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ILLUSTRATIONS

OF

MEDICAL BOTANY:

CONSISTING OF

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COLOURED FIGURES OF THE PLANTS

AFFORDING THE IMPORTANT ARTICLES OF THE

MATERIA MEDICA.

AND DESCRIPTIVE LETTERPRESS

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THE DRAWINGS ON STONE BY J. H. COLEN.

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Plate LVII.

CYNANCHUM ARGEL.

MEDICAL BOTANY.

COROLLIFLORÆ.

Composed of plants having a calyx and corolla. The petals are united into one, within which the stamens are borne.

ASCLEPIADEÆ.

Essential Char.—*Flowers* somewhat umbelled, fascicled, or racemose, proceeding from between the petioles. *Calyx* five—divided, persistent. *Corolla* monopetalous, hypogynous, five-lobed, regular, within imbricated, very seldom valvular in æstivation, deciduous. *Stamens* five, inserted into the base of the corolla, alternate with the segments of the limb. *Filaments* usually connate. *Anthers* two-celled, sometimes almost four-celled, in consequence of their dissepiments being nearly complete. *Pollen* at the period of the dehiscence of the anthers cohering in masses, either equal to the number of the cells, or occasionally cohering in pairs and sticking to five processes of the stigma either by two's or four's, or singly. *Ovaries* two. *Styles* two, closely approaching each other, often very short. *Stigma* common to both styles, dilated, five-cornered, with corpusculiferous angles. *Follicles* two, one of which is sometimes abortive. *Placenta* attached to the suture, finally separating. *Seeds* numerous, imbricated, pendulous, almost always comose at the hylum. *Albumen* thin. *Embryo* straight. *Cotyledons* foliaceous. *Radicle* superior. *Plumule* inconspicuous. (*Lindley. Veg. King.*)

The plants belonging to this class are, herbs or shrubs, milky, twining frequently, and having entire, opposite alternate or whorled leaves; in lieu of stipules ciliæ are found between the petioles. They for the most part are possessed of acrid irritating properties resident in some portions of them. They abound in Africa; in the tropics they are common, but are rare in the Northern latitudes.

SOLENOSTEMMA ARGEL.

HAYNE.

Cynanchum Argel.—*Delile.*
Cynanchum Oleæfolium.—*Nectoux.*

Sex. Syst.—Pentandria, Monogynia.

Gen. Char.—*Corolla* rotate, coronet of stamens double; the exterior cup-shaped, or annular, crenated; the interior five-leaved, longer than the outer, with fleshy segments. *Anthers* terminated by a membrane. *Pollen* masses fixed by the point, pendulous. *Stigma* nearly blunt. *Follicles* slender, smooth. *Seeds* comose. (*R. Brown. Lindley.*)

Specif. Char.—*Stem* about three feet high, sending off slender, straight cylindrical branches; the *leaves* are opposite, lanceolate, of a pale green hue, supported on short petioles; their central nerve is prominent; the *flowers* are white, numerous, and disposed in dichotomous clusters in the axils of the leaves, at the summit of the branches; the *calyx* of each flower is short, with five divisions. *Corolla* deeply five-parted, rotate. *Segments* linear and acute; an ulterior crown, with five plicæ and five teeth, surrounds the *stamens* which, to the number of five, are united in the centre of the flower, so as to form a truncated body elevated on a pedicel formed by the filaments. The *fruit* consists

of two ovoid pointed follicles, the exterior of which is glabrous, hard, thick and spotted; they contain imbricate, ovoid, comatose seeds. (*Delile, Des. des sennés.*)

This plant inhabits Nubia, and the portions of Upper Egypt in which are found the plants composing Alexandrian senna. It is chiefly interesting as furnishing leaves which enter into the composition of this drug. Lindley seems to doubt the intentional introduction of argel; but the specific description of the manner in which Alexandrian senna is made up, places this beyond dispute. Delile and Nectoux both mention the plant as being collected, and M. Rayer informs us that the leaves are mixed in the proportion of two-tenths, with senna leaves; which proportion is borne out by examination. It is easy to determine between the leaf of the argel and that of a cassia, by its equilateral base, elongated form, thick leathery structure, and hairyness.

Argel contains an acrid resinous principle, to which some of the harsh action of the Alexandrian senna is attributed. It has a nauseous odour, and a nauseous bitter taste.

PLATE LIV.—*Represents the plant in flower, and the fruit.*

STYRACEÆ.

RICHARD.

STYRAX TRIBE.

ESSENTIAL CHAR.—*Calyx* inferior (or superior) with five (or four) imbricated divisions, persistent. *Corolla* monopetalous, the number of its divisions frequently different from that of the calyx; with imbricated æstivation. *Stamens* definite or indefinite, arising from the tube of the corolla, of unequal length, cohering in various ways, but generally in a slight degree only. *Anthers* innate, two-celled, bursting inwardly. *Pollen* broadly elliptical, smooth. *Ovary* superior, or adhering to the calyx, with from two to five cells, which are opposite the lobes of the calyx when they are of the same number, the partitions sometimes scarcely adhering in the centre. *Ovules* anatropal, two or none in each cell, all pendulous, or the upper ascending, the lower pendulous. *Style* simple. *Stigma* somewhat capitate. *Fruit* drupaceous, surmounted by, or inclosed in the calyx, generally with all the cells abortive except one. *Seeds* ascending or suspended 5—1, with the slender embryo lying in the midst of the albumen. *Radicle* long, directed towards the hylum. *Cotyledons* flat. (*Lindley. Veg. King.*)

Trees or shrubs with alternate usually toothed leaves, without stipules. *Flowers* axillary, either solitary or clustered, with scale-like bracts; the hairs often clustered. The medical properties of this tribe are balsamic.

STYRAX BENZOIN.

DRYANDER.

THE BENJAMIN TREE.

BENZOIN OFFICINALE.—*Hayne.*

SEX. SYST.—Decandria Monogynia.

GEN. CHAR.—*Calyx* rather campanulate, nearly entire, or five-toothed. *Corolla* campanulate at the base, deeply 3—7 cleft. *Stamens* 6—16, seldom ten, exserted. *Filaments* united to the tube of the corolla, sometimes adhering at the base into a ring. *Anthers* linear, two-celled, opening by internal longitudinal slits. *Style* simple. *Stigma* obtuse, somewhat lobed. *Drupe* dry, splitting imperfectly into two or three valves, with 1—2—3 stones. *Seed* solitary, erect, with a large leafy thin embryo lying in the midst of a fleshy albumen with an inferior radicle. (*Lindley.*)

SPECIF. CHAR.—*Branches* round, tomentose. *Leaves* alternate, stalked, oblong, perfectly entire, acuminated, above smooth, beneath tomentose, a palm long. *Footstalks* round, striated, channelled, tomentose, very short. *Racemes* axillary, compound, nearly the length of the leaves; common *footstalks* tomentose; partial alternate, spreading tomentose. *Pedicels* very short. *Flowers* on one side. *Calyx* campanulated, very obscurely five-toothed, out-

STYRAX BENZOIN.

wardly tomentose; above a line in depth. *Petals* five, (perhaps connate at the base,) linear, obtuse, outwardly gray, with very fine down, four times longer than the calyx. *Filaments* ten, inserted into the receptacle, rather shorter than the petals, beneath connate into a cylinder of the length of the calyx, ciliated on the upper part below the anthers. *Anthers* linear, longitudinally adnate to the petals, and shorter by half than they. *Ovary* superior, ovate, tomentose. *Style* filiform, longer than the stamens. *Stigma* simple. (*Dryander* and *Lindley.*)

The plant described is a native of Sumatra, Borneo, Siam, and Java, as well as some other portions of the Eastern Archipelago. It affords the product known as *Benzoin* or Gum Benjamin. The origin of this drug had not accurately been determined prior to the publication of its source by Mr. Dryander in the Philosophical Transactions for 1787.

The tree grows in the plains and on the borders of rivers; it furnishes for twelve years, by means of incisions, an abundant juice which, upon hardening, constitutes the article of commerce. This juice is at first white, then more coloured; a single tree furnishes about three pounds of balsam; the incisions are made when the plant is six years old. Marsden, in his History of Sumatra, and Crawford, in his History of the Indian Archipelago, have both noticed the article under consideration. The first and purest exudation is white, and termed *head* benzoin; that which flows later is termed *belly*, and the inferior sorts are called *foot*. Another means of designation is into firsts, seconds, and thirds. Benzoin of first quality occurs in tears and in lumps. The *tears* are seldom met with alone, but are mixed with the lump. A very fine specimen found some years ago in the market, consisted almost entirely of tears, of a rounded or flattened form, reddish on the outside, but composed of a clear white uniform amygdaloid substance internally. It was connected with pieces of bark. The *lump Benzoin* is in masses consisting of the tears embedded in a shining reddish-brown substance; upon fracturing this, the tears appear like broken almonds, giving a mottled appearance, hence the term *Amygdaloid Benzoin*. Both these kinds are imported from Siam. A very inferior kind, dark brown in appearance without tears, or with small white specks and mixed with impurities, comes from Calcutta, and is designated by the name of this port. It corresponds to the foot Benzoin of Crawford, which is said to be the scrapings of the tree, when nearly exhausted.

Benzoin is hard, but fusible, has an agreeable balsamic odour, with a sweetish taste at first, but irritating the fauces if chewed. It has been analyzed by a number of chemists, and found to contain *volatile oil, resin, benzoic acid, extractive, &c.*

Benzoin, in the older works on Pharmacy, is called *Assa dulcis;* the term benzoin is said to be of Hebrew origin, from *Ben Jaoy*. It is a stimulant antispasmodic, and expectorant, used in diseases of the lungs and in torpid constitutions. It is administered in substance, or in the forms of emulsion and tincture.

PLATE LV.—*Represents the plant in flower, with the dissected and exposed organs of reproduction.*

OLEACEÆ.

LINDLEY.

THE OLIVE TRIBE.

OLEINEÆ.—*R. Brown.*

ESSENTIAL CHAR.—*Flowers* in terminal, or axillary racemes or panicles; the pedicels opposite, with single bracts. *Flowers* hermaphrodite, or dioecious. *Calyx* divided, persistent, inferior. *Corolla* hypogynous, monopetalous, four-cleft, occasionally of four petals connected in pairs by the intervention of the filaments, sometimes absent; æstivation somewhat valvate. *Stamens* two (rarely four), alternate with the segments of the corolla or with the petals. *Anthers* two-celled, opening longitudinally. *Ovary* simple, without any hypogynous disk, two-celled, the cells two-seeded; the ovules pendulous and collateral. The *style* one or none. *Stigma* bifid or undivided. *Fruit* drupaceous, berried, or capsular, often by abortion one-seeded. *Seeds* with dense, fleshy, abundant albumen. *Embryo* about half its length straight. *Cotyledons* foliaceous. *Radicle* superior. *Plumule* inconspicuous. (*Lindley.*)

Trees or shrubs, branches usually dichotomous, and ending abruptly by a conspicuous bud. *Leaves* opposite, simple, sometimes pinnated. This tribe of plants inhabits temperate regions. The medical properties differ; in some they are tonic and astringent; in the ash a sweetish juice is found, in some species presenting the form of manna.

ORNUS EUROPŒA.

PERSOON.

MANNA ASH.

FRAXINUS ORNUS.—*Linnæus.*

SEX. SYST.—Diandria Monogynia.

GEN. CHAR.—*Calyx* very small, four-cleft. *Corolla* divided to the base into linear segments. *Pericarp* or winged key, not dehiscing. (*Lindley.*)

SPECIF. CHAR.—A small tree, twenty to thirty feet high, with a close round head. *Leaves* opposite, pinnated, large, in three or four pairs; *leaflets* stalked, oblong, acute, serrated, very hairy at the base of the midrib on the under side. *Panicles* dense, terminal, nodding. *Flowers* small and polygamous. *Petals* small, white and drooping. *Fruit* flat, wedge-shaped, smooth, winged.

This plant is an inhabitant of the south of Europe, especially Italy and Sicily. From this as well as from other species is obtained officinal manna.

Manna is procured by incising the tree. The incisions are commenced in August, and the process is terminated towards October, when the rains commence. The incisions are practised daily, and are extended up the trunk of the tree until they reach the branches; they are made two inches in length. The juice flows out and is conveyed by a leaf of the tree into the large leaf of the Indian Fig. The most valuable flows first, during the hottest season, *flake manna;* the next in value flows later, *manna in sorts;* and the least valuable flows towards the conclusion of the season when the heat has moderated, *fat manna.* In 1776, Houel, in his Voyage Pittoresque de Sicile, gave an account of the mode of collection, which account has been published in the Penny Magazine, vol. iii. p. 202, 1834.

Flake manna resembles stalactites; it is in the form of flakes, convex on one side, hollowed on the other from the surface of the tree on which it has hardened, or in the form of flat pieces; externally it is rough, of a yellowish white colour, light, porous, and fusible, the fractured surface presenting crystals.

The manna in sorts consists of broken pieces or flakes united by a viscid brownish substance; it is in the form of mass. The fatty manna is soft, and viscid, and consists of some minute fragments with the soft uncrystallizable matter. The odour of manna is not pleasant, like impure sugar, and the taste sweet but slightly nauseous. The principal ingredient is *mannite*, a pure white crystalline substance, which differs from sugar in not undergoing fermentation. The *nauseous matter* is said to be the purgative principle; it also contains some uncrystallizable sugar.

Manna is laxative when taken in sufficient doses, it however is used as an adjuvant to other articles, as senna.

PLATE LVI.—*Represents the plant in flower.*

LOGANIACEÆ.

ENDLICHER. LINDLEY.

LOGANIADS.

ESSENTIAL CHAR.—*Flowers* racemose, corymbose, or solitary. *Calyx* valvate or imbricated, inferior 4—5 parted. *Corolla* regular or irregular 4—5 or ten-cleft, with valvate or convolute æstivation. *Stamens* arising from the corolla, all placed upon the same line, and not always symmetrical with the divisions of the corolla. *Pollen* with three bands. *Ovary* superior, two-celled (three or spuriously four-celled). *Style* continuous. *Stigma* simple. *Ovules* none or solitary, peltate and amphitropal, or ascending and anatropal. *Fruit* either capsular and two-celled, with placentæ finally becoming loose; or drupaceous, with one or two-seeded stones; or berried with seeds immersed in pulp. *Seeds* sometimes winged, usually peltate. *Albumen* fleshy or cartilaginous. *Embryo* small, with the radicle turned towards the hylum or parallel to it.

The plants belonging to this order are shrubs, herbaceous plants or trees. The leaves are opposite, entire, usually

ORNUS EUROPÆA.

Plate LVII.

with stipules, which adhere to the leaf-stalks, or are combined in the form of interpetiolary sheaths. (*Lindley. Veg. King.*)

This order has been subdivided into *Spigelieæ*, *Strychneæ*, and *Loganeæ*.

SPIGELIEÆ.

LINDLEY.

SPIGELIACEÆ.—*Martius.*

ESSENTIAL CHAR.—*Leaves* furnished with stipules. *Flowers* isomeric; æstivation of the corolla valvate, capsules didymous, many-seeded, seeds without wings. *Embryo* small, cotyledons little conspicuous. Warm parts of the New World, and in New Holland; a few species in tropical Asia. (*Royle.*)

SPIGELIA MARILANDICA.

LINNÆUS.

CAROLINA PINK.

SEX. SYST.—Pentandria, Monogynia.

GEN. CHAR.—*Calyx* five parted. *Corolla* funnel-shaped, with a five cleft equal limb. *Anthers* converging. *Capsule* didymous, two-celled, four-valved, many-seeded. (*Nuttall. Lindley.*)

SPECIF. CHAR.—*Root* fibrous, perennial. *Stem* herbaceous, six to twenty inches high, branching near the base, (angular,) slightly winged, towards the summit pubescent. *Leaves* sessile, ovate-lanceolate, acute, with the margin and veins underneath pubescent. *Flowers* in a simple terminal secund raceme. *Calyx* five-leaved, persistent, leaves subulate acute, finely serrulate. *Corolla* monopetalous, tube angled, ventricose, five times as long as the calyx, yellow within, crimson without, border five-cleft, segments acute, somewhat expanded. *Filaments* shorter than the corolla, inserted into the tube between the segments. *Anthers* oblong, cordate, two-celled, yellow. *Germ* superior, ovate. *Style* longer than the corolla, jointed at its base. *Stigma* simple, obtuse. (*Elliot.*) The *Capsule* is sub-rotund, didymous, two-celled, four-valved. *Seeds* numerous, angular, scabrous. (*Willdenow.*)

This is a very beautiful plant; it was supposed to be a *Lonisera* by Linnæus, but afterwards called by its present name. It grows in the Southern and South-western States abundantly, rarely penetrating into the Middle States. It grows in rich dry soils, on the borders of woods, flowering from May to July, and ripening its seeds in the autumn. The root is the officinal portion; it consists of an immense bunch of downy fibres, half a foot in length, proceeding from a small knotted rhizoma; they are of a brown colour, have a weak odour, and a bitter taste. The herbaceous portion is sometimes employed, but it is decidedly inferior. The root was formerly collected by the Cherokee and Creek Indians, but now by the settlers.

Spigelia root contains bitter extractive, and acrid resin. Its medical properties are those of an anthelmintic, but it has also an effect upon the brain and spinal marrow, producing vertigo, dimness of vision, dilatation of the pupils, and spasms or convulsions. As an anthelmintic, its mode of operation seems to be connected with this action, as intestinal worms are voided after its exhibition, either dead or torpid. A knowledge of it originated with the aborigines, but it was brought prominently before the medical profession by Drs. Garden, Lining, and Chambers. It is given in powder or infusion, followed by or combined with a cathartic, as senna.

PLATE LVII.—*Represents the plant in flower, and the reproductive organs.*

STRYCHNEÆ.

Flowers regular; æstivation of the corolla valvate. *Embryo* rather large. Trees or shrubs. Tribe *Eustrychneæ*. *Berry* or *drupe* two-celled, many-seeded, or from abortion one-celled, one-seeded; seeds peltate, apterous. (*Royle. Mat. Med.*)

STRYCHNOS NUX VOMICA.

LINNÆUS.

POISON NUT.

Sex. Syst.—Pentandria, Monogynia.

Gen. Char.—*Calyx* four to five parted. *Corolla* tubular, with a spreading 4—5 cleft limb, and a valvate æstivation. *Stamens* 4—5 inserted into the throat of the corolla, which is either naked or bearded. *Ovary* two-celled, with indefinite ovules attached to a central placenta. *Style* one. *Stigma* capitate. *Berry* corticated, one-celled, many-seeded, or by abortion, one-seeded. *Seeds* nidulant, discoidal. *Albumen* large, cartilaginous, almost divided into two plates. *Embryo* with leafy cotyledons. (*Lindley.*)

Specif. Char.—*Trunk* short, often crooked, but pretty thick. *Branches* irregular, covered with smooth ash-coloured bark; young shoots highly polished, deep green; wood white, hard, close grained, and bitter. *Leaves* opposite, short stalked, oval, shining, smooth on both sides, from three to five-nerved, or rather between that and triple, or quintriple, differing in size from one and a half to four inches long, and from one to three broad. *Flowers* small, greenish white, collected in small terminal corymbs. *Calyx* five-toothed, permanent. *Filaments* scarcely any, or exceedingly short, inserted over the bottom of the divisions of the corolla. *Anthers* oblong, half within the tube, and half without. *Ovary* two-celled, with many ovules in each cell, attached to the thickened centre of the partition. *Style* the length of the tube of the corolla. *Stigma* capitate. *Berry* round, smooth, size of a pretty large apple, covered with a smooth, somewhat hard shell, of a rich orange colour when ripe, filled with a white, soft gelatinous pulp. *Seeds* several, immersed in the pulp of the berry.

This plant is a native of the East Indies, growing in British India and Persia, as well as other parts. The drug appears to have been known to the Arabians. The plant was discovered and figured by Rheede in his *Hortus Malabaricus*, and from it Linnæus formed his genus Strychnos. All parts of it are endowed with the properties—but the seeds alone are officinal. The bark in 1837 was fully determined by Dr. O'Shaughnessy, to be identical with the *False Angustura*, which conclusion had previously been arrived at by Drs. Pereira and Christison.

The seeds (*nuces vomicæ*) are round, flat, an inch in diameter, two lines in thickness, rounded and smooth on the margins, a little concave on one surface, with an umbilical prominence, slightly convex upon the other; they are of an ash-gray colour, and covered with minute silky hairs. They are composed of the testa and two flat hairy, white cotyledons and the minute embryo; within the testa is a delicate membrane, the endopleura. The seeds are extremely hard and difficult to pulverize. They have no odour, and a very bitter taste.

They contain *igasuric acid* in combination with *strychnia* and *brucia*, together with wax, gum, starch, and colouring matter.

This article is one of the most active, in its effects on the animal economy, of the whole list of the Materia Medica. Its force is principally expended upon the cerebro-spinal centre, through which, in sufficient amount, it throws the whole muscular system into the most violent spasms. Death, when it occurs, is of the most violent and terrific kind. (See *Pereira, Mat. Med.*, for a full exposition of its effects in the several degrees of action.) In small doses it is tonic and roborant. As a medicine, the wood and bark have been used in the treatment of intermittent fever in the East. The nux vomica is employed in paralysis to stimulate and arouse nerves which have lost their power of action. Strychnia is sometimes used as a substitute. The tincture and alcoholic extract are the preparations employed.

Plate LVIII.—*Represents the plant in flower, and the fruit.*

Plate LVIII.

STRYCHNOS NUX VOMICA.

STRYCHNOS S^T IGNATII.

STRYCHNOS ST. IGNATII.

BERGIUS.

ST. IGNATIUS BEAN.

STRYCHNOS. ST. IGNATII. *Lamarck.* IGNATII AMARA.—*Linnæus, Jr.*

SEX. SYST.—Pentandria, Monogynia.

GEN. CHAR.—See preceding.

SPECIF. CHAR.—A branching tree, with long, taper, smooth, scrambling branches. *Leaves* ovate, acute, stalked, veiny, smooth, a span long; hooks none. *Panicles* small, axillæ 3—5 flowered, with short, round, rigid pedicels. *Flowers* very long, nodding, white, smelling like jasmine. *Fruit* smooth, round, as large as an orange.

This plant is a native of the Philippine Islands, where the seeds are called *Igasur*.

The seeds came into the Dutch shops from the East Indies about the latter end of the seventeenth century. There is reason to suppose, however, that they were known previous to that period. Loreiro mentions the plant in his *Flora Cochinchinensis*, under the name of *Ignatiena Philippinica*. The idea attached to it is that the Jesuits were acquainted with it, and bestowed upon it the name of their patron, St. Ignatius (Loyola).

The seeds are the size of a small olive, triangular in form, two sides flat, the third rounded, with the hylum at one of the angles; they are darker coloured than nux vomica, but like it covered with minute hairs; they are composed of two parts, the testa, and hard, horny, semi-transparent cotyledons with the embryo. They are destitute of odour, and have a bitter taste.

The constituents are the same as nux vomica, and their effects are precisely similar.

GENTIANEÆ.

JUSSIEU.

GENTIAN TRIBE.

ESSENTIAL CHAR.—*Flowers* terminal or axillary, regular, or very seldom irregular. *Calyx* divided, inferior, persistent. *Corolla* monopetalous, hypogynous, usually regular and persistent; the limb regular, sometimes furnished with delicate fringes; its lobes of the same number as those of the calyx, generally five, sometimes four or six, eight or ten; occasionally extended at the base into a bag or spur, with a plaited or folded, or imbricated, twisted æstivation. *Stamens* inserted upon the corolla, all in the same line, equal in number to the segments, and alternate with them; some of them occasionally abortive. *Ovary* composed of two carpels, one or partly two-celled, many-seeded. *Style* one, continuous with the ovary. *Stigmas* two, right and left of the axis. *Ovules* none, anatopal, parietal. *Capsule* or berry many-seeded; when two-valved, the margins of the valves turned inwards, and bearing the seeds. *Seeds* small, testa single. *Embryo* minute, in the axis of soft fleshy albumen. *Radicle* next the hylum. (*Lindley. Veg. King.*)

Herbaceous plants, seldom shrubs, generally smooth, sometimes twining. *Leaves* opposite, entire, without stipules, sessile, or having their petioles confluent in a little sheath, in most cases three to five-ribbed; very rarely brown and scale-like; sometimes alternate.

This is a numerous order, found in all parts of the world. It is extremely regular as regards its affinities, both botanical and chemical. A peculiar bitter principle is found in a large number of the species—of which it is constituted. This principle, highly elaborated, is *Gentianin*.

GENTIANA LUTEA.

LINNÆUS.

YELLOW GENTIAN.

Sex. Syst.—Pentandria, Monogynia.

Gen. Char.—*Calyx* 4—5 parted. *Corolla* variously divided, twisted to the right in æstivation, often with accessory lobes between the principal ones, without depressed glands upon the petals. *Filaments* equal at the base. *Anthers* not changing *Stigmas* terminal on the ovary or style. *Placentæ* united with the endocarp, and overspreading the valves of the capsules. (*Lindley.*)

Specif. Char.—*Root* cylindrical, wrinkled, ringed, thick, forked, brown externally, yellow within. *Stem* three or four feet high, hollow and stout. *Radical leaves* ovate oblong, five-nerved, two or three inches broad; those on the stem, sessile, ovate acute; those next the flowers cordate, amplexicant, concave; all of a pale green. *Flowers* bright yellow, in many flowered whorls, stalked. *Calyx* of a papery texture, and semi-transparent, three or four cleft, with short lanceolate unequal segments. *Corolla* with a very short tube, and 5—6 green glands at the base, 5—6 parted, with oblong, acute, veiny lobes. *Anthers* subulate, somewhat united, becoming distinct. *Stigmas* revolute. *Capsule* oblong, stalked. *Seeds* roundish, compressed with a membranous brownish border. (*Lindley.*)

This is the "Common Gentian," the root of which furnishes the drug of commerce. It grows in Alpine meadows in the middle of Europe, at an elevation of three to five thousand feet. The root is stated by the *United States Dispensatory* to come from Germany. Pereira states, that into England it is imported from Havre and Marseilles. Hansen in Germany is said to be famous as a depot for it.

The root consists of stout branches, becoming at their termination reduced to fibres, the whole concentrated on a rough thick head. In the dried state it is brought into the market in pieces more or less branched or simple, an inch or more to a few lines in thickness, and several inches in length. It is marked by transverse annular rings, and is furrowed from drying. Its fracture is short. Its colour externally is yellowish-brown, and internally yellow. Its taste is intensely bitter; its odour not agreeable. Deleterious effects have been attributed to the odoriferous principle when the root is drying; this, however, would be more likely to arise from the roots of some of the butter cup species, or Ranunculaceæ, which are said to be occasionally mixed with gentian.

In 1821, Henry and Caventou examined gentian root, and announced that it contained *volatile odorous matter*, *bitter crystalline matter* (*gentianin*), *fugaceous odorous principle*, yellow colouring matter, *green fixed oil*, gum, *uncrystallizable* sugar, *matter identical with* bird lime, *a free organic acid*, and woody fibre. The volatile principles are connected with oil procurable by distillation. The *gentianin* has been shown by Trommsdorff and Leconte, in 1837, to be composed of an acid principle, *gentisic acid*, and a bitter one *gentianite;* the last has not been obtained pure. By the latter authority the bird lime is stated to be a compound of oil, wax, and caoutchouc.

In consequence of the existence of sugar, an infusion of gentian is capable of undergoing the alcoholic fermentation; from this spirit may be distilled, *gentian spirit*, which is a favourite beverage with the Swiss mountaineers; the taste for it, however, must be acquired in consequence of its bitterness.

Gentian is so named from Gentius, a King of Illyria, but the cause of the bestowal of his name on the root is not apparent. As a medicine it has been known from the earliest ages. The medical properties are those of a pure bitter; it invigorates the stomach, promoting the appetite and removing general debility; hence it is used in such cases as require tonics; it is not a stimulant. It is employed usefully in combination.

The mode of exhibition is in the form of powder, infusion, tincture and extract. Most of the wine bitters have this root as the basis.

Plate LX.—*Represents the plant in flower, a radical leaf, and the organs of reproduction.*

GENTIANA LUTEA.

IPOMÆA JALAPA.

R. P. SMITH, 144 CHESTNUT ST PHILA

CONVOLVULACEÆ.

R. BROWN.

BINDWEEDS.

Essential Char.—*Inflorescence* axillary or terminate. *Peduncles* one or many-flowered, the partial ones generally with two bracts, which sometimes enlarge greatly after flowering. *Calyx* persistent, in five divisions, remarkably imbricated, as if in more whorls than one, often very unequal. *Corolla* monopetalous, hypogynous, regular, deciduous; the limb five-lobed, plaited, the tube without scales. *Stamens* five, inserted into the base of the corolla, and alternate with its segments. *Ovary* simple, with two to four cells, seldom with one; sometimes in two or four divisions; few-seeded; the ovules definite and erect, when more than one collateral. *Style* one, usually divided at the top, or as many as the divisions of the ovary, and arising from their base. *Stigmas* obtuse or acute. *Disk* annular, hypogynous. *Capsule* with from one to four cells, succulent or capsular; the valves fitting at their edges to the angles of a loose dissepiment, bearing the seeds at its base. *Seeds* with a small quantity of mucilaginous albumen. *Embryo* curved. *Cotyledons* leafy, shrivelled. *Radicle* inferior next the hilum. (*Lindley, Veg. King.*)

This class is composed of herbaceous plants, usually twining and succulent, smooth, or with a simple pubescence; sometimes erect bushes. *Leaves* alternate, undivided, or lobed, seldom pinnatifid, with no stipules. The plants of this class are possessed of two principles, which render a number of them valuable: these are resin and starch; the former constitutes the purgative, the latter, the nutritive principle. They grow in profusion in the tropics, but are not unknown to cold climates.

IPOMŒA JALAPA.

NUTTALL.

Ipomœa Purga.—*Wenderoth.*

Sex. Syst.—Pentandria, Monogynia.

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

Specif. Char.—*Root* a roundish, somewhat pear-shaped perennial tuber; externally blackish, incrassated; internally white when recent, somewhat beset with fibres. *Stem* annual, twining, smooth, inclined to twist, reddish. *Leaves* heart-shaped, entire, smooth, conspicuously acuminated, and deeply sinuated at the base; the lower ones sometimes nearly hastate, or with diverging angular points; the under surface prominently veined; the footstalks often nearly the length of the lamina of the leaf, from the point of its insertion. *Peduncles* about the length of the petioles, bearing commonly two, more rarely, three flowers. *Calyx* without bracts, five-leaved, obtuse; two of the divisions external. *Corolla* funnel-formed, (with a clavate, cylindrical tube, and a sub-pentagonal, horizontally expanded limb, *Zucarrini,*) lilac purple. *Stamens* five. *Anthers* oblong, white, somewhat exserted. *Pistillum*, germ slender and attenuated into the style. *Stigma* capitate. (*Nuttall.*)

The plant from which the true jalap is derived was, for a long time, the object of much conjecture and erroneous statement. Linnæus at first supposed it to be a *Mirabilis*, to which he gave the specific name of *jalapa*, but he afterwards changed his opinion, and supposed it to be a bindweed, to which he gave the name *Convolvulus jalapa.* During a considerable period, it was confounded with the *Ipomœa macorrhiza* of Michaux. In the year 1827, Dr. J. R. Coxe, then Professor of Materia Medica in the University of Pennsylvania, obtained from Mexico some living tubers, and from these obtained the plant above described. The botanical account was drawn up by Mr. Nuttall, and published in the paper of Dr. Coxe (*Am. Journ. of Med. Sciences*, Feb. 1830). The late Dr. M. Burrough, when Consul at Vera Cruz, in 1837, sent some living tubers to Philadelphia, and some of them being placed in the hands of Dr. Wood, the present Professor in the University, a verification of all the statements of Dr. Coxe was made, thus most satisfactorily settling this mooted question. About the time Dr. Coxe's paper appeared, Dr. Schiede and Dr. Wenderoth described

the jalap plant under the name of *I. purga.* Dr. Christison states that the specimens derived from Dr. Wood's plants, do not exactly coincide with the plates of *I. purga*, as figured by Hayne, or *I. Schiedeana* of Nees. (See *Griffith's Med. Bot.*) There have now been determined to be several species in Mexico affording varieties of jalap, and the Continental European botanists may have hit upon some of these, which will account for discrepancy.

The name Ipomœa jalapa has been objected to, as preoccupied by Pursh in his *Flor. Americæ Septentionalis*, but as this author was describing the plant of Michaux and under an error, in fact changing the name in compliance with this error, there seems to be no impropriety in giving it the correct application by its present adoption.

Jalap appears solely to be a native of Mexico, where it thrives in an elevated region, about 6000 feet above the level of the sea. The root is gathered at all seasons, but particularly in March and April, when the young shoots begin to sprout. It takes its name from Jalapa, which city is the depot for the drug, whence it is carried to Vera Cruz, and exported. It has been proposed to introduce and cultivate it, for medicinal purposes, in the United States, but no effort so far has been successfully made.

Jalap root comes into the market in bags, weighing from one to two hundred pounds. Sometimes large quantities of small, light, immature tubers are sent. A full sized tuber should weigh from one to six ounces. They are either round, egg-shaped, or irregularly pyriform, of a mottled black and brown colour externally, fawn-coloured internally, breaking under the hammer, and presenting an undulated resinous and starchy appearance. The odour of jalap is unpleasant, and the taste acrid and nauseous.

Jalap contains *starch, resin and extractive.* From the resin a peculiar substance has been obtained called *jalapine.*

Worms prey upon jalap, and by eating out the starch, leaving the resin, make it more active.

The male jalap, a large sized light and little resinous tuber, is derived from *I. orizabensis.* (*Pelletan.*)

Plate LXI.—*Represents the plant in flower, the section of the corolla, and the germ and root.*

CONVOLVULUS SCAMMONIA.

LINNÆUS.

SCAMMONY PLANT.

Convolvulus Syriacus.—*Morrison.*

Sex. Syst.—Pentandria, Monogynia.

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

Specif. Char.—*Root* perennial, fusiform, very long, fleshy, with an acrid cathartic juice. *Stems* numerous, annual, branching, slender, round, smooth, twining, very slightly angular near the ends. *Leaves* stalked, sagittate oblong, acute, entire, quite smooth, truncate and angular at the base, with acute, spreading lobes. *Peduncles* solitary, three-flowered, scarcely twice so long as the leaves. *Sepals* rather lax, smooth, ovate, repand, obtuse, with a reflex point coloured at the edge. *Corolla* very much expanded, pale sulphur yellow, thrice as long as the calyx, an inch and more in length. *Stamens* erect, converging, thrice as long as the corolla. *Style* the length of the stamens. *Stigmas* oblong, erect, parallel, distant, white. *Ovary* two-celled, four-seeded. *Capsule* two-celled.

This plant is a native of Greece, Syria, Asia Minor, and Palestine; it is said to grow in hedges and bushy places. It is the one from which is obtained Scammony of commerce.

The mode of obtaining pure scammony is to clear the earth from the top of the root, and then to remove it by an oblique incision; the juice flows from the cut surface, and is collected in shells or other recipients. This is the mode of obtaining it at the present time. The last writer who describes it is Russel, and it may be remarked that it is exactly the same described by Dioscorides. The product obtained in this way is *Virgin Scammony.* This kind, however, is in comparatively small amount sent into the market; inferior quantities, or rather, such as are made by the admixture of foreign substances, constitute the commercial article.

The virgin scammony is in lumps, apparently fragments of larger masses, as if rubbed, and of a whitish ash colour externally; the fracture is conchoidal, and when recent, displays a glistening resinous lustre, pale green in the first

CONVOLVULUS SCAMMONIA

instance, but becoming darker by exposure; a thin fragment is somewhat diaphanous; it is porous, very brittle, easily reduced to powder, the powder being of an ash gray colour; sp. gr. 1.2. (*Pereira.*) It has a faint odour if rubbed or breathed on, resembling old cheese, and the taste is slightly bitter, becoming acrid.

The composition of two specimens, according to Christison, was *Resin* 81.8, and 83.0. *Gum* 6.0 and 8.0. *Starch* 1.0 and 0.0. *Fibre* and sand, 3.5 and 3.2. *Water* 7.7 and 7.2. It is called a *Gum resin*, but the gum is in exceedingly small quantity.

Formerly the drug was divided into two kinds, *Aleppo* and *Smyrna*, and a distinction then existed between them. Aleppo scammony corresponded to the virgin, not always, however, so pure as that described. It was so called because the city of Aleppo became a depot for it. Hasselquist says (*as quoted by the Dict. des Plantes Usu.*), the best "comes from Marach, where resides a Pasha, four days' journey from Aleppo, near the frontiers of Armenia. It is carried to Aleppo in small skins, whence it is sent to London and Marseilles. It was derived from Mt. Carmel by way of Acre, but it does not come now; the Arabs are in the habit of plundering the carriers rather than cultivate it. I have seen the Convolvulus from which it is obtained, in the valleys between Nazareth and Mt. Carmel."

The Smyrna scammony has always been regarded as inferior; by Lemery, in the early part of the eighteenth century, it was described as more close or compact, heavier, blacker, less resinous, breaking with difficulty, less gray in powder, and whitening less the liquor in which dissolved. This scammony, by Tournefort, has been said to be derived from Notalia, but sent to Smyrna, hence the name. It has been supposed to be derived from a different plant, the *Periploca secammone, Lin.;* but this is not proved. In *Messue's* time, other modes of obtaining scammony, besides the natural exudation, were practised, as, for instance, by expressing the juices of the root, as also those of the leaves and stems, and then inspissating them. The difference in the mode of preparing the article may account for the difference in the properties of it, when the above distinction prevailed. The specimens which I have seen were in half cakes, and factitious.

The distinction in commerce between Aleppo and Smyrna scammony, has now been abandoned. The article either comes in the *virgin state*, or is sophisticated; this is done in Smyrna, according to a tariff of prices; and the most worthless trash is now thrown into the market. The articles used for admixture are chalk, starch of some kind of pulse, sand, bone-black and tragacanth. The proportion of resin in the specimens I have examined, varies from six to forty per cent. This kind comes in cakes, contained in drums, and varies from the colour and appearance of sap-sago cheese, to shining leaden black, and light transparent reddish gum colour. Some specimens can hardly be pulverized, and the odour is so cheese-like as to lead to the idea that it was communicated artificially. It has been doubted whether the scammony of Dioscorides, and that of the present time, are identical. There is no good reason for supposing that they are not. It has been stated by Sibthorp, that the plant described, imperfectly indeed, by Dioscorides, was the C. farinosus; upon what ground, however, as remarked by Lindley, does not appear. Prof. Lindley is of opinion that the modern and ancient plants were of the same species, and states that the description of Dioscorides, if the terms of the Aldine edition of 1499 be accepted, is applicable to the modern plant. The translation from the Greek into Latin, given by Matthiolus, has a like signification. There are other reasons, however, for thus regarding them. Dioscorides gives a clear description of the drug, and states that the best comes from Mysia; he was a traveller, and familiar with the countries and their products around him; he therefore says, that this article is preferable to that of Syria and Judea, which was liable to adulteration with the juice of the tithymalus (*Euphorbia*) and orobus (*lentil*) farina. The plant, then, was a native of Asia Minor, of which Mysia is a province. It has also been found in Greece and the neighbouring islands, and it has been known to exist in Syria and Palestine from the earliest record. In the absence of direct proof that another plant produced it in the time of Dioscorides, the inference clearly is, that the only plant known, has always produced it; and that the change in the source of supply has arisen from causes by which trade is ordinarily regulated.

Scammony is a purgative of the warm drastic kind; formerly given in the conserve of the quince, or some electuary, now more in combination; but sophisticated as it is, can hardly be of any value.

PLATE LXII.—*Represents the plant in flower, the expanded flower, and fruit.*

LABIATEÆ.

JUSSIEU.

THE MINT TRIBE.

LAMIACEÆ.—*Lindley.*

ESSENTIAL CHAR.—*Calyx* tubular, inferior, persistent, the odd tooth being near the axis; regular five or ten-toothed, or irregular bilabiate, three or ten-toothed. *Corolla* monopetalous, hypogynous, bilabiate; the lesser lip undivided or bifid, overlapping the lower, which is larger and three-lobed. *Stamens* four, didymous, inserted upon the corolla, alternately with the lobes of the lower lip; the two upper sometimes wanting. *Anthers* two-celled, sometimes apparently unilocular, in consequence of the confluence of the cells at the apex; sometimes one cell altogether obsolete, or the two cells separated by a bifurcation of the connective. *Ovary* deeply four-lobed, seated in a fleshy hypogynous disk; the lobes each containing one erect ovule. *Style* one, proceeding from the base of the lobes of the ovary. *Stigma* bifid, usually acute. *Fruit* one to four small nuts, enclosed within the persistent calyx. *Seeds* erect, with little or no albumen. *Embryo* erect. *Cotyledons* flat.

Herbaceous plants or undershrubs. *Stem* angulated, with opposite ramifications. *Leaves* opposite, divided or undivided, without stipules; replete with receptacles of aromatic oil. *Flowers* in opposite, nearly sessile, axillary cymes, resembling whorls; sometimes solitary, or as if capitate. (*Lindley.*)

The plants appertaining to this tribe are, for the most part, odoriferous; some are fetid. They contain a volatile oil, which resides in secreting glands. This oil is camphoraceous frequently, or disposed to furnish stearoptene (camphor). They also contain a bitter and astringent principle. The medical properties are stimulating and tonic.

MENTHA PIPERITA.

LINNÆUS.

PEPPERMINT.

SEX. SYST.—Didynamia, Gymnospermia.

GEN. CHAR.—*Calyx* campanulate, or tubular, five-toothed, equal, or somewhat two-lipped, with the throat naked inside or villous. *Corolla* with the tube enclosed, the limb campanulate, nearly equal, four-cleft, the upper segment broader, nearly entire, or emarginate. *Stamens* four, equal, erect, distant. *Filaments* smooth, naked. *Anthers* with two parallel cells. *Style* shortly bifid, with the lobes bearing stigmas at the points. *Fruit* dry, smooth. (*Bentham.*)

SPECIF. CHAR.—*Stem* procumbent, ascending, branched, reddish, quite smooth, or fringed with a very few spreading hairs. *Petioles* generally ciliated. *Leaves* ovate oblong, or somewhat lanceolate, rounded at the base, deep green, smooth, or hairy on the under side. Upper floral leaves small, lanceolate subulate, shorter than the flowers. *Whorls* few, lax, the uppermost collected into a short, oblong, obtuse, reddish spike; the lowermost remote, with the cymes shortly stalked. *Bracts* subulate, the outer ones as long as the calyx. *Pedicels* quite smooth. Teeth of the calyx hispid. (*Bentham. Lindley.*)

This plant is wide-spread. It grows all over Europe, in India, Africa, and North and South America. It flowers in this country early in the summer.

The whole herb is officinal. It is kept in the shops in the dried state, and should preserve its green appearance. It has a peculiar aromatic odour, and a warm biting, slightly bitter taste. It contains a volatile oil, *Oleum Menth. Piperitæ*, some resin, bitter extractive and tannin.

As a medicine, it is a warm aromatic stimulant. It is used in the fresh or dried state in infusion. The oil obtained by distillation is officinal; from it are prepared the spirit of peppermint, and the water.

PLATE LXIII.—*Represents the plant and the flower and fruit.*

MENTHA PIPERITA.

DIGITALIS PURPUREA.

SCROPHULARIACEÆ.

LINDLEY.

FIGWORTS.

Essential Char.—*Peduncles* opposite or alternate, sometimes simple and one-flowered, sometimes many-flowered in dichotomous cymes. *Calyx* inferior, persistent, pentamerous, or by abortion tetramerous, the sepals sometimes united almost to the point, sometimes only at their base, sometimes altogether distinct and imbricated, often unequal; the upper one being largest, the two lowest smaller, the lateral ones smallest. *Corolla* monopetalous, pentamerous, or, the upper petals being united to their points, tetramerous; *tube* short or long; *limb* flat or erect, nearly equally divided or bilabiate, imbricated in æstivation. *Stamens* in a single series opposite the sepals; the uppermost altogether deficient or sterile, or very rarely fertile, and shorter than the others; the two lateral equal, antheriferous, or very rarely sterile and abortive; the lower equal, sometimes fertile and equal to the lateral ones, or longer, often sterile or deficient, abortive. *Anthers* two-celled, or, by growing together or half disappearing, one-celled, opening longitudinally. *Ovary* superior, two-celled, many-seeded. *Style* simple, or rarely shortly bifid. *Stigmatic surface* terminal when the style is entire, either very thin and punctiform, or more or less pulvinate or capitate, entire or emarginate. When the style is bifid, the stigmatic surface either lines the inner surface of the lobes, or their margins, or rarely forms a pulvinate mass in the fork. *Fruit* capsular, seldom berried, dicarpellary, two-celled, sometimes with two entire or bifid valves, sometimes with four entire ones, sometimes opening by pores or lids, very rarely almost indehiscent; dissepiment parallel or opposite the valves, finally loose in the centre, or altogether. *Placenta* adhering to the dissepiment, sometimes when mature separate, and forming 1—2 central columns. *Seeds* indefinite, rarely definite, albuminous. *Embryo* orthotropal, heterotropal, and antitropal, but slightly curved. (*Bentham. Lindley.*)

Herbs or undershrubs, or sometimes shrubs, usually without scent, but sometimes fetid, rarely aromatic. *Leaves* opposite, whorled, or alternate. *Flowers* axillary, or racemose, rarely spiked. *Peduncles* opposite or alternate, sometimes simple and one-flowered, sometimes many-flowered in dichotomous cymes.

The plants composing this family are in abundance in all parts of the world. The properties of such as are medicinal are acrid and bitterish, possessing a marked action on the nervous system.

DIGITALEÆ.

DIGITALIS PURPUREA.

LINNÆUS.

PURPLE FOXGLOVE.

Sex. Syst.—Didynamia, Angiospermia.

Gen. Char.—*Sepals* five, rounded or acute, permanent, much shorter than the corolla; the uppermost narrowest. *Corolla* ventricose, contracted at the base, with an oblique limb; upper lip emarginate, lower three-fid, with the middle lobe the largest. *Stamens* didynamous, inserted into the base of the corolla. *Anthers* acute, naked. *Stigma* bilamellate. *Capsule* ovate, with a septicidal dehiscence. (*Lindley.*)

Specif. Char.—A biennial, root of long and numerous slender fibres. *Stem* straight, wand like, leafy, mostly simple, roundish, with several slight angles, downy, three or four feet high. *Leaves* alternate, ovate, or elliptic oblong, crenate, downy, rugged and veiny, of a dull green, tapering at the base into winged footstalks; radical ones largest. *Raceme* terminal, one-sided, erect, simple, of numerous, sometimes sixty, large pendulous, scentless, crimson flowers; elegantly marked with eye-like spots, as well as hairy within. (*Smith.*) *Seeds* small, oblong, pale brown, pitted.

This plant is a native of Europe, but has been introduced into the United States and cultivated. It flowers at midsummer. In England it is found in pastures, and about hedges, on a gravelly or sandy soil.

The parts employed are the leaves and seeds. The leaves of the foxglove should be gathered when perfectly formed and matured, just before or during inflorescence; the laminæ are to be preferred; the petioles are hard, and possessing little activity, should be rejected. They should be carefully dried, which is best accomplished in baskets and in a dark stove room. They should be preserved in close vessels. When properly dried and preserved, they retain their green appearance, and have a faint odour, and a bitter, nauseous taste.

The seeds are small, roundish, of a grayish-brown colour, and have a bitter taste.

Foxglove has been examined by a number of chemists. Rein and Haase, in 1812, pointed out the existence of a green resin, extractive, gum and salts. In 1824, Le Royer, of Geneva, announced the existence of a peculiar principle, digitalin, and in 1833, Mr. Welding added tannin. The *digitalin* has been studied by Lancelot, Redig and Homolle; the latter more recently. It is a white, porous substance, difficult to crystallize, very bitter, acrid, neutral and only completely soluble in alcohol. A bitter principle is called by Redig *picrin*, and a brown, almost tasteless extractive *scaptin*. An empyreumatic oil has been generated from it.

In this market there are two kinds of digitalis, one imported from England, the other derived from the Shakers. The latter is not generally good. A good article should have a fresh appearance. The adulterations practised upon this article are with the leaves of the Mullein, particularly the Verbascum Blattaria, but the physical properties of the leaf will serve to distinguish it. It does not appear that the digitalis was known to the ancients; the earliest account of it was given by Fuschius, who named it from its resemblance to the finger of a glove. Sigmond says, that *Foxglove* is a corruption of Folk's glove. It appears to have been known by the common name probably before the Norman conquest. (*Pereira.*) To Dr. Withering is due the merit of having introduced the drug to the notice of the medical public in 1785.

Digitalis is a powerful sedative to the circulation and nervous system, sometimes acting inordinately and producing poisonous effects. It is used in inflammatory affections, and in disease of the heart. The forms of exhibition are substance, tincture, infusion, and extract or syrup.

Plate LXIV.—*Represents the plant in flower, a mature leaf, and the organs of reproduction.*

SOLANACEÆ.

LINDLEY.

THE NIGHTSHADE TRIBE.

Solaneæ.—*Jussieu.*

Essential Char.—*Calyx* five-parted, seldom four-parted, persistent inferior. *Corolla* monopetalous, hypogynous; the limb five-cleft, seldom four-cleft, regular or somewhat unequal, deciduous; the æstivation plaited or imbricated. *Stamens* inserted upon the corolla, as many as the segments of the limb, with which they are alternate. *Anthers* bursting longitudinally, rarely by pores at the apex. *Ovary* two-celled, rarely four or many-celled, with polyspermous placentæ. *Style* continuous. *Stigma* simple. *Pericarp* with two, or four, or many cells, either a capsule with a double dissepiment parallel with the valves, or a berry with the placentæ adhering to the dissepiment. *Seeds* numerous, sessile. *Embryo* straight or curved, often out of the centre, lying in a fleshy *albumen*. *Radicle* next the hylum. (*Lindley.*)

The plants of this order are shrubby or herbaceous, with alternate undivided or lobed, sometimes collateral leaves, the floral ones sometimes doubled and contiguous.

Prof. Lindley states that they are natives of most parts of the world within the arctic and antarctic circles; especially within the tropics. The medical properties of most of the Solanaceæ are narcotic and poisonous, sometimes acrid; these depend upon the presence of an alkaline principle, which in many of them has been isolated. The roots of a few are excellent as nutriment (as the potato) in consequence of the large amount of wholesome fecula in them. While the fruit of others is nutritious and wholesome (as the egg-plant and tomato). One genus affords stimulants. viz., the Capsicum.

Plate LXV.

ATROPA BELLADONA.

HYOSCYAMUS NIGER.

ATROPA BELLADONNA.

LINNÆUS.

DEADLY NIGHTSHADE.

Sex. Syst.—Pentandria, Monogynia.

Gen. Char.—*Calyx* five-parted, permanent, nearly equal. *Corolla* campanulate, with a very short tube; limb with five shallow nearly equal segments. *Filaments* nearly as long as the tube of the corolla. *Anthers* cordate, four-lobed. *Stigma* capitate. *Berry* two-celled, many-seeded, subtended by the enlarged calyx. (*Lindley.*)

Specif. Char.—*Root* fleshy, creeping. Whole plant fetid when bruised, of a dark and livid aspect, indicative of its deadly narcotic character. *Stems* herbaceous, annual, three feet high, round, branched, leafy, slightly downy. *Leaves* lateral, mostly two together, of unequal size, ovate, acute, entire, smooth. *Flowers* imperfectly axillary, solitary, stalked, drooping, dark dull purple in the border, paler downwards, about an inch long. *Berry* of a shining violet black, the size of a common cherry, sweetish and not nauseous. (*Smith and Lindley.*)

This plant is a common one of Europe in waste places, and among ruins. It has been introduced into the gardens of the United States, and flowers and matures its fruit all summer.

The leaves, the root, and the seeds have been used in medicine. The leaves are collected in June, and should be carefully dried; they should have a fresh appearance, and possess a narcotic somewhat pleasant odour, and a bitter subacrid taste. The root is brownish externally, internally whitish, and has a feeble odour and a sweetish slightly bitter taste. The best analysis of the leaves is by Brandes; from this it is shown to contain *Supermalate of Atropia*, *Pseudo-toxin*, with malate of atropia and potash salts, wax, chlorophylle, phytocolla, gum, starch, albumen, lignin, and salts.

The Atropia is an alkaloid substance, crystallizable, odourless, soluble in alcohol and ether, but slightly in water. It is a powerful poison. Luebekind has described as existing in it a volatile alkaloid which he has called *Belladonnin*, and a volatile crystallizable acid has been stated to exist by Richter.

The medical properties of belladonna are those of a narcotic. In moderate doses it quiets the nervous system and produces sleep or lulls pain; in larger doses it is apt to affect the head and cause delirium. In overdoses it occasions death. A peculiar effect is to redden the skin, dry and exalt the redness of the mouth and fauces, hence the idea that it produces factitious scarlatina, and its use upon the absurd principles of Hahnemann as a prophylactic. It also dilates the pupil, and the parturient uterus.

It is employed in powder, in extract, and in tincture, externally in the form of the ointment and the plaster.

Plate XLV.—*Represents the plant in flower, the structure of the flower and the fruit.*

HYOSCYAMUS NIGER.

LINNÆUS.

COMMON HENBANE.

Sex. Syst.—Pentandria, Monogynia.

Gen. Char.—*Calyx* tubular, inflated at the base, five-toothed, permanent. *Corolla* funnel-shaped, irregular, with a spreading unequal limb, divided into five obtuse segments. *Filaments* nearly equal. *Stigma* capitate. *Capsule* opening transversely by a convex lid, two-celled, many-seeded. (*Lindley.*)

Specif. Char.—Biennial. *Stem* from six inches to two feet in height, taper, scarcely branched, covered closely with long weak hairs tipped with a minute black gland. *Leaves* sessile, occasionally somewhat decurrent; stem clasping, oblong acute, coarsely and unequally slashed, pale dull green, slightly pubescent, with long glandular hairs, like those of the stem, upon the midrib. *Flowers* axillary, sub-solitary, nearly sessile, embosomed in the uppermost

leaves, than which they are much shorter. *Calyx* funnel-shaped, villous, five-lobed, regular, wider than the corolla, to whose tube it is equal in length; each lobe ovate, acute, with an open æstivation. *Corolla* dull dirty yellow, strongly netted with purple veins, and deep purple at the orifice; funnel-shaped, with a somewhat erect limb, which is five-lobed; lobes rounded, the two anterior a little smaller than the others, and separated at the base by a deep slit in the tube. *Stamens* five, declinate, straight, shorter than the corolla, the three lower longer than the others. *Filaments* pubescent, inserted about the middle of the tube of the corolla. *Ovary* nearly round, shining, pale green, two-celled, with numerous ovules adhering to the dissepiment. *Style* filiform, declinate, purple at the apex. *Stigma* capitate. *Fruit* an ovate, many-seeded pyxis.

Henbane is a common plant in Europe; in the United States it has been introduced and cultivated. It flowers in July.

From the showing of Pereira it would appear that there has been a difference of opinion among botanists, with respect to the duration of this plant. By some it has been supposed to be annual, by others biennial. The truth appears to be that it is both. The annual plant is comparatively inert. Mr. Houlton first pointed out the cause of inertness, and stated that the plant in the second year only was reliable for medicinal purposes. The leaves and seeds are the officinal portions. The former, when fresh, have a strong, unpleasant narcotic odour, a mucilaginous, slightly acrid taste, and a clammy feel; they are pale dull green, but become brown by drying. The seeds are small, compressed, roundish, of a yellowish-gray colour, and have the odour of the plant, and an oily, bitter taste.

Both the portions above named contain a peculiar alkaloid principle, *Hyoscyamia*, in which the medical properties appear to reside. It was obtained by Brandes and confirmed by Geiger and Hesse, and Mein. By distillation an empyreumatic oil was obtained by Dr. Morries, probably similar to the oil from tobacco. There is a variety of this plant which, from having white flowers, has been called *Hyoscyamus albus*. The *H. agrestis* and *H. pallidus* are not different.

Henbane is a sedative narcotic, and alterative. In small doses it calms the system and allays pain, predisposing to or producing sleep. It in large doses will affect the head, causing giddiness, vertigo, dimness of vision, &c., but in moderate doses is not so apt to affect the sensorium as opium, from which it differs also in its effect on the eye and the bowels. In overdoses it is poisonous. It is used in substance, and in the form of extract or tincture.

PLATE LXVI.—*Represents the plant in flower, the flower and the capsule.*

DATURA STRAMONIUM.

LINNÆUS.

THORNAPPLE.

SEX. SYST.—Pentandria, Monogynia.

GEN. CHAR.—*Calyx* oblong, tubular, five-angled, five-toothed, dropping off from its base by a circular horizontal incision, which remains permanently at the base of the ovary. *Corolla* funnel-shaped, regular, angular, plaited, with mucronate lobes. *Stigma* thick, obtuse, two-lobed. *Ovary* four-celled. *Fruit* dry, often prickly, half four-celled, with four valves and many seeds. (*Lindley.*)

SPECIF. CHAR.—A bushy, smooth, fetid annual, two or three feet high. *Stem* much branched, forked, spreading, leafy. *Leaves* from the forks of the stem large, ovate, smooth, unequal at the base, variously and acutely sinuated and toothed, veiny, of a dull green. *Flowers* axillary, erect, white or lilac, exhaling some odour when the dew is on them, about three inches long. *Fruit* as large as a walnut, prickly, and containing, in four cells, black seeds.

This plant is found in waste places all over Europe. It may also be said to be common all through this country, where two varieties are to be met with, one with white flowers and green stems, the other with lilac flowers and purple stems and veins. It flowers during the summer and fall, until frost. It is here called *Jimpson weed*, a corruption of *Jamestown weed*, in the neighbourhood of which place it appears to have first been noticed. Some doubt has been expressed with respect to the native country of this plant, but the probability is, that it is originally a European plant introduced; first, because mention is made of it by Fuchsius in 1542, and secondly, because its appearance occurred in the first colony on this continent.

DATURA STRAMONIUM.

COCCOLOBA UVIFERA.

The officinal portions are the leaves and the seeds. The leaves are collected when fully matured; they have an unpleasant narcotic odour, and nauseous, bitter taste. By drying, the odour is in a measure lost. The seeds are small, compressed, kidney-shaped, rough, blackish and without odour; they have a bitter, nauseous and acrid taste. These seeds are eaten by goats.

The seeds have been analyzed by Brandes, who found an alkaloid principle, *daturia*, in combination with malic acid.

The medical effects are those of a sedative narcotic; in over-doses it is poisonous. It is used to allay pain and produce sleep. It has also more or less alterative properties. It is used in substance, the leaves or seeds being given in powder, also in extract, tincture and ointment.

PLATE LXVII.—*Represents the purple plant in flower, and the seed vessel and seeds.*

MONOCHLAMYDEÆ.

Plants possessing a calyx only, or none. They are called APETALÆ.

POLYGONACEÆ.

BUCKWHEATS.

LINDLEY.

POLYGONEÆ.—*Jussieu.*

ESSENTIAL CHAR.—*Flowers* occasionally unisexual, often in racemes. *Calyx* free, often coloured, imbricated in æstivation. *Stamens* very rarely perigynous, usually definite, and inserted in the bottom of the calyx. *Anthers* dehiscing lengthwise. *Ovary* free, usually formed by the adhesion of three carpels, one-celled, with a single erect ovule, whose foramen always points upwards. *Styles* or *stigmas* as many as the carpels of which the ovary consists. *Ovule* orthatropal. *Nut* usually triangular, naked, or protected by the calyx. *Seed* with farinaceous albumen, rarely with scarcely any. *Embryo* inverted, generally on one side, sometimes in the axis. *Radicle* superior, long. (*Lindley, Veg. King.*) These are herbaceous plants, rarely shrubs. The leaves are alternate, their stipules cohering round the stem; when young, rolled backwards, occasionally wanting.

The medical properties of this tribe are astringent, and in some combined with purgative action. Many contain malic acid, in different parts.

COCCOLOBA UVIFERA.

SEA SIDE GRAPE.

LINNÆUS.

SEX. SYST.—Pentandria, Trigynia.

GEN. CHAR.—*Calyx* five parted, permanent, eventually becoming succulent. *Filaments* five, inserted into the base of the calyx, and forming a short ring by their union. *Style* three. *Stigmas* simple. *Nut* one-seeded, bony, covered with the succulent enlarged calyx. *Embryo* in the middle of the albumen. (*Lindley.*)

SPECIF. CHAR.—A tree twenty feet or more in height, much branched, the branches flexuose. *Leaves* very beautiful, ample, orbicular cordate, coriaceous, entire, obtuse, waved, of a full bright and glossy green, with the principal nerves red, especially at the base. *Petioles* short, with combined sheathing stipules at their base. *Racemes* terminal, long, erect in flower, afterwards cernuous, pedicels short, in many closely placed fascicles, with little scales or bracts at their base. *Flowers* fragrant. *Calyx* small, white, in deep spreading segments, uniting into a fleshy attenuated base,

which is jointed upon the pedicel. *Stamens* five, combined at the base into an annulus which surrounds the germen. *Ovary* superior ovate. *Styles* three. *Stigmas* obtuse. As the first advances to maturity, it becomes enveloped by the enlarged and fleshy perianth, which thus forms an obovate, reddish purple berry, resembling a small pear, with a scar at the top where the segments of the perianth had been attached; within is one cell, divided at the base into three imperfect cells, whose dissepiments enter into the base of the nut. *Nut* roundish, very acute, longitudinally wrinkled, three-lobed at the base below, and attached by the centre. *Albumen* copious, marked with numerous clefts, and fissures at the margin. In the middle of this, or nearly so, is the foliaceous embryo, with its radicle pointing upwards. (*Hooker in Bot. Mag. Lindley.*)

This plant is a native of Jamaica and other West India islands. It is also found on the coast of S. America. It affords the article called *Jamaica kino.* The fruit is edible, but not particularly pleasant. From its clustered mode of production, and berry-like form, the name *Sea side Grape* originated.

The article called Jamaica kino is produced by boiling the chips or shavings of the wood in water, and evaporating. It is brought at times in quantities into the market, sometimes in casks in the semifluid state. The most perfect specimens I have seen were imported in gourds. It is broken into angular masses, beautifully shining, of a clear claret colour, transparent at the edges, readily reducible to powder, the colour of which is reddish brown, possessing slight odour and a decided astringent slightly sweetish taste. It is soluble in water and alcohol, and forms greenish black precipitates, with the salts of iron. It has not been examined, but probably in addition to tannic acid, contains some *catechuine.*

This article is highly efficacious as an astringent, and may be used in the cases to which the several varieties of kino are applicable. The forms of administration are powder, infusion, or tincture.

An article known as Caraccas kino, which closely resembles the kind under consideration, except that it is rougher, is either the product of this, or closely resembling species.

PLATE LXVIII.—*Represents the plant in flower, the fruit, and sections of the reproductive organs.*

RHEUM PALMATUM.

PALMATED RHUBARB.

LINNÆUS.

SEX. SYST.—Enneandria, Monogynia.

GEN. CHAR.—*Calyx* petaloid, six-parted, withering. *Stamens* about nine, inserted into the base of the calyx. *Styles* three-reflexed. *Stigmas* peltate, entire. *Achenium* three-cornered, winged, with the withered calyx at the base. *Embryo* in the centre of the albumen. (*Lindley.*)

SPECIF. CHAR.—The *root* is large, thick, and divided into fasciculi. It is brown externally, and covered with a thick cortical substance; internally, it is yellow. The *stem* is erect, round, hollow, jointed, sheathed and scored, and branched; it attains the height of six feet. The *leaves* are green, with reddish veins, roundish cordate, half palmate, with five or seven deeply sinuate pointed segments; not wavy, but uneven and very much wrinkled on the upper side, hardly scabrous at the edge, minutely downy on the under side, sinus completely closed; the lobes of the leaf standing forwards beyond it. The *petiole* is long, channelled, green, with purple ribs. The *flowers* are reddish green. The *seeds* triangular, alated, greenish at first, then brown. The *radical* leaves are a foot and a half in length, and a foot in breadth; the cauline ones small.

The habitation of this plant is Central Asia, in the country about the great wall of China, "a long chain of mountains, partly naked of forests, which, skirting Chinese Tartary on the West, commence to the North, not far from the town of Selia, and extend to the South as far as Lake Kohonor near Thibet." (*Murray. Lindley.*)

In the present state of information, it is impossible to determine the species which afford the several varieties of rhubarb of commerce. The present species is supposed to afford a part of the officinal article, especially the Russian. It is said to have been made known in 1750, by Kaw Boerhaave, the physician to the Emperor of Russia; he procured the seeds from Tartary. It was cultivated by Linnæus, in Sweden, in 1762, and has since constituted one of the species from which in Europe what is there called Indigenous Rhubarb, is derived. Guibourt and Pereira inform

RHEUM PALMATUM.

us that the root, when prepared, most resembles the China kind. In England, it is cultivated near Banbury for the London market. The *R. palmatum* has been introduced and cultivated in the gardens of the United States.

The Asiatic varieties of Rhubarb are the *Russian* and *Chinese*. The former is so called, because it is introduced through the medium of the Russian trade. It appears that in 1772, a compact was made between the Russian government and a Bucharian family, who have the monopoly of Rhubarb in China, to supply the article at Kiachta, a frontier town near the borders of Thibet. An inspector is there placed, and all inferior qualities are rejected. He bores the centre of the pieces to determine their soundness. The Chinese rhubarb is derived from Canton; it has not undergone inspection, and as a general rule is inferior to the other. From Royle the following information is derived with respect to the localities from which rhubarb is originally derived. "The Chinese obtain the rhubarb produced in China proper, from that part of the province of Shensee, now called Kansu, situated between N. Lat. 35° and 40°, but the best, according to the missionaries, who say it is called Taihoang, in the province of Letchuen, from the mountains called Sue-chan, or of snow, which extend from N. lat. 26° to 33° and from about 100° to 105° of E. longitude. That from the latter province probably forms much of what is called China rhubarb; the missionaries met large quantities of it brought down in the months of October and November. That from Kansu may afford some of what is called Russian rhubarb, but both Pallas and Rehman have ascertained that the greater portion, if not the whole of this, is obtained in April and May from the clefts of rocks in high and arid mountains, surrounding Lake Kokonor. Bell also learnt that it was the produce of Mongolia, and Marco Polo of Succuir, in Tanguth." (*Illustrations of the Botany of the Himalaya Mountains, &c.*, and *Lindley*.) The author above quoted, places the rhubarb country at about 95° E. longitude, and 35° N. latitude, which is in the heart of Thibet.

Fee, in his *Cours d'Histoire Naturelle Pharmaceutique*, has collected some interesting information from the accounts of travellers, with respect to the cultivation, preparation, &c., of rhubarb. This, in a condensed form, will be now presented. All the information that has been collected is derived from the Bucharians, the family of Tartars who deal in the article, and no European has been enabled to verify it. The Russian variety grows naturally in the mountainous districts, either on the sides of the mountains, or on their summits in soils of different kinds. It prefers, however, light and sandy loose earth. The most vigorous plants are those which grow in the shade. The Siberian variety, on the contrary, thrives best in the sun. The roots are collected twice annually, in the spring and the autumn. The age of the root, before being removed from the earth, should be at least six years, and sometimes even nine. When taken up it is immediately cleansed, deprived of its bark, and dried under cover in the shade, but exposed to the air; this may be done artificially. The drying process is the most difficult, and at the same time most important, in the preparation of rhubarb. A large amount of the weight is lost in drying.

There is a difference in the appearance of the two articles mentioned, which is owing to preparation. The Russian is angulated by the removal of the exterior with a sharp instrument; it is simply perforated for inspection. The Chinese is in rounded masses, smooth from attrition, which is stated to be accomplished in a barrel, and perforated, for the purpose of suspending on cords to dry. The Russian has a bright marbled fracture; the Chinese is deeper in colour. The odour of the former is more aromatic, and its taste less disagreeable, and gritty.

The composition of Rhubarb is complex; it has been attempted by several chemists, but not satisfactorily. Upon some *volatile substance* the odour depends; it has been supposed to be oil. An acid principle, called *Rhabarbaric acid* by Brande; *Rheumin*, by Horneman; *Rhabarbarin*, by Geiger; *Rhein*, by Pereira, which gives the *yellow colour*, hence called *yellow colouring matter*, is said by Royle to be identical with *Chrysophanic acid*. *Tannin* is a constituent, and a bitter extractive principle which has been called *Caphopicrite*. The latter would appear to be of the nature of resin, from its insolubility in water, and solubility in alcohol. To these may be added *oxalate of lime*, in the form of raphides.

Rhubarb is a purge in proper doses; in small ones, astringent and tonic. It has the property of emptying the prima via without producing a drain on the secretions, and hence is useful where only the evacuant operation of a medicine is required. It is given in substance, infusion, syrup, or tincture, and is constantly combined with other substances.

PLATE LXIX.—*Represents the plant in flower, and the organs of reproduction.*

RHEUM EMODI.

WALLICH.

RHEUM AUSTRALE.—*Don.*
SEX. SYST.—Enneandria, Trigynia.
GEN. CHAR.—Ut supra.
SPECIF. CHAR.—*Stems* six to ten feet high, much branched and sulcated, very thick below, gradually attenuated upwards into the large panicles, and there rough with minute warts or excrescences; the colour is yellow green, streaked with red brown. *Leaves* very large, but gradually smaller upwards, roundish cordate, entire, somewhat wavy, slightly rough upon the surface, and at the margin. *Petioles* thick, angled, and furrowed, rough, embracing the stem by means of the large, bifid, sheathing membranous stipules. *Panicles*, or rather compound racemes, terminal, very long, the branches erect, virgate, rough. *Pedicels* solitary, or clustered, somewhat verticillate, short, spreading, in front deflexed. *Flowers* very small, of a deep blood red colour. *Perianth* of six, spreading, ovate deep segments; three alternate ones smaller. *Stamens* nine, shorter than the perianth. *Filaments* subulate, monadelphous at the base. *Germen* short, triquetrous, often abortive. *Styles* three, spreading. *Stigmas* large, warty. *Fruit* pendant, dark blood-coloured, shining; an achenium which is cordate, triangular, the angles sharply winged, covered at the base with the persistent perianth, of which the three smaller segments are applied to the three winged angles. *Seed* ovate triquetrous. (*Hooker, Botan. Mag.*)

This plant, when first made known, was regarded as the true one, affording Russian rhubarb. The same doubt rests over this, however, as the other species. It is a native of the vast range of the Thibetian and Himalaya mountains, and was first discovered by Dr. Wallich. By this botanist it was found at *Emodus*, a mountainous district of *Gossam Than;* hence the specific name given to it. Mr. Robert Blenkworth met with it about Kamoun, and seeds were sent to Europe by Dr. Wallich in 1828. It has been found to thrive well in England and in the United States.

The root, when prepared, was found by Pereira not to resemble the rhubarb of the shops, but is, according to experiments of Dr. Twining and others, efficacious as a medicine.

PLATE LXX.—*Represents the plant in flower, and the enlarged flower.*

RHEUM COMPACTUM.

LINNÆUS.

SEX. SYST.—Enneandria, Trigynia.
GEN. CHAR.—See Rheum Emodi.
SPECIF. CHAR.—This plant has thick branching roots, and an erect, branching, jointed, somewhat channeled *stem*, five or six feet in height. The *leaves* are heart-shaped, obtuse, very wavy, deep green, of a thick texture, scabrous at the margin, quite smooth on both sides, glossy and even on the upper side; the sinus nearly closed by the parenchyma. *Petiole* green, hardly tinged with red, except at the base; semicylindrical, a little compressed at the sides, with the upper side broad, flat, bordered by elevated edges, and of equal breadth at each end. *Flowers* are in close panicles at the extremity of the branches, of a greenish white colour. *Fruit* triangular, winged and brown, when mature.

The plant is said to be a native of Tartary and China. It is supposed by Pallas to afford some form of officinal rhubarb, and was introduced into Europe probably at the time the other species were, but Guibourt states, the time when, he cannot tell. It is now cultivated in France and England, as well as other parts of Europe, and affords a part of the rhubarb which is there termed indigenous, to us known as European Rhubarb.

It has been a long time since public attention was first directed to the cultivation of rhubarb in Europe, and an effort made to naturalize the plants which afford this important medicine. In France, such attempts were in a measure prompted by necessity, from the restriction of her commerce; dependent upon the resources within herself, the

RHEUM EMODI.

RHEUM COMPACTUM.

cultivation of rhubarb was one of the numerous channels into which agricultural industry was coerced to move, and the results were so favourable as to warrant a continuance of the endeavour to render the supply of the drug equal to the demand. Many of the establishments thus created were upon the most extensive scale. It appears that experiments were originally commenced at Grobois, and afterwards at Claye, near Paris. M. Genthen, a pharmaceutist at L'Orient, cultivated the rhubarb with some profit at that place; he obtained from 1200 to 1500 pounds, which were sold and consumed in France; he was followed by others with like success. The species cultivated were, R. palmatum, R. undulatum, and R. rhaponticum, but the best success was obtained with the R. compactum. The department of Morrhiban became famous for its rhubarb plantations, and in Brittany a place has been named *Rheumpole*, from this species of agricultural product. (See *Fée*.)

The mode of preparation is similar to that pursued in China; the pieces are introduced into a barrel, which is made to rotate on its axis for an hour, by which means they are rubbed smooth, and covered with powder from the attrition between them.

In England good rhubarb is raised from the same species; some of it in this market had a handsome appearance, and more closely resembles the Tartarian rhubarb than the French.

Cultivated rhubarb occurs in pieces which are longer than broad; it has a more fibrous texture than Asiatic, and exhibits very contracted, fine, concentric and radiating veins. The smell is less pleasant, and the taste is astringent and bitter; it colours faintly the saliva, and does not so much grit between the teeth. The colour of the powder is deeper. It is less active than the true, but quite efficacious. Dr. Sigmond states that English rhubarb seldom pinches or produces disagreeable effects. The French rhubarb contains more tannin, and a larger amount of starch.

In the United States the rhubarb plants are cultivated more for the sake of the leaf-stalks which are full of malic acid, and in the spring of the year are used as a substitute for the acidulous fruits.

Plate LXXI.—*Represents the plant in flower, a large sized leaf, and the organs of reproduction magnified.*

THYMELACEÆ.

LINDLEY.

DAPHNADS.

Thymeleæ.—*Jussieu.*

Essential Char.—*Stem* shrubby, very seldom herbaceous, with tenacious bark. *Leaves* without stipules, alternate or opposite, entire. *Flowers* capitate or spiked, terminal or axillary, occasionally solitary, sometimes unisexual by abortion, often enclosed in an involucre. *Calyx* inferior, tubular, coloured; the limb four-cleft, with an imbricated æstivation. *Corolla* none, or sometimes scale like petals in the orifice of the calyx. *Stamens* definite, inserted in the tube or its orifice, often eight, sometimes four, less frequently two; when equal in number to the segments of the calyx or fewer, opposite to them. *Anthers* two-celled, dehiscing lengthwise in the middle. *Ovary* composed of a single carpel, with one solitary, pendulous, anatropal ovule. *Style* one. *Stigma* undivided. *Fruit* hard, dry, and nutlike or drupaceous. *Albumen* none, or thin and fleshy. *Embryo* straight. *Cotyledons* plano-convex, sometimes lobed and crumpled. *Radicle* short, superior. (*Lindley.*)

The plants of this order are few in Europe and North America, more frequent in India and South America, and abundant in South Africa and New Holland.

The medical properties are acrid, sometimes poisonous; the principle *daphnin*, detected in Mezereon, probably may be found in others.

DAPHNE MEZEREUM.

LINNÆUS.

Sex. Syst.—Octandria, Trigynia.

Gen. Char.—*Calyx* tubular, withering. *Tube* cylindrical, coriaceous, longer than the limb, imperforate at the base, containing the stamens, limb divided into four deep, ovate, spreading coloured segments. *Filaments* short in two rows, from about the middle of the tube. *Anthers* roundish, oblong, of two cells, simple, enclosed within the tube. *Ovary* ovate. *Style* short, terminal. *Stigma* capitate, depressed, entire. *Berry* oval, of one cell. *Seed* solitary, suspended, oval, large, with a thin brittle skin. (*Lindley.*)

Specif. Char.—*Stem* bushy, four or five feet high, with upright, alternate, smooth, tough and pliant branches, leafy while young. *Leaves* scattered, stalked, lanceolate, smooth, two inches long, appearing after the flowers, and soon accompanied by flower buds for the next season. *Flowers* highly, and to many persons, too powerfully fragrant, seated in little tufts on the naked branches, with several brown, smooth, ovate bractes underneath. *Calyx* like a corolla in texture, crimson all over; the tube externally hairy. *Berries* scarlet. (*Smith, Eng. Flor.*)

This plant is an inhabitant of the north of Europe. It flowers very early in the season, sometimes before the snows have melted. There is a variety with white flowers.

The bark of the root and of the stems is used for medicinal purposes. The former is tough, pliable, and fibrous, externally brown and corrugated, internally white. The latter is smooth and shining externally, the epidermis in the dried state peeling off in transparent laminæ, with a green substratum of cellular tissue covering the fibrous liber. It is very tough, and is peeled off in long pieces, which are dried and rolled into balls or masses for use. The taste of both these is at first sweetish, afterwards highly acrid. They possess no odour.

Mezereon contains *wax, acrid resin, daphnin*, volatile oil, yellow colouring principle, &c.

The local effects are irritating, the internal administration is followed by increase of the secretions, and an alterative action. It frequently purges, and in too large doses is productive of inordinate irritation of the throat, stomach, bowels, and bladder. It is given in infusion, and decoction.

Plate LXXII.—*Represents the plant in flower, in leaf, and the enlarged flower and fruit.*

MYRISTICACEÆ.

LINDLEY.

NUTMEGS.

Myristiceæ.—*R. Brown.*

Essential Char.—*Calyx* coriaceous, mostly downy outside. *Flowers* completely unisexual. *Calyx* trifid, rarely quadrifid, with valvular æstivation. *Male. Filaments* either separate or completely united in a cylinder. *Anthers* 3–12 or more, two-celled, turned outwards and bursting longitudinally; either connate or distinct. *Female. Calyx* deciduous. *Carpels* solitary, or many, with a single erect anatropal ovule. *Style* very short. *Stigma* somewhat lobed. *Fruit* baccate. *Albumen* ruminate, between fatty and fleshy. *Stigma* somewhat lobed. *Embryo* small, orthotropal. *Cotyledons* diverging. *Radicle* inferior. (*Lindley.*)

The plants belonging to this order are found in the tropics. The leaves are alternate without stipules, not dotted, entire and coriaceous. The inflorescence is axillary or terminal, various; the flower is small.

Their medical properties are aromatic and stimulating, due to the great quantity of volatile oil in their structures, hence many of them afford spices.

DAPHNE MEZEREUM.

MYRISTICA MOSCHATA.

MYRISTICA MOSCHATA.

THUNBURG.

NUTMEG TREE.

Sex. Syst.—Dicœcia, Monadelphia.

Gen. Char.—*Flowers* dicœcious. *Calyx* bracteolate, three-toothed. *Male. Filaments* monadelphous. *Anthers* 6–10, connate. *Female. Ovary* simple. *Style* none. *Stigma* two-lobed. *Pericarp* fleshy, two-valved, one-seeded. *Seed* enveloped in a fleshy arillus. (*Lindley.*)

Specif. Char.—A dicœcious tree. *Trunk* from 20 to 25 feet high. *Bark* greyish-brown, tolerably smooth, abounding in a yellow juice. *Leaves* aromatic, from three to six inches long, subbifarious, oblong, approaching to elliptical, glabrous, rather obtuse at the base, acuminate, quite entire, above dark green, and somewhat glossy, beneath much paler, but neither pulverulent nor downy. *Petioles* from one-half to three-quarters of an inch long, plane above. *Racemes* axillary, subumbellate, sometimes forked or compound. *Peduncles* and pedicels glabrous, the latter having a quickly deciduous, ovate bract at its summit, often pressed close to the flower. *Male flowers*, three or five, or more on a peduncle. *Calyx* bracteolate, thick and fleshy, clothed with a very indistinct reddish pubescence, dingy pale yellow, cut into three, erect, or erecto-patent teeth. *Filaments* incorporated into a thickened, whitish cylinder, about as long as the calyx, the upper half covered by about ten linear oblong two-celled anthers, free at their base, opening longitudinally. *Female flowers* scarcely different from the male, except that the pedicel is very frequently solitary. *Pistil* solitary, shorter than the calyx, broadly ovate, a little tapering upwards into a short style, and bearing a two-lobed persistent stigma. *Fruit* fleshy, nearly spherical, of the size, and somewhat of the shape of a small pear; flesh astringent, yellowish, almost white within, four or five lines thick, opening into two, nearly equal, longitudinal valves. *Arillus* thick, between horny and fleshy, much lacerated, folded and anastomosing towards the extremity, enveloping the nut almost entirely, and so tightly as to form inequalities on its surface; when fresh, brilliant scarlet, when dry, much more horny, of a yellow brown colour, and very brittle. *Nut* broadly ovate, or oval; the shell very hard, rugged, dark brown, glossy, about half a line thick, pale and smooth within. *Seed* or nutmeg oval, pale brown, quite smooth when first deprived of its shell, but soon becoming shrivelled, so as to have irregular, vertical lines or furrows on its surface. *Albumen* firm, but fleshy, whitish, but so traversed with red brown veins, which abound in oil, as to appear beautifully marbled. Near the base of the albumen, and embedded in a cavity in its substance, is the embryo, which is small, fleshy, yellowish white, rounded below, where is the radicle; its cotyledons of two large somewhat foliaceous plicate lobes, in the centre of which is seen the plumule. (*Lindley.*)

The fruit of this tree affords two important spices,—the arillus, constituting *mace*, and the kernel, the *nutmeg*.

The tree is a native of the Moluccas, especially the islands of Amboyna and Banda, where it is cultivated, and where the Dutch endeavoured to concentrate it. "The natural limits of the geographical distribution of the nutmeg are much wider than those of the clove. This tree is found even beyond the limit of the Archipelago, having been discovered in New Holland, in the southern peninsula of India, and in Cochin China. The produce of all these countries, however, is utterly tasteless, and without flavour." The Dutch had dispossessed the Portuguese of their possessions in the Molucca islands between 1524 and 1539, and from that period to 1615, furnished annually to Europe more than 400,000 lbs. of nutmegs, and 150,000 lbs. of mace. More recently the quantity which is brought from these places is less considerable, because the plant has been introduced and cultivated elsewhere, viz., the Isle of France, (to which it was carried in 1720–2, by Poivre,) India, Martinique, Cayenne, &c., in opposition to the precautions of the Hollanders. The mace of Amboyna, however, is most sought for in consequence of its superiority.

In 1815 there were exported from the Moluccas only 215,000 lbs. of nutmegs, while the amount of mace was 253,000 lbs.

Crawford, from whom the present details have, for the most part, been obtained, states that in the Indian islands there are at least eight kinds of nutmegs, which appear to be only varieties, though generally permanent ones. The only important distinction is effected by culture; all the cultivated ones are highly flavoured, the wild ones much less so.

The same singular fact exists both with regard to the clove and nutmeg, that while these two plants excited the attention of the most distant countries, they were utterly neglected by the natives where produced.

The nutmeg tree comes to maturity in its ninth year, and its life is usually of 75 years' duration. It is propagated with some little difficulty. The trees which are transplanted into the nutmeg parks, are generally such as have been disseminated from the fruit by a certain blue pigeon called by the Dutch *nut-eater*. This bird, extracting the nutmeg from its pulpy covering, devours the whole entire. The mace is digested, and the nutmeg in its shell being voided, readily germinates when deposited in a shady place. The practice of transplanting is usually followed in the third year, but may be done later, and such is the hardihood of the plant, that if the earth be carefully lifted with the tree, and the tap root not injured, it may safely be removed at any age. The fruit of the Myristica is collected by hand; it is ascertained to be ripe by the blush on the pulpy covering, and by its bursting; the outer covering is peeled off, the mace is separated, flattened, and dried in the sun, when the rich crimson changes to a dull red, then dusky yellow; it is afterwards sprinkled with salt water to assist in its preservation. The nut is dried in the sun or by ovens, and then exposed to smoke; when the kernel rattles in the shell, this is broken and it is withdrawn; when freed from the shells the nutmegs are dipped twice or thrice in lime water made of fine shells, which is supposed to secure them from the depredations of insects and worms. After the last process they are fit for the market, and are packed in casks. Although the nutmeg bears throughout the year, there are still three distinct periods for reaping the crop, or three harvests, one in April, one in July and August, and one in November. The first affords the best fruit, the second the largest quantity, the third is a sort of supplemental harvest to the second.

Good nutmeg trees, well taken care of, will give annually a produce of from ten to fourteen pounds of mace and nutmegs together. The product of an acre of a nutmeg plantation is 266⅔ lbs., or two picals. In fifteen parts of the whole produce, there are two parts of mace, five of shell, and eight of nutmegs, or in 100, 13⅓ per cent. of mace, 33⅓ of shell, and 53⅓ of nutmegs. The proportion which the shell bears to the nutmeg is as five to eight, which is 38½ per cent. of shell to 61½ nutmegs. The proportion which the mace bears to the nutmeg is as one to four. At the commencement of the nutmeg trade, they were always sold and transported in the shell; this continued until the time of the Dutch monopoly. One object in removing the shell was to prevent germination. It is stated that the Dutch burned the nutmegs for which they had no use, after having supplied the demand in Europe, and having satisfied the consumption of the country, and provided for the amount necessary to furnish the oil. Valmont de Bomare asserts, that he saw a heap of nutmegs burned worth eight millions of francs, and as many were to be burned the next day. The same author declares that the Holland company were always many years in advance of the demand, and that at the period when the crop of 1740 was sold, it was still 15 years in advance.

Mace contains volatile and fixed oil, a gummy matter, and ligneous fibre.

Nutmegs should be solid and heavy; they contain volatile and fixed oils. Both, from their warmth and aroma, belong to the spices.

The nutmeg was known to the Egyptians, as is ascertained by meeting with them in the mummy cases. M. Bonastre has supposed this was the cinnamon of the Greeks.

The use of mace and nutmegs is extensive as a condiment and as an aromatic adjuvant in medicine. Narcotic properties have been attributed to the nutmeg. A number of preparations contain this spice.

PLATE LXXIII.—*Represents the plant in flower, the organs of reproduction, and the fruit.*

LAURACEÆ.

LINDLEY.

THE CINNAMON TRIBE.

LAURI.—*Jussieu.*

LAURINEÆ.—*Ventenat* and *R. Brown.*

ESSENTIAL CHAR.—*Calyx* four to six cleft, with imbricate æstivation, the limb sometimes obsolete. *Stamens* definite, perigynous, opposite the segments of the calyx, and usually twice as numerous; three innermost, which are opposite the three inner segments of the calyx sterile or deficient; the six outermost scarcely ever abortive. *Anthers*

LAURUS CAMPHORA

adnate, two to four-celled; the cells bursting by a longitudinal persistent valve, from the base to the apex; the outer anthers valved inwards, the inner valved outwards (or both valved inwards). *Glands* usually present at the base of the inner filaments. *Ovary* single, superior, with one or two single pendulous ovules. *Style* simple. *Stigmas* obtuse. *Fruit* baccate, or drupaceous, naked or covered. *Seed* without albumen. *Embryo* inverted. *Cotyledons* large, plano-convex, peltate near the base. *Radicle* very short, included, superior; plumule conspicuous, two-leaved. (*R. Brown. Pereira.*) *Trees* of large size, with alternate or stipulous leaves, rarely opposite; entire or lobed. *Inflorescence* panicled or umbelled.

The chemical constitution of this tribe of plants depends upon the presence of volatile oil, which is proved to become concrete, and afford either true camphor, or a species of stearoptine resembling it. In the bark of some of the species, tannin is found; hence its astringency. In the berries of many, the volatile oil is commingled with fixed.

CAMPHORA OFFICINARUM.

NEES.

THE CAMPHOR TREE.

CINNAMOMUM CAMPHORA.—*Nees and Ebermayer.*
LAURUS CAMPHORIFERA.—*Kæmpfer.*
LAURUS CAMPHORA.—*Linnæus.*
SEX. SYST.—Enneandria, Monogynia.
GEN. CHAR.—*Flowers* hermaphrodite, panicled, naked. *Calyx* six cleft, papery, with a deciduous limb. *Fertile stamens* nine, in three rows; the inner with two-stalked compressed glands at the base. *Anthers* four-celled; the outer turned inwards, the inner outwards. Three sterile stamens shaped like the first, placed in a whorl alternating with the stamens of the second row; three others stalked with an ovate glandular head. *Fruit* placed on the obconical base of the calyx. *Leaves* triple nerved, glandular in the axils of the principal veins. *Leaf-buds* scaly. (*Lindley.*)

SPECIF. CHAR.—A small *tree* with smooth bark and branches. *Branches* lax, when young, yellowish. *Leaves* evergreen, oval, acuminate, attenuate at base, bright green and shining above, and paler beneath, coriaceous, triple-nerved, with a sunken gland at the axil of the principal veins, projecting at the upper side and opening by an oval pore beneath. *Petioles* from an inch to one and a half inches long, slender and smooth. *Panicles* axillary and terminal, corymbose and naked. *Flowers* small, yellowish-white, smooth on the outside. *Berry* round, blackish-red, size of a black currant. *Seed* solitary.

This plant is a native of China and Japan, but is cultivated in warm climates, and sometimes thrives well in conservatories. All parts of it abound in camphor. It has been introduced into Java.

It appears that there are two modes of obtaining the camphor. One by boiling the chips of the wood, bark, root, &c., in an iron vessel with water, and catching the camphor in an earthen head containing straw, which is inverted over it. The camphor subliming, is caught by the straw. The other, by boiling the chips in water, until the camphor will concrete on the stirrer, then straining out the camphor and subliming it in copper vessels.

The Dutch or Japan camphor is of a pink colour, in large grains; it is purer than Chinese, which is in grayish grains, and mixed with impurities.

Camphor, to render it purer, is refined; this formerly was practised in glass vessels called *Bombolos*, but the present plan is to use iron vessels similar to ovens, placed in range, and having moveable perforated covers. Refined camphor is in cakes, diaphanous, tough, and composed of crystalline granules. It has the peculiar camphoraceous odour, and a warm, persistent taste.

Camphor is a stearoptine, having for its base an elæoptine. This latter is isomeric, with spirits of turpentine; hence the composition. Elæoptine ($C^{10}H^8$)+O, forming Stearoptine or Camphor.

By further oxygenation it becomes camphoric acid. The relation between this product and volatile oil is well understood.

Camphor is a powerful nervous and vascular stimulant; it also acts upon the secretions. It is used in substance, in solution with water, and alcohol, and enters into a number of preparations.

PLATE LXXIV.—*Represents the plant in flower, and the fruit.*

CINNAMOMUM ZEYLANICUM.

.NEES.

THE CINNAMON TREE.

LAURUS CINNAMOMUM.—*Linnæus.*

SEX. SYST.—Enneandria, Monogynia.

GEN. CHAR.—*Flowers* hermaphrodite or polygamous, panicled or fascicled, naked. *Calyx* six-cleft, with the limb deciduous. *Fertile stamens* nine, in three rows; the three inner with two sessile glands at the base. *Anthers* four-celled; the three inner turned outwards. Three capitate abortive stamens next the centre. *Fruit* seated in a cup-like calyx. *Leaves* ribbed. (*Lindley.*)

SPECIF. CHAR.—The Cinnamon *tree* is about thirty feet high. The *root* has the odour of cinnamon as well as that of camphor, and yields this principle on distillation. The *twigs* are somewhat four-cornered, smooth, shining, and free from downiness. The *leaves* are liable to variation, ovate, or ovate-oblong, terminating in an obtuse point, triple or three-nerved, that is, there are three principal nerves, which sometimes remain separate to the very base, but usually approach each other a little above the base, but without uniting; there are, moreover, in many cases, two shorter nerves external to these. *Leaves* reticulated on the under side, smooth, shining, the uppermost the smallest, with a good deal the taste of cloves. The leaf-buds are naked. *Panicles* terminal and axillary. *Flowers* usually bisexual, rather silky. *Perianth* six-cleft, segments oblong, the upper part deciduous. *Fertile stamens* nine, in three rows; the three inner with two sessile glands at the base. *Anthers* ovate, four-celled, the three interior opening outwards. Three abortive capitate stamens (staminodia), in the interior of all. *Ovary* one-celled, with a single ovule. *Stigma* disk-like. *Drupe* (or berry) one-seeded, seated in the cup-like six-lobed base of the perianth. *Seed* large, with large oily cotyledons. *Embryo* above.

The trunk of this tree is irregular and knotted, and covered with thick, rough scabrous bark, which, externally, is ash-coloured, internally, reddish. The young shoots are beautifully speckled with dark green, and light orange.

The native country of the cinnamon tree is the island of Ceylon. It is not a native of the Indian islands, but gives place to the cassia tree. Rumphius has remarked, that the trees which yield cinnamon, cassia, and clove bark, are hardly ever found in the same countries. Crawford states "that the cinnamon tree has, in recent times, been introduced into the Indian islands, and grows luxuriantly; but this is not enough; it must grow as cheaply, and of equal quality with that of the country which produces it in the highest perfection, to be useful as an article of agricultural industry." Considerable trade is carried on in it from Ceylon.

The Dutch at first collected the bark from the plants which were found growing spontaneously in a wild state, but from the profit which its collection and exportation yielded, they turned their attention to its cultivation, and since the English have gained possession of the island of Ceylon, they have continued its culture. The portions of the island where it more especially grows, are the southern and eastern; it is between Matura and Negambo, in a kind of soil abounding in quartz, called cinnamon fields, that the quality most esteemed is produced; the soil is sandy and dry. When this plant is reared in humid vegetable mould, its vegetation is rapid, but the bark is in a corresponding degree inferior, being thick, spongy, and little aromatic; it is to this cause that the little value of a large portion of cinnamon introduced into commerce is to be attributed.

In the cultivation of cinnamon, the plants are set out in clusters, or several seeds are sowed in the same vicinity. The plantations are without any fixed order, or arrangement; the trees are located among others of a different nature. The seeds are planted in the month of August, and germination commences on the twenty-first day. The plants flower in February and March. At the end of six years (Thunburg states three years), they have attained the height of seven or eight feet, and may be submitted to the operation of barking; the size of the shrub is more regarded, however, than its age. The young plants should not be cut until their diameter has attained half an inch. Accord-

CINNAMOMUM ZEYLANICUM.

ing to Thunburg, the cinnamon barkers belong to a particular caste of Cingalese, known by the name of *chalia;* they enjoy peculiar privileges. An incision is made in the bark to ascertain whether it is adherent, or can be separated; this is practised on new branches of old trees, as well as upon the young plants. The season for barking is after the rains, which fall periodically, at which time the sap has ascended; this is from April to August, and from November to January, twice annually. One or two longitudinal slits are made according to the size of the limb, by which segments or strap-shaped pieces are removed. When a certain quantity of these pieces are removed, they are tied in bundles and allowed to remain for twenty-four hours, so as to be allowed to undergo a slight fermentative action which facilitates the removal of the epidermis, and the interior green substance, which are scraped off. When thus prepared, they are rolled into tube-like cylinders, about three feet in length, and the smaller are introduced within the larger, so as to form solid masses, which are first dried in the shade, then in the sun.

The British East India Company possess the entire monopoly of the cultivation of cinnamon. An assortment of the different kinds takes place in their godowns, and such as is of inferior quality is rejected. It is then packed in bundles of about eighty pounds each; the number of these bundles sent to London annually is 5000. (*Crawford.*)

Several kinds of cinnamon are distinguished by the Cingalese, as the *krasse-karonde*, or sweet; *Nai-karonde*, or serpent; *Capourte-karonde*, the camphorated, and the *Canotte-karonde*, or astringent. These are varieties.

The pieces of cinnamon which are too small to be packed, are reserved for the extraction of the oil.

The Company enjoying the monopoly of the cinnamon trade, have prevented the indiscriminate exportation of it, by permitting each ship not carrying it, which visits Ceylon, to be furnished only with ten pounds.

Although the largest proportion of the cinnamon which arrives in Europe is supplied from Ceylon, it appears that it has been introduced into the Cape de Verd Islands, and it is said that the product is of the very best quality; endeavours have been made to naturalize it in Italy. The Isle of France, Brazil, Pondicherry, and Gaudaloupe, at present furnish it to commerce. It is also cultivated in Jamaica. We are told by Loreiro that the true cinnamon grows in Cochin China, but is consumed in the country.

This bark, to possess superior value, should be thin and papyraceous; in the inferior kinds, it is thicker and firmer; it is more or less cylindrical, and is of a pale brown, or red colour; the fracture is fibrous. Its odour is strong, aromatic, and sweet; its taste pungent, sweet and astringent. It contains an *acrid volatile oil, tannin*, &c. The oil is distilled in alembics; it is of two kinds, light and heavy; from exposure, the oil absorbs oxygen, and deposits stearoptine, which is sometimes found already formed in the root.

The medical qualities of cinnamon are stimulating and astringent; it is much used as an adjuvant. There are several preparations into which it enters. The tincture and water are those formed of it singly. The powder is sometimes used, but the greatest consumption is as a condiment.

Plate LXXV.—*Represents the plant in flower, and the fruit.*

ARISTOLOCHIACEÆ.

LINDLEY.

Aristolochiceæ.—*Jussieu.*

Essential Char.—*Flowers* hermaphrodite. *Calyx* adherent to the ovary (i. e. superior), monosepalous; the limb three-lobed or tubular, and irregularly dilated at the upper part; valvate in æstivation. *Stamens* definite, generally in ternary numbers, free and distinct, or adherent to the style and stigma, and epigynous. *Ovary* three to six-celled. *Style* short. *Stigma* divided. *Capsule* or berry coriaceous, three to six-celled; many seeded; the placenta lateral. *Embryo* very small, at the base of a cartilaginous albumen. Usually climbing herbs or shrubs, with alternate, simple petiolated leaves. (*Bot. Gall and Pereira.*)

The medical qualities of this tribe depend upon the presence of bitter extractive and volatile oil.

ARISTOLOCHIA SERPENTARIA.

LINNÆUS.

VIRGINIA SNAKEROOT.

ARISTOLOCHIA OFFICINALIS.—*Nees and Ebermayer.*

SEX. SYST.—Gynandria, Hexandria.

GEN. CHAR.—*Calyx* superior, tubular, coloured, permanent; tumid and nearly globose at the base; limb dilated; either lobed and equally spreading, or unilateral, and undivided. *Filaments* consolidated into a notched cup, crowning the ovary within the calyx. *Anthers* six; sessile on the outer surface of the cup, each of two oblong, separated, parallel, bivalve cells. *Ovary* inferior, oblong, angular. *Style* scarcely any. *Stigma* nearly globular, with six deep lobes; the summit concave. *Capsule* with six angles, six cells, and six valves, with double partitions from their inflexed margins. *Seeds* numerous in each cell, depressed, horizontal, lying over each other, triangular, with a dilated or thickened winged margin. (*Lindley.*)

SPECIF. CHAR.—*Root* perennial, of numerous, rather coarse fibres. *Stem* herbaceous, nine to fifteen inches high, simple or branched from the base, erect or somewhat leaning, slender, angular, pubescent, nearly naked, or with small abortive leaves below, leafy above. *Leaves* two to five inches long, and three-quarters of an inch to two and a half inches wide, lance oblong, acuminate, entire, cordate at base, sometimes auriculately produced, somewhat pubescent. *Petioles* a quarter to an inch long. *Flowers* rather large, few at the base of the stem, often concealed under dead leaves, on flexuose bracteate peduncles one to two inches in length. *Bracts* small, ovate, alternate. *Perianth* a dull, purplish brown, subcoriaceous, pubescent, tubular, verticose at base, angularly bent, gibbous at the angle, the limb dilated and somewhat three-lobed. *Capsule* turbinate, or roundish-obovoid, large (half an inch or three-quarters in length), somewhat succulent, pubescent. *Seeds* of a tawny ash colour, obovoid, somewhat compressed, slightly keeled or ribbed near each margin, tuberculate dotted, open or concave on one side, with a central ridge in the cavity. (*Darlington.*)

This plant is a native of the Southern and Middle sections of the United States. It inhabits rich woodlands, flowering in June, and maturing its fruit in July and August.

The root of this plant is the officinal portion. It is composed of brown fibres attached to a knotty head, having a bitter and aromatic taste, and a strong camphoraceous aromatic odour. It contains volatile oil and resin, bitter extractive, starch, &c.

It is brought usually from the South and West in bales. The medical properties are those of a stimulant tonic, and as such it is highly useful. It is given in powder, infusion, and tincture, and constitutes one of the ingredients of the compound tincture of bark.

PLATE LXXVI.—*Represents the plant in flower, the fruit, and the dissection of the flower.*

ARISTOLOCHIA RETICULATA.

NUTTALL.

SEX. SYST.—Gynandria, Hexandria.

GEN. CHAR.—Ut supra.

SPECIF. CHAR.—*Root* resembling the preceding, which sends off numerous short stems, most usually simple, but occasionally branching near the root. These are slender, round, flexuose, jointed, and slightly villous in old, from numerous, scattered, yellowish-white hairs, but in young specimens amounting to a dense pubescence. The leaves are large, subsessile, varying from round to oblong, cordate, obtuse, reticulate, with very prominent veins and villous upon both surfaces, more especially upon the veins and very short petioles. The *peduncles*, several in number, (four

ARISTOLOCHIA SERPENTARIA.

SERPENTARIA RETICULATA.

or five), given off from the lower joints of the stem, are hairy, jointed, and support at the joints small leafy, villous bracts, (tomentose when young,) and several flowers, or short subpeduncles. The *flowers* are small, purplish and densely pubescent, especially at their base and on the germ. The hexangular, deeply sulcate capsule, which may be sometimes seen on the same general peduncle with the unexpanded flower, is sprinkled with scattered hairs, and bears at its apex the decayed corolla. (*Bridges, in Amer. Journ. of Pharmacy.*)

The root as found in the shops is in appearance of a coarser character than the common kind. From a knotty caudex it sends off numerous long fibres, two or three times the thickness of those from the A. serpentaria, of a yellowish colour. Its smell is aromatic, its taste warm, aromatic and bitter.

From the specimens of this plant collected by Mr. Nuttall, and labelled "Red River," the plant appears to be a Southwestern one. The root of late, in some quantity, has been brought into the market, and as it is unmixed, would appear to be the only one of the locality. It is probably the result of the collections made by the Creeks and Cherokees removed west of the Mississippi, who were accustomed to gather the serpentaria in Georgia.

This root has been submitted to comparative examination by Mr. Wiegand, who found the two to possess the same composition. The present plant differs from its congener solely in the larger amount of volatile oil and bitter extractive. In medical properties then, it is not only equal, but superior, to the preceding, and may be used for the same purposes.

PLATE LXXVII.—*Represents the plant in flower.*

EUPHORBIACEÆ.

JUSSIEU.

THE EUPHORBIUM TRIBE.

ESSENTIAL CHAR.—*Flowers* unisexual, monœcious or dicœcious, sometimes disposed in clusters, or united in a common involucre, at other times more rarely, solitary. The *calyx* is often double, of from five to ten divisions, of which the most interior are petaloid and coloured. In the *male* flowers, the number of stamens is very variable. The *filaments*, often articulated in the middle, are free, or united at base into a single or many-columns. *Anthers* two-celled, cells distinct, dehiscing longitudinally on the outer side. The *female* have a calyx similar to the male, and a sessile or pedicellate pistil. *Ovary* more or less globose, superior, sessile, or stipitate, two, three, or more celled, the cells arranged around a central placenta. *Ovules* solitary, or in pairs; suspended from the inner angle beneath the apex. *Stigmas* single or compound. *Fruit* a capsule containing two or three cells, bursting elastically. *Seeds* solitary or double, with an arilla. *Embryo* surrounding a fleshy albumen. *Cotyledons* flat. *Radicle* superior. (*Bot. Gall. and Richard Elem.*)

The Euphorbiaceæ vary in their habit; some are herbaceous, others ligneous; their leaves are alternate, attenuate or opposite, sometimes thick and succulent. They contain a quantity of milky juice.

There is a close analogy in the active properties of this class, owing to the presence of an acrid principle, which is not fixed, existing in all parts of the vegetable, and when concentrated capable of producing poisonous results. In the seeds of several of them is a fixed oil, which, varying in its association with more or less of the acrid principle, renders them moderately or strongly purgative. This acridity is evanescent. Caoutchouc is also a general ingredient. They are inhabitants of all parts of the world, principally, however, to be found in warm latitudes.

CROTON ELEUTERIA.

SWARTZ.

Sex. Syst.—Monœcia, Monadelphia.

Gen. Char.—*Flowers* monœcious, or very rarely dicœcious. *Calyx* five-parted. *Male. Stamens* ten, or more, distinct. *Female. Petals* none. *Styles* three, divided into two or more partitions. *Capsule* tricoccous. (*Jussieu.*)

Specif. Char.—A small tree, from five to twenty feet high. *Branches* and twigs angular, rather compressed, striated downy, ferruginous. *Leaves* stalked, alternate, ovate, or cordate lanceolate, with a short but obtuse point, quite entire, slightly nerved, green on the upper surface, with a few scattered leprous dots, beneath, silvery and densely downy, about two inches long, petioles scarce half an inch long, scurfy. *Racemes* axillary and terminal, branched or compound; the branches short, divaricating, covered with numerous, closely parted, sub-sessile, monœcious flowers. *Males* uppermost and smallest. *Females* lowest, few, and on short stalks. *Filaments* ten to twelve. *Capsule* roundish, minutely warted, scurfy, not bigger than a pea, with three furrows, three cells, and six valves.

This plant is a native of the West India Islands. It is said to grow in Jamaica and the Bahamas, but its specific nature would indicate that it is the product of *Eleuthera*, one of the Lucayas. It affords at least a portion of the *Cascarilla* bark.

Cascarilla bark is brought into this market in two forms, one in quills, the other in chips. The quills vary from the size of a crow's quill to that of the finger; externally, they are white and silvery, rugose and cracked, the epidermis peeling off readily; internally, they are dark coloured. The substance is compact, hard, heavy, with a short resinous fracture. The taste is warm, spicy, and bitter, the odour aromatic. The chips are thin, delicate, curved longitudinally, and sometimes connected with the wood. Perhaps these varieties come from different plants.

This bark is remarkable for burning with odour of musk, and hence its use in fumigating compounds. It contains *volatile oil, resin and extractive.*

Cascarilla is brought from the West Indies in bags or casks.

Pereira states that the first author who mentioned it was Stisser, in 1686.

As a medicine, it is stimulating and tonic, and is sometimes used as a substitute for Cinchona. It may be used in powder, infusion and tincture.

Plate LXXVIII.—*Represents the plant in flower, and the magnified flower and fruit.*

CROTON TIGLIUM.

LAMARCK.

PURGING CROTON.

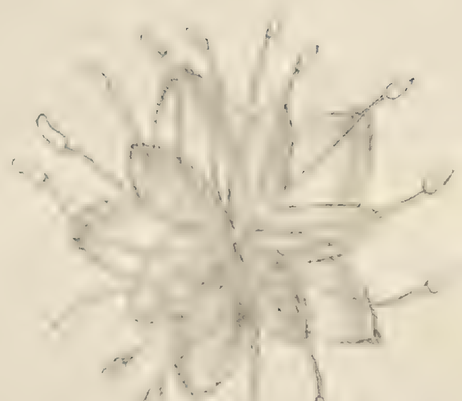
Sex. Syst.—Monœcia, Monadelphia.

Gen. Char.—Ut supra.

Specif. Char.—A middle sized tree. *Young branches* terete, smooth, shining, a little furrowed towards the ends. *Leaves* oval oblong, acute, and 3–5 nerved at base, acuminate at the point, with shallow glandular serratures; thin, membranous, with two glands at their base, covered when young, with extremely minute, stellate, scattered hairs. *Petioles* channelled, about one-third of the length of the leaf; when quite young, furnished with stellate hairs, but soon losing them. *Racemes* terminal, erect, male at apex, female below. *Flowers* downy. *Male. Calyx* five-cleft. *Petals* five, (white,) lanceolate, woolly. *Stamens* fifteen, distinct. *Female. Calyx* five-cleft, permanent. *Styles* long, bifid. *Capsules* oblong, obtusely triangular, the size of a hazelnut, closely covered with minute stellate hairs; the cells completely filled with the solitary seeds. Skin of the seeds pale dull brown, overlaying a darker hard integument. (*Lindley.*)

This plant is a native of India, of Ceylon, and the Moluccas. From the seeds is obtained the drastic oil, known as *Croton Oil.* (*Oleum Tiglii*).

CROTON ELEUTHERIA.



CROTON TIGLIUM.

RICINUS COMMUNIS.

All parts of the plant are highly purgative; the seeds, however, are more so than other portions; they were known for a long time by the name of *Grana Molucca* and *Grana Tiglii*. Rumphius states that the root is employed in Amboyna, in the dose of a few grains as a drastic purge, and the leaves are also stated to be so acrid that, when chewed and swallowed, they excite painful inflammation in the mouth, throat, and whole alimentary canal. The wood even is active.

The seeds are rather larger than a grain of coffee, of an oblong form, rounded at the extremities, of two faces, the external considerably more convex than the internal, separated from each other by longitudinal ridges, and each divided by a similar longitudinal ridge, so that the whole seed presents an irregular quadrangular figure. It sometimes happens that one of the three seeds in the capsule is abortive, in which case the two perfect ones are impressed by the central column, forming a well-marked central groove. The shell is covered with a soft, yellowish-brown epidermis, beneath which the surface is black and smooth; when this epidermis is partially removed, the seeds are of a mottled appearance, and sometimes nearly black. The kernel abounds in oil. They have scarcely any odour, and their taste is acrid, pungent and nauseating.

Brands found them to contain *fixed oil, volatile oil*, and a *volatile acid*, (crotonic,) an alkaline substance (crotonin or tiglin) and resin. The proportion of shell to the kernel, according to Dr. Nimmo, is thirty-six to sixty-four.

According to Mr. Pope, the acrid principle resides in the perisperm, and not in the kernel of the seeds. The seeds are highly purgative; they for a long time were known in India, and employed with this indication. About the year 1630 they were introduced into Europe; the Dutch were first acquainted with their properties.

The oil is now used; it has an orange yellow colour, the consistence of sweet oil, is slightly soluble in alcohol, and slightly reddens litmus paper. It has a disagreeable odour and a pungent taste. This oil is a highly active purgative, in small doses (one drop), giving little uneasiness to the patient, but in large doses producing vomiting, spasm and inflammation. It was brought into notice in England, by Dr. Conwell, in 1820.

The seeds of C. paverna are said by Dr. Hamilton also to yield a similar oil.

PLATE LXXIX.—*Represents the plant in flower, the magnified flower and the fruit.*

RICINUS COMMUNIS.

LINNÆUS.

THE CASTOR OIL PLANT.

SEX. SYST.—Monœcia, Monadelphia.

GEN. CHAR.—*Flowers* monœcious. *Calyx* 3–5 parted, valvate. *Petals* none. *Male. Filaments* numerous, unequally polyadelphous; cells of the anther distinct, below the apex of the filament. *Female. Style* short. *Stigmas* three, deeply bipartite, oblong, coloured, feathery. *Ovary* globose, three-celled, with an ovule in each cell. *Fruit* generally prickly, capsular, tricoccous. *Trees*, shrubs, or herbaceous plants, sometimes becoming arborescent. *Leaves* alternate, stipulate, palmate, peltate, with glands at the apex of the petiole. *Flowers* in terminal panicles, the lower male, the upper female; all articulated with their peduncles, and sometimes augmented by biglandular bracts. (*Lindley.*)

SPECIF. CHAR.—*Root* perennial or annual, long, thick, and fibrous. *Stems* round, thick, jointed, channelled, glaucous, of a purplish red colour upwards. *Leaves* large, deeply divided into seven segments, on long tapering purplish stalks. *Flowers* in long green and glaucous spikes, springing from the divisions of the branches; the males from the lower part of the spike, the females from the upper. *Capsules* prickly. *Seeds* ovate, shining, black dotted with grey. (*Lindley.*)

This plant, from its large palmated leaf, has been called *Palma Christi*. It is a native of the East, but grows in all parts of the world, in the temperate and tropical regions.

It has been known for ages, as it is mentioned in the works of the oldest writers on medicine under different names. M. Caillaud announced the fact that the seeds of the Palma Christi had been noticed by him in the sarcophagi of the embalmed Egyptians, which evinces the great estimation in which it was held.

The varieties of this plant are several, depending on soil and climate, &c. In Great Britain it is an annual, attaining a height of three or four feet, in the United States, ten or fifteen. In India, according to Roxburg, it is a

perennial of large size. Clusius saw it in Spain with a trunk as large as a man's body. Monard asserts the same, and Richard informs us, that, in the year 1818, he saw, in the vicinity of Ville Franche, near Nice, upon the borders of the sea, a small wood composed entirely of the Ricinus.

The seeds of this plant, at one time called *cataputia major* in the shops of Europe, are oval, obtuse at both ends, the size of a small bean, compressed, smooth, and shining, of a grayish or ash colour, marbled with reddish-brown spots and veins. At one extremity of the seed is a small yellowish tubercle, from which an obscure longitudinal ridge proceeds to the opposite extremity, dividing the side upon which it is situated into two flat surfaces. In its general appearance, the seed is thought to resemble the *tick*, and hence the Latin name Ricinus. Its variegated colour depends upon a very thin pellicle, closely investing a hard, brittle, black, tasteless, easily separable shell, within which is the kernel, of a white colour, abounding in oil and possessing a sweetish, thin, acrid taste. This substance soon becomes rancid, and the oil from it is acrid and irritating.

Geyer found of 100 parts (exclusive of moisture) 23·82 were envelope, and 69·09 were kernel. The latter was found to consist of fixed oil, gum, starch, lignin and albumen. An acrid principle, volatile by heat, and dissipated by boiling, exists in the kernel of the seeds.

The fixed oil is the medicinal article; it is white, yellowish or brown, according to the mode of preparation. It is thick, viscid, and difficult to congeal, is heavier than most fixed oils, and is soluble in alcohol. It has, when pure, no odour, but this is hardly ever the case, the odour being unpleasant; its taste is sweet, then acrid. By the action of the atmosphere, and from age, it becomes thick and rancid. It contains a volatile oil, ricinic, oleo-ricinic, and margaro-ricinic acids. The modes of procuring the oil are: 1st, decoction; 2d, expression; 3d, by alcohol.

The method of procuring the oil in this country, is a modification of the two first. Considerable quantities are made in the Southern States, for home consumption and shipment. A good oil is made in India, and West India castor oil is sometimes met with. The yield of the seed is twenty-five per cent.

Castor oil is a mild effectual cathartic, in doses of an ounce.

PLATE LXXX.—*Represents the plant in flower, the germ, and the capsule matured.*

JANIPHA MANIHOT.

KUNTH.

CASSAVA OR TAPIOCA PLANT.

JATROPHA MANIHOT.—*Linnæus.*

SEX. SYST.—Monœcia, Monadelphia.

GEN. CHAR.—*Flowers* monœcious. *Calyx* campanulate, five-parted. *Petals* none. *Male. Stamens* ten. *Filaments* unequal, distinct, arranged around a disk. *Female. Style* one. *Stigmas* three, consolidated into a rugose mass. *Capsule* tricoccous. (*A. de Jussieu.*)

SPECIF. CHAR.—*Root* oblong, tuberous, as big as one's fist, full of a wheyish, venomous juice. *Stems* white, crooked, brittle, having a very large pith, and several knobs sticking out on every side like warts, being the remains of the footstalks of the leaves, which have dropped off, usually six to seven feet high, with a smooth, white bark. *Branches* crooked, and have on every side near their tops, leaves irregularly placed on long serete petioles, broadly cordate in their outline, divided nearly to their base into five spreading, lanceolate, entire segments, attenuated at both extremities, dark green above, pale glaucous beneath; the midrib strong, prominent below, and there yellowish red; from it there branch off several oblique veins, connected by lesser transverse ones. *Stipules* small, lanceolate, acuminate, caducous. *Panicles* or compound racemes, axillary and terminal, four to five inches long, bearing sometimes all male or all female flowers; at other times these are mixed on the same peduncle. *Pedicels* with small, subulate bracts at their base. *Male flower* smaller than the female. *Calyx* purplish on the outside, fulvous brown within, cut about half way down into five spreading segments. *Disk* orange-coloured, fleshy, annular, ten-rayed. *Stamens* ten, alternate with the lobes of the disk. *Filaments* shorter than the calyx, white, filiform, free. *Anthers* linear-oblong, yellow. *Female flower* of the same colour as the male, deeply five-parted, the segments lanceolate, ovate spreading. *Disk* an annular, orange-coloured ring, in which the purple, ovate, furrowed ovary is embedded. *Style* short. *Stigmas* three, reflexed, furrowed, and plaited, white. *Capsule* ovate, three-cornered, tricoccous. *Seeds* elliptical, black, shining, with a thick fleshy funiculus.

JATROPHA MANIHOT.

EUPHORBIA IPECACUANHA.

This plant is an inhabitant of the tropical portions of America and the West Indies; some fine roots I have obtained from St Domingo, but it is common in the other islands. It is cultivated for food, and is called Manioc. It yields an abundant crop without much attention, the roots attaining their full development at the expiration of the first year. These are sometimes of very large size, and weigh ten to thirty pounds. They are of an ashy-brown colour externally, internally white and fibrous, and possessed of a slight prussic odour and an acrid taste.

To obtain the fecula, the roots are scraped and reduced to pulp; the juice is then expressed; this on standing deposits fecula, which, when washed and dried on hot plates, assumes the granulated form, and constitutes Tapioca; if dried by a moderate heat, it retains the pulverulent form, and is sometimes sold for arrowroot. The latter is called Moussache by the Spaniards, and, according to Pereira, constitutes Brazilian arrowroot. The pulp, from which the juice has been expressed, when spread in cakes and baked, constitutes *Cassava bread*, and if dried merely and reduced to powder, is Cassava powder.

There are two kinds of Manioc, the *bitter* and the *sweet;* the former is employed to procure the fecula, the latter is used as a vegetable; the plant of the sweet is smaller, and the root is rougher, reddish, and smaller.

The juice of the bitter manioc may be ranged under the head of acro-narcotic poisons, producing inflammation of the primæ viæ in small doses, with prostration of the vital powers, and speedy death in larger quantities. It is used as a poison by the negroes of the West Indies. The poisonous principle is extremely soluble in water, hence washing will remove it; it is also readily dissipated by heat. It has the odour of hydrocyanic acid, and this acid is supposed by Henry to exist in the juice. It also contains an acrid, bitter principle.

As found in commerce, Tapioca consists of white, irregular grains, of various sizes, which are rough and hard. To the taste it is farinaceous and without odour. The granules are irregular in form under the microscope, owing to the rupture of the granules and their cohesion by heat when moist. The granules of the powder prepared without heat are round, and present at the hilum a cross. In consequence of the rupture of the envelopes of a large number of granules, and the escape of the amadine, tapioca is partly soluble in cold water.

The fecula is coloured blue by iodine.

Tapioca is imported from the West Indies and from Brazil. It is highly nutritious, forming when boiled with water a tremulous, gelatiniform, transparent viscid solution, which is highly demulcent and nutritious, and used as a diet in sickness. It is flavoured with wine, spices, or lemon juice.

PLATE LXXXI.—*Represents the plant in flower.*

EUPHORBIA IPECACUANHA.

LINNÆUS.

IPECACUANHA SPURGE.

SEX. SYST.—Monœcia, Monadelphia.

GEN. CHAR.—*Flowers* collected in monœcious heads, surrounded by an involucrum, consisting of one leaf, with five divisions, which have externally five glands alternating with them. *Male* naked, monandrous, articulated with their pedicel, surrounding the female which is in the centre. (Involucrum caliciform, eight to ten-toothed, exterior alternate, dentures glanduloid, or petaloid. *Stamina* indefinite, twelve or more, rarely less. *Filaments* articulated. *Nuttall.*) *Female* naked, solitary. *Ovarium* stalked. *Stigmas* three-forked. *Fruit* hanging out of the involucre, consisting of three cells, bursting at the back with elasticity, and each containing one suspended seed. (*Lindley.*)

SPECIF. CHAR.—*Root* irregular and fleshy, perennial, of a yellowish colour, perpendicular, and penetrating several feet into the sand in which it grows; when mature, from half an inch to an inch and a half in diameter; when wounded pouring out plentifully a thick milk-like tenacious fluid. The *stems* are numerous, growing in tufts from the head of the root, procumbent, herbaceous, round, smooth, dichotomously branched, jointed, white or dull green under ground, red, green or pale-green above. *Leaves* inserted at the joints, opposite, sessile, smooth, oval, round, obovate lanceolate, or linear. In the spring they are small, but increase in size with the age of the plant; they vary in colour from green to crimson. The *flowers* are solitary, on long peduncles from the forks of the stem. *Calyx* spreading, divided into five obtuse segments. Inner segments or nectaries five, small, gibbous. *Stamens* numerous,

in five parcels, appearing at different times, two or three together, with double anthers. The fertile flowers have a large, roundish, drooping, pedicelled germ, crowned with six revolute stigmas. *Capsule* three-celled, three-seeded.

The plant under consideration is found in the middle and southern sections of the United States, in sandy soil, skirting the sea coast. It blooms from May to August.

The root is the officinal portion; it is active at all seasons. When dried, it is light, brittle, grayish, or dirty-yellow externally, white internally. It has little odour, and an acrid bitter taste. In the recent state it is more active than when dried, and by keeping, loses its activity. It contains resin, starch, gum, caoutchouc, and a volatile principle.

In its effects it is emetic, in large doses acrid and irritating, with the production of prostration. It was mentioned by Dr. B. S. Barton, in his collections, and more thoroughly brought before the medical public by Drs. W. P. C. Barton and Bigelow.

PLATE LXXXII.—*Represents two forms of the plant, and the flowers and fruit.*

PIPERACEÆ.

KUNTH.

THE PEPPER TRIBE.

ESSENTIAL CHAR.—*Flowers* naked, hermaphrodite, with a bract on the outside. *Stamens* definite, or indefinite, arranged on one side, or all round the ovary; to which they adhere more or less. *Anthers* one or two-celled, with or without a fleshy connective. *Pollen* smooth. *Ovary* superior, simple, one-celled, containing a single erect ovule. *Stigma* sessile, simple, rather oblique. *Fruit* superior, somewhat fleshy, indehiscent, one-celled, one-seeded. *Seed* erect, with the embryo lying in a fleshy sac, placed at that end of the seed which is opposite the hylum, on the outside of the albumen. *Shrubs or herbaceous plants. Leaves* opposite, verticillate, or alternate, in consequence of the abortion of one pair of the leaves, without stipules. *Flowers* usually sessile, sometimes pedicellate, in spikes which are either terminal or axillary, or opposite the leaves. (*Lindley.*)

The peppers are inhabitants of the tropical portions of the earth, and are numerous. Those employed for medicinal purposes are endowed with pungent stimulating properties due to the presence of a volatile oil, in one or two a peculiar principle (piperin) has been found, and in another a more volatile solid, cubebin. It is probable that similar principles exist in others.

PIPER NIGRUM.

LINNÆUS.

BLACK PEPPER.

SEX. SYST.—Diandria, Trigynia.

GEN. CHAR.—*Spadix* covered with flowers on all sides. *Flowers* hermaphrodite, rarely dicœcious, each supported by a scale. *Stamina* two or more. *Ovarium* with one, solitary, erect ovule. *Stigma* punctiform, obtuse or split. *Berry* one-seeded. *Embryo* dicotyledonous, inverted. (*Blume. Pereira.*)

SPECIF. CHAR.—*Stem* trailing or climbing, shrubby, flexuose, and dichotomously branched, jointed, swelling at the joints, and often throwing out radicles there which adhere to bodies like the roots of ivy, or become roots striking into the ground. *Leaves* from four to six inches long, alternate, distichous, broadly ovate, acuminated, of a full green and glossy colour, paler beneath, five to seven nerved, the nerves connected by lesser transverse ones or veins, and prominent beneath. *Petioles* rounded, from half an inch to nearly an inch long. *Spikes* opposite the leaves, chiefly near the upper ends of the branches, stalked, from three to six inches long, slender, drooping, apparently some male, others female, while sometimes the flowers are furnished with both stamens and pistil. *Stamens* three. *Fruit* ripen-

PIPER NIGRUM.

PIPER CUBEBA.

ing irregularly all the year round, sessile, the size of a pea, at first green, then red, afterwards black, covered by pulp. (*Lindley.*)

The native countries of black pepper are Malabar and the most westerly islands of the Indian Archipelago, as Sumatra, Java, Borneo, &c. It also grows in Cochin China, and Siam. Crawfurd states that it does not appear to be an indigenous product of the latter place, and concludes that it was introduced by the Hindoos in early times from Malabar.

The plant yields two crops of berries annually. The culture is simple and certain. In its native country the plant is an inhabitant of the mountains, and in the islands where cultivated, it thrives best in dry upland soil, and never in low rich loams. Either in the wild or cultivated state, when the vine is suffered to creep on the ground, the fibres, which, when it is trained, adhere to the prop, strike into the ground and become roots, and in this situation it never bears fruit. To enable it to do so, it must be trained upon some tree or pole. The vines are propagated by slips or cuttings. The pepper yields fruit in its third year, and continues to bear for eight or nine. The berries are plucked when the first of the cluster turn red; they are in a state to pluck two months after the time of flowering. The clusters are gathered into baskets, and then trodden under feet to separate them.

In the hands of the Malays one vine yields only six and a half ounces of berries, while, as cultivated at Penang under the eye of Europeans, a pound may be procured. The best pepper grows in Malabar; Java is said to produce the worst.

In the first intercourse of the Dutch and English with India, pepper constituted the most considerable and valuable article of their commerce. The pepper trade of the United States at present is with Singapore. It has been introduced into the West Indies by Poivre, and also will grow in Italy.

The best pepper is large and heavy; it ought not to be too much wrinkled. Each grain is composed of an exterior envelope and a white interior substance. Pelletier found it to contain *piperin*, a very acrid concrete green oil, *balsamic volatile oil*, extractive, coloured gum, bassorin, malic and uric acids, lignin and salts. The two oils communicate odour and pungency. Piperin was discovered by Prof. Oersted of Copenhagen. When black pepper is macerated in water, and the envelope separated, it forms white pepper. The purest piperin can be obtained from it, almost free from the oils.

As a condiment, the use of black pepper is universal. It was known to the Greeks and Romans. As a medicine, it is a warm stimulant, capable of producing general excitement as well as topical. It is given in substance, and enters into several preparations.

PLATE LXXXIII.—*Represents the pepper vine in flower and fruit, and the organs of reproduction.*

PIPER CUBEBA.

LINNÆUS.

THE CUBEB PEPPER.

SEX. SYST.—Diandria, Trigynia.

GEN. CHAR.—See *P. nigrum.*

SPECIF. CHAR.—*Stem* climbing. *Branches* round, the thickness of a goose quill, ash-coloured, smooth, rooting at the joints; when very young, as well as the petioles, downy. *Leaves* four to six and a half inches long, one and a half to two inches broad, stalked, oblong, or ovate oblong, acuminate, rounded or obliquely cordate at base, strongly veined, netted, coriaceous, very smooth. *Spikes* at the end of the branches, opposite the leaves, diœcious, on peduncles the length of the petioles. *Fruit* rather larger than black pepper, globose, on pedicels from one-third to half an inch long. (*Lindley.*)

This species of pepper is a native of Java, and the Prince of Wales Island. It grows luxuriantly in the woods. It is said to grow in Nepaul and in the island of Bourbon. It is plucked in the immature state. The berries are round, about the size of small peas, of a brown colour, and marked over their whole surface with prominent veins, arranged in the form of net-work. To them the peduncle remains attached, hence the name with the French of *poivre à queue*, and the officinal name in some of the books of *Piper caudatum.* When softened in water, these

berries exhibit a quadruple structure of their envelope; the interior substance is white. Their smell is aromatic, their taste warm, acrid, and bitter; they deteriorate by age and are best kept whole. Monheim found in them *green volatile oil, yellow volatile oil, cubebin*, balsamic resin, wax, chloride of sodium, extractive, lignin.

Thunberg first described the Cubebs plant, but Myrepsicus was the first author who mentioned it, (*Fee.*) The introduction of this drug has been attributed to the Arabians, but of this there is some doubt. (*See Pereira.*) The term Cubebs comes from the Arabic word *kabebeh.*

As a medicine, Cubebs are stimulating, with an especial tendency to operate upon the kidneys and genito-urinary organs. In large doses, producing inordinate excitement and disturbance of the sensorial functions.

They are given in the form of powder or pills, and are sometimes prepared in tincture and extract.

PLATE LXXXIV.—*Represents the plant in flower, in fruit, and the organs of reproduction.*

CUPULIFERÆ.

RICHARD.

THE OAK TRIBE.

CORYLACEÆ.—*Mirbel.*

ESSENTIAL CHAR.—*Flowers* unisexual. *Males* amentaceous. *Females* aggregate or amentaceous. *Males. Stamens* five to twenty, inserted into the base of the scales, or of a membranous calyx, generally distinct. *Females. Ovaries* crowned by the rudiments of a superior calyx, seated on a coriaceous involucre (*cupule*) of various figure, and with several cells and several ovules, the greatest part of which are abortive. *Ovules* twin or solitary, pendulous. *Stigmas* several, subsessile, distinct. *Fruit* a long or coriaceous one-celled nut, more or less enclosed in the involucre. *Seeds* solitary, one, two, or three, pendulous. *Embryo* large, with plano-convex, fleshy cotyledons, and a minute superior radicle. *Trees or shrubs. Leaves* with stipules, alternate, simple, often with veins proceeding straight from the midrib to the margin. (*Lindley.*)

The peculiarity of this tribe of plants is the existence of an abundance of tannin in their composition; hence they possess powerful astringent properties.

QUERCUS INFECTORIA.

OLIVIER.

THE GALL OAK.

SEX. SYST.—Monœcia, Polyandria.

GEN. CHAR.—*Male Flowers* lax, amentaceous, deciduous. *Bract* membranous in four, five, or more, deep, often divided segments. *Filaments* about eight or more, short, awlshape. *Female flowers* separate. *Involucre* hemispherical, coriaceous, imbricated, single-flowered, entire, much enlarged in the fruit, and externally scaly or tuberculated. *Calyx* in six minute, deep, sharp, downy segments, closely surrounding the base of the style. *Ovary* globose, of three cells, with two ovules in each. *Style* solitary, short, conical. *Stigmas* three, obtuse, recurved. *Nut* solitary, oval, coriaceous, not bursting, of one cell, attached by a broad scar to the inside of the capsule. *Embryo* solitary, rarely two, with large plano-convex cotyledons, and a superior radicle. (*Lindley.*)

SPECIF. CHAR.—A small bush. *Leaves* on short stalks, one, to one and a-half inches long, oblong, with a few coarse mucronate teeth on each side, bluntly mucronate, rounded and rather unequal at base, smooth, shining on the upper side. *Acorns* solitary, long, obtuse, with a hemispherical scaly cup. (*Lindley.*)

This species of oak, affording nutgalls, is among the smallest species of the genus. It is a native of Asia Minor, from the Bosphorus to Syria, and from the Archipelago to the frontiers of Persia.

Nutgalls are excrescences produced on the bark of the plant by an insect. The following excellent account of

QUERCUS INFECTORIA.

their formation as given by Pereira. "The Hymenopterous insects of the tribe called *Gallicolæ*, or Diploleparіæ (*Cuvier, Regne Animal*), are furnished with a *terebara* or borer, by means of which they are enabled to perforate the foliaceous or cortical parts of plants for the purpose of depositing their eggs, along with an acrid liquor in the wound thus made. The irritation thereby produced, gives rise to influx of the juices of the plant to the wounded part, and an excrescence is formed, which is termed a gall, (*galla.*) Here the insect undergoes its transformations; the egg produces the larva (or maggot), which feeds on the juices of the plant, and is changed into the pupa. This afterwards becomes the perfect insect (*immago*), and perforating the gall, escapes from its prison house. The external form and appearance of these productions are very constant, when formed by the same insect, on the same part of the plant; but the galls of different species of vegetables, as well as those of the same species, produced by a different insect, vary considerably. There is reason for believing that the form and appearance of the gall are determined more by the insect than by the plant; for we have sometimes on the same oak two kinds of galls, of very dissimilar appearance, produced by different insects." The insect producing galls is the *Cynips Gallæ Tinctoriæ.* (*Olivier.*)

Galls are derived from several sources. Aleppo furnishes the best. Smyrna galls are more mixed. East India galls are brought from Bombay, and are said to be the product of Persia. They are of two kinds, *Black or Blue Galls*, and *White Galls.*

The former are of the size of a pea to that of a hazelnut, of a bluish-black tinge, tuberculated, with smooth interstitial spaces, without perforation, but a central cavity. They are hard, with difficulty reduced to powder, unorganized, but of crystalline structure, and destitute of odour, and possessed of a strong styptic taste. They have been plucked in the early stage of the insect.

The white galls are larger, lighter, of a dirty white or yellow colour, having a perforation on the side, and are plucked after the insect has escaped.

Galls contain *tannin* and *gallic* acid. An acid called ellagic has been announced by Braconnot, probably a product, and not an educt. Sir H. Davy found in them, tannin 26.00, gallic acid 6.2, mucilage 2.4, carbonate of lime 2.4, lignin 63.00=100. The tannic acid affords bluish-black precipitates with the salts of iron.

This article of the Materia Medica, in consequence of the large quantity of tannin, is powerfully astringent. In the arts, it is used for tanning and for dyeing. In medicine, galls are used in powder, in infusion, tincture, &c.

PLATE LXXXV.—*Represents the plant with the galls attached, the fruit and inflorescence, and the insect.*

JUGLANDACEÆ.

LINDLEY.

WALNUT TRIBE.

JUGLANDEÆ.—*De Candolle.*

ESSENTIAL CHAR.—*Flowers* declinous. *Sterile flowers* in an ament. *Perianth* scaly, oblique, irregularly lobed. *Stamens* inserted on the receptacle, indefinite (three to thirty-six). *Filaments* short, distinct. *Anthers* thick, two-celled, bursting longitudinally. *Fertile flowers* with a single or double perianth, the outer four-parted, the inner (when present) of four pieces. *Ovary* inferior, one-celled. *Ovule* solitary, erect. *Styles* one to two, very short or none. *Stigmas* large, either two and lacerated, or discoid, and four-lobed. *Fruit* drupaceous, one-celled, with four imperfect partitions. *Seed* four-lobed. *Albumen* none. *Cotyledons* fleshy, two-lobed, wrinkled. *Radicle* superior. (*Beck.*)

The plants belonging to this family are large sized trees, with alternate unequally pinnate leaves. A purgative principle exists in the following species; perhaps a similar one may be found in others.

JUGLANS CINEREA.

LINNÆUS.

BUTTERNUT.

JUGLANS CATHARTICA.—*Michaux.*

SEX. SYST.—Monœcia, Polyandria.

GEN. CHAR.—Monœcious. *Sterile flowers*, ament, imbricate, scales mostly five-parted. *Perianth* five to six-parted. *Stamens* eighteen to thirty-six. *Fertile flowers*. *Perianth* double, each four-parted. *Styles* one or two. *Drupe* partly spongy. *Nut* rugose and irregularly furrowed.

SPECIF. CHAR.—*Leaves* pinnate; *leaflets* numerous, lanceolate, serrate, rounded at the base, soft, pubescent beneath. *Petioles* villous. *Fruit* oblong ovate, with a terminal projection, viscid and hairy, on a long peduncle, not oblong, acuminate, conspicuously sculptured. (*Beck. Bot. of North and Mid. States.*)

The common names by which the plant is known are White Walnut and Butternut. In some situations, it is a large tree with numerous branches and smooth cinereous bark. It abounds in Canada and the northern and middle sections of the United States, in rich bottoms and along streams. It flowers in May, and ripens its fruit in September and October. The fruit by age becomes rancid and unpleasant. It abounds in oil. Early in the spring, if the bark be pierced, there exudes from it a saccharine juice.

The inner bark, when first separated from the tree, is of a pure white colour, but soon begins to change, and by the time it becomes dry, is of a deep brown colour. It comes into market in pieces which have a fibrous fracture. If the epidermis has not been removed, they are smooth externally. The inner bark is the portion used. The bark of the root is regarded as most active. When in the fresh state, a rubefacient effect is said to be made by applying it to the skin. The period for collecting it is in May. The odour is feeble, but aromatic, and the taste bitter and pungent. Mr. S. Wetherill found in this bark fixed oil, resin, saccharine matter, a peculiar principle, extractive, and tannin, with salts of the alkalies.

The extract prepared from the bark above noticed, is mildly purgative, and as such is used by practitioners; it may also be used in decoction.

PLATE LXXXVI.—*Represents the plant in leaf, the flowers and the fruit.*

CONIFERÆ.

JUSSIEU.

THE FIR TRIBE.

CONACEÆ or PINACEÆ.—*Lindley.*

ESSENTIAL CHAR.—*Flowers* monœcious, or diœcious. *Males* monandrous or monadelphous, each floret consisting of a single *stamen*, or of a few united, collected in a deciduous omentum, about a common radius. *Anthers* two-lobed, or many-lobed, bursting outwardly, often terminated by a crest, which is an unconverted portion of the scale, out of which each stamen is formed. *Pollen* large, usually compound. *Females* in cones. *Ovary* spread open, and having the appearance of a flat scale, destitute of style or stigma, and arising from the axil of a membranous bract. *Ovule* naked, in pairs on the face of the ovary, having an inverted position, and consisting of one or two membranes, open at the apex, and of a nucleus. *Fruit* consisting of a cone, formed of the scale-shaped ovaries, become enlarged and indurated, and occasionally of the bracts also, which are sometimes obliterated, and sometimes extend beyond the scales in the form of a lobed appendage. *Seed* with a hard crustaceous integument. *Embryo* in the midst of fleshy oily albumen, with two or more opposite cotyledons; the radicle next the apex of the seed, and having an organic connection with the albumen. (*Lindley.*)

Plate LXXXVI

JUGLANS CINEREA.

Plate LXXXVII

PINUS AUSTRALIS.

The plants belonging to this order are shrubs or trees, sometimes of gigantic growth, and immense age, as marked by the concentric woody rings in the trunk. The leaves are linear, fasciculated. They abound in northern and high situations, but are found in other portions of the world. They owe their medical properties to a volatile oil, which is stimulating, diuretic and narcotic.

PINUS AUSTRALIS.

MICHAUX.

LONG LEAVED PINE.

PINUS PALUSTRIS.—*Wildenov.*

SEX. SYST.—Monœcia, Monadelphia.

GEN. CHAR.—*Flowers* monœcious. *Male. Catkins* solitary or stalked. *Stamens* numerous, inserted on an axis. *Filaments* very short. *Anthers* two-celled, terminated by a crest, or scale-like connective; the cells bursting longitudinally or irregularly in a transverse direction. *Female. Catkins* solitary or clustered. *Scales* imbricated, usually subtended by an adnate scale. *Ovules* two, at the base of the scales, collateral, inverted, their points lacerated and directed downwards. *Cone* consisting of hard, woody, truncated scales, excavated at the base for the reception of the seeds. *Seeds* extended at the base into a membranous wing. *Leaves* evergreen, in fascicles, surrounded at the base by a membranous tubular sheath. (*Lindley.*)

SPECIF. CHAR.—A large sized tree, from 60 to 70 feet high, and a foot to two in diameter. The bark of the trunk is rough and furrowed. The *leaves* are about a foot long, of a beautiful green colour, united to the number of three in the same sheath, and collected in bunches at the extremity of the branches. The *male flowers* form masses of divergent violet-coloured aments about two inches long. The *cones* are very large, seven or eight inches long, and four inches thick, when open. (*Michaux.*)

It flowers in April, and the cones are matured in October.

It is found in the southern portion of Virginia, and thence to Florida along the coast, in dry sandy and sterile soil, called *Pine barrens.* The wood is hard, durable, of a red colour, and abundantly supplied with resinous matter. In the south, it is much used in building, and is most esteemed of the pines in ship building.

From this plant is obtained turpentine. It is officinal under the name *white turpentine.* The product is the sap of the tree, obtained by making incisions into its trunk. "It begins to distil about the middle of March, when the circulation commences, and flows with increasing abundance as the weather becomes warmer, so that July and August are the most productive months. When the circulation is slackened by the chills of autumn, the operation is discontinued." (*Michaux.*) This operation is performed by making *boxes*, as they are termed, or cavities in the base of each tree of the capacity of three pints, generally, however, proportioned to the size of the trunk. These are so shaped as to conduct into them the juices which exude from the wounded surfaces, and sometimes several are made on different sides; that facing the south is preferred. As the turpentine collects in them, it is removed by means of a wooden shovel into pails, which again are emptied into casks. By renewing the surface, a larger quantity can be collected. The boxes fill every three weeks. The turpentine thus collected is the best, and is called the *pure dipping.* That which becomes solid upon entering the sides of the boxes, is called the *scraping.*

The consistence of white turpentine varies with the temperature. In summer, it is semifluid; in winter, it is firm, hard, and brittle. It has a white colour, bordering on yellow, with some translucency. Its odour is that of oil of turpentine, its taste pungent and bitterish. It yields 17 per cent. of oil.

Large quantities are furnished to the Northern States, and to Europe. It is a staple of North Carolina. In Paris it is known as Boston Turpentine, because it was shipped first from that city.

The oil of turpentine is procured from this article by distillation, and tar, by combustion.

PLATE LXXXVII.—*Represents a cluster of the leaves, the male flower and the cone.*

MONOCOTYLEDONEÆ VEL ENDOGENEÆ.

Monocotyledonous or *Endogenous* plants are such as have but *one* cotyledon or lobe, attached to the embryo of the seed. They grow by additions to the interior, or by interstitial deposit. In this division, the distinction into bark, wood and pith, is not found, but the basis of their structure is cellular tissue, in which the vessels are disseminated, or arranged in fasciculi. From their interior growth, in contradistinction to that which prevails in the previous division, they are termed *endogenous*. Their trunk is usually cylindrical. *Leaves* disposed to sheath at base, and adherent to the stem without articulation, mostly alternate, with parallel veins and transverse connections. *Flowers* in ternary divisions. *Calyx* and *corolla* frequently the same. *Embryo* enclosed in the cotyledon, and bursting through it.

Not near so large a proportion of the plants appertaining to this division, as of the former, afford articles of the Materia Medica. If any characteristic prevails, it is that of succulency. Some nutritive substances, but few edible fruits, are afforded by it. The products are diverse, as in the preceding division.

PALMACEÆ.

LINDLEY.

THE PALM TRIBE.

PALMÆ.—*Jussieu.*

ESSENTIAL CHAR.—*Flowers* hermaphrodite, or frequently polygamous. *Perianth* six parted, in two series, persistent, the three outer segments often smaller, the inner sometimes deeply connate. *Stamens* inserted into the base of the perianth, usually definite in number, opposite the segments of the perianth, to which they are equal in number, seldom three, sometimes in a few polygamous genera, indefinite in number. *Ovary* one, three-celled, or deeply three-lobed; the lobes or cells one-seeded, with an erect ovule, rarely one-seeded. *Fruit* baccate or drupaceous, with fibrous flesh. *Albumen* cartilaginous, and either terminate or furnished with a central or ventral cavity. *Embryo* lodged in a particular cavity of the albumen, usually at a distance from the hylum, dorsal, and indicated by a little nipple, taper or pulley-shaped. *Plumule* included, scarcely visible; the *cotyledonous* extremity becoming thickened in germination, and either filling up a pre-existing cavity, or one formed by the liquefaction of the albumen in the centre. *Trunk* arborescent, simple, occasionally shrubby, and branched, rough, with the dilated half sheathing bases of the leaves, or their scars. *Leaves* clustered, terminal, very large, pinnate, or flabelliform, plaited in vernation. *Spadix* terminal, often branched, enclosed in a one or many-valved spath. *Flowers* small, with bractlets. *Fruit* occasionally very large. (*R. Brown. Pereira.*)

SAGUS RUMPHII.

WILDENOW.

SAGO PALM.

SAGUS FARINIFERA.—*Gaertner.*

SEX. SYST.—Monœcia, Hexandria.

GEN. CHAR.—*Leaves* pinnated. *Flowers* monœcious. *Male. Calyx* three-toothed. *Petals* three. *Stamens* 6–12,

SAGUS RUMPHII.

with distinct compressed filaments. *Female*. *Calyx* three-toothed. *Corolla* campanulate, trifid. *Cup of stamens* six-toothed, with abortive sagittate anthers. *Ovary* three-celled. *Stigmas* three, subulate, connate. *Fruit* one-seeded, coated by a mail of reversed scales. *Albumen* runcinated. *Embryo* dorsal, upon an umbilical pit. (*Lindley*.)

Specif. Char.—This Sago Palm is one of the smallest of its congeners, its extreme height being from twenty to thirty feet. The trunk is thick, straight, round, and covered with spines which are the remains of the leaf stalks. It is of a dark brown colour. The *leaves* form a crown of foliage at the summit, curving gracefully downwards, presenting a handsome appearance; they are large and pinnate, the leaflets being aculeate, of a deep green colour. The *flowers* are arranged in long spadices, arising from the midst of the leaves. The *fruit* is a roundish nut, with an imbricate scaly shell.

This tree is a native of the Molucca islands, and those constituting the eastern Archipelago, where the farinaceous nutriment derived from it is employed as that yielded by the cereal grasses in the Western continents. It flourishes in low and moist situations; a Sago plantation or forest is a bog knee deep. The cultivated plant affords the best Sago, and in largest quantity. (*Cranfurd*.)

Before attaining maturity, which requires fifteen years, the stem consists of a shell about two inches thick, filled with spongy medullary matter; this becomes gradually absorbed, and the trunk is rendered hollow. At the proper period of its growth, when the medullary matter is fully developed, and has not commenced to be absorbed, the tree is felled and cut into billets, which are split, in order to admit the extraction of the pith. From this the fecula is washed out, and deposits from the water upon standing. This, while moist, is passed through a sieve, and moulded into grains. When the Sago is simply dried after deposit from the water, it affords Sago meal. The granulated is in two forms, *Common* or *Brown*, and *Pearl*.

The granules of Sago are rotund, or oval, but in consequence of the violence done to them by heat in a moist state, are lacerated and frequently jagged. Sago has no odour; its taste is mucilaginous. It is highly nutritious, and is prepared as tapioca is, for use.

Sago appears not to have been known to the ancients. Its introduction dates from the prosecution of maritime enterprise in the East by modern nations.

Plate LXXXVIII.—*Represents the plant in leaf, the flowers and fruit.*

LILIACEÆ.

LINDLEY.

THE LILY TRIBE.

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

Some active medicines are yielded by this tribe of plants, but the medicinal properties are not uniform, nor do they depend upon one principle.

SQUILLA MARITIMA.

STEINHEIL.

SQUILL.

SCILLA MARITIMA.—*Linnæus.*

SEX. SYST.—Hexandria, Monogynia.

GEN. CHAR.—*Sepals* three, coloured, spreading. *Petals* like them, and scarcely broader. *Stamens* six, shorter than the perianth. *Filaments* smooth, somewhat dilated at the base, acuminate, entire. *Ovary* three-parted, glandular, and melliferous at the apex. *Style* smooth, simple. *Stigma* obscurely three-lobed, papillose. *Capsule* rounded, three-cornered, three-celled. *Seeds* numerous, in two rows, flattened, with a membranous testa.

SPECIF. CHAR.—Bulb roundish ovate, very large between globose and ovate, half above ground, with the integuments either pale-green or red. *Leaves* appearing long after the flowers, broad, lanceolate, channelled, spreading, recurved. *Scape* about two-feet high, terminated by a rather dense, long, ovate raceme. *Flowers* about three-quarters of an inch across, spreading, pale-yellowish-green, with a green stain along the middle of each segment. *Filaments* shorter than the segments of the perianth.

This plant is a native of the coasts of the Mediterranean, on both sides. It is found in France, Spain, Italy, Sicily, the Grecian Islands, and in Africa. It affords the officinal article known as squills. The bulb, when fresh, is somewhat pyriform, from the size of the fist to that of a child's head, composed of thick, fleshy, smooth, shining scales, attenuated at their edges, closely applied over each other, and attached to a conical rudimentary stem, projecting below, and giving rise to the root fibres. The outer scales are dry and brown, the interior succulent. In this state it has very little odour, and a bitter, acrid taste.

To prepare for exportation in the dried state, the bulb is cut transversely, and neither the interior scales which are young and gummy, nor the exterior, which are dry and exhausted, are taken; the intermediate alone are active. In commerce, squills are in the form of pieces longer than broad, a little wedge-shaped, brittle when perfectly dry, without odour, and possessed alone of bitterness, without the acrimony.

There are two kinds of squills, *white* and *red*, the former by the older writers denominated *male*, the latter *female* squills. The first comes from Spain, the latter from Italy. The colour of the dried article is either yellowish white, or brownish-red, as procured from one or the other.

Squills are apt to become mouldy from exposure to moisture, which is readily attracted from the atmosphere; this is probably owing to the salts, more especially nitrate of potassa, in their composition.

They contain *acrid volatile matter;* this is dissipated by drying, but manipulation with squills in the fresh state is apt to excoriate the fingers, and inflame the eyes and nose. Another principle is *scillitin*. They also contain tannin.

Squills are emetic, diuretic, and expectorant, and are used in numerous preparations. Vinegar is the best menstruum.

PLATE LXXXIX.—*Represents the plant in leaf, the scape and flower, and an enlarged flower and fruit.*

ALOE VULGARIS.

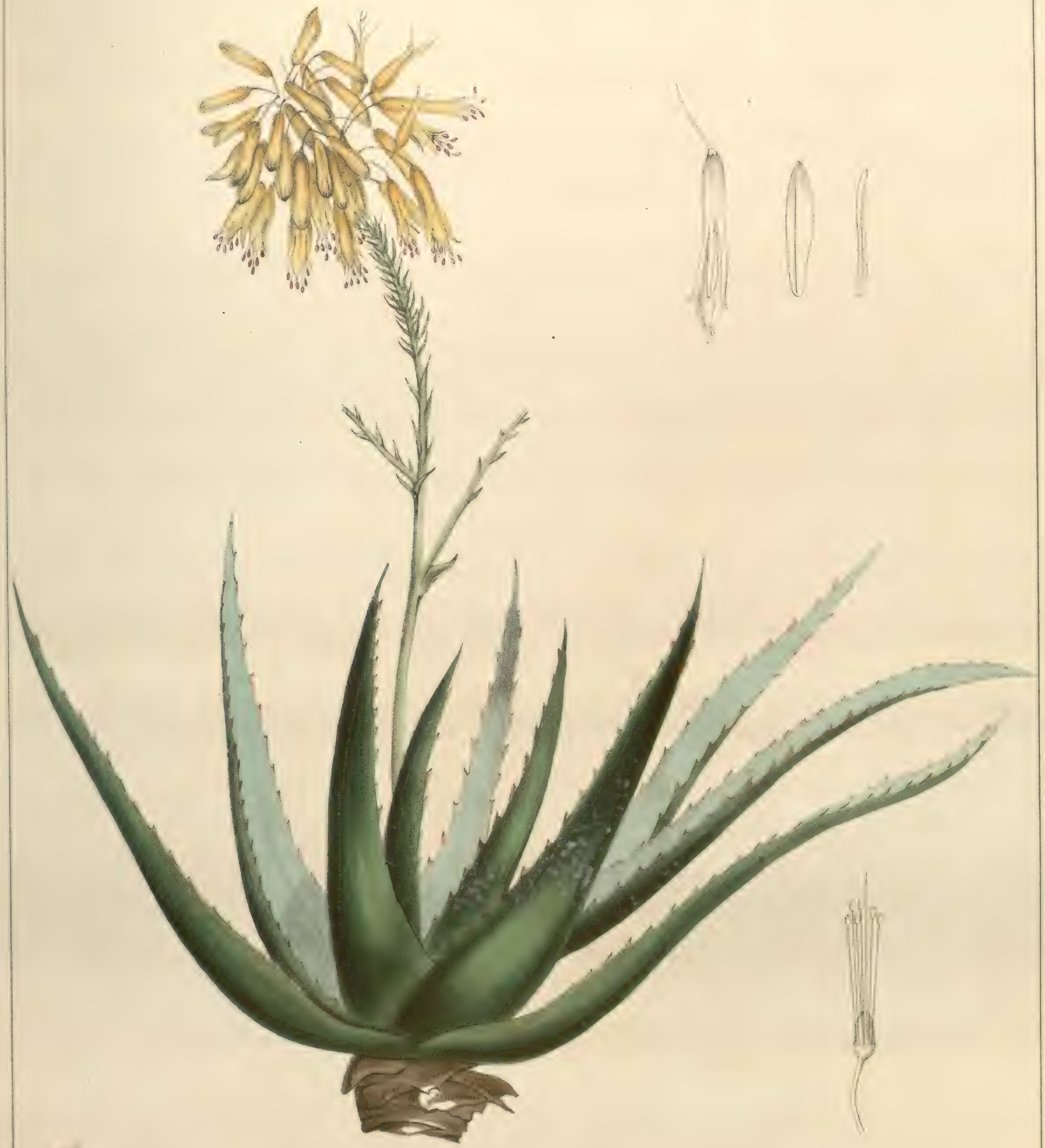
LAMARCK.

COMMON ALOE.

SEX. SYST.—Hexandria, Monogynia.

GEN. CHAR.—*Perianth* tubular, six-cleft, fleshy, nectariferous at the base, sepals of the same form as the petals, and closely imbricating them. *Stamens* hypogynous, as long as the perianth, or even longer. *Capsule* membranous,

SCILLA MARITIMA.



ALOE VULGARIS.

R P SMITH, 144 CHESTNUT ST PHILA.

ALOE ARBORESCENS.

B.P. SMITH 144 CHESTNUT ST PHILA

scarious, three-cornered, three-celled, three-valved, with a loculicidal dehiscence. *Seeds* numerous, in two rows, roundish or angular. (*Lindley.*)

Specif. Char.—*Stem* woody, simple, cylindrical, short. *Leaves* fleshy, amplexicaul, first spreading, then ascending; lanceolate, glaucous green, flat above, convex below, armed with hard, distant, reddish spines, perpendicular to the margin, a little mottled with darker colour; the parenchyma slightly coloured brown, and very distinct from the tough, leathery cuticle. *Scape* axillary, glaucous reddish, branched. *Spike* cylindrical ovate. *Flowers* at first erect, then spreading, afterwards perpendicular, yellow, not longer than the stamens. (*Lindley.*)

According to Pereira, this species is a native of the East Indies and Barbary, and is cultivated in the West Indies, Italy, Sicily, and Malta. It yields *Barbadoes Aloes,* and perhaps some of the varieties of hepatic. Beneath the epidermis of the leaves, in peculiar parallel vessels, is found a brownish-yellow, bitter, resinous juice.

Barbadoes Aloes is procured in the month of March. It is of several qualities, according to the mode of preparation. The best is prepared by boiling the juice, which has exuded from the cut leaves, in kettles, to the proper consistence. It is usually poured into gourds or calabashes, and hence sometimes is called *Gourd Aloes.* They weigh from 60 to 70 pounds. Inferior kinds are prepared by the expression of the juices from the bruised leaves and evaporation, or by decocting the leaves.

It varies in colour from a dark brown or black to a reddish brown or liver colour, which diversity is apparent in the same gourd. Its fracture is glossy or dull. It has a very disagreeable odour, and an intensely bitter taste.

This kind of Aloes is a warm cathartic, acting upon the lower intestines, more especially the colon and rectum. This, or other kinds of the drug, enters into numerous preparations.

Plate XC.—*Represents the plant in flower, and the reproductive organs.*

ALOE ARBORESCENS.

MILLER.

TREE ALOE.

Aloe Perfoliata.—*Var. β. Lin. Spec.*

Sex. Syst.—Hexandria, Monogynia.

Gen. Char.—Ut supra.

Specif. Char.—*Root* ligneous, ramose fibrous. *Stem* ligneous, arborescent, erect or a little inclined, simple or branched, cylindrical, below naked, roughened by the remains of the leaves, and annulated. *Leaves* interruptedly spiral, thick set, amplexicaul, sub-glaucous, lanceolate, wide reflexed at the apex, somewhat concave above, convex below, spinous on the margin, spines yellow, distant. *Peduncle* cylindrical, erect, simple, smooth, provided with broad, obtuse, sparse bracts. *Flowers* densely spiked, disposed in a quintriptical spiral form around the axis. *Spikes* long, with concave obtuse bracts. *Pedicels* cylindrical, longer than the bracts. *Flowers* first erect, then horizontal, at length reflected. *Corolla* cylindrical, beautifully rubicund, with a sweet fluid in the nectarium. *Stamens* six, equal to the corolla. *Anther* oblong. *Ovary* superior, trigonous. *Style* erect. *Stigma* simple. *Capsule* obtusely trigonous, bilocular. *Seeds* sub-ovate.

This plant is an inhabitant of the Cape of Good Hope, and a part of the Aloes of commerce is said to be collected from it. The leaves abound in the peculiar bitter juice.

Plate XCI.—*Is a representation of the plant in flower.*

Mo. Bot. Garden
1904.

ALOE SOCOTRINA.

LAMARCK. DE CANDOLLE.

SEX. SYST.—Hexandria, Monogynia.

GEN. CHAR.—Ut supra.

SPECIF. CHAR.—The stem of this species is woody, straight, one and a half feet high or more, naked below, where it is marked with the scars of the leaves. The leaves are amplexicaul, ascending, ensiform, green, curved inward at the point, convex below, rather concave above, marked with numerous small white margitudinal serratures; the parenchyma abounding in a bright brownish-yellow juice. *Raceme* cylindrical, unbranched. *Flowers* scarlet at the base, pale in the middle, green at the point. *Stamens* unequal, three of them longer than the flowers. (*Lindley.*)

The *Aloe Socotrina* is stated to be a native of the island of Socotora, and other portions, as Melinda, of the possessions of the Imaum of Muscat. It is probably not confined to these districts, however, but extends to neighbouring countries. It affords the finest kinds of *Aloes*, as the *Socotrine* and *Hepatic.* Wellstead states, that the leaves are plucked at any period, and by any one who chooses to take the trouble, and, after being placed in a skin, the juice is allowed to exude from them. He further informs us, that the hills on the western side of the island mentioned, are covered to the extent of many miles with the aloe plants, and that it is not likely, at any future period, that the whole quantity of the drug will be collected.

The juice which, by inspissation, yields aloes, is lodged in vessels which run longitudinally beneath the epidermis; when exposed to the air, it becomes violet and ultimately brown.

The best account of Socotrine Aloes is given by Pereira, from whose work we extract it. "It comes over in skins, contained in casks, (holding from 11 to 15 cwt.,) kegs, or chests. Its consistence and colour are liable to considerable variation. The exterior portion of each skinful is usually hard, but the internal portion is frequently soft and even semi-liquid. The hardened portions vary in colour in different parts of the same mass; sometimes they are garnet red, at other times much paler, and when quite dry, are golden-red, and yield a golden-yellow powder. By exposure to the air, the colour is deepened. The fracture of fine selected pieces is smooth, glassy, and conchoidal; but Socotrine Aloes of excellent quality, often breaks with a roughish fracture. The finest kind of Socotrine Aloes which I have met with, had the semi-transparent red colour, observed when we break a fine tear of myrrh. Thin films of pure and hardened aloes are usually translucent, or nearly transparent. The odour of fresh broken pieces (especially when breathed on), is very fragrant, and is much stronger in recent and soft specimens. The same odour is obtained by heating the aloes on the point of a knife in a candle."

Hepatic Aloes from the East Indies is a variety of the Socotrine, and frequently comes mixed with such as has been described. In the skins veins of the latter of fine quality run through the hepatic. The importation by the Muscat ship "Sultanee," which visited this country several years ago, confirmed the opinion that socotrine and hepatic have a like source.

Socotrine Aloes has the highest reputation as a medicine of all the varieties. Pereira thinks, however, that it is not superior to Barbadoes.

PLATE XCII.—*Represents the plant in flower, and the cleft expanded flower.*

ALOE SOCOTRINA.

COLCHICUM AUTUMNALE.

MELANTHACEÆ.

R. BROWN.

THE COLCHICUM TRIBE.

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

The plants belonging to this order are bulbous,—tuberous or fibrous rooted plants, extremely variable in appearance. They are not confined by geographical limits, but are most abundant in northern countries.

The medical properties are violent, and are due to a principle which is alkaloid; viz., veratria, or a modification of it.

COLCHICUM AUTUMNALE.

LINNÆUS.

MEADOW SAFFRON.

Sex. Syst.—Hexandria, Monogynia.

Gen. Char.—*Perianth* coloured, funnel-shaped, with a very long subterranean slender tube, and a somewhat campanulate, six-parted limb. *Stamens* six, inserted into the throat of the tube. *Ovary* three-celled. *Ovules* numerous, in two or four rows. *Styles* three, filiform, long. *Stigmas* somewhat clavate. *Capsule* three-celled, three-partible, opening inwardly. *Seeds* numerous, roundish, with a shrivelled skin. (*Lindley.*)

Specif. Char.—*Cormus* large, ovate. *Leaves* dark green, very smooth, obtuse, above a foot long, one and a-half inch broad, somewhat keeled, produced in the spring along with the capsules. *Flowers* several, radical, leafless, bright purple (or pink), with a long white tube appearing in the autumn without the leaves. *Capsules* three, distinct, though forming together one oblong, elliptic fruit, with intermediate fissures. *Seeds* whitish, polished. The flowers in one variety accompany the leaves in the spring, and have long, narrow, greenish-white segments, violet-coloured at base. (*Smith* and *Lindley.*)

This plant is a native of England, in moist, rich pastures; it also grows in various places upon the continent of Europe. It has been introduced into the United States, but not for medicinal purposes generally.

The structure and mode of growth and propagation in this plant are peculiar. The cormus is covered by a loose brown membrane, which is in the form of a spathe, reflected first upon the flower tubes, and then upon the leaves and stalk of the capsule. The cormus, after it has leafed, throws off an offset laterally in the form of a new bulb, which from the commencement is indicated by a projection or tubercle. This is slowly accomplished, and in the fall, when the new cormus is capable of independent existence, it sends up two or three flowers upon long tubular prolongations, which communicate with the subterraneous ovaria. The flowers fade in October, but the following spring the ovaria are developed into capsules which rise above ground, surrounded and supported by the leaves. The cormus is then ready in its turn for a new production laterally. As it flowers in the autumn and produces its leaves in the spring along with the mature capsules, it is not in a fit condition for gathering until all these acts have been finished, as the leaves contribute by their functions to the development of its principles, when these have faded and before the scion is so far advanced as to have exhausted the bulb, should it be gathered. June and July are specified as being the proper season for collection.

Upon the attention paid to the stage of growth depends the value of the colchicum brought into the market; the new cormus is inert, or nearly so. Dr. Lindley says, that he had seen many *cwts.* sent to London, of this description,

from which the flower-stalks had been broken to elude detection. When taken at the proper stage, the cormi should be quickly and thoroughly dried, which is accomplished after previously slicing them. To dry the entire cormus is difficult, in consequence of its great retention of vitality, and Mr. Houlton recommends the entire removal of the little bulb or germ of the new cormus previously to drying. The vitality is thus destroyed. In proportion to the advance of this will be the size of the projecting tubercle upon the bulb.

Dr. Christison observes, that the cormus is whitest, firmest and largest at the end of June and beginning of July, and then abounds in starch, there being no other cormus connected with it. If taken earlier, it is quite as bitter, if not more so.

The cormus contains, according to Pelletier and Caventou, *Veratria* united with excess of gallic acid, fatty matter and a volatile acid, yellow colouring matter, gum, starch, inulin and lignin. In the seeds, Geiger and Hesse have announced the existence of a new principle, *colchicina*, which somewhat differs from veratria, but may be a modification of it. (See *Pereira, Mat. Med.*)

Colchicum is an irritant, and in large doses a narcotic acrid poison. It powerfully acts upon the secretions, and is sometimes emetic and cathartic. Its chief value is in gout and rheumatism, and kindred affections. It is given in wine and tincture.

PLATE XCIII.—*Represents the plant in flower, in leaf, and fruit, and presents the embryo capsules with the long connected styles, occupying the tube of the flower.*

VERATRUM SABADILLA.

RETZIUS.

SEX. SYST.—Polygamia, Monœcia.

GEN. CHAR.—*Flowers* polygamous. *Perianth* six-parted. *Segments* broad, concave, imbricating, nearly equal, striated, not excavated at the base. *Stamens* six, equal, inserted into the base of the segments. *Filaments* subulate. *Anthers* uniform with confluent cells. *Ovary* with three divaricating stigmas. *Capsule* three-horned, separating into three many-seeded follicles. *Seeds* compressed, winged at the apex. (*Lindley.*)

SPECIF. CHAR.—A plant three or four feet high. *Stem* erect, simple, round. *Leaves* numerous, spreading on the ground, all radical, ovate oblong, obtuse, with eight to fourteen ribs, glaucous underneath. *Panicle* spreading, simple, or a little branched. *Flowers* rather nodding. *Pedicels* very short, approximated in twos and threes; those of the fertile flowers eventually becoming turned to one side; those of the sterile flowers deciduous and leaving a scar. *Segments* of the perianth ovate lanceolate, veinless, blackish purple. *Ovaries* three, oblong, connate, obtuse. *Styles* acute, dilated downwards. *Stigmas* simple. *Capsules* three, in form resembling those of the larkspur, opening at the apex inside. *Seeds* three in each cell, imbricated, curved, blunt on one side, sooty, acrid. (*Descourtilz. Lindley.*)

This plant is an inhabitant of Mexico, and the West Indies.

The seeds of this plant as well as those of the *Asagræa officinalis*, constitute the *Sevadilla, Sebadilla*, or Sabadilla seeds of commerce. They are imported in the capsules from Vera Cruz. They "rarely exceed, or even equal half an inch in length, and are about one line, or a line and a half in diameter. They are ovate oblong, acuminate. Their colour is pale, yellowish-brown, or reddish-gray. The coat of each is thin, dry, and of a papery consistence. Each fruit is composed of three follicles, mutually adherent towards the base, open at the superior and internal part. The receptacle, fruit-stalk, and the remains of the dry and withered calyx, are usually present in the cebadilla of the shops." This description, from Pereira, will apply to one set of capsules as well as to another, but the seeds in the two plants appear to differ, in the one being dull brownish-black and obtuse, in the other shining black brown, and scimitar shaped.

Sabadilla seeds contain *veratria*, cevadic or sabadillic acid, oil, veratric acid of Merk, resin, and gum resin of Couerbe.

In the manufacture of veratria are these seeds principally consumed.

PLATE XCIV.—*Presents the plant in flower, the capsules and the outlines of the full-sized leaf.*

VERATRUM SABADILLA.

SMILAX MEDICA

SMILACEÆ.

LINDLEY.

THE SMILAX TRIBE.

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

The species of Smilax which yield the root called sarsaparilla, contain an acrid principle *smilacine* and starch. The structure of the root is peculiar, a ligneous cord, surrounded by starchy cortical substance.

SMILAX MEDICA.

SCHLECHTENDALL.

Sex. Syst.—Diœcia, Hexandria.

Gen. Char.—Diœcious. *Perianth* six-parted, nearly equal, spreading. *Male. Stamens* six. *Anthers* erect. *Female. Perianth* permanent. *Ovary* three-celled, the cells one-seeded. *Style* very short. *Stigmas* three. *Berry* one and three-seeded. *Seeds* roundish. *Albumen* cartilaginous. *Embryo* remote from the hylum. (*R. Brown.*)

Specif. Char.—*Stem* angular, armed with straight aculei at the joints, and with a few hooked ones in the intervals. *Leaves* of the texture of paper, bright green on each side, smooth, cordate, auriculate, shortly acuminate, five-nerved, with the veins of the underside prominent. In form they are very variable, being ovate, somewhat panduriform, auriculate, and somewhat hastate, with the lobes of the base obtuse, sometimes obsolete, sometimes divaricating; their edge not straight, but as if irregularly crenate. *Petioles* and midrib armed, when old, with straight subulate prickles. *Peduncle* axillary, smooth, about an inch long. *Inflorescence* an eight to twelve flowered umbel. *Fruit* red, size of a small cherry, contains one to three reddish-brown seeds. *Embryo* cylindrical, lodged in a horny albumen. (*Lindley. Nees.*)

Dr. Lindley states, that this is undoubtedly the species which produces the *Vera Cruz Sarsaparilla*. "Scheide, who found it on the eastern slope of the Mexican Andes, says it is carried from the villages of Papantla, Tuspan, Nantla, Misantla, &c., to Vera Cruz under the name of Zarsaparilla, and there is introduced into the European market. He was told that the roots were gathered all the year long, dried in the sun and then tied in bundles for sale. (*Linnea*, iv., 576.) It comes dried to the United States, in large rather loose bales, weighing about two hundred pounds, bound with cords or leather thongs, and usually containing the roots folded upon themselves and separately packed. These, as in the Honduras Sarsaparilla, consist of a head or caudex, with numerous long radicles, which, however, are somewhat smaller than in that variety, and have a thinner bark. They are often soiled with earth." (*U. S. Dispensatory.*)

This variety has not been as much esteemed as the other kinds, but from the experiments of Dr. Ruschenberger, (*Am. Journ. of Pharm.*, N. S., vol. xii., 260,) it affords an extract better than that of Honduras Sarsaparilla, and inferior to Brazilian.

Sarsaparilla contains *sarsaparillin* (*Thubeuf*), *smilacin* (*Folchi*), *paraglin* (*Palotti*), *parallinic acid* (*Batka*), substances shown to be identical by Poggiale. This principle is white and granular. It possesses the acridity of the root. It also contains colouring substance, resin, starch, lignin, thick fixed aromatic oil, wax, and salts.

This medicine is alterative in its impression, and is given in infusion, decoction, syrup, and extract. It is usually given in combination, and enters into the composition of numerous preparations.

Plate XCV.—*Represents the plant in leaf and fruit, and the organs of reproduction.*

ORCHIDACEÆ.

LINDLEY.

ORCHIDS.

ORCHIDEÆ.—*R. Brown.*

ESSENTIAL CHAR.—*Flowers* hermaphrodite, irregular, variable in form. *Perianth* adherent, variable, herbaceous or coloured, membranous or fleshy, permanent or withering; the parts in two rows, rarely in three, free or connected in various modes, often resupinate from a curve in the ovary. *Sepals* three, equal at base, or variously expanded there; the two lateral are in front when the ovary is twisted, and the third dorsal, sometimes surrounded by a true calyx. *Petals* mostly three, rarely one, placed between the sepals; the two lateral like the dorsal sepal, the third variously formed and appendaged. *Stamens* and *style* consolidated into a central column. *Stamens* three, opposite the sepals, one only fertile, (except in Cypropedium.) *Anthers* usually two-celled. *Cells* divided by 2—4 partitions. *Pollen* powdery, or in grains, or in wedge-like masses; these masses free, or connected to the anther by a caudicle. *Ovary* adherent, one-celled, of six carpels. *Style* never distinct, (except in Cypropedium.) *Stigmas* usually confluent in a mucous disk. *Capsule* rarely fleshy, undehiscent, pod-shaped, separating into six dry, rigid valves, with horizontal cells, three of which only contain seeds. *Seeds* usually numerous, minute. (*Condensed by Griffith, Med. Bot.*)

This order is extensive, but few are active; the species of orchis having tuberous roots afford nutrition, of this the plants producing salap are examples.

ORCHIS MASCULA.

LINNÆUS.

SEX. SYST.—Gynandria, Triandria.

GEN. CHAR.—*Flowers* galeate. *Sepals* nearly equal; the upper converging with the petals into a sort of arch; the lateral either converging, or reflexed. *Petals* erect, of about the same size and form as the upper sepal. *Labellum* anterior, calcarate, entire, or undivided, connate with the base of the column. *Anthers* erect with contiguous parallel cells. *Pollen* masses granular, with two distinct glands enclosed in one common pouch, (or pouch-like fold of the stigma.) Terrestrial plants with tubercular roots and soft rather flaccid even leaves. (*Lindley.*)

SPECIF. CHAR.—*Tubercles* two, at the base of the stem, ovoid, elongated, white, fleshy, beset with fibres, simple and cylindrical, constituting the true root. *Stem* about a foot high, cylindrical, glabrous, simple, terminated by a dense spike of purple flowers. *Leaves* oval, elongated, shining, glabrous, frequently spotted with a purplish-black deposit. *Flowers* large, purple, in an ovoid spike, three inches long, in the axils of lanceolate bracts, sometimes coloured; the spur is very nearly the length of the ovary, which is spirally twisted; the lip is in three crenate divisions, the central one longest, is bilobed. (*Richard.*)

This plant is European, and flourishes in woods and pastures. The roots are employed to form the indigenous salap in France, of sufficiently good quality to be a substitute for the oriental article. Lindley states that the latter article is most likely to be the product of *O. variegata*, *O. taurica*, and *O. militaris*, found in Turkey and Persia.

Salap is constituted of the bulbs. When a year old they are removed, cleansed, and subjected for a few minutes to the action of boiling water, when they are suspended upon threads and allowed to dry. They are in the form of rounded masses, the size of a filbert, of a pale, yellowish colour, and having a translucent appearance, their consistence is corneous, hard, and of difficult reduction to powder, which is farinaceous. The odour is faint, resembling sperm, the taste insipid and mucilaginous. They soften in water and partly dissolve; with boiling water, a gelatinous solution is formed.

They contain fecula and bassorin. The grains of fecula are spherical.

ORCHIS MASCULA.

MARANTA ARUNDINACEA.

A bland nutritious aliment may be prepared from this article by boiling the powder in water or milk, useful in chronic dysentery. Salep is used by the Turks in the same way that arrow root is in the West Indies.

When the doctrine of signatures prevailed, Salep was regarded as powerfully aphrodisiacal.

PLATE XCVI.—*Represents the plant in flower, with the tubers and the organs of reproduction.*

MARANTACEÆ.

LINDLEY.

MARANTS.

CANNÆ.—*Jussieu. R. Brown.*

ESSENTIAL CHAR.—*Calyx* superior, of three sepals, short. *Corolla* tubular, irregular, with segments in two whorls, the outer three-parted, nearly equal; the inner very irregular; one of the lateral segments usually coloured, and formed differently from the rest; sometimes by abortion, fewer than three. *Stamens* three, petaloid, distinct, of which one of the laterals and the intermediate one are either barren or abortive, and the other lateral one fertile. *Filament* petaloid, either entire or two-lobed, one of the lobes bearing the anther on its edge. *Anther* one-celled, opening longitudinally. *Pollen* round. *Ovary* one to three-celled. *Ovules* solitary, erect, and campylotropal; or numerous, anatropal, and attached to the axis of each cell. *Style* petaloid, or swollen. *Stigma* either the mere denuded apex of the style, or hollow, cucullate and incurved. *Fruit* capsular. *Seeds* round, without axil. *Albumen* hard, somewhat flowery. *Embryo* straight, naked, its radicle lying against the hylum. (*Lindley.*) Herbaceous tropical plants, rhizome tuberous, abounding in starch, stem often branching.

MARANTA ARUNDINACEA.

LINNÆUS.

ARROW ROOT.

SEX. SYST.—Monandria, Monogynia.

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

SPECIF. CHAR.—*Root* perennial, fibrous, producing numerous fusiform, fleshy, scaly, pendulous tubers from its crown. *Stem* two to three feet high, much branched, slender, finely hairy, turned at the joints. *Leaves* alternate, with long, leafy, hairy sheaths, ovate, lanceolate, slightly hairy underneath, pale-green on both sides. *Panicles* terminal, lax, spreading, with long, linear, sheathing bracts at the ramifications. *Ovary* hairy. *Calyx* green, smooth. *Corolla* white, small. *Fruit* nearly globular, with three obsolete angles, the size of a small currant. (*Lindley.*)

This plant is a native of the West India islands, where it is generally cultivated. It has been introduced and cultivated in Florida, and we have seen fine tubers produced in South Carolina. It affords the arrow root of commerce.

To obtain the fecula, the roots are dug up when a year old; after being cleansed completely, they are beaten into a pulp, which is thrown into pure water and agitated so as to separate the fecula from the fibrous portion. The fibres are removed, and the fecula remains suspended in the water. This is then strained, and allowed to stand until the fecula has subsided, which, after being washed, is dried in the sun.

The best arrow root is known in commerce as Bermuda. It is in the form of light white powder, or small pulverulent masses, without smell or taste. It is pure fecula, consisting of minute ovoid grains. It absorbs moisture

and becomes musty. It is insoluble in cold water, but by rupture of the envelope is soluble in hot. Arrow root is highly nutritious.

PLATE XCVII.—*Represents the plant in flower, and the organs of reproduction.*

ZINGIBERACEÆ.

LINDLEY.

THE GINGER TRIBE.

SCITAMINEÆ.—*R. Brown.*
DRYMYRHZEÆ.—*Ventenat.*

ESSENTIAL CHAR.—*Calyx* superior, tubular, three-lobed, short. *Corolla* tubular, irregular, with six segments in two whorls; the outer three-parted, with the intermediate segment (labellum) larger than the rest and often three-lobed, the lateral segments sometimes nearly abortive. *Stamens* three, distinct, of which the two lateral are abortive, and the intermediate fertile; this placed opposite the labellum, and arising from the base of the intermediate segment of the outer series of the corolla. *Filament* not petaloid, often extended beyond the anther in the shape of a lobed or entire appendage. *Anthers* two-celled, opening longitudinally, its lobes often embracing the upper part of the style. *Pollen* globose, smooth. *Ovary* three-celled, sometimes imperfectly so. *Ovules* several, attached to a placenta in the axis. *Style* filiform. *Stigma* dilated, hollow. *Fruit* usually capsular, three-celled, many-seeded (sometimes by abortion one-celled); occasionally varied, (the dissepiments generally central, proceeding from the axis of the valves, at last usually separate from the latter, and of different texture. (*R. Brown.*) *Seeds* roundish or angular, with or without the axil. (*Albumen* flowery, its substance radiating and deficient near the hylum. *R. Brown.*) *Embryo* enclosed within a peculiar membrane (*Vitellus. R. Brown, Prod. Membrane of the amnios,* and in King's *Voyage,* 21), with which it does not cohere. (*Lindley.*) Aromatic plants found in the tropics. Herbaceous with knotted rhizomes. *Stems* formed of the sheathing concentric petioles of the leaves. *Leaves* simple sheathing, with a single midrib and regular angular veins. *Inflorescence* a dense spike or a panicle. *Flowers* beset with spathaceous bracts.

The plants belonging to this order are characterized by the production of a volatile oil, residing in the fruit or roots; hence their aromatic virtues. The roots contain starch, and sometimes colouring matter.

ZINGIBER OFFICINALE.

ROSCOE.

GINGER PLANT.

AMOMUM ZINGIBER.—*Linnæus.*
SEX. SYST.—Monandria, Monogynia.

GEN. CHAR.—*Corolla* with the outer limb three-parted, inner one-lipped. *Filaments* lengthened, beyond the anther into a simple, incurved beak. *Capsule* three-celled, three-valved. *Seeds* numerous, with axils. *Rhizomata* tuberous, articulated, creeping. *Stems* annual, enclosed in the sheaths of distichous leaves. *Leaves* membranous. *Spikes* cone-shaped, radical or rarely terminal, solitary, consisting of one-flowered imbricated bracts. (*Blume, Lindley.*)

SPECIF. CHAR.—*Rhizoma* tuberous, biennial. *Stems* erect, and oblique, invested by the smooth sheaths of the leaves; generally three or four feet high, and annual. *Leaves* subsessile on their long sheaths, bifarious, linear lanceolate, very smooth above, and nearly so underneath; sheaths smooth, crowned with a bifid ligula. *Scapes* radical, solitary, a little removed from the stems, from six to twelve inches high, enveloped in a few obtuse sheaths, the uppermost of which sometimes end in tolerably long leaves. *Spikes* oblong, the size of a man's thumb. *Exterior bracts* imbricated, one-flowered, obovate, smooth, membranous at the edge, faintly striated lengthwise; interior enveloping

ZINGIBER OFFICINALE.

Plate VII.X.

ELETTARIA CARDAMOMUM.

the ovary, calyx, and the greater part of the tube of the corolla. *Flowers* rather small, when compared with the rest of this natural order. *Calyx* tubular, opening on one side, three-toothed. *Corolla* with a double limb; outer of three nearly equal oblong segments, inner or three-lobed lip of a dark purple colour. *Sterile stamens* subulate. *Filament* short. *Anthers* oblong, double, crowned with a long, curved tapering grooved horn. *Ovary* oval, three-celled, with many ovules in each. *Style* filiform. *Stigma* funnel-shaped, ciliate, lodged just under the apex of the horn of the anther. (*Lindley.*)

The Ginger plant is a native of the tropics, growing both in the East and West Indies. It is cultivated for the sake of the rhizoma, which is the portion used.

When the root is a year old, it is dug from the ground, picked, cleaned and scalded. If dried in this state, it is called *black* ginger; if the epidermis be scraped off, and then the root dried, it constitutes *white* ginger. The first comes from the East Indies, the latter from Jamaica. Pereira suspects that there is a difference in the plants affording the one or the other.

Black Ginger occurs in flattish, branched or lobed palmate pieces (*races*), from two to four inches in length, covered with a wrinkled brown epidermis, breaking with a short fracture, mealy and fibrous internally, and resinous immediately beneath the epidermis. Sometimes it is white from the application of lime, which is made to cover the pieces to protect them from insects. Its odour is aromatic, and its taste warm and slightly bitter.

White Ginger occurs in similarly shaped pieces, white, smooth, starchy externally, and destitute of epidermis. The roots of the ginger are constantly imported in the fresh state. It is brought sometimes in a beautiful white powder in canisters from London. The ingredients of ginger are volatile oil, resin and starch, gum, fibre, ozmazome, acetic acid and salts.

It is aromatic, cordial, stimulating and carminative, used as a condiment or medicine. The officinal preparation is the tincture. A fine preserve is prepared from it.

PLATE XCVIII.—*Represents the plant in leaf, in flower, and the flower enlarged.*

ELETTARIA CARDAMOMUM.

MATON.

OFFICINAL CARDAMOM.

AMOMUM REPENS.—*Sonerat.*
AMOMUM CARDAMOMUM.—*White.*
ALPINIA REPENS.—*Smith.*
ALPINIA CARDAMOMUM.—*Roscoe.*
SEX. SYST.—Monandria, Monogynia.
GEN. CHAR.—Inner limb of the corolla one-lipped. *Tube* filiform. *Anther* naked. *Capsule* berried, three-celled, three-valved. *Seeds* numerous, aculeate.

SPECIF. CHAR.—*Rhizoma* with numerous fleshy fibres. *Stems* perennial, erect, smooth, jointed, enveloped in the spongy sheaths of the leaves; from six to nine feet high. *Leaves* bifarious, subsessile on their sheaths, lanceolate, fine pointed, somewhat villous above, sericeous underneath, entire, from one to two feet long. *Sheaths* slightly villous, with a rounded ligula rising above the mouth. *Scapes* several, (three or four,) from the base of the stems, prostrate, flexuose, jointed branched, from one to two feet long. *Branches* or racemes alternate, one from each joint of the scape, suberect, two or three inches long. *Bracts* solitary, oblong, smooth, membranous, striated, sheathing, one at each joint of the scape. *Flowers* alternate, short-stalked, solitary at each joint of the racemes, opening in succession as the racemes lengthen. *Calyx* funnel-shaped, three-toothed at the mouth, about three-quarters of an inch long, striated with fine veins, permanent. *Tube of the corolla* slender, as long as the calyx, limb double, exterior of three oblong concave, nearly equal, pale greenish white divisions, somewhat curled at the edge, with the apex slightly three-lobed, marked chiefly in the centre with purple violet stripes. *Filament* short, erect. *Anthers* double, emarginate. *Ovary* oval, smooth. *Style* slender. *Stigma* funnel-shaped. *Capsule* oval, somewhat three-sided, size of a small nutmeg, three-celled, three-valved. *Seeds* coriaceous, and pale brown, many, blackish. (*Lindley.*)

The Cardamom plant is a native of Malabar, where the fruit is collected for exportation. The fruit is derived either from the wild plant or from the cultivated. Between Travancore and Madura, they grow wild, (*Hamilton.*) The cardamoms of Wynaad, which are most highly esteemed, are cultivated; they are shorter, whiter, and fuller of seed.

Cardamoms in capsule, are ovate oblong, obtusely triangular bodies, from three to ten lines long, from three to four thick; the pericarp is thick, coriaceous, wrinkled longitudinally, and of a straw colour. The seeds which are crushed are angular, rugose, and blackish brown. The odour is fragrant, and the taste warm, and highly aromatic.

There are three varieties called shorts, short-longs, and long-longs, which are not from different, but from the same plant.

From Trommsdorff's analysis, Cardamoms contain volatile oil, fixed oil, a salt of potash, colouring matter, fecula, nitrogenous mucilage, fibre.

The medical value of cardamoms is as a spice, highly stimulating and carminative. They were known to and employed by the Greeks.

PLATE XCIX.—*Represents the plant in flower and a capsule.*

IRIDACEÆ.

LINDLEY.

ESSENTIAL CHAR.—*Calyx* and *corolla* adherent or coloured; their divisions either somewhat adherent or wholly separate, sometimes irregular, the three petals being occasionally very short. *Stamens* three, inserted at the base of the sepals. *Filaments* distinct or connate. *Anthers* with an external longitudinal dehiscence, fixed by their base, two-celled. *Ovary* three-celled. *Cells* many-seeded. *Ovules* anatropal. *Style* one. *Stigmas* three, often petaloid, sometimes two-lipped. *Capsule* three-celled, three-valved, with a loculicidal dehiscence. *Seeds* spheroidal, angular oblong, or winged. *Albumen* horny, or firmly fleshy. *Embryo* enclosed in it. (*Griffith, in Med. Bot.*)

CROCUS SATIVUS.

LINNÆUS.

SAFFRON CROCUS.

SEX. SYST.—Triandria, Monogynia.

GEN. CHAR.—*Perianth* funnel-shaped, expanding only in the sunshine, with a very long tube, and a regular six-parted limb. *Stamens* three, inserted into the tube. *Anthers* sagittate. *Style* filiform, with three long, narrow-plaited stigmas, which are usually dilated and jagged at the apex. *Capsule* three-celled, many-seeded. *Seeds* roundish. (*Lindley.*)

SPECIF. CHAR.—*Cormus* roundish; the integuments consisting of parallel fibres, which are distinct at the upper end. *Leaves* very narrow, linear, long, flaccid, surrounded at base with long membranous sheaths. *Flowers* axillary, with a two-valved membranous spathe, appearing with the leaves, large, purple, striated with a campanulate limb. *Stigmas* three, deeply divided, linear, wedge-shaped, deep orange colour, hanging down on one side of the flower, fragrant, notched at the points. (*Lindley.*)

This plant grows in England and upon the continent of Europe; it flowers in the autumn. It is said to have come from the East.

The flower is somewhat constructed like the colchicum; it has a long tube through which the style descends to the ovarium, which at the time of flowering is under ground, but, when this has passed by, elevates itself into the air as a capsule. The *stigmas* are gathered for medicinal use, and constitute *saffron.*

Saffron is dried in kilns, and formed into cakes, or in loose packages: *Cake saffron*, and *Hay saffron.* Each filament is an inch to an inch and a half long, thin, brownish-red; one extremity is expanded (clavate) and notched,

CROCUS SATIVUS.

the other is narrow, capillary. The odour of saffron is strong, aromatic, and penetrating, the taste is aromatic and slightly bitter.

There are several kinds of saffron, the English, Spanish and French, &c.; the Spanish is regarded as the best.

The ingredients of saffron which give it value, are volatile oil, and colouring matter, the latter termed *Polychroite.*

The uses to which saffron is put are as a flavouring and colouring substance. It does not seem to have any medicinal qualities, although those of a stimulant and narcotic have been attributed to it.

Some other species besides *C. sativus* are said to afford saffron. (See *Pereira.*)

PLATE C.—*Represents the plant in bloom, and the open tubular flower with the stigmas.*

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Cassia obovata	Nectoux	I.	35	XXVIII.
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Chimaphila umbellata	Specimen	I.	62	LIII.
Cimicifuga racemosa	Specimen	I.	9	III.
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Cinchona condaminea	Humboldt and Bonpland	I.	53	XLV.
Cinchona cordifolia	Hayne	I.	51	XLIII.
Cinchona micrantha	Ruiz and Pavon	I.	52	XLIV.
Cinnamomum zeylanicum	Bot. Mag.	II.	30	LXXV.
Cissampelos pareira	Specimen	I.	15	VIII.
Citrullus colocynthis	Specimen	I.	46	XXXIX.
Coccoloba uvifera	Bot. Mag.	II.	21	LXVIII.
Cocculus palmatus	Bot. Mag.	I.	13	VII.
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Convolvulus scammonia	Nees von Ess.	II.	14	LXII.
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Croton eleuteria	Hayne	II.	34	LXXVIII.
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Datura stramonium	Specimen	II.	20	LXVI.
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Euphorbia ipecacuanha	Specimen	II.	37	LXXXII.
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Gentiana lutea	Specimen	II.	12	LX.
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