of the stem and branches. It occurs in quills or broken pieces, which are hard, somewhat twisted, of a yellowish-white or pale orange-colour, somewhat lighter on the internal surface, and have an aromatic clove-like odour, an acrid peppery taste, and a white granular fracture.

J. Bauhin and others have confounded it with *Winter's bark;* hence it has been denominated *spurious Winter's bark* (*cortex Winteranus spurius.*) The pale colour of its inner surface is one out of several physical characters by which the two barks may be distinguished. Chemically they may be distinguished by nitrate of baryta and sulphate of iron, both of which cause precipitates in the infusion of Winter's bark, but not in that of canella. (*Journ. de Pharm.* t. v. p. 481.)

Composition.—Canella bark was analysed, in 1820, by Henry (*Ibid.*); and, in 1823, by Petroz and Robinet, (*op. cit.* vol. viii. p. 197).

Henry's Analysis.	*Petroz and Robinet's Analysis.*
Volatile oil.	Volatile Oil.
Aromatic resin.	Resin.
Brownish yellow colouring matter.	Bitter extractive.
Extractive.	*Canellin.*
Gum.	Gum.
Starch.	Starch.
Albumen.	Albumen.
Lignin.	Lignin.
Salts.	Salts.
Canella bark.	Canella bark.

1. Volatile Oil of Canella bark.—According to Cartheuser it is dark yellow, fluid, and heavier than water. It has an acrid taste.

2. Resin.—Henry found this constituent to be aromatic, but not acrid.

3. Bitter Extractive.—Brown, very bitter, not crystallizable. Soluble in alcohol, ether, and slightly in water.

4. Canellin (*Mannite?*).—A crystallizable, saccharine substance, incapable of undergoing the vinous fermentation.

Physiological Effects.—Canella bark is an aromatic stimulant and tonic. Its aromatic qualities depend on the oil and resin; its tonic properties on its bitter principle. As an aromatic it ranks between cinnamon and cloves.

Uses.—In this country it is employed principally as an aromatic addition to purgatives and tonics (see *pulvis aloës cum canellâ*, D., and *vinum aloës*, p. 114; and *tinctura gentianæ composita*, E. p. 341, and *vinum gentianæ*, E.); and is well adapted for debilitated conditions of the digestive organs.

By the Caribs (the ancient natives of the Antilles) and the negroes of the West Indies, it is employed as a condiment. It has been considered useful in scurvy.

Administration.—Dose of the powder, grs. x. to ʒss.

Order LXX.—AURANTIACEÆ, *Corréa.*—THE ORANGE TRIBE.

Essential Character.—*Calyx* urceolate or campanulate, somewhat adhering to the disk, short, three or five-toothed, withering. *Petals* three to five, broad at the base, sometimes distinct, sometimes slightly combined, inserted upon the outside of a hypogynous disk, slightly imbricated at the edges. *Stamens* equal in number to the petals, or twice as many, or some multiple of their number, inserted upon a hypogynous disk; *filaments* flattened at the base, sometimes distinct, sometimes combined in one or several parcels; *anthers* terminal, innate. *Ovary* many-celled; *style* one, taper; *stigma* slightly divided, thickish. *Fruit* pulpy, many-celled, with a leathery rind replete with receptacles of volatile oil, and sometimes separable from the cells; *cells* often filled with pulp. *Seeds* attached to the axis, sometimes numerous, sometimes solitary, usually pendulous, occasionally containing more embryos than one; *raphe* and *chalaza* usually very distinctly marked; *embryo* straight; *cotyledons* thick, fleshy; *plumule* conspicuous.—*Trees* or *shrubs*, almost always smooth, and filled everywhere with little transparent receptacles of volatile oil. *Leaves* alternate, often compound, always articulated with the petiole, which is frequently winged. *Spines*, if present, axillary (*Lindley*).

Properties.—In the bark, leaves, flowers, and rind of the fruit, are numerous vesicular or rounded reservoirs, which contain a highly fragrant volatile oil. Pulp of the fruit acidulous and refrigerant.

1. CI'TRUS MED'ICA, *Risso, E.*[1]—THE CITRON TREE.

Sex. Syst. Polyadelphia, Polyandria.

HISTORY.—The fruit of this species is supposed to be the μῆλον μηδικὸν of Theophrastus. (*Hist. Plant.* i. 22, and iv. 4.) Pliny (*Hist. Nat.* xv. 14, ed. Valp.) calls it *malum citreum*. It is probable the citron is referred to in the Old Testament on several occasions, (*Cant.* ii., vii., and viii.; *Joel*, i.,) where, in our translation, the word apple has been employed. (Carpenter, *Script. Nat. Hist.*)

BOTANY. **Gen. Char.**—*Flowers* usually with a quinary proportion of parts. *Calyx* urceolate, three to five-cleft. *Petals* five to eight. *Stamens* twenty to sixty; *filaments* compressed, more or less united at the base, polyadelphous; *anthers* oblong. *Style* terete; *stigma* hemispherical. *Fruit* baccate, seven to twelve-celled; cells many-seeded, pulpy. *Spermoderms* (seed coats) membranous; auricles of the *cotyledons* very short. (De Cand.)—*Trees* or *shrubs*, with axillary spines. *Leaves* reduced to one terminal leaflet at the apex of the petiole, often winged. The *rind* of the fruit is regarded by De Candolle as a kind of torus, by Dr. Lindley as the union of the epicarp and sarcocarp. In the external yellow portion (*flavedo* or *zeste*) of it are the rounded or vesicular receptacles containing volatile oil; the inner white portion is spongy. The *cells* of the fruit are filled with small pulpy bags, readily separable from each other, and containing the acid juice. *Seeds* exalbuminous, marked externally with the raphe; inner coat stained at one extremity, indicating the place of the chalaza.

Sp. Char.—*Petioles* naked. *Leaves* oblong, acute. *Flowers* with forty anthers, often without pistils. *Fruit* oblong, rugous, with a thick rind and acidulous pulp. (De Cand.)—*Tree.* Young *branches* violet. *Leaves* subserrate. *Petals* externally purplish. *Fruit* large, violet-red when young, fine yellow when mature; its rind adherent, with an agreeable odour. Risso (*Ann. du Mus. d'Hist. Nat.* xx.) enumerates three varieties.

Hab.—A native of Asia. Cultivated in the South of Europe.

DESCRIPTION, &c.—The fruit of this tree is the *citron* (*malum citreum*). It sometimes attains a weight of more than 20 lbs. Those fruits which preserve their pistilla are called *pitima*. Risso says they are sought after by the Jews, who suspend them to palms at the feast of the tabernacle. The flavedo of the citron abounds in volatile oil, which may be obtained either by expression or distillation. The leaves, as also the flowers, of the citron-tree, yield a volatile oil by distillation. (Raybaud, *Journ. de Pharm*, Août, 1834, p. 437.) The leaves are interposed between linen, to which they communicate a fragrant odour: moreover they are said to keep away insects.

Two volatile oils, known respectively as the *essence* or *essential oil of citron*, and the *essence* or *essential oil of cedra*, are employed in perfumery. Both are highly fragrant, almost colourless, and lighter than water. They are distinguished by their odour: that of the essence of cedra combining the odours of citron and bergamot. These two oils are usually confounded by pharmacological writers. From their apparent freedom from mucilage I presume both have been procured by distillation. The composition of one of these has been ascertained, by Dumas, (*Traité de Chimie*, v. 672,) to be identical with that of the essential oil of lemons, viz. C^{10} H^8.

PHYSIOLOGICAL EFFECTS AND USES.—Analogous to those of the orange and lemon. The fruit is seldom brought to the table in the raw state, but it yields some excellent preserves and sweetmeats. The juice is employed to flavour punch and negus. It forms, with sugar and water, a refreshing, refrigerant beverage. The essential oil is used in perfumery, and may be employed in medicine for scenting.

[1] In the Edinburgh Pharmacopœia of 1839, and also in that of 1841, *Lemons* are referred to *Citras medica*, Risso (De Cand.) This is an error.

2. CI'TRUS BERGA'MIA, *Risso*.—THE BERGAMOT CITRUS.

Citrus Limetta Bergamium, *L.*—Citrus Limetta, *E.*
Sex. Syst. Polyadelphia, Polyandria.
(Oleum è fructûs cortice destillatum, *L.*—Volatile oil of the rind of the fruit, *E.*)
(Oleum Bergamii, U. S.)

BOTANY. **Gen. Char.**—See *Citrus medica*.

Sp. Char.—*Leaves* oblong, more or less elongated, acute or obtuse, under-side somewhat pale. *Petiole* more or less winged or margined. *Flowers* usually small, white. *Fruit* pale yellow, pyriform or depressed; rind with concave receptacles of oil; pulp more or less acid (Wight and Arnott).

Hab.—Cultivated in the south of Europe.

DESCRIPTION.—The *volatile oil* or *essence* of *bergamot* (*oleum bergamii*, *oleum bergamotæ*), imported from the south of Europe, is procured from the rind of the fruit. It may be obtained either by expression (as the volatile oil of lemons) or by distillation. (Raybaud, *Journ. de Pharm.* Août 1834.) It is pale greenish yellow, with a remarkable odour, and a sp. gr. of 0·885. Its composition is identical with that of oil of lemons, being C^{10} H^8.

USES.—Oil of bergamot is employed as a perfume only. It is a useful odoriferous adjunct to unguents.

3. CI'TRUS LIMO'NUM, *Risso*, *L. E.*[1]—THE LEMON TREE.

Ci'trus med'ica, *D.*
(Fructus. Fructûs cortex exterior. Oleum è fructûs cortice exteriori destillatum. Succus, *L.*—Fruit. Rind of the fruit. Volatile oil of the rind of the fruit, *E.*—Fructûs succus, tunica exterior et ejus oleum volatile, *D.*)
(Limon. Limonis Cortex, U. S.)

HISTORY.—It is supposed that the Greeks and Romans were unacquainted with the Orange and Lemon, which only became known to Europeans at the time of the Crusades. (Macfadyen, in Hooker's *Bot. Miscel.* vol. i. p. 299.) This supposition receives confirmation from the fact, "that the Persian and Arabian authors do not, as is their wont, give any Greek synonyme of either, but of the citron, which is supposed to have been known to the Romans." (Royle, *Illustr.* p. 130.)

BOTANY. **Gen. Char.**—See *Citrus medica*.

Sp. Char.—Young *branches* flexible. *Leaves* oval or oblong, usually toothed. *Petiole* simply margined. *Flowers* white, tinged with red. *Fruit* yellow, ovoid or rarely globular; terminated by a more or less elongated knob; rind with convex vesicles of oil; pulp acid (Wight and Arnott).

Hab.—A native of Asia (Himalaya, *Royle*; Persia, *Risso*). Cultivated in the south of Europe.

DESCRIPTION, COMPOSITION, PROPERTIES, and USES.—Lemons (*limones*) are imported from Spain, Portugal, Italy, and the Azores, packed in chests, each lemon being separately rolled in paper. The Spanish lemons are most esteemed. We employ in medicine both *the rind* and *the juice*.

1. **Lemon Peel** (*Cortex Limonum*, L. E.)—The flavedo (*flavedo corticis limonum*) is pale yellow and rough. By drying its colour deepens. Its taste is aromatic and bitter; its odour, which is owing to the volatile oil lodged in appropriate receptacles, is strong and peculiar. The inner portion of the cortex is white, spongy, and almost both odourless and tasteless. The flavedo yields, both by distillation and expression, a volatile oil (*essential oil of lemons*). A watery infusion of lemon peel becomes greenish-brown on the addition of the sesquichloride of iron.

Lemon peel has not been regularly analyzed, though some of its constituents have been examined. It contains *volatile oil*, *hesperidin*, *a bitter principle*, and *gallic acid*.

[1] In the Edinburgh Pharmacopœia limes are erroneously referred to this species.

1. Volatile Oil.—(See p. 649.)

2. Hesperidin.—A crystallizable, neutral, resinous (?) principle, which resides in the white portion of the rind of the fruit of the genus *Citrus*. It has the form of silky needles, which are odourless and tasteless, when pure, though they usually possess slight bitterness, probably from the presence of another principle. It is fusible, slightly soluble in water, but more so in alcohol; insoluble in ether, and the oils both fixed and volatile. Oil of vitriol reddens it. (Hebreton, *Journ. de Pharm.* xiv. 377.)

8. Bitter Matter (*Aurantin*).—This is referred to the class of substances vaguely denominated extractive. It is the presence of this substance which enables an aqueous solution of impure hesperidin to form a reddish-brown precipitate with the persalts of iron. It frequently contains traces of gallic acid.

Lemon peel is a grateful stomachic and aromatic. It is employed more as a flavouring ingredient than for its own proper effects. It is a constituent of the *infusum gentianæ compositum*, (p. 340) and of the *infusum aurantii compositum*. *Candied lemon peel* (*cortex limonum conditus*) is an agreeable stomachic, and is employed as a dessert and in confectionary.

2. **Lemon Juice** (*Succus Limonum*, L.)—A slightly turbid, very sour liquor, with a grateful flavour, obtained from lemons by expression and straining. Owing to the mucilage and extractive which it contains, it readily undergoes decomposition, though various methods have been proposed of preserving it. On this account an *artificial lemon juice* has been proposed as a substitute (see vol. i. p. 359). The juice both of lemons and limes (the fruit of *Citrus Lima*, Macfadyen, or *C. acida*, Roxburgh) is extensively imported. In 1839, duty of one halfpenny per gallon was paid on 37,338 gallons of these juices. In the West Indies *lime juice* is preferred to lemon juice.

According to Proust, *lemon juice* consists of *citric acid*, 1·77; *malic acid*, *gum*, and *bitter extractive*, 0·72; and *water*, 97·51. *Lime juice* contains the same ingredients, in somewhat different proportions: the quantity of citric acid in it is larger, while that of mucilage, &c., is less.

Citric Acid.—(See vol. i. p. 356.)

Lemon juice furnishes a most agreeable and refreshing beverage, and proves refrigerant and antiscorbutic. It is employed for several purposes, as follows:

α. *In the preparation of refrigerant drinks.*—It may be either added to barley-water or mixed with sugar and water to form *lemonade*. The latter may be extemporaneously made, by adding two lemons sliced, and two ounces of sugar to two pints of boiling water, and digesting until cold. A similar beverage is called, by Mr. Brande, (*Dict. of Pharm.* 341,) *King's Cup*. These acidulated drinks are exceedingly useful for allaying thirst, and as refrigerants in febrile and inflammatory complaints, and in hemorrhages. In the latter maladies *iced lemonade* should be preferred. When there is nausea or a tendency to sickness, *effervescent lemonade* is useful. "Lemonade, as a beverage in putrid diseases, was first introduced by the French physicians in the beginning of the seventeenth century; and about the year 1660, an Italian from Florence, having learnt a process of freezing confectionary, conceived the happy idea of converting such beverage into ice. This found a ready sale, and was the occasion of so great an increase in the number of sellers of lemonade, that in the year 1676 the *Lemonadiers* of Paris were formed into a company, and received a patent from the Government." (Dr. Paris, *Pharmacol.* ii. 301, 6th ed.)

β. *In the formation of the effervescing draught.*—The effervescing draught, made with lemon juice (or citric acid) and bicarbonate of potash, is one of the best remedies we possess for allaying sickness and vomiting (vol. i. p. 359). The citrate of potash, which is formed, is a mild diaphoretic and diuretic, and often allays restlessness and watchfulness in fever. It is adapted for lithic acid deposits; but, like other remedies of the same class, is objectionable in phosphatic deposits. When our object is to determine to the skin, an effervescing draught, composed of lemon juice or citric acid and sesquicarbonate of ammonia, is to be preferred. The relative proportions of the alkaline carbonates, and of

lemon juice or citric acid (vol. i. p. 356) for the formation of effervescent draughts, is as follows :

Citric Acid.	*Lemon Juice.*	*A scruple of the Alkali.*
Grs. 14	or f℥iiiss.	Bicarbonate of Potash.
Grs. 17	or f℥iv.	Carbonate of Potash.
Grs. 24	or f℥vj.	Sesquicarbonate of Ammonia.

Effervescing draughts are exceedingly valuable vehicles for the exhibition of other remedies.

[*The neutral mixture* (Liquor Potassæ Citratis, U. S.) is directed to be prepared, either by taking fresh Lemon Juice, half a pint; Carbonate of Potassa, a sufficient quantity. Add the Carbonate of Potassa gradually to the Lemon Juice till it is perfectly saturated; then filter. Or, take Citric Acid, half an ounce; Oil of Lemons, two minims; Water, half a pint; Carbonate of Potassa, a sufficient quantity. Rub the Citric Acid with the Oil of Lemons, and afterwards with the Water, till it is dissolved; then add the Carbonate of Potassa gradually until the acid is perfectly saturated. Dose a tablespoonful.]

γ. *As an Antiscorbutic.*—Lemon juice has long been regarded as an invaluable antiscorbutic; but on account of the difficulty of preserving it, crystallized citric acid is usually substituted. "Those only," says Sir Gilbert Blane, (*Select Dissert.* p. 8, 1822; see also *Observ. on the Diseases incident to Seamen,*) "who have made themselves acquainted with the early part of the naval history of this country, or those who have perused the interesting, popular, and eloquent narrative of Commodore Anson's voyage, can duly appreciate the value of this simple remedy." Yet, on hypothetical grounds, Dr. Stevens (*On the Blood*) ventures to assert that citric acid produces scurvy!

δ. *As an Antidote.*—In poisoning by the alkalis and their carbonates, the vegetable acids are the antidotes, and the most convenient easily procurable acidulous substances are, in general, vinegar and lemon juice.

ε. *As an Anti-narcotic.*—In poisoning by narcotic substances, as opium, lemon juice may be administered, after the poison has been removed from the stomach, to counteract the effects.

ζ. *Other uses.*—Several of the medicinal uses of lemon juice can only receive a passing notice. Such are the employment of it, with common salt, in *dysentery*, *remittent fever*, *bellyache*, and *putrid sore throat*, as recommended by Dr. Wright (*Mem. of the late Dr. Wright*, p. 322); its use in *cardialgia*, by Dr. Dewees; and in *syphilis*, by Dr. Rollo. As *a topical remedy for uterine hemorrhage* after delivery, Dr. Evratt (*Arch. Gén. de Méd.* Janv. 1825, p. 141) recommends that a cut peeled lemon be introduced into the uterus, and the juice there expressed. It causes uterine contractions by which the juice is expelled, and the hemorrhage stopped. In *hospital gangrene*, Dr. Werneck (Dierbach, *Neuest. Entd. in d. Mat. Med.* 2te Abt. S. 512, 1828) applied, with good effect, in the first stage of the disease, either lint soaked in lemon juice, or segments of lemons.

Administration.—The mode of employing lemons will be obvious from the preceding remarks.

1. **OLEUM LIMONUM**, L. E.; (*Oleum Limonis*, U. S.) *Essential Oil of Lemon Peel; Essence of Lemons.*—This oil is usually procured by expression, as follows:—The flavedo of the lemons is removed by rasping, and is afterwards expressed in hair sacks. The oil which is thus procured is received in flasks, where it deposits some of its impurities, and is then decanted and filtered. (Henry and Guibourt, *Pharm. Raison.* t. i. p. 284, 2me éd.) Baumé (*Elém. de Pharm.* t. i. p. 486) says the rasped flavedo is pressed between glass plates. Expressed oil of lemons is somewhat turbid, and liable to undergo change by keeping, owing to the mucilaginous matter which it contains in solution. Oil of lemons may be procured also by distillation; and the oil thus procured is

pure, not disposed to undergo change by keeping, and is employed, under the name of *scouring drops*, for removing grease spots from silks and other textures; but its flavour is less pleasant and sweet. The greater part of the oil of commerce is brought from Portugal and Italy; some, however, is procured from France. When quite pure, it is colourless, limpid, and of a fragrant odour, like that of lemons. Its sp. gr. at 70° F. is 0·847. It is soluble in all proportions in anhydrous alcohol, and it boils at about 145° F. When the commercial oil is exposed to a temperature of —4° F. it deposits white crystals, whose nature is not known: the rectified oil remains perfectly liquid and transparent at this temperature. Oil of lemons is composed of two isomeric oils,—one (*citrene*, Dumas; *citronyle*, Blanchet and Sell) capable of forming, with hydrochloric acid, a crystalline compound (composed of C^{10} H^8 + H Chl.); the other (*citryle*) not forming any crystalline compound with this acid. The composition of oil of lemons is C^{10} H^8—*i. e.* it is identical with that of the oil of turpentine, savin, copaiva, bergamot, and citron.[1]

Oil or essence of lemons possesses the stimulant properties of the milder volatile oils, and is denominated carminative and diaphoretic. In full doses it is said to be apt to occasion headache and giddiness. Its principal use is for communicating an agreeable odour and flavour to other medicines. It may be taken as a carminative, in the dose of a few drops, on sugar (*elæosaccharum limonum*). As a perfume, it is an exceedingly useful adjunct to sulphur ointment, and to evaporating lotions. To this, as to some other volatile oils (see *oleum rosmarini*), has been ascribed the power of promoting the growth of the hair, and, in consequence, it has been added to pomatum. More recently it has been employed as a stimulant application in various external inflammations of the eye. It was first used in these diseases by Dr. Worlitz,[2] who applied it by squeezing the little drops of oil from the rind of the lemon into the eye. He used it with good effect in rheumatic, catarrhal, and scrofulous inflammations of the eye, in pannus and pterygium, and in opacity and some other consequences of inflammation of the cornea. It has since been tried by Mr. Foote, (*Trans. of the Med. Bot. Soc.* 1832-33, p. 73,) at the Ophthalmic Hospital, who dropped the oil into the eye in the same way that the *vinum opii* is applied. In some cases it caused excessive pain. He thinks it preferable to the *vinum opii*, in all cases where a stimulant is required.

2. SYRUPUS LIMONUM, L. E. D. (*Syrupus Limonis*, U. S.) *Syrup of Lemons.*—(Lemon juice, strained, [and freed from impurities by subsidence, *E. D.*], Oj.; Sugar, lb. ijss. [℥lviij. *D.*] [lb. ij. U. S.] Dissolve the sugar in the lemon juice, by the aid of a gentle heat, then set aside for twenty-four hours; afterwards remove the scum, and should there be any dregs, pour off the clear liquor.)—Refrigerant. An agreeable adjunct to diluent drinks, as barley-water, in febrile and inflammatory complaints, and to gargles. Dose, f℥j. to f℥iv.

4. CI'TRUS AURAN'TIUM, *Risso*, L. E. D.—THE COMMON OR SWEET-ORANGE TREE.

Sex. Syst. Polyadelphia, Polyandria.

(Fructus. Fructûs cortex exterior. Flores. Oleum è floribus destillatum, *L.*—Distilled water of the flowers. Volatile oil of the flowers, *E.*—Fructûs succus et tunica exterior. Flores. Folia, *D.*)

(Aurantii Cortex, U. S.)

History.—It is somewhat uncertain when the sweet orange became known to Europe. The bitter orange, as well as the lemon, was known during the

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1 For some interesting observations on this and some other oils of this order, see Soubeiran and Capitaine, *Journ. de Pharm.* xxvi. 1 and 66.

2 Dierbach, *Neuest. Entd. in d. Mat. Med.* Bd. i. S. 78, 1837: also *Lond. Med. and Phys. Journ.* for 1830, vol. vii. N. S. p. 366.

middle ages, but the sweet orange is supposed not to have been introduced until a period after this. (Macfadyen, *Bot. Miscell.* i. 302.)

BOTANY. **Gen. Char.**—See *Citrus medica.*

Sp. Char.—*Leaves* oval, elongated, acute, sometimes slightly toothed; *petiole* more or less dilated and winged. *Flowers* white, large. *Fruit* orange-coloured, roundish or ovoid, usually depressed, rarely terminated by a small knob; *rind* with convex vesicles of oil; *pulp* sweet (Wight and Arnott).—A great number of sorts is known to gardeners. The *China orange* is the common orange of the markets and of the Portuguese. The *St. Michael's orange* is a small seedless variety. The *blood-red orange* has a reddish-yellow fruit, with a pulp irregularly mottled with crimson.

FIG. 239.

Citrus Aurantium.

Hab.—Asia; probably China. Cultivated in the South of Europe, the Azores, and the West Indies.

DESCRIPTION.—*Orange leaves* (*folia aurantii*) are feebly bitter. Their watery infusion is greenish and somewhat bitter. They contain a fragrant volatile oil, which is procured by distillation, and is called, in the shops, *essence de petit grain*. *Orange flowers* (*flores aurantii* seu *naphæ*), when fresh, are white. They are sometimes exported from the South of Europe, stratified with common salt, in barrels (Risso). Dried orange flowers are yellowish, and have an agreeable odour, which is less powerful than that of the fresh flowers. By distillation, orange flowers yield a fragrant volatile oil (*oleum Neroli; oleum aurantii*). *The small green fruits* (*fructus immaturus aurantii*) which fall during the great heats of the summer, are carefully collected and dried. They, as well as the unripe fruit of the next species, [*citrus vulgaris*,] form the *orange berries* (*baccæ aurantii*) of the shops. Their size does not exceed that of a cherry; their colour is dark grayish or greenish-brown; they have an aromatic odour and a bitter taste. They are used for flavouring *Curaçoa*. When smoothed by a lathe, they constitute the *issue peas* of the shops; they are preferred to ordinary peas for keeping up the discharge of an issue, on account of their pleasant odour. An infusion of orange berries is rendered green by the sesquichloride of iron. By distillation these berries yield a fragrant oil (the original *essence de petit grain*). *The ripe fruit*, or the *orange* (*aurantium; poma aurantiorum*), is imported in chests and boxes, each orange being separately packed in paper. The best come from the Azores and Spain; very good ones are also brought from Portugal, Italy, and other places. The *rind* is sometimes employed as a substitute for the rind of the bitter orange. It yields, by distillation, a fragrant volatile oil (*essential oil of sweet orange*).

COMPOSITION. — **1. Orange Flowers** were analyzed by Boullay, (*Bull. de Pharm.* i. 337,) and found to contain *volatile oil*, *bitter extractive*, *gum*, *acetic acid*, and *acetate of lime*.

2. Orange Berries were analyzed, in 1828, by Lebreton, (*Journ. de Pharm.* xiv. 377,) who found their constituents to be as follows:—*Volatile oil*, *sulphur*, *chlorophylle*, *fatty matter*, *hesperidin*, *bitter astringent matter*, with some traces of *gallic acid*, *citric and malic acids*, *citrates and malates of lime and potash*, *gum*, *albumen*, *lignin*, *mineral salts*, and traces of *iron* and *silica*. Widemann (*Journ. de Pharm.* xvi. 707) obtained a *crystalline substance* analogous to, but yet different from, hesperidin.

3. Orange Peel has not been analyzed; but its composition is, doubtless, analogous to that of lemon peel (p. 647).

4. Orange Juice consists of *citric acid*, *malic acid*, *mucilage*, *albumen*, *sugar*, *citrate of lime*, and *water*.

1. Volatile Oils from the Sweet Orange Tree.—The volatile oils obtained from the leaves, flowers, and fruit rind of the sweet orange tree, agree, in their essential chemical characters, with each other, with the corresponding oils obtained from the bitter orange, and with the volatile oil of lemons (see p. 649). They differ principally in their odour.

The *oil of sweet orange* kept in the perfumers' shops is obtained by distillation with water, from the rind of the fruit.

The other volatile oils of this species are not distinguished in English commerce from those of the next species (see p. 653).

2. Hesperidin
3. Bitter principle (*Aurantiin*) } Described at p. 648.

4. Widemann's crystalline matter.—Obtained from unripe oranges. Is distinguished from Hesperidin by its very distinct prismatic crystallization, by its insolubility in alcohol, by its solubility in water, and by its not forming oxalic acid with nitric acid.

Physiological Effects and Uses. — **Sweet Orange Peel** is an aromatic stomachic and tonic analogous to lemon peel, and is occasionally employed as a substitute for the *bitter orange peel*. "Large quantities of it are sometimes productive of mischief, especially in children, in whom colic, and even convulsions, are sometimes induced by it. We have known the case of a child, in which death resulted from eating the rind of an orange." (*United States Dispensatory.*)

Orange Juice is a refreshing and grateful beverage, and is extensively used at the table. In febrile and inflammatory complaints it is a valuable refrigerant;—allaying thirst and diminishing preternatural heat.

5. CITRUS VULGARIS, *Risso*, L. E.—THE BIGARADE OR BITTER ORANGE TREE.

Sex. Syst. Polyadelphia, Polyandria.

(Fructûs cortex exterior, *L.*—Distilled Water of the flowers, Rind of the fruit, Volatile oil of the flowers, *E.*)

(Aurantii Cortex, U. S.)

History.—The bitter orange became known to Europe during the middle ages. All the old established orange groves of Spain, as those at Seville, planted by the Moors, are of the bitter orange. (Macfadyen, in *Hooker's Bot. Miscel.* i. 302.)

Botany. **Gen. Char.**—See *Citrus medica.*

Sp. Char.—*Leaves* elliptical, acute or acuminated, slightly toothed. *Petiole* more or less winged. *Flowers* large, white. *Fruit* orange-coloured, roundish or slightly elongated or depressed; rind with concave vesicles of oil; pulp acid and bitter (Wight and Arnott).

Numerous varieties of this are cultivated. One of these yields the fruit known in the English market as the *Seville Orange.*

Hab.—Asia. Cultivated in Europe.

Description.—The *leaves* of this species, when rubbed, emit a very agreeable odour. Distilled with water they yield a bitter aromatic-water, known in Languedoc as *eau de naphre* (*aqua naphæ*). At the same operation is procured a volatile oil, called the *essence de petit grain*, of finer quality than that obtained from the leaves of the sweet orange. The *flowers* yield by distillation with water, *orange-flower water* (*aqua aurantii*, Ph. Ed.) and *oil of Neroli* (*oleum aurantii*, Ph. Ed.) of finer quality than the corresponding preparations obtained from the flowers of the sweet orange. The *unripe fruits*, like those of the sweet orange, are called *orange berries*, and are employed for the purposes before mentioned (p. 651). The *Seville orange* is round and dark, and has an uneven, rugged, very bitter rind (*bitter orange peel; cortex aurantii*, Ph. L. and Ed.), which is employed for medical purposes as well as in the preparation of *candied orange peel*, and for flavouring the liqueur called *Curaçoa.*

Composition.—The composition of the *leaves*, *flowers* and *fruit* of the bitter orange is doubtless analogous to that of the corresponding parts of the sweet orange.

1. Oil of Orange-leaf; *Essence de petit grain.*—The term *essence de petit grain* was originally applied to the volatile oil of orange-berry, which, however, readily underwent decomposition. It is now used to indicate the volatile oil obtained from the leaves both of the bitter and sweet orange. That procured from the bitter orange is of better quality than that from the sweet.

2. Oil of Orange-flower; *Oil of Neroli* (*Oleum Aurantii*).—Procured from the flowers of both the bitter and sweet orange; but that from the former is preferred. It is obtained by submitting the flowers, with water, to distillation; and it is found floating on the water in the receiver. It has an aromatic and fragrant odour, somewhat different from that of the flower. "It appears to me," says Soubeiran, (*Nouv. Traité de Pharm.* i. 454,) "to be a product of the alteration of the natural essential oil. The latter is more soluble than the neroli oil, and remains in solution in the water. Its presence may be demonstrated by agitating the distilled water with ether deprived of alcohol. By spontaneous evaporation the etherial solution leaves behind an essential oil, which has absolutely the same odour as the flowers, and which dissolves in water." Oil of neroli, furnished me by one of the most respectable importers as genuine oil, has a reddish colour. I am informed that the *essence de petit grain* is frequently substituted for it.

3. Oil of the Rind of the Bitter Orange.—This is sold by perfumers as *essential oil of bitter orange.* It has a considerable resemblance to the oil of the sweet orange.

Physiological Effects and Uses.—The *rind* of the Seville orange being considerably more bitter than that of the sweet orange, is to be regarded as more stomachic and tonic. Its uses are the same. Its principal value is as a flavouring agent.

1. INFUSUM AURANTII COMPOSITUM, L. D.; *Infusum Aurantii*, D. *Compound Infusion of Orange Peel.* (Bitter Orange-peel, dried, ℥ss. [℥ij. *D.*]; Fresh Lemon-peel, ℥ij. [℥j. *D.*]; Cloves, bruised, ʒj. [ʒss. *D.*]; Boiling [distilled] Water, Oj. [Oss. *D.*] Digest for a quarter of an hour in a vessel lightly covered, and strain [through linen or calico, *E.*])—An agreeable stomachic. It is an excellent vehicle for the exhibition of various other medicines, as saline purgatives, ammonia, bitter tinctures, &c.—Dose, f℥j. to f℥ij.

2. CONFECTIO AURANTII, L.; (*Confectio Aurantii Corticis*, U. S.); *Conserva Aurantii*, *E. Confection of Orange-Peel.* (Fresh Orange-peel, separated by a rasp, lb. j.; Sugar lb. iij. Beat the rind in a stone mortar, with a wooden pestle; then, the sugar being added, again beat them until they are thoroughly incorporated, *L.*—Grate off the rind of bitter oranges, and beat it into a pulp, adding gradually thrice its weight of white sugar, *E.*)—An agreeable stomachic. Employed as an adjunct to bitter and purgative powders, which are to be formed into electuaries. It is a good vehicle for the exhibition of the sesquioxide of iron.

3. SYRUPUS AURANTII, L. E. D.; *Syrup of Orange-Peel.* (Fresh Bitter Orange-peel, ℥iiss. [℥viij. *D.*]; Boiling Water, Oj. [Ovj. *wine measure*, *D.*]; Pure Sugar, lb. iij. [lb. xivss. *D.*] Macerate the peel in the water for twelve hours, in a vessel lightly covered; then strain the liquor [if necessary, *E.*] and add the sugar [and dissolve with the aid of heat, *E.*]).—To avoid the volatilization of the essential oil, as little heat as possible should be employed in the process. An equally agreeable and efficacious syrup may be prepared by adding f ʒj. of tincture of orange-peel to Oj. of simple syrup. Syrup of orange-peel is stomachic, but its principal use is for flavouring.—Dose f ʒj. to f ʒiij.

4. TINCTURA AURANTII, L. E.; *Tincture of Orange-Peel.* (Bitter Orange-peel, dried, ℥iijss.; Proof Spirit, Oij. Macerate for fourteen [seven, *E.*] days [and express strongly. *E.*] and filter the liquor. "This tincture may be prepared by percolation, by cutting the peel into small fragments, macerating it in a little of the spirit for twelve hours, and beating the mass into a coarse pulp before putting it into the percolator," *E.*)—This preparation was accidentally omitted from the Dublin Pharmacopœia. It is an agreeable stomachic, and is principally employed as a flavouring adjunct to decoctions and infusions (tonic or purgative), effervescing mixtures, &c.—Dose, f ʒj. to f ʒiij.

5. AQUA FLORUM AURANTII, L.; *Aqua Aurantii*, E. *Orange-flower Water.* (Orange-flowers, lb. x.; Proof Spirit, f ℥vij.; Water, *Cong.* ij. Let a gallon

distil, *L.*)—Orange-flower water is usually imported. That prepared from the flowers of the bitter orange possesses the most fragrant odour, but it is sometimes prepared from the flowers of the sweet orange. It contains free acetic acid, derived from the flowers; hence, if kept in a vessel of lead or copper, it acquires a metallic impregnation. The presence of lead in it has recently been pointed out by Mr. Squire. (*Brit. Ann. of Med.* Jan. 1837, p. 15.) The following are the characters of the pure orange-flower water:

"Nearly colourless: unaffected by sulphuretted hydrogen."—*Ph. Ed.*

Sulphuretted hydrogen produced, with either lead or copper, a dark-coloured precipitate. Orange-flower water is employed in medicine, as well as in purfumery, on account of its agreeable odour.

Aqua Coloniensis; *Eau de Cologne; Cologne Water.*—A much-admired perfume. Two varieties are known in the shops—the *French* and the *German;* the latter fetches the highest price. Both profess to be made by Farina. The recipes for making it are numerous. I subjoin one, which is said, by Trommsdorff, (*Journ. de Pharm.* xviii. 79,) to be followed in the Cologne manufactories:—Oil of Neroli; Oil of Citron; Oil of Bergamot; Oil of Orange; Oil of Rosemary: of each twelve drops; Malabar Cardamoms, 3j.; Rectified Spirit, Oj. Distil.—Eau de Cologne forms an agreeable evaporating lotion in headache, fever, &c. It should be applied by means of a single layer of linen.

OTHER MEDICINAL AURANTIACEÆ.

The Fero'nia Elephan'tum, a large tree growing in most parts of India, yields a gum which is used for medicinal purposes by the practitioners of Lower India. It is an exudation of the stem, and closely resembles gum Arabic. (Ainslie, *Mat. Ind.* i. 161.) It is not improbable, therefore, that part of the *East India gum* brought to this country (see p. 570) may be the produce of this tree.

Order LXXI.—TERNSTRÖMIACEÆ, *Lindley*.—THE TEA TRIBE.

Though unable to do more than bestow a passing notice on Tea, I could not wholly omit all reference to this important and interesting substance. Two kinds of Tea plant are cultivated in our green-houses; the one called *Thea viridis* or *Green Tea*, the other *Thea Bohea* or *Black Tea*. Great discrepancy of opinion exists as to whether the different varieties of tea of commerce are obtained from one or two species. (See Royle's *Illustr.* p. 109; and Hooker, *Bot. Mag.* t. 3148.) The well known differences between green and black teas lend great support to the assertions of those who contend that these teas are obtained from different plants, growing in different provinces of China. Mr. Reeves's observations on this point (see Royle, *op. cit.*) appear to me to be exceedingly apposite. In commerce, two principal kinds of tea are distinguished,—the *Black* and *Green;* to the first belong *Bohea*, *Congou*, *Campoi*, *Souchong*, *Caper*, and *Pekoe;* to the latter, *Twankay*, *Hyson-skin*, *Hyson*, *Imperial*, and *Gunpowder*.[1] Frank (Gmelin, *Handb. d. Chem.* i. 1252) analyzed both black and green teas, and obtained the following results:—

Fig. 240.

Thea Bohea.

	Black.	*Green.*
Tannin	40·6	34·6
Gum	6·3	5·9
Woody fibre	44·8	51·3
Glutinous matter	6·3	5·7
Volatile matter, and loss	2·0	2·5
Tea	100·0	100·0

Sir H. Davy (*Phil. Trans.* 1803, p. 268,) also found more tannin in black than in green tea, in the proportion of 48 to 41. But these results are opposed to our daily experience, as derived from flavour, which indicates the greater astringency in the green tea, and to the experi-

[1] For some interesting observations on *Assam Tea*, see Royle's *Essay on the Productive Resources of India*, Lond. 1840; and Bruce's *Report on the Manufacture of Tea, and on the Extent and Produce of the Tea Plantations in Assam*, in Jameson's *Journ.* xxviii. p. 130. 1840.

ments of Mr. Brande. (*Quart. Journ.* xii. 201.) The difference in the quantity of tannin in the two kinds of tea is, however, not very great. A few years ago, Oudry (Thomson, *Org. Chem.* p. 295,) announced the existence in tea of a crystalline, salifiable base, to which he gave the name of *theina*; but more recently, Jobst (*Ann. d. Pharm.* xxv. 63, 1838,) has asserted its identity with *caffein*, already noticed (p. 462). Dr. R. D. Thompson (Jameson's *Journal*, vol. xxii. p. 380,) has described a fixed oil (*Tea Oil*) obtained from the tea plant. It is composed of *elaine* 75 and *stearine* 25. Notwithstanding the extensive employment of tea as an article of diet, yet it is no easy matter to ascertain correctly its precise *effects* on the constitution. Its astringency is proved by its chemical properties: and hence tea may be resorted to as an easily accessible antidote in cases of poisoning by substances containing vegetable alkalis (vol. i. p. 181), or by emetic tartar. Another quality possessed, especially by green tea, is that of diminishing the tendency to sleep. Hence, like coffee (see p. 462) tea is often resorted to by those who desire nocturnal study. Moreover, it may be employed as an antisoporific to counteract the effects of opium and intoxicating liquors; and Dr. Clutterbuck (*Inq. into the Seat and Nat. of Fever*, 2d ed. p. 434,) has suggested its application to the relief of the stupor of fever, which he considers to be nearly allied to intoxication. Tea appears to possess a sedative influence with regard to the vascular system: and in this, as well as in the watchfulness which it produces, tea somewhat resembles foxglove. On account of its sedative power, Dr. T. Percival (*Essays*, vol. i.) recommends its use in feverish and inflammatory diseases, and I can speak from frequent observation of its good effects in these maladies. To this power should also be referred the relief of headache experienced by the use of tea. In colds, catarrhs, rheumatism, &c. warm infusion of tea is frequently employed as a diluent, diaphoretic, and diuretic. Strong green tea taken in large quantities is capable, in some constitutions, of producing most distressing feelings (Dr. E. Percival, *Dubl. Hosp. Rep.* vol. i. p. 219); and of operating as a narcotic. Dr. Lettsom (*Nat. Hist of the Tea Tree*, 1772,) found that a strong infusion of tea introduced into the abdomen of a frog caused paralysis of the hind extremities of the animal.[1]

Order LXXII.—DIPTERACEÆ, *Lindley*.—THE DIPTEROCARPUS TRIBE.

Dipterocarpeæ, *Blume*.

Dryobalanops aromatica, Gærtner (*D. Camphora*, Colebrooke; *Shorea camphorifera*, Roxb.) is a large tree growing in Sumatra and Borneo. From its stem are obtained a liquid called *Camphor oil*, and a crystalline solid denominated *Sumatra* or *Borneo Camphor*.

1. *Liquid Camphor. Camphor Oil.*—Is obtained by making deep incisions into the tree with an axe. The oil gushes out, and is received in bamboos or other convenient utensils. (Prince, Roxb. *Fl. Ind.* ii. 616.) It is occasionally imported into this country in tin canisters. It is sometimes perfectly limpid, transparent, and colourless; but more usually it is more or less coloured, being yellow or brownish. Its odour is somewhat analogous to that of oil of cajuputi, combined with the odour of camphor and cardamoms. Some samples have a strong odour of turpentine. This oil has been analyzed by Martius. (*Berlin. Jahrbuch*, Bd. xl. S. 464, 1838.) The mean of three analyses gave him for its constituents *carbon* 83·129, *hydrogen* 11·346, and *oxygen* 5·525: or C^{20} H^{16} O^{2}. Recently Pelouze (*Journal de Pharmacie*, t. xxvi. p. 646,) has analyzed it. He regards it as a hydrocarbon, whose formula is C^{20} H^{16}. By exposure to the air it rapidly oxidizes and becomes C^{20} H^{16} O^{4}. Hence, therefore, it would appear that Martius must have analyzed an oxidised oil. Camphor oil has been employed in the preparation of scented soap. Sixty pounds of dark brown oil yielded a distiller forty pounds of colourless liquid oil, and twenty pounds of crystalline camphor.

2. *Sumatra* or *Borneo Camphor*. By the natives of Sumatra it is termed *Kapurbarus* (i. e. *Baroos Camphor*).—It is found in the natural fissures or crevices of the wood, and is obtained by cutting down the tree, dividing it transversely into several blocks, which are split with wedges into small pieces, from the interstices of which the camphor, if there be any, is extracted. (Marsden, *Hist. of Sumatra*, p. 150, 3d ed.) After being separated from impurities, it is packed in *catties*. Being much esteemed by the Chinese, it fetches a very high price. According to Mr. Crawford (*Hist. of the Ind. Archip.* vol. iii. p. 418,) its value is 78 times that of Japan camphor! It rarely comes to this country as a commercial article. For some of the samples in my museum I am indebted to the late Mr. Gibson (of the firm of Howard, Jewell, and Gibson, of Stratford), who stated that "they are part of two very small boxes imported about twenty years ago, which were bought by me at the common price of camphor at the time, but which, it was afterwards discovered, were invoiced at an enormous price. Our firm gave them up to the importers, reserving samples, and they were re-shipped for India. I never on any other occasion, except one, saw a small specimen of what I have named *native camphor*."

Sumatra or Borneo Camphor occurs in small white fragments of crystals. They are transparent, brittle, and have a camphoraceous odour and a hot taste. According to Pelouze its

[1] For some interesting information on Tea, see Dr. Sigmond's work, entitled *Tea, its Effects, Medicinal and Moral*, 1839.

crystalline form is a prism with six regular faces, and derived from the rhombohedric system (see also p. 245). It is lighter than water, very slightly soluble only in water; but is very soluble in alcohol and ether. It is fusible and volatile. Its composition according to Pelouze is C^{20} H^{18} O^{2}.

Sumatra Camphor is distinguished from Common or Laurel Camphor by several characters; such as the form of the crystals above mentioned; their greater hardness, so that when shaken in a bottle they produce a ringing sound; they are more brittle, and do not so readily sublime and condense in crystals in the upper parts of the bottle.

Its medicinal properties are probably similar to those of ordinary or laurel camphor. But in the East, especially by the Chinese, the most extravagant virtues are assigned to it, and it is accordingly highly valued. In the *Puntsaou* it is called Lung Naou Heang, or "Dragon's Brain perfume."

Order LXXIII.—BYTTNERIACEÆ, *De Candolle*.—THE CACAO TRIBE.

The Theobroma Cacao is a native of the West Indies and of Continental America. Its seeds (*nuclei cacao*) when torrefied, and with various additions (sugar and usually either cinnamon or vanilla), made into a paste, constitutes *chocolate* (*chocolata*), which furnishes a very nourishing beverage, devoid of the ill properties possessed by both tea and coffee, but which, on account of the contained oil, is apt to disagree with dyspeptics. (For particulars respecting the manufacture of chocolate, see Ure, *Dict. of Arts*, 292; and Soubeiran, *Traité de Pharm.* i. 447.) *Cocoa* is another preparation of these seeds. It is said to be made from the fragments of the seed-coats mixed with portions of the kernels. It is somewhat astringent, and is adapted for persons with relaxed bowels.

Fig. 241.

Theobroma Cacao.

Order LXXIV.—MALVACEÆ, *R. Brown*.—THE MALLOW TRIBE.

Essential Characters.—*Calyx* of five (rarely three or four) sepals, more or less coherent at the base, valvate in æstivation, often with bracts or external sepals forming an involucre or outer calyx. *Petals* as many as the sepals, and alternate with them; hypogynous, equal; spirally contorted in æstivation, generally adnate to (but sometimes distinct from) the lower part of the tube of the stamens. *Stamens* equal in number, or more commonly a multiple of the petals; generally indefinite (rarely definite), hypogynous. *Filaments* united into a tube, and unequal in length, the outer ones being shorter. *Anthers* one-celled, uniform, dehiscing by a transverse chink. *Ovary* of many carpels, generally verticillated round the axis, and coherent (sometimes free). *Styles* as many as the carpels, either distinct or united. *Stigmas* as many as the carpels, more or less distinct. *Carpels* either one or two-seeded, and dehiscing inward by a chink, or polyspermous, with a loculicidal dehiscence, or having a septum in the middle which bears the seeds on the inner side; in some cases nearly free, in others united into a many-celled capsule or an anomalous berry. *Albumen* none. *Embryo* straight. *Radicle* terete. *Cotyledons* twisted like a chrysalis.—*Herbs*, *shrubs*, or *trees*. *Leaves* alternate, generally petiolate, and with stipules (De Cand.)

Properties.—"The uniform character is to abound in mucilage, and to be totally destitute of all unwholesome qualities" (Lindley).

1. MAL'VA SYLVES'TRIS, *Linn. L. E.*—COMMON MALLOW.

Sex. Syst. Monadelphia, Polyandria.

(Herb, *E.*)

History.—According to Dr. Sibthorp, (*Prodr. Fl. Græc.* ii. 45,) the Μαλάχη χερσαία of Dioscorides (Lib. ii. cap. 144), is the *Malva sylvestris*.

Botany.—**Gen. Char.**—*Calyx* five-cleft, persistent, surrounded by an involucel of usually three, rarely one or two, or five or six, more or less oblong or setaceous bractioles. *Ovary* with many cells each with one ovule. *Styles* as many as the cells. *Carpels* several (rarely only five), capsular, indehiscent, one-seeded, circularly arranged around the axis. *Radicle* inferior (*Wight* and *Arnott*).

Sp. Char.—*Stem* erect. *Leaves* five to seven-lobed, acute. *Pedicels* and *petioles* hairy (De Cand.)

Root perennial, tapering, branching, whitish. *Stem* two or three feet or more high, branched. *Leaves* deep green, soft and downy. *Flowers* large, three or four together, axillary. *Petals* obcordate, purplish-rose coloured, with deeper veins, combined by the base of their claws.

Hab.—Indigenous; hedges and roadsides. Flowers from June to August.

DESCRIPTION.—Common Mallow (*herba malvæ sylvestris*) is odourless, and has merely a mucilaginous herbaceous taste. Its watery infusion is deepened in colour by the sesquichloride of iron, and forms a precipitate with acetate of lead. Dwarf mallow (*herba malvæ rotundifoliæ*) possesses similar properties.

COMPOSITION.—I am unacquainted with any analysis of this plant. The constituents are probably similar to those of Althæa officinalis. *Mucilage* is the prevailing principle. *Extractive* also is another constituent. The *colouring matter* of the flower is an exceedingly delicate test of alkalis, which render it green.

PHYSIOLOGICAL EFFECTS AND USES.—Emollient and demulcent. Employed in the form of decoction, in irritation of the alimentary canal, and of the pulmonary and urinary organs. In tenesmus the decoction is used in the form of enema. In external inflammations, emollient fomentations and cataplasms of mallow are sometimes employed.

DECOCTUM MALVÆ COMPOSITUM, L. *Compound Decoction of Mallow.* (Mallow, dried, ʒj.; Chamomile, dried, ʒss.; Water, Oj. Boil for a quarter of an hour, and strain).—Employed for fomentations and enemata as above mentioned.

2. ALTHÆ'A OFFICINA'LIS, *Linn. L. E. D.*—COMMON MARSH-MALLOW.

Sex. Syst. Monadelphia, Polyandria.

(Folia, Radix, *L. D.*—Leaves. Root, *E.*)

(Althæa, U. S.—The Root.)

HISTORY.—According to Dr. Sibthorp (*Prodr. Fl. Græc.* ii. 42) this plant is the Ἀλθαία of Dioscorides. (Lib. iii. cap. 163.)

BOTANY. **Gen. Char.**—*Calyx* surrounded by a six to nine-cleft involucel. *Carpels* numerous, capsular, closely and circularly arranged round the axis (*Wight* and *Arnott*).

Sp. Char.—*Leaves* softly tomentose on both sides, cordate or ovate, toothed, undivided, or somewhat three-lobed. *Peduncles* axillary, many-flowered, much shorter than the leaf. (De Cand.)

Root perennial, tap-shaped, rather woody. *Stem* two or three feet high. *Leaves* hoary green, peculiarly soft and downy, with a fine starry pubescence. *Flowers* three or four together, on axillary stalks, large pale rose coloured.

Hab.—Indigenous; marshes, especially near the sea.

DESCRIPTION.—The leaves of Marsh-mallow (*foliæ althææ*) are odourless, and have a mucilaginous taste. The root (*radix althææ*) is long, cylindrical, branched, about the thickness of the finger, plump, mucilaginous, white internally, and covered with a yellowish epidermis. That which is imported from France has been deprived of its epidermis, and is white (*decorticated root of marsh-mallow*). Its odour is feeble, its taste sweet and mucilaginous. Iodine colours it dark blue. Sesquichloride of iron forms with the concentrated decoction a brown semi-transparent gelatinous mass.

COMPOSITION.—Marsh-mallow root has been analysed by Bacon (*Journ. de Chim. Méd.* ii. 551); by L. Meyer (Gmelin, *Handb. d. Chem.* ii. 1251); by Wittstock (*Pharm. Central-Blatt für* 1831, S. 277); and by Buchner (*Ibid. für* 1832, S. 511). The results of the latter chemist are as follows:—*Fatty oil* 1·26, *glutinous matter* 1·81, *uncrystallizable sugar* and *althein* 8·29, *mucilage* 35·64, *starch* 37·51, *phosphate of lime* 8·29, *vegetable medulla* 11·05, and *woody fibre* 7·50 [excess 11·35].

ASPARAGIN.—*Asparamide; Althein.*—The substance which has been called *althein* is identical with *asparagin*. It is crystallizable, odourless, and almost tasteless. It is soluble in water and alcohol, sp. gr. 0·837; but it is insoluble in absolute alcohol and in ether. It consists of $C^8 H^7 N^2 O^6$. Acted on by the watery solutions of the alkalis, it evolves ammonia, and is converted into *aspartic acid* ($C^8 H^5 N O^6$): hence it is called *asparamide*, as it is an aspartite of ammonia ($C^8 H^5 N O^6 + H^3 N$), minus an atom of water. It has no influence on the therapeutic properties of the root.

PHYSIOLOGICAL EFFECTS AND USES.—Similar to those of common mallow, already stated (p. 657). On the continent it is a favourite demulcent. The *pastilles* and *pate de guimauve* are used as pectorals. The powder of marshmallow root is used in France to envelope pills. "The simple decoction is recommended as an injection, to be thrown into the vagina, in cases of difficult labour, arising from rigidity of the soft parts." (Montgomery, *Obs. on the Dub. Pharm.*)

1. MISTURA ALTHÆÆ, E. *Decoctum Althææ*, D. *Marshmallow Mixture.* (Root [and herb, *D.*] of Althæa, ʒiv.; Raisins stoned, ʒij.; [Boiling, *E.*] Water, Ov. [Ovij. *wine measure*, D.] Boil down to three [five, *D.*] pints; strain [through linen or calico, *E.*], and when the sediment has subsided, pour off the clear liquor for use).—An agreeable diluent and demulcent. Employed in visceral inflammation and irritation; as nephritis, calculous affections, gonorrhœa, strangury, &c. From one to three pints may be taken in the course of the day.

2. SYRUPUS ALTHÆÆ, L. E. D. *Syrup of Marshmallows.* (Althæa root, fresh and sliced, ʒviij. [lb. ss., *D.*]; Pure Sugar, lb. ijss. [lb. ij. *D.*]; Water [boiling, *E.*], Oiv. [*wine measure*, D.] Boil down the water with the root to one half [strain, *E.*], and express [strongly through calico, *E.*] the liquor [when cold, *L. D.*] Set aside for twenty-four hours, that the impurities may subside; then pour off the liquor, and the sugar being added, boil down to a proper consistence).—Demulcent, employed as an adjunct to cough mixtures, and as a pectoral for children. It readily ferments, and becomes ropy.—Dose, f ʒj. to f ʒss.

3. GOSSYP'IUM HERBA'CEUM, *Linn.* E.—COMMON COTTON.

Sex. Syst. Monadelphia, Polyandria.

(Hairs attached to the seed, *E.*)

HISTORY.—It is somewhat doubtful who first mentioned cotton. There is some reason for supposing that cotton cloth is referred to in the Old Testament. (Harris, *Mat. History of the Bible:* Carpenter, *Script. Nat. Hist.*) Cotton (*βύσσος*), is mentioned by Herodotus (*Thalia*, cv.); but he or his translators are in error, in stating (*Euterpe*, lxxxvi.) that the Egyptians, in embalming, wrapped the body in cotton cloth; since all mummy cloths are found, on a microscopic examination, to be linen.[1] Pliny (*Hist. Nat.* lib. xix. cap. 2, ed. Valp.) speaks of the cotton plant (*Gossypion*) and of the cloth (*Xylina*) made of the woolly substance which envelopes the seeds. (For further historical details see Royle's *Illustr.* p. 84, *et seq.*)

BOTANY. **Gen. Char.**—*Calyx* cup-shaped, obtusely five-toothed, surrounded by a three-leaved involucel, with the leaves united and cordate at the base, and deeply cut or toothed irregularly. *Style* simple, marked with three or five furrows towards the apex. *Stigmas* usually three, sometimes five. *Capsules* three to five-celled, three to five-valved at the apex, loculicidal. *Seeds* numerous, imbedded in cotton.—Young *branches* and *leaves* more or less conspicuously covered with little black dots; nerves below usually with one or more glands (*Wight and Arnott*).

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1 Dutrochet, in Jameson's *Journal*, vol. xxiii. p. 220. This author suggests that the *βυσσος* of Herodotus was the filamentous weavable matter which lint [flax] supplied.

Sp. Char.—Bi-tri-ennial; *young parts* hairy. *Leaves* hoary, palmate, with sub-lanceolate, rather acute lobes. *Stipules* falcate-lanceolate. *Leaves* of the exterior calyx dentate. *Capsules* ovate pointed. *Seeds* free, clothed with firmly adhering white down under the long white wool (*Roxburgh*).—*Petals* of a lively yellow colour, with a purple spot near the claw. Dr. Roxburgh (*Fl. Ind.* iii. 184,) particularly distinguishes three varieties cultivated in India—viz. the *Dacca*, the *Berar*, and the *China* cottons.

FIG. 242.

Gossypium herbaceum.

Hab.—Asia. Cultivated in India, Syria, Asia Minor, the Mediterranean, and America.

DESCRIPTION.—The filamentous substance, called *cotton* (*gossypium*) consists of tubular hairs, which arise from the surface of the seed-coat. By drying, they become flattened; and in this state, if they be immersed in water and examined by the microscope, they appear like distinct, flat, narrow ribands, with only occasional appearances of joints, which are indicated by a line at a right angle, or nearly so, to the side of the tube. Cotton is distinguished (under the microscope) from the vegetable fibre which constitutes linen by the tubes of the latter being in bundles, round, tapering at the extremities, and, when jointed, having oblique articulations. Cotton which has undergone no preparation is denominated *raw cotton*.[1]

COMPOSITION.—Cotton is a modification of *lignin*, and consists, therefore, of *carbon*, *hydrogen*, and *oxygen*; but the precise relative proportions of its constituents have not been ascertained. In all its essential chemical properties it agrees with ordinary woody fibre. It is completely insoluble in water, alcohol, ether, oils, and vegetable acids. Strong alkaline leys dissolve it. The strong mineral acids decompose it. With nitric acid it yields oxalic acid.

PHYSIOLOGICAL EFFECTS AND USES.—Raw cotton, or cotton-wool, has been employed with apparently good effect in the treatment of burns. (Anderson, *Ed. Med. and Surg. Journ.* vol. xiii. p. 215, 1828.) It allays pain and irritation, apparently by forming, with the discharges, a substitute for the epidermis, under the protection of which the process for the formation of the new cuticle takes place, undisturbed by external irritation. The exclusion of the air seems to be a most important part of the treatment; and, of course, to effect this, many other agents (as lint) will answer in the place of cotton. The following is the method of employing cotton:—The cotton should be carded in narrow fleeces, thin enough to be translucent, and applied in successive layers, so as completely to protect the injured parts from the effects of motion and pressure. When the skin is severely scorched, a spirituous or turpentine wash may be applied previously to the application of the cotton. As complete repose of the parts is necessary, the first dressing should be allowed to remain as long as possible undisturbed. Raw cotton has also been used as a topical application in erysipelas. (*Lond. Med. Gaz.* Nov. 8, 1839.)

Cotton-wool impregnated with nitre or chlorate of potash has been employed as moxa (see p. 396).

The well-known superiority of linen to cotton, as a dressing for wounds and ulcers, is usually ascribed to the triangular shape of the cotton fibres, the sharp angles of which are supposed to cut and irritate the flesh. But this shape of the fibre exists only in the imagination of those who have never examined them by the microscope. Raspail (*Chim. Organ.*) ascribes the superiority of linen for surgical purposes to the hollow condition of the tubular

[1] For much interesting information regarding Cotton, but which is unsuited to this work, consult Royle, *op. cit.*; M'Culloch's *Dict. of Comm.*; and Ure's *Dict. of Arts.*

fibrillæ, by which they are enabled to absorb into their interior the blood or purulent secretion. The tubes of cotton, on the other hand, are filled with an organizing substance, and, therefore, can imbibe nothing into their interior.

Order LXXV.—LINACEÆ, *Lindley*.—THE FLAX TRIBE.

Lineæ, *De Candolle*.

Essential Character.—*Calyx* three or four, generally five-sepaled. *Sepals* coherent only at the base, imbricate in æstivation, continuous with the peduncle, and therefore persistent. *Petals* as many as the sepals; hypogynous, unguiculate at the base, slightly united together, and to the ring of the stamens; alternate with the sepals, twisted in æstivation. *Stamens* equal in number, and alternate with the petals, cohering into a monadelphous ring at the base, and having an abortive filament, or tooth, between each. *Anthers* innate, bilocular, bi-rimose. *Ovaries* subglobose, with as many cells as there are sepals, rarely fewer. *Styles* as numerous as the cells of the ovary. *Capsule* globose, crowned by the permanent bases of the styles, composed of carpels having induplicate margins and dehiscing at the apex by two valves, and which are divided into partial cells, by an incomplete dissepiment arising from the centre. Seeds in each cell, two inverted. *Albumen* generally none, but in its stead there is a tumid fleshy endopleura. *Embryo* straight, with the radicle turned towards the hilum.—*Herbs* or *shrubs* with entire exstipulate *leaves* (De Cand.)

Properties.—The fibres of Linaceæ have great tenacity. The seeds abound in oil and mucilage, and are in consequence emollient.

1. LI'NUM USITATIS'SIMUM, *Linn.* L. E. D.—COMMON FLAX.

Sex. Syst. Pentandria, Pentagynia.

(Semina. Oleum e seminibus expressum, *L. D.*—Seeds. Meal of the seeds deprived of their fixed oil by expression. Expressed oil of the seeds, *E.*)

(Linum, U. S. Flaxseed.)

History.—From time immemorial flax has been employed in the manufacture of cloth; and it appears from our most ancient records, that Egypt was celebrated for its production. (*Exod.* ix. 31; Herodotus, *Euterpe*, cv.) Dutrochet (Jameson's *Journal*, vol. xxiii. p. 221) asserts that mummy-cloth is made of flax.

Botany. **Gen. Char.**—*Sepals* five, distinct, quite entire or serrated. *Petals* five. *Stamens* five. *Styles* three to five, distinct from the base, or combined to the middle or apex (*Wight* and *Arnott*).

Sp. Char. — Smooth, erect. *Leaves* lanceolate or linear. *Panicle* corymbose. *Sepals* ovate, acute, with membranous margins. *Petals* somewhat crenate, larger by three times than the calyx. (De Cand.)—Annual. One or two feet high. *Leaves* distant. *Flowers* large, purplish-blue. *Capsule* globular, about the size of a small pea.

Fig. 243.

Linum usitatissimum.

Hab.—Indigenous; corn fields; not unfrequent. Extensively cultivated in this, as well as in other European countries, both for its fibre for making thread, and for its oil obtained from the seeds.

Description.—The seed of the flax, commonly termed *linseed* or *lintseed* (*semina lini*) is small (about a line long), oval, oblong, flattened on the sides with acute edges, pointed at one extremity, smooth, glossy, brown externally, yellowish white internally, odourless, and has an oily mucilaginous taste. The seed coat is mucilaginous; the nucleus oily. The *cake* (*placenta lini*) left after the expression of the oil, is usually denominated *oil cake*; it forms, when ground to a fine powder, *linseed meal* (*farina lini*). The best oil cake for the preparation of linseed meal is the English fresh made. Foreign cake is of inferior quality. The colour of linseed meal is grayish-brown. It abounds in mucilage. The meal prepared by grinding the unpressed seeds, yields a considerable quantity of oil.

The substance termed *flax* is prepared from the fibrous portions of the bark of the plant. (See Ure's *Dict. of Arts*, p. 482.) The short fibres which are removed in heckling constitute *tow* (*stupa*), which is employed both in pharmacy and surgery. Of flax is made *linen* (*linteum*), which, when scraped, constitutes *lint* (*linteum carptum ; linamentum*), an important agent to the surgeon.

Composition.—Linseed has been analysed by L. Meyer. (Gmelin, *Handb. d. Chem.* ii. 1251.) Its constituents he found to be as follows:—*fat oil* (in the nucleus) 11·265, *wax* (in the husk principally) 0·146, *acrid soft resin* (in the husk principally) 2·488, *resinous colouring matter* 0·550, *yellow extractive with tannin* and *salts* (nitre and the chloride of potassium and calcium) 1·917, *sweet extractive* with *malic acid* and some *salts* 10·884, *gum* (in the nucleus) 6·154, *nitrogenous mucilage* with *acetic acid* and *salts*, (in the husk principally) 15·120, *starch* with *salts* (in the husk) 1·480, *albumen* (in the nucleus) 2·782, *gluten* (in the nucleus) 2·932, *husk* and *emulsion* (?) 44·382. The ashes contained *oxide of copper*.

1. Fixed Oil.—(See below.)

2. Mucilage of Linseed.—Has been examined by Bostock (*Nicholson's Journal*, xviii. 31); by Vauquelin, (*Ann. de Chim.* lxxx. 314,) and by Guerin-Varry, (*Journ. d. Chim. Méd.* vii. 739.) Resides in the seed coats. Is extracted by hot water. When the solution is mixed with alcohol, white mucilaginous flocks are precipitated. Diacetate of lead forms a precipitate in it. Neither infusion of nutgalls nor chlorine have any effect on it. It is not coloured blue by iodine. It reddens litmus (owing to the free acetic acid). It consists of two parts: one soluble, the other insoluble in water. Its ashes contain carbonates of potash and lime, phosphate of lime, chloride of potassium, sulphate of potash, oxide of iron, alumina, and silica.

Proximate Analysis.		*Ultimate Analysis.*	
Soluble part	52·70	Carbon	34·30
Insoluble part	29·89	Hydrogen	5·69
Ashes	7·11	Nitrogen	7·27
Water	10·30	Oxygen	52·74
Mucilage of Linseed	100·00	Mucilage of Linseed	100·00

α. *Soluble part* (*Arabine?*) soluble in cold water. Treated with nitric acid, yields 14·25 per cent. of mucic acid, besides some oxalic acid.

β. *Insoluble part.*—A nitrogenous substance, not soluble in water, and not yielding mucic acid by the action of nitric acid. Properly speaking, therefore, it is not a gummy substance.

Physiological Effects.—Linseed is emollient and demulcent. It also possesses nutritive qualities; for, in the form of a thick mucilage (or jelly, as it is termed), it is employed for fattening cattle: *Linseed cake* is also employed for a similar purpose. *Linseed oil* is a mild laxative.

Uses.—Employed, to allay irritation, in the form of *infusion* or *tea*, *expressed oil*, and *meal*.

1. INFUSUM LINI COMPOSITUM, L. D.; *Infusum Lini*, E. (U. S.) *Linseed Tea.*—(Linseed, bruised, ʒvj. [ʒj. *D.*] (ʒss. U. S.); Liquorice-root, bruised, ʒij. [ʒss. *D.*]; Boiling [distilled, *L.*] Water, Oj. [Oij. *D.*] Digest [near the fire, *L. E.*] in a lightly-covered vessel, and strain [through linen or calico, *E.*) —Employed as an emollient and demulcent in irritation and inflammation of the pulmonary and urinary organs, and of the mucous membranes generally; as gonorrhœa, dysentery, alvine irritation, and pulmonary affections. It is rendered more palatable by the addition of sliced lemon and sugar-candy.—Dose, fʒij. to fʒiv. or *ad libitum*.

2. OLEUM LINI, L. E. D. (U. S.) *Linseed Oil.*—To prepare this oil, the seeds are first bruised or crushed, then ground, and afterwards subjected to pressure in the hydraulic or screw press. (See Ure's *Dict. of Arts*, p. 899.) *Cold-drawn linseed oil* (*oleum lini sine igne*) is paler coloured, less odorous, and has less taste, than linseed oil prepared by the aid of a steam heat of about 200° F. (*oleum lini*, offic.); but, according to Mr. Brande, (*Dict. of Pharm.*) it "soon becomes rancid and more disagreeable than that expressed at a higher temperature." The seeds yield by cold expression 18 or 20 per cent. of oil; but by the

aid of heat from 22 to 27 per cent. Linseed oil is usually amber-coloured; but it may be rendered quite colourless. For a fine sample of colourless oil I am indebted to Mr. Whipple. Linseed oil has a peculiar odour and taste; it is soluble in alcohol, but more readily so in ether. When exposed to the air it dries into a hard, transparent varnish. This change is greatly accelerated by boiling the oil, either alone or with litharge, with sugar of lead or with common white vitriol. The resulting oil is called *drying oil* or *boiled oil*. The efficacy of the process is ascribed by Liebig (*Journ. de Pharm.* xxvi. 193) to the elimination of substances which oppose the oxidation of the oil. The ultimate composition of linseed oil, according to Saussure, is *carbon* 76·014, *hydrogen* 11·351, and *oxygen* 12·635. Its proximate constituents are *oleic acid* (chiefly), *margaric acid*, and *glycerin*.—Rarely employed internally. Its most ordinary use is for the preparation of *linimentum calcis*, already described. (Vol. i. p. 491.)

3. FARINA LINI, E.; *Linseed Meal.*—(The meal of the seeds deprived of their fixed oil by expression, *E.*)—Emollient. Employed in the preparation of the *linseed meal poultice*. It is a constituent of the *pulvis pro cataplasmate*, D. already noticed, (p. 59.)—The farina of the unpressed linseed is preferred to the powder of linseed-cake, on account of its oleaginous quality. What is usually sold as such has been prepared from recently pressed English oil cake.

4. CATAPLASMA LINI, L.; *Linseed Meal Poultice.*—(Boiling Water, Oj.; Linseed, powdered, as much as may be sufficient to make it of a proper consistence. Mix.)—A valuable emollient poultice.

2. LI'NUM CATHAR'TICUM, *Linn. E.*—PURGING FLAX.

Sex. Syst. Pentandria, Pentagynia.

(Herb, *E.*)

History.—First mentioned by Thalius in the sixteenth century. (Sprengel, *Hist. Rei Herb.* i. 35.)

Botany. **Gen. Char.**—See *Linum usitatissimum.*

Sp. Char.—Smooth, erect. *Leaves* opposite, obovate-lanceolate. *Stem* above dichotomous. (De Cand.)

Annual. Stem slender, two to six inches high. *Flowers* drooping before expansion, white, small.

Hab.—Indigenous; pastures: common.

Description.—Purging flax (*herba lini cathartici*) is odourless, but has a very bitter taste.

Composition.—I am unacquainted with any analysis of this plant. Probably its purgative principle is *bitter extractive.*

Physiological Effects and Uses.—Cathartic and occasionally diuretic; but somewhat uncertain in its operation. Formerly used in rheumatism. Now almost obsolete.—Dose, 3j. of the dried plant; or an infusion of a handful of the fresh plant may be employed.

Order LXXVI.—CARYOPHYLLACEÆ.—THE CHICKWEED TRIBE.

Caryophylleæ, *Jussieu; De Candolle.*

Essential Character.—*Calyx* generally persistent, of four or oftener five sepals, which are continuous with the pedicel, and either free or coherent into a four or five-dentate tube, imbricate in æstivation. *Petals* as many as the sepals (very rarely none), inserted on the torus, which is more or less elevated on a pedicel (anthophorus), alternate with the sepals, unguiculate, having the fauces sometimes crowned with petaloid scales. *Stamens* as many as, or double the number of, the petals, inserted in the torus. *Filaments* subulate, sometimes submonadelphous at the base. *Anthers* two-celled. *Ovary* simple, two to five-valved, inserted at the apex of the torus, and crowned by an equal number of styles. *Capsule* of two to five valves, united at the base, dehiscing at the apex, generally one-celled, sometimes two to five-celled. *Septa* protruding from the middle of the valves, incomplete or continuous to the axis. *Placenta* central. *Seeds* numerous (very seldom few or definite); *albumen* farinaceous, generally central; *embryo* usually peripherical, more or less incurved (seldom central

and straight); *radicle* directed towards the hilum.—*Herbs* or *undershrubs*, with opposite entire *leaves*. *Stems* jointed. (De Cand.)

PROPERTIES.—Remarkable, for the most part, for their insipidity and consequent inactivity.

DIAN'THUS CARYOPHYL'LUS, *Linn. D.*—CLOVE PINK; CARNATION, OR CLOVE GILLYFLOWER.

Sex. Syst. Decandria, Digynia.

(Flores, *D.*)

HISTORY.—First noticed by Manfredus de Monte Imperiali. (Sprengel, *Hist. Rei Herb.* i. 298.)

BOTANY. **Gen. Char.**—*Calyx* tubular, five-toothed, imbricated at the base with two to four opposite scales. *Petals* five, with long claws. *Stamens* ten. *Styles* two. *Capsule* one-celled. *Seeds* compressed, convex on one side, concave on the other; peltate. *Embryo* scarcely curved. (De Cand.)

Sp. Char.—*Stem* branched. *Flowers* solitary. *Scales* of the calyx four, very short, ovate, somewhat mucronate. *Petals* very broad, beardless. *Leaves* linear-awl-shaped, channelled, glaucous (De Cand.)

A *perennial* plant; the origin of the fine carnations of the gardens. *Flowers* pink, purple, white, or variegated; double, semi-double, or single. (For horticultural information respecting them, consult Loudon's *Encycl. of Gardening*.)

Hab.—Indigenous. Cultivated in gardens.

DESCRIPTION.—The red or deep crimson gillyflowers (*flores dianthi caryophylli; flores caryophylli rubri; flores tunicæ*) were formerly employed in medicine on account of their colour. They have a pleasant aromatic smell, and a bitterish sub-astringent taste. They communicate to water their smell and colour. (Lewis, *Mat. Med.*)

COMPOSITION.—I am unacquainted with any analysis of them. They obviously contain *a volatile oil*, *colouring matter*, and an *astringent principle*.

PHYSIOLOGICAL EFFECTS AND USES.—Formerly supposed to have an influence over the nervous system, to raise the spirits, &c. Simon Pauli (*Quadrip. Bot.* p. 241,) recommended them in various nervous and spasmodic affections, and in malignant fever. They have also been used as flavouring and colouring agents; and a *syrup* of them was formerly contained in the British pharmacopœias. Though still retained in the Dublin Pharmacopœia, their medical use is obsolete.

ORDER LXXVII.—POLYGALEÆ, *De Candolle*.—The MILKWORT TRIBE.

POLYGALACEÆ and KRAMERIACEÆ, *Lindley*.

ESSENTIAL CHARACTER.—*Sepals* five, imbricate in æstivation, the two interior generally petaliform, the three exterior smaller; two of them are interior and sometimes united, the third is posterior. *Petals* three to five, hypogynous, more or less united by means of the tube of stamens (rarely distinct). *Filaments* of stamens adherent to the petals, monadelphous, divided at the apex into two opposite equal phalanges. *Anthers* eight, one-celled, innate, dehiscing by pores at the apex. *Ovary* one, free, two-celled, rarely one or three-celled. *Style* one. *Stigma* one. *Pericarp* capsular or drupaceous, two or one-celled. *Valves* septigerous in the middle. *Seeds* pendulous, solitary, often with a carunculate arillus at the base; *embryo* straight, generally in the axis of a fleshy albumen, (or rarely) exalbuminous, in which case the endopleura is tumid.—*Herbs* or *shrubs*. *Leaves* entire, generally alternate, articulated on the stem (De Cand.)

PROPERTIES.—Leaves and roots for the most part bitter and astringent.

1. POLYG'ALA SEN'EGA, *Linn. L. E. D.*—THE SENEKA.

Sex. Syst. Diadelphia, Octandria.

(Radix, *L. D.*—Root, *E.*)

(Senega, U. S.)

HISTORY.—The root of this plant was introduced into medicine as a remedy

for the bites of venomous animals, in the early part of the last century, by Dr. Tennant, a Scotch physician, residing in Pennsylvania (*An Epistle to Dr. Mead.* 1742.)

BOTANY. **Gen. Char.**—*Sepals* persistent, the two inner ones wing-like. *Petals* three to five, adnate to the tube of the stamen; the inferior one keel-shaped (perhaps composed of two united). *Capsule* compressed, elliptical, or obcordate. *Seeds* pubescent, carunculated at the hilum, destitute of a coma (De Cand.)

Sp. Char.—*Stems* several, somewhat erect, simple, terete. *Leaves* ovate-lanceolate, the upper ones acuminate. *Racemes* somewhat spiked. *Wings* orbiculate. *Capsule* elliptical, emarginate (De Cand.)

Root perennial, branching. *Stems* annual, from nine to twelve inches high, occasionally tinged at their lower part with red or purple. *Leaves* alternate, sessile, or on very short stalks, paler beneath. *Flowers* small, white. *Alæ* of the calyx white, with green veins. *Capsule* small, containing two blackish *seeds*.

Hab.—United States of America: most abundant in the southern and western parts.

DESCRIPTION.—*Senega* or *Seneka* root (*radix senegæ* seu *senekæ*), sometimes called the *seneka-snake root* or the *rattlesnake root*, is imported from the United States in bales. It varies in size from that of a writing-quill to that of the little finger; it is contorted, presents a number of eminences, and terminates superiorly in an irregular tuberosity, which exhibits traces of numerous stems: a projecting line extends the whole length of the root. The cortical portion is corrugated, transversly cracked, thick, of a grayish yellow colour. The central portion (*meditullium*) is woody and white. The taste of the root is at first sweetish and mucilaginous, afterwards acrid and pungent, exciting cough and a flow of saliva: its odour is peculiar and nauseous.

COMPOSITION.—Senega root has been repeatedly made the subject of chemical investigation. In the last century it was examined by Burckhard, by Keilhorn, and by Helmuth. (Murray, *App. Med.* ii. 564.) In 1804 it was analysed by Gehlen (Gmelin, *Handb. d. Chem.* ii. 1249); and in 1811 by Fougeron. (*Journ. de Chim. Méd.* ii. 549.) Peschier (quoted by Goebel and Kunze, *Pharm. Waarenk.*,) also published an analysis of it. In 1826 it was analysed by Feneulle, (*Journ. de Chim. Méd.* ii. 431,) in 1827 both by Dulong D'Astafort (*Journ. de Pharm.* xiii. 567,) and by Folchi, (*Journ. de Chim. Méd.* iii. 600,) in 1832 by Trommsdorff, (*Pharm. Central-Blatt für* 1832, S. 449,) and in 1836 by Quevénne, (*Journ. de Pharm.* xxii.) I subjoin three of these analyses.

Trommsdorff.		*Dulong.*	*Quevénne.*
Volatile oil	*a trace.*	Volatile oil, traces.	Polygalic acid.
Acrid resin	4·552	Acrid extractive.	Virgineic acid.
Sweetish-bitter extractive	33·570	Yellow extractive.	Tannic acid.
		A substance reddened by sulphuric acid.	Pectic acid.
Pectic acid	10·444	Pectic acid.	Cerin.
Wax	0.746	Wax.	Fixed oil.
Soft resin	5·222	Resin.	Yellow colouring matter.
Mucus	5·968	Gum.	Gum.
Woody fibre	34·316	Woody fibre.	Albumen.
Malates, potash, and lime.	2·536	Malates of potash and lime.	Woody fibre.
		Mineral salts and iron.	Salts, alumina, silica, magnesia, and iron.
Dried Senega root	97·354	Senega root.	Senega root.

1. POLYGALIC ACID, in the impure state, was first procured by Gehlen, who called it *Senegin*. It is the active principle of the root, and resides in the cortical part of the root. When pure it is a white odourless powder, which is at first tasteless, but afterwards communicates an acrid feeling to the mouth, and a sense of constriction to the fauces. It irritates the nostrils, and excites sneezing. It is volatile, and, when decomposed by heat in a glass tube, evolves no ammonia, and hence contains no nitrogen. It is soluble in water and in alcohol, especially when aided by heat; but is insoluble in ether, acetic acid, and the oils. Its solution forms white precipitates (*polygalates*) with diacetate of lead and protonitrate of mercury. Sulphuric acid

has a characteristic effect on polygalic acid: it renders polygalic acid yellow, then rose-red, and afterwards dissolves it, forming a violet-coloured solution, which becomes decolorised in twenty-four hours. The *alkaline polygalates* are not crystallizable. Polygalic acid consists of *carbon* 55·704, *hydrogen* 7·529, and *oxygen* 36·767; or C^{22} H^{19} O^{11}. It has considerable resemblance to esculic acid. (*Journ. de Pharm.* xxiii. 270.) Given to dogs in doses of six or eight grains, it causes vomiting, embarrassed respiration, and death in three hours. Two grains thrown in the jugular vein caused vomiting, and, in two hours and a half, death.

2. Virgineic Acid.—A volatile fatty acid, analogous to valerianic, phocenic, and butyric acids. It is an oily liquid, of a reddish colour, a strong, penetrating, disagreeable odour, and an acrid taste. It is soluble in alcohol, ether, and caustic potash, but scarcely so in water.

Physiological Effects.—Senega possesses acrid and stimulant properties. In small doses it is diaphoretic, diuretic, and expectorant; in large doses, emetic and purgative. Sundelin (*Handb. d. spec. Heilmittell.* ii. 176, 3te Aufl.) took a scruple of powdered senega root every two hours for six hours: it caused irritation of the back part of the tongue and throat, and gave rise to an increased flow of saliva. These effects were soon followed by considerable burning in the stomach, nausea, and vomiting. The skin became warmer and moister; there was griping pain of the bowels, followed by watery evacuations; the secretion of urine was increased, and a feeling of heat was experienced in the urinary passages. For some days after there was gastric uneasiness, with loss of appetite. *In larger doses* it caused burning pain in the stomach and bowels, violent vomiting, purging, anxiety, and giddiness.

It appears to excite moderately the vascular system, to promote the secretions (at least those of the kidneys, skin, uterus, and bronchial membrane), and to exert a specific influence over the nervous system. It has been principally celebrated for its expectorant effects.

In its operation on the nervous system it has considerable resemblance to Arnica (see p. 398). But its influence over the secreting organs is much greater. It is somewhat analogous to Helenium (p. 391) in its action.

Uses.—In this country senega is comparatively but little employed. It is an exceedingly valuable remedy in the latter stages of *bronchial* or *pulmonary inflammation*, when this disease occurs in aged, debilitated, and torpid constitutions, and when the use of depletives is no longer admissible. It appears to re-establish a healthy condition of the secreting organs, to promote the resolution of the morbid deposits, and to give strength to the system. I usually administer it in combination with ammonia, which appears to me to promote its beneficial operation. Frequency of pulse, and a febrile condition of the system, are by no means to be regarded as impediments to the use of this medicine.

In *chronic catarrh* and *humoral asthma* it has also been used. It has been extravagantly praised by Dr. Archer, of Maryland, as a remedy for *croup*. (Eberle, *Mat. Med.*) He represents it as being capable, without the aid of any other means, of removing this alarming disease. Few practitioners, I suspect, would venture to trust it. Yet it might be a useful addition to emetics. As a stimulant and promoter of the secretions, it has been used with advantage in the latter stage of low *fever* accompanied with torpidity. It has also been used as an emetic, purgative, and diaphoretic, *in rheumatism*, as a diuretic in *dropsy*, and as an emmenagogue in *amennorrhœa*. It was introduced into practice as a remedy against the bite of venomous animals—as the rattlesnake.

Administration.—The dose of the *powder* is from grs. x. to ʒj. But the *infusion* or *decoction* is the best form of exhibition.

1. DECOCTUM SENEGÆ, L. E. D. (U. S.) *Decoction of Senega.*—(Senega root, 3x. [3iij. *D.*]; Water [distilled, *L.*], Oij. [Ojss. *wine measure* D.] Boil down to a pint [3viij. *D.*], and strain.)—[The U. S. P. directs Senega, bruised, an ounce; Water, a pint and a half. Boil down to a pint and strain.]—Stimulating, expectorant, and diuretic.—Dose, f ʒj. to f ʒiij. three or four times daily. Ammonia is often a valuable addition to it.

2. SYRUPUS SENEGÆ, U. S. *Syrup of Seneka.*—Take of Seneka, bruised,

four ounces; Water, a pint; Sugar, a pound. Boil the Water with the Seneka to one half, and strain; then add the Sugar, and proceed in the manner directed for Syrup. Or, take Seneka in coarse powder, four ounces; Water, a sufficient quantity; Sugar, fifteen ounces. Mix the Seneka with four fluid ounces of Water, and allow the mixture to stand for twelve hours; then put it into an apparatus for displacement, and gradually pour water upon it until the liquid passes nearly tasteless. Evaporate the filtered liquor to half a pint, strain, and having added the Sugar, proceed as for Syrup.—This preparation possesses all the advantages of the decoction, to which, moreover, it is superior, in its acceptability to the patient. It may be employed by itself or it may be combined with other articles and employed in the form of cough mixture. The dose is f3i. or f3ij.

3. EXTRACTUM SENEGÆ. *Extract of Seneka.*—To make this preparation a formula has been given by Mr. Procter, in *Am. Journ. of Pharmacy*, vol. xiv. p. 287. Take of Senega in coarse powder, ʒxvj.; Alcohol, Oij.; Water, Oiv. Mix the Alcohol and Water, and macerate the Senega in one half of it for two days, place the mixture in a displacement apparatus and operate with the same menstruum until six pints of tincture are obtained. Evaporate this on a water bath till reduced to the consistence of an extract. One drachm of this extract dissolved in a pint of water yields a preparation of the same theoretical strength but greater actual strength than the officinal decoction. It may be used in the same manner as the preceding, by combination.

4. SYRUPUS SCILLÆ COMPOSITUS, U. S. *Compound Syrup of Squill. Hive Syrup.* Seneka is an equally important ingredient with squill in this preparation. It is prepared advantageously as follows. Take of Squill, Seneka, each, in coarse powder, four ounces; Tartrate of Antimony and Potassa, forty-eight grains; Alcohol, half a pint; Water, a sufficient quantity; Sugar, three pounds and a half. Mix the Alcohol with two pints and a half of water, and macerate the Squill and Seneka in the mixture for twenty-four hours. Put the whole into an apparatus for displacement, and add as much water as may be necessary to make the filtered liquor amount to three pints. Boil the liquor for a few minutes, evaporate to one half and strain; then add the Sugar, and evaporate until the resulting Syrup measures three pints. Lastly, dissolve the Tartrate of Antimony and Potassa in the Syrup while hot. This is an excellent emetic and expectorant in croup, hooping-cough, and commencing inflammatory attacks of the lungs. The dose is ʒi. to ʒss.—J. C.]

KRAME'RIA TRIAN'DRA, *Ruiz and Pavon, L. E. D.*—THE RHATANY.

Sex. Syst. Tetrandria, Monogynia, *Willd.*

(Radix, *L.*—Root, *E.*—Radix et extractum, *D.*)

(Krameria, U. S.)

History.—This plant was discovered by Ruiz and Pavon, in 1779, in South America. It was introduced to notice into this country, as a medicine, by Dr. Reece, in 1808. In 1813, Ruiz's dissertation on it appeared in an English dress. (Eckard, *Diss. Inaug. de Rad. Ratanhiæ.* Berol. 1822.)

Botany. **Gen. Char.**—*Sepals* four or five, irregular, coloured, spreading, deciduous. *Petals* four or five, irregular, smaller than the calyx, the three inner unguiculate. *Stamens* one, three, or four, hypogynous, unequal. *Ovary* one-celled, or incompletely two-celled; *style* terminal; *stigma* simple; *ovules* in pairs, suspended. *Fruit* between hairy and leathery, globose, covered with hooked prickles, by abortion one-seeded, indehiscent.—Spreading many-stemmed *undershrubs*. *Leaves* alternate, simple, entire or three-foliate, spreading. *Racemes* simple, spiked (Lindley).

Sp. Char.—*Leaves* oblong, somewhat acute, villous-silky. *Pedicels* somewhat longer than the leaf, bitracteate, forming a short *raceme* (De Cand.)

Suffruticose. *Root* long, branching. *Stem* procumbent, branching. *Leaves* sessile, covered on both surfaces with long, silky leaves. *Flowers* solitary, lake-coloured. *Stamens* three. *Drupe* round, beset with stiff reddish hairs.

Hab.—Peru; growing abundantly in Huanuco, Huamalies, and Canta.

Description.—Rhatany root (*radix krameriæ* seu *rhatanhiæ*) is brought from Peru. It consists of numerous, woody, cylindrical, long branches, varying in thickness from that of a writing quill upwards. These pieces consist of a slightly fibrous, reddish-brown bark, having an intensely astringent and slightly bitter taste,—and of a very hard, ligneous meditullium, of a yellowish or pale red colour. The largest quantity of astringent matter resides in the bark, and therefore the smaller branches (which have a larger proportion of bark) are to be preferred.

Foreign or *South American extract of rhatany* (*extractum krameriæ* seu *rhatanhiæ americanum*) is occasionally imported.

Composition.—Rhatany root has been analysed by Trommsdorff, Vogel, C. G. Gmelin, and Peschier. (L. Gmelin, *Handb. d. Chem.* ii. 125.)

C. G. Gmelin.	
Tannin	38·3
Sweet matter	6·7
Mucilage	8·3
Nitrogenous ditto	2·5
Lignin	43·3
[Loss	0·9]
Rhatany root	100·0

Peschier.	
Dried Watery extract	31·25
Insoluble matters	68·75
Rhatany root	100 00
Tannin	42·6
Gallic acid	0·3
Gum, extractive and colouring matter	56·7
Krameric acid	0·4
Dried watery extract of rhatany root	100·0

1. Tannic acid.—To this, as well as in part to a minute portion of gallic acid, rhatany root owes its astringent qualities. It is this acid which enables an infusion of rhatany root to form, with a solution of gelatine, a precipitate (*tannate of gelatine*), and with sesquichloride of iron a brownish gray precipitate (*tannate of iron*). The properties of tannic acid have been already described (see p. 192).

2. Krameric acid.—Peschier ascribes the stypticity of rhatany to this acid, the properties of which are at present imperfectly known.

Physiological Effects.—A powerful astringent, and, like other agents of this class, tonic also. (See the effects of astringents, vol. i. p. 188.)

Uses.—Rhatany root is adapted to all those cases requiring the employment of astringents; such as *profuse mucous discharges* (as humid catarrh, old diarrhœas, fluor albus, &c.), *passive hemorrhages* (especially menorrhagia) and *relaxation* and *debility of the solids*. It is sometimes used as a *tooth powder* (as with equal parts of orris root and charcoal). Dentists sometimes employ tincture of rhatany diluted with water *as an astringent mouth wash*.

Administration.—The *powder* may be given in doses of from grs. x. to ʒss. The *infusion* or *extract* is more commonly employed. *Compound tincture of rhatany* is prepared by digesting ʒiij. of bruised rhatany root, and ʒij. of orange peel, in Oj. of proof spirit. Sometimes ʒss. of serpentary root and ʒj. of saffron are added. It is an efficacious astringent and stomachic.—Dose fʒj. to fʒiij.

1. INFUSUM KRAMERIÆ, L. (U. S.) *Infusion of Rhatany*.—(Krameria, ʒj.; Boiling distilled water, Oj. Macerate for four hours in a lightly covered vessel, and strain.)—Astringent and tonic.—Dose, fʒj. to fʒij.

2. EXTRACTUM KRAMERIÆ, E. D. (U. S.) *Extract of Rhatany*.—(Prepared as extract of liquorice [p. 560] *E.*)—(A better mode is by displacement.—J. C.) Astringent.—Dose, grs. x. to ℈j.

[3. TINCTURA KRAMERIÆ, U. S. *Tincture of Rhatany*.—(Rhatany in powder, ʒvi.; Diluted Alcohol, Oij. Macerate for fourteen days and strain, or prepare by displacement.) Used as an adjunct to cretaceous mixtures, or with tonics. The dose is fʒj. to fʒij. It may be employed diluted with water as a gargle.

4. SYRUPUS KRAMERIÆ, U. S. *Syrup of Rhatany.*—(Extract of Rhatany, ℥ij. Water, Oj., Sugar, lb. ijss. Dissolve the extract in the water, and make the solution into a syrup. A pleasant astringent, used in diarrhœas, chronic dysentery, and hemorrhages. Dose f℥j. to f℥ss.—J. C.]

Order LXXVIII.—VIOLACEÆ, *Lindley.*—THE VIOLET TRIBE.

Violariæ.—*De Candolle.*

Essential Character.—*Sepals* five, persistent, with an imbricate æstivation usually elongated at the base. *Petals* five, hypogynous, equal or unequal, usually withering, and with an obliquely convolute æstivation. *Stamens* five, alternate with the petals, usually opposite them, inserted on a hypogynous disk, often unequal; *anthers* bilocular, bursting inwards, either separate or cohering, and lying close upon the ovary; *filaments* dilated, elongated beyond the anthers; two, in the regular flowers, generally furnished with an appendage or gland at their base. *Ovary* one-celled, many-seeded, or rarely one-seeded, with three parietal placentæ opposite the three outer sepals; *style* single, usually declinate, with an oblique hooded *stigma*. *Capsule* of three valves, bearing the placentæ in their axis. *Seeds* often with a tumour at their base; *embryo* straight, erect, in the axis of fleshy *albumen*.—*Herbaceous* plants or *shrubs*. *Leaves* simple, usually alternate, sometimes opposite, stipulate, entire, with an involute *vernation*. *Inflorescence* various. (Lindley.)

Properties.—Roots more or less emetic.

VIOLA ODORATA, *Linn. E. D.*—THE SWEET VIOLET.

Sex. Syst. Pentandria, Monogynia.

(Flowers, *E.*—Flores, *D.*)

History.—According to Dr. Sibthorp, (*Prodr. Fl. Græc.* i. 147,) this is the Ἴον πορφυρόεν (*purple violet*) of Dioscorides. (Lib. iv. cap. 122.) It was employed in medicine by Hippocrates.

Botany. **Gen. Char.**—*Sepals* five, unequal, prolonged into appendages at the base. *Corolla* unequal, two-lipped, of five petals, the lower calcarate. *Capsule* bursting with elasticity, many-seeded, three-valved. *Herbaceous* plants (Lindley).

Sp. Char.—*Stigma* uncinate, naked. *Leaves* rounded cordate. *Sepals* ovate, obtuse. *Spur* very blunt. *Capsule* turgid, hairy. *Seeds* turbinate, pale. *Runners* flagelliform (De Cand.)

Perennial. Flowers fragrant, deep purple, often white, occasionally lilac. *Bracts* inserted above the middle of the scape.

Hab.—Indigenous. Flowers in March and April. Cultivated on account of the odour and colour of the flowers.

Description.—Violets (*flores violæ odoratæ*) should be gathered immediately they are expanded, as they subsequently become purplish. Their delightful fragrance is well known. The root of the violet (*radix violæ odoratæ*) has been used in medicine.

Composition.—In 1822, Pagenstecher (Gmelin, *Handb. d. Chem.* ii. 1249) detected the following substances in an infusion of the flowers: *odorous principle*, *blue colouring matter*, *sugar* both *crystallizable* and *uncrystallizable*, *gum*, *albumen*, and *salts of potash* and *lime*. Boullay (*Journ. de Pharm.* x. 23) from the *root*, *leaves*, *flowers*, and *seeds*, an acrid principle, which he has termed *violine*.

1. Odorous Principle.—This has not been isolated. It is supposed, however, to be of the nature of volatile oil. By digesting violets in olive oil, the latter dissolves the odorous matter and acquires the smell of violets: this preparation is the *oil of violets*,—the *huile de violette* of perfumers. The *eau*, or *esprit de violette*, is nothing more than alcoholic tincture of rhizome of the Florentine orris (p. 137), which has an odour similar to that of the violet.

2. Colouring Matter.—It is soluble in water, but not in alcohol. It is changed to red by the strong acids, and to green by the alkalis: hence the expressed juice and syrup are valuable as tests for discovering the existence of either acids or alkalies. An infusion of violets has been said to contain three kinds of colouring matter; namely, a *blue colouring matter*, not precipitable by the acetate of lead, but which is completely decolorized by sulphuretted hydrogen; secondly, a *bright red acid colouring matter*, which causes a bluish green precipi-

tate with the solution of acetate of lead; thirdly, a *violet-red colouring matter*, which does not precipitate the neutral acetate of lead, but throws down a greenish yellow precipitate with the subacetate of lead.

3. Violine (*Emétine indigène.*)—It was at first mistaken for *emetina* (p. 451). Its nature requires further investigation. It is a white powder, of a bitter, acrid taste, slightly soluble in water, and insoluble in ether. It is precipitated from its solution by infusion of nutgalls. Its operation is similar to that of emetine.

Physiological Effects.—The *odorous emanations* of violets, like those of some other flowers, are said to have occasionally proved dangerous, and in one case were supposed to have brought on apoplexy. (Triller, quoted by Murray, *App. Med.* i. 778). Dr. Lindley (*Fl. Med.*) has known them to cause faintness and giddiness. *Taken internally*, violets act as laxatives. The *seeds* possess similar properties. The *root*, in doses of from 3ss. to 3j. proves emetic and purgative.

Uses.—Violets are employed in the preparation of the officinal syrup. They are useful as a test for acids and alkalis, and are much sought after for bouquets. The root might be employed as a substitute for ipecacuanha.

SYRUPUS VIOLÆ, E. D. *Syrup of Violets.*—(Fresh Violets [the petals, *D.*] lb. j. [lb. ij. *D.*]; Boiling Water, Oijss. Ov. *wine measure, D.*]; Pure Sugar, lb. vijss. [lb. xij. and 3j. *D.*] Infuse the flowers for twenty-four hours in the water [in a covered glass or earthenware vessel, *E.*]; strain [through fine linen, *D.*] without squeezing, and dissolve the sugar in the filtered liquor.)—The colour of this preparation is improved by making it in a tin or pewter vessel. No satisfactory explanation of this has been offered. The Edinburgh College, fearful, I presume, of metallic impregnation, direct glass or earthenware vessels to be employed.—Genuine syrup of violets is readily distinguished from any counterfeit by its being reddened by an acid, and made green by an alkali. Hence it is employed as a test.—As a medicine it is used as a mild laxative for new-born infants. Thus, a mixture of equal parts of oil of almonds and syrup of violets is often administered, in the dose of one or two teaspoonfuls, for the purpose mentioned.

OTHER MEDICINAL VIOLACEÆ.

The roots of several species of *Ionidium* possess emetic qualities, and have been employed as substitutes for our officinal ipecacuanha (*Cephaëlis Ipecacuanha*).

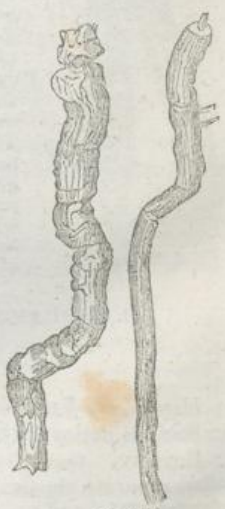
The root of Ionidium Ipecacuanha, a native of the Brazils, is termed *false Brazilian ipecacuanha*. It yielded Pelletier five per cent. of emetine. The dose of it as an emetic, is 3ss. to 3j. infused in water.

The root of the Ionidium microphyllum, or the *Cuichunchully*, a native of Quito, possesses similar properties.

Dr. Bancroft (*Comp. to Bot. Mag.* i. 278) speaks favourably of it in Elephantiasis tuberculata. But the specimens which he sent home as Cuichunchully are said by Sir W. Hooker to be identical with *Ionidium parviflorum* Vent. Dr. Lindley, (*Flora Medica*, p. 98) however received from the Hon. W. F. Strangways the "Cuichunchully de Cyença," which was the *I. microphyllum* of Humboldt.

The root of the Viola pedata is officinal, Sec. List, U. S. P.

Fig. 244.



Root of Ionidium Ipecacuanha.