTRATION.—It may be given in *powder*, *infusion*, or *tincture* (alcoholic or ethereal.) Dr. Reece employed an *oxymel*. The dose of the *powder* as an emetic, is from grs. x. to ℥j.; as an expectorant, from gr. j. to grs. v. It deserves especial notice that the effects of *lobelia* are very unequal on different persons, and that some are exceedingly susceptible of its influence. (Elliotson, *Lancet*, June 1832; and April 15, 1837.)

1. TINCTURA LOBELIÆ, E. (U. S.); *Tincture of Lobelia*.—(*Lobelia*, dried, and in moderately fine powder, ℥v.; Proof Spirit, Oij. This tincture is best prepared by the process of percolation, as directed for the tincture of capsicum; but it may also be made in the usual way by digestion.)—[The U. S. P. directs *Lobelia*, four ounces; Diluted Alcohol, two pints. Macerate for fourteen days and filter, or proceed by displacement.]—Dose, as an emetic and antispasmodic, from ℥j. to ℥ij. repeated every two or three hours until vomiting occur; as an expectorant, ℥x. to ℥j. For children of one or two years old, the dose is ℥x. to ℥xx.

2. TINCTURA LOBELIÆ ÆTHEREA, E.; *Ethereal Tincture of Lobelia*.—(*Lobelia*, dried, and in moderately fine powder, ℥v.; Spirit of Sulphuric Ether, Oij. This tincture is best prepared by percolation, as directed for tincture of capsicum; but it may be also obtained by digestion in a well-closed vessel for seven days.) This may be used in the same doses as the alcoholic tincture.



With some persons the ether is apt to disagree, and for such the alcoholic tincture is preferred. *Whitlaw's ethereal tincture*, used by Dr. Elliotson, consisted of Lobelia, lb. j.; rectified spirit, Oiv.; spirit of nitric ether, Oiv.; spirit of sulphuric ether, ℥iv. Macerate for fourteen days, in a dark place. (*Lancet*, June 3, 1837.)

[As has been stated, page 385, heat injures the activity of lobelia, when its active principle is in a free state, and though combined with a weak acid in the plant, boiling is found to impair the activity of the decoction, hence in making preparations which require heat, some acid, as the acetic, should be associated with it. A VINEGAR OF LOBELIA may be prepared by treating four ounces of lobelia by displacement, with two pints of diluted acetic acid. With vinegar of lobelia, a *syrup* may be made in the same manner as syrup of squills.

By treating the powdered seeds with eight parts of diluted alcohol, containing 1 per cent. of acetic acid, a preparation is obtained possessing the activity of lobelia in a concentrated form (Proctor).—J. C.]

#### OTHER MEDICINAL LOBELIACEÆ.

LOBELIA SIPHERITICA, a native of the United States, possesses emetic, cathartic, and diuretic properties. It derived its name siphilitica from its supposed efficacy in syphilis, as experienced by the North American Indians, who considered it a specific in that disease, and from whom the secret of its use was purchased by Sir W. Johnson. (Woodville, *Med. Bot.* vol. i. p. 178.) Its antisiphilitic powers appear to have no foundation in fact. (Pearson, *Observ. on Various Art. of the Mat. Med.* p. 70.) The root was the part used: it was given in the form of decoction.

#### ORDER L.—COMPOSITÆ, De Candolle.

SYNANTHEREÆ, Richard; MUTISACEÆ, CICHORACEÆ, ASTERACEÆ, and CYNARACEÆ, Lindley.

ESSENTIAL CHARACTER.—*Calyx* gamosepalous; the tube adherent to the ovary; the limb generally degenerated into a pappus, or sometimes into a scaly corona, or entirely abortive. *Pappus* simple, pilose, ramose, or plumose; stipitate by the prolongation of the tube beyond the ovary or sessile. *Corolla* inserted into the upper part of the tube of the calyx, gamopetalous; the nerves in the tube being directed towards the sinuses; in appearance five, but really ten; which then proceed from the sinuses, along the margins of the lobes, to the apex, where they inosculate [*neuramphipetalous*.] *Tube* various in length; in the regular corolla, often funnel-shaped. *Lobes* generally five, valvate in æstivation. *Corolla* regular or irregular; the regular, of five equal lobes (*tubular corolla*); the irregular two-lipped (*bilabiate corolla*) or strap-shaped, five-dentate (*ligulate corolla*). *Stamens* generally five; in the female florets wanting, or rudimentary. *Filaments* adnate to the tube of the corolla; distinct or monadelphous; articulated near the apex, the upper portion acting as a connective. *Anthers* erect; connected in the tube, which is perforated by the style (*syngenesious* or *synantherous*). *Pollen* rough or smooth, globose or elliptical. *Ovary* adherent to the calyx, one-seeded. *Style* generally terete and bifid at the apex; the branches (commonly called *stigmas*) more or less free; flat above, convex beneath. *Stigmatic glands* (*true stigmas*) ranged in a double row along the upper margin of the branches of the style, more or less prominent: the upper portion of the style, in hermaphrodite flowers, provided with hairs, which collect the pollen. *Fruit* consisting of an achene and calyx closely connected, and inclosing the embryo; the achene one-celled, articulated on the receptacle, generally sessile; rostrate or not rostrate at the apex. *Seed* attached to the base of the fruit by a very short funiculus. Inner portion of the *spermoderm* (*endopleura* of De Cand., *albumen* of Lessing) diaphanous, pierced by the bifid funiculus. *Embryo* erect, with a short, straight, inferior radicle, and an inconspicuous plumule. *Florets* collected into dense heads (*capitules*); either all hermaphrodite (*homogamous*) or the outer ones female or neuter, the inner being hermaphrodite or male (*heterogamous*); or the capitules are entirely composed of florets of distinct sexes (*monœcious*, *diœcious*, *heterocephalous*). *Capitules* with the florets sometimes all tubular (*discoid* or *flosculous*); sometimes all ligulate (*ligulate* or *semi-flosculous*); sometimes the central florets are tubular, while those of the ray are ligulate (*radiate*). *Involucre* of one or many rows of more or less united scales, surrounding the receptacle which is formed by the concretion of the extremities of the peduncles; either covered with chaffy scales (*paleaceous*) or naked (*epaleaceous*); sometimes the receptacle is indented with pentagonal hollows (*areolated*) or the margins of these are slightly raised (*alveolated*) or fringed (*fimbriated*).—*Herbs* or *shrubs* (rarely *trees*), forming almost a tenth part of the vegetable kingdom. *Leaves* simple, alternate, or opposite (Macreight, condensed from De Candolle).

PROPERTIES.—Variable. A bitter principle pervades most species; this communicates tonic properties. The laxative and anthelmintic qualities possessed by some of the species may,