

## ORDER IX.—ARACEÆ, Schott, Lindl.—THEARUM TRIBE.

This order is distinguished from the preceding one by its naked unsexual flowers, arranged upon a spadix within a spathe. Its prevailing property is acridity, especially remarkable in *Dieffenbachia Seguina*, or the Dumb Cane, a native of the West India Islands, two drachms of whose juice have been known to prove fatal in two hours.

FIG. 132.



Arum Colocasia.

*Arum Maculatum* (Wake-Robin) or *Cuckoo pint*, is the only indigenous plant of the order. Every part of it is acrid; but, by drying or heating, it loses this property. From the underground tubers is manufactured, in the island of Portland, a feculant substance, called *Portland Arrow-root* or *Portland Sago*.<sup>1</sup> The substance which I have received under this name is a white amylaceous powder. Examined by the microscope the particles are found to be exceedingly small. They are circular, mullar-shaped, or polyhedral. The angular appearance of some of them probably arises from compression. The hilum is circular, and apparently lies in a small depression. It cracks in a linear or stellate manner.

*Arum Colocasia* (fig. 132) is cultivated in Egypt for the nutritious matter got from the tubers. *Arum Esculentum* is cultivated in the West Indies for a similar purpose.

[ARUM TRIPHYLLUM. ARUM, U. S. *Secondary List.* The *Cornus*. This plant is indigenous to the United States, where it grows in damp woods. It is known by the names of Dragon Root, Indian Turnip, and Wake Robbin, to the inhabitants of the country. The root is perennial and tuberous, round and flattened; early in the season it sends up an erect green or purplish scape, at the extremity of which is an ovate acuminate spathe, of a green colour, striped with purple, convoluted at bottom, flattened at top, and bent over like a hood; within the spathe is a club-shaped spadix. The male flowers are at the summit, the

FIG. 133.



Particles of Portland Arrow-root.

female at the base. The berries are clustered, scarlet; leaves on long sheathing petioles, composed of three ovate acuminate leaflets. All parts of the plant are peculiarly acrid, this is more apparent in the root than elsewhere, producing a burning, corrosive sensation in the mouth when chewed. The acrid principle is extremely volatile, being entirely driven off by heat and by drying; it is not imparted to water or alcohol. When dried the root consists almost entirely of ficula, which can be obtained from it as pure and white as arrow root.

This article of the *Materia Medica* when recent or partially dried, possesses stimulating properties, increasing the secretions, and especially those from the bronchial mucous surface. On this account it may be used in chronic bronchitis, a case in my hands of this nature, was much benefitted by its use. The powder is used as an application to the apthæ in the mouths of children. Dose ʒj.—J. C.]

## ORDER X.—PALMÆ, Juss.—THE PALM TRIBE.

PALMACEÆ, Lindl.

ESSENTIAL CHARACTER.—Flowers hermaphrodite, or frequently polygamous. *Perianth* six-parted, in two series, persistent; the three outer segments often smaller, the inner sometimes deeply connate. *Stamens* inserted into the base of the perianth, usually definite in number, opposite the segments of the perianth, to which they are equal in number, seldom three; sometimes, in a few polygamous genera, indefinite in number. *Ovary* one, three-celled, or deeply three-lobed; the lobes or cells one-seeded, with an erect ovule, rarely one-seeded. *Fruit* baccate or dupraceous, with fibrous flesh. *Albumen* cartilaginous, and either ruminant or furnished with a central or ventral cavity; *embryo* lodged in a particular cavity of the albumen, usually at a distance from the hilum, dorsal and indicated by a little nipple,

<sup>1</sup> Withering's *Arrangement of British Plants*, vol. iii. p. 670, 7th ed. 1830.



taper or pully-shaped; *plumule* included, scarcely visible; the cotyledonous extremity becoming thickened in germination, and either filling up a pre-existing cavity, or one formed by the liquefaction of the albumen in the centre.—*Trunk* aborescent, simple, (fig. 134), occasionally shrubby and branched, rough with the dilated half-sheathing bases of the leaves or their scars. *Leaves* clustered, terminal, very large, pinnate or flabelliform, plaited in veneration. *Spadix* terminal, often branched, inclosed in a one or many valved spathe (fig. 134 a). *Flowers* small, with bractlets. *Fruit* occasionally very large. (R. Brown, 1810.)

**PROPERTIES.**—The stems of many palms (e. g. *Sagrus levus* and *farinifera*, *Saguerus*, *Rumphii*, *Phoenix farinifera*, and *Caryota urens*) yield a feculent matter, called *Sago*. By incision into the spathe at the top of the stems of some (e. g. *Cocos nucifera*, *Caryota urens*, and *Saguerus Rumphii*), a saccharine liquor, termed *Sweet Toddy*, is procured, which, when fermented, constitutes *Palm Wine*, and yields by distillation *Arrack* or *Rack* (see vol. i. p. 324). A waxy substance exudes from the stems of some (e. g. *Ceroxylon Andicola*). The fruits of the palms want uniformity in their properties: thus, some are oily (e. g. *Elais*), some are saccharine and nourishing (e. g. *Phoenix dactylifera*), some are acrid (e. g. *Caryota urens* and *Saguerus Rumphii*), others are astringent (e. g. *Latania borbonica*), or acid (e. g. *Calamus Rotang*). The seeds, likewise, are not uniform: those of *Cocos nucifera* are oleaginous, while those of *Areca Catechu* are astringent.

FIG. 134.



*Cocos nucifera.*  
a, shows the 1 valved spathe, with branched spadix. b, The fruit, a fibrous drupe.

### 1. SAGUS RUMPHII, Willd. L.—THE MALAY OR RUMPHIUS'S SAGO-PALM.

*Sagrus farinifera*, Gaertn.

*Sex. Syst.* Monœcia, Hexandria.

(*Sago*; *Fæcula caudicis*. *Sago*; *Medulle fæcula*, L.) (*Sago*; U. S.)

**HISTORY.**—*Sago* is not mentioned by the ancient Greeks and Romans. Fern. Lopez (*Hist. dell Ind. Orient.* Ven. 1578,) is the first author in whose works I have found any notice of it. By the earlier writers it was variously called *zagu*, *sagu*, and *saga*. (C. Bauhin, *Pinax*.) In Java the word *Saga* signifies bread.<sup>1</sup>

**BOTANY.** **Gen. Char.**—*Spathes* many. *Spadix* (terminal) super-decompound. **Male:** *Calyx* three-toothed. *Corolla* three-parted. *Stamina* inserted on the base of the corolla. **Female:** *Calyx* and *Corolla* as in the male. *Stamina* abortive. *Style* three-parted *Berry* backwardly imbricated with cartilaginous scales. *Seed* solitary. *Embryo* lateral. (Roxburgh.)

**Sp. Char.**—Arboreous, armed, with strong straight spines. *Leaves* pinnate. (Roxburgh.)

The stature of this tree seldom exceeds thirty feet. Before maturity, and previous to the formation of the fruit, the stem consists of a thin hard wall, about two inches thick, and of an enormous volume of

FIG. 135.



a, The tree. c, Fruit-bearing spadix.  
b, The shrub. d, Ripe fruit.

<sup>1</sup> Sir F. Drake, Hakluyt's *Princip. Navigations, Voyages, &c.* vol. iii. p. 742.



tissue (commonly termed the *medulla* or *pith*), from which the farina, called sago, is obtained. As the fruit forms, the farinaceous medulla disappears, and when the tree attains full maturity, the stem is no more than a hollow shell. The utmost age of the tree does not exceed thirty years.

**Hab.**—Peninsula of Malacca and the Malay Islands. It is an inhabitant of low marshy situations.

## 2. SAGUS LÆVIS, Rumph.—THE UNARMED SAGO-PALM.

*S. lævis*, Jack, in *Comp. Bot. Mag.* i. 266; *S. inermis*, Roxb.

(Sago; *Fæcula caudicis*, *Offic.*)

**BOTANY. Gen. Char.**—Vide supra.

**Sp. Char.**—Arboreous, unarmed. *Embryo* lodged in or near the apex of the seed. *Leaves* pinnate. (*Roxburgh.*)

**Hab.**—Sumatra, Borneo, and the islands between them. Grows spontaneously in low swampy lands.

## 3. SAGUERUS RUMPHII, Roxb.—RUMPHIUS'S WINE SAGO-PALM.

*Palma Indica vinaria secunda*, Saguerus, sive Gomutus Gommuto, Rumph.

*Sex. Syst.* Monœcia, Polyandria.

(Sago; *Fæcula caudicis*, *Offic.*)

**BOTANY. Gen. Char.**—Male: *Calyx* three-leaved. *Corolla* three-petalled. Female: *Calyx* five-leaved. *Corolla* three-petalled. *Ovarium* superior, three-celled; cells one-seeded, attached to the base of the axis. *Style* none. *Stigma* three-dentate. *Berry* three-celled, with a single seed in each cell. *Embryo* in the back of the albumen. (*Roxburgh.*)

**Sp. Char.**—The only species.

**Hab.**—Islands eastward to the Bay of Bengal.

**MANUFACTURE OF SAGO.**—A farinaceous substance, called sago, is said to be obtained from two species of *Cycas* (vide *CYCADACEÆ*). But the sago of English commerce is obtained from one or more palms.<sup>1</sup> All the three just mentioned (viz. *Sagus Rumphii* and *lævis*, and *Saguerus Rumphii*) yield it. Dr. Roxburgh (*Fl. Indica*, iii. 623,) says, the granulated sago met with in Europe, is got from *Sagus lævis*. Marsden, (*Hist. of Sumatra*), on the other hand, says the *Sagus Rumphii* yields the sago of the shops. The manufacture of sago varies somewhat in different localities. In the Moluccas it is procured as follows:—When the tree is sufficiently mature, it is cut down near the root, and the trunk subdivided into portions of six or seven feet long, each of which is split into two parts. From these the medullary matter is extracted, and, with an instrument of bamboo or hard wood, is reduced to powder, like sawdust. This is mixed with water, which is then strained by a sieve. The filtered liquor deposits the farina, which, after two or moreedulcorations, is fit for use. This is *raw sago meal*.

For exportation, the finest meal is mixed with water, and the paste rubbed into small grains of the size and form of coriander seeds. Within the last few years, the Chinese of Malacca have invented a process by which they refine sago so as to give it a fine pearly lustre. The quantity of sago afforded by the sago-palm is prodigious. Five and six hundred pounds is not an unusual produce for one tree. (Crawford, *Hist. of the Indian Archipelago*, vol. i. 383 et seq. and vol. iii. 348.)

**DESCRIPTION OF SAGO.**—Sago occurs in commerce in two states, pulverulent and granulated.

**1. Pulverulent Sago; Sago Meal: Sago Flour (Furina Sagu).**—This is

<sup>1</sup> In the Edinburgh Pharmacopœia it is said to be the "Farina from the interior of the trunk of various Palmaceæ and species of *Cycas*."



imported in the form of a fine amylaceous powder. It is whitish, with a buffy or reddish tint. Its odour is faint, but somewhat unpleasant and musty. Examined by the microscope it is found to consist of oval, more or less ovate, particles; many of which appear as if truncated, so that they are more or less mullar-shaped. Some of them resemble in form a caoutchouc bottle cut off at the neck. From their strong lateral shading they are obviously convex. Many of the particles are more or less broken. Most of them have an irregular or tuberculated surface. The hilum, when perfect, is circular; it cracks in the form of a single slit, or of a cross, or in a stellate manner. The surface of the particles presents the appearance of a series of concentric rings or annular lines, which, however, are much less distinct than in potato starch. These lines are indicative of the concentric layers of which each particle is composed.

2. **Granulated Sago** (*Grana Sagu*).—Of this there are two kinds, pearl sago, and common brown sago.

a. *Pearl Sago* (*Sagu perlatum*).—This occurs in small hard grains not exceeding in size that of a pin's head, inodorous, and having little taste. They have a brownish or pinkish yellow tint, and are somewhat translucent. By the aid of a solution of chloride of lime they can be bleached and rendered perfectly white (*bleached pearl sago*). I am informed that the dealers pay seven pounds per ton for the bleaching of it. Bleached pearl sago resembles some samples of *potato sago* which I have met with, and which is sold as genuine palm sago. Pearl sago swells up in cold water. Examined by the microscope, it is found to consist of the same kind of particles as sago meal, but all ruptured, and presenting very indistinct traces of rings. These peculiarities are doubtless produced by the process of granulation.

β. *Common or Brown Sago* (*Sagu fuscum*) occurs in larger grains. That which I have usually met with consists of grains about the size of those of pearl barley; but I have received from Dr. Douglas Maclagan, of Edinburgh, a sample of some nearly as large as gray peas. Common sago is whitish or brownish white: the same grain being whitish on one part of its surface, and brownish on another. Examined by a microscope, the grains of common sago are found to consist of particles like those of pulverulent sago, perhaps somewhat more broken and less regular in their shape.

**ADULTERATION.**—Potato sago is sometimes sold for white or bleached pearl sago. The fraud can be distinguished by the microscope. The largest particles of potato sago are larger than those of palm sago; moreover, the particles of potato sago are more regularly oval and ovate, more distinctly ringed, smoother, and less broken than those of genuine sago. When their circular hilum cracks it frequently forms two slightly diverging rents (see fig. 137). I have two varieties of potato sago, one in grains, about the size of those of pearl sago (*pearl potato sago*), the other in larger sized grains, received from

Professor Guibourt, who tells me it is made near Paris (see *Potato Starch*).  
**COMMERCE.**—The quantity of sago on which duty was paid in 1840 was 26,895 cwts. (*Trade List*.) It is brought from Singapore, in bags, &c. The quantity imported into France, in 1834, was 41,312 lbs. (*Planche, Journ. de Pharm.* xxiii. 116.)

**COMPOSITION.**—Sago has not been analyzed; but its composition is presumed to be analogous to that of other starchy bodies (vol. i. p. 79).

**CHEMICAL CHARACTERISTICS.**—Sago possesses the characteristics of ordinary starch. A cold decoction forms a blue compound (*iodide of starch*) with iodine. A filtered infusion (prepared with cold distilled water,) of pulverulent sago, or

FIG. 136.



Particles of Sago Meal.

FIG. 137.



Particles of Potato Sago.



of brown sago, undergoes no change of colour on the addition of a tincture of iodine. But a similar infusion of pearl sago becomes blue with iodine. This evidently depends on the latter having been submitted to some process by which the starch-globules have become broken. The cold infusion of brown sago is rendered milky by nitrate of silver, diacetate of lead, and protonitrate of mercury; but the cold infusions of pulverulent and of pearl sago are scarcely affected by these tests.

**PHYSIOLOGICAL EFFECTS.**—It is nutritive and easy of digestion, and is an important article of food in some parts of the East. “The Malay sago palm,” says Dr. Roxburgh, “is the tree, the pith of which is the staff of life to the inhabitants of the Moluccas.”

**USES.**—Sago puddings are occasionally brought to table. But the principal use of sago is to yield a light, nutritious, easily digestible, and non-irritating article of food for the invalid, in febrile and inflammatory cases. For this purpose it should be boiled in water (in some cases milk is preferred), the solution strained, and flavoured with sugar and spices, or even with a little white wine, when the use of this is not contra-indicated.

#### 4. ARECA CATECHU, Linn. E.—CATECHU PALM.

*Sex. Syst. Monœcia, Hexandria.*

(Semen.—Extract of the kernels, E.—Carbo seminis, *Offic.*)

**HISTORY.**—Areca nuts are not mentioned in the writings of the ancient Greeks and Romans. Avicenna speaks of them under the name of *Fufel*. (Lib. ii. p. 306. Venet. 1564.)

**BOTANY. Gen. Char.**—1. MALE: *Calyx* three-parted. *Corolla* three-petalled. 2. FEMALE: *Calyx* three-leaved. *Corolla* three-petalled; *nectary* six-toothed. *Ovarium* superior, one-celled, one-seeded; attachment inferior. *Drupe* coriaceous. *Seed* single, ruminant. *Embryo* in the base of the albumen. (Roxburgh.)

**Sp. Char.**—*Trunk* straight and slender, from forty to fifty feet high. *Fronde* pinnate; *leaflets* compound, linear, opposite, premorse. *Spathe* erect, ramous. *Male flowers* hexandrous. *Seed* of a roundish conic form, and obtuse. (Roxburgh.)

**Hab.**—Cultivated in all the warmer parts of Asia.

**DESCRIPTION AND USES OF THE SEEDS.**—The fruit of the Catechu palm is about the size and shape of a small egg, yellowish, and smooth. Within the fibrous pericarp is the seed (*Areca nut*; *Betel nut*; *Pinang nut*). This is about the size of a nutmeg, roundish conical, flattened at the base, hard, horny, inodorous, externally reddish brown, internally brown with whitish veins. The principal part of the seed is the ruminant albumen, at the base of which is the embryo. (Roxburgh's *Plants of Coromandel*, pl. 75.) According to Morin, (*Journ. de Pharm.* viii. 449.) these seeds are composed of *tannin* (principally), *gallic acid*, *glutin*, *red insoluble matter*, *fixed oil*, *gum*, *oxalate of lime*, *lignin*, &c. With lime and the leaves of *Piper Betel*, these nuts form the celebrated masticatory of the East, called *betel*. They are usually cut into four equal parts; one of which is rolled up with a little lime in the leaf of the *Piper Betel*, and the whole chewed. The mixture acts as a sialogogue, and tinges the saliva red. The Indians have an idea that by this means the teeth are fastened, the gums cleansed, and the mouth cooled. Peron (*Voyage aux Terres Australes*) was convinced that he preserved his health, during a long and difficult voyage, by the habitual use of the betel, while his companions, who did not use it, died mostly of dysentery. In this country, *areca-nut charcoal* is used as a tooth-powder. I know of no particular value it can have over ordinary charcoal, except, perhaps, that derived from its greater hardness.

**MANUFACTURE OF PALM CATECHU.**—From the seeds is obtained an astringent extract, which constitutes two (or perhaps more) kinds of the substance



called *catechu* in the shops. It is largely procured in Mysore, about Sirah, in the following manner:—"Areca nuts are taken as they come from the tree, and boiled for some hours in an iron vessel. They are then taken out, and the remaining water is inspissated by continued boiling. This process furnishes *Kassu*, or most astringent terra japonica, which is black, and mixed with paddy husks and other impurities. After the nuts are dried, they are put into a fresh quantity of water, boiled again, and this water being inspissated, like the former, yields the best or dearest kind of catechu, called *Coury*. It is a yellowish brown, has an earthy fracture, and is free from the admixture of foreign bodies, (Dr. Heyne, *Tracts, Historical and Statistical, on India*).

PROPERTIES OF PALM CATECHU.—None of the commercial extracts, called catechu, are distinguished by any name referring to the catechu palm; and the description hitherto given of palm catechu is too slight and vague to enable us to recognise it with certainty.<sup>1</sup>

#### OTHER MEDICINAL PRODUCTS OF PALMACEÆ.

1. PALM OIL (*Oleum Palmæ*) is imported from the western coast of Africa, principally from Guinea, where it is procured by expression from the fruit of the *Elais guineensis* (fig. 138). It has a solid consistence, a rich orange-yellow colour, a sweetish taste, and an agreeable odour, somewhat similar to that of the rhizome of the Florentine orris. By exposure to light it is bleached. It consists of *Oleine*, *Margarine*, and about two-thirds of its weight of *Palmitine*. The last mentioned substance is a white solid fat, composed of palmitic acid ( $C^{32} H^{52} O^4$ ) and glycerine. The Africans use palm oil as butter. It is emollient and demulcent, like the other fixed oils, but is rarely employed in medicine. By the public it is occasionally employed by way of friction in bruises, sprains, &c. It is a constituent of the common black bougie. Its ordinary use in this country is in the manufacture of yellow soap. It readily becomes rancid. It may be bleached by the solar rays, by sulphuric acid, or by chlorine.

2. The term DRAGON'S BLOOD (*Sanguis Draconis*) is applied in commerce to certain resinous substances which are mostly obtained from some palms of the genus *Calamus*. But the term is also applied to a product of the *Dracæna Draco* [vide LILIACEÆ], as also to a substance obtained from the *Pterocarpus Draco* [vide LEGUMINOSÆ]. Lieut. Wellstead says, that in Socotra, Dragon's blood exudes spontaneously from the stem of a tree, (*Athenæum*, May 16, 1835; also, *Journ. of Royal Geographical Society*). Dragon's blood is now never used in medicine in this country. The following are the kinds of it which I have met with:

a. *Dragon's blood in the reed; Dragon's blood in sticks; Sanguis Draconis in baculis*.—This occurs in dark reddish brown sticks, of from twelve to eighteen inches long, and from a quarter to half an inch in diameter, enveloped with the leaf of the Talpat palm (*Corypha umbraculifera*), and bound round with slender slips of cane (probably the stem of *Calamus petraeus*). It is supposed to be obtained from a species of *Calamus*, perhaps *C. Draco*.

β. *Dragon's blood in oval masses; Dragon's blood in drops; Sanguis Draconis in lachrymis*, Martius.—This occurs in reddish brown lumps of the size and shape of an olive, enveloped with the leaf of *Corypha umbraculifera* or *Corypha Licuala*, which thus connects them together in a row, like the beads of a necklace. This kind is rare in English commerce. It is obtained, according to Rumphius, by rubbing or shaking the fruit of *Calamus Draco* in a bag. A resinous exudation is by this means separated, and is afterwards softened by heat, and made up in these masses.

FIG. 138.



*Elais guineensis*.

<sup>1</sup> For an account of the varieties, properties, composition, effects, and use of catechu, vide *Acacia Catechu*, *Beutia frondosa*, and *Nauclæa Gambir*.



γ. *Dragon's blood in powder*.—This is a reddish powder of very fine quality, imported from the East Indies. It is probably the dust obtained from the fruit of the *C. Draco*, in the way just described.

δ. *Dragon's blood in the tear*. *Sanguis Draconis in granis*, Martius. It occurs in irregular pieces, not exceeding the size of a horsebean. T. W. C. Martius, (*Pharmakognosie*), says, pieces of the fruit of the Calamus Rotang are frequently found intermixed.

ε. *Lump Dragon's blood*. *Sanguis Draconis in massis*.—This is of inferior quality. It occurs in large masses, which, when broken, present a heterogeneous appearance.

Other varieties of Dragon's blood are described, but I have never met with them. Dragon's blood is composed of *red resin* (called *draconin*), 90.7; *fixed oil*, 2.0; *benzoic acid*, 3.0; *oxalate of lime*, 1.6; *phosphate of lime*, 3.7, (Herberger, *Journ. Pharm.* xvii. 225.)

It is inert, or nearly so, but was formerly reputed an astringent. It is a constituent of some tooth-powders and tinctures, but is never prescribed by medical practitioners. Its principal consumption is for colouring spirit and turpentine varnishes.

#### ORDER XI.—MELANTHACEÆ, R. Brown.—THE COLCHICUM TRIBE.

ESSENTIAL CHARACTER.—*Perianth* inferior, petaloid, in six pieces, or, in consequence of the cohesion of the claws, tubular; the pieces generally involute in æstivation. *Stamens* six; *anthers* mostly turned outwards. *Ovary* three-celled, many seeded; *style* trifid or three-parted; *stigma* undivided. *Capsule* generally divisible into three pieces; sometimes with a loculicidal dehiscence. *Seeds* with a membranous testa; *albumen* dense, fleshy. (R. Brown.)

PROPERTIES.—Poisonous; operation acro-narcotic. This is well shown in the genera *Colchicum*, *Veratrum*, and *Asagraea*. MM. Pelletier and Caventou extracted what they considered to be *veratria* from each of these genera. According to Hesse and Geiger the active principle procured from *Colchicum* is *colchicina*.

#### I. COLCHICUM AUTUMNALE, Linn, L. E. D.—THE COMMON MEADOW SAFFRON.

*Sex. Syst.* Hexandria, Trigynia.

(*Cornus et semina*, L. E.—*Bulbus et semina*, D.)

(*Colchici radix* and *Colchici semen*, U. S.)

HISTORY.—Dioscorides (Lib. iv. cap. 84,) speaks of *Colchicum* (κόλχικόν), and says it grows in Messenia and at Colchis. From the latter place it received its name. Dr. Sibthorp (*Prodr. Fl. Græcæ*, i. 250,) found three species of *Colchicum* in Greece, viz. *C. autumnale*, *C. montanum*, and *C. variegatum*. The first of these he considers to be the *Colchicum* of Dioscorides. It is the species admitted into the *Pharmacopœia Græca*, printed at Athens in 1837.

FIG. 139.



*Colchicum autumnale*.

a. The flowering plant.  
b. Stigmas, with a portion of the styles.  
c. Leaves and fruit.

**BOTANY.** *Gen. Char.*—*Perianth* single, tubular, very long, rising from a spatha; limb campanulate, six-partite, petaloid. [*Stamens* six, inserted into the throat of the tube. *Ovarium* three-celled. *Styles* three, filiform, long. *Stigmas* somewhat clavate.] *Capsule* three-celled; cells united at the base. (Hooker, with some additions.)

*Sp. Char.*—*Leaves* plane, broadly lanceolate, erect (Hooker).

*Root* fibrous. *Cornus* (improperly called *root* or *bulb*) ovate, fleshy, large, covered with a loose brown membrane. The *leaves* are produced in the spring along with the fruit, and disappear before the flower appears. *Flowers* several, lilac or pale purple, arising from the *cornus* by a long, narrow, white tube. *Fruit* oblong, elliptical, composed of three cells, which may be regarded as distinct capsules, with intermediate fissures. *Seeds* small, spherical, with a rough brown testa, and large fleshy strophiole; internally they are white, and consist of a minute embryo lodged in a horny elastic albumen. The flowers appear in September, and the fruit the following spring or summer.



**Hab.**—Moist rich meadows in many parts of England and in various countries of Europe.

**COLLECTION.**—The activity of the *cormus* varies at different seasons of the year. It is greatest about the months of July and August, that is, between the withering of the leaves and the sprouting forth of the flower. At this period the new cormus is fully developed, and has not exhausted itself by the production of the flower. But many of the cormi brought to market have already pushed forth their flowers, which are broken off, so as to prevent the circumstance from being observed. "I have seen many *cormi*," says Dr. Lindsay, (*Flora Medica*, p. 589,) "sent to town in this state, which nevertheless found a ready sale, and at the best price." The *seeds* should be gathered when fully ripe. The London market is principally supplied from Gloucestershire, but partly also from Hampshire and Oxfordshire.

**DESCRIPTION.**—The *cormus*, commonly called the *bulb* or *root*, when gathered at the proper season, is about the size of a chestnut, and somewhat resembles in external appearance the bulb of the common tulip (*Tulipa Gesneriana*); which as well as other liliaceous bulbs, are distinguished from the cormus of Colchicum by being composed of laminæ or scales, whereas the cormus of Colchicum is solid. It is rounded on one side, flattened on the other, where is perceived the fibrous germ of a new cormus, which, if allowed to grow, shoots up and bears the flower, while the old cormus wastes, becomes insipid, and inert. It is covered by two coats, an inner reddish yellow one, and an external brown one. Internally, the cormus is white, fleshy, solid, contains a milky juice, is very feculent, and has an acrid bitter taste. "Before drying the cormus, it should be cut transversely in thin slices, the dry coats being previously removed," (*Ph. Lond.*) The slices are to be quickly dried, in a dark airy place, with a heat not exceeding 170° F. (Battley, *Lond. Med. Rep.* xiv. 429,) Dr. A. T. Thomson (ditto, p. 344,) recommends the slices to be dried upon clean white paper, *without artificial heat*, but the time required for this is an objection to it in practice. The dried slices (*radix siccata*, *Offic.*) should be about the eighth or tenth of an inch thick, rounded, oval, with one notch only on one part of their circumference (not fiddle-shaped), inodorous, of a grayish-white colour and an amylaceous appearance.

The *seeds* (*semina*) are about the size of those of white mustard, odourless, and have a bitter acrid taste. Their other qualities have been described above.

**COMPOSITION.**—The Colchicum cormus was analyzed in 1810 by Melandri and Moretti, (*Bull. de Pharm.* vol. ii. p. 217,) in 1818 by Stoltze, (*Thomson's Org. Chem.* 846,) and in 1820 by Pelletier and Caventou, (*Journ. de Pharm.* vi. 364.)

<i>Analysis of Pelletier and Caventou.</i>		<i>Stoltze's Analysis.</i>		
			Cormi gathered in March.	Ditto in October.
Fatty matter composed of	{ Olein. Stearin. Volatile acid.	Volatile acrid matter.....	trace	rather more
Supergallate of veratria.		Soft resin.....	0.04	0.06
Yellow colouring matter.		Crystallizable sugar.....	0.41	1.12
Gum.		Encrystallizable sugar.....	5.91	2.72
Starch.		Bitter extractive.....		2.17
Inulin in abundance.		Difficultly soluble extractive.....	1.30	0.52
Lignin.		Gum. like tragacanth.....	0.81	1.65
Ashes, a minute quantity.		Starch.....	7.46	10.12
		Lignin.....	2.32	1.61
		Extractive, soluble in potash.....	0.61	0.52
Colchicum cormus.		Water.....	81.04	80.31
		Colchicum cormus.....	99.90	100.80

*Veratria* will be described hereafter (vide *Asagrain officinalis*).

The existence in colchicum seeds of a new principle, called *colchicina*, *colchicia*, or *colchicine*, has been announced by Geiger and Hesse. (*Journ. de Chim.* x. 465.) It was prepared by digesting colchicum seeds in boiling alcohol; this dissolved a supersalt, which was precipitated by magnesia, and the precipitate treated with boiling alcohol. By evaporation, colchicina was



deposited. The following are said to be its *properties*:—It is a crystallizable alkaline substance, without odour, but having a bitter taste. Its hydrate is feebly alkaline, but neutralizes acids, and forms crystallizable salts, having a bitter taste. It is soluble in water, and the solution precipitates the solution of chloride of platinum. Nitric acid colours colchicina deep violet, which passes into indigo blue, and quickly becomes, first green, and then yellow. Concentrated sulphuric acid colours it yellowish brown.

Colchicina is said to be distinguished from veratria by the following characteristics:—1st, it is soluble in water, whereas veratria is not; 2dly, it is crystallizable, whereas pure veratria is not; 3dly, it does not possess the acidity of veratria; and it differs from the latter in this, that when applied to the nose it does not excite sneezing, whereas the least portion of veratria occasions a most convulsive sneezing.

Colchicina is a powerful poison. One-tenth of a grain, dissolved in weak spirit, killed a young cat in about twelve hours. The symptoms were salivation, diarrhoea, vomiting, a staggering gait, cries, convulsions, and death. The stomach and intestines were violently inflamed, and had extravasated blood throughout their whole course.

The above statements require confirmation.

**CHEMICAL CHARACTERISTICS.**—A cold decoction of the fresh cormi forms a deep blue precipitate (*iodide of starch*) with a solution of iodine. Sesquichloride of iron communicates a faint bluish tint (*gallate of iron*) to the decoction. Acetate and diacetate of lead, and protonitrate of mercury, form white precipitates with the cold decoction. Nitrate of silver produces a precipitate which is at first white, but becomes in a few minutes black. Tincture of nutgalls produces a slight dirty-looking precipitate, which is somewhat diminished by the effect of heat. Pelletier and Caventou (*Journ. de Pharm.* vi. 365) regard this precipitate as a mixture of the *tannates of starch* and *inulin* (and of veratrin?). When heated to 122° F. the tannate of starch dissolves, but not that of inulin. Fresh prepared tincture of guaiacum with a few drops of acetic acid produces a cerulean blue colour with the fresh cormus, indicating the presence of gluten.

**PHYSIOLOGICAL EFFECTS.** *a. On Vegetables.*—Not yet determined.

*β. On Animals.*—Colchicum is a poison to animals. It acts as a local irritant, reduces the force of the circulation, and causes inflammation of the alimentary canal. Animals, for the most part, refuse to feed on it. It has, however, been eaten by deer and cattle, and proved poisonous to them. (Wibmer, *Wirk. d. Arzn. u. Gifte*. Bd. ii. 150.) It is said to prove injurious at spring-time only. (Hacquet, in Wibmer, *op. cit.*; also, Want, *Lond. Med. and Phys. Journ.* vol. xxxii. p. 216.) Moreover, we are told that when dried it may be eaten in hay with impunity. Störck (*Lib. de Colchico*, p. 17) and Kratochwill (quoted by Wibmer) gave it to dogs, on whom it acted as an acrid poison, and caused death. Sir E. Home (*Phil. Trans.* 1816) injected 160 drops of a vinous infusion of colchicum into the jugular vein of a dog: all power of motion was instantly lost, the breathing became slow, the pulse hardly to be felt. In ten minutes it was 84, in twenty minutes 60, in an hour 115, with the respiration so quick as hardly to be counted. In two hours the pulse was 150, and very weak. The animal was purged, vomited, and very languid: he died in five hours. On dissection, the internal coat of the stomach was found inflamed, in a greater or less degree, universally. From this experiment it appears that the action of colchicum on the alimentary canal is of a specific kind.

In opposition to the above statements it deserves notice that Orfila (*Toxicol. Gén.*) has frequently given to dogs, in the month of June, two or three cormi without perceiving any sensible effects; from which he infers, that climate and seasons of the year have great influence on their deleterious properties.

It has been said that horses eat colchicum with impunity; but it is probable that this statement is erroneous. Withering (*Brit. Plants*, ii. 462, 7th ed. 1830) states, on the authority of Mr. Woodward, that, “in a pasture in which were several horses, and eaten down nearly bare, the grass was closely cropped, even under the leaves, but not a leaf bitten.”

Some further information on the effects of colchicum on dogs will be found in Sir C. Scudamore's *Treatise on Gout and Rheumatism*, 3d ed. p. 477, 1819.



γ. *On Man.*—*In small and repeated doses* colchicum has a tendency to promote the action of the secreting organs, especially of the intestinal mucous membrane. The kidneys, the skin, and the liver, are less certainly and obviously affected by it. The most constant effects observed from the use of *larger doses* are nausea, vomiting, and purging. Reduction of the frequency of the pulse is a common, though not an invariable effect. Mr. Haden (*Pract. Observ. on the Colchicum autumnale*, 1820) was, I believe, the first to direct attention to the advantages to be taken of this effect in the treatment of inflammatory diseases. In some experiments made on healthy individuals by Dr. Lewins, (*Ed. Med. and Surg. Journ.* vol. xlvii. p. 345, 1837,) debility, a feeling of illness, and headache, were experienced. This feeling of debility is not, however, to be referred to the evacuations produced; for, as Dr. Barlow (*Cyclop. of Pract. Med.* art. *Gout*, vol. ii. p. 371) has observed, the number of motions is sometimes considerable without any proportionate depression of strength ensuing. "I have known," says Dr. B. "even twenty stools occasioned by a single dose of colchicum, the patient not complaining of the least debility." The action of colchicum on the secretory apparatus is not confined to that of the alimentary canal: after the use of three or four full doses of this medicine copious sweating is often produced, especially when the skin is kept warm. On other occasions the kidneys are powerfully acted on. In one case, mentioned by Dr. Lewins, seventy drops of *Vinum Colchici* caused the discharge of upwards of a pint of bile by vomiting. Violent salivation resulted in a case recorded in an American journal. (Wood and Bache's *United States Dispensatory*, 3d ed.) Chelius, of Heidelberg, (*Lond. Med. Gaz.* vol. ii. p. 830,) asserts, that in gout and rheumatism, colchicum occasions a striking increase in the quantity of uric acid contained in the urine: in one case it was nearly doubled in the space of twelve days. But this effect is by no means constant, as Dr. Graves (*Lond. Med. Gaz.* vol. vii. p. 548) has pointed out. Indeed, it not unfrequently happens, in acute rheumatism, when the urine is loaded with uric acid or the urates, that the use of colchicum diminishes the quantity of these matters in the urine; so that it would seem rather to prevent the formation of uric acid in the system than to provoke its elimination.

Under some circumstances colchicum acts as anodyne: thus in gouty and rheumatic cases it sometimes speedily relieves the pain in a most surprising manner.

*In excessive or poisonous doses* colchicum acts as a powerful poison. In a case related by Mr. Fereday, (*Lond. Med. Gaz.* vol. x. p. 160,) where two ounces of the wine of the seeds of colchicum were swallowed, the symptoms were acute pain in the bowels, coming on in about an hour and a half after taking it, vomiting, acute tenesmus, small, slow, and feeble pulse, cold feet, and weakness of limbs. The nausea, vomiting, and pain in the stomach, continued with undiminished violence, the pulse became also imperceptible and intermitting, the urine was suppressed, the respiration hurried, purging of copious liquid stools came on, and loss of sight for a minute or two after getting out of bed. The patient died forty-seven hours after swallowing the poison. On a *post-mortem* examination, the skin of most parts of the body was found to be covered with a purple efflorescence: no inflammation was observed in the alimentary canal; two red patches were found, one in the stomach, and the other in the jejunum. These were produced by the effusion of a small quantity of blood, in the one case, between the muscular and mucous coats; in the other, between the peritoneal and muscular coats. Ecchymosed spots were observed on the surface of the lungs, of the heart, and of the diaphragm. More recently a case of poisoning by a decoction of the seeds has been recorded; (*Journ. de Chim. Med.* t. vi. 2<sup>e</sup> Série, p. 505.) as also by the leaves of this plant.

In Mr. Fereday's case the only indications of an affection of the nervous system were weakness of the limbs, the temporary loss of sight, and the slowness and feebleness of the pulse.



It is deserving of notice, that in this case, also in another related by Chevalier, (*Journ. de Chim. Méd.* t. viii. 351,) likewise in a third mentioned by Mr. Dillon, (Stephenson and Churchill's *Med. Bot.* vol. ii.,) and in Mr. Haden's case, (*Majendie's Formulary*, by C. T. Haden,) no convulsions were observed; and in the three first cases no insensibility. In the last case, however, Mr. Haden mentions that at "ten P.M. she fell into an apoplectic kind of sleep, which terminated in death before morning." It is remarkable that convulsions are ascribed to veratria by Magendie, and to colchicina by Geiger and Hesse. In one case of fatal poisoning from an ounce and a half of the tincture of colchicum (*Ed. Med. and Surg. Journ.* xiv. 262,) delirium occurred.

The above account of the effects of colchicum applies both to the *cormi*, the *seeds*, and the *leaves*. The *flowers* are likewise poisonous, and a fatal case from their use is mentioned by Dr. Christison. (*Treat. on Poisons*, 3d ed. p. 792.) They have been recommended for medicinal use.

USES.—The following are the principal diseases in which the Meadow Saffron has been employed :

1. *In Gout.*—The circumstances which of late years have led to the extensive employment of colchicum in gout are the following :—About seventy years ago, M. Husson, a military officer in the service of the king of France, discovered, as he informs us, a plant possessed of extraordinary virtues in the cure of various diseases. From this plant he prepared a remedy called *Eau Medicinale*, which acquired great celebrity for abating the pain and cutting short the paroxysm of gout. (Dr. E. G. Jones, *An Account of the Remark. Effects of the Eau Medicinale d'Husson in the Gout.*) Various attempts were made to discover the nature of its active principle. In 1782, MM. Cadet and Parmentier declared that it contained no metallic or mineral substance, and that it was a vinous infusion of some bitter plant or plants. Alyon (*Elém de Chimie*,) asserted that it was prepared with Gratiola; Mr. Moore (*Two Letters on the Composition of the Eau Medicinale*, 2d ed. 1811,) that it was a vinous infusion of white hellebore with laudanum; Mr. Want (*Med. and Phys. Journ.* vol. xxxii. 1814,) that it was a vinous infusion of Colchicum. Although most writers have adopted Mr. Want's opinion, we should bear in mind that the proofs hitherto offered of its correctness, viz. analogy of effect, cannot be admitted to be conclusive, as is well shown by the fact, that they have been advanced in favour of the identity of other medicines with the *Eau Medicinale*.

The power of Colchicum to alleviate a paroxysm of gout is admitted by all: but considerable difference of opinion exists as to the extent of this power, and the propriety of employing it. Sir Everard Home, (*Phil. Trans.* 1816,) from observations of its effects on his own person, regarded it as a specific in gout, and from experiments on animals concluded that its beneficial effects in this malady are produced through the circulation.

Dr. Paris (*Pharmacologia*, vol. ii. p. 175, 6th ed.) observes, "As a *specific* in gout its efficacy has been fully ascertained: it allays pain, and cuts short the paroxysm. It has also a decided action upon the arterial system, which it would appear to control through the medium of the nerves." But if by the word *specific* is meant a medicine infallibly, and on all patients, producing given salutary effects, and acting by some unknown power on the disease, without being directed by indications, (vide Dr. Parr's *Lond. Med. Dict.* art. *Specifica*,) undoubtedly Colchicum is no specific for gout.

That Colchicum alleviates a paroxysm of gout I have before mentioned; but that alleviation is palliative, not curative. It has no tendency to prevent a speedy recurrence of the attack; nay, according to Sir Charles Scudamore, (*Treat. on Gout and Rheumatism*, 3d ed. p. 197,) it renders the disposition to the disease much stronger in the system. Furthermore, by repetition its power over gouty paroxysms becomes diminished.

The *modus medendi* of Colchicum in gout is an interesting though not very



satisfactory part of our inquiry. I have already stated that some regard this remedy as a specific, that is, as operating by some unknown influence. Others, however, and with more propriety, refer its therapeutical uses to its known physiological effects. "Colchicum," says Dr. Barlow, (*Cyclop. of Pract. Med.* art. *Gout*, vol. ii. p. 372,) "purges, abates pain, and lowers the pulse. These effects are accounted for by assigning to it a cathartic and sedative operation, and it is this combination perhaps to which its peculiar virtues are to be ascribed." The fact that a combination of a drastic and a narcotic (as elaterium and opium, mentioned by Dr. Sutton, (*Tracts on Gout*, p. 201,) and white hellebore and laudanum, recommended by Mr. Moore, (*op. cit.*) has been found to give, in several cases of gout, marked and speedy relief, seems to me to confirm Dr. Barlow's opinion. The idea entertained by Chelius, and adopted by Dr. G. Hume Weatherhead, (*Treat. on Headaches*, p. 88, 1835,) that colchicum relieves gout by augmenting the quantity of the acid in the urine, is not supported by fact, as I have already mentioned. Whether it acts by preventing the formation of uric acid in the system, I am not prepared to say.

In acute gout occurring in plethoric habits, blood-letting should precede the use of Colchicum. This medicine should then be exhibited in full doses, so as to produce a copious evacuation by the bowels, and then the quantity must be considerably diminished. Though purging is not essential to the therapeutical influence of Colchicum, it is admitted by most that, in a large number of cases at least, it promotes the alleviation of the symptoms. Hence, many practitioners recommend its combination with saline purgatives, as the sulphate of magnesia. Sir Charles Scudamore has experienced "the most remarkable success from a draught composed of *Magnesie*, gr. xv. ad xx.; *Magnes. Sulphat.* ʒj. ad ʒij.; *Aceti Colchici*, ʒj. ad ʒij.; with any distilled water the most agreeable, and sweetened with any pleasant syrup, or with 15 or 20 grains of Extract. Glycyrrhiz."<sup>1</sup>

2. *In Rheumatism.*—The analogy existing between gout and rheumatism has led to the trial of the same remedies in both diseases. But its therapeutical powers in the latter disease are much less marked than in the former. Rheumatism may affect the fibrous tissues of the joints, the synovial membrane, the muscles or their aponeuritic coverings, the periosteum, or the neurilemma, constituting thus five forms of the disease, which may be denominated respectively the *fibrous*, or *ligamentous*; the *synovial*, *arthritic*, or *capsular*; the *muscular*; the *periosteal*; and the *neuralgic* forms of rheumatism. (Dr. Macleod, *Lond. Med. Gaz.* xxi. 120.) Of these colchicum is said to produce its best effects in the synovial form. It is remarkable, however, that in all the severe cases of this variety of rheumatism which have fallen under my notice, the disease has proceeded unchecked, or was scarcely relieved by the use of Colchicum. In one instance, that of my much-lamented friend, the late Dr. Cummin (whose case is noticed by Dr. Macleod, in the *Lond. Med. Gaz.* xxi. 358), the disease proved fatal by metastasis to the brain. In another melancholy, but not fatal case, the gentleman has lost the sight of both his eyes, and has both knee-joints rendered stiff. In neither of these cases was colchicum of the slightest avail.

Of the mode of administering colchicum "in rheumatic gout," recommended by Mr. Wigan, (*Lond. Med. Gaz.* June 30, 1838,) I have no experience. He gives eight grains of the powder in some mild diluent every hour until active vomiting, profuse purging, or abundant perspiration, take place; or at least till the stomach can bear no more. The usual quantity is eight or ten doses; but

<sup>1</sup> Under the name of *Lartignes' Pills*, a remedy for gout has recently been employed with some advantage in Philadelphia. The following recipe is that given by M. Bouchardat, in the *Journal de Chimie Medicale*, May, 1841.—Take of compound extract of Colocynth dr. ss.; alcoholic extract of Colchicum seeds, alcoholic extract of Digitalis, each, gr. iss.—make into mass and divide into ten pills; two or three to be given in the twenty-four hours. The proportion of extract of Colchicum might be doubled.—J. C.



while some take fourteen, others can bear only five. Though the pain ceases, the more active effects of the colchicum do not take place for some hours after the last dose. Thus administered, Mr. Wigan declares colchicum "the most easily managed, the most universally applicable, the safest, and the most certain specific, in the whole compass of our opulent Pharmacopœia." But its use in these large doses requires to be carefully watched.

3. *In Dropsy.*—Colchicum was used in dropsy with success by Störck. (*Libellus.*) It has been employed in dropsical cases with the two-fold view of purging and promoting the action of the kidneys. Given in combination with saline purgatives, I have found it beneficial in some cases of anasarca of old persons.

4. *In inflammatory diseases generally.*—Colchicum was recommended as a sedative in inflammatory diseases in general by the late Mr. C. T. Haden. (*Pract. Observ. on the Colchicum autumnale*, 1820.) He used it as an auxiliary to blood-letting for the purpose of controlling arterial action; and gave it in the form of powder, in doses of six or seven grains, three or four times daily, in combination with purgatives, in inflammatory affections of the lungs and their membranes, and of the breasts and nipples. In chronic bronchitis it has also been found useful by Dr. Hastings. (*Treat. on Inflammation of the Mucous Membrane of the Lungs*, 1820.)

5. *In fevers.*—The late Mr. Haden, (*op. cit.*), and more recently Dr. Lewin, (*Ed. Med. and Surg. Journ.* April, 1837,) have spoken favourably of the use of colchicum in fever. In my opinion it is only admissible in those forms of the disease requiring an active antiphlogistic treatment. In such it may be useful as an auxiliary to blood-letting and cathartics.

6. *In various other diseases.*—For expelling tape-worm, colchicum has been found efficacious by Chisholm and Baumbach. In some chronic affections of the nervous system, as chorea, hypochondriasis, hysteria, &c. Mr. Raven (*London Medical and Physical Journal*, Jan. 1817,) employed it with advantage. In humoral asthma, and other chronic bronchial affections, I have found it of great service, especially when these complaints were accompanied with anasarca swellings.

ADMINISTRATION.—The cormi and seeds of meadow saffron have been employed in substance, in a liquid form, and in the state of extract.

1. PULVIS CORMI COLCHICI.—Dose, from two to eight or nine grains. To preserve it Mr. Wigan recommends it to be kept mixed with sugar.

2. PULVIS SEMINUM COLCHICI.—Dose the same as that of the cormus. The seeds are to be preferred to the cormi, as being more uniform in their properties.

3. TINCTURA [SEMINUM] COLCHICI, L. Ed.; *Tinctura seminum Colchici*, D. [*Tinctura Colchici seminis*, U. S.] (Meadow Saffron seeds bruised [ground finely in a coffee-mill, *Ed.*], ℥v. (℥ij. D.); Proof Spirit, Oij. (Oj. wine measure, Dub.) Macerate for fourteen days, and strain, *L.* "Percolation is much more convenient and speedy than digestion, *E.*) [Colchicum seed bruised four ounces; diluted alcohol, two pints. Macerate for fourteen days, express and filter through paper, or moisten the powder with the diluted alcohol, allow to stand for twenty-four hours, and then displace. U. S.]—Dr. Williams (*London Med. Rep.* vol. xiv. p. 93,) objected to this preparation as being "turbid, unpalatable, and disposed to precipitation." The same writer (*op. cit.* vol. xv. p. 442,) also asserts, that the active property of the seeds resides in their husk or cordical part, and, therefore, protests against bruising them. But were his assertion correct (and it is most improbable that the embryo is devoid of activity), bruising them cannot destroy or injure their activity. The average dose is from ℥ss. to ℥j. I have repeatedly given ℥ij. at a dose without any violent effect. Dr. Barlow, who prefers this to the other preparations of colchicum, advises that in gout a drachm, a drachm and a half, or two drachms of the tincture, should be given at night, and repeated the following morning. If this quantity



fail to purge briskly, a third dose may be administered the ensuing night. Externally, the tincture has been employed as a liniment, to relieve rheumatic, gouty, venereal, and other pains. (Laycock, *London Med. Gaz.* vol. xxiii. p. 899; and vol. xxiv. 388.)

4. TINCTURA [SEMINUM] COLCHICI COMPOSITA, L.; *Spiritus Colchici ammoniacus*, L. 1824. (Meadow Saffron seeds,  $\bar{z}$ v.; Aromatic Spirit of Ammonia, Oij. Macerate for fourteen days, and strain). Dose,  $\mathfrak{xx}$  to  $\mathfrak{f}\bar{3}$ j.—This preparation was recommended by Dr. Williams as being “of greater value when acidity or flatulence prevails, than the *Vin. sem. Colchici*, and better adapted to the palates of those who object to the flavour of white wine.” It is seldom employed. Mr. Brande (*Dict. of Mat. Med.* 1839) says, doubts are entertained as to the propriety of employing ammonia in it.

5. VINUM SEMINUM COLCHICI. [*Vinum Colchici seminis*, U. S.]—No formula for this exists in any of the British pharmacopœias. The following is Dr. Williams' formula:—Meadow Saffron seeds, dried,  $\bar{3}$ ij.; Sherry Wine, Oj. (*wine measure*). Macerate for eight or ten [fourteen] days, occasionally agitating, then filter. The average dose is  $\mathfrak{f}\bar{3}$ ss. to  $\mathfrak{f}\bar{3}$ j. I have given it to the extent of  $\mathfrak{f}\bar{3}$ ij. Dr. Williams says it may be gradually increased to  $\mathfrak{f}\bar{3}$ ij. [This formula has been adopted by the U. S. Pharmacopœia, which directs double the proportions each of the ingredients, and directs maceration for fourteen days.]

6. VINUM [CORMI] COLCHICI, L. E. [*Vinum Colchici radices*, U. S.] (Meadow Saffron cormus, dried and sliced,  $\bar{3}$ vij. Sherry Wine, Oij. Macerate for fourteen [seven, *E.*] days, [express strongly the residuum, *E.*] and strain).—Average dose,  $\mathfrak{f}\bar{3}$ ss. to  $\mathfrak{f}\bar{3}$ j. [The formula of the U. S. Pharmacopœia is Colchicum Root well bruised, a pound; Wine, two pints. Macerate for fourteen days and filter, or by displacement]. Sir E. Home (*Phil. Trans.* 1837,) thought that the second and subsequent deposits which take place from this wine, contain the principle which acts on the stomach and bowels, while that which cures the gout is retained in permanent solution. But Sir C. Scudamore (*Treatise on Gout*, 3d edit. p. 513,) found the sediment to be inert.

7. ACETUM [CORMI] COLCHICI, L. E. D. (U. S.) (Fresh Meadow Saffron cormus, sliced,  $\bar{3}$ j.; Distilled vinegar,  $\mathfrak{f}\bar{3}$ xvj.; Proof spirit,  $\mathfrak{f}\bar{3}$ j. Macerate the meadow saffron cormus with the vinegar, in a covered glass vessel, for three days; afterwards press and strain the liquor, and set it by, that the dregs may subside: lastly, add the spirit to the clear liquor).—[The U. S. Pharmacopœia directs: Colchicum root (dried) bruised, two ounces; distilled vinegar, two pints; alcohol, a fluid ounce. Macerate the root with the distilled vinegar, in a close vessel, for seven days; then express the liquor and set it by that the dregs may subside; lastly, pour off the clear liquor and add the alcohol, or prepare by displacement. Diluted acetic acid may be substituted for distilled vinegar.]—Though the colleges order the *fresh* cormus to be used, druggists frequently prepare it with the *dried*, on account of the impossibility of procuring the fresh at all seasons of the year. Hence it is to be regretted that the colleges have directed the latter to be employed, as it leads to variation in the mode of preparation. In practice, one part of the dried cormus may be considered equal to three parts of the fresh: for Mr. Battley (*Lond. Med. Gaz.* xii. 463,) says the cormus loses about 67 per cent. of its weight in drying; and Mr. Bainbridge (Haden, *Practical Observations on Colch. autumn.* p. 77,) obtained 2 lbs. 15 ozs. of dried slices from 8 lbs. of fresh cormi. The proof spirit used in preparing the acetum is for the purpose of checking decomposition. By the action of the acetic acid on the colchicina of the cormus, an acetate of this alkaloid is obtained. Sir C. Scudamore (*Observations on the Use of Colchicum*,) regards an acetic preparation of colchicum as milder than the wine or tincture made with the same relative weights of cormi and liquids, though it is a most efficient preparation in gout. He advises, as I have before mentioned, that it should be given in combination with magnesia, by which its acid menstruum is



destroyed (acetate of magnesia being formed), and the active principle of the colchicum left in the most favourable state for administration. The average dose is from ℥ss. to ℥ij.

8. **EXTRACTUM [CORMI] COLCHICI ACETICUM, L. E.**—(Fresh Meadow Saffron cormus, lb. j.; Acetic [pyroligneous, *Ed.*] acid, ℥ij. Bruise the cormus gradually sprinkled with the acetic acid, then press out the juice, and evaporate it in an earthen vessel which is not glazed with lead [over the vapour bath, *Ed.*] to a proper consistence.)—This compound contains the acetate of colchicina. It is a very favourite remedy in the treatment of gout and rheumatism, and was introduced into practice by Sir C. Scudamore. Dr. Paris (*Append. to the 8th ed. of the Pharmacologia*,) observes that he has “found it useful in promoting healthy discharges of bile.” He occasionally combines it with blue pill, calomel, or potassio-tartrate of antimony. The dose is from gr. j. to gr. iij. twice or thrice a day.

9. **EXTRACTUM COLCHICI CORMI, L.**—(Fresh Meadow Saffron cormus, lb. j. Bruise the cormus, sprinkled with a little water, in a stone mortar; then press out the juice, and evaporate it, unstrained, to a proper consistence.)—This is a favourite preparation with Dr. Hue, of St. Bartholomew’s Hospital, in the early stage of acute rheumatism. The dose is gr. j. every four hours.

10. **OXYMEL [CORMI] COLCHICI, D.**—(Fresh Cormus of Meadow Saffron, cut in thin slices, ℥j.; Distilled Vinegar, Oj. (*wine measure*); Clarified Honey, *by weight*, lb. ij. Macerate the meadow saffron with the vinegar in a glass vessel for two days; to the liquor, strongly expressed from the cormus and filtered, add the honey, and then boil down the mixture to the consistence of a syrup, frequently stirring it with a wooden rod.)—The active principle of this preparation is apt to be injured by boiling, and hence its strength is uncertain. It is used in gout, rheumatism, dropsy, and humoral asthma. The dose is ℥j. gradually increased to ℥ij. or more, twice in the day.

11. **SUCCUS COLCHICI; Preserved Juice of Colchicum.**—The mode of preparing and preserving vegetable juices has been already described (see vol. i. p. 325.) Mr. Bentley informs me that from one cwt. of very fine cormi gathered at the end of August, and well bruised and pressed, he obtained four imperial gallons and ℥xij. of a light fawn coloured juice. This juice becomes darker coloured by exposure to the air. After standing forty-eight hours the spirit is added to it. A large quantity of fecula is deposited, and the liquor acquires a paler tint. Exposure to light appears to render it somewhat paler. The smallest dose of Mr. Bentley’s succus colchici is five minims.

ANTIDOTE.—See VERATRUM ALBUM.

## 2. HERMODACTYLUS, *Auct.*—HERMODACTYL.

**HISTORY.**—Among the later Greek and the Arabian physicians, a medicine called hermodactyl (*ερμωδακτυλος*, from *Ερμης*, Mercury or *Hermes*: and *δακτυλος*, a finger) was in great repute as a remedy for arthritic diseases. It was first mentioned by Alexander of Tralles, (*Lib. xi.*,) who flourished A. D. 560. Paulus of Egina, (*opera*, lib. iii. cap. 78,) who lived A. D. 650. Avicenna, (*Lib. ii. cap. 352*,) Serapion, (*De simplicibus*, cap. 194,) and Mesue, (*opera*, p. 37, Ed. Bonon. 1484,) also speak of it. It is deserving of especial notice, that under the name of *Sarugen* or Hermodactyl, Serapion comprehends the *καρχακίον* and *εφημερον* of Dioscorides, and the *ερμωδακτυλος* of Paulus.

**NATURAL HISTORY.**—The cormi brought from Oriental countries in modern times under the name of hermodactyls, answer to the descriptions given of the ancient substance bearing this name. I am, therefore, induced to believe them to be identical with the latter. Their resemblance to the cormi of *Colchicum autumnale* leads me to reject the notion of Matthioli, at one time entertained by Linnæus, (*Murray, App. Med. vol. v. p. 215.*) and adopted by Martius, (*Pharmakognosie*, 42,) that they are produced by *Iris tuberosa*. That they are the underground stems of some species of *Colchicum* can scarcely, I think, be doubted by any one who carefully examines them. Notwithstanding the statements of Mr. Want (*Med. and Phys. Journ. vol. xxxii.*,) and of Sir H. Hallford, (*On the Treatment of Gout*,) I cannot admit hermodactyls to be the cormi of *Colchicum autumnale*, though this is the only species of *Colchicum* admitted into the new Greek Pharmacopœia. Though resembling the latter in several circumstances,



they possess certain distinctive peculiarities. Some of the most eminent pharmacologists of Europe (e. g. Guibourt, Goebel, Geiger, Geoffroy, &c.) also regard them as distinct. The *Colchicum illyricum*, mentioned in many works as yielding hermodactyl, is unknown to modern botanists. The cormus of *Colchicum byzantinum* is too large to be confounded with hermodactyl. *Colchicum variegatum* has been supposed by several botanists and pharmacologists to be the source of hermodactyl, but further evidence is required to establish the opinion. This plant is a native of Sicily, Crete, Greece, and Portugal. Dr. Sibthorp (*Prod. Fl. Græcæ*, ii. 250.) found it on Helicon, Parnassus, and other mountains of Greece. It is not improbable, I think, that *Colchicum bulbocodiodes* may yield hermodactyl, which Dale (*Pharmacologia*, p. 245, ed. 3<sup>rd</sup>.) tells us is brought from Syria. For Dr. Lindley informs me that this species of *Colchicum* was found by Colonel Chesney near the Euphrates, where it was very common, flowering in March. The cormi were not brought over. *Iris tuberosa* was not found there. Forskål (*Fl. Ægypt. Arab.* p. 77.) found *Colchicum montanum* (which Sprengel, in his *Syst. Veg.* regards as identical with *C. bulbocodiodes*) at Kurma, in Arabia.

**DESCRIPTION.**—Mesue says that hermodactyl is either long, like the finger, or round. Of the round, he adds, there are three kinds,—the white, the red, and the black, the white being the best. Through the kindness of my friend, Professor Royle, I have had the examination of two kinds of hermodactyl, procured by him in the bazaars of Northern India, brought, he thinks, from Surat or Bombay, and probably imported there from the Red Sea.

1. *Tasteless Hermodactyl.* *Sorinjan sheeran* (i. e. sweet sorinjan). Royle. *Hermodactylus*, Auct. nostræ ætatis.—In their general form, these cormi resemble those of *Colchicum autumnale*. They are flattened, cordate, hollowed out or grooved on one side, convex on the other. At their lower part (forming the base of the heart) is a mark or disk for the insertion of the root fibres. Their size varies: the specimens I have examined were from  $\frac{3}{4}$  to  $1\frac{1}{2}$  inches in length or height, 1 to  $1\frac{1}{2}$  inches in breadth, and about  $\frac{1}{2}$  an inch in depth. (Lib. xi.) They have been deprived of their coats, are externally dirty yellow or brownish, internally white, easily broken, farinaceous, opaque, odourless, tasteless, or nearly so, and worm-eaten. They agree precisely with hermodactyls furnished me by Professor Guibourt. They are readily distinguished from the cormi of *Colchicum autumnale* by the following characters, which are correctly stated by Geoffroy: (*Trait. de Mat. Méd.* t. ii. p. 79.)—They are not rugose, are white internally, are moderately hard, easily broken, and form a whitish powder; whereas the dried cormi of *Colchicum autumnale* are rugose, softer, and have a reddish or grayish tint both internally and externally.

2. *Bitter Hermodactyl.* *Sorinjan tulkh* (i. e. bitter sorinjan), Royle. ? *Bulbs of another Colchicum*. (Goebel, *Pharm. Waarenk.* p. 271.) ?? *Hermodactylus rubeus et niger* (Avicenna and Mesue). The cormi of this variety are distinguished from the preceding by their bitter taste, their smaller size, and by having externally a striped or reticulated appearance. Their colour for the most part is darker; in some specimens it is blackish. One cormus is ovate-cordate: 1 inch in height or length,  $\frac{3}{4}$  of an inch broad, and about  $\frac{1}{2}$  of an inch thick, grooved or hollowed on one side, convex on the other; of a brownish yellow colour, semi-transparent, has a horny appearance, and is marked by longitudinal stripes, indicating a laminated structure. A second is opaque, amylaceous, reticulated externally, white internally, less flattened, and of a remarkable shape, the concave or hollow side of the cormus being continued half an inch below the mark for the attachment of the root fibres. The other cormi are of the size and shape of a large orange pip, but flattened or grooved on one side; some of them are worm-eaten, and one is blackish brown externally.

**COMPOSITION.**—Lecanu (*Journ. de Pharm.* xi. 350.) analysed hermodactyls (the *tasteless* variety), and obtained the following results:—*Starch* (forming the principal constituent of the hermodactyl), *fatty matter*, *yellow colouring matter*, *gum*, *supermalates of lime and potash*, and *chloride of potassium*.

Is the absence of veratria or colchicina to be ascribed to the cormi having undergone decomposition by keeping? No inulin was detected.

**CHEMICAL CHARACTERISTICS.**—Both the *tasteless* and *bitter* hermodactyls are blackened by tincture of iodine, showing the presence of starch. A cold decoction of the *bitter* variety produced an intense blue precipitate (*iodide of starch*) with a solution of iodine. Tincture of galls, and solutions of protonitrate of mercury, and of diacetate of lead, caused a cloudiness in the cold decoction.

**EFFECTS AND USES.**—No modern experiments have been made to determine the activity of hermodactyl. The *tasteless* variety is probably inert, or nearly so: but the *bitter* variety, I suspect, possesses some activity. Is its operation analogous to that of the cormus of *Colchicum autumnale*?

Speaking of the treatment of gout and arthritis, Paulus says, "some, in the paroxysms of all arthritic diseases, have recourse to purging with hermodactylus; but it is to be remarked, that the hermodactylus is bad for the stomach, producing nausea and anorexia, and ought, therefore, to be used only in the case of those who are pressed by urgent business; for it removes rheumatism speedily, and after two days at most, so that they are enabled to resume their accustomed employment." (Adams's *Translation* vol. i. p. 357.)



## 3. VERA'TRUM ALBUM, Linn. L. E. D. (U. S.)—WHITE HELLEBORE.

Sex. Syst. Polygamia, Monœcia.

(Radix, L. D.—Rhizoma, E.)

**HISTORY.**—This is, I think, the ἑλλέβορος λευκός of Dioscorides, and probably, therefore, of other ancient writers, as Hippocrates and Theophrastus. On this point, however, considerable difference of opinion has existed. Schulze (*Diss. inaug. sist. Toxicol. Veterum*, Halæ, 1788,) while he acknowledges the great similitude between *Veratrum album*, Linn. and the white hellebore of Dioscorides, is of opinion that the true hellebore (both white and black) of Theophrastus is wholly lost. And Dr. Sibthorp (*Prod. Fl. Græcæ*, i. 439,) regards *Digitalis ferruginea* as the white hellebore of Dioscorides, an opinion from which Sir J. Smith, the editor of the Prodrômus, expresses his dissent.<sup>1</sup> The term *veratrum* is said by Lemery to be derived from *vere atrum* (*truly black*), in reference to the colour of the rhizome; but this etymology is improbable.

**BOTANY. Gen. Char.**—Flowers polygamous. *Perianth* six-parted; segments broad, concave, imbricating, nearly equal, striated, not excavated at the base. *Stamens* six, equal, inserted into the base of the segments; *filaments* subulate; *anthers* reniform, with confluent cells. *Ovary* with three divaricating *stigmas*. *Capsule* three-horned, separating into three many-seeded follicles. *Seeds* compressed, winged at the apex. (*Lindley*.)

FIG. 140.



*Veratrum album*, Linn.  
var. *albiflorum*.

**Sp. Char.**—*Panicle* decomposed. *Bracts* equalling the flowers. *Pedicels* pubescent. *Segments of the perianth* somewhat erect and obtuse, serrulate. *Leaves* ovate-oblong, plaited. (*Sprengel*.)

*Root* composed of numerous fleshy, brownish-white fibres, arising from a perennial, cylindrical, fleshy, subterraneous stem or *rhizome*, which is brown externally, brownish-white internally, and is placed obliquely in the earth. *Stem* one to four feet high. The plant flowers from June to August.

Two varieties (by some considered distinct species) are included here:

- α. *albiflorum* (*V. album*, Bernh.) with decomposed raceme and white flowers.
- β. *viridiflorum* (*V. Lobelianum*, Bernh.) with compound raceme and greenish flowers.

**Hab.**—Mountainous regions of Europe. Abounds in the Alps and Pyrenees.

**DESCRIPTION.**—The *rhizome* (*radix veratri*, offic. *radix hellebori albi*) is single, double, or many-headed, having the form of a cylinder, or, more frequently, of a truncated cone. It is from two to four inches long, and about one inch in diameter, rough, wrinkled, grayish or blackish-brown externally, whitish internally. Portions of the root fibres are usually attached to it, as well as some soft, fine, hair-like fibres. At the upper extremity of the rhizome we frequently observe the cut edges of numerous concentric, woody, or membranous scales: they are portions of the dried leaf-sheaths. When cut transversely, the rhizome presents a large central portion (frequently called *medulla*), which varies in its qualities, being woody, farinaceous, or spongy, in different specimens. This is separated by a brown fine undulating line from a thick woody ring, in which the root fibres take their origin. On the outside of this is a narrow but compact, brown, epidermoid coat. The odour of the dried rhizome is feeble: the taste is at first bitter, then acrid. By keeping, the rhizome is apt to become mouldy.

<sup>1</sup> For some interesting information respecting the ancient hellebore, consult Dierbach, *Arzneimittel d. Hippocrates*, p. 107.



COMPOSITION.—White hellebore rhizome was analyzed in 1820 by MM. Pelletier and Caventou, (*Journ. de Pharm.* vol. vi. p. 363,) who obtained the following results:—Fatty matter (composed of olein, stearin, and a volatile [cevadac?] acid), supergallate of veratria, yellow colouring matter, starch, ligneous matter, and gum. The ashes contained much phosphate and carbonate of lime, carbonate of potash, and some traces of silicia and sulphate of lime, but no chlorides. They could not obtain the volatile [cevadac?] acid in a crystalline form.

Simon (*Pharmaceutisches Central Blatt für 1837*, S. 191,) has discovered two new vegetable bases in the rhizome of this plant; one of these he has called *Jervin*, the other *Barytin*.

1. VERATRIA (see p. 100).

2. BARYTIN. This has been so called in consequence of its being precipitated from its solution in acetic or phosphoric acid by sulphuric acid or the sulphates, like baryta.

3. JERVIN. So called from *Jerva*, the Spanish name for a poison obtained from the root of white hellebore, (Bauhin's *Pinax*, p. 186). It is a crystalline substance, which forms, with sulphuric, nitric, and hydrochloric acids, difficultly soluble compounds.<sup>1</sup>

CHEMICAL CHARACTERISTICS.—A decoction of the rhizome underwent, on the addition of a solution of gelatin, no change, showing the absence of tannic acid; but with the sesquichloride of iron, it became olive green (*gallate?* of iron). With tincture of galls it became slightly turbid (*tannate of veratria and starch*). With acetate and diacetate of lead, and protonitrate of mercury, it formed copious precipitates. The rhizome left after the decoction had been prepared from it, became, on the addition of a solution of iodine, black (*iodide of starch*).

PHYSIOLOGICAL EFFECTS. *a. On Vegetables.*—Not ascertained.

*β. On Animals generally.*—“The best account of its effects is contained in a thesis by Dr. Schabel, published at Tübingen, in 1817. Collecting together the experiments previously made by Wepfer, Courten, Viborg, and Orfila, and adding a number of excellent experiments of his own, he infers that it is poisonous to animals of all classes—horses, dogs, cats, rabbits, jackdaws, starlings, frogs, snails, and flies; that it acts in whatever way it is introduced into the system—by the stomach, windpipe, nostrils, pleural membrane of the chest, on external wounds, or the veins; that it produces in every instance symptoms of irritation in the alimentary canal, and injury of the nervous system; and that it is very active, three grains of the extract applied to the nostrils of a cat having killed it in sixteen hours,” (Christison's *Treatise on Poisons*, 3d ed. p. 790).

*γ. On Man.*—Its local action is that of a powerful acrid. Applied to the Schneiderian membrane, it excites violent sneezing. Epistaxis even is said to have been induced by it. Its operation when swallowed, or placed in contact with the skin, is also that of an energetic irritant.

Its remote action is on the secretory apparatus, the stomach and intestines, and the nervous system. In small and repeated doses it promotes secretion from the mucous surfaces, the salivary glands, the kidneys, and the uterus, and increases the cutaneous exhalation, (Greding, *Sämmtl. med. Schrift.* Th. 1, S. 179). In larger doses it causes vomiting, purging, pain in the abdomen, tenesmus, and occasionally bloody evacuations, and great prostration of strength. In some instances a few grains even have had these effects. Schabel says there is no substance which so certainly and promptly provokes vomiting; and Horn, (*Archiv.* B. x. H. 1, S. 161,) employed it as a sure emetic. In addition to the local action which it exercises, when swallowed, on the stomach and intestines, it possesses a specific power of influencing these viscera: for Etmüller, (*opera omnia*, tom. ii. pt. 2, p. 144,) has seen violent vomiting result from the application of the rhizome to the abdomen; and Schröder, (Orfila, *Toxicol. Gén.*) observed the same occurrence where the rhizome was used as a suppo-

<sup>1</sup> *Pharm. Central Blatt für 1837*, S. 753; also *Berlinisches Jahrb. für d. Pharm.* Bd. xxxiii. S. 393; and *Lond. and Edinb. Phil. Mag.* vol. xii. p. 29.



sitory. In *excessive doses* it operates as a narcotico-acrid poison, producing gastro-intestinal inflammation and an affection of the nervous system. The symptoms are, violent vomiting and purging (sometimes of blood,) tenesmus, burning sensation of the mouth, throat, œsophagus, stomach, and intestines, constriction of the throat, with a sense of strangulation, griping pain in the bowels, small, and in some cases almost imperceptible pulse, faintness, cold sweats, tremblings, giddiness, blindness, dilated pupils, loss of voice, convulsions, and insensibility, terminating in death. A cutaneous eruption has in some instances followed the use of white hellebore.

I am indebted to Dr. Wm. Rayner, of Stockport, for notes of three cases of poisoning by infusion of white hellebore. The symptoms resembled those just mentioned, except that there was no purging. All three cases rapidly recovered.

Hutchinson (Schwartz's *Pharm. Tab.* 2<sup>te</sup> Ausg.) remarked, that when death did not occur, palpitation and intermitting pulse, besides dyspeptic and nervous symptoms, remained for some time.

These effects were not observed in Dr. Rayner's cases.

In its action on the system, *Veratrum album* is more closely related to *cebada* and meadow saffron than to any other medicinal agents. It is more acrid and less stupifying than *Helleborus niger*, with which it has been so frequently compared both by ancients and moderns. Orfila, (*Toxicol Gén.*) ascertained by experiment on animals that it is more active as a poison than the last-mentioned substance. It exercises no known chemical influence over the tissues by which it is distinguished from the mineral irritants, as baryta and emetic tartar, with which Schabel compared it.

USES.—It is but rarely employed, principally on account of the alleged uncertainty of its operation. But from the few trials which I have made with it, I suspect this uncertainty is much exaggerated, and is principally referrible to the varying lengths of time which the rhizome has been kept after its removal from the earth, for, like colchium, it deteriorates by keeping. The following are the principal cases in which it has been employed :

1. *In affections of the nervous system*, as melancholia, mania, and epilepsy. (Greding. *Sämmul. mediz. Schriften*, T. 1, S. 179.) As an emetic, purgative, and promoter of the secretions generally, we can easily understand that it may prove occasionally beneficial.

2. *In chronic skin diseases*, as herpes, Dr. C. Smyth (*Med. Communications*, vol. i. p. 207,) gave the tincture internally with benefit. As external applications, the decoction and ointment are used in scabies (hence the Germans call rhizome *Kratzwurzel* i. e. *itch-root*), *tinea capitis*, &c.; but their use is not quite free from danger.

3. *In gout* it was given in combination with opium, by Mr. Moore, (*Two Letters to Dr. Jones*, 1811,) as a substitute for, or in imitation of, the *Eau Médicinale*. The dose, in a paroxysm of gout, was from forty minims to two drachms of a mixture composed of three parts of *Vin. Veratri albi* and one part of liquid laudanum.

4. *In amaurosis and chronic affections of the brain* occurring in torpid habits, it is employed as an errhine or sternutatory (hence its German name, *Niesswurzel* i. e. *sneeze-root*). It is usually diluted with some mild powder. The German snuff called *Schneeberger* is said to contain it.

5. *To destroy pediculi*, the decoction is used as a wash.

6. *As an emetic*, it was employed by Horn.

ADMINISTRATION.—The following are the principal modes of exhibition :

1. **PULVIS VERATRI**; *White Hellebore Powder*.—The dose of this at the commencement should not exceed one or two grains. This quantity will sometimes occasion nausea and vomiting; but Greding found that in some cases eight grains, and, in a few instances, a scruple of the bark of the rhizome in powder



were required to excite vomiting. As an errhine, not more than two or three grains, mixed with eight or ten of some mild powder (as starch, liquorice, Florentine orris, or lavender) should be employed at one time. It is a constituent of the *Unguentum Sulphuris compositum*, (see vol. i. p. 400.)

2. VINUM VERATRI, L. *Tinctura veratri albi*; *Tincture of White Hellebore*. (White Hellebore, sliced, ℥viiij.; Sherry Wine, Oij. Macerate for fourteen days, and strain.—As a substitute for Colchicum in gout and rheumatism, the dose is ten minims twice or thrice daily. This quantity is to be gradually increased. A full dose acts as an emetic and cathartic.

3. DECOCTUM VERATRI, L. D.; *Decoction of White Hellebore*. White Hellebore, bruised, ℥x.; Distilled Water, Oij.; Rectified Spirit, f℥iij. Boil the hellebore in the water down to a pint, and when it is cooled add the spirit.—This preparation is only used as an external application in skin diseases (scabies, lepra, tinea capitis, &c.) and to destroy pediculi. When the skin is very irritable, the decoction will sometimes require dilution. If the surface to which it is applied be denuded, absorption of the veratria may occur, and constitutional symptoms be thereby induced; hence it is a dangerous application, especially to children.

4. UNGUENTUM VERATRI, L. D.; (*Unguentum Veratri albi*, U. S.) *Ointment of White Hellebore*.—(White Hellebore, powdered, ℥ij.; Lard, ℥viiij.; Oil of Lemons, ℞xx. Mix., L. (U. S.)—The *Dublin College* omits the oil of lemons.)—This ointment is used in the treatment of the itch as a substitute for the disagreeable, though far more effective, sulphur ointment. Like the decoction, there is danger of the absorption of the active principle of the rhizome when the ointment is applied to raw surfaces; it is, therefore, an unfit remedy for children.

ANTIDOTES.—Astringent solutions have been recommended; and in one case, which fell under my notice, infusion of nutgalls seemed to give relief. The supposed benefit has been referred to the union of tannic acid with veratria, by which the solubility and activity of the latter are diminished; but Schabel (quoted in Brandt and Ratzburg's *Giftgewächse*, Abt. 1, p. 28,) found that three drachms of a tincture of white hellebore, given with infusion of galls, to a cat, proved fatal in twenty minutes. Hahnemann recommends coffee, both as a drink and in clyster. Demulcent liquids, and in some cases opiates, may be useful. The other part of the treatment must be conducted on general principles. Stimulants will be usually required on account of the failure of the heart's action.

#### 4. ASAGRÆA OFFICINALIS, Lind.—SPIKE-FLOWERED ASAGRÆA.

*Veratrum officinale*, Schlecht; *Helonias officinalis*, Don. L. E.

*Sex. Syst.* Hexandria, Trigynia,

(Semina; Sabadilla, L.—Sabadilla; Fruit of *Veratrum Sabadilla* of *Helonias officinalis*, and probably of other *Melanthaceæ*, E.)

HISTORY.—This plant was described by Schlechtendahl, (*Linnea*, vi. 45,) afterwards by Mr. Don, (*Ed. New Phil. Journ.* Oct. 1839,) and subsequently by Dr. Lindley. (*Bot. Reg.* June, 1839.) The seeds were known to Monardes in 1573. They were called *Sabadilla*, or *Cevadilla*, or more properly *Cebadilla* (from the Spanish *Cebada*, barley,) on account of the supposed resemblance of the inflorescence of the plant to that of *Hordeum*.

BOTANY. *Gen. Char.*—Flowers polygamous,—racemose, naked. *Perianth* six-partite; *segments* linear, veinless, almost equal, with a nectariferous excavation at the base, equal to the stamens. *Stamens* alternately shorter; *anthers* cordate, as if unilocular, after dehiscence shield-shaped. *Ovaries* three, quite simple, attenuated into an obscure *stigma*. *Follicles* three, acuminate, papery;



seeds scimitar-shaped, corrugated, winged.—*Bulbous herbs*, with grass-like leaves, and small, pale, densely-racemed flowers. (Lindley.)

**Sp. Char.**—The only species known.

Leaves linear, acuminate, subcarinate, roughish at the margin, four feet long, and three lines broad. *Scape* round, about six feet high. *Raceme*, a foot and a half long, very dense, very straight, spiciform. *Flowers* white, with a bractea at the base. *Anthers* yellow.

**Hab.**—Eastern side of the Mexican Andes, near Barranca de Tioselo (*Schiede*). Neighbourhood of Vera Cruz (*Hartweg*).

**DESCRIPTION.**—The *cebadilla*, *cevadilla*, or *sabadilla* of the shops (*sabadilla*; *semina sabadille mexicance*) comes from Vera Cruz and Mexico. It consists of the follicles, (some containing seeds, others empty,) loose seeds, stalks, and abortive flowers of the *Asagraea officinalis*, and perhaps of *Veratrum Sabadilla* also.

The follicles, commonly termed capsules, rarely exceed, or even equal, half an inch in length, and are about one line or a line and a half in diameter. They are ovate-oblong, acuminate. Their colour is pale yellowish-brown, or reddish gray. The coat of each is thin, dry, and of a papery consistence. Each fruit is composed of three follicles mutually adherent towards the base, open at the superior and internal part. The receptacle, fruitstalk, and the remains of the dried and withered calyx, are usually present in the *cebadilla* of the shops. Seldom more than one or two, though sometimes three, seeds are found in each follicle.

The seeds are two or three lines long, scimitar-shaped, pointed, blackish brown, shiny, wrinkled or corrugated, slightly winged. Internally they are whitish or horny. Embryo straight, next the hilum, lodged in fleshy albumen. They have little odour, but a bitter, acrid, persistent taste.

**COMPOSITION.**—Two analyses of *cebadilla* have been made about the same time (1819); one by Meissner (*Schweigger's Journ. f. Chem.* xxxi. 187); and a second by Pelletier and Caventou. (*Journ. de Pharm.* vi. 353.) The following are the results:

<i>Meissner's Analysis.</i>	<i>Pelletier and Caventou's Analysis.</i>
Fatty matter ( <i>olein</i> and <i>stearin</i> ).....	24.63
Wax ( <i>myricin</i> ).....	0.10
Sabadillin ( <i>veratria</i> ).....	0.58
Resin (soluble in ether).....	1.45
Hard resin (insoluble in ether).....	8.45
Bitter extractive with the acid which is united } to the sabadillin.....	5.97
Sweet extractive.....	0.65
Extractive reparable by alkalis.....	24.14
Gum.....	4.90
Vegetable jelly ( <i>phyteumacolla</i> ) with chloride } of potassium and vegetable salts of potash.. }	1.11
Oxalate of lime combined with bassorin.....	1.06
Lignin.....	20.56
Water.....	6.40
Cebadilla.....	100.00

The ashes contained oxide of copper.

1. **CEVADIC OR SABADILLIC ACID.**—This is a crystalline, fusible, volatile, fatty acid, having an odour analogous to butyric acid. It is soluble in water, alcohol, and ether. It is obtained by the saponification of the oil of *cebadilla* (fatty matter). Cevadate of ammonia causes a white precipitate with the persalts of iron. The composition of this acid is unknown.

*Oil of cebadilla* given me by Mr. Morson is green, lighter than water, and has a faint, somewhat rancid taste.

2. **VERATRIC ACID**, of Merck (*Pharmaceutisches Central-Blatt für 1839*, S. 235).—This is a crystalline, fusible, volatile acid, soluble in alcohol, slightly so in water, but insoluble in ether. According to Schroetter it consists of  $C^{16} H^9 O^7 + aq$ .

3. **RESIN.**—The two resins found by Meissner, but overlooked by Pelletier and Caventou, are probably endowed with activity. Couerbe obtained from *cebadilla* seeds, *sabadillina*, resin of *veratria*, and gum resin of *sabadillina*.

*Resin of veratria* (*veratrin*, Couerbe) is a brown solid, fusible at 365°. Insoluble in ether



(by which it is distinguished from *veratria*), and in water. It combines with acids, but neither saturates them, nor forms with them any crystallizable salts. It consists of  $C^{20}H^{16}NO^6$ . Its action on the animal economy has not been determined.

*Gum resin of sabadillina* (*resinogomme*, Couerbe: *monohydrate of sabadillina*, Alter.) is a reddish solid, soluble in water and alcohol, but slightly so in ether. It saturates acids, but does not form crystalline compounds with them. Alkalis throw it down from its saline combinations. It consists of  $C^{20}H^{14}NO^6$ . Hence it differs from anhydrous *sabadillina* in containing an atom more water. Furthermore it is distinguished from this alkali in not being crystallizable.

*Sabadillina* is said, by Simon, (*Berl. Jahrb.* Bd. xxxix. S. 393.) to be merely a compound of resinates of soda and resinates of veratria. Dr. Turnbull found it inferior in activity to veratria.

#### 4. VERATRIA.—(See p. 100.)

**CHEMICAL CHARACTERISTICS.**—The brownish coloured decoction of cebadilla reddens litmus, owing to the presence of free acid. Sesquichloride of iron deepens the colour of the decoction, and causes an olive brown precipitate. Alkalis deepen, whilst acids diminish, the colour of the decoction (by their action on the yellow colouring matter, *Pelletier*.) Acetate and diacetate of lead, protonitrate of mercury, and sulphate of copper, form precipitates in the decoction. Oxalate of ammonia renders it turbid (*oxalate of lime*). Nitrate of silver forms a coloured precipitate, which is, for the most part, soluble in nitric acid: the insoluble portion is *chloride of silver*. Solutions of iodine and tincture of nutgalls have no obvious effect.

**PHYSIOLOGICAL EFFECTS.** *a. On Vegetables.*—Not ascertained.

*β. On Animals.*—Are similar to those of *Veratrum album*. Cebadilla has proved poisonous to dogs and cats. (*Willemet, Nouv. Mém. de l'Acad. de Dijon*, 1782.) A pinch of it produced violent spasms in cats; half a drachm caused vomiting and convulsions in dogs. It is a poison to insects. Thus bugs die from it in convulsions: hence its use as a bug poison! (*Seeliger, in Schmucker's Vermischt. chirurg. Schrift.* vol. ii. p. 272.) Its efficacy in destroying pediculi has long been known.

*γ. On Man.*—The action is probably similar to, though more acrid than, white hellebore. The effects of *small and repeated doses* have not been satisfactorily ascertained. *Large and poisonous doses* cause burning and pain in the throat and stomach, nausea, vomiting, purging, prostration of strength, convulsions, delirium, and sometimes a cutaneous eruption. Even the external application of the powder has caused dangerous effects. Plenck tells us of a young man who was rendered temporarily insane by the application of powder of cebadilla to the head. Lentin says an infant, whose nurse had sprinkled the powder in its hair, died in convulsions. (*Murray, App. Med.* vol. v. p. 172.)

Rubbed on the skin, the tincture causes a stinging sensation similar to that produced by veratria. After its use for some days, a slight eruption appears on the skin. Rubbed over the cardiac region, it in some instances reduces the frequency and force of the pulse in a marked degree. The alcoholic extract has nearly the same effects, when taken internally, as veratria. It also induces sensations of heat and tingling on the surface of the skin, and sometimes acts as a diuretic. (*Turnbull, On the Medicinal Properties of the Ranunculaceæ*, p. 7.)

**USES.**—Cebadilla has been employed internally, as an *anthelmintic*, in both thread-worms and tape-worms. (*Schmucker's Verm. chirurg. Schrift.* Bd. ii. S. 271.) Dr. Turnbull (*op. cit.* p. 7.) has given the extract with benefit in painful rheumatic and neuralgic affections. Though it is applicable in all the maladies for the relief of which veratria has been recommended, it is rarely administered by the mouth.

Externally the powder of the seeds has been used to destroy pediculi; hence the Germans called the seeds *Läusesaamen* or *lice-seeds*. But it cannot be applied with safety to children, and especially when the skin is broken. I have already referred to the dangerous consequences of its employment. The tincture has been used as a rubefacient in chronic rheumatism, and, rubbed over the heart, in some cases of nervous palpitation. (*Turnbull, op. cit.*) It may,



in fact, be employed as a cheap though efficient substitute for the tincture of veratria.

But the principal use of the seeds, for which indeed they have been introduced into the Pharmacopœia, is for yielding veratria.

ADMINISTRATION.—The following are the preparations of Cebadilla which have been employed in medicine.

1. PULVIS SABADILLÆ.—*Pulvis contra pediculos*; *Poudre de Capucin*; *Powder of Cebadilla*.—The dose for an adult is from two to six grains; gradually increased. In one case of tape-worm, half a drachm was taken daily for fourteen days. (Seeliger, in Schmucker, *op. cit.* vol. ii. p. 271.)

2. TINCTURA SABADILLÆ.—*Saturated Tincture of Cebadilla*, Turnbull. (Cebadilla seeds, freed from their capsules and bruised, *any quantity*; Rectified Spirit, *as much as will cover them*. Digest for ten days).—Used as a rubefacient liniment in chronic rheumatism and paralysis. It is rubbed over the heart in nervous palpitation.

3. EXTRACTUM ALCOHOLICUM SABADILLÆ; *Alcoholic Extract of Cebadilla*.—Evaporate the saturated tincture, with a very gentle heat, to a proper consistence. Dose, 1-6th of a grain, gradually increased. It is given, in the form of pill, in rheumatic and neuralgic cases.

4. VERATRIA, L. E.; (U. S.) *Veratrine*; *Veratrina*, Thomson; *Sabadillin*, Meissner.—This vegetable alkaloid was discovered about the same time (1819), by Meissner in Germany, and by Pelletier and Caventou in France. Couerbe (*Ann. de Chim. et de Phys.* t. 52, p. 368,) probably was the first who obtained it pure.

PREPARATION.—The following process for making veratria, contained in the London Pharmacopœia, is nearly identical with that described by Soubeiran, (*Nouv. Traité de Pharm.* t. ii. p. 190,) and is a modification of one given by Couerbe. (It has been adopted by the U. S. P.)

“Take of Cebadilla, bruised, lb. ij.; Rectified Spirit, Cong. iii.; Diluted Sulphuric Acid; Solution of Ammonia; Purified Animal Charcoal; Magnesia; each as much as may be sufficient. Boil the Cebadilla with a gallon of the spirit, for an hour, in a retort to which a receiver is fitted. Pour off the liquor, and boil what remains with another gallon of spirit and the spirit recently distilled, and pour off the liquor: and let it be done a third time. Press the Cebadilla, and let the spirit distil from the mixed and strained liquors. Evaporate what remains to the proper consistence of an extract. Boil this three or more times in water, to which a little diluted sulphuric acid has been added, and with a gentle heat, evaporate the strained liquors to the consistence of a syrup. Into this, when cold, put the magnesia to saturation, frequently shaking [them]; then press, and wash. Let this be done twice or thrice: then dry what remains, and digest with a gentle heat in spirit two or three times, and as often strain. Afterwards let the spirit distil. Boil the residue in water, to which a little sulphuric acid and animal charcoal are added, for a quarter of an hour, and strain. Lastly, the charcoal being thoroughly washed, cautiously evaporate the [mixed] liquors until they have the consistence of a syrup, and drop into them as much ammonia as may be sufficient to throw down the veratria. Separate this, and dry it.”

The process of the Edinburgh Pharmacopœia is as follows:

“Take any convenient quantity of Cevadilla: pour boiling water over it in a covered vessel, and let it macerate for 24 hours; remove the Cevadilla, squeeze it, and dry it thoroughly with a gentle heat. Beat it now in a mortar, and separate the seeds from the capsules by brisk agitation in a deep narrow vessel. Grind the seeds in a coffee-mill, and form them into a thick paste with rectified spirit. Pack this firmly in a percolator, and pass rectified spirit through it till the spirit ceases to be coloured. Concentrate the spirituous solutions, by distillation, so long as no deposit forms, and pour the residuum, while hot, into twelve times its volume of cold water. Filter through calico, and wash the residuum on the filter so long as the washings precipitate with ammonia. Unite the filtered liquid with the washings, and add an excess of ammonia. Collect the precipitate on a filter, wash it slightly with cold water, and dry it first by imbibition with filtering paper, and then in the vapour bath. A small additional quantity may be got by concentrating the filtered ammoniacal fluid, and allowing it to cool.

“Veratria thus obtained is not pure, but sufficiently so for medicinal use. From this coloured substance it may be obtained white, though at considerable loss, by solution in very weak muriatic acid, decolorization with animal charcoal, and re-precipitation with ammonia.”



**THEORY.**—The following statement applies to the process of the London College, and is perhaps correct as far as it goes:—Cebadilla yields to rectified spirit veratria in combination with a vegetable acid. When the alcoholic extract is treated with water and sulphuric acid, an impure solution of the sulphate of veratria is obtained. Magnesia decomposes this, unites with the sulphuric and vegetable acids, and sets free the alkaloid, which is taken up by rectified spirit. The extract obtained by distilling off the spirit is then boiled in water with sulphuric acid and animal charcoal: the acid unites with the alkaloid, while the charcoal abstracts colouring matter. Ammonia being added to the strained solution, combines with the sulphuric acid, and occasions a precipitate, which, when dried, constitutes *commercial* or *medicinal veratria* (*veratria*, L. and E.)

By Couerbe's process, a drachm of commercial veratria may, it is said, be procured from one pound of cebadilla.

*Commercial veratria* was said by Couerbe to be composed of *pure veratria*, *sabadillina*, *resin of veratria* (*veratrin*, Couerbe), and *gum-resin of veratria* (*resinogomme*, Couerbe). These are separated from each other by the successive action of water, ether, and alcohol, as shown by the following table:—

Commercial Veratria	{	yields to boiling water.....	1. <i>Sabadillina</i> , which crystallizes on cooling.
		insoluble in boiling water...	2. <i>Resin of Veratria</i> , left in the cold solution. 3. <i>Veratria</i> , soluble in ether. 4. <i>Gum resin of veratria</i> , insoluble in ether, but soluble in alcohol.

The nature of *sabadillina* has been already pointed out (p. 99).

**PROPERTIES.**—*Commercial veratria* is pulverulent, odourless, and grayish or brownish white. All the samples I have tasted were bitter and acrid, and produced a feeling of numbness and tingling when applied to the tongue. But *pure veratria* is an almost white, friable solid, having the aspect of a resin: it is uncrystallizable, odourless, has a very acrid taste, without any mixture of bitterness. It is fusible at 240° F. It is sparingly soluble in ether, readily so in alcohol, scarcely so in cold water. It possesses alkaline properties: thus, it restores the blue colour of reddened litmus, and saturates acids. Its salts crystallize with difficulty: indeed the *sulphate* and *hydrochlorate* alone have been obtained in the state of crystals; the other salts have a gummy aspect. Both the hydrochlorate and sulphate are soluble in water.

**Characteristics.**—Veratria is known by the following characters:—Its alkalinity, its combustibility, its uncrystallizability, the difficult crystallizability of its salts, its solidity at ordinary temperatures, its ready solubility in alcohol, its being almost insoluble in water, but sparingly soluble in ether, and by the intense red colour which it assumes when mixed with strong liquid sulphuric acid (see *Salicin*). Nitric acid renders commercial veratria reddish, and forms a yellow solution with it (see *Morphia and Narcotina*). A solution of veratria in dilute acetic acid produces a whitish precipitate (*tannate of veratria*) with tincture of nutgalls, a white one (*hydrated veratria*) with ammonia, and an intense red colour with concentrated sulphuric acid. Carbazotic acid does not occasion a precipitate (see vol. i. p. 182). To these chemical peculiarities must be added those characteristics derived from its physiological effects:—A minute portion of veratria causes violent sneezing, and a small quantity of a solution of four grains of veratria in a fluidrachm of rectified spirit, rubbed on the wrist or forehead, produces, within three or four minutes, heat and tingling.

The *London College* give the following characters of veratria:—Dissolves but slightly in water, more soluble in alcohol, but most in sulphuric ether. It has no smell, and a bitter taste. It is to be cautiously administered.

**COMPOSITION.**—The following is the composition of pure veratria, according to Couerbe:

	Atoms.	Eq. Wt.	Per Cent.	Couerbe.
Carbon.....	34	204	70.83	70.786
Hydrogen.....	22	22	7.64	7.636
Nitrogen.....	1	14	4.86	5.210
Oxygen.....	6	48	16.67	16.368
Veratria.....	1	288	100.00	100.000



PHYSIOLOGICAL EFFECTS. *a. On Animals.*—Magendie (*Formulaire*, p. 162, 8<sup>me</sup> ed.) has shown that the local action of veratria is that of an irritant. Placed in the nostrils of a dog the acetate of veratria provoked violent and continued sneezing. When introduced into the intestinal canal it caused inflammation. Applied to parts whence absorption goes on actively (as the pleura and tunica vaginalis), it occasions tetanus and death in a few minutes. Forcke (*Untersuch. über d. Veratrin*, 1837,) gave moderate and gradually increased doses ( $\frac{1}{4}$  to  $\frac{1}{2}$  of a grain) of veratria for 20 days. It caused vomiting, and occasionally foaming at the mouth. The stools continued hard. Dr. Bardsley (*Hosp. Facts and Observ.* 1829,) observed vomiting and giddiness (reeling) produced in animals to whom he gave veratria.

*β.* On man.—Applied to the nose a minute quantity excites excessive sneezing. Rubbed on the skin in the form of ointment, it causes a sensation of heat and tingling (called by Dr. Turnbull *electro-stimulation*). This effect is not confined to the part and its immediate neighbourhood where the application has been made: for somewhat similar sensations are occasionally experienced in distant parts.

Taken internally, in *small or medicinal doses*, veratria excites a feeling of warmth in the stomach and bowels, which extends to the chest and extremities. Tingling and various anomalous sensations (as of a current of hot or cold air or water passing over the skin) are perceived in various parts of the body. Nausea and vomiting are occasionally excited by a full dose. On the secretions and exhalations its action is not very uniform. It frequently produces perspiration, and not unfrequently diuresis. Forcke (*op. cit.* p. 22,) mentions increased secretion of saliva and of tears produced without the contact of the veratria either with the conjunctiva or mouth. The bowels are for the most part confined, so that purgatives are not unfrequently required during the use of it. Yet in some cases veratria has caused copious bilious evacuations. In some instances it has promoted, in others diminished, the appetite. Forcke mentions that a pustular eruption is sometimes induced by it. Dr. Bardsley generally found the pulse become slower and depressed after the use of veratria.

I am not acquainted with any cases of poisoning in the human subject by *excessive doses* of veratria. Vomiting and convulsions would probably be induced.

USES.—Veratria is employed externally or internally: sometimes in both ways at the same time. It has been tried in the following cases:

*a. In neuralgia* it has been used by Dr. Turnbull, Dr. Ebers, of Breslau, (Dierbach, *Neurist. Entd. in d. Mat. Med.* 1837,) and Dr. Forcke. It is applied in the form of ointment, containing from twenty to forty grains of veratria to an ounce of lard. The frictions are to be continued until the heat and tingling caused by the veratria have acquired a considerable degree of intensity. Though, according to my own experience, it fails to give relief in a large majority of cases, yet in some few its effects are highly beneficial, and in none is it injurious. As a remedy for neuralgia, it is, however, far inferior to *Aconitum* and its alkali *Aconitina*.

*β. In some nervous diseases* (Neuroses, *Cull.*)—Veratria has been extensively used in this class of diseases, but for the most part empirically. If it possess any therapeutical power, "a more extended experience is required to establish its claim to our regard," (Paris, *Appendix* to the 8th ed. of the *Pharmacologia*.) Among the maladies against which it has been used (in some instances internally, but mostly externally) are,—nervous palpitation, paralysis, hooping-cough, epilepsy, hysteria, hypochondriasis, &c. (see the treatises of Turnbull and Forcke, before referred to.)

*γ. In rheumatism and gout.*—Dr. Bardsley gave it internally in rheumatism, but with no remarkable results. Externally it has been employed in the form of ointment by Sir C. Scudamore and Dr. Turnbull. It should not be ap-



plied while the inflammation is of an active kind. It would appear to be best adapted for the neuralgic forms of rheumatism.

δ. *In dropsy*.—Dr. Bardsley administered it internally in dropsy, but says it possesses “no particular claims to the attention of the profession.” Ebers employed veratria endermically, and also, in the form of ointment, epidermically. It acted as a diuretic, and gave relief. (See Forcke, *op. supra cit.*)

ADMINISTRATION.—The ordinary veratria of the shops is administered in doses of one-sixth of a grain, three times a day. On account of its acridity it should not be given in solution, but in the form of pills.

α. *Pilule Veratriæ*; *Veratria Pills*; Turnbull.—Veratria, gr. j.; Extract of Hyoscyamus; Licorice powder, aa gr. xij. Let 12 pills be made, of which one must be taken every three hours.

β. *Tinctura Veratriæ*; *Veratria Embrocation*; Turnbull.—Veratria, ℥j.; Rectified Spirit ℥ij. Dissolve. This embrocation is sometimes used as a substitute for the ointment. Magendie (*Formulaire*) directs a tincture of veratria to be prepared by dissolving four grains of the alkali in an ounce of alcohol. Of this from 10 to 25 drops are taken, in a cup of broth, as a substitute for the tincture of colchicum.

γ. *Unguentum Veratriæ*; *Veratria Ointment*; Turnbull.—Veratria, ℥ss.; Olive Oil, ℥j.; Prepared Lard, ℥j. M.

δ. *Sales Veratriæ*.—The sulphate and tartrate of veratria (prepared by saturating veratria with sulphuric or tartaric acid) are sometimes used instead of the uncombined alkali. The dose and mode of administration are the same as for the latter.

ANTIDOTE.—*Vide* VERATRUM ALBUM.

#### OTHER MEDICINAL MELANTHACEÆ.

The fruit and seeds of *Veratrum Sabadilla*, Ph. Ed. are said to be brought from the Antilles, under the name of *Cebadilla* (*Semina Sabadilla Caribæa*), but I have never met with them. *V. Sabadilla* is a native of Mexico and the Antilles. Its leaves are radical, oval-oblong, obtuse, ribbed. Its stem is almost leafless. The panicle is nearly simple. The flowers have short pedicels, and are nodding. The rhizome of *Veratrum viride* is used in the United States as a substitute for that of *Veratrum album*.

[The VERATRUM VIRIDE, U. S. (*Secondary List*) is known in the United States as *American Hellebore*, *Swamp Hellebore*, *Indian Poke*, and *Ich Weed*. It has a perennial, thick, fleshy root, tunicated at top, the lower part solid and sending off numerous white or light yellow radicles. The stem is annual, from two to three feet high, pubescent. Leaves at base six inches to a foot long, broad, oval, nerved, acuminate, of a deep green colour and pubescent; those on the stem narrower, and at the summit bractæiform. Flowers in panicles, terminal and of a greenish yellow tint. The calyx is wanting; petals six, stamens six, pistil rudimentary. (*Willdenow*.) Germs three when not rudimentary, on the lower portion of the panicle.

The plant is found in many parts of the United States, from Canada to Carolina, inhabiting damp places in the neighbourhood of streams and meadows. It appears early in March.

The whole plant has an acrid and burning taste; the root only is officinal. This, when dried, consists of a somewhat tunicated top, with a thick hard base, and numerous radicles attached to it. The odour, disagreeable in the recent state, is lost by drying. The taste is at first sweetish, then bitter, followed by an acrid burning sensation in the mouth, which lasts for some hours after it has been chewed. When powdered it acts as a sternutatory. For the composition of this root we are indebted to Mr. Henry Worthington, (*American Journal of Pharmacy*, vol. x. p. 97.) who found it to contain gum, starch, sugar, bitter extractive, fixed oily matter, colouring matter, gallic acid, an ALKALOID SUBSTANCE identical with veratria, lignin, and salts of lime, and potassa. With regard to the alkaloid substance, he describes it as “nearly insoluble in water, more soluble in ether, and entirely soluble in absolute alcohol. When exposed to flame it first melts, then swells up, and burns without residue. It produces a burning acrid sensation in the mouth, which lasts for several hours. It acts powerfully as a sternutatory, producing violent sneezing, which lasts for half an hour after it has been applied to the nose.” “In its chemical relations the analogy is carried out by not being changed to a red colour by the action of nitric acid, and from its forming salts with the acids, none of which are crystallizable but the sulphate, tartrate, and oxalate.”

That the framers of the United States Pharmacopœia have done well in the introduction of this article, is shown by the testimony in its favour as a potent medicine. Dr. Osgood, (*Am. Journ. of Pharm.* vol. vii. p. 202,) and Dr. Ware, (*Bigelow's Med. Bot.* vol. ii. p. 127, 132,) have each instituted a course of experiments to test its remedial powers. The first found it an emetic; and the second met with a case where this effect on the stomach was produced



by the application of the ointment to an ulcer on the leg. Mr. Worthington submitted himself to the test of its powers. He took the fourth of a grain of the *Alcoholic Extract*, which caused an acrid burning sensation in the mouth, and communicated to the throat and fauces a sense of dryness and heat, which finally reached the stomach. In the course of about an hour this dryness and burning sensation in the throat and stomach became intense, and a disposition to hiccough was excited, which soon commenced, gradually increasing in frequency until it reached fifteen or twenty times per minute. This was attended with some sickness and retching until vomiting took place. This was violent, and seemed to come on about every ten or fifteen minutes for the space of an hour. During this time dizziness and tremor were created, which passed off with the effect of the dose. With the hiccough there was a copious secretion of saliva, and discharge of mucous from the stomach and nose. During the action of this dose, the pulse was weakened so as to be scarcely perceptible, and reduced from sixty-eight to fifty-two pulsations per minute. (*Op. cit.*)

The experiment just detailed was repeated three times, and in neither was there a disposition to catharsis. The effects are those of an acro-narcotic, and not of one the least potent of this class of remedies. The uses and mode of administration are similar to those of the White Hellebore. In gout and rheumatism, the medical gentlemen before mentioned speak in its favour. A knowledge of it is stated to be possessed by the North American Indians. J. C.]

#### ORDER XII.—LILIACEÆ, *Lindl.*—THE LILY TRIBE.

**ESSENTIAL CHARACTER.**—*Calyx* and *corolla* confounded, coloured, regular, occasionally cohering in a tube. *Stamens* six, inserted into the sepals and petals; *anthers* opening inwards. *Ovary* superior, three-celled, many-seeded; *style* one; *stigma* simple or three-lobed. *Fruit* succulent, or dry and capsular, three-celled. *Seeds* packed upon one another, in one or two rows; *embryo* with the same direction as the seed, in the axis of fleshy *albumen*, or uncertain in direction and position.—*Roots* fibrous or fasciculate. *Stem* none, except a bulb; or tuberous, or creeping, or erect, or aborescent. *Leaves* with parallel veins, membranous, not articulated with the stem; either sessile or with a narrow leafy petiole. (*Lindley*)

**PROPERTIES.**—Not uniform.

##### 1. AL'OEË, *Linn. E.*—AL'OE.

*Aloë spicata, L.*; and *A vulgaris, D.*; Undetermined Species of *Aloë, E.*

*Sex. Syst.* Hexandria, Monogynia.

(*Succus proprius spissatus foliorum ex variis Aloës speciebus.*)

(*Aloe, U. S.*)

**HISTORY.**—Neither *Aloe* plants nor the inspissated juice of their leaves are mentioned by Hippocrates or Theophrastus; but both are described by Dioscorides (*Lib. iii. cap. xxv.*) and Pliny. (*Hist. Nat. lib. xxvii. cap. v.*)

**BOTANY.** **Gen. Char.**—*Perianth* tubular, six-cleft, fleshy, nectariferous at the base, the sepals of the same form as the petals, and closely imbricating them.

*Stamens* hypogynous, as long as the perianth, or even longer. *Capsule* membranous, scarious, three-corned, three-celled, three-valved, with a loculicidal dehiscence. *Seeds* numerous, in two rows, roundish or angular. (*Lindley.*)—Succulent plants.

**Species.**—The following species furnish the greater part of the substance called in the shops *aloes*:

1. AL'OEË VULGAR'IS, *Lam. D.*—'Αλόη, *Dioscor. Sibth.* *Stem* woody, simple, cylindrical, short. *Leaves* fleshy, amplexicaul, first spreading, then ascending, lanceolate, glaucous green, flat above, convex below, armed with hard, distant, reddish spines, perpendicular to the margin; a little mottled with darker colour; the parenchyma slightly coloured brown, and very distinct from the tough leathery cuticle. *Scape* axillary, glaucous reddish, branched. *Spike* cylindrical-ovate. *Flowers* at first erect, then spreading, afterwards pendulous, yellow, not

FIG. 141.



Various Species of *Aloë.*



larger than the stamens. (*Lindley*.)—Beneath the epidermis of the leaves, in peculiar parallel vessels, is found a brownish-yellow, bitter, resinous juice. This plant is a native of the East Indies and Barbary, and is cultivated in the West Indies, Italy, Sicily, and Malta. It yields *Barbadoes Aloes*. *A. vulgaris* has been subdivided by some botanists into *A. abyssinica* and *A. barbadensis*.

2. AL'OE SOCOTRI'NA, *Lam. De Cand.*—*Stem* woody, straight, one and a half feet high or more, naked below, where it is strongly marked with the scars of leaves. *Leaves* amplexicaul, ascending, ensiform, green, curved inwards at the point, convex below, rather concave above, marked with numerous small white marginal serratures, the parenchyma abounding in a bright brownish yellow juice. *Raceme* cylindrical, unbranched. *Flowers* scarlet at the base, pale in the middle, green at the point. *Stamens* unequal, three of them longer than the flowers. (*Lindley*.)

FIG. 142.



Aloë socotrina.

—The leaves contain, in peculiar vessels, a yellow juice, which, when exposed to the air, becomes violet, and ultimately brown. This juice is more copious and bitter than that of *Aloë vulgaris*. *Aloë socotrina* is said to be a native of the island of Socotra, and to yield *socotrine* (and *real hepatica*?) aloes; but further evidence is required to establish these statements. Lieut. Wellestead (*Journal of the Royal Geograph. Soc.* vol. v.) says, the hills on the west side of this island are covered for an extent of miles with aloe plants; and he observes, that it is not likely, at any future period, that the whole quantity will be collected which might be required.

3. A'LOË SPICA'TA, *Thunb. L. D.*—*Stem* three to four feet high, as thick as a man's arm. *Leaves* thick, fleshy, broad at the base, gradually narrowing to the point, channelled, full two feet long, distantly toothed, with a few white spots; their parenchyma almost colourless. *Spike* a foot long, very compact, with the flowers campanulate and horizontal. The three petals broader, ovate, obtuse, white, with a triple green line, the sepals narrower, less concave. *Stamens* much longer than the perianth. The flowers are filled with a purplish honey. (*Lindley*.)—This species is a native of the interior of the Cape of Good Hope, and contributes to yield *Cape Aloes*.

**PREPARATION.**—The finest kind of aloes is obtained by evaporating the juice which flows spontaneously from the transversely-cut leaves. This juice is lodged in vessels running longitudinally beneath the epidermis. The exudation of it is promoted by dipping the leaves in hot water. But if pressure be employed the proper aloetic juice becomes mixed with the mucilaginous liquid of the leaves, and thus an inferior kind of aloes is obtained. A still commoner variety is procured by boiling the leaves, from which the juice has been previously allowed to escape, in water.

In the island of Socotra the leaves are plucked at any period, and by any one who chooses to take the trouble; and after being placed in a skin, the juice is allowed to exude from them. (*Wellstead, Journal of the Royal Geograph. Soc.* vol. v.)

In Barbadoes the aloes is best procured in the month of March. It is obtained as follows:—"Every slave hath by him three or four portable tubs. The leaves being cut near the roots, are thrown into these, with their broken ends downwards; and as the leaves are full of large longitudinal veins or vessels, they yield an easy passage to the juice (which is of a greenish yellow colour) to drip out. This being boiled for about five hours in a copper or kettle, the watery particles evaporate, and the remainder comes to a consistency and thickening as sugar doth when sufficiently boiled. The way to know when it is enough boiled is, to dip a stick in the liquor, and observe whether the aloe sticking to it, when cold, breaks short: if it doth, then it is boiled to perfection, and fit to be poured



into gourds or calabashes, or other vessels for use."<sup>1</sup> Dr. Wright (*Lond. Med. Journ.* vol. viii. p. 219,) says, that in Jamaica, the leaves contained in hand-baskets, or nets are boiled in water, and the strained liquor evaporated to a proper consistence, and then poured into gourds or calabashes.

Mr. George Dunsterville, surgeon of Algoa Bay, and lately one of my pupils, has furnished me with the following information respecting the manufacture of Cape aloes. "A shallow pit is dug, in which is spread a bullock's hide or sheep's skin. The leaves of the aloe plants in the immediate vicinity of this pit are stripped off, and piled up on the skin, to variable heights. These are left for a few days. The juice exudes from the leaves, and is received by the skin beneath. The Hottentot then collects in a bucket or other convenient article the produce of many heaps, which is then put in an iron pot capable of holding 18 or 20 gallons. Fire is applied to effect evaporation, during which the contents of the pot are constantly stirred to prevent burning. The cooled liquor is then poured into wooden cases of about three feet square by one foot deep, or into goat or sheep skins, and thus is fitted for the market. In the colony, aloes realize about 2½*d.* to 3½*d.* per lb." Mr. Dunsterville also informs me, that the Hottentots and Dutch boors employ indiscriminately different species of Aloë in the preparation of Cape aloes. He adds that "The Cape aloes, which is usually prized the highest in the English market, is that made at the Missionary Institution of Bethelsdorp (a small village about nine miles from Algoa Bay, and chiefly inhabited by Hottentots and their missionary teachers). Hence it is called *Bethelsdorp Aloes*. Its superiority arises, not from the employment of a particular species of Aloë, for all species are indiscriminately used, but from the greater care and attention paid to what is technically called 'the cooking of the aloes,' that is, the evaporation, and to the absence of all adulterating substances (fragments of lime-stone, sand, earth, &c.) often introduced by manufacturers."

DESCRIPTION AND VARIETIES.—I am acquainted with seven varieties of aloes, namely *Socotrine*, *Hepatic*, *Barbadoes*, *Cape*, *Mocha*, *Caballine*, and *Indian*.

1. **Socotrine Aloes:** (*Aloë socotrina*; *Aloë socotorina* and *Aloë indica*, E).<sup>2</sup> A few years ago this kind of aloes was brought by way of Smyrna, and hence was frequently termed *Turkey Aloes*. But since the expiration of the charter of the East India Company it is usually brought by way of Bombay. It comes over in skins<sup>3</sup> contained in casks (holding from 11 to 15 cwt. each), kegs, and chests. Its consistence and colour are subject to considerable variation. The exterior portion of each skinful is usually hard, but the internal portion is frequently soft or even semiliquid.

The hardened portions vary in colour in different parts of the same mass; sometimes they are garnet red, at other times much paler, and when quite dry are golden red, and yield a golden yellow powder. By exposure to the air the colour is deepened. The fracture of fine selected pieces is smooth, glassy, and conchoidal; but socotrine aloes of excellent quality often breaks with a roughish fracture. The finest kind of Socotrine aloes which I have met with had the semitransparent red colour observed when we break a fine tear of myrrh. Thin films of pure and hardened Socotrine aloes are usually translucent or nearly transparent. The odour of fresh broken pieces (especially when breathed on), is very fragrant, and is much stronger in recent and soft specimens. The same agreeable odour is obtained by heating the aloes on a point of a knife in a candle. By distillation with water we obtain a liquid having the same odour, but free from any bitter taste. When fresh, Socotrine aloes possess consider-

<sup>1</sup> Hughes, *Nat. Hist. of Barbadoes*, p. 154. This account is further confirmed by that of Mr. Millington, *Lond. Med. Journ.* vol. viii. p. 422.

<sup>2</sup> I have received from Dr. D. MacLagan, Lecturer on Materia Medica in Edinburgh, two specimens of aloes, one marked "True Socotrine Aloes garnet red in their fragments;" the other "Aloes given to me as True Socotrine, rough fracture nearly garnet red in thin fragments. Included under *Aloe indica*, Ed. Pharm." Both kinds are Socotrine aloes.

<sup>3</sup> I am informed that they are the skins of the Gazelle.



able acidity, and Mr. Hennell informs me, that in the preparation of the Compound Extract of Colocynth he has frequently observed the fatty acid of the soap set free by the acid of the Socotrine aloes.

When a package of Socotrine aloes arrives at a druggist warehouse, it is usually garbled or sorted. The finest, clear, and hard pieces are separated for sale. The soft portions are placed upon slabs or in shallow tin trays, or other vessels, and exposed to a very gentle heat to harden them (*hardened Socotrine aloes*), and at the same time to preserve the favourite colour of this kind of aloes. Mr. Whipple, who has had great experience in these matters, informs me, that "the loss would be frightful, if after selecting or separating the clean aloes, the skins were not washed and the aloes obtained by subsequent evaporation."

In the Edinburgh Pharmacopœia the following characters are assigned to the *Aloë socotrina*:

"In thin pieces, translucent, and garnet red; almost entirely soluble in spirit of the strength of sherry. *Very rare.*"

But Socotrine aloes as imported is not "*in thin pieces*;" this character being given to it in the garbling process, or by drying the soft portions in thin layers as above mentioned. *Translucency* and a *garnet red* colour are qualities not possessed by many fine specimens of Socotrine aloes. The *alcoholic strength of sherry* is subject to variation, and, therefore, the statement of the College as to the solubility of Socotrine aloes is not very definite. Lastly, as to Socotrine aloes being *very rare*, I may observe that Mr. Hennell, of Apothecaries' Hall, informs me (Dec. 21, 1841), that he will be happy to take an order for 500 lbs. of it.

The impure and dirty pieces of Socotrine aloes are sometimes melted and strained (*Strained Socotrine Aloes*) by which its colour and odour are impaired, and its other qualities somewhat altered.

Socotrine aloes has long been regarded as the best kind of aloes, though its commercial value is now below that of Barbadoes aloes. It is, I suspect, inferior in activity.

Socotrine aloes is mentioned by Avicenna and Mesue, both of whom regarded it as the best kind. By Fée, (*Cours d'Hist. Nat. Pharm.* t. i. p. 325,) and some other continental writers, it is confounded with Cape aloes.

The aloes prepared in the island of Socotra is probably procured from *Aloë socotrina*. In 1833, the quantity exported from this island was 83 skins, or 2 tons. But a much larger quantity might be procured if required. (Wellstead, *Journ. Geograph. Soc.* vol. v.) Sir Whitelaw Ainslie (*Materia Indica*, vol. i. p. 9,) says that the greater part of the extract now sold under the name of Socotrine aloes is prepared in the kingdom of Melinda.

Two samples (one of which I have in my museum) brought direct from the island of Socotra, by a friend of Professor Royle, are largely intermixed with foreign substances, as sand, skins, &c.

**2. Genuine Hepatic Aloes:** *Liver-coloured Socotrine Aloes (Aloë hepatica vera. ? Aloë indica E.).*<sup>1</sup> I have never met with any description of this kind; and I suspect continental writers confound it with the foregoing variety. In English commerce it is always regarded as distinct.

It is brought to us from Bombay (hence it is sometimes called *Bombay or East India Aloes*) in skins, contained in casks holding from 200 to 300 pounds.<sup>2</sup> Its odour is very much the same as that of the Socotrine kind, or perhaps it is a

<sup>1</sup> I suspect hepatic aloes is included by the Edinburgh College under "*Aloë indica*." For in preparing Decoction of Aloes the College orders Socotrine or Hepatic Aloes, though the term hepatic does not occur in the list of *Materia Medica*.

<sup>2</sup> Mr. Whipple informs me that it is "received in packages varying from 55 lbs. to 12 cwt. casks, most commonly in firkins. Lately it has come over in boxes lined with tin, and holding about 56 lbs. All of these, except the last, contain the skin packages."



little less fragrant. It is distinguished from the latter by its opacity and its liver colour. I have a sample of this aloes quite soft or semiliquid. The similarity of the odour of Socotrine and hepatic aloes leads to the suspicion that they are obtained from the same plant; and which is further confirmed by the two being sometimes brought over intermixed, the Socotrine occasionally forming a vein in a cask of the hepatic aloes. By digestion in rectified spirit of wine, a yellowish granular powder (in appearance something like lycopodium) is obtained, which is insoluble in water, alcohol, ether, and dilute sulphuric acid, but is readily soluble in a solution of caustic potash, forming a red-coloured liquid.

**3. Barbadoes Aloes:** *Aloes in gourds* (*Aloë barbadensis*, Ph. Ed.)—This is the kind denominated by most continental writers (as Geiger, Theod. Martius, Pfaff, Fée, and others), *Hepatic Aloes* (*Aloë hepatica*), but its colour is not constantly that of the liver. It is imported from Barbadoes or Jamaica in gourds, weighing from 60 to 70 pounds, or even more than this. It varies in colour from a dark brown or black (*brown or black Barbadoes aloes*) to a reddish brown or liver colour (*liver-coloured or hepatic Barbadoes aloes*): even in the same gourd a difference of colour is occasionally observed. The fracture also varies, sometimes being dull, at other times glossy. Its unpleasant odour, (which is much increased by breathing on it) will always distinguish it from the foregoing kinds. Its powder is of a dull olive-yellow colour. This kind of aloes is obtained from the *Aloë vulgaris*.

**4. Cape Aloes** (*Aloë capensis*: *A. lucida* of Geiger).—This kind is imported, as its name indicates, from the Cape of Good Hope. It is brought over in chests and skins, the latter being preferred, as the aloes contained therein are usually purer and more glossy. It has a shining resinous appearance, is of a deep brown colour, with a greenish tint, and has a glossy or resinous fracture; its edges, or thin laminæ, viewed by transmitted light, have a yellowish red or ruby colour; its odour is stronger and more disagreeable than the Barbadoes aloes; its powder is greenish yellow. Some of the commoner kinds of Cape aloes have a rough fracture. The finest kinds of Cape aloes is called *Bethelsdorp aloes* (see p. 106).

Occasionally it has been imported of a reddish brown colour, like that of the liver, and opaque *liver-coloured or hepatic Cape aloes*. Some years since an experienced dealer bartered 3 lbs. of Cape aloes for 1 lb. of what he thought to be the genuine hepatic aloes, but which turned out to be a fine sort of Cape aloes. I presume this is the kind which Professor Guibourt, (*Hist. des Drog. simpl.* t. ii. p. 418, 3<sup>me</sup> éd.) to whom I sent a specimen of it, terms *Aloës hépatique faux*. Its odour, when breathed on, instantly detects it.

Cape aloes is procured from *Aloë spicata*, and perhaps also from other species, as *A. arborescens*, Mill., *A. commelyni*, Willd., *A. mitriformis*, Willd. (Lindley, *Flora Medica*.)

**5. Fetid, Horse or Caballine Aloes.** (*Aloë caballina*).—I have never met with any aloes under this name in English commerce. From Prof. Guibourt I have received two substances, which he denominates *Aloës Caballin*.

*α.* One is impure or foot Cape aloes.

*β.* The other is in black opaque masses. Its fracture is uniform. It is difficult to pulverise, adheres to the pestle, gives a greenish powder, has very little odour, and yields a dark brown decoction. It is probably an extract prepared by boiling the leaves in water.

Professor Guibourt (*Hist. des Drog.* ii. 419) says Caballine aloes is procured either in the countries which furnish ordinary aloes, or in Spain or Senegal.

**6. Mocha Aloes** (*Aloë de Mochá*).—Under this name I found in a drug warehouse, where it had lain for many years, an impure kind of aloes, in large irregular masses, opaque, and black externally, intermixed with sand, strings, &c. In its brittleness, odour, and the pale colour of its decoction, it resembles Cape aloes. The interior of the mass is not uniform: in some places it is dark and opaque, somewhat like Barbadoes aloes, in other places it resembles Socotrine



aloës, and here and there we find portions having the transparency and resinous appearance of Cape aloës. Recently this kind of aloës has been imported under the name of Mocha aloës from Muscat, in chests containing nearly 2 cwt. each.<sup>1</sup>

**7. Indian Aloës** (*Aloë indica*; not the *Aloe indica* of the Edinburgh Pharmacopœia.)—Through the kindness of Professor Royle, I have examined four kinds of aloës brought from the interior of India:

- a. *Aloës from Northern India*.—Is dull, black, and brittle, and has little odour. It came from the northern parts of India, where it is common in the bazaars. It is probably the kind which Ainslie (*Mat. Ind.* vol. ii. p. 10) says resembles Barbadoes aloës.
- β. *Guzerat Aloës*.—Is dark, more gummy in its appearance and feel, more difficult to fracture. It came from Guzerat.
- γ. *Salem Aloës*.—In blackish masses. It was brought from Salem. It is distinguished from all the preceding by the numerous large air cavities observed in its interior. Its odour is analogous to that of Socotrine aloës. Its price is marked one anna and nine pice [about twopence-halfpenny] per pound.
- δ. *Trichinopoli Aloës*.—Resembles Cape aloës in its brittleness, odour, and colour, but is more opaque. Its price is marked two annas [about threepence] per pound.

These aloës are probably the produce, in part at least, of *Aloë indica* (Royle, *Bot. of the Himalayan Mountains*); a species with reddish flowers, common in dry situations in the northwestern provinces of India, and which, if known to Roxburgh, was included by him in the *A. perfoliata*, Linn. and perhaps also of *A. vulgaris*, or the plant mentioned by Rheedé. (*Hort. Malab.* ii. t. 3.)

COMPOSITION.—Aloës has been analysed by Trommsdorf, (*Ann. de Chim.* t. lxxviii. p. 11, 1808,) by Bouillon-Lagrange and Vogel, (*Ann. de Chim.* t. lxxviii. p. 155,) by Braconnot, (*Journ. de Physiq.* t. lxxxiv. p. 334, 1817,) and by Winkler. (Geiger, *Hand. d. Pharm.* Bd. ii. p. 782, 1829.)

Trommsdorf.		Bouillon-Lagrange and Vogel.		Braconnot.		Winkler.			
<i>Socotrine.</i>		<i>Barbadoes.</i>		<i>Soc.</i>		<i>Bar.</i>			
Saponaceous principle	75	81	25	Extractive	68	52	Bitter matter	50	60
Resin	25	6	25	Resin	32	42	Resin	50	35
Vegetable albumen	0	12	5	Vegetable albumen	0	6	Albumen	0	5
Galic acid	trace	trace							
Aloës	100	100	100	100	100	100	100	100	100

1. **ALOEIN**, Pfaff, (*Saponaceous Matter; Extractive; Bitter Principle*). This is the principal constituent of aloës. It is contained in the cold infusion of aloës, and also in a decoction which has cooled; it may be obtained from either by evaporation. Thus procured it is a brown and bitter mass, readily soluble in water, but difficultly so in spirit of wine. In pure alcohol or ether it is said to be insoluble, or nearly so. Besides carbon, hydrogen, and oxygen, it contains nitrogen, for it yields ammonia by destructive distillation, and furnishes carbazotic acid when treated by nitric acid. Aloësin is probably a mixture or compound of various proximate principles. Obtained as above, Braconnot says it contains some of the *puce-coloured principle*, which may be removed by oxide of lead.

2. **RESIN**.—The substance which deposits from a decoction of aloës as it cools is usually denominated resin. Braconnot says it is a mixture of aloësin and *puce-coloured principle*; while Berzelius regards it as *apothème* combined with unaltered extract. It is transparent, brown, fusible, soluble in alcohol, ether, and alkaline solutions. The *puce-coloured principle* of Braconnot is an odourless and tasteless powder, combustible, but not fusible; and is prepared by digesting aloës with water and oxide of lead: a compound of the puce principle and the oxide is procured, which is to be washed and decomposed by weak nitric acid: the oxide is dissolved, and the puce principle left. From Braconnot's observations, this principle seems to be rather oxidized extractive (*apothème*, Berz.) than resin.

3. **VEGETABLE ALBUMEN**.—This term is applied to a substance insoluble in both water and alcohol.

4. **ALOEIC ACID**.—This is the acid which Trommsdorf supposed to be *gallic acid*. A solution of aloës reddens litmus, darkens ferruginous solutions, but does not precipitate gelatin: hence Trommsdorf assumed the presence of gallic acid. But while gallic acid causes a blue colour with the persalts of iron, infusion of aloës produces an olive brown one. Furthermore, if excess of diacetate of lead be added to the infusion, and sulphuretted hydrogen be passed

<sup>1</sup> Mr. Whipple tells me, that in dissolving and straining Mocha aloës, he has never found less than 25 per cent. of impurities (sand, stone, &c.)



through the filtered liquor, to throw down the excess of lead, the boiled and strained liquor possesses the property of becoming olive brown on the addition of sesquichloride of iron. Hence it appears to me that the acid is a peculiar one, and I have accordingly termed it *aloetic acid*. It must not be confounded with an acid obtained by the action of nitric acid on aloes, and which has also been termed aloetic acid.

Meissner (Pfaff's *Mat. Med.* vol. vii. p. 171) has given the name of *Aloine* to a supposed alkali in aloes. Its solution was brown, and acted as an alkali on reddened litmus paper. With sulphuric acid, aloine formed a crystalline salt.

Winkler (Schwartz, *Pharm. Tabell.* p. 294, 2<sup>te</sup> Ausg.) regards aloes as a neutral vegetable salt, composed of two peculiar basic substances (viz. a non-bitter resin, and a bitter substance), and an acid, viz. a colouring, non-bitter matter.

Fabroni (*Ann. de Chim.* xxv. 301) obtained a fine violet colour from the recent juice of the Aloë, which has been proposed as a dye for silk. It is formed by the action of the oxygen of the air on the juice.

**CHEMICAL CHARACTERISTICS.**—Aloes is almost completely soluble in boiling water. The cold decoction of Cape aloes is much paler coloured than that of any other kind of aloes. Barbadoes aloes yields the deepest coloured decoction. When the decoction of aloes cools, the substance called resin is deposited. The clear solution reddens litmus, strikes a deep olive brown tint (*aloetate of iron*) with sesquichloride of iron, is deepened in colour by alkalis, but is unchanged by gelatin. Diacetate of lead forms a copious yellow precipitate with it.

When aloes is heated with nitric acid, nitrous fumes are evolved, and the principles of which aloes consist are oxidized. The residuum has an intensely bitter taste, and is termed *Artificial Aloebitter* (*Künstliches Aloebitter*). It is probably a mixture of several principles.

The products of the action of nitric acid on aloes have occupied the attention of several distinguished chemists; but the results of their experiments, though highly interesting, are not uniform. Braconnot (*Ann. de Chim.* lxxviii. 28), and Chevreul (*Ann. de Chim.* lxxiii. 46,) examined the reaction. The former applied the term *aloetic acid* to the residual solid; which Liebig<sup>1</sup> subsequently declared to be a mixture of *nitric or nitrous acid, carbazotic acid, and a peculiar, non-acid, resinous red matter*. Boutin (*Journ. de Pharmacie*, t. xxvii. p. 185,) has more recently examined the reaction of nitric acid on aloes, and he states the products to be *polychromatic acid* (the aloetic acid of Braconnot) composed, according to Pelouze, of  $C^{12} H^2 N^2 O^{13}$ , *oxalic acid, carbazotic acid, and cyanile*. Schunck (Kane's *Elements of Chemistry*, p. 1034,) states that by the action of nitric acid on aloes, he obtained four peculiar acids, viz. *aloetic acid, aloëresinic acid, chrysammic acid, C^{16} H^2 N^2 O^{12} + Aq., and chrysolepic acid, C^{12} H^2 N^2 O^{13} + Aq.*

**PHYSIOLOGICAL EFFECTS.** *a. On Vegetables.*—Not ascertained.

*β. On Animals.*—Aloes is the ordinary purgative for solipedes (the horse, the ass, the zebra, &c.) as it is both safe and sure. In horses, previously prepared by two or three bran-mashes to soften the dung, the dose is from five to seven drachms. (Youatt, *The Horse*, p. 211.) It acts slowly, requiring from eighteen to forty-eight hours for its operation. (Moiroud, *Pharm. Vétér.* p. 26.) Mr. Youatt informs me that aloes is a valuable purgative for the dog, in doses of from one to three drachms, and with the addition of from one to three grains of calomel. Barbadoes aloes is preferred by veterinarians, as being more effective than Cape aloes, in the ratio of about seven to five. Aloes proves purgative to oxen, sheep, and pigs, but, as in the other cases, it operates slowly. (Wibmer's *Wirk. d. Arzneim.*) Moiroud (*op. cit.*) injected into the veins of a horse four drachms of aloes dissolved in water with a little alcohol, and the next day an ounce more, without any other effect than the evacuation of a large quantity of urine. The dung, however, was enveloped by a thin pellicle formed by altered intestinal mucus. This was collected and analyzed subsequent to the death of the animal (which followed three days after the injection): it offered scarcely any traces of the constituents of the bile.

*γ. On man.*—Taken internally in small doses, aloes acts as a tonic to the alimentary canal, assisting the digestive process, strengthening the muscular fibres, and promoting the secretions, especially that of the liver, which organ it

<sup>1</sup> Poggendorf's *Annalen*, xiii. 205; also Liebig and Poggendorf's *Handwörterbuch d. Chem.* S. 268. 1837.



is thought specifically to influence. *In large doses* it acts as a purgative. There are, however, some peculiarities attending its cathartic operation deserving of notice. In the first place, these effects are not so speedily produced as by some other purgatives; for eight, twelve, and sometimes twenty-four hours elapse before they are produced. Secondly, aloes acts especially on the large intestines, and a full dose is in some persons apt to produce heat and irritation about the rectum and tenesmus, and, in those troubled with hemorrhoids, it is said not unfrequently to increase, or even to bring on, the sanguineous discharge. Fallopius (*opera omnia*, p. 109, Francof. 1600,) tells us that of one hundred persons who used aloes as a purgative, ninety were affected with the hemorrhoidal flux, which ceased when the use of aloes was omitted. But though this statement has been often quoted as an objection to the use of aloes, it is of little importance, as there is no evidence that the disease was brought on by aloes. The uterus, in common with all the pelvic viscera, is stimulated by aloes. A determination of blood towards these organs, and a fulness of the blood-vessels (especially of the veins), are produced, and thus uterine irritation and menorrhagia are apt to be increased by aloes, while in amenorrhœa and chlorosis it may occasionally act as an emmenagogue. Dr. Wedekind (*Rust's Magazin*, 1827, Bd. 24, Heft. 2, S. 304,) says that small doses of aloes often occasion erection, and increase the sexual feelings.

The purgative effects of aloes do not arise merely from their local action on the alimentary canal, since this effect is sometimes produced when the medicine has been neither swallowed nor given by the rectum. Thus Monro *primus* (*Works*, p. 306, 1781,) tells us, that the tincture of aloes applied to a caries of the bone produced purging; and it is said (*Mém. de la Soc. Roy. de Méd. Paris*, tom. ii. p. 162,) that an aloetic pill used as a stimulant to an issue had a similar effect; lastly, applied to a blistered surface it has the same operation. So that the purgative action of aloes appears to be of a specific kind.

According to Dr. Wedekind, (*op. cit.*; also *Lancet*, vol. i. 1827-8, p. 347,) the operation of aloes depends on the increased secretion of bile, which is produced by the specific action of this medicine on the liver. He founds this opinion on the results of various experiments. Thus he says, that if aloes be added to purgatives (a laxative infusion and sulphate of soda,) whose operation is speedy, its effects do not take place for some hours after those caused by the other purgatives; and he also asserts, that the evacuations in the second purging differ from those of the first both in appearance and smell. Moreover, he found that as long as the stools were white or gray in icterus, the aloes did not purge even when exhibited in large doses; but the purgative effect supervened immediately after the fecal matter began to contain bile, proving that the presence of bile in the intestinal canal is a necessary condition of the purgative effect of aloes. But in Moiroud's experiment above quoted, no effect seemed to be produced on the hepatic secretion.

In all probability, the increased secretion of bile, the irritation about the rectum, the disposition to hemorrhoids, and the vascular excitement of the sexual organs, all of which are said to be produced by aloes, are the effects of a stimulant action exerted by this medicine over the venous system of the abdomen, and especially of the pelvis.

Dr. Greenhow (*Lond. Med. Gaz.* vol. xix. p. 270,) ascribes a diuretic effect to aloes, and his statement is corroborated by Moiroud's experiment.

Socotrine aloes is said not to be so apt to occasion hemorrhoids as the Barbadoes kind. Some years since, Dr. Clutterbuck instituted numerous experiments at the General Dispensary, Aldersgate Street, which I witnessed, to determine the effects of the different kinds of aloes, but scarcely any difference in their operation on the human subject was perceptible. However, it is probable that Cape aloes is less powerful in its action on man, as it is on the horse, than the Barbadoes kind. But the difference is less obvious in the human subject, on



account of the comparative smallness of the dose required to produce the purgative effect.

As a purgative, aloes holds an intermediate rank between rhubarb and senna. Vogt (*Pharmakodynamik*, Bd. ii. S. 334, 2<sup>te</sup> Aufl.), places it between jalap and rhubarb. From rhubarb it is distinguished by its more stimulant influence over the large intestines and the pelvic organs: from senna by its feebler action as a purgative, by its slow operation, and by its tonic influence when given in small doses. It irritates less powerfully than either jalap or scammony; further, its influence over the blood-vessels of the pelvic viscera is greater than these.

USE.—The uses of aloes may be readily inferred from the remarks already made. It is evidently not adapted for those cases in which a speedy effect is required; and it is, therefore, useless to add it to purgatives to quicken their operation. It is well fitted for cases of costiveness where there is a scanty secretion of bile, and for torpid conditions of the large intestines, especially when attended with deficient uterine action. Some of the ill effects ascribed to the use of aloes are probably imaginary, and others are much exaggerated. (*On the Use and Abuse of Aloes*, *Lond. Med. Gaz.* vol. iv. p. 139.) It is, however, advisable to avoid the use of this purgative in inflammatory conditions and organic diseases of the liver, in biliary calculi, in mechanical impediments to the passage of the blood through the branches of the portal veins, in hemorrhage from any of the pelvic organs (as the uterus and rectum), in irritation of the rectum, prostate gland, or bladder, in pregnancy, &c. For we have many other equally efficient purgatives, to the use of which, in these cases, no ill consequences have been ascribed. While, therefore, I concur with Dr. Fothergill (*Med. Obs. and Inq.* vol. v. p. 173,) in advising that the exhibition of aloes should be avoided when the menses are about to cease, I am not prepared to admit that "the piles, strangury, immoderate discharges of the menses, racking pains in the loins, representing labour pains, and other similar complaints," are frequently induced by this medicine. On the contrary, I suspect this catalogue of the evils of aloetic purges to be much overcharged. "Aloetic medicines," says Dr. Denman, (*Introd. to the Pract. of Midwifery*), "are forbidden during pregnancy, lest they should do mischief by their supposed deobstruent qualities; but they are cheap and conveniently given in the form of pills, and I have not observed any bad effects from them." The emaciation, stricture of the rectum, and enteritis, referred by Dr. Greenhow (*Lond. Med. Gaz.* vol. xix. p. 270) to the long-continued use of aloetic medicines, ought doubtless to be ascribed to other causes.

The following are some of the cases in which the use of aloes has been advised:

1. *In loss of appetite, and dyspepsia*, depending on a debilitated condition of the digestive organs, accompanied by costiveness, but unattended with any signs of local irritation, aloes may be given in small doses as a stomachic.
2. *In habitual costiveness*, depending on deficiency of bile, or on a sluggish condition of the large intestines—particularly in hypochondriacal or studious persons, or in those whose habits or occupations are sedentary—aloes, given in sufficient doses to purge, will be found a very useful medicine. A torpid state of the colon, with large fecal accumulation, is not unusual in females. (Copland, *Dict. Pract. Med.* art. *Colon, torpor of.*) In such the use of aloes is often attended with much benefit.
3. *To excite the menstrual discharge* aloes is frequently employed. It has been supposed that by determining an afflux of blood to the pelvic organs, aloes would stimulate the uterine vessels, and thus relieve deficient menstruation connected with atonic conditions of the uterus. But it often fails: indeed Dr. Cullen (*Treat. of the Mat. Med.*) says that it rarely succeeds.
4. *To reproduce the hemorrhoidal discharge*, aloes has been frequently employed in large doses. Serious affections of the head, or of other parts, have



sometimes disappeared on the occurrence of the hemorrhoidal flux; and, therefore, in persons who have been subject to this discharge, but in whom it has stopped, it is advisable to attempt its re-establishment, with the view of relieving other more serious disorders.

5. *To promote the secretion of bile* where a deficiency of this fluid does not arise from hepatic inflammation—as in some forms of jaundice which are unconnected with biliary calculi, inflammation, mechanical obstruction of the ducts, &c.

6. *In cerebral affections.*—The compound decoction of aloes is a most valuable stimulating purgative for elderly persons in whom a tendency to apoplexy exists, especially in cold and phlegmatic habits. It will frequently be necessary to conjoin other cathartics, as the infusion of senna.

7. *As an anthelmintic*, a decoction of aloes, used as an enema, has been efficacious in the small thread-worm (*Ascaris vermicularis*).

ADMINISTRATION.—On account of its nauseous taste, aloes is frequently given in the form of pill (*pilule aloeticae*, offic.) One or two grains seldom fail to produce one stool, which seems to be merely an evacuation of what may be supposed to have been present for the time in the great intestines (Cullen). The ordinary dose is five grains; but ten, fifteen, or even twenty grains are sometimes given.

1. *PILULÆ ALOËS COMPOSITÆ*, L. D.; *Pilule Aloes*, E.; *Compound Pills of Aloes*.—(Aloes [hepatic, D.], powdered, ℥j.; Extract of Gentian, ℥ss.; Oil of Caraway, ℥xl.; Syrup, as much as may be sufficient, L. D. Beat them together until incorporated.—The *Edinburgh College* orders of Socotrine Aloes, and Castile Soap, *equal parts*; Conserve of Red Roses, a sufficiency. Beat them into a proper pill mass. This pill may be also correctly made with the finer qualities of East Indian Aloes, as the Socotrine variety is very scarce; and many, not without reason, prefer the stronger Barbadoes Aloes. E.)—The addition of Syrup, ordered by the London and Dublin Colleges, is unnecessary and improper, for the aloes and extract react on each other, and become so soft, that not unfrequently some powder is necessary to give the mass a proper consistence. (Duncan, *Edinburgh Dispensatory*.) This pill is a valuable purgative in habitual costiveness. Dose, five to fifteen grains.

2. *PILULÆ ALOËS CUM MYRRHÆ*, L. D.; *Pilule Aloës et Myrrhæ*, E. (U. S.); *Pilule Rufi*, offic.; *Pills of Aloes and Myrrh*; *Rufus's Pills*.—(Aloes [hepatic, D.; Socotrine or East Indian, E.], ℥ij. [four parts, E.]; Saffron [one part, E.], Myrrh, of each ℥j. [two parts, E.]; Syrup [Conserve of Red Roses, E.], as much as may be sufficient. Rub the aloes and the myrrh separately to powder; then beat the whole together until incorporated.) [Aloes, ℥ij.; Myrrh, ℥j.; Saffron, ℥ss.; Syrup, q. s.; ℞. To be divided into 480 pills, U. S.] Used as a purgative in chlorosis and amenorrhœa. Dose, ten to twenty grains.

3. *PILULÆ ALOËS ET ASSAFËTIDÆ*, E. (U. S.); *Pills of Aloes and Asafetida*.—(Aloes (Socotrine or East Indian), Assafetida, and Castile Soap, *equal parts*. Beat them, with Conserve of Red Roses, into a proper pill mass.)—Used in dyspepsia attended with flatulence and costiveness. Dose, ten to twenty grains.

4. *PILULÆ ALOËS ET FERRI*, E.; *Pills of Aloes and Iron*.—(Sulphate of Iron, *three parts*; Barbadoes Aloes, *two parts*; Aromatic Powder, *six parts*; Conserve of Red Roses, *eight parts*. Pulverize the aloes and sulphate of iron separately; mix the whole ingredients, and beat them into a proper mass, which is to be divided into five-grain pills.)—A valuable emmenagogue in atonic amenorrhœa and chlorosis. Dose, one to three pills.

5. *PULVIS ALOËS COMPOSITUS*, L. D.—*Compound Powder of Aloes*. (Aloes [hepatic, D.], ℥iiss.; Guaiacum Resin, ℥j.; Compound Powder of Cinnamon, ℥ss. Rub the aloes and the guaiacum resin, separately, to powder; then mix



them with the compound powder of cinnamon).—Purgative and sudorific. Seldom used. Dose, ten to twenty grains.

6. PULVIS ALOËS CUM CANELLÀ, D. (U. S.); *Hiera Picra*, offic.—*Powder of Aloes and Canella*.—(Hepatic Aloes, lb. j.; Canella bark, ʒij. Powder them separately, and then mix. A popular emmenagogue. Dose, five to fifteen grains.

7. DECOCTUM ALOËS COMPOSITUM, L. D.; *Decoction Aloes*, E.; *Compound Decoction of Aloes*.—(Extract of Liquorice, ʒvij. [ʒss. E.]; Carbonate of Potash, ʒj. [ʒii. E.]; Aloes, [hepatic, D. or socotrine, E.] powdered; Myrrh, powdered; Saffron, of each ʒiss. [ʒi. E.]; Compound Tincture of Cardamom, fʒvij. [fʒiv. E.]; Distilled Water, Oiss. [fʒxvi. E.] Boil down the liquorice, carbonate of potash, aloes, myrrh, and saffron, with the water, to a pint [fʒxii. E.]; and strain; then add the compound tincture of cardamom.)—A most valuable preparation. A mild cathartic, tonic, antacid, and emmenagogue. Used in the before-mentioned cases, in doses of fʒss. to fʒij. Acids, acidulous salts, and most metallic salts, are incompatible with it. If it be desirable to conjoin chalybeates with it, either the *Ferri Potassio-tartras*, L., or the *Ammonice Ferro-tartras*, may be added to the cold decoction without undergoing decomposition.

8. EXTRACTUM ALOËS PURIFICATUM, L.; *Extractum Aloës Hepaticæ*, D.; *Purified Extract of Aloes*.—Aloes powdered, ʒxv., Boiling Water, Cong. j. Macerate for three days with a gentle heat; afterwards strain, and set by, that the dregs may subside. Pour off the clear liquor, and evaporate it to a proper consistence.)—A most unnecessary preparation. It is intended to deprive the aloes of the substance called resin, on which its irritating and griping qualities have been erroneously supposed to depend. Dose, five to fifteen grains.

9. TINCTURA ALOËS, L. D. E. (U. S.); *Tincture of Aloes*.—Aloes [Socotrine, D. Socotrine or Indian, E.] coarsely powdered, ʒj.; Extract of Liquorice, ʒij.; Water, Oiss.; [Oj. and fʒvij. E.]; Rectified Spirit, Oss. [fʒxii. E.] Macerate for fourteen [seven, D. E. with occasional agitation, E.] days, and strain.—The *Dublin College* dissolves the liquorice in ʒxvj. of water, and adds fʒxvj. of proof spirit, instead of the water and rectified spirit used by the London and Edinburgh Colleges.—“This tincture cannot without difficulty and delay be prepared by percolation, E.)—Purgative and stomachic. Dose, ʒij. to ʒj.

10. TINCTURA ALOËS COMPOSITA, L. D.; *Tinctura Aloës et Myrrhæ*, E. (U. S.); *Elixir Proprietatis* of Paracelsus, *Compound Tincture of Aloes*.—(Aloes, [Socotrine or Indian, E.] coarsely powdered, ʒiv. (ʒij. U. S.); Saffron, ʒij. (ʒi. U. S.); Tincture of Myrrh, Oij. Macerate for fourteen [seven, E.] days, and strain, L. The *Dublin College* omits the saffron. This tincture cannot be well prepared by percolation, E.)—Purgative, stomachic, emmenagogue. Used in cold, sluggish habits. Dose, ʒss. to ʒj.

11. VINUM ALOËS, L. D. E. (U. S.); *Tinctura Sacra*. *Wine of Aloes*.—Aloes [Socotrine, D.] rubbed to powder, ʒij.; Canella, powdered, ʒiv.; Sherry Wine, Oij. [Oiss. and Proof Spirit Oj. *wine measure*, D.] Macerate for fourteen days, frequently shaking, and strain. The *Edinburgh College* uses Aloes (Socotrine or East Indian), ʒiss.; Cardamom seeds ground; Ginger in coarse powder, of each ʒiss.; Sherry, Oij. Digest for seven days, and strain through linen or calico. [The U. S. P. directs Aloes, ʒi.; Cardamom, Ginger, āā. ʒi.; Wine, Oj. Macerate for fourteen days and filter.] Wine of aloes is purgative in doses of fʒss. to fʒij.; stomachic in doses of fʒj. to fʒij.

12. ALOË COLATA; *Strained Aloes* (Melt Aloes in a metallic vessel heated by steam or hot water, and strain through a hair or wire sieve). By this process aloes is deprived of foreign matters with which it is frequently mixed. Its physical properties suffer some change. Its colour for example is deepened.



Aloes is a constituent of several other preparations, (as *Extractum Colocynthis compositum*, L. D., *Pilula Colocynthis*, E.; *Pilula Rhei composita*, L. E.; *Pilula Cambogiae*, E., *Pilula Cambogiae composita*, L. D.; *Pilula Sagapeni composita*, L.; *Tinctura Rhei et Aloes*, E.) which will be described hereafter.

2. SQUILLA MARITIMA, *Steinheil, E.*—THE SEA ONION, OR OFFICINAL SQUILL.

*Scilla maritima*, Linn. L. D.

*Sex. Syst.* Hexandria, Monogynia.

(*Bulbus recens*, L. *Bulbus*, D. *Bulb*, E.)

(*Scilla*, U. S.)

**HISTORY.**—The Egyptians worshipped a bulbous plant called by Lucian Κρόμμυον, and which Pauw (*Phil. Diss. on the Egypt. and Chinese*, vol. i. p. 130, 1795,) asserts to be the squill, and further suggests that it was the red variety (? *Squilla Pancration* var. *a. Bulbo rufo*, Steinheil. Pythagoras (Pliny, *Hist. Nat.* lib. xix. cap. 30,) is said to have written a volume on the medicinal properties of squill, and to have invented the *acetum scillae*. Hippocrates employed squill (*σκιλλα*) internally, (*de victus ratione*,) externally, (*de ulceribus*,) and as a pessary. (*De Nat. Mul.*)

**BOTANY.** **Gen. Char.**—*Sepals* three, coloured, spreading. *Petals* very like them, and scarcely broader. *Stamens* six, shorter than the perianth; *filaments* smooth, somewhat dilated at the base, acuminate, entire. *Ovary* three-parted, glandular and melliferous at the apex; *style* smooth, simple; *stigma* obscurely three-lobed, papillose. *Capsule* rounded, three-cornered, three-celled. *Seeds* numerous, in two rows, flattened with a membranous testa. (*Lindley*, from Steinheil.)

**Sp. Char.**—*Leaves* very large, consequently spreading. *Bracts* long. *Flowers* white; flower-bud somewhat acute. *Anthers* yellow. *Ovarium* thick, yellowish. *Bulb* very large (Steinheil). (*Ann. Sc. Nat.* t. vi. p. 272, 2<sup>de</sup> Sér.)

*Bulb* roundish-ovate, half above ground. The *leaves* appear after the flowers; they are broad, lanceolate, twelve to eighteen inches long. *Scape* about two feet high, terminated by a dense long raceme.

**Hab.**—Shores of the Mediterranean, viz. Spain, France, Sicily, Africa, &c. Navarino has long been celebrated for its squills. In its native soil the plant flowers about August.

**DESCRIPTION.**—The fresh bulb (*bulbus recens*, L.; *radix recens*, offic.) is pyriform, of the size of the fist to that of a child's head, and is composed of thick, fleshy, smooth, shiny scales, attenuated at their edges, closely applied over each other, and attached to a conical disk (a rudimentary stem) which projects inferiorly, and gives origin to the root fibres, the remains of which are to be frequently found in the bulbs of commerce. The outer scales are usually dry, thin, coloured, membranous, or papery. By cracking the inner or fleshy scales, numerous spiral vessels may be drawn out. On submitting the cuticle of the scales to a microscopic examination, numerous acicular crystals (*raphides*) are perceived in cells, which are distinguished from the surrounding angular cells, by being larger and elliptical. The *pulvis scillae*, offic. contains nine or ten per cent. of these crystals.

Two kinds of squills, both abounding in an acrid juice, and having a very bitter taste, are met with in commerce; viz. the *white* (*squilla alba*), and the *red* (*squilla rubra*), (is the red kind the *Squilla Pancration* var. *a. Bulbo rufo*, Steinheil?) both of which are so called from the colour of the scales. The white is preferred in England.

In the London Pharmacopœia the fresh bulbs are directed to be preserved in dry sand; and, before drying them, the dry rind is to be removed; they are then to be cut transversely into thin slices, and dried as quickly as possible with a gentle heat.



Dried squill (*radix scille siccata*, offic.) is, however, for the most part imported, in consequence of the duty being no higher for this than for the recent bulb. It occurs in white or yellowish white, slightly diaphanous pieces, which, when dry, are brittle, but when moist are readily flexible. As their affinity for moisture is great, they should be preserved in well-stoppered bottles, or in a very dry place.

Squill is imported from Malta, and other countries of the Mediterranean. Also from Petersburg and Copenhagen. (*Trade List*, Sept. 11, and Nov. 20, 1838.)

COMPOSITION.—The more recent analyses of squill are those of Vogel, in 1812, (*Ann. de Chim.* t. 83, p. 147,) and of Tilloy, in 1826. (*Journ. de Pharm.* xii. p. 635.) Buchner, (*Berl. Jahrb.* xv. p. 1,) in 1811, examined the juice of the fresh bulb.

Vogel's Analysis of Squills, dried at 212° F.	Tilloy's Analysis of dried and fresh Squills.	Buchner's Analysis of fresh Squill bulb juice.
Scillitin with some sugar..... 35	Acrid, bitter, resinous extractive (Scillitin).....	Peculiar bitter extractive... 9.47
Tannin..... 24	Uncrystallizable sugar.	Mucilage..... 3.00
Gum..... 6	Gum.	Gelatinous matter ( <i>Tra-</i> } 0.94 <i>geanthin?</i> ).....
Woody fibre, and some ci- } trate (and perhaps tar- } 30	Fatty matter.	Phosphate of lime..... 0.31
trate of lime..... } Acrid volatile matter..... 5	Piquant, very fugaceous matter.	Fibrous matter..... 3.38
Loss..... 5	Squill bulb.	Water..... 79.01
Squill bulb..... 100		Astringent Acid..... traces
		Loss..... 4.40
		Squill juice..... 100.60

1. ACID, VOLATILE ? MATTER.—It is well known that squill, in the recent state, is very acrid, and, when applied to the skin, causes irritation, inflammation, and even vesication. By drying, the greater part of this acridity is got rid of; and hence the acrid principle is usually described as being of a volatile nature, and, in confirmation of its volatility, Athanasius (Pfaff, *Mat. Med.* Bd. v. S. 18,) states, that two ounces of water distilled from fresh squills caused the death of a dog in six hours. However, by others, its volatility is denied; and Vogel says, that six ounces of water distilled from fresh squills had no effect on dogs. Buchner (*Toxikologic*, 340,) states, that besides the bitter scillitin, squill contains, according to his experiments, another principle, which is combined with phosphate of lime, and which is capable of exciting itching and inflammation. This acrid matter may be easily decomposed, but is not volatile, as is generally supposed.

2. SCILLITIN (*Scillitite*, Thomson).—The substance to which Gogel gave the name of Scillitin is a whitish transparent deliquescent substance, which, when dry, has a resinous fracture, and may be easily rubbed to powder. Its taste is bitter, and subsequently sweetish. It readily dissolves in water, spirit of wine, and acetic acid. The substance sold in the shops under the name of Scillitin is a thick treacle-like liquid. Landerer (Thomson's *Org. Chem.* p. 717,) obtained crystals of Scillitin. He says they possessed alkaline properties.

4. RAPHIDES (*Phosphate of Lime?*) The acicular crystals found in the cuticle of the scales of the bulb, as before mentioned, probably consist of phosphate of lime. These perhaps are the needle-like crystals obtained by Vogel by evaporating the juice of the bulb, and which he regarded as citrate of lime.

CHEMICAL CHARACTERISTICS.—An aqueous decoction of squills is pale, and very bitter. Sesquichloride of iron communicates an intense purplish blue colour (*gallate of iron*) to it. Gelatin has scarcely any effect on it. Nitrate of silver forms a white precipitate (*chloride of silver*) soluble in ammonia, but insoluble in nitric acid. Oxalate of ammonia renders the decoction turbid, and after some time causes a white precipitate (*oxalate of lime*). Diacetate of lead and protonitrate of mercury form precipitates in the decoction. Tincture of nut-galls has no effect on it. Starch is not recognizable in it by iodine. Alkalis heighten the colour of the decoction.

PHYSIOLOGICAL EFFECTS. *a.* On Vegetables.—Not ascertained.

*β.* On Animals.—An ounce of powdered squill acts as a diuretic on horses and other large animals; the same effect is produced on smaller animals by half a drachm. (Moiroud, *Pharm. Vétér.*) When the dose is large, squill acts as a poison. It first causes local irritation; then its active principle becomes absorbed, affects the nervous system, and thereby quickens the respiration, causes convulsions, and death. (Orfila, *Toxicol. Gén.*) Hillefeld (Marx, *Die Lehre*



*von d. Giften*, vol. ii.) mentions paralysis produced in a rabbit by nineteen grains of powdered squill. Emmert and Hoering (*Meckel's Archiv*, B. 4, Heft 4, S. 527,) state that squill juice introduced into the abdominal cavity, became absorbed.

*γ. On Man.*—In small doses it acts as a stimulant to the excretory organs. Thus it promotes secretion from the mucous membranes (especially the bronchial and gastro-intestinal) and the kidneys. Its most marked effect is that of a diuretic. Its expectorant effects are less obvious and constant. Sometimes, when it fails to act on the kidneys, it increases cutaneous exhalation. Its influence on secreting organs is probably to be referred to the local stimulus communicated to their vessels by the active principle of squill in its passage out of the system, for Emmert and Hoering (*op. cit.*) have shown that the juice is absorbed, so that squills may be regarded as an acrid even for these remote parts. When it proves diuretic in dropsies, it usually promotes the absorption of the effused fluid—an effect which is, I think, indirect, and a consequence of the diuresis. But Sundelin (*Handb. d. sp. Heilm.* Bd. ii. p. 17,) observes of squill, that it promotes the secretion of urine less by its local irritation of the kidneys, than by its general excitement of the absorbent apparatus.

By the continued use of squill in gradually increased doses, it disturbs the functions of digestion and assimilation.

In full medicinal doses, squill excites nausea and vomiting. Purging, also, is not unfrequently produced. When squill proves emetic or purgative, its diuretic operation is much less obvious—a circumstance which Cullen (*Treat. of the Mat. Med.* p. 557,) refers to the squill being prevented reaching the blood-vessels and kidneys. Home, (*Clinical Experiments*, p. 384, 1783, 3d ed.) however, alleges that the diuretic effects are not to be expected unless there be some operation on the stomach. But the operation on the stomach may be, as Cullen suggests, a mere test of the activity of the squills. However, that the effect of squill, in strong doses, is not confined to the alimentary canal, is proved by the fact, that when the vomiting and purging were present, the pulse has been observed to be reduced in frequency, often to forty beats per minute (Home).

In excessive doses, squill acts as a narcotico-acrid poison, and causes vomiting, purging, griping pain, strangury, bloody urine, convulsions, inflammation and gangrene of the stomach and intestines. (Murray, *App. Med.* vol. v. p. 97.) Twenty-four grains of the powder have proved fatal. (Vogel, *Journ. de Phys.* lxxv. 194.)

Considered with reference to its diuretic effect, squill is comparable with foxglove. But it exceeds the latter in its stimulant influence over the urinary organs. On the other hand, foxglove is characterized by its powerfully sedative effect on the vascular system; for though squill has, in some instances, reduced the frequency of the pulse, this effect is by no means common. Squill, says Vogt, (*Pharmakodyn.* ii. 343, 2<sup>te</sup> Aufl.) preponderates in its action on the inferior or vegetative [organic] life; foxglove, on the other hand, in its action on the higher or animal life.

Uses.—The principal uses of squill are as an emetic, diuretic, and expectorant.

1. *As a diuretic in dropsies.*—It is applicable to those cases of dropsy requiring the use of stimulating or acrid diuretics, and is improper in inflammatory cases. It is an unfit remedy for dropsy complicated with granular kidney or vesical irritation; but when these conditions are not present, it is adapted for torpid, leucophlegmatic subjects. Hence, it is more serviceable in anasarca than in either ascites or hydrothorax. It should be given so as to excite a slight degree of nausea (not vomiting), as recommended by Van Swieten. (*Comment. upon Boerhaave's Aphorisms*, vol. xii. p. 435.) By this means its absorption is promoted. The acetate or bitartrate of potash may be conjoined. Calomel is usually regarded as a good adjunct for promoting the diuretic influence of



squill. When it does not purge it is beneficial, but its tendency to affect the bowels is an objection to its use.

2. *As an expectorant in chronic pulmonary affections* admitting of the use of a substance stimulating the capillary vessels of the bronchial membrane. Thus, in chronic catarrh, humid asthma, and winter cough, it is often employed with considerable benefit. It is of course improper in all acute cases accompanied with inflammation or febrile disorder. In old persons it is often combined with the *tinctura camphoræ composita*, and with good effect. The oxymel or syrup of squill may be given to relieve troublesome chronic coughs in children.

3. *As an emetic* it is occasionally used in affections of the organs of respiration requiring or admitting of the use of vomits. Thus, the oxymel is given, with the view of creating sickness and promoting expectoration, to children affected with hooping-cough; and sometimes, though with less propriety, in mild cases of croup. The great objection to its use is the uncertainty of its operation: in one case it will hardly excite nausea, in another it causes violent vomiting. Furthermore, it is of course highly objectionable as an emetic for delicate children with irritable stomachs, on account of its acrid properties, and the irritation it is capable, in these cases, of setting up.

ADMINISTRATION.—The following are the preparations of squills usually employed:

1. PULVIS SCILLÆ, D.; *Powdered Squill*.—The directions of the Dublin College for the preparation of this are as follows:—Remove the membranous integuments from the bulb of the squill, cut it into slices, and dry with an inferior heat (between 90° and 100° F.); then reduce them to powder, which ought to be kept in glass bottles with ground stoppers. The bulb loses about four-fifths of its weight by drying: so that six grains of the dry powder are equal to half a drachm when fresh. Powdered squill readily attracts water from the atmosphere, and becomes soft and mouldy; hence the necessity of preserving it in stoppered bottles and in a dry place. It is usually administered in the form of pill. The dose of the powder, as an emetic, is from six to fifteen grains; ten grains being the average. As an expectorant or diuretic we should commence with one grain, and gradually increase the dose until slight nausea is excited.

2. PILULÆ SCILLÆ COMPOSITÆ, L. D. (U. S.); *Pilule Scille, E. Compound Squill Pills*.—(Squill, fresh dried and powdered, ℥j.; Ginger, powdered [℥ij. D.]; Ammoniacum, powdered, each ℥ij.; Soap, ℥ij.; Syrup [Molasses, D.] as much as may be sufficient. Mix the powders together; then beat them with the soap, and add the syrup [molasses, D.] so as to obtain a proper consistence. The *Edinburgh College* takes of powdered Squill, *five parts*; powdered Ammoniac, and Ginger, and Spanish soap, each *four parts*; Conserve of Red Roses, *two parts*; and forms them into five-grain pills.)—Expectorant and diuretic. Principally used in chronic bronchial affections. Dose from five to twenty grains. It readily spoils by keeping.

3. TINCTURA SCILLÆ, L. D. E.; *Tincture of Squills*.—(Squill, fresh dried [in coarse powder, E.] ℥v.; Proof Spirit, Oij.; macerate for fourteen days, and strain, L. The directions of the *Dublin College* do not essentially differ from these. "Prepare this tincture by percolation, as directed for tincture of cinchona, but without packing the pulp firmly in the percolator. It may likewise be obtained by the process of digestion from the sliced bulb." E.)—Expectorant and diuretic. Used in chronic bronchial affections. Dose ℞x. to ℥ss.

4. ACETUM SCILLÆ, L. D. E. (U. S.); *Vinegar of Squills*.—(Squill, fresh dried, ℥xv. [℥viij. D.]; Distilled Vinegar, Ovj. [Oij. D. wine measure]; Proof [rectified, D.] Spirit, Oss. [℥iv. D.] The relative proportions used by the *Edinburgh College* are the same as those of the *London College*, except that one-tenth less spirit is employed. Macerate the squill with the vinegar, with a gentle heat, in a covered vessel, for twenty-four hours [seven days, D. Ed.];



afterwards press out [the liquor] and set it by, that the dregs may subside : lastly, add the spirit to the clear liquor.)—[The U. S. Pharmacopœia directs Squill, bruised, four ounces ; Distilled Vinegar, two pints ; alcohol, a fluid ounce. The process is the same as that of the Dublin College ; or it may be made by displacement.]—A most ancient preparation. Expectorant and diuretic. Used in chronic pulmonary affections and dropsies under the regulations before described. Dose ʒss. to ʒiiss. in some aromatic water. It is a constituent of the *Mistura Cascariellæ composita*, Ph. L.

5. OXYMEL SCILLÆ, L. D. (U. S.); *Syrupus Scillæ*, E.; *Oxymel of Squills*. *Syrup of Squills*.—(Honey [despumated] lb. iij. ; Vinegar of Squill, Oiss. (Oij. U. S.) Boil down in a glass vessel, with a slow fire, to a proper consistence, L. D.—Vinegar of Squills, Oij. ; Pure sugar, lb. vij. Dissolve the sugar in the vinegar of squills with the aid of a gentle heat and agitation, E.)—Used as an expectorant in chronic catarrhs and asthma, in doses of fʒj. or fʒij. As an emetic it is sometimes given to children affected with the whooping-cough or croup, in doses of a teaspoonful repeated every quarter of an hour until vomiting occurs.

ANTIDOTE.—No antidote is known. The first object, therefore, in a case of poisoning, is to evacuate the stomach ; the second, to allay the inflammatory symptoms which may supervene.

5. ALLIUM SATIVUM, Linn., L. E. D.—COMMON OR CULTIVATED GARLIC.

*Ser. Syst.* Hexandria, Monogynia.

(*Bulbus*, L. D.—*Bulb*, E.)

(*Allium*, U. S.)

HISTORY.—This plant was well known to the ancients. The Greeks called it *κρόκοδος*. It was used by Hippocrates.

BOTANY. *Gen. Char.*—*Flowers* umbellate, with a membranous *spathe*. *Perianth* six-parted, permanent, equal. *Stamens* inserted into the base of the perianth ; *filaments* either all alike, or every other one tricuspidate, with the *anther* on the middle point. *Style* subulate ; *stigma* simple. *Capsule* usually obtusely three-cornered or three-lobed, depressed, three-celled, bursting into three valves through the dissempiments, and containing two or one black angular seed in each cell. (*Lindley*.)

*Sp. Char.*—*Bulb* surrounded by smaller ones. *Leaves* linear, entire. *Umbel* bulbiferous, globose. *Spathe* ovate, rounded. *Segments of the perianth* ovate, obtuse. *Pistil* and *stamens* exsert. (*De Candolle*, *Bot. Gall.*) *Stem* about two feet high. *Flowers* whitish.

*Hab.*—? South of Europe. ?Egypt. ?Persia. Cultivated in kitchen gardens. It flowers in July.

DESCRIPTION.—The *bulb* (*bulbus*) is composed of *cloves*, each furnished with its proper envelopes. Its odour is strong, irritating, and characteristic : its taste is acrid.

COMPOSITION.—Cadet (*Gmelin*, *Handb. d. Chem.* ii. 1336.) analysed garlic. He found the constituents to be *acrid volatile oil*, *extractive* (a little) *gum*, *woody fibre*, *albumen*, and *water*. The ashes contained alkaline and earthy salts. Bouillon-Lagrange has detected, besides these, *sulphur*, *starch*, and *saccharine matter*. (*Journ de Pharm.* t. ii. p. 358.)

OIL OF GARLIC has a very acrid taste, a strong smell, and yellow colour. It is heavier than water, and is soluble in alcohol. It contains sulphur, and hence, in burning, produces sulphurous acid. According to Cadet, 20lbs. of garlic yielded only six drachms of essential oil. It strikes a black colour when rubbed with oxide of iron. It is a powerful irritant, and when applied to the skin causes irritation. The Hindoos, according to Dr. Ainslie, (*Materia Indica*, i. 151.) prepare a stimulating expressed oil from garlic, which they give internally in ague, and use externally in palsy and rheumatism.

PHYSIOLOGICAL EFFECTS.—Garlic is a local irritant. When swallowed it



operates as a tonic and stimulant to the stomach. Its volatile oil becomes absorbed, quickens the circulation, occasions thirst, and is thrown out of the system by the different excretories; the activity of which it promotes, and to whose excretions it communicates its well-known odour. Large doses occasion nausea, vomiting, and purging. Puihu, (quoted by Wibmer, *Die Wirk. d. Arzneim.*) says the expressed juice has proved fatal.

USES.—Employed by the cook as a flavouring ingredient in various made-dishes, sauces, &c. Rarely used by the medical practitioner. Internally it has been exhibited as a stimulant and stomachic in enfeebled digestion; as an expectorant in old chronic catarrhs; as a diuretic in atonic dropsies; and as an anthelmintic. Externally it has been employed as a resolvent in indolent tumours; as a local irritant or rubefacient applied to the feet to cause revulsion from the head or chest; as an antispasmodic liniment (composed of oil and garlic juice) in infantile convulsions; as a remedy for some cases of deafness, a clove or a few drops of the juice being introduced into the ear.

ADMINISTRATION.—A clove may be swallowed either entire, or, more conveniently, cut into small pieces. The dose of the fresh bulbs is one or two drachms. The expressed juice mixed with sugar, the infusion of garlic, and a syrup, are sometimes employed.

[*SYRUPUS ALLII*.—Take of fresh Garlic, sliced, six ounces; distilled vinegar, a pint; sugar, two pounds. Macerate the garlic in the vinegar in a glass vessel for four days, then express the liquor and set it by that the dregs may subside. Add the sugar to the clear liquor and proceed in the manner directed for syrup.

This formula was adopted from the recommendation of Mr. Daniel B. Smith, of Philadelphia, who demonstrated the futility of the old method of preparing syrup of garlic, of whose formula (*Journal of Philadelphia College of Pharmacy*, No. 1, p. 50,) it is a modification. Dose ʒi.—J. C.]

#### 4. ALLIUM CEPA, Linn. D.—THE ONION.

*Sex. Syst.* Hexandria, Monogynia.

(*Bulbus, D.*)

HISTORY.—The onion was known and used in the most ancient times. It was employed in medicine by Hippocrates. An onion taken from the hand of an Egyptian mummy, perhaps 2000 years old, has been made to grow. (*Muller's Physiol.* by Baly, vol. i. p. 29.)

BOTANY. *Gen. Char.*—Vide *Allium sativum*.

*Sp. Char.*—*Stem* fistulous, ventricose beneath; longer than the terete, fistulous leaves. *Umbel* capsuliferous, globose. *Segments of perianth* linear-elliptic, obtuse; shorter than the stamens and pistil. (*Botanicon Gallicum.*) Biennial. *Flowers* whitish. July.

Loudon (*Encycl. of Gard.*) enumerates eighteen varieties deserving of culture.

*Hab.*—Egypt. Cultivated in kitchen gardens.

DESCRIPTION.—The bulb (*bulbus*) is tunicated. When cut it evolves an acrid principle, having a well-known odour, and a powerful action on the eyes, causing a flow of tears. Its taste is sweet and acrid. *Onion juice* is colourless, but by exposure to the air becomes reddish.

COMPOSITION.—According to Fourcroy and Vauquelin (*Ann. Chim.* lxx. 161, 1808,) the onion contains an acrid volatile oil, uncrystallizable sugar, gum, woody fibre, albumen, acetic and phosphoric acids, phosphate and citrate of lime and water.

VOLATILE OIL OF ONIONS.—This is acrid, piquant, colourless, and, like that of garlic, contains sulphur.

PHYSIOLOGICAL EFFECTS.—Analogous to those of garlic, but milder. By



boiling onions, the volatile oil is dissipated, and the bulb is deprived of its irritating qualities, and becomes a mild esculent substance.

USES.—Extensively used as an article of food and as a condiment. It is very rarely employed in medicine, but is adapted to the same cases as garlic. Raw onions are occasionally taken as an expectorant, with advantage, by elderly persons affected with winter cough.

ADMINISTRATION.—A roasted onion is sometimes employed as an emollient poultice to suppurating tumours, or to the ear to relieve earache. The expressed juice has been given to children, mixed with sugar as an expectorant.

#### OTHER DIETETICAL, MEDICINAL, OR POISONOUS LILIACEÆ.

1. The CROWN IMPERIAL (*Fritillaria Imperialis*) is said to be a narcotic poison, (Brandt and Ratzburgh, *Giftgewächse*), though Orfila (*Tox. Gén.*) could not recognise any acidity in it.

2. The recent bulb of the COMMON WHITE LILLY (*Lilium candidum*) has been used as a diuretic in dropsies. The boiled bulb is employed as an emollient cataplasm.

3. Various species of ALLIUM, besides those already mentioned, are cultivated for culinary purposes: as, *A. Porrum*, the Leek; *A. ascalonicum*, the Shallot; *A. Schæno'prasum*, the Chive; *A. Scorod'oprasum* or Rocambole. Their virtues are analogous to those of the onion and garlic.

4. SQUILL'LA PANCRATI'ON. Steinh. (*Παγκρατίον*, Dioscorides) is said by Steinheil to yield a small bulb of a reddish colour, found in commerce under the name of squill.

5. The root of AL'E'TRIS FARINO'SA is used in the United States as a tonic.

6. ERYTHRO'NIUM AMERIC'ANUM is emetic. (Wood and Bache, *United States Dispensatory*.)

7. The fresh rhizome of SOLOMON'S SEAL (*Concalla'ria Polygonatum*) is a popular application to bruised parts (the eye, for example), to remove the marks.

8. XANTHOR'CEA HASTI'LE and *X. arborea*, natives of New Holland, yield resinous substances. That obtained from the first species somewhat resembles gamboge, and is called yellow gum [resin] of New Holland. It has been described by Mr. Kite (*Essays and Observ.*), who used it in several diseases. More recently Dr. Fish (Dierbach, *Neuesten Entd. in d. Mat. Med.* from the *Boston Journ.* vol. x.) has used it in the form of tincture, with opium, in *fluxus hepaticus* and diarrhœa. Mr. Johnston (*Phil. Trans.* for 1839,) says, this resin contains more oxygen than any other resinous substance hitherto analysed. Its composition is  $C^{40} H^{20} O^{12}$ . A red resin, probably from *X. arborea* has been recently imported under the name of black-boy gum.

9. The young shoots of ASP'ARAGUS OFFICINA'LIS are well-known articles of food. They are diuretic, and communicate a peculiar odour to the urine. *Asparamide* (formerly called *asparagin*) is contained in this plant. Its composition is  $C^8 H^6 N O^5 + NH^3$ .

10. DRAC'ENA DRA'CO (fig. 143), a native of the Canary Islands and of the East Indies, yields a substance called Dragon's blood. One of these trees growing at Orotava had long been celebrated for its great size and age. Next to the Baobab trees (*Adansonia digitata*), it is regarded as one of the oldest inhabitants of the earth. (Humboldt, *Tabl. de la Nature*.)

FIG. 143.



Drac'ena Draco.

#### ORDER XIII.—SMILACEÆ, Lindl.—THE SMILAX TRIBE.

ESSENTIAL CHARACTER.—Flowers hermaphrodite or diœcious. *Calyx* and *corolla* confounded, inferior six-parted. *Stamens* six, inserted into the perianth near the base; seldom hypogynous. *Ovary* three-celled, the cells one, or many-seeded: *style* usually trifid; *stigmas* three. *Fruit* a roundish berry. *Albumen* between fleshy and cartilaginous; *embryo* usually distant from the hilum.—Herbaceous plants or under shrubs, with a tendency to climb. *Stems* woody. *Leaves* reticulated. (Lindley.)

PROPERTIES.—Those of Smilax are alone known.



## SMILAX, Linn.—SEVERAL SPECIES OF SMILAX YIELDING SARSAPARILLA.

*Smilax officinalis*, L.; and probably other species, E.; *Smilax Sarsaparilla*, D.

*Sex. Syst.* Dicoecia, Hexandria.

(*Radix dicta Sarza seu Sarsaparilla*.)

(*Sarsaparilla*, U. S.)

**HISTORY.**—Sarsaparilla first appeared in Europe in 1530, and was employed as an antivenereal remedy. (Voigtel, *Mat. Med.* Bd. i. S. 117.) The Spanish term *Zarzaparilla* (from *zarza* a bramble, and *parilla* a vine) signifies a thorny vine.

**BOTANY. Gen. Char.**—*Dicoecious. Perianth* six-parted, nearly equal, spreading. *Male Flowers: stamens* six; *anthers* erect. *Female Flowers: perianth* permanent; *ovary* three-celled, the cells one-seeded; *style* very short; *stigmas* three. *Berry* one to three-seeded. *Seeds* roundish; *albumen* cartilaginous; *embryo* remote from the hilum. (R. Brown, *Prodromus*, p. 293.)

**Species.**—The following species yield at least part of the sarsaparilla of commerce:

1. *Smilax officinalis*, Kunth, L. E.—*Stem* twining, shrubby, prickly, quadrangular, smooth; the young shoots are unarmed, and almost round. *Leaves* ovate-oblong, acute, cordate, netted, five to seven-nerved, coriaceous, smooth, a foot long, and four to five inches broad; the young ones are narrow, oblong, acuminate, and three-nerved. *Petioles* smooth, an inch long, bearing two tendrils above the base. *Flowers and fruit* unknown.—Grows in New Granada, on the banks of the Magdalena, near Bajorque. This is called *Zarzaparilla* by the natives, who transmit large quantities to Carthage and Mompos; whence it is shipped for Jamaica and Spain. (Humb. *Nov. Gen. et Spec.* i. p. 215.) It is probably the source of *Jamaica*, and perhaps also of *Lima* and *Honduras sarsaparillas*.

2. *Smilax medica*, Schlecht.—*Stem* angular, armed at the joints with straight prickles, with a few hooked ones in the intervals. *Leaves* shortly acuminate, smooth, five to seven-nerved; inferior ones, cordate, auriculate-hastate; upper ones cordate-ovate. *Peduncle* axillary, smooth, about an inch long. *Inflorescence* an eight to twelve-flowered umbel. *Fruit* red, size of a small cherry; contains one to three reddish-brown seeds. *Embryo* cylindrical, lodged in horny albumen.—(T. F. L. Nees, *Pl. Med. Suppl.*) Schiede found it on the Eastern slope of the Mexican Andes. It is carried from the villages of Papantla, Taspan, Nautla, Misantla, &c. to Vera Cruz, under the name of *Zarzaparilla*, and is there introduced into the European market. The roots are gathered all the year long, dried in the sun, and then tied in bundles for sale. (*Linnaea*, iv. 576, quoted from Lindley's *Fl. Med.*) This species yields *Vera Cruz sarsaparilla*.

3. *Smilax siphilitica*, Willd.—*Stem* round, strong, with two to four straight prickles at the knots. *Tendrils* long, attached to the apex of the stipules. *Leaves* oblong-lanceolate, three-nerved, coriaceous, smooth, and shining.—Humboldt and Bonpland discovered it in New Granada, on the river Cassiquiare, between Mandavala and San Francisco Solano. (*Nova Gen. et Sp. Plant.* t. i. 271.) Von Martius (*Reise in Brasilien*, Bd. iii.) found it in the Brazils at Yupará and Rio Negro. It yields *Brazilian sarsaparilla*.

4. *Smilax Sarsaparilla*, Linn, D.—*Stem* prickly, somewhat quadrangular. *Leaves* ovate-lanceolate, cuspidate, almost five-nerved, beneath glaucous (*Willdenow*). It is a native of Virginia, and other southern states of the American union. There is no evidence that it yields any of the sarsaparilla of the shops. Yet Th. Martius (*Pharmakognosie*) ascribes the Vera Cruz variety, which, he says, sometimes comes over under the name of American sarsaparilla, to it.

**DESCRIPTION.**—The roots of the preceding, and perhaps of other species, constitute the *Sarsaparilla* or *Sarza* of the shops. These are imported, made up in bundles, formed either of the spirally folded roots (*sarsaparilla rotunda*),



as in the Jamaica and Lima varieties, or of unfolded parallel roots (*sarsaparilla longa*), as in the Brazilian variety. Attached to the roots are, in some varieties (as the Lima and Vera Cruz kinds), portions of the rhizome and aerial stem; these constitute what druggists call the *chump*. On the aerial stem are frequently found the *aculei* or *prickles*.

The roots are usually several feet long, about the thickness of a writing quill, wrinkled more or less longitudinally, with root-fibres in greater or less abundance attached to them. Their colour varies, being more or less red or brown, frequently with a grayish tint. Greater or less care in drying, time of year when collected, soil, and many other circumstances, doubtless modify the colour. The taste of the root is mucilaginous, and slightly acrid. The acidity is only perceived after chewing the root for a few minutes. The odour is somewhat earthy.

The radix or runners are composed of two parts, the *cortex* and *medullium*. (See figs. 144 and 145.) The *cortex* consists of—1st, the *cuticle* or *epidermis*; 2dly, a layer of elongated cellular tissue, which I shall call the *subcuticular tissue*; 3dly, a layer of *hexagonal cellular tissue*. The last-mentioned layer is red in Jamaica sarsaparilla: but in the Honduras variety it is thick, white, and amylaceous. The *medullium* consists of—1st, a ring of elongated cellular tissue analogous to the subcuticular tissue; 2dly, a *woody zone*, composed principally of reticulated ducts; 3dly, a central tissue analogous to *medulla* or *pith*, consisting of hexagonal cellular tissue, which frequently abounds in starch. The apertures seen in the woody zone, on a transverse section of the root, are the cut extremities of ducts. In structure, then, sarsaparilla root much resembles an exogenous stem, except that it has no medullary rays. The starch globules are small, and are frequently united in masses of three or four; when of four, the masses have a tetrahedral form.

QUALITY.—It is not easy to lay down criteria of the goodness of sarsaparilla; for, on the one hand, in the absence of a correct knowledge of the active principle of this root, we have no chemical tests on which we can rely; and, on the other hand, the immediate and obvious effects of sarsaparilla are so slight that we are unable to ascertain by experience the relative value of different samples. In the drug trade, Jamaica sarsaparilla is esteemed the best; but though I do not doubt the correctness of this opinion, I confess I am unacquainted with any accurate comparative experiments on which it is founded.

The *colour* of the root is not to be absolutely depended on; but roots having a deep orange-red tint are preferred. *Taste* perhaps is the best criterion: the more acrid and nauseous the taste, the better is the quality of the root. This test has been much insisted on by Dr. Hancock. (*Trans. Med.-Bot. Soc.* 1829.) Many druggists prefer *mealy* sarsaparilla, that is, sarsaparilla whose cortex is brittle and powdery, and which, on being fractured transversely, throws out a white dust. But this quality, which is so obvious in Honduras sarsaparilla, depends on the presence of starch; and, instead of being a test of goodness, is to be regarded as the reverse. The *quantity of extract* yielded by a given weight of the root has been much depended on by Mr. Battley and Mr. Pope as a test of goodness; both these writers have asserted the superiority of Jamaica sarsaparilla, because it yields a larger quantity of extract. But though a sarsaparilla which yields very little extract cannot be regarded as good, yet it does not follow, especially in the absence of comparative trials, that a sarsaparilla which yields the most abundant extract is necessarily the best, since the quantity may arise from the presence of mucilage and other inert matters. The *beard* is another criterion of goodness: the greater the quantity of root fibres (technically called *beard*) the better the sarsaparilla.

1. *Jamaica Sarsaparilla*, offic.; *Red-bearded Sarsaparilla* (*Radix Sarzæ jamaicensis*). The roots are folded and made up in bundles (*sarsaparilla rotunda*) of about a foot or half a yard long, and four or five inches broad. These



bundles are neither trimmed nor closely packed. They consist of long, slender runners, furnished with numerous small fibrous rootlets (called the *beard*). Its cortex is brownish, but with an orange-red tint, which distinguishes it from

FIG. 144.



Magnified view of a section of Jamaica Sarsaparilla.

- a. Cuticle.  
 b. Subcuticular tissue.  
 c. Hexagonal cellular tissue.  
 d. Cellular ring.  
 e. Woolly zone.  
 f. Medulla.

other kinds of sarsaparilla, and has given rise to its name of *red sarsaparilla*. The cortex is reddish, and when examined by the microscope is found to contain some starch globules. The medullium has frequently a reddish tint. When chewed, Jamaica sarsaparilla tinges the saliva. Its taste is not remarkably mucilaginous, but slightly bitter, and after a few minutes slightly acrimonious. Its decoction is deepened in colour by a solution of iodine; but no blue is perceptible. Its powder is pale reddish brown, and when rubbed with water and tincture of iodine becomes blue, but less intensely so than the powder of the Honduras variety. It yields a larger quantity of extract than the other varieties: its extract is perfectly soluble in cold water. From three pounds of average quality about one pound of extract may be obtained (Hennell; also Battley); but from the same quantity of root of very fine quality, nearly one pound and a quarter of extract may be procured (Hennell). 874 grains of the cortical portion of the root yielded 484 grains of extract (Battley). According to Mr. Pope, the cortex yields five times as much as the medullium.

Jamaica sarsaparilla is not the produce of the island whose name it bears, but, as I am informed, of the Mosquito shore on the eastern coast of Honduras and of St. Juan, from whence it is brought to England by way of Jamaica. Occasionally it is brought from Guatemala.

In the collection of Materia Medica at Apothecaries' Hall, London, is a sample of sarsaparilla grown in Jamaica. Its colour is pale cinnamon brown. Internally it is mealy. Jamaica sarsaparilla is perhaps the root of *Smilax officinalis*.

2. *Brazilian Sarsaparilla: Lisbon, Portugal, or Rio Negro Sarsaparilla (Radix Sarsæ braziliensis)*. This is usually exported from Maranhão. It is brought over unfolded, tied in cylindrical bundles (*sarsaparilla longa*) of from three to five feet long, and about a foot in diameter. It is free from *chump*. It has fewer longitudinal wrinkles than the Jamaica kind, fewer radicles, especially at one end; has a reddish-brown colour, and abounds in amylaceous matter, both in the cortex and pith. Its decoction is much paler coloured than the Jamaica variety.

Martius (*Reise*, Bd. iii. S. 1280) says it is the produce of *Smilax siphilitica*, and is gathered all the year round. After being dried over a fire, the roots are tied up in bundles with a flexible stem called *Timbotitica*; and to prevent them being worm-eaten, they are preserved in the gables of the houses, where they are exposed to smoke. Dr. Hancock (*Trans. Med.-Bot. Soc.* 1829) has denied that the "Rio Negro Sarsa" is the produce of *S. siphilitica*, because he found no auxiliary spines on a portion of stem adhering to the roots, and Dr. Lindley (*Fl. Medica*, p. 597) has admitted the correctness of the inference. But until we know the extent of stem examined, we are not authorised, I conceive, to adopt Dr. Hancock's conclusion; for in the same bale of apparently the same kind of sarsaparilla, we frequently find portions of stem (not exceeding three or four inches in length), some of which have prickles, others are without them, and there is not the least ground for supposing them to have been procured from different species. Professor Guibourt, who has described (*Hist. des Drog.* i. 578) a second kind of Caraccas sarsaparilla as devoid of prickles, tells me that he has since met with them in other samples of the same kind of sarsaparilla.



3. *Lima Sarsaparilla* (*Radix Sarzæ de Limâ*). Originally imported from Lima, but is now frequently brought from Valparaiso, and sometimes from Costa Rica. I know of one importation of 99,000 lbs. from the latter place. It has a close resemblance to Jamaica sarsaparilla, for which I am told it is extensively sold, but it yields a smaller quantity of extract. It is imported folded (*sarsaparilla rotunda*) in bundles of about three feet long, and nine inches in diameter, with the attached *chump* contained in the interior of the bundle. Its colour is brown or grayish brown. Occasionally a few roots are found in the bale of good Lima sarsaparilla, which, as well as their rhizome and stem, are light clay-coloured. The stems are square and prickly; the prickles are few and small, except in the clay-coloured variety. It is probably the produce of *Smilax officinatis*.

Occasionally a knobby root, (*rhizome?*) like the *radix Chinæ*, with a round stem, and long, smooth, wiry, brown root-fibres, is found in a bale of Lima sarsaparilla. A transverse section of the stem presents, to the naked eye, a structure somewhat similar to the common cane. I have received the same root (under the name of *Salsepareille-Squine de Macaraiibo*) from Professor Guibourt, who found it in Caraccas sarsaparilla.

4. *Honduras Sarsaparilla; Mealy Sarsaparilla* (*Radix Sarzæ de Honduras*). Is imported from Belize and other parts of the Bay of Honduras. The roots are folded and formed into bundles (*sarsaparilla rotunda*), two or three feet long, in the interior of which are found roots of inferior quality, stones, clumps of wood, &c. The roots or runners are furnished with but few rootlets. The colour is dirty or grayish brown. The cortex consists of a thin epidermis, within which is a thick, white, amylaceous layer, which gives to this variety its remarkable *mealy* appearance when broken. This cortical portion readily cracks transversely, and shells off, leaving the medullium, which is thinner than in the Jamaica kind. The taste of the root is amylaceous, and ultimately somewhat acrid. Its decoction becomes intensely blue by the addition of a solution of iodine. Its powder is fawn-coloured, and when rubbed with water and tincture of iodine, becomes intensely bluish black. From five pounds of the root of fine quality about one pound of extract may be produced (Hennell). A sample, examined by Mr. Battley, yielded six and a half ounces of extract from three pounds of root, which is about ten and a half ounces from five pounds: 874 grains of the cortical portion of the root yielded 230 grains of extract (Battley). In one operation, in the laboratory of a friend of mine, 170 lbs. of root yielded 45 lbs. of extract. According to Mr. Pope, the cortex yields twice as much extract as the medullium.

5. *Vera Cruz Sarsaparilla* (*Radix Sarzæ de Vera-Cruz*). This is occasionally imported from Vera Cruz, but is seldom met with in the drug market. The roots are unfolded (*sarsaparilla longa*) and have the *chump* attached. They are thin, tough, of a light grayish brown colour, and devoid of starch in the cortex. Mr. Pope terms this variety, "lean, dark, and fibrous." The roots or runners give off very few rootlets. It yields a deep-coloured decoction, which is unchanged by a solution of iodine.

Vera Cruz sarsaparilla is the produce of *Smilax medica*.

I have received from Professor Guibourt the following kinds of sarsaparilla.

1. *Caraccas Sarsaparilla*, Guib. (*Hist. des Drog.* t. ii. p. 577.) Of this there are two kinds, both of which have portions of the rhizome and aerial stem attached to them. One kind (*la*

FIG. 145.



Magnified view of a section of Honduras Sarsaparilla.

This and the preceding woodcut are from drawings made by Mr. Letheby. The letters refer to the same parts as those of fig. 144.

The hexagonal cellular tissue(c)abounds in starch.



*première sorte* (*op. cit.*) occasionally presents spines on the aerial stem. The other (*la seconde sorte*) (*op. cit.*) comes from Macaraibo (Maracaibo?). Professor Guibourt tells me he found, about three years ago, a bale of this second kind, one half of which was made up of the root above referred to, which he calls *Salsepareille-Squine de Macaraibo*, and which he thinks ought rather to be regarded as a *China root* (*Squine*, Fr.) than a sarsaparilla.

Caraccas sarsaparilla has considerable resemblance to the Lima sarsaparilla of English commerce.

2. *Peruvian Sarsaparilla*, Guib. (MS.) "The tuberosities possess a yellow colouring principle, and the stems are rather spongy than ligneous." This kind also appears to me to be closely allied to, if not identical with, Lima sarsaparilla.

3. *Brazilian, called Portugal, Sarsaparilla*, Guib. (*Hist. des Drog.* t. i. p. 578.) Accompanying this is a portion of the stem of some monocotyledonous plant (*Timbotitica*) used in tying the roots in bundles. The sample sent me by Professor Guibourt has some resemblance to what I have above called *Vera Cruz Sarsaparilla*; but the quantity is too small to draw any accurate conclusion from it.

4. *Brazilian Sarsaparilla en Souches*, Guib. (MS.) This, I think, is identical with our *Vera Cruz sarsaparilla*. "I thought at first," says Professor Guibourt, "that it came from the Brazils, because it appeared to me identical with that which constitutes the sarsaparilla called Portugal. But a druggist tells me he has received it wholly under the name of *Tampico Sarsaparilla*."

5. *Mexican, called Honduras, Sarsaparilla*, Guib. (*op. cit.* t. ii. p. 574.) This is not the Honduras sarsaparilla of English druggists. Its colour is paler and yellowish. The roots are more shrivelled, the cortical part is tougher; and, when broken, does not give out a white dust, in consequence of being deficient in the white amylaceous layer which is so abundant in the Honduras variety of our commerce.

The sarsaparilla which Guibourt (MS.) regards as the washed Honduras kind (*Salsepareille Honduras lavée?* Guib.) appears to me to be a distinct species.

6. *Jamaica Sarsaparilla*, Guib. (*op. cit.* p. 515.) This is not Jamaica sarsaparilla of English druggists. It appears to me to be very similar to the *Salsepareille Honduras lavée*, Guib. Both kinds have a roseate amylaceous cortex.

7. *Woody Sarsaparilla*, Guib. (*op. cit.* p. 576.)

8. *Unknown Sarsaparilla*, Guib. (MS.) "It approaches Caraccas sarsaparilla."

COMPOSITION.—Sarsaparilla was analyzed by Cannobio; (*Brugnatelli, Giornale di Fisica*, &c. Dec. 2, vol. i. p. 421, 1818,) by Pfaff; (*Syst. de Mat. Med.* Bd. vii. S. 90, 1824,) by Batka; (*Journ. de Pharm.* t. xx. p. 43, 1834.) and by Thubeuf. (*Journ. de Pharm.* t. xx. 682, 1834.)

Cannobio's Analysis.	Pfaff's Analysis.	Batka's Analysis.	Thubeuf's Analysis.
Bitter acid resin . . . 2.8	Balsamic resin . . . . . 2.0	1. A crystalline matter ( <i>parallic acid</i> )	1. A crystalline substance ( <i>salseparine</i> )
Gummy extractive . . 5.5	Acrid extractive . . . 2.5	2. A colouring crystalline matter	2. A colouring matter
Starch . . . . . 54.2	Extractive similar to cinchona . . . . . 3.7	3. An essential oil	3. A resinous matter
Woody fibre . . . . . 27.8	Common extractive . . 9.4	4. Gum	4. Ligneous matter
Loss . . . . . 9.7	Gummy extractive . . 1.4	5. Bassorin	5. Starch
Sarsaparilla [Honduras?] . . . . . 100.0	Starch . . . . . trace	6. Starch	6. Chloride potassium
	Albumen . . . . . 2.2	7. Albumen	7. Nitrate potash
	Woody fibre . . . . . 75.0	8. Extractiform matter	8. Fixed aromatic thick oil
	Moisture . . . . . 3.0	9. Gluten and gliadine	9. Waxy substance
	Loss . . . . . 0.8	10. Fibrous and cellular tissue	
	Sarsaparilla [Vera Cruz] . . . . . 100.0	11. Lactic acid	Sarsaparilla.
		12. Acetic acid	
		13. Salts—namely, chlorides of calcium, potassium, and magnesium, carbonate of lime, oxide of iron, and alumina.	
		Sarsaparilla.	

1. OIL OF SARSAPARILLA.—Berzelius (*Traité de Chim.* t. vi. p. 211.) states that 100 lbs. of the root yield about 3j. of volatile oil; but there must be some error in this statement.

The following experiments were made by a friend, a manufacturing chemist, who gave me the products for examination. 140 lbs. of Jamaica sarsaparilla were distilled, by steam heat, at twice, with 220 gallons of water. 50 gallons of a milky liquor were obtained, which were again submitted to distillation until 20 gallons had passed over. 20 lbs. of common salt were added to the distilled product, and heat being applied, 3 gallons were drawn over. The liquor



was milky, held in solution carbonate of ammonia, and contained a few drops of a volatile oil, which was heavier than water, was soluble in rectified spirit, and had the odour and acrid taste of sarsaparilla. 100 lbs. of Jamaica sarsaparilla were distilled with 100 gallons of water. The distilled liquor was acid, and formed a white precipitate with solutions of acetate of lead. It was re-distilled: the liquor that first passed over was not ammoniacal, but towards the end of the process became so.

2. SMILACIN.—Discovered in 1824 by Palotta, (*Journ. de Pharm.* x. 543,) who termed it *pariglin*. Folchi, about the same time, also procured it, and gave it the name of *smilacin*. Thubeuf, in 1831, called it *salseparin*. In 1833, Batka announced that the active principle of this root was an acid, which he termed *parallinic acid*. Lastly in 1834, Poggiale (*Journ. de Chim. Méd.* x. 577,) showed the identity of these different substances.

It is procured by decolorizing a concentrated hot alcoholic tincture of sarsaparilla by animal charcoal. The tincture deposits, on cooling, impure smilacin, which may be purified by repeated solution and crystallization. Soubeiran (*Nouv. Traité de Pharm.* ii. 166,) has proposed a more economical process.

It has been frequently asserted that the active principle of sarsaparilla resides in the cortical portion only of the root; but Poggiale asserts that the medullium is not inert.

Smilacin is a white, crystallizable, odourless, and, in the anhydrous state, almost tasteless substance; very slightly soluble in cold water, more so in boiling water, and depositing from the latter by cooling. Its solution has the bitter acrid taste of sarsaparilla, and froths on agitation. It is soluble in alcohol, ether, and oils. It does not combine with acids to form salts. Strong sulphuric acid colours it red, then violet, and lastly yellow. It dissolves in cold and pure hydrochloric acid; the solution becomes red and afterwards gelatinous, when heated. It is soluble in strong nitric acid: if the solution be heated, nitrous gas escapes; and by evaporation a solid residuum is obtained, which is soluble in boiling water, from which it precipitates in white flocks, as the liquid cools.

Smilacin is closely allied to, if it be not identical with, saponin. Now, as the latter is readily converted into an acid (*esculic acid*), so probably is the former: hence, perhaps, the parallinic acid of Batka may not be absolutely identical with smilacin, but bear the same relation to it that esculic acid does to saponin.

Smilacin has the following composition:

	Poggiale. (Mean of 12 analyses)	Henry.	Petersen.
Carbon.....	62.53	62.64	62.60
Hydrogen.....	8.07	9.76	9.14
Oxygen.....	28.80	27.40	28.06
Anhydrous Smilacin..	100.00	100.00	[Parillina] 100.00

Poggiale gives the following formula for its atomic constitution,  $C^8 H^7 O^3$ ; while O. Henry (*Journ. de Pharm.* xx. 682,) assumes  $C^9 H^9 O^3$ , and Petersen (*Thomson, Org. Chem.* 279,)  $C^9 H^8 O^3$ . As no definite compound of smilacin has been obtained, these formulæ are of little value. Thubeuf says that hydrated [crystallized] smilacin contains 8.56 water.

Cellier (*Journ. de Chim. Méd.* t. i. p. 45, Seconde Sér.) gave it to nine syphilitic patients. In doses of six grains the stomach readily supported it; but nine grains caused weight at the stomach and nausea. It appeared to relieve the patients' symptoms, and in one case, seemed to effect a cure. According to Palotta, pariglin, in doses of from two to thirteen grains, acts as a debilitant, reducing the circulation, sometimes producing constriction of the œsophagus, and exciting nausea and diaphoresis. He thinks it might be useful in chronic rheumatism, skin diseases, &c.

3. STARCH.—The large quantity of starch found in Honduras sarsaparilla must render this variety nutritive. In the Jamaica and Vera Cruz varieties the quantity is very small.

4. RESIN AND EXTRACTIVE.—These principles require further examination. On them probably depends a part, at least, of the medicinal properties of sarsaparilla.

CHEMICAL CHARACTERISTICS.—A decoction of sarsaparilla froths greatly when shaken. It scarcely, if at all, reddens litmus. Diacetate of lead, and protonitrate of mercury, cause precipitates. Alkalis deepen the colour of the decoction. Solution of iodine forms a copious blue precipitate (*iodide of starch*) in the decoction of both Honduras and Lisbon sarsaparilla. Sesquichloride of iron slightly deepens the decoction (in different degrees in different specimens), and in some cases causes a flocculent precipitate, which subsides slowly. A strong decoction of Honduras sarsaparilla forms a copious precipitate (*starch*) on the addition of alcohol.

COMMERCE.—The following are the quantities of sarsaparilla on which duty (sixpence per lb.) was paid for the last six years, (*Trade List* for 1835-6-7-8-9 and 40.)



For 1835 .....	125,413 lbs.	For 1837 .....	101,298 lbs.	For 1839 .....	117,522 lbs.
1836 .....	125,140	1838 .....	121,888	1840 .....	121,814

The countries from which sarsaparilla was imported in 1831 are thus stated in a parliamentary return: (*statements of the imports and exports for 1831*).

Portugal .....	16,110 lbs.
Italy and the Italian Islands .....	107
British Northern Colonies .....	71
British West Indies .....	45,063
United States of America .....	29,122
Mexico .....	43,254
Guatemala .....	14
Brazil .....	31,972
Peru .....	11,141
Total import .....	176,854
Retained for home consumption .....	107,410

PHYSIOLOGICAL EFFECTS. *a. On Vegetables.*—Not ascertained.

*β. On Animals.*—Not ascertained.

*γ. On Man.*—Imperfectly determined; no experiments having been made to ascertain its physiological effects.

To the taste, sarsaparilla is slightly acrid, and somewhat nauseous. Diaphoresis is by far the most common effect of its internal use. When the skin is kept cool, diuresis is not unusual. But in estimating the diaphoretic or diuretic power of sarsaparilla, we must take into consideration the amount of liquid in which the medicine is usually taken, and the other medicines which are frequently conjoined with it: for in many instances the diaphoresis or diuresis is referrible rather to these than to sarsaparilla.

In several cases I have given the powder of this root in very large doses, in order to ascertain its effects. Nausea, vomiting, and temporary loss of appetite, were alone observed.

Dr. Hancock (*Trans. Med. Bot. Soc.* 1829,) says, that on one patient, an African, an infusion of four ounces of Rio Negro sarsa acted as a narcotic, producing nausea, great prostration of strength, torpor, and unwillingness to move. The pulse was scarcely altered, unless it were a little retarded. Though the effects here stated agree, to a certain extent, with those ascribed to smilacin, they cannot be regarded as the ordinary effects of this root.

In some conditions of system, especially those of a cachetic kind, sarsaparilla acts as a powerful and valuable alterative tonic. Its continued use is often attended with improvement of appetite and digestion, augmentation of strength, increase of flesh, the production of a more healthy tone of mind, and the palliation, or, in some cases, complete disappearance of various morbid symptoms—as eruptions, ulcerations, pains of a rheumatic character, &c. Sarsaparilla differs in several respects from the bitter vegetable tonics. Though it is not devoid of, yet it does not, as they do, abound in a bitter principle. It is not adapted for the cure of intermittents, or of simple debility. But its best effects are seen in those depraved conditions of system which the public, and even some medical men, ascribe to the presence of a morbid poison, or to a deranged condition of the fluids. Hence it is frequently denominated *a purifier of the blood*. Those who do not adopt the pathological notion here referred to, call it an *alterative*.

Those varieties of sarsaparilla which abound in starch (as the *Honduras* kind) possess demulcent and nutritive properties.

Uses.—By many practitioners sarsaparilla is considered to possess no remedial properties; by others it is regarded as a medicine of great efficacy. Considering that more than 100,000 lbs. of it are annually consumed in this country, the number of those who entertain the latter opinion cannot be small. It has been justly remarked by Mr. Lawrence, (*Lect. on Surg.* in the *Lond. Med. Gaz.* vol. v. p. 770,) that physicians have no confidence in it, and surgeons a great deal. I think that this fact is readily explained by the circumstance,



that physicians are much less frequently called in to prescribe for those forms of disease, in the treatment of which, surgeons have found sarsaparilla so efficacious.

Many practitioners have doubted or denied its remedial activity on what, it must be admitted, are very plausible grounds; viz. that the root possesses very little taste and no smell; that by the ordinary mode of using it, it produces very slight, if any, obvious effects on the animal economy; and that it has failed in their hands to relieve or cure diseases in which others have asserted they found it effectual. They are, therefore, disposed to refer any improvement of a patient's health, under the long-continued use of sarsaparilla, either to natural changes in the constitution, or to the influence of remedial means with which the sarsaparilla was conjoined. But I would observe, that hitherto no experiments had been made to ascertain what effects the long-continued employment of sarsaparilla may give rise to in the system of a healthy man, and we are not warranted in assuming that none would result because none are observable from the employment of a few doses. Moreover, it is to be remembered that some of our most powerful poisons prove the most efficacious remedies, when given in such small doses that they excite no other obvious effect on the system than the removal of morbid symptoms. Witness the beneficial influence of the minute doses of arsenious acid in lepra. Furthermore, no one has ascribed to sarsaparilla the power of a specific, and its warmest advocates admit its occasional failure. But so often has it been found, that various diseases, which had resisted all other tried remedial means, and were gradually increasing, became stationary, and afterwards subsided, under the use of sarsaparilla, that a large majority of British surgeons, including the most eminent of the present day, have been compelled to admit its therapeutic power.

As no obvious relationship exists between its known physiological effects and its apparent therapeutic agency, an argument has been raised against its medicinal activity, on the ground that we cannot explain its *methodus medendi*; but, for the same reason, we might refuse to admit the power of cinchona to cure ague. "Mr. Lawrence (*op. cit.* p. 769,) justly observes, that, although we cannot point out the manner in which a remedy "operates, we are not, on that account, to withhold our confidence in its power. It is enough for us, in medical science, to know that certain effects take place. In point of fact, we are in many cases unable to distinguish the *modus operandi* of medicines—the manner in which their influence is produced." The most plausible explanation of the agency of alterative medicines is that offered by Müller, (*Physiology*, vol. i. pp. 56 and 363,) and which I have before had occasion to notice, (vol. i. p. 121). It assumes that these remedies cause changes in the nutritive fluids (the chyle and blood), and thereby produce slight chemical alterations in organs morbidly changed in composition, by which already existing affinities are annulled, new ones induced, and the vital principle enabled to effect the further restoration and cure. This hypothesis may be used to explain the remedial influence of sarsaparilla.

Sarsaparilla has been found especially serviceable in the following maladies:

1. *In inveterate venereal disease.*—It is beneficial principally when the malady is of long continuance, and the constitution is enfeebled and emaciated, either by the repeated attacks of the disease, or by the use of mercury. In such cases it is, as Sir William Fordyce (*Med. Obs. and Inq.* vol. i. p. 169,) correctly observed, "the great restorer of appetite, flesh, colour, strength, and vigour." When the disease resists, or is aggravated, by the use of mercury, sarsaparilla evinces its most salutary powers. It is given to relieve venereal pains of a rheumatic character; to remove venereal eruptions; to promote the healing of ulcers of the throat; and to assist in the cure when the bones are affected. In recent chancre, or bubo, it is of little use; nor does it appear to possess the least power of preventing secondary symptoms. We cannot ascribe



it to "the same anti-syphilitic properties—that is, the same power of arresting or curing the venereal disease—that experience warrants us in attributing to mercury."<sup>1</sup> Sarsaparilla is sometimes given alone, but more frequently with other remedies: as with stimulating diaphoretics (mezereon, sassafras, and guaiacum), or with mercurials in small or alterative doses, or with acids (especially the nitric), or with alkaline substances (as potash or lime), or with the bitter tonics. It is difficult to lay down concise rules to guide us in the selection of these adjuncts. In venereal pains and eruptions, sudorifics, the copious use of warm diluents and warm clothing, are especially applicable, and should be conjoined with sarsaparilla. In scrofulous constitutions, with enlarged glands, it will be for the most part advisable to avoid the use of mercury. In such I have seen the alkalis most serviceable. When extreme debility is present, the bitter tonics and nitric acid are often added to sarsaparilla with benefit.

2. *In chronic rheumatism* sarsaparilla is often advantageously conjoined with powerful sudorifics and anodynes (as opium or hyoscyamus), especially when any suspicion exists as to the venereal origin of the disease.

3. *In obstinate skin diseases* benefit is frequently obtained by the use of sarsaparilla. Its employment is not confined to cutaneous affections of one particular elementary form, since it is given with good effect in papular, vesicular, pustular, and tubercular skin diseases, of a chronic kind, when they occur in enfeebled and emaciated constitutions. Though, in these cases, its value principally depends on its tonic and alterative effects, its diaphoretic operation is to be encouraged by the use of diluents, warm clothing, &c.

4. *In cachectic conditions of the system generally*, sarsaparilla may be given, often with the best effects, and never with any ill consequences, save that of occasionally producing slight nausea. Indeed, one of the great advantages of sarsaparilla over many other alteratives and tonics, is, that although it may fail in doing good, it never does any harm beyond that of now and then causing slight disorder of stomach. In chronic abscesses, attended with profuse discharge, diseases of the bones, obstinate ulcers, chronic pulmonary affections accompanied with great wasting of the body, enlarged glands, and various other maladies connected with a depraved state of the system, sarsaparilla is often a very useful medicine.

ADMINISTRATION.—Sarsaparilla is administered in substance, and in the form of infusion, decoction, extract, and syrup.

1. **PULVIS SARZÆ; Powdered Sarsaparilla.**—The ordinary dose of this is from half a drachm to one or two drachms. Half an ounce frequently nauseates, and in some cases gives rise to vomiting. Powder of Jamaica sarsaparilla is to be preferred to that of other varieties. It is redder than that of the Honduras kind, and produces a much less intense blue colour when rubbed with water and tincture of iodine. I have been informed that some druggists employ, in the preparation of the powder, the roots from which the extract has been prepared. This fraud may be detected by the powder being almost devoid of taste, macerating it in water, and carefully comparing the infusion with one prepared from an unadulterated sample.

2. **INFUSUM SARSAPARILLÆ COMPOSITUM, D. Compound Infusion of Sarsaparilla.**—(Sarsaparilla root previously cleansed with cold water and sliced, ℥j.; Lime Water, Oj. [*wine measure*]. Macerate for twelve hours in a covered vessel, with occasional agitation, and strain.)—According to Mr. Battley (*Lond. Med. Rep.* xix. 169.) lime water is not so good a solvent for the constituents of sarsaparilla root as distilled water: for 874 grains of the root lost only 140 grains by maceration in lime water; whereas the same quantity of root lost 175

<sup>1</sup> Lawrence, *op. cit.* p. 769; see also Mr. Pearson's *Observations on the Effects of Various Articles of the Materia Medica in the cure of Lues Venerea*, p. 30, 1800.



grains in distilled water. The dose of his infusion is from ℥iv. to ℥vj. two or three times a day.

3. INFUSUM SARSAPARILLÆ, (U. S.) Take Sarsaparilla, bruised, an ounce; Boiling Water, a pint. Digest for two hours in a covered vessel and strain, or by displacement.]

4. DECOCTUM SARZÆ, L. E. *Decoction Sarsaparilla*, D.; *Decoction of Sarsaparilla*.—(Sarza, sliced [in chips, E.; and cleansed with cold water, D.], ℥v. [℥iv. D.]; Boiling water, Oiv. [wine measure, D.] Macerate for four hours, in a vessel lightly covered, near the fire, then take out and bruise the sarsaparilla. When bruised return it to the liquor, and again macerate in the same manner for two hours; afterwards boil down to two pints, and strain.)—An objection has been taken to this, as well as to all preparations of sarsaparilla made by boiling, that the heat employed volatilizes or decomposes the active principle of the root. “An infusion of sarsaparilla,” says Soubeiran, (*Nouv. Traité de Pharm.* t. ii. p. 168.) “which is odorous and sapid, loses both its odour and taste by boiling for a few minutes: these changes speak but little in favour of the decoction. On the other hand, it is known that the fibrous parts of vegetables always give less soluble matters to water, when treated by decoction; and if it be added, that sarsaparilla is completely exhausted by hot water, I cannot see what advantages the decoction can possess over preparations made by other methods.” Without denying the injurious effects of long boiling, and, therefore, the superiority of preparations made without it, I cannot admit that either the decoction or extract of sarsaparilla is inert. No objection, however, exists to the substitution of an *infusion* for a decoction. But it is advisable to employ a somewhat larger quantity of the root, and to have it crushed before macerating it. The proportions of root and water, in the above preparation, are such that one ounce of the decoction contains the extractive of one drachm only of the root. Hence the extract or syrup is usually conjoined. An infusion or decoction of Jamaica sarsaparilla produces little or no blue colour with tincture of iodine: whereas the corresponding preparations of Honduras sarsaparilla (the kind usually met with, cut in small split lengths, in the shops) becomes bluish black on the addition of a solution of iodine. The dose of *Decoction Sarzæ* is ℥iv. to ℥vij. three or four times daily.

5. DECOCTUM SARSÆ COMPOSITUM, L. E. *Decoction Sarsaparilla compositum*, D. (U. S.); *Compound Decoction of Sarsaparilla*.—(Decoction of Sarsaparilla, boiling hot, Oiv. [wine measure, D.]; Sassafras, sliced and bruised; Guaiacum wood shavings; Liquorice root, bruised, of each ℥x. (℥j. D.); Mezereon [bark of the root], ℥ij. [℥ss. E.] Boil for a quarter of an hour, and strain.)—[Take of Sarsaparilla, sliced and bruised, six ounces; Bark of Sassafras Root, sliced; Guaiacum wood, rasped; Liquorice root, bruised, each an ounce; Mezereon, sliced, three drachms; Water, four pints. Boil for a quarter of an hour, and strain.] This preparation is an imitation of the celebrated *Lisbon Diet Drink*. The objections made to the use of ebullition in preparing the simple decoction, apply equally to the present preparation. The additions are for the most part valueless. The guaiacum wood is useless, water not being able to dissolve the resin. The volatile oil contained in the sassafras-wood is in part dissipated by the boiling. The mezereon, an active agent, is used in such small quantity, that it can confer but little medicinal power. The liquorice is employed merely to communicate flavour. An improvement in the present formula would be to omit the guaiacum, to increase the quantity of sarsaparilla and mezereon, to substitute maceration for decoction, and to add oil of sassafras. The dose of the officinal preparation is from ℥iv. to ℥vj. three or four times a day. The syrup or extract is usually conjoined with it. During its use the skin should be kept warm.

6. SYRUPUS SARZÆ, L. E. *Syrupus Sarsaparilla*, D.; *Syrup of Sarsaparilla*.—(Sarza, sliced, ℥xv. [lb. j. D.]; Boiling Water, Cong. j. [wine measure,



D.]; Sugar, ℥xv. Macerate the sarsaparilla in the water for twenty-four hours; then boil down to four pints, and strain the liquor while hot; afterwards add the sugar, and evaporate to a proper consistence.)—Simonin (*Journ. de Pharm.* xx. 110) has successfully prepared the syrup by the percolation method.

This I conceive to be a very unnecessary preparation; for as Dr. A. T. Thomson (*Lond. Dispens.* 9th ed.) justly observes, "it can be much better and more easily supplied by rubbing up a few grains of the extract with some simple syrup." It is, however, frequently prescribed as an adjunct to the decoction. Prepared with Jamaica sarsaparilla it is not liable to ferment, and its flavour is somewhat disagreeable, being very analogous to that of West Indian molasses. Mr. Brande (*Dict. of Mat. Med.*) says, that the above syrup is not of sufficient strength to render it an effective form of sarsaparilla; and that it ought to be of such strength that one ounce is equal to a pint of the simple decoction: of this ℥ss. or ℥vi. may be taken two or three times a day, diluted with about two parts of water. A few drops of solution of potassa sometimes prevents its disagreement with the stomach.

The *Syrup of Sarsaparilla* of the United States Pharmacopœia is intended to represent the famous French *Sirap de Cuisinier*. It is prepared with proof spirit, which extracts the acrid principle of the root without taking up the inert fecula; and the tincture being evaporated, to get rid of the alcohol, is made into syrup. By this means the long-continued boiling is avoided. As the editors of the *United States Dispensatory* speak most confidently of the remedial value of this preparation, I subjoin the formula for its preparation, taken from the American Pharmacopœia:

*Syrup of Sarsaparilla*, U. S.—"Sarsaparilla, bruised, lb. ij.; Guaiacum wood, rasped, ℥ij.; Red Roses; Senna; Liquorice root, bruised, each, ℥ij.; Oil of Sassafras; Oil of Anise, each, Mv.; Oil of Partridge-berry [*Gualtheria procumbens*, an astringent aromatic] Mij.; Sugar, lb. viij.; Diluted Alcohol, Ox. [*wine measure*]. "Macerate the Sarsaparilla, Guaiacum wood, Roses, Senna, and Liquorice root, in the diluted Alcohol for fourteen days; then express and filter through paper. Evaporate the tincture, by means of a water-bath, to four pints and a half; then add the Sugar, and dissolve it, so as to form a syrup. With this, when cold, mix the Oils previously triturated with a small quantity of syrup." The dose is ℥ss. (equivalent to somewhat less than ℥j. of the root), taken three or four times a day.

[The last edition of the U. S. Pharmacopœia also directs the syrup to be made with the same ingredients, but substituting a sufficient quantity of water for alcohol. Using these ingredients, it orders to mix the sarsaparilla, guaiacum wood, roses, senna, and liquorice root, with three pints of water, and allow the mixture to stand for twenty-four hours. Then transfer the whole to an apparatus for displacement, and pour on water gradually until one gallon of filtered liquor is obtained. Evaporate this to four pints, then add the sugar, and proceed in the manner directed for syrup. Lastly, having rubbed the oils with a small portion of the syrup, mix them thoroughly with the remainder. This substitution was adopted at the recommendation of a committee of the Philadelphia College of Pharmacy, who state in their report, that it has not been done without due consideration, but after carefully preparing it both ways.—J. C.]

7. EXTRACTUM SARZÆ, L. *Extractum Sarsaparillæ*, D. *Extract of Sarsaparilla*. (Sarsaparilla, sliced, lb. iiss. [lb. j. D.]; Boiling [distilled, L.] Water, Cong. ij. [Cong. j. *wine measure*, D.] Macerate for twenty-four hours, then boil down to a gallon [four pints, D.], and strain the liquor while hot; lastly, evaporate to a proper consistence. Dose ℥ss. to ℥ij.

8. EXTRACTUM SARZÆ FLUIDUM, E. *Extractum Sarsaparillæ fluidum*, D. *Fluid Extract of Sarsaparilla*, offic.—(Sarsaparilla, sliced [in chips, E.] lb. j.; [Boiling, E.] Water, Ovj. [Oxij. *wine measure*, D.] Let them boil together for an hour, and pour off the liquor; then add twelve pints of water, and repeat the boiling and pouring off. Press strongly the liquor from the remaining material, set aside the mixed liquors that the fæces may subside; then evaporate the mixture by continual boiling down to thirty ounces, and add two ounces of rectified



spirit. *D.* "Digest the root for two hours in four pints of the water; take it out, bruise it, replace it in the water, and boil for two hours; filter and squeeze out the liquid; boil the residuum in the remaining two pints of water, and filter and squeeze out this liquor also; evaporate the united liquors to the consistence of thin syrup; add, when the product is cool, as much rectified spirit as will make in all sixteen fluid ounces. Filter.—This fluid extract may be aromatized at will with various volatile oils or warm aromatics." *E.*)

Jamaica sarsaparilla should be used in the preparation of the extract. Honduras and other inferior kinds of sarsaparilla are to be avoided. The chumps so frequently used by pharmaceutical chemists should be rejected. The small root fibres, commonly called the *beard*, of Jamaica sarsaparilla, are to be preferred, as containing less starch and woody fibre, and a large quantity of the cortical layer. I am informed that they yield a much greater quantity of extract than the runners. Steam heat must be employed to effect the evaporation of the decoction, and the temperature employed should little if at all exceed 212° F. When the concentrated decoction (especially of the Honduras kind) is allowed to cool, as at night, a kind of fermentation is readily set, and gas is copiously evolved. The *fluid extract* is to be preferred to the ordinary more consistent preparation. The quantity of extract obtained from different kinds of sarsaparilla has been already noticed. For further information on this point I must refer the reader to the papers of Mr. Battley (*Lond. Med. Rep.* xix. 168); Mr. Pope (*Med.-Chir. Trans.* xii. 344); and M. Thubeuf (*Journ. de Pharm.* t. xvi. and xviii).

Extract of Jamaica sarsaparilla, when rubbed on white paper or porcelain, exhibits a reddish tint not observable in the extract of the Honduras kind. The flavour and odour are also characters which assist in distinguishing well-prepared extract. Rubbed up with water it is almost completely soluble, and the solution, which should be clear, by standing deposits scarcely any thing. The dilute solution should not become blue on the addition of a solution of iodine.

Extract of sarsaparilla is declared by many writers to be an inert and useless preparation; but the assertions are, for the most part, founded rather on theoretical than practical considerations. I have extensively used it, and believe that when properly prepared from Jamaica sarsaparilla, it is a most valuable and efficient remedy; and the enormous quantity of it which is consumed by the profession generally (including some of the most eminent of its members), is a proof that many others entertain a similar opinion of it. It is given in doses of from half a drachm to two or three drachms three or four times a day. It should be rubbed down with water, and flavoured by the tincture of orange-peel, or by some volatile oil (as the oil of cloves, allspice, lemon, or cinnamon). Alkalis render its flavour somewhat disagreeable, though they frequently increase greatly its remedial powers.

9. EXTRACTUM SARZÆ COMPOSITUM. *Compound Extract of Sarsaparilla.*—Not in any Pharmacopœia, though kept in the shops. It is made by mixing, with extract of sarsaparilla, an extract prepared by evaporating a decoction of mezereon bark, liquorice root, and guaiacum shavings, and a small quantity of oil of sassafras. This preparation is employed as a convenient substitute for the compound decoction of sarsaparilla. The dose of it, and the mode of exhibition, is the same as of the simple extract. Three quarters of an ounce of the compound extract are equal to a pint of the compound decoction.

#### OTHER MEDICINAL SMILACEÆ.

1. The CHINA ROOT of the shops (*Radix Chinae orientalis*) is the produce of *Smilax China* (Linn.), and is said to come from the province of Onansi, in China. It occurs in large, lignous, knotty pieces, of from three to eight inches long, and an inch or two thick. Externally it has a grayish-brown colour, and internally a light flesh or yellowish-white colour. It is in-



odorous, and has a slightly astringent taste. It appears to consist of *extractive, tannic acid, colouring matter, starch, and woody fibre*. It was introduced into Europe in 1535 as an infallible remedy for the venereal disease, and obtained great celebrity in consequence of the benefit which the Emperor Charles the Fifth is said to have derived from it in gout. Its effects are not very obvious, but it is said to be diaphoretic. It tinges the sweat. It has been used in the same maladies as sarsaparilla; viz. venereal diseases, rheumatism, gout, obstinate skin diseases, &c. It is given in the form of decoction.

The *American China root (Radix China Americanæ)* is brought from Mexico, and is said to be the produce of *Smilax Pseudo-China*.

2. *SMILAX ASPERA* is used in the south of Europe as a substitute for sarsaparilla; but the substance sold in London under that name is brought from India, and is the produce of *Hemidesmus indicus*, and will be described hereafter.

#### ORDER XIV.—IRIDACEÆ, *Lindl.*—THE CORNFLAG TRIBE.

*IRIDÆE, Juss.*

**ESSENTIAL CHARACTERS.**—*Calyx* and *corolla* superior, confounded, their divisions either partially cohering, or entirely separate, sometimes irregular, the three petals being sometimes very short. *Stamens* three, arising from the base of the sepals; *filaments* distinct or connate; *anthers* bursting externally lengthwise, fixed by their base, two-celled. *Ovary* three-celled, cells many-seeded; *style* one; *stigmas* three, often petaloid, sometimes two-lipped. *Capsule* three-celled, three-valved, with a localicidal dehiscence. *Seeds* attached to the inner angle of the cell, sometimes to a central column, becoming loose; *albumen* corneous, or densely fleshy; *embryo* inclosed within it.—*Herbaceous* plants, or very seldom *under-shrubs*, usually smooth; the hairs, if any, simple. *Roots* tuberous or fibrous. *Leaves* equitant, distichous in most genera. *Inflorescence* terminal, in spikes, corymbs, or panicles, or crowded. *Bracts* spatheaceous, the partial ones often scarious; the *sepals* occasionally rather herbaceous (*Lindley*).

**PROPERTIES.**—The underground stems and roots usually abound in fecula and mucilage; but these nutritive substances are generally combined with an acrid principle, which excludes their employment as articles of food. However, *Moræa edulis*, *M. sisyrinchium*, *Gladiolus edulis*, and a species of *Tigridia*, have been used as esculent substances. The rhizomes of several species of *Iris* (as *I. Pseud-acorus*, *I. germanica*, *I. sibirica*, and *I. versicolor*) are remarkable, especially in the fresh state, for their acridity, in consequence of which some of them have been used as purgatives, sialogogues, or errhines, or for issue-peas. The rhizomes of some species (as *I. florentina* and *I. germanica*) have an agreeable smell. The colour and the odour of the saffron are to be regarded as part of the petaloid qualities of the stigmata of *Crocus*. The effects of this medicine on the nervous system are regarded by De Candolle (*Essai sur les Propriétés Méd.*) as similar to those of [certain odorous] flowers.

#### CROCUS SATIVUS, *Allioni, L. E. D.*—THE SAFFRON CROCUS.

*Sex. Syst.* Triandria, Monogynia.  
(*Stigmata exsiccata, L. Stigmata, E. D.*)  
(*Crocus, U. S.*)

**HISTORY.**—Saffron is mentioned in the Old Testament. (*Solomon's Song*, iv. 14.) Homer (*Iliad*, xiv. 346,) speaks of the *Crocus*, (*κρόκος*). Hippocrates (*opera*, Ed. Fœs. pp. 407, 575, 614, 626, and 876,) employed Saffron in uterine and other maladies. The word *Saffron* (*zafaran*, Avicenna) is of Arabic origin.

**BOTANY.**—**Gen. Char.**—*Perianth* [coloured], with a slender tube twice as long as the limb; limb six-partite, equal, erect. [*Stamens* three, inserted into the tube; *anthers* sagittate.] *Stigmas* three, thick, convoluted, generally crested. *Capsule* under ground, elevated by a short peduncle from the root, which peduncle elongates after the decay of the flowers, and the capsules appear above ground. (*Hooker*, with some additions.)

**Sp. Char.**—*Stigma* protruded, drooping, in three deep linear divisions.—(*Hooker*.)

*Cormus* roundish; its brownish coats reticulated, separating superiorly into distinct parallel fibres. *Leaves* linear, with a white central stripe, and surrounded at their base with long membranous sheaths. *Flowers* light purple, shorter than the leaves, with a two-valved membranous spathe. *Anthers* pale yellow. *Stigmas* deep orange-coloured.

**Hab.**—A native of Asia Minor. Now naturalized in England, France, Spain,



and some other European countries. It is a doubtful native of the Eastern parts of Europe. It is said to have been introduced into Spain by the Arabs. (Dillon, *Travels through Spain*.) It flowers in September and October.

**PREPARATION.**—The flowers are gathered in the morning, and the stigmata, with part of the style, plucked out for use, the rest of the flower being thrown away. The stigmata are then dried on paper, either by means of portable kilns over which a hair-cloth is stretched, (Douglas, *Phil. Trans.* for 1728,) or in a room by the sun. (Fiske, *Stephenson and Churchill's Med. Bot.* vol. iii.) When dried between paper under the pressure of a thick board and weights, the saffron is formed into cakes now no longer to be met with.

**DESCRIPTION.**—Two kinds of saffron are kept in the shops, viz. *hay saffron* and *cake saffron*.

1. **Hay Saffron.** (*Crocus in feno*.)—Consists of the stigmas with part of the style, which have been very carefully dried. They are from an inch to an inch and a half long, thin, brownish red; the upper portion, (stigma) is expanded, notched at the extremity; the lower portion, which constitutes part of the style, is called by Th. Martius, (*Pharmakogn.*) *Föminelle*: it is narrow, capillary, yellowish. The odour is penetrating, aromatic, and of large quantities, narcotic. The taste is bitter, somewhat aromatic. When chewed, saffron tinges the mouth and the saliva yellow. I find by careful examination that one grain of good commercial saffron contains the stigmata and styles of nine flowers; hence 4,320 flowers are required to yield one ounce of saffron.

a. *English Saffron* (*Crocus anglicus*) is no longer found in commerce.

β. *Spanish Saffron* (*Crocus hispanicus*) constitutes the best saffron of the shops. It is imported from Gibraltar (principally), Cadiz, Denia, Santander, and Malaga. From the concurrent accounts of pharmacologists it would appear that formerly Spanish saffron was spoiled by being dipped in oil to preserve it. But the saffron now imported from Spain has not been subjected to this treatment. Occasionally, Spanish, as well as any other kind of saffron, is oiled by the dealers to give it an appearance of freshness, but this fraud is, I suspect, usually performed in this country.

γ. *French Saffron* (*Crocus gallicus*) is usually considered in commerce to be of second quality. It is the produce of Gatinais (*Gatinais Saffron*) and Orléanais, which comprehend part of the departments of Seine-et-Marne and Eure-et-Loire, and the whole of the department of Loiret. The saffron of Angoulême is the worst. (Guibourt, *Histoire des Drog.* ii. 254.) French saffron is shipped for England at Calais, Boulogne, and Havre.

Besides the preceding, several other varieties of saffron are mentioned by pharmacologists, but they are not distinguished in English commerce, and I am unacquainted with them. Such are *Austrian*, *Bavarian*, *Oriental*, and the *Sicilian saffron* (*C. austriacus*, *bavarius*, *orientalis*, and *sicilienses*) mentioned by Murray, (*App. Med.* vol. v.) Geiger, (*Handb. de Pharm.*) and others. From the Customs report (*Trade List* for 1837-8-9), it appears that saffron is occasionally imported from Hamburgh, Antwerp, Genoa, Naples, and Bombay. But I am ignorant of its place of growth and quality. According to Gassone, (Lindley, *Flora Medica*.) *Crocus odoratus* yields Sicilian saffron. Dioscorides (*Lib. i. cap. xxv.*) considered the saffron of Corycus (a mountain of Cilicia, in Asia Minor, now called *Curco*.) to be the best, and that of Lycia and Olympus to be of second quality; while Cyrenaic saffron, as well as that from Centuripinum (*Centorbe*) in Sicily, he declares to be the worst.

2. **Cake Saffron.** (*Crocus in Placentâ*.)—Formerly this was compressed hay saffron. But the cakes now met with in the inferior shops are composed of Safflower (*Carthamus tinctorius*) and gum-water, made into a paste, and rolled out on a tin plate with a rolling-pin into oval cakes of 11 inches long, 10 inches broad, and about one-tenth of an inch thick. These are dried on brown paper in a stove. They are shining, and of a brownish red colour. I can detect neither saffron nor marigolds (*Calendula officinalis*) in them. Their price is about one-fifth of that of good hay saffron. I am informed, by a maker of cake saffron, that there is only another person besides himself by whom this substance is made in London.

**ADULTERATION.**—The only adulteration practised on saffron, which has come under my notice, is that of mixing safflower with saffron, and this I have met with once only. It must have been effected abroad, since the druggist who



pointed it out to me bought the saffron in bond, and did not discover the fraud until the saffron had been for some time in his warehouse. The pieces of safflower readily escape the eye of a superficial observer. If rubbed with the moistened finger on paper, they produce a slightly yellow mark only, whereas genuine saffron causes a very intense orange-yellow stain. The fraud may also be detected by infusing the suspected saffron in hot water, when the florets of the safflower may be readily distinguished from the stigmas which constitute saffron.

I am informed that old and dry saffron is sometimes oiled, to give it the appearance of freshness. The stain communicated to the fingers, or white blotting paper, when such saffron is compressed, readily detects the fraud.

Fibres of smoked beef and the petals of the officinal marigold are said to have been used for adulterating saffron. But there is no fear of these adulterations now. Such frauds would be readily detected by the eye, especially when the suspected saffron has been infused in hot water.

COMMERCE.—The quantity of saffron on which duty (of 1s. *per lb.*) is paid is about 5,000 lbs. *per annum*. The places from which it is imported have been already mentioned. It is brought over in cases, barrels, and boxes.

COMPOSITION.—Saffron was analyzed in 1811 by Vogel and Bouillon-Lagrange, (*Bull. de Pharm.* iv. 89,) and in 1818 by Aschoff. (Gmelin. *Handb. d. Chim.* ii. 1334.)

	Vogel and Bouillon-Lagrange.	Aschoff.
Volatile oil .....	7.5	1.4
Wax .....	0.5	4.0
Polychroite .....	65.0	52.0
Gum .....	6.5	10.4
Soluble albumen .....	0.5	—
Woody fibre .....	10.0	19.0
Water .....	10.0	10.0
Balsamic matter, soluble in ether and alcohol .....	—	2.0
Saffron .....	100.0	98.8

1. VOLATILE OIL OF SAFFRON. (*Oleum Croci*).—Obtained by distilling saffron with water. It is yellow, heavier than water, has a burning, acrid, somewhat bitter taste, and is slightly soluble in water. By keeping, it becomes white, solid, and lighter than water. On it depends probably the medicinal properties of saffron.

2. COLOURING MATTER: *Polychroite* (so called from  $\pi\epsilon\gamma\chi\rho\acute{o}\varsigma$ , *many*, and  $\chi\rho\omicron\alpha$ , *colour*, in consequence of its being susceptible of numerous changes of colour).—By digesting the aqueous extract of saffron in alcohol, and evaporating the tincture to dryness, a substance is obtained which Bouillon-Lagrange and Vogel called *polychroite*, but which Henry (*Journ. de Pharm.* vii. 397,) has separated into volatile oil and a bitter red substance (*polychroite properly so called*). Pure *polychroite* is pulverulent, bitter, scarlet-red, odourless, slightly soluble in cold water, much more so in hot water, readily soluble in alcohol and oils (both fixed and volatile,) slightly soluble in ether. Sulphuric acid turns it blue, then lilac. Nitric acid makes it green, but the colour is very fugitive. The hypochlorites destroy the yellow colour of a solution of *polychroite*.

CHEMICAL CHARACTERISTICS.—An aqueous infusion of saffron gives no indication of starch on the addition of a solution of iodine. The hypochlorites bleach it. Sulphuric and nitric acids act on it as on *polychroite* above mentioned. Acetate of lead causes no precipitate. By evaporation, the infusion yields an extract from which alcohol removes the colouring matter and leaves a gummy substance.

PHYSIOLOGICAL EFFECTS.—Formerly saffron was considered to be cordial, aromatic, narcotic, and emmenagogue. Some (Boerhaave, *Hist. Plant.* pars ii. p. 590,) have accused it of causing laughing delirium; others (Bergius, *Mat. Med.* t. i. p. 38,) have ascribed to its use great mental dejection; and several (Boerhaave, *op. cit.*; Riverius, *Op. Med.*) have declared that they have seen immoderate uterine hemorrhage produced by it, which, in the case referred to



by Riverius, is said to have terminated fatally. But modern experience has proved that most of these statements are erroneous. Alexander (*Experim. Essays*, p. 88, 1768,) swallowed four scruples of saffron without perceiving any obvious effects therefrom; and Wibmer (*Wirk. d. Arzneim.* Band 2, S. 204,) took a drachm without observing the slightest effect.

By the long-continued use of saffron, the colouring particles become absorbed, and tinge the secretions, especially the urine and perspiration. In some instances the *fœtus in utero* has been stained by it. (Wibmer, *op. cit.*) The failure of Alexander to detect the yellow tinge in his secretions arose probably from the short time he had been using this medicine. Mr. Gibson<sup>1</sup> gave a considerable quantity of saffron to a pigeon, which thereby had its fæces tinged, yet no perceptible alteration was produced in its bones.

Headache, prostration of strength, apoplexy, and even death, have been ascribed to the inhalation of the vapour arising from large quantities of saffron;<sup>2</sup> and perhaps correctly so, for it is well known that the odours of other plants (as the rose, the pink, &c.) act on some individuals as narcotic poisons. (*Orfila, Toxicol. Gén.*)

USES.—Saffron is employed, especially on the continent, as a flavouring and colouring ingredient in various culinary preparations, articles of confectionary, liqueurs, &c. It was used by the ancients as a perfume as well as a seasoning agent. (Beckmann, *Hist. of Invent. and Discov.* vol. i. p. 278.)

In the modern practice of medicine it is chiefly used as a colouring ingredient. It is a popular remedy for assisting the eruption of exanthematous diseases; on the same principle, I suppose, that bird-fanciers give it to birds when moulting. It was at one time esteemed as an antispasmodic in asthma, hysteria, and cramp of the stomach; and was formerly used as an emmenagogue, and to promote uterine contractions and the lochial discharge. Lastly it has been employed as a stimulant to the nervous system in hypochondriasis.

ADMINISTRATION.—It may be given in doses of from ten grains to a drachm in the form of powder or pill. It is popularly used in the form of infusion or tea.

1. SYRUPUS CROCI, L. E.—(Saffron, 3x.; Boiling water, Oj.; Sugar, lb. iij. Macerate the saffron in the water for twelve hours, in a vessel lightly covered, then strain the liquor, and add the sugar to it).—It is employed principally for its colour.

2. TINCTURA CROCI, E.; *Tincture of Saffron* (Saffron chopped fine, ℥ij.; Proof Spirit, Oij. This tincture is to be prepared like tincture of cinchona, either by percolation or by digestion, the former method being the more convenient and expeditious).—Used as a colouring liquid. It is also employed as a stimulant and emmenagogue in doses of from ℥ʒj. to ℥ʒij.

As a colouring and flavouring ingredient saffron is a constituent of several other preparations.

#### OTHER MEDICINAL IRIDACEÆ.

The ORRIS ROOT of the shops is the rhizome of *Iris florentina*, and perhaps also of *I. pallida*. It is imported in casks from Leghorn and Trieste. It consists according to Vogel, (*Journ. de Pharm.* i. 481.) of volatile oil, acrid resin, astringent extractive, gum, starch, and ligneous matter. Raspail (*Chim. Organ.*) detected in it crystals of oxalate of lime. Orris root is an acrid substance, and in full doses causes vomiting and purging. It is principally used on account of its violet odour. Thus hair and tooth powders, perfumed oils, &c. are frequently scented with it. During teething, infants are sometimes permitted to rub their gums with, and bite the rhizome: but the practice is objectionable, since it is not unfrequently attended with irritation of the mouth and disorder of the stomach and bowels. Furthermore, the danger of the rhizome

<sup>1</sup> *Mem. of the Lit. and Phil. Soc. of Manchester*, 2nd Ser. vol. i. p. 148.

<sup>2</sup> See the Reports of Borellus, Tralles, Forster, and others, quoted by Wibmer and Murray, *op. cit.*



getting into the œsophagus or trachea is not to be overlooked. One fatal case of this kind is recorded. (Kraus, *Heilmittellehre*, S. 541.) Powdered orris root is sometimes used as an emetic.

ORDER XV.—TACCACEÆ, Lindley.—THE TACCA TRIBE.

Taccæ, Presl.

THIS is a small and imperfectly-known order of plants. It contains the *Tacca pinnatifida*, Forst. a native of the Molucca Isles, and of the Islands of the Pacific Ocean. The roots are

FIG. 146.



*Tacca pinnatifida*.

and sold as "Arrow-root prepared by the native converts at the Missionary stations in the South Sea Islands." It is

FIG. 147.



Particles of Tahiti Arrow-Root.

tuberose, fleshy, intensely bitter, and acrid. By cultivation they become larger and somewhat milder. They yield a highly nutritious fecula. At Tahiti (Otaheite) this fecula is procured by washing the tubers, scraping off their outer skin, and then reducing them to a pulp by friction on a kind of rasp made by winding coarse twine (formed of the cocoa-nut fibre) regularly round a board. The pulp is washed with sea-water through a sieve, made of the fibrous web which protects the young frond of the cocoa-nut palm. The strained liquor is received in a wooden trough in which the fecula is deposited; and the supernatant liquor being poured off, the sediment is formed into balls, which are dried in the sun for 12 or 24 hours, then broken and reduced to powder, which is spread out in the sun to dry. (Matthews, *Gardener's Magazine*, vol. viii. p. 585, Lond. 1832.) [Mr. Nuttall states, (*Am. Journal of Pharmacy*, vol. ix. p. 306,) that the plant affording Sandwich Island arrow root is not the *Tacca pinnatifida* of the East Indies, but a new and distinct species, to which he has given the name *Tacca oceanica*.—J. C.]

*Tahiti Arrow-root*, sometimes called *Otaheite Salep* (Rees' *Cyclopædia*, art. *Tacca pinnatifida*.) is imported into London, by the microscope I find it to consist of particles which appear circular, mullar-shaped, or polyhedral. Some of the mullar-shaped particles are slightly narrowed at the base. Moreover the base of the mullar, instead of being flat, appears to me to be hollowed out. The hilum is small and circular; it cracks in a linear or stellate manner. The rings are few and not very distinct. This fecula is used as a substitute for the West Indian Arrow-root.

In some parts of the world cakes are made of the meal of the tubers of *T. pinnatifida*, "which are the *tacca youy* of some navigators: they form an article of diet in China and Cochin China, as also in Travancore," where, according to Dr. Ainslie, they attain a large size, and are eaten by the natives with some acid to subdue their acrimony. (Royle, *Illustrations of the Botany of the Himalayan Mountains*, p. 378.)

FIG. 148.



*Narcissus tazetta*.

FIG. 149.



The Banana.

FIG. 150.



The Plantain.



ORDER XVI.—AMARYLLIDACEÆ, *Lindl.*—THE NARCISSUS TRIBE.

NONE of the plants of this order are employed in England as articles of the *Materia Medica*. Yet many of them act powerfully on the system, and one of them (*Hæmanthus toxicarius*) is said to be used by the Hottentots to poison their arrow heads. The prevailing property of the order is acridity, which is possessed principally by the bulbs, several of which (as those of *Pancreatum maritimum* and *Hæmanthus coccineus*) seem to be endowed with properties very similar to those of squill. The leaves and flowers of *Narcissus Pseudo-Narcissus* are enumerated among the simples of the French *Codex*. In doses of 20 or 30 grains they sometimes cause vomiting. They have been employed in spasmodic affections, (as hooping-cough,) in diarrhœa, and in agues. (Merat and De Lens, *Dict. de Mat. Méd.* t. iv.) Several other species of *Narcissus*, as *N. Tazetta* and *N. odorus*, also possess emetic properties. (De Candolle, *Essai sur les Propriétés Méd.*) *Narcissus Tazetta* is supposed by Dr. Sibthorp to be the *Narcissus* of the poets.

ORDER XVII.—MUSACEÆ, *Agardh.*—THE BANANA TRIBE.

NONE of the Musacœ are used in medicine. But the importance of the Banana (*Musa SAPIENTUM*) and Plantain (*M. PARADISIACA*), as articles of food, is so great to the inhabitants of some tropical countries, that it would be almost inexcusable to pass by the order without a notice. "But for plantains," says Dr. Wright, (*London Med. Journ.* vol. viii.) Jamaica "would scarcely be habitable, as no species of provision could supply their place. Even flour, or bread itself, would be less agreeable and less able to support the laborious negro, so as to enable him to do his business, or to keep in health." (See also Humboldt's *Pl. Æquinoct.*) Boussingault (*Journ. de Pharm.* xxii. 385.) analysed the fruit of *Musa paradisiaca*, and found in it sugar, gum, malic, gallic, and pectic acids, albumen, and lignin.

ORDER XVIII.—MARANTACEÆ, *Lindl.*—THE ARROW-ROOT TRIBE.

ESSENTIAL CHARACTERS.—*Calyx* superior, of three sepals, short. *Corolla* tubular, irregular, with the segments in two whorls; the *outer* three-parted, nearly equal, the *inner* very irregular; one of the lateral segments usually coloured, and formed differently from the rest; sometimes by abortion fewer than three. *Stamens* three, petaloid, distinct, of which one of the laterals and the intermediate one are either barren or abortive, and the other lateral one fertile. *Filament* petaloid, either entire or two-lobed, one of the lobes bearing the anther on its edge. *Anther* one-celled, opening longitudinally. *Pollen* round (papillose in *Canna coccinea*, smooth in *Calathea zebрина*). *Ovary* three-celled; *ovules* solitary and erect, or numerous and attached to the axis of each cell; *style* petaloid or swollen; *stigma* either the mere denuded apex of the style, or hollow, hooded and incurved. *Fruit* capsular, as in Scitamineæ. *Seeds* round, without aril; *albumen* hard, somewhat floury; *embryo* straight, naked, its *radicle* lying against the hilum (*Lindley*).

PROPERTIES.—The rhizomes abound in fecula.

MARANTA ARUNDINACEA, *Linn. L. E.*—THE WEST INDIAN ARROW-ROOT.

*Sex. Syst.* Monandria, Monogynia.

(Arrow-root: Rhizomatis fecula. *Lond.*—Fecula of the tubers: Arrow-root. *Ed.*)

(*Maranta*, U. S.)

HISTORY.—This plant was brought from the island of Dominica, by Colonel James Walker, to Barbadoes, and there planted. From thence it was sent to Jamaica. That gentleman observed that the native Indians used the root against the poison of their arrows, by mashing and applying it to the poisoned wounds. (*Sloane's Jamaica*, vol. i. p. 254.)

BOTANY. *Gen. Char.*—*Corolla* unequal, one of the inner segments in the form of a lip. *Stamens* petaloid, with half an anther on its edge. *Style* hooded, adhering to the edge of a sterile filament. *Ovary* three-celled, smooth: *ovules* solitary. *Fruit* even, dry, one-seeded. Caulescent plants with fleshy *rhizomata* or tubers. *Stems* branched, often dichotomous. *Inflorescence* terminal, paniced, jointed, with glumaceous, deciduous bracts. (*Lindley*.)

*Sp. Char.*—*Culm* branched, herbaceous. *Leaves* ovate, lanceolate, somewhat hairy underneath. *Peduncles* two-flowered (*Willdenow*).

*Rhizome* white, articulated, tuberous, placed horizontally in the earth, and giving origin to several tuberous jointed stoles (*stolones tuberosi*;) similar to itself, but covered with scales. Those stoles are often more than a foot long, and curved, so that the points rise out of the earth and become new plants (*Nees and Ebermaier*). *Stem* two to three feet high. *Leaves* alternate, with long, leafy, hairy, sheaths. *Flowers* white and small.



The *Marantia indica*, Tussac, (*Journ Bot.* iii. 41.) *E.*, is characterized by its leaves being smooth on both sides, and by its seeds; those of *M. arundinacea* being violet. But, after a careful examination, Wickström declares that Tussac's plant is identical with the *M. arundinacea*, Linn. (Nees v. Esenb. and Eberm. *Handb. d. Med. Pharm. Bot.*)

**Hab.**—West Indies. In Jamaica it is cultivated in gardens and provision grounds.

**EXTRACTION OF THE FECULA.**—The roots (tubers), when a year old are dug up, well washed in water, and then beaten in large, deep, wooden mortars to a pulp. This is thrown into a large tub of clean water. The whole is then well stirred, and the fibrous part wrung out by the hands and thrown away. The milky liquor being passed through a hair-sieve, or coarse cloth, is suffered to settle, and the clear water is drained off. At the bottom of the vessel is a white mass, which is again mixed with clean water and drained; lastly, the mass is dried on sheets in the sun, and is pure starch. (Wright, *Lond. Med. Journ.* vol. viii.)

FIG. 151.



Particles of West Indian Arrow-root.

**PROPERTIES.**—The fecula (*fecula marantæ*) called in the shops *West Indian arrow-root*, is white, odourless, and tasteless. It is in the form either of a light opake white powder or of small pulverulent masses. When pressed between the fingers it feels firm, and, when rubbed produces a slight crackling noise. Examined by the microscope<sup>1</sup> it is found to consist of oblong, somewhat ovate-oblong, or irregularly-shaped convex particles, with small mamillary processes occasionally projecting from some portion of the surface, and which are especially evident after the particles have been in water for a few minutes. The rings are very fine. The hilum is circular, and cracks in a linear or stellate manner.

*Portland Arrow-root* is obtained from *Arum maculatum* (see p. 78).  
*East India Arrow-root* is the fecula procured from *Corchorus angustifolia*, and will be described hereafter.  
*Brazilian Arrow-root* is the fecula of *Jatropha Manihot*. It is described by M. Guibourt (*Hist. des Drog.* ii. 456, 3<sup>me</sup> éd.) under the name of *Moussache* or *Cipipa*, and will be noticed hereafter (vide EUPHORBIAEÆ).  
*Tahiti Arrow-root* is the fecula of *Tacca pinnatifida*, and has already been noticed (p. 138).

**COMPOSITION.**—Arrow-root has been analyzed by Dr. Prout (*Phil. Trans.* 1827,) and by Payen, (*Ann. des Scien. Nat.* 2<sup>nd</sup> Sér. Botanique, 1838, pp. 183, 184,) who obtained the following results:

Prout.			Payen.	
	<i>Air dried.</i>	Dried between 200° & 212° for 20 hours.	Portion most easily disaggregated dried at 212° F.	Amidon intact purified by alcohol & water, and dried at 382° F.
Carbon.....	36.4	42.8	44.3	44.33
Water.....	63.6	57.2	6.2	6.25
Arrow-root.....	100.0	100.0	49.6	49.42
			100.0	100.00

The formula which agrees with Prout's third analysis is C<sup>6</sup> H<sup>5</sup> O<sup>5</sup>.  
 Dr. Prout regards arrow-root as a low variety of starch analogous to the low sugar of honey; while wheat-starch he considers to be the most perfect form of starch, analogous to sugar-candy.

**COMMERCE.**—Arrow-root is brought, in tin cases and in barrels and boxes, from the West India Islands (Jamaica, Barbadoes, Antigua, St. Vincent, Dominica, Bermuda, St. Kitt's, Grenada, Demerara, and Berbice). *Bermuda arrow-root* is the most esteemed variety; whether justly or otherwise I know not. Importations of a fecula called arrow-root are occasionally made from Calcutta, and sometimes from Para, Maranham, and Sierra Leone.

<sup>1</sup> Raspail has depicted the grains of the fecula of *Convolvulus Batatas* for arrow-root (see Payen, *Ann. Scien. Nat.* 2<sup>nd</sup> Sér. t. x. Botanique, 1838, p. 16.



The quantity of arrow-root on which duty (of one shilling *per cwt.*) was paid during the last six years, is as follows:

Cwts.		Cwts.		Cwts.	
In 1835 .....	3,581	In 1837 .....	2,853	In 1839 .....	2,964
1836 .....	3,280	1838 .....	2,538	1840 .....	2,124

**ADULTERATION.**—Potato-starch (sold in the shops as *English arrow-root*) is said to be sometimes substituted for the Indian arrow-root. The fraud may be readily detected by the naked eye as well as by a good microscope (see *Potato-starch*).

**PHYSIOLOGICAL EFFECTS.**—Nutritive, emollient, and demulcent. It is somewhat less nutritive than wheat starch, but more palatable and digestible.

**USES.**—Employed at the table, as an article of food, in the form of puddings. It forms a nutritious, easily-digested, agreeable, non-irritating diet for invalids or infants. In irritation of the alimentary canal, of the pulmonary organs, or of the urinary apparatus, it is especially valuable, as a nutritive, emollient, and demulcent.

**ADMINISTRATION.**—To invalids and infants it is exhibited when boiled in water or milk and flavoured. Milk disagrees with some patients, and in such is of course to be avoided. The addition of sugar improves the flavour and increases the nutritive qualities. Spices, lemon juice, or wine, may be employed according to circumstances.

#### OTHER DIETETICAL MARANTACEÆ.

**CANNA.**—An imperfectly determined species of *Canna*, E.—Within the last three or four years considerable quantities of a feculent substance, called *Tous les Mois*, or *Starch of the Canna coccinea*, have been imported. It comes from St. Kitt's, and is said to be prepared, by a tedious and troublesome process, from the root (rhizome) of the above-mentioned plant. It is, however, very doubtful whether it be really produced by the *Canna coccinea* of botanists, and the Edinburgh College, therefore, properly declares *Tous les Mois* to be the "fecula of the root of an imperfectly determined species of *Canna*." When examined by the microscope its particles are found to be distinguished from those of all other commercial feculas by their great size, which exceeds that of every other starch particle which I have hitherto examined. Their shape is oval or oblong; generally more or less ovate. The circular hilum is usually placed at the narrow extremity; very rarely it is double. The rings are numerous, regular, close, but somewhat unequally so. The hilum and the body of the particle are frequently cracked. Examined by the naked eye, *tous les mois* has a slightly satiny appearance, and is devoid of that dead white or opaque character presented by some amylaceous substances. It approaches more nearly to potato starch than to any other fecula with which I am acquainted; but its particles are larger than those of the latter. Like the other amylaceous substances, it forms a valuable and nutritious article of food for the invalid. (See the *Medico-Chirurgical Review* for Oct. 1, 1836.)

FIG. 152.



Particles of *Tous les Mois*.

#### ORDER XIX.—ZINGIBERACEÆ, Lindl.—THE GINGER TRIBE.

DRYMYRHIZÆÆ, Vent.—SCITAMINEÆ, R. Brown.

**ESSENTIAL CHARACTER.**—*Calyx* superior, tubular, three-lobed, short. *Corolla* tubular, irregular, with six segments in two whorls; the *outer* three-parted, nearly equal, or with the odd segment sometimes differently shaped; the *inner* (sterile stamens) three-parted, with the intermediate segment (*labellum*) larger than the rest, and often three-lobed, the lateral segments sometimes nearly abortive. *Stamens* three, distinct, of which the two lateral are abortive, and the intermediate one fertile; this placed opposite the *labellum*, and arising from the base of the intermediate segment of the outer series of the corolla. *Filament* not petaloid, often extended beyond the anther in the shape of a lobed or entire appendage. *Anther* two-celled, opening longitudinally, its lobes often embracing the upper part of the style.



*Pollen* globose, smooth. *Ovary* three-celled, sometimes imperfectly so; *ovules* several, attached to a placenta in the axis; *style* filiform; *stigma* dilated, hollow. *Fruit* usually capsular, three-celled, many seeded [sometimes by abortion one-celled]; occasionally berried (the dissepiments generally central, proceeding from the axis of the valves, at last usually separate from the latter, and of a different texture, *R. Br.*) *Seeds* roundish or angular, with or without an aril (*albumen* floury, its substance radiating, and deficient near the hilum, *R. Br.*); *embryo* inclosed within a peculiar membrane (*vitellus*, *R. Br. Prodr. membrane of the amnios*, *ibid.* in *King's Voyage*, 21) with which it does not cohere.—Aromatic, tropical, herbaceous plants. *Rhizoma* creeping, often jointed. *Stem* formed of the cohering bases of the leaves, never branching. *Leaves* simple, sheathing their *lamina*, often separated from the sheath by a taper neck, and having a single midrib, from which very numerous, simple, crowded veins diverge at an acute angle. *Inflorescence* either a dense spike, or a raceme, or a sort of panicle, terminal or radical. *Flowers* arising from among spathaceous membranous bracts, in which they usually lie in pairs. (*Lindley*.)

PROPERTIES.—Rhizomes and seed aromatic. The rhizomes of some species are remarkable for the colouring matter which they contain.

### I. ZINGIBER OFFICINALE, *Roscoe*, L. E.—THE NARROW-LEAVED GINGER.

*Amomum Zingiber*, *Linn.* D.

*Sex. Syst.* Monandria, Monogynia.

(*Rhizoma*, L. E.—*Radix*, D.)

(*Zingiber*, U. S.)

HISTORY.—*Dioscorides*, (*Lib. ii. cap. 190.*) and *Pliny*, (*Hist. Nat. lib. xii.*) were acquainted with ginger, which was called ζγγίβερης by the former, *zingiberi* and *zimpiberi* by the latter of these authors.

BOTANY. *Gen. Char.*—*Corolla* with the outer limb three-parted, inner one-lipped. *Filament* lengthened beyond the anther into a simple incurved beak. *Capsule* three-celled, three-valved. *Seeds* numerous, arillate.—*Rhizocarpial* plants. *Rhizomata* tuberous, articulated, creeping. *Stems* annual, inclosed in the sheaths of distichous leaves. *Leaves* membranous. *Spikes* cone-shaped, radical or rarely terminal, solitary, consisting of one-flowered imbricated bracts (*Blume.*) (*Enumerat. Plant Javæ.*)

*Sp. Char.*—*Leaves* sub-sessile, linear-lanceolate, smooth. *Spikes* elevated, oblong. *Bracts* acute. *Lip* three-lobed. (*Roxburgh.*)

*Rhizome* biennial. *Stems* erect and oblique, and invested by the smooth sheath of the leaves; generally three or four feet high, and annual. *Leaf-sheaths* smooth, crowned with a bifid ligula. *Scapes* solitary, six to twelve inches high. *Spikes* the size of a man's thumb. *Lip* dark purple. *Ovary* oval, with numerous *ovules*; *style* filiform; *stigma* funnel-shaped, ciliate. *Capsule* roundish, unilocular. *Seeds* numerous; mostly abortive, (*Roxburg, op. cit.*, and *Dr. P. Browne, History of Jamaica.*)

*Hab.*—Cultivated in the tropical regions of Asia and America. Native soil doubtful, probably Asia.

PREPARATION.—The young shoots put forth every spring by the perennial rhizome, are used in the manufacture of the delicious *preserved ginger* (*conditum zingiberis*). These shoots are carefully picked, washed, scalded, scraped, peeled, and then preserved in jars with syrup. (*Dr. P. Browne, Hist. Jamaica.*)

The *ginger-root* of the shops is prepared when the stalks are wholly withered, and the rhizomes are about a year old. In Jamaica this happens in January or February. The rhizomes are dug up, picked, cleaned, and scalded. *Black ginger* is dried, after being scalded, without being scraped: *white ginger*, on the contrary, requires to be carefully scraped. Both kinds are dried in the sun in the open air.

The difference between the black and white ginger of the shops are ascribed, by *Dr. P. Browne*, (*op. cit.* p. 120,) and others, to different methods merely of curing the rhizomes; but this is scarcely sufficient to account for them, and we cannot help suspecting the existence of some difference in the plants themselves. That this really exists is proved by the statement of *Rumphius*, (*Herb. Amboin. lib. viii. cap. xix. p. 156.*) that there are two ginger plants, the *white* and the *red*. Moreover, *Dr. Wright*, (*Lond. Med. Journ. vol. viii.*) says, that two sorts are



cultivated in Jamaica; viz. the *white* and the *black*; and he adds, "black ginger has the most numerous and largest roots."

When brought to this country, the common kinds of ginger are bleached by washing them in a solution of chloride of lime, and sometimes by exposing them to the fumes of burning sulphur. This treatment, though it may improve the colour, must injure the acidity and aromatic qualities of the rhizomes.

**DESCRIPTION.**—The *rhizome*, called in commerce *ginger-root* (*radix zingiberis*), occurs in flattish, branched, or lobed, palmate pieces, called *races*, which do not exceed four inches in length. The unscraped pieces are covered with a wrinkled epidermis; but those which have been scraped (as the Jamaica variety) are without it. Ginger breaks moderately short, but the fractured surface presents numerous projecting pointed fibres, imbedded in a mealy or farinaceous tissue. A transverse section of the larger and more perfect pieces shows an outer, horny, resinous-looking zone, surrounding a farinaceous centre, which has a speckled appearance from the cut extremities of the fibres and ducts. The taste of ginger is aromatic, hot, and biting: the odour of a fresh broken piece is peculiar and pungent, though aromatic. In commerce several varieties, distinguished by their colour and place of growth, are met with.

**a. White Ginger.** (*Radix Zingiberis albi*).—The finest is that brought from Jamaica. *Jamaica white ginger* occurs in larger, rounder, and thinner races than the other kinds. Its epidermis has been carefully removed by scraping. Externally it is yellowish-white or very pale buff; internally it has a pale buff tint: inferior kinds have an ash tint externally. It forms a beautiful bright straw yellow, somewhat buffy, powder. A great part of the Jamaica ginger of the shops has been washed in whiting and water (or *white-washed*, as it is technically termed), under the pretence of preserving it from insects. (Brande, *Dict. of Mat. Med.*) The dark-coloured kinds are frequently bleached with chloride of lime. *Barbadoes ginger* is in shorter, flatter races of a darker colour, and covered with a corrugated epidermis. *African ginger* is in smallish races, which have been partially scraped, and are pale-coloured. *East India ginger* is unscraped; its races are dark ash-coloured externally, and are larger than those of the African ginger. *Tellicherry ginger* is in large plump races with a remarkable reddish tint externally.

**β. Black Ginger.** (*Radix Zingiberis nigri*).—*Jamaica black ginger* is not frequently found in the shops. The *Malabar dark ginger* is in unscraped short pieces, which have a horny appearance internally, and are of a dirty brown colour both internally and externally.

**COMMERCE.**—Ginger is imported in bags, weighing about a hundred weight each. The quantities on which the duty of eleven shillings per cwt. has been paid for the last six years, are as follows:

	Brit. W. Indies. cwts.	East Indies. cwts.	Total cwts.		Brit. W. Indies. cwts.	East Indies. cwts.	Total cwts.
In 1835.....	6,496	867	7,363	In 1838.....	9,305	1,911	11,216
1836.....	4,426	1,912	6,338	1839.....	6,357	818	7,175
1837.....	9,157	3,590	12,677	1840.....	7,528	1,535	9,063

**COMPOSITION.**—Ginger was analyzed in 1817 by Bucholz, (*Gmelin's Handb. d. Chem.*) and in 1823 by Morin, (*Journ. de Pharm.* ix. 253.)

*Bucholz's Analysis.*

Pale yellow volatile oil.....	1.56
Aromatic, acrid, soft resin.....	3.60
Extractive, soluble in alcohol.....	0.65
Acidulous and acrid extractive, insoluble in alcohol.....	10.50
Gum.....	12.05
Starch (analogous to bassorin).....	19.75
Apothème, extracted by potash (ulmin?).....	26.00
Bassorin.....	8.30
Woody fibre.....	8.00
Water.....	11.90

White Ginger.....102.31

*Morin's Analysis.*

Volatile oil.
Acrid soft resin.
Resin insoluble in ether and oils.
Gum.
Starch.
Woody fibre.
Vegeto-animal matter.
Osmazome.
Acetic acid, acetate of potash, and sulphur.
The ashes contained carbonate and sulphate of potash, chloride of potassium, phosphate of lime, alumina, silica, and oxides of iron and manganese.

Ginger.



1. VOLATILE OIL OF GINGER.—Is pale yellow, very fluid, lighter than water, odour that of ginger, taste at first mild, afterwards acrid and hot.

2. SOFT RESIN.—Obtained by digesting the alcoholic extract of ginger first in water, then in ether, and evaporating the ethereal tincture. The residual resin is yellowish brown, soft, combustible, has an aromatic odour, and a burning aromatic taste. Is readily soluble in alcohol, ether, oil of turpentine, and hot almond oil.

PHYSIOLOGICAL EFFECTS.—Ginger is one of the acrid aromatics, whose effects have been already noticed (*vide* vol. i. p. 183). Its dust applied to the mucous membrane of the nostrils acts as an irritant, and provokes sneezing. The rhizome chewed is a powerful sialogogue. The powder mixed with hot water, and applied to the skin, causes a sensation of intense heat and tingling. When taken into the stomach it operates as a stimulant; first, to the alimentary canal, secondly, to the body generally: but especially to the organs of respiration. Like some other spices (the peppers for instance), it acts as an excitant to the genital organs. Furthermore, it is said to increase the energy of the cerebral functions. It is less acrid than pepper.

USES.—Its principal consumption is as a *condiment*. Its powers in this way are considerable, while its flavour is by no means disagreeable, and its acridity scarcely sufficient to enable it, when taken with food, to irritate or inflame.

As a *stomachic* and *internal stimulant* it serves several important purposes. In enfeebled and relaxed habits, especially of old and gouty individuals, it promotes digestion, and relieves flatulency and spasm of the stomach and bowels. It checks or prevents nausea and griping, which are apt to be produced by some drastic purgatives. It covers the nauseous flavour of many medicines, and communicates cordial and carminative qualities to tonic and other agents. As a *sialogogue* it is sometimes chewed to relieve toothache, relaxed uvula, and paralytic affections of the tongue. As a *counter-irritant* I have frequently known a ginger plaster (prepared by mixing together powdered ginger and boiling water, and spreading the paste on paper or cloth) relieve violent headache when applied to the forehead.

ADMINISTRATION.—*Powdered ginger* may be administered, in doses of from ten grains to a scruple or more, in the form of pill. Made into a paste with hot water it may be applied as a *plaster*, as already mentioned.

*Preserved ginger* (*conditum zingiberis*), though commonly used as a sweetmeat, may be taken with advantage as a medicine to stimulate the stomach. *Ginger lozenges*, *ginger pearls* (commonly termed *ginger seeds*) and *ginger pipe*, are useful articles of confectionary, frequently of benefit in dyspepsia accompanied with flatulence.

1. TINCTURA ZINGIBERIS, L. E. D. (U. S.) *Tincture of Ginger*.—(Ginger, sliced, [in coarse powder, *E. D.*] ℥ijss.; Rectified Spirit, Oj. [*wine measure*, *D.*] Macerate for fourteen [seven, *D.*] days, and strain, *L. D.* "Proceed by percolation or digestion, as directed for tincture of cinchona." *E.*)—A very valuable carminative. It is commonly employed as an adjunct to tonic, stimulant, and purgative mixtures. Its dose is ℥ʒj. or ℥ʒij. The tincture, made with proof spirit, becomes turbid by keeping in consequence of the mucilage it contains.

*Essence of ginger* is prepared as a tincture, except that the quantity of rhizome should be increased. Some preparers of it concentrate the tincture by distilling off part of the alcohol.

2. SYRUPUS ZINGIBERIS, L. E. D. (U. S.) *Syrup of Ginger*.—(Ginger, sliced, [bruised, *D.*] ℥ijss. [ʒiv. *D.*]; Boiling water, Oj. [Oij. *wine measure*, *D.*]; Sugar, lb. ijss. [℥lxxxvij. *D.*] Macerate the ginger in the water for four hours, and strain; then add the sugar, and dissolve it.)—Used for flavouring. It is scarcely strong enough to be of much value. An extemporaneous syrup may be prepared by adding the tincture of ginger to common syrup. The *syrupus zingiberis* of the United States Pharmacopœia is made by adding ℥ʒiv. of tincture of ginger (prepared with ℥vij. of ginger and Oij. *wine measure*, of alcohol) to a gallon of syrup, and evaporating the alcohol by a water bath.



3. INFUSUM ZINGIBERIS; *Infusion of Ginger; Ginger Tea.* This is a very useful domestic remedy, and is prepared by digesting from ℥ij. to ℥iv. of Ginger, in ℥vj. of Boiling Water, for two hours.—When flavoured, it is employed as a carminative in flatulence, &c. in doses of one or two table-spoonsful.

4. GINGER BEER. For the following excellent formula for the preparation of this popular and agreeable beverage, I am indebted to Mr. Pollock, of Fenchurch Street:—"Take of White Sugar, lb. xx.; Lemon (or Lime) juice, ℥xxvij.; Honey, lb. j.; Ginger bruised, ℥xxij.; Water cong. xvij. Boil the ginger in three gallons of water for half an hour; then add the sugar, the juice, and the honey, with the remainder of the water, and strain through a cloth. When cold, add the White of one Egg and ℥ss. of Essence of Lemon: after standing four days, bottle." This yields a very superior beverage, and one which will keep for many months. Lemon juice may be purchased for sixpence a pint in Botolph Lane, Thames Street. A formula for the preparation of *Ginger Beer Powders* has already been given (see vol. i. p. 474).

## 2. CURCUMA LONGA, Linn. L. E. D.—THE LONG-ROOTED TURMERIC.

*Sez. Syst. Monandria, Monogynia.*

(Rhizoma, L. E.—Radix, D.)

**HISTORY.**—Turmeric is probably the *Κύπερος Ἰνδικός*, (*Cyperus indicus*) of Dioscorides. (Lib. i. cap. iv.) Both Dioscorides and Pliny (*Hist. Nat.* lib. xxi. cap. lxx. ed. Valp.) state that this Indian Cyperus has the form of ginger, and that, when chewed, it colours the saliva yellow like saffron. The word *Curcuma* is derived from *Kurkum*, the Persian name for saffron. (Royle, *Essay on the Antiq. of Hindoo Med.* p. 87.)

**BOTANY. Gen. Char.**—Tube of the *Corolla* gradually enlarged upwards; limb two-lipped, each three-parted. *Filament* broad. *Anther* incumbent, with two spurs at the base. *Style* capillary. *Capsule* three-celled. *Seeds* numerous, arillate.—Stemless plants, with palmate tuberous roots. *Leaves* with sheathing petioles, bifarious, herbaceous. *Scape* simple, lateral or central. *Spike* simple, erect, comose, somewhat imbricated at the base with bracts or saccate spathes. *Flowers* dull yellow, three to five together, surrounded by bracteolæ. (Blume, *op. cit.*)

**Sp. Char.**—*Bulbs* small, and with the numerous, long, palmate tubers, inwardly of a deep orange yellow. *Leaves* long-petioled, broad-lanceolar, of a uniform green (Roxburgh).

**Hab.**—Much cultivated about Calcutta, and in all parts of Bengal, also in China and Cochin-China. One acre yields about 2000 lbs. of the fresh root.

**DESCRIPTION.**—The tubers, called in the shops *turmeric* (*radix curcumæ*, seu *terra merita*), are distinguished by their place of growth into China, Bengal, and Java turmeric; the first being the best and most valuable. From their shape they are sometimes divided into the *round* and *long*. The first (*curcuma rotunda*) is round, oval, or ovate, about two inches long, and one inch in diameter, pointed at one end, marked externally with numerous annular wrinkles. The second (*curcuma longa*) is cylindrical, not exceeding the thickness of the little finger; two or three inches long, somewhat contorted, tuberculated. Both kinds are grayish-yellow externally, internally more or less orange-yellow passing into brown. The fractured surface has a waxy appearance. The odour is aromatic, somewhat analogous to ginger, but peculiar: the taste is aromatic. When chewed it tinges the saliva yellow. Its powder is orange-yellow. The tubers are frequently worm-eaten.

**COMPOSITION.**—Two analyses of turmeric have been made: one by John, (Gmelin's *Handb. d. Chem.*) and a second by MM. Vogel and Pelletier. (*Journ. de Pharm.* i. 289.)



<i>John's Analysis.</i>		<i>Fogel and Pelletier's Analysis</i>	
Yellow volatile oil.....	1	Acrid volatile oil.	
Curcumin.....	10 to 11	Curcumin.	
Yellow extractive.....	11 to 12	Brown colouring matter.	
Gum.....	14	Gum (a little).	
Woody fibre.....	57	Starch.	
Water and loss.....	7 to 5	Woody fibre.	
		Chloride of calcium.	
<hr/>		<hr/>	
Turmeric.....	100	Turmeric.	

**CURCUMIN.** *Yellow Colouring Matter.*—Is obtained, mixed with some volatile oil and chloride of calcium, by digesting the alcoholic extract of turmeric in ether, and evaporating the ethereal tincture to dryness. In the mass, *curcumin* is brownish-yellow, but when powdered it becomes full yellow. It is tasteless, odourless, almost insoluble in water, but readily soluble in alcohol and ether. These properties show that it is of a resinous nature. The alkalis colour it reddish-brown, and readily dissolve it. The alcoholic solution, evaporated with boracic acid, becomes red. Hydrochloric acid also reddens it. The alcoholic solution of curcumin produces coloured precipitates with several salts, as acetate of lead and nitrate of silver.

**CHEMICAL CHARACTERISTICS.**—The alkalis change an infusion of turmeric, or turmeric paper, to reddish-brown. A similar alteration of colour occurs when turmeric paper is exposed to the vapour of hydrochloric acid gas, or is touched with oil of vitriol. If, to tincture of turmeric, boracic acid be added, and the mixture be evaporated to dryness, an orange-red residue is obtained, whereas, without the acid, the residue is yellow. Sulphate of copper causes a yellowish precipitate with an infusion of turmeric. A similar effect is produced by sesquichloride of iron.

**PHYSIOLOGICAL EFFECTS.**—Are those of a mild aromatic, *vide* vol. i. p. 183. The colouring matter becomes absorbed, and communicates a yellow tinge to the urine. (Lewis, *Mat. Med.*; and Reiger, quoted by Murray, *App. Med.* vol. v. p. 78.) According to Mr. Gibson, (*Mem. of the Lit. and Phil. Soc. of Manchester*, vol. i. Sec. Ser. p. 148.) the colouring matter of turmeric is somewhat changed by the digestive organs; for the stools of animals fed with this root were green, whilst either logwood or madder exhibited its respective hues after passing through the intestines.

**USES.**—Employed as a condiment, colouring ingredient, and test. It is a constituent of the well-known *curry powder* and *curry paste*, and of many other articles of Indian cookery. Formerly it had some reputation in hepatic and other visceral diseases, and especially in jaundice. As a test it is used to detect the presence of free alkalis, which change its yellow colour to a reddish-brown. But some acids, and several salts, produce the same effect on it.

**CHARTA CURCUMÆ; Charta exploratoria flava; Turmeric Paper.**—This is prepared with white, bibulous, or unsized paper, which is to be brushed over with, or soaked in, a *tincture of turmeric* (prepared by digesting one part of bruised Turmeric in six parts of Proof Spirit), and drying in the air, the access of alkaline and acid fumes being prevented. Mr. Faraday (*Chemical Manipulation*), directs it to be prepared with a *decoction of turmeric* (prepared by boiling one ounce of the coarsely-powdered turmeric in ten or twelve ounces of water, straining through a cloth, and allowing the fluid to settle for a minute or two). Turmeric paper is employed as a test for alkalis, which render it reddish or brownish.

### 3. CURCUMA ANGUSTIFOLIA, Roxburgh.—THE NARROW-LEAVED TURMERIC.

(Fæcula tuberis. East Indian Arrow-root, *Offic.*)

**HISTORY.**—This plant was found by H. T. Colebrook, Esq. in the forests extending from the banks of the Sonā to Nagpore, and was by him introduced into the Botanic garden at Calcutta. (Roxburgh, *Flora Indica.*)

**BOTANY. Gen. Char.**—*Vide Curcuma longa.*

**Sp. Char.**—*Bulb* oblong, with pale, oblong, pendulous tubers only. *Leaves* stalked, narrow lanceolate. *Flowers* longer than the bracts.



**Hab.**—East Indies: from the banks of the Sona to Nagpore. The fecula obtained from its tubers is sold in the markets of Benares, and is eaten by the natives. (Roxburgh, *op. cit.*) Grows also in abundance on the Malabar coast, where, especially at Travancore, large quantities of fecula are extracted from the tubers. (Ainslie, *Mat. Indica*, i. 19.)

**DESCRIPTION.**—Under the name of *East Indian Arrow-root* I have found in commerce two kinds of fecula, both of which are imported from Calcutta.

*a. White East Indian Arrow-root.*—A fine white powder, readily distinguishable, both by the eye and the touch, from West Indian Arrow-root. To the eye it somewhat resembles a finely-powdered salt (as bicarbonate of soda or Rochelle salt). When pinched or pressed by the fingers, it wants the firmness so characteristic of West Indian Arrow-root, and it does not crepitate to the same extent when rubbed between the fingers.

Examined by the microscope it is found to consist of ovate, or oblong-ovate, flattened particles, often with a very short neck, or nipple-like projection. On account of their flatness, they have but little lateral shading, except when viewed edgewise. The hilum is placed at the narrow extremity; it is circular, very small, and not very distinct. The rings are seen both on the flat surface and on the edges: they are numerous, close, and very fine.

*β. Pale Buff-coloured East Indian Arrow-root.*—In the form of powder, or of pulverulent masses, which are dirty or buffy white. Paddy husks, woody fibre, and various impurities, are intermixed.

To the microscope both kinds present the same appearance, from which it is probable that they are obtained from the same plant, but with unequal degrees of care. However, this is somewhat doubtful, as Dr. Roxburgh (*Fl. Indica*, vol. i. p. 126), says that a fecula, like arrow-root, is procured from several species of *Curcuma*, (as *C. rubescens* and *C. leucorrhiza*; the fecula of the latter is called *Tikor*). The particles of East Indian arrow-root are very unequal in size, but on the average are larger than those of West Indian arrow-root.

**COMPOSITION.**—Not ascertained, but doubtless analogous to that of West Indian arrow-root.

**EFFECTS AND USES.**—Analogous to those of the West Indian fecula. Its commercial value, however, is much below that of the latter.

#### 4. AMOMUM CARDAMOMUM, Linn. D.—THE CLUSTER OR ROUND CARDAMOM.

*Sex. Syst. Monandria, Monogynia.*

(Fructus. *Cardamomum rotundum*, *Offic.*)

**HISTORY.**—The fruit of this plant is the *Ἀμωμόν* of Dioscorides, (lib. i. cap. 14,) the *Amomiwa* of Pliny. (*Hist. Nat.* lib. xii. cap. 28, ed. Valp.)

**BOTANY. Gen. Char.**—*Inner limb of the corolla* one-lipped. *Filament* dilated beyond the anther, with an entire or lobed crest. *Capsule* often berried, three-celled, three-valved. *Seeds* numerous, arillate.—*Herbaceous perennials*, with articulated creeping *rhizomes*. *Leaves* in two rows, membranous, with their sheaths split. *Inflorescence* spiked, loosely imbricated, radical (Blume). (*op. cit.*)

**Sp. Char.**—*Leaves* with short petioles, lanceolate. *Spikes* half immersed in the earth, loosely imbricated with villous, lanceolate, acute, one-flowered *bracts*. *Lip*, with the anterior margin, three-lobed. *Crest* three-lobed. (Roxburgh.)

**Hab.**—Sumatra, Java, and other islands eastward to the Bay of Bengal.

**DESCRIPTION.**—The fruit of this plant is the *round cardamom* (*cardamomum rotundum*) of the shops. It varies in size from that of a black cur-

FIG. 153.



Particles of White East Indian Arrow-root.



rant to that of a cherry. It is roundish, or roundish-ovate, with three convex, rounded sides or lobes, more or less striated longitudinally, yellowish or brownish-white, sometimes with a red tint, and when examined by a pocket lens shows the remains of hairs, the greater part of which have been probably rubbed off. The seeds are brown, angular, cuneiform, shrivelled with an aromatic, camphoraceous flavour. The fruits in their native clusters or spikes (constituting the *Amomum racemosum*) are rarely met with: a fine sample is in the Sloanian collection of the British Museum.

FIG. 154.



*Round Cardamom.* are probably analogous to those of the Malabar cardamom, (*Elettaria Cardamomum.*)

**EFFECTS AND USES.**—Similar to those of the Malabar cardamom. Round cardamoms are rarely employed in this country. They are official in the French Codex, and are principally consumed in the southern parts of Europe. The seeds are directed to be used by the Dublin Pharmacopœia, but I presume those of the *Elettaria Cardamom* are meant.

#### 5. AMOMUM GRANA-PARADISI, Smith and 6. A. MELEGUETTA, Roscoe.

**HISTORY.**—Afzelius<sup>1</sup> refers the seed called, in the shops, *grains of paradise*, and which, he says, are the *true Malaguetta pepper*, to his *Amomum Granum Paradisi*.<sup>2</sup> Roscoe, (*Monandrian Plants*), on the other hand, asserts most positively, that Malaguetta pepper is the produce of his *Amomum Melegueta*, which he considers to differ from any previously-described plant. I strongly suspect the seeds of at least two species have been confounded in commerce, under the names of *grains of paradise*, or *Malaguetta pepper*. Afzelius (*Sierra Leone Company's Report* in 1791, Svo. p. 173.) states that there are four sorts of Malaguetta pepper, viz. *Maboobo*, *Massa aba*, *Massa amquona*, and *Tossan*, the last being the native and true one; but Sir J. E. Smith (*Rees' Cyclop.* vol. xxxix. art. *Amomum*.) has shown that the two first of these are distinct species; *Maboobo* being *A. macrospermum*, Smith, and *Massa Aba* being *A. strobilaceum*, Smith.

**BOTANY.** Gen. Char.—Vide *Amomum Cardamomum*.

**Species.**—1. *A. Grana-paradisi*, Smith.

*Rhizome* perennial, woody, creeping horizontally. *Stems* erect, simple, slender, three feet high, leafy, but destitute of flowers. *Leaves* numerous, crowded, two-ranked, alternate, a span long and an inch broad, lanceolate, or slightly ovate, with a long taper point, entire, smooth, single-ribbed, striated with innumerable oblique veins. Their flavour is slightly aromatic, after having been dried 20 years. *Foot-stalks* sheathing, linear, very long, smooth, striated. *Flower-stalks* radical, solitary, an inch or two in length, ascending, clothed with numerous, close, sheathing bracts, all abrupt, ribbed, somewhat hairy and fringed; the lower ones very short, the upper gradually much larger. Of the parts of the flower nothing could be made out in Sir J. Smith's specimens. [Afzelius (*Beschr. offic. Planz.*) declares them to be formed like those of *A. excapum*, Sims.] *Capsule* an inch and a half long, half an inch in diameter, oblong, bluntly triangular, scarcely ovate, beaked, of a dark reddish-brown, ribbed, coriaceous, rough, with minute deciduous bristly hairs. When broken it is very powerfully aromatic, even after being kept twenty years, with a peculiar pepper-like flavour, rather too strong to be agreeable. *Seeds* numerous, enveloped in membranes formed of the dried pulp, roundish or somewhat angular, of a shining golden brown, minutely rough or granulated, extremely hot and acrid (Smith).—Native of Guinea, about Sierra Leone.

#### 2. *A. Melegueta*, Roscoe.

*Stem* erect, six feet high. *Leaves* two-ranked, subsessile, narrow-lanceolate. *Scapæ* radical, covered at the base with about seven imbricated, ovate, concave, pointed, and somewhat cuspidate bracts. *Calyx* cylindrical, of one leaf, green, spotted with red. *Flowers* cylindrical, expanding in a double border; outer border in three sections, the middle section largest, ovate,

<sup>1</sup> *Remed. Guineens.* x. n. 1, quoted in the *Beschreib. offic. Planz.* of Nees, &c.

<sup>2</sup> *A. Grana-paradisi* of Smith in *Rees' Cyclop.* vol. xxiii. art. "Melegueta."



the two others linear and opposite; inner lip very large, broad-ovate, crenate, pale-yellow at the base, crimson at the margin. *Filament* strong, erect, clavate, terminating in three lobes, middle lobe erect and bifid, the other two pointed and recurved; a pair of hornlets on the filament, near the base of the lip. *Anther* in two lobes, seated in front of the filament, a little below the apex, bright yellow. *Style* erect, tubular, expanding into a dilated *stigma* or cup, supported at the base by two linear *processes*, about an inch in length, and one-eighth of an inch in breadth, by much the largest specimen of this part observable in any scitamineous plant. *Capsule* cylindrical coriaceous, six inches long, yellow, spotted with orange, supported at the base by the large ovate, concave, cuspidate bracts, and containing a columella or receptacle about four inches long, covered with seeds beautifully arranged, arilled, and imbedded in a tomentose substance. Seeds angular, light brown, with a highly aromatic and grateful flavour (Roscoe).—Cultivated at Demerara: probably from Africa.

**DESCRIPTION.**—In the Sloanian Collection of the British Museum are several capsules of Malaguetta pepper, one of which is labelled "*Meleguetta, a pod from Guinea.*" (Fig. 155 is taken from one of these). They are two and a half inches long, and one inch in diameter, ovate or ovate-oblong, coriaceous, wrinkled as if shrivelled, yellowish-brown. The seeds are identical with those called, in the shops, *Guinea grains*, or *grains of Paradise*. Are these capsules the fruit of *A. Meleguetta*, Roscoe?

In Dr. Burgess's collection of *Materia Medica*, in the College of Physicians, is a capsule smaller than the preceding, oval or oval-oblong, somewhat reddish-brown, wrinkled longitudinally. (Fig. 156 is taken from it.) The seeds very closely resemble, if they be not identical with, the grains of paradise of the shops. They have also the same vehemently hot taste. This capsule appears to me to be the fruit of *A. Grana Paradisi*, Smith.

The seeds, called in the shops *grains of paradise* (*grana paradisi*), or *Guinea grains*, are roundish or ovate, frequently bluntly angular, and somewhat cuneiform; shining golden brown; minutely rough, from small warts and wrinkles; internally white. Their taste is aromatic and vehemently hot or peppery: when crushed and rubbed between the fingers their odour is feebly aromatic. Their greatest diameter rarely exceeds  $1\frac{1}{4}$  lines. The acrid taste resides in the seed coats.

**COMMERCE.**—Grains of paradise are imported in casks, barrels, and puncheons, from the coast of Guinea. The quantities on which duty (two shillings per lb.) has been paid during the last six years, is as follows (*Trade List*):

In 1835.....	14,603 lbs.	In 1837.....	17,134 lbs.	In 1839.....	19,036 lbs.
1836.....	16,234	1838.....	16,199	1840.....	9,916

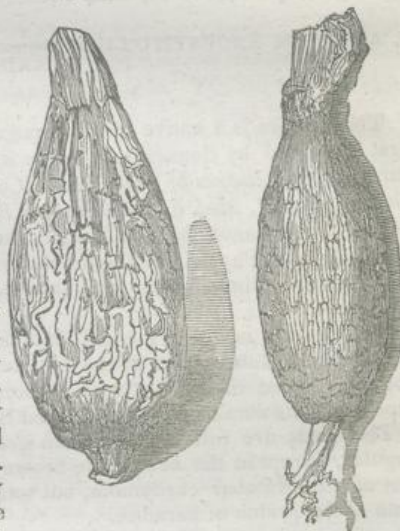
"*Extract or preparation of Guinea grains*" is mentioned by Frewin (*Digested Abridgm. of the Laws of the Customs*, 1819,) in his table of *Imports*, as paying a duty of two shillings per lb.

The heavy duty imposed on grains of paradise is intended to act as a prohibition of their use. (*Fourth Report of the African Institution*, p. 16.)

**COMPOSITION.**—Grains of paradise were analyzed in 1811 by Willert, (*Trommsdorff's Journ.* xx. St. 2, 1811,) who obtained the following results:—*Volatile oil* 0.52, *acrid resin* 3.40, *extractive* 1.27, *tragacanthin* and *woody fibre* 82.8 [? *water and loss* 12.01].

FIG. 155.

FIG. 156.



Capsules of Malaguetta Pepper.



1. The VOLATILE OIL has a light yellow colour, a camphoraceous smell, and a hot penetrating taste.

2. The RESIN is brown, soft, odourless, and has an acrid, burning taste.

PHYSIOLOGICAL EFFECTS.—Analogous to those of pepper. A very erroneous notion prevails that these seeds are highly injurious. (Roscoe, *op. cit.*)

USES.—Rarely employed as an aromatic. Esteemed in Africa as the most wholesome of spices, and generally used by the natives to season their food. (*Fourth Report of the African Institution.*)

Its principal consumption is in veterinary medicine, and to give an artificial strength to spirits, wine, beer, and vinegar. By 56 *Geo.* III. c. 58, no brewer or dealer in beer shall have in his possession or use grains of paradise, under a penalty of £200 for each offence: and no druggist shall sell it to a brewer, under a penalty of £500 for each offence.

7. AMOMUM ANGUSTIFOLIUM, *Sonnerat.*—THE GREATEST OR MADAGASCAR CARDAMOM.

*Amomum madagascariense, Lamarch.*

This species is a native of Madagascar, growing in marshy ground, and was first described by Sonnerat. (*Voyage aux Indes*, t. ii. p. 242.) Its fruit is the *cardamomum majus* of Matthioli, (*Comment. in vi. lib. Diosc. Venet.* 1583,) Geoffroy, (*Mat. Med.* ii. 366,) Smith, (*Rees' Cyclop.* art. *Millegetta*,) and Geiger. (*Handb. d. Pharm.* Bd. ii.) In Dr. Burgess's Collection of *Materia Medica* at the College of Physicians, there are several fine specimens (from one of which the accompanying figure was taken), marked "*Cardomomum maximum Matthioli.*"

The capsule is ovate, pointed, flattened on one side, striated, with a broad, circular umbilicus or scar at the bottom, around which is an elevated, notched, and corrugated margin. Some authors, who have mistaken the base of the capsule for its summit, have compared the shape to that of a fig.

The seeds are rather larger than grains of paradise, roundish or somewhat angular, abrupt at the base, olive-brown, with an aromatic flavour analogous to that of the Malabar cardamom, but totally devoid of the vehemently hot acrid taste of the grains of paradise.

FIG. 157



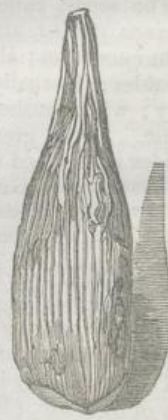
*Madagascar Cardamom.*

FIG. 158.



*Amomum Clusii.*

FIG. 159.



*Amomum macrospermum.*



8. AMO'MUM CLU'SII, *Smith*.—LONG-SEEDED AMOMUM.

I have received from a druggist a capsule (fig. 158), which agrees with one noticed and figured by Clusius (*Exoticorum*, pp. 37, 38). Another specimen is described by Sir J. E. Smith, (*Rees, Cyclop.* vol. xxiii. art. *Mellegetta*, and vol. xxxix. *Addenda* art. *Amomum*). This capsule must be confounded neither with that of the Madagascar cardamom, nor with that of the grain of paradise. It is ovate, pointed, slightly triangular, cartilaginous, striated, smooth, yellowish [reddish, *Smith*] brown. The seeds distinguish it from all other species: they are oblong or ovate, inclining to cylindrical, dark-brown, highly polished, as if varnished; with a pale yellowish-brown, corrugated, and notched, margin surrounding the scar. They are very slightly aromatic.

9. AMO'MUM MACROSPERMUM, *Smith*. LARGE-SEEDED GUINEA AMOMUM.

Zingiber Melegueta, *Gartner*. Mabooboo, *Azelius*. Banda Cardamom, *Th. Martius*.

This was mistaken by Gartner for Malagueta pepper. The capsule is ovate, pointed, somewhat striated, about two inches long, and six lines broad, with a corrugated beak. Seeds ovate, or nearly globular, or somewhat oblong, scarcely larger than grains of paradise, smooth, polished, greenish-gray, or lead-coloured, with a strong umbilicated scar at their base, with a whitish or pale-yellow margin; flavour slightly aromatic. A native of Sierra Leone. (Fig. 159 is from a specimen in the Sloanian Collection of the British Museum.)

10. AMO'MUM MAXIMUM, *Roxburgh*.—THE GREAT-WINGED AMOMUM.

(Fructus: Java Cardamom, *offic.*)

HISTORY.—This plant was first described by Roxburgh. (*Asiatic Researches*, xi. p. 344.) That it yields the *Java cardamom* of commerce I entertain but little doubt; for the latter agrees precisely with the characters assigned by Roxburgh and Blume, (*Enum. Pl. Javæ*), to the fruit of this plant, the seeds of which, the first of these botanists says, "are aromatic, and pass for a sort of cardamom." (*Fl. Indica*, vol. i. p. 44, 1832.) Moreover, *Amomum maximum*, being a native of Java, accounts for its fruit being called in commerce the *Java cardamom*. Lastly, no other plant noticed in the works of Roxburgh and Blume agrees precisely in the characters of its fruit with the cardamom in question.

*Elettaria cardamomum medium*, Roxburgh, which I at one time, (*Lond. Med. Gaz.* vol. xviii. p. 463.) with some other botanists, fancied might be the parent plant, disagrees in several respects: the shape and size of its fruit, the inequality of its wings, and the qualities of its seed coats, are the most essential points of disagreement. The fruit of *Amomum aromaticum* (Dr. Roxburgh's drawing of which was kindly shown me by Dr. Horsfield) has no resemblance to the *Java cardamom*. Lastly, I have examined the fruits of *Amomum grandiflorum*, *A. Afzelii*, and *A. dealbatum* [a specimen of the latter in the British Museum is erroneously marked *A. maximum*], in the collections of the Linnean Society and the British Museum, and find that none of them are the *Java cardamom*.

BOTANY. Gen. Char.—Vide *Amomum Cardamomum*.

Sp. Char.—Leaves stalked, lanceolate, villous underneath. Spikes oval, even with the earth. Bracts lanceolate. Lip elliptical. Coronet of one semilunar lobe. Capsules round, nine-winged. (Roxburgh.)

The capsule is "almost globular, size of a gooseberry, three-celled, three-valved, ornamented with nine [seven to thirteen, *Blume*], firm, short, ragged (when old and dry), membranaceous wings. The seeds possess a warm, pungent, aromatic taste, not unlike that of cardamoms, but by no means so grateful." (Roxburgh.) The *Nepal cardamom*, described by Dr. Hamilton, (*An Account of the Kingdom of Nepal*, ed. 1819,) appears to be identical with the *Java cardamom*. Dr. Hamilton says, the plant yielding it "is a species of *Amomum*,



as that genus is defined by Dr. Roxburgh, and differs very much from the cardamom of Malabar."

**Hab.**—The Malay Islands (Roxburgh); Java (Blume). Cultivated in the mountainous parts of Nepal, where it is propagated by cuttings of the root [rhizome]; the plants yield in three years, and afterwards give an annual crop. (Hamilton.)

**DESCRIPTION.**—Greater Java cardamoms (*cardamomi majores javanenses*, Th. Martius; Java cardamoms, offic.; Nepal Cardamoms, *desi elachi* [i. e. country cardamoms] of Hindustan, Hamilton; the *bura elachee* [i. e. great cardamoms] of Saharunpore,—the Bengal cardamoms of the Calcutta market, Royle; cardamome *fausse-maniguette*, Guibourt) are oval or oval-oblong,

FIG. 160.



Java Cardamom, with its foot-stalk.

frequently somewhat ovate, three-valved, from eight to fifteen lines long, and from four to eight lines broad, usually flattened on one side, convex on the other, occasionally curved, sometimes imperfectly three-lobed, and resembling in their form the pericarp of the cocoa-nut. Their colour is dirty grayish-brown. They have a coarse, fibrous, aged appearance, are strongly ribbed, and when soaked in hot water become almost globular, and present from nine to thirteen ragged, membranous wings, which occupy the upper half or three-fourths of the capsule, and are scarcely perceptible in the dried state of the pericarp. By the possession of wings, these cardamoms are distinguished from all others of commerce, and hence might be called the *winged cardamoms*. Occasionally the footstalk is attached, with, now and then, portions of brown, membranous, imbricated scales, as long as the fruit.

At the opposite or winged extremity of the capsule are frequently the fibrous remains of the calyx. Seeds somewhat larger than grains of paradise, dull, dirty brown, with a shallow groove on one side, internally white; taste and odour feebly aromatic. One hundred parts of the fruit consist, according to Th. Martius, (*Pharmakogn.*) of seventy parts seeds, and thirty parts pericarpial coats. They are imported from Calcutta in bags.

**COMPOSITION.**—Analogous probably to that of the Malabar cardamom, except in the quantity of volatile oil which it yields; for Martius procured only four scruples of it from a pound of the fruit. The oil obtained was white and thickish.

**EFFECTS AND USES.**—Java cardamoms are not used here. They are of inferior quality, and when brought to this country are usually sold in bond for continental use. In 1839 a quantity of them was sold at seven-pence *per lb.*

#### 11. ELETTERIA CARDAMOMUM, Maton.—THE TRUE OR OFFICIAL CARDAMOM.

*Alpinia Cardamomum*, Roxb. L.—*Renealmia Cardamomum*, Ed.—*Amomum Cardamomum*, D.  
*Sex. Syst. Monandria, Monogynia.*  
 (Semina, L. D.—The fruit; Cardamoms, Ed.)  
 (Cardamomum, U. S.)

**HISTORY.**—A medicine called Cardamom (*Καρδαμύμον*), is mentioned by Hippocrates, (pages 265, 572, 603, 651, ed. Fœs.) Theophrastus, (*Hist. Plant.* lib. xi. cap. vii.) and Dioscorides, (lib. i. cap. 5) the first of whom employed it in medicine. But it is now scarcely possible to determine what substance they referred to, as their notices of it are brief and imperfect, though I believe it to have been one of the fruits which we call cardamoms. Pliny (*Hist. Nat.* lib. xii. cap. xxix. ed. Valp.) speaks of four kinds of cardamoms, but it is almost impossible to ascertain with any certainty what species he refers to.

**BOTANY.** **Gen. Char.**—The same as that of *Amomum*, but the *tube of the corolla* filiform, and the *anther* naked (Blume).

**Sp. Char.**—*Leaves* lanceolate, acuminate, pubescent above, silky beneath.



Spikes lax. Scape elongated, horizontal. Lip indistinctly three-lobed. (Blume.)

Rhizome with numerous fleshy fibres. Stems perennial, erect, smooth, jointed, enveloped in the spongy sheaths of the leaves; from six to nine feet high. Leaves subsessile on their sheaths, entire; length from one to two feet. Sheaths slightly villous, with a roundish ligula rising above the mouth. Scapes several (three or four) from the base of the stems, flexuose, jointed, branched, one to two feet long. Branches or racemes alternate, one from each joint of the scape, suberect, two or three inches long. Bracts solitary, oblong, smooth, membranaceous, striated, sheathing, one at each joint of the scape. Flowers alternate, short-stalked, solitary at each joint of the racemes, opening in succession as the racemes lengthen. Calyx funnel-shaped, three-toothed at the mouth, about three-quarters of an inch long, finely striated, permanent. Tube of corolla slender, as long as the calyx; limb double, exterior of three, oblong, concave, nearly equal, pale greenish white divisions; inner lip obovate, much larger than the exterior divisions, somewhat curled at the margin, with the apex slightly three-lobed, marked chiefly in the centre with purple violet stripes. Filament short erect: anther double emarginate. Ovary oval, smooth: style slender: stigma funnel shaped. Capsule oval, somewhat three-sided, size of a small nutmeg [!], three-celled, three-valved. Seeds many, angular (Roxburgh).

Hab.—Mountainous part of the coast of Malabar.

PRODUCTION.—Cardamoms are produced naturally or by cultivation. Between Travancore and Madura they grow without cultivation; (Hamilton, [Buchanan], *Journey through Mysore, Canara, and Malabar*, vol. ii. p. 336.) and also at certain places in the hills which form the lower part of the Ghâts in Cadutinada and other northern districts of Malayata. (Hamilton, *op. cit.* vol. ii. p. 510.) The cardamoms of the Wynaad, which are esteemed the best, are cultivated: the spots chosen for the cardamom farms are called *Ela-Kandy*, and are either level or gently-sloping surfaces, on the highest range of the Ghâts after passing the first declivity from their base. (White, *Trans. of Linn. Soc.* vol. x. p. 237.) “Before the commencement of the periodical rains, in June, the cultivators of the cardamom ascend the coldest and most shady sides of a woody mountain; a tree of uncommon size and weight is then sought after, the adjacent spot is cleared of weeds, and the tree felled close at its root. The earth, shaken and loosened by the force of the fallen tree, shoots forth young cardamom plants in about a month’s time. (Capt. Dickson, in Roxburgh’s *Fl. Indica*.)

The quantities of cardamoms brought for sale at Malabar is about 120, or, according to another account, only 100 candies, from the following places (Hamilton, *op. cit.* vol. ii. p. 538):

	Candies of 640 lbs.	Candies of 640 lbs.
Coorg .....	40	30
Wynaad .....	57	65
Tamarachery .....	20	3
Cadutinada or Cartinaad .....	3	2
	120	100

The cardamoms of the Wynaad are shorter, fuller of seed, and whiter, than those of Malabar, and sell for 100 rupees a candy more. Those of Coorg have fewer fine grains, but they have also fewer black or light ones. The cardamoms of Sersi (western part of Soonda) are inferior to those of Coorg. (Hamilton, *op. cit.* vol. ii. p. 538, and vol. iii. p. 228.)

DESCRIPTION.—The fruit of the *Elettaria Cardamomum* constitutes the *small, officinal, Malabar cardamom* (cardamoms, Ed.; *cardamomum minus*, Clusius, Matthioli, Bontius, Geoffroy, Dale, Geiger, Th. Martius, and Guibourt; *cardamomum malabarensis*). It is an ovate-oblong, obtusely triangular capsule, from three to ten lines long, rarely exceeding three lines in breadth; coriaceous,



ribbed, grayish or brownish yellow. It contains many angular, blackish or reddish brown, rugose seeds (*cardamomum*, L.; *cardamomum excorticatum*, Offic.) which are white internally, have a pleasant aromatic odour, and a warm, aromatic, agreeable taste.<sup>1</sup> 100 parts of the fruit yield 74 parts of seeds and 26 parts of pericarpial coats. (Th. Martius, *Pharmakogn.*)

Three varieties of Malabar cardamoms are distinguished in commerce, viz. *shorts*, *short-longs*, and *long-longs*.

FIG. 161.



Malabar Cardamoms.

a. shorts.  
b. short-longs.  
c. long-longs.

a. SHORTS: Malabar cardamoms properly so called: *Petit cardamome* (Guib.); ? *Wynaad cardamom* (Hamilton); ?? *Prima species Elettari planè rotunda et albicans*. (Rheede, pars xi. tab. 4, 5, and 6.)—From three to six lines long, and from two to three lines broad; more coarsely ribbed, and of a browner colour, than the other varieties. This is the most esteemed variety.

β. SHORT-LONGS: ? *Secunda species Elettari oblongior sed vilior* (Rheede).—Differs from the third variety in being somewhat shorter and less acuminate.

γ. LONG-LONGS.—*Moyen cardamome* (Guib.); ?? *Tertia species Elettari vilissima et planè acuminata* (Rheede).—From seven lines to an inch long, and from two to three lines broad: elongated, somewhat acuminate. This, as well as the last variety, is paler and more finely ribbed than var. a. *shorts*. The seeds also are frequently paler (in some

cases resembling those of the Ceylon cardamom) and more shrivelled.

COMPOSITION.—The small cardamom was analyzed by Trommsdorff, in 1834. (*Journ. de Chim. Méd.* t. i. p. 196, 2<sup>nd</sup> Sér.) He obtained the following results:—*Essential oil* 4·6, *fixed oil* 10·4, *a salt of potash (malate?)* combined with *a colouring matter* 2·5, *secula* 3·0, *nitrogenous mucilage* with *phosphate of lime* 1·8, *yellow colouring matter* 0·4, and *woody fibre* 77·3.

1. VOLATILE OR ESSENTIAL OIL OF CARDAMOM.—Is obtained from the seeds by distilling them with water. 50 lbs. of good short Malabar cardamoms yielded, at one operation, about f3viss. of oil for every lb. of fruit. (*Private information.*) It is colourless, has an agreeable odour, and a strong, aromatic, burning taste. Its sp. gr. is 0·943. It is very soluble in alcohol, ether, oils (both fixed and volatile), and acetic acid. It is insoluble in potash-ley. By keeping, it becomes yellow, viscid, and loses its peculiar taste and smell. It then detonates with iodine, and takes fire when placed in contact with concentrated nitric acid. On this oil depends the odour, flavour, and aromatic qualities of the seeds. Its composition is analogous to that of oil of turpentine, being C<sup>10</sup>H<sup>8</sup>.

2. FIXED OIL OF CARDAMOM.—Is soluble in alcohol, ether, and the oils, both fixed and volatile. Nitric acid, assisted by heat, reddens it. It has some analogy to castor oil.

PHYSIOLOGICAL EFFECTS.—The effects of cardamoms are those of a very agreeable and grateful aromatic, devoid of all acidity. (See the effects of the *Spices*, vol. i. p. 183.)

USES.—Cardamoms are employed partly on account of their flavour, and partly for their cordial and stimulant properties. They are rarely administered alone, but generally either as adjuvants or correctives of other medicines, especially of stimulants, tonics, and purgatives.

ADMINISTRATION.—Though cardamoms enter into a considerable number of pharmaceutical compounds, only two preparations derive their names from these seeds. They are the following:

1. TINCTURA CARDAMOMI, L. E. (U. S.) *Tincture of Cardamoms*.—(Cardamom seeds, bruised, ʒijss. [ʒivss. *Ed.* (U.S.)]; Proof Spirit, Oij. Macerate for fourteen [seven, *Ed.*] days, and strain. “This tincture may be better prepared by the process of percolation, in the same way with the tincture of capsicum, the seeds being first ground in a coffee-mill,” *E.*)—This compound is agreeably aromatic. It is used as an adjunct to cordial, tonic, and purgative mixtures.—Dose, fʒj. to fʒij.

<sup>1</sup> For some drawings of the minute structure of the seeds, vide Bischoff's *Handb. d. botanic. Terminal*. Ter. xliii. fig. 1876 and 1954.



2. **TINCTURA CARDAMOMI COMPOSITA**, L. E. D. *Compound Tincture of Cardamoms*.—(Cardamom seeds, bruised; Caraway seeds, bruised, of each ʒijss. [ʒij. D.]; Cochineal, powdered, ʒj.; Cinnamon, bruised, ʒv. [ʒss. D.]; Raisins [stoned], ʒv.; Proof Spirit, Oij. [*wine measure*, D.] Macerate for fourteen [seven, *Ed.*] days, and filter. "This tincture may also be prepared by the method of percolation, if the solid materials be first beat together, moistened with a little spirit, and left thus for twelve hours before being put into the percolator," *Ed.* The *Dublin College* omits the cochineal and raisins.)—This tincture is used for the same purposes and the same doses as the former preparation, over which it has the advantage of a more agreeable flavour. Moreover, its colour often renders it useful in prescribing.

2. **ELETTARIA MAJOR**, *Smith*.—THE GREATER OR CEYLON ELETTARIA.

*Alpinia Granum paradisi*, *Moon*.  
(Fructus; Ceylon Cardamom, *Offic.*)

**HISTORY**.—The fruit of this plant was known to Clusius, (*Exoticorum*, lib. i. p. 186, 187,) who has noticed and figured it under the name of the *Cardamomum majus vulgare*.

**BOTANY**.—The flower has not yet been described, but the other parts of the plant are so similar to the corresponding parts of *Elettaria Cardamomum*, that I have felt no difficulty in referring this plant to the genus *Elettaria*. Sir James Edward Smith, (Rees's *Cyclopædia*, vol. xxxix. art. *Elettaria*,) who was acquainted with the fruit only, observes, "we are persuaded they must belong to the same genus as the Malabar Cardamom."

**Gen. Char.**—See *Ellettaria Cardamomum* p. 152.

**Sp. Char.**—*Capsule* lanceolate-oblong, acutely triangular, with flat sides. *Calyx* three lobed. (Smith.)

*Rhizome* with numerous fibres. *Stem* erect, smooth, enveloped by leaf sheaths. *Leaves* sessile on their sheaths, silky beneath, acuminate; the shorter ones lanceolate, the larger ones oblong-lanceolate: breadth 2 to 3 inches, length not exceeding 15½ inches. *Sheaths* about half the length of the leaves, with a roundish ligula. *Scape* from the upper part of the rhizome, flexuose, jointed, nine inches long, branched; the branches alternate, one from each joint of the scape, sub-erect, half an inch long, supporting two or three pedicels of about 3-10ths of an inch. *Bracts* solitary, sheathing at each joint of the scape, withered; partial ones, solitary, ovate, acute. *Flowers* not present. *Capsules* one or two on each branch of the scape, with the permanent calyx attached to them: their characters are described in the text.

The plant from which the above description has been drawn, formed part of a collection made for me in Ceylon by my much lamented friend and pupil, the late Mr. Fred. Sauer, Assistant-Surgeon in her Majesty's 61st regiment. He received it from Mr. Lear, Acting Superintendent of the Royal Botanic Gardens in Ceylon, whose letter, describing it as "*Alpinia* [*Amomum*] *Granum paradisi*," I have in my possession. I presume, therefore, that it is the plant which Mr. Moon,<sup>1</sup> the former superintendent of the Gardens, has described under the same name. The following facts favour this conclusion:

1. Mr. Moon states that its Singhalese name is *Ensal*, a term which both Hermann (*Musæum Zeylanicum*, p. 66, Ed. 2<sup>da</sup>. Lugd. Bat. 1726,) and Burmann (*Thesaurus Zeylanicus*, p. 54, Amstelæd. 1737,) gave as the native name for Cardamom.

FIG. 162.



*Elettaria major*.

<sup>1</sup> *A Catalogue of the Indigenous and Exotic Plants growing in Ceylon*. Colombo, 1824.



2. Mr. Moon states that it is cultivated at Candy. If the real grain of paradise plant were cultivated in Ceylon, it would be somewhat remarkable that its seeds are never exported. Now I have carefully examined the list of exports from that island for several years, but the word grain of paradise never once occurs; and all the seeds imported into England under that name, I find, by the Custom-House returns, come from the western coast of Africa. On the other hand, the Ceylon Cardamom comes, as its name indicates, from that island.

It is probable, I think, that the plant which yields the grains of paradise of European commerce does not grow in the East; and that writers who have stated otherwise have confounded it with the plant yielding Ceylon Cardamom. But the term "grains of paradise" is so truly oriental in its character, that I suspect it was first applied to Ceylon Cardamoms, a supposition rendered probable by the much more agreeable flavour of the latter seeds, as well as by the observation of Dale, (*Pharmacologia*, p. 252, 3<sup>rd</sup> ed. Lond. 1737,) that grains of paradise were often substituted for the Ceylon Cardamom.<sup>1</sup>

**Hab.**—Cultivated at Candy.

**COMMERCE.**—Bertollacci<sup>2</sup> says that the Ceylon cardamom is collected chiefly in the Candian territory, and that he was informed it is not indigenous, but was introduced by the Dutch. The quantity exported from 1806 to 1813 inclusive varied from 4½ to 18 candies annually. Percival (*Account of Ceylon*, 1805,) states that cardamoms grow in the south-east part of Ceylon, particularly in the neighbourhood of Matura. I am informed that occasionally Ceylon cardamoms come from Quillon.

**DESCRIPTION.**—The *Ceylon cardamom*, or, as it is sometimes termed in English commerce, the *Wild Cardamom* (*cardamomum zeylanicum*; *cardamomum medium*, Matth. and Geoffr.; *cardamomum majus*, Bont. and Dale; *cardamomum majus vulgare*, Clusius; *cardamomum majus officinarum*, C. Bauhin; *cardamomum longum*, Th. Martius and Geiger; *grande cardamome*, Guib.) is a lanceolate-oblong capsule, acutely triangular, more or less curved, with flat and ribbed sides, about an inch and a half long and one-third of an inch broad. At one extremity we frequently find the long, cylindrical, permanent, three-lobed Calyx; at the other, the fruit stalk, which is sometimes branched. The pericarp is coriaceous, tough, brownish, or yellowish ash-coloured, three-celled. The seeds are angular, rugged, have a yellowish red tinge, a fragrant and aromatic but peculiar odour, and a spicy flavour. The long diameter of the vitellus is parallel to that of the embryo. Th. Martius (*Pharmakognosie*,) says that 100 parts of these fruits yield 71 parts of seeds, and 29 parts of pericarpial coats.

**COMPOSITION, EFFECTS, AND USES.**—Ceylon cardamoms have not been analysed. Their constituents, as well as their effects and uses, are doubtless analogous to those of the Malabar cardamom. Their commercial value is about one-third that of the latter.

FIG. 163.



*Ceylon Cardamom.*  
a, Remains of the Calyx.  
b, Stalk.

#### OTHER MEDICINAL ZINGIBERACEÆ.

##### a. Cardamoms.

Besides the Cardamoms already mentioned there are several other kinds which I have met with, and which I notice in order to make the account of these fruits as complete as possible.

1. *ALPINA ALBA*, Roscoe; *Hellenia alba*, Willd.; *Amomum medium*, Loureiro.—The fruit of this plant is called by Loureiro, (*Flora Cochinchinensis*,) *Tsao quo*. He gave specimens of it to the Muséum d'Histoire Naturelle of Paris. For my specimens I am indebted to Professor Guibourt,<sup>3</sup> who calls the fruit the *Ovoid China Cardamom*.

The dried fruit is about the size and shape of a large nutmeg: it is ovoid, from ten to fourteen lines long, and from six to eight lines broad, rather rigid, striated longitudinally, yellow-

<sup>1</sup> It would appear, however, that the term Grain of Paradise is also applied, in Ceylon, to *Alpinia Allughas*. (See Burmann's *Thesaurus*, p. 54; and Sir J. E. Smith, in Rees's *Cyclopaedia*, vol. xxxix. art. *Alpinia*.)

<sup>2</sup> *Agricult. Commerce and Finance Interests of Ceylon*, p. 157. 1817.

<sup>3</sup> *Histoire Abrégée des Drogues simples*, t. ii. pp. 287 and 288, 3d ed. Paris, 1836.



ish-brown with a reddish tint [scarlet when recent: *König*]. Seeds numerous, very large, pyramidal, brown externally, flavour and odour terebinthinate; albumen white, embryo yellow.

2. ROUND CHINA CARDAMOMS, Guibourt.—“The Muséum d'Histoire Naturelle possesses two varieties of this fruit mixed together. The seeds, merely united in globular and coherent masses are marked *Cao-Keu*; and the entire fruits *Tsao-Keou*.” (*Histoire Abrégée des Drogues simples*, p. 287.)

a. LARGE ROUND CHINA CARDAMOM, Guibourt (MS).—Probably the fruit of *Anomum globosum*, Loureiro. The accompanying (fig. 165) was made from specimens kindly lent me for that purpose by Professor Guibourt. Capsule thin, round or oval. Seeds in globular masses, marked, on the surface opposed to the pericarp, by a linear depression or groove. I have observed specimens in the Sloanian Collection, as also in a collection of Chinese medicines at the College of Physicians. On comparing Professor Guibourt's specimen with the fruit of *Alpinia nutans* in Dr. Wallich's Collection, in the possession of the Linnean Society, the two are scarcely distinguishable externally. The seeds, however, are quite dissimilar.

FIG. 164.

Ovoid China  
Cardamom.

FIG. 165.



Large Round Cardamom.

a, Fruit.  
b, Globular mass of seeds.



FIG. 166.

Small Round China  
Cardamom.

a, Fruit.  
b, Globular mass of seeds.



FIG. 167.

Black Carda-  
mom.

β. SMALL ROUND CHINA CARDAMOM, Guibourt, (MS).—I am indebted to Professor Guibourt for my specimens of this fruit. Capsules ovate, oblong, obtusely triangular. Seeds have no linear depression or groove as those of the larger variety, and by the absence of this they may be readily distinguished from the preceding; coherent in masses, which are three-lobed, not quite globular. In my specimens the epicarp is eroded. The flavour of the seeds is aromatic and terebinthinate but not powerful.

3. BLACK CARDAMOMS, Gärtner.—For specimens of these I am also indebted to Professor Guibourt. It is unknown from what plant it is obtained. Capsule larger than the short Malabar cardamoms, acuminate at its two extremities, and formed, as it were, of two obtusely-triangular pyramids joined base to base. Pericarp ash-brown, aromatic, but less so than the seeds (Guibourt). Seeds angular, brown, slightly aromatic, but devoid of the terebinthinate flavour.

4. CARDAMOMUM MAJUS, Burgess.—In Dr. Burgess's collection at the College of Physicians is a capsule (in a bad state of preservation) marked “*Cardamomum majus*.” Its size and shape are analogous to the grain-of-paradise pod (fig. 156). It has a fibrous tuft (remains of calyx?) at one extremity, and is much split at the other. The seeds are angular, oblong, larger than those of Malabar cardamoms, shining brownish yellow, and have a large concave depression (hilum) at one extremity. They have a warm aromatic flavour and an agreeable odour, somewhat analogous to that of the oil of lemon-grass.

#### β. Aromatic Rhizomes.

5. ALPINIA GALANGA, Roxburgh.—The rhizome of this plant constitutes the *Galangal Root* (*Radix Galangæ*) of English druggists. It occurs in pieces which are as thick as the finger, seldom exceeding three inches in length, cylindrical or somewhat tuberous, often forked, sometimes slightly striated longitudinally, and marked with whitish circular rings. Externally its colour is reddish-brown; internally pale, reddish-white. Its colour is agreeably aromatic; its taste peppery and aromatic. It is the rhizome of *Alpinia Galanga*, Rox. It has been analyzed by Bucholz (*Trommsdorf's Journal*, xxv. 2, p. 3.) and by Morin (*Journ. de Pharm.* ix. p. 257). The former obtained Volatile Oil 0.5, Acrid soft Resin 4.9, Extractive 9.7, Gum 8.2, Bassorin 41.5, Woody fibre 21.6, Water 12.3, Loss 1.3. Its effects, uses, and doses, are analogous to ginger.

6. CURCUMA ZEDOARIA, Roxburgh.—The sliced tuber of this plant is the *Zedoary Root* (*Radix Zedoariæ*) of English druggists, which appears to me to agree with Professor Guibourt's de-



scription of *Round Zedoary* (*Zedoaria rotunda*). It occurs in segments (halves, quarters, or flat sections) of a roundish or ovate tuber. The external portion of the tuber is marked by the remains, membranes, and fibres, and is of a pale brownish-gray or whitish appearance. When cut it presents a yellowish marble appearance, not very dissimilar to the cut surface of rhubarb. It has a warm, aromatic, bitter taste, and an aromatic odour. It has been analyzed by Bucholz, (*Trommsdorff's Journal*, xxv. 2, p. 3,) and by Morin (*Journ. de Pharm.* t. ix. p. 257). Its constituents, according to the latter chemist, are—*Volatile oil, Resin, Gum, Starch, Woody fibre, Vegeto-animal Matter (?) Osmazome (?) free Acetic Acid, Acetate of potash, Sulphur*, and in the ashes *Carbonate and Sulphate of potash, Chloride of potassium, Phosphate of Lime, Alumina, Silica, Oxides of Iron and Manganese*. It possesses aromatic and tonic properties. It is less heating than ginger and galangal, and is more analogous to turmeric.

7. ZINGIBER CASSAMUNAR, Roxburgh.—This perhaps is the plant from whence is derived the root known by English druggists as *Cassamunar Root*, and which they regard as identical with *Zerumbet Root*. (Private information; also Gray, *Pharmacology*.) It appears to me to be the *Turmeric-coloured Zedoary* of Ainslie. (*Materia Indica*, vol. i. p. 490.) It occurs in segments (halves or quarters) of an ovate tuber (which in the dried state must have been about the size of a pigeon's egg), the external surface of which is marked with circular rings and the bases of the root-fibres, and is of a dirty turmeric-yellow colour. Internally it is reddish-brown, and has some resemblance, in its colour and pellucidity, to a fresh-fractured surface of *Socotrine aloes*. Its flavour is warm and aromatic; its odour is aromatic. It has not been analyzed. Its effects must be similar to those of ginger. It was at one time used in convulsive and other cerebral diseases. (Sir Hans Sloane, *Phil. Trans.* vol. xxii. No. 264, p. 580.)

8. CURCUMA ZERUMBET, Roxburgh.—This I suspect to be the origin of the *Zerumbet Root* given me by Dr. Royle. It is very similar in shape to a curved or arched piece of long turmeric. Its colour is yellowish-gray.

#### ORDER XX.—ORCHIDÆ, R. Brown.—THE ORCHIS TRIBE.

ORCHIDES, Jussieu. ORCHIDACEÆ and VANILLACEÆ, Lindley.

This remarkable order of gynandrous monocotyledons is, in reference to its dietetical and medicinal properties, of little importance.

The tuberous or palmate roots abound in gummy and, at certain times, in farinaceous matters, which render them nutritive, emollient, and demulcent. *Salap* is the prepared and dried roots of several orchideous plants, and is sometimes sold in the state of powder. *Indigenous Salap* is procured from *Orchis mascula*, *O. latifolia*, and other native plants of this order, (Dr. Percival, *On the Preparation, Culture, and Use of the Orchis Root*, 1773.) *Oriental Salap* is procured from other Orchidæ. Professor Royle states that the salap of Cachmere is obtained from a species

of *Eulophia*. The notion of the aphrodisiac properties of salap seems to be founded on the doctrine of signatures.

The *Vanilla* of the shops is the fruit of *Vanilla aromatica*, Sw., a native of Peru, Mexico, Jamaica, and Cuba. Schiede (*Schlechtendal's Linnaea*, Oct. 1829, S. 573) mentions three other Mexican species (*V. sativa*, *V. sylvestris*, and *V. Pompana*) which yield vanilla. Notwithstanding the strong odour of this fruit, no volatile oil can be obtained by distillation. (See Bucholz's analysis in *Buchner's Repert.* ii. 253.) The white acicular crystals found on the fruit are a kind of solid volatile oil. *Vanilla* is employed in this country for flavouring chocolate, ice-creams, &c. But on the continent it is used as a medicinal agent. It is an aromatic stimulant; has an exhilarating effect on the mental functions, prevents sleep, increases the energy of the muscular system, and excites the sexual feelings. (Sundelin, *Heilmittellehre*, ii. 203, 3<sup>te</sup> Aufl.) It has been administered in asthenic fevers, rheumatism, hysteria, impotence of the male, melancholy, &c.



Vanilla aromatica.

The dose of it is from 8 to 12 grains. (Vogt. *Pharmak.* ii. 600, 2 Aufl.)

#### 3. EXOGENÆ, De Cand.—EXOGENS.

DICOTYLEDONES, Jussieu.

ESSENTIAL CHARACTERS.—*Trunk*, consisting of bark, wood, and pith, placed one within the other; the pith being innermost. *Bark*, composed of strata (the younger and inner being called *liber*), increasing by the deposit of new cortical matter on its inner side. *Wood*, consisting of ligneous strata, traversed by *medullary rays*, and increasing by the deposit of new woody matter on its outer side (*exogenous growth*): the older and inner strata are called *duramen*, or *perfect wood*; the younger and outer strata are termed *alburnum*, or *sap wood*.