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GENERA
FLORÆ AMERICÆ BOREALI-ORIENTALIS
ILLUSTRATA.

THE GENERA
OF THE
PLANTS OF THE UNITED STATES
ILLUSTRATED

BY FIGURES AND ANALYSES FROM NATURE,

By ISAAC SPRAGUE,
MEMBER OF THE BOSTON NATURAL HISTORY SOCIETY.

SUPERINTENDED, AND WITH DESCRIPTIONS, &c.,

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BOTANICAL SOCIETY OF RATISBON, &c., &c.

CHICAGO HULL

VOL. II.

PLATES 101—186.

696

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TO
JOHN CAREY, Esq.,
THIS VOLUME IS GRATEFULLY DEDICATED
IN MEMORIAL
OF A LONG AND INTIMATE COMPANIONSHIP
IN BOTANICAL PURSUITS,
BY
HIS ATTACHED FRIEND,
ASA GRAY.

CAMBRIDGE, JUNE 1, 1849.

704847

JUN 16 '34

ERRATA.

- Page 114, line 2 from bottom, for "GUAIACIDUM," read "GUAIACIDIUM."
" 119, " 3, for "raphi," read "rhapsi."
" 121, " 9, for "raphen," read "rhapphen."
-

ERRATA FOR VOL. I.

- Page 21, line 4, for "minora, calycem referentia," read "minus, calycem referens."
" 23, " 5, for "sessili," read "sessile."
" 44, " 5, for "inter," read "intra."
" 47, " 5, for "baccata," read "baccato."
" 59, " 3, for "claudentes," read "claudentibus."
" 75, " 9, for "cordiformis," read "cordiformibus."
" 83, " 4, for "majuscula," read "majusculus."
" 89, " 3, for "Petala," read "Sepala."
" 91, " 4, for "imbricativo," read "imbricativa."
" 105, " 4, same correction.
" 135, " 4, for "disilientibus," read "dissilientibus."
" 139, " 4, for "recta," read "rectus."
" 167, " 6, for "equalia," read "æqualia."
" 191, " 5, for "æqualia, nunc dupla v. tripla," read "æqualibus, nunc duplis v. triplis."
" 193, " 4, for "bipartita," read "bipartiti."
-

NOTE. In order not to divide the illustrations of the important Natural Family (the Leguminosæ) which succeeds, this volume is closed with Plate 136. The fourteen plates which complete the second hundred will be given in the third volume.

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ORD. CARYOPHYLLACEÆ.

Herbæ blandæ, foliis oppositis integerrimis : dicotyledoneæ, plerumque dichlamydeæ, symmetricæ, pentameræ v. tetrameræ ; calyce persistente æstivatione imbricato ; staminibus sepalis numero æqualibus (vel abortu paucioribus) et antepositis, seu duplis ; ovario libero 1-5-loculari ; ovulis amphitropis vel campylotropis e placenta centrali ; embryone peripherico albumini farinaceo adplicito idemque sæpius plus minusve cingente.

CARYOPHYLLÆ, Juss. Gen. p. 239 (excl. gen.). Fenzl in Endl. Gen.

CARYOPHYLLÆ & PARONYCHIEÆ, DC. Prodr. 1. p. 351, & 3. p. 365.

SILENEÆ, ALSINEÆ, PARONYCHIEÆ, & SCLERANTHEÆ, Bartl. Beitr. 2. p. 153, & Ord. Nat. p. 305.

CARYOPHYLLACEÆ, ILLECEBRACEÆ, & SCLERANTHACEÆ, Lindl. Veg. Kingd. p. 496, 526.

THE PINK OR CHICKWEED FAMILY is well marked among the Polypetalæ by the opposite and entire dotless leaves, more or less connate or connected by a transverse line across the usually tumid nodes ; the centrifugal inflorescence ; the symmetrical pentamerous or occasionally tetramerous flowers, with an herbaceous and persistent calyx ; and the capsular fruit. Taken in the most extended view, it is absolutely distinguished from every other order with petaliferous flowers, excepting Portulacaceæ, by having the slender embryo applied to the outside of the farinaceous albumen, and more or less curved or completely coiled around it. There is, however, a series of gradually reduced forms, either with or without scarious stipules, many of them apetalous and with a one-seeded utricular fruit, which are scarcely separable from Amaranthaceæ and Chenopodiaceæ by any single absolute character.

According to Fenzl, who has investigated this order with great care and ability, the position of the stamens furnishes the essential distinction between Caryophyllaceæ and Portulacaceæ ; these organs, when only a single series is present, being inserted opposite the sepals in the former, and opposite the petals (alternate with the sepals) in the latter family. He accordingly refers

Mollugo and its allies to the Purslane Family, although in all other respects they agree with the Chickweeds. This character, however, is not applicable when both series of stamens are present; nor is it borne out by our triandrous species of Mollugo, in which the stamens alternate regularly (not with the sepals, but) with the cells of the ovary, one of them being consequently situated directly opposite one of the inner sepals. (Plate 101, Fig. 1.) Some other diagnosis is therefore to be sought.

Throughout the whole family, whenever there is a tricarpellary ovary in a pentamerous flower, the carpels, or cells of the ovary, are not really placed opposite the three exterior sepals, as is stated; but one of them is situated directly before the sinus between the third and the fifth sepals (and therefore opposite a petal if there be any), while the two others, equally divergent from this and from each other, stand opposite the two exterior (the first and second) sepals;—these organs being numbered, of course, in the order in which they occur in the quincuncial æstivation, beginning with the outer or lowest one of the spiral.

The plants of this family exhibit no marked sensible properties, and are applied to no important use; except that several, especially of the Pink tribe, are cultivated for ornament, a few of these (such as the Clove Pink) being also prized for the fragrance of their flowers. The greater part are humble weeds. All are herbaceous, or barely suffruticose. The Alsineæ are entirely bland and insipid, with a watery or mucilaginous juice; the Illecebræ have a slight astringency; while the Sileneæ also exhibit traces of a subacid and saponaceous principle, which in Saponaria, &c., has received the name of *saponine*, and is thought to possess alterative qualities, having been used as a substitute for sarsaparilla. The root of *Silene Virginica* is a reputed anthelmintic; but its use for this purpose may probably have originated from the coincidence between its popular name, "Wild Pink," and that of *Spigelia Marilandica*, which is called "Pink-root." The seeds of *Lychnis Githago* (Corn Cockle) are thought to injure flour. They doubtless are a little acrid.

Some representatives of the order occur in every flora. Far the greater part belong to the northern hemisphere; the Alsineæ chiefly abounding in the cooler or frigid, the others in the warmer temperate regions. Few are found within the tropics, except on mountains, where the elevation gives a cool climate.

The perigynous insertion of the stamens, being also common in Alsineæ, will by no means distinguish the Illecebræ as a separate family, nor can the stipules be deemed to furnish an ordinal character. *Scleranthus* differs from the Illecebræ only in the total absence of stipules, and, we may add, in the extrorse resupination of the ovule. Retaining the Mollugineæ in this family, but arranging it next to the Portulacaceæ, which precede (Vol. I. pl. 97-100); the whole order, as represented in the United States, may be disposed as follows.

SUBORD. I. MOLLUGINEÆ.

Stamens alternate with the sepals when of the same number; or when three, alternate with the cells of the ovary: — otherwise as in Illecebreæ and Alsineæ. — Leaves often pseudo-verticillate, seldom stipulate.

MOLLUGO. (Plate 101.) Capsule 3-celled, loculicidal, many-seeded.

SUBORD. II. SCLERANTHEÆ.

Leaves exstipulate. Calyx-tube urceolate in fruit. — Otherwise as in Illecebreæ, Tr. Paronychieæ.

SCLERANTHUS. (Plate 102.) Stamens 5 or 10: anthers 2-celled.

SUBORD. III. ILLECEBREÆ. (PARONYCHIEÆ, *St. Hil.*)

Sepals distinct or united below. Petals often rudimentary or wanting. Ovary sessile. Leaves scarious-stipulate.

TRIBE I. PARONYCHIEÆ. — Fruit a one-seeded utricle.

SIPHONYCHIA. (Plate 103.) Sepals united to the middle; the lobes petaloid, with plane and pointless tips. Petals subulate, inserted with the stamens into the throat of the calyx. Style elongated. Utricle inclosed in the calyx-tube. Seed resupinate.

ANYCHIA. (Plate 104.) Sepals nearly distinct, slightly cucullate and mucronulate at the apex. Petals none. Styles very short. Utricle larger than the calyx. Seed erect.

PARONYCHIA. (Plate 105.) Sepals united only at the base, cucullate at the apex or convolute, mostly cuspidate or awned, all alike connivent in fruit and inclosing the utricle. Seed suberect or resupinate.

TRIBE II. SPERGULEÆ. — Fruit a 3-5-valved several-seeded capsule.

LÆFLINGIA. (Plate 106.) Petals minute or none. Sepals cuspidate-pointed; the three exterior bearing a subulate appendage (like the stipules) on each side.

STIPULICIDA. (Plate 107.) Petals spatulate, larger than the emarginate scarious-margined sepals. Capsule about 20-seeded. Cauline leaves subulate, minute, connate by the adnate pectinate stipules. Embryo little curved.

SPERGULARIA. (Plate 108.) Petals oval. Sepals herbaceous. Valves of the many-seeded capsule alternate with the sepals when of the same number. Embryo incompletely annular. Leaves not verticillate: stipules free.

SUBORD. IV. ALSINEÆ.

Sepals distinct, or united only at the base. Petals usually present and imbricated in æstivation. Ovary sessile. — Stipules none.*

* The tribes of this suborder proposed by Fenzl are not here adopted, because we find the ovary more or less completely three-celled in *Honkenya*, *Mæhringia*, &c.; and at an early period the dissepiments may be seen in other *Alsineæ*.

* Styles alternate with the sepals.

SAGINA. (Plate 109.) Valves of the capsule as many as the sepals (4 or 5) and opposite them. Petals entire or none.

* * Styles fewer than the sepals, or if as many, opposite them.

+ Valves of the capsules as many as the styles (usually 3) and entire.

HONKENYA. (Plate 110.) Stamens inserted on a conspicuous glandular-10-lobed disk. Seeds few, inserted on the base of the capsule, rostellate. Leaves and stems very succulent.

ALSINE. (Plate 111.) Seeds numerous on a central columnar placenta, not strophiolate. Leaves subulate, filiform or linear.

+ + Capsule dehiscent by twice as many valves or teeth as there are styles.

MÖHRINGIA. (Plate 112.) Petals entire. Capsule 4-6-valved. Seeds few, strophiolate.

STELLARIA. (Plate 113.) Petals 2-cleft, rarely minute and entire, or none. Capsule 6-8-valved. Seeds numerous, not strophiolate.

CERASTIUM. (Plate 114.) Petals obcordate or 2-cleft. Capsule dehiscent at the apex by twice as many teeth (usually 10) as there are styles.

SUBORD. V. SILENEÆ.

Sepals united into a tube. Petals unguiculate, usually convolute in æstivation, inserted with the stamens upon the summit of a short or elongated stipe (carpopore) which supports the ovary. — Stipules none.

SILENE. (Plate 115.) Calyx ebracteolate, 5-toothed. Styles 3. Capsule dehiscent at the summit by 6 teeth.

PLATE 101.

MOLLUGO, L.

Corolla nulla. *Stamina* 5, *laciniis calycis alterna, seu 3 loculis ovarii alterna*, hypogyna. *Stigmata* 3. *Capsula* 3-locularis, loculicide 3-valvis, polysperma. — *Folia* plana pseudo-verticillata, stipulis obsoletissimis. *Flores* sæpius pseudo-axillares.

MOLLUGO, Linn. Gen. 139. Gærtn. Fr. 2. p. 235. t. 130. f. 8. Wight & Arn. Prodr. Ind. Or. 1. p. 43. Fenzl in Ann. Wien. Mus. 1. p. 375 (excl. subgen.) & 2. p. 246. Endl. Gen. 5186.

Indian Chickweed. Carpet-weed.

CALYX spreading, of five oval SEPALS, which are colored (white) inside and on the margins, quincuncially imbricated in æstivation, persistent. COROLLA none. HYPOGYNOUS DISK minute or none. STAMENS hypogynous, as many as the sepals and alternate with them (or very rarely from 6 to 10, the exterior series alternate with the sepals), or reduced to three when they alternate with the cells of the ovary (one stamen being opposite the fourth sepal!): FILAMENTS subulate: ANTHERS globular or oblong, two-celled, innate, the cells opening longitudinally. OVARY ovoid, somewhat three-lobed, three-celled, two of the cells placed nearly opposite the two exterior sepals, the third opposite the sinus between the third and fifth sepals: STYLES 3, short, the summit and whole inner surface stigmatose. OVULES several or numerous, in two series in each cell, horizontal, amphitropous.

FRUIT a membranaceous CAPSULE, three-celled, three-valved, loculicidal, the partitions separating from the central seminiferous axis, and borne on the middle of the valves. SEEDS indefinite, campylotropous; the testa crustaceous. EMBRYO coiled into a nearly complete ring, surrounding the central farinaceous albumen.

HERBS chiefly annual and depressed, dichotomously much branched and proliferous; the leaves flat, opposite, but by fasciculation usually falsely verticillate or rosulate: the stipules early fugacious or obsolete. Flowers small, in cymes or sessile umbels, rarely solitary, terminal, but commonly appearing as if axillary on account of the repeated proliferous evolution of one or more branches from each node.

ETYMOLOGY. The name is a kind of diminutive of *mollis*, coined by Linnæus, in allusion to the softness of these plants.

GEOGRAPHICAL DISTRIBUTION. These humble weeds belong to the tropical region of both worlds, one species extending to the Northern United States, where it abounds in waste or cultivated places, especially near dwellings; but it has probably been introduced from a more southern latitude. It is through some mistake, doubtless, that *M. arenaria*, *H. B. K.*, is cited by Fenzl as having been found in Connecticut by Drummond.

PLATE 101. *MOLLUGO VERTICILLATA*, *Linn.*; — a small specimen, of the natural size.

1. Diagram of the flower, with a magnified section of the ovary.
2. A flower, enlarged.
3. A stamen, more magnified.
4. Pistil, enlarged; the calyx removed.
5. Vertical section of an enlarged pistil and of the base of the calyx (showing also a minute hypogynous disk).
6. An ovule, magnified.
7. Dehiscent capsule and persistent calyx, enlarged. (The valves are represented too thick.)
8. A magnified seed.
9. Section of the same and of the annular embryo.

PLATE 102.

SCLERANTHUS, L.

Calyx 5-fidus ; tubo urceolato seu infundibulari, fructifero indurato fauce constricto utriculum membranaceum includente. Corolla nulla. Stamina 10 fauci calycis inserta ; 5 alterna, ejusdem sinubus opposita, sæpissime sterilia. Styli 2. Ovulum extrorsum resupinato-pendulum. Radicula superior : cotyledones funiculum spectantes. — Folia lineari-subulata, basi connata, exstipulata.

SCLERANTHUS, Linn. Gen. 562. Gærtn. Fr. t. 126. Schk. Handb. t. 120. R. Br. Prodr. p. 412. DC. Prodr. 3. p. 378. Nees, Gen. Fl. Germ. 3. t. 77 (mal.). Endl. Gen. 5222. Torr. Fl. N. Y. 1. p. 108.

Knawel.

CALYX five-cleft (rarely four-cleft), herbaceous, persistent ; the lobes ovate, imbricated in æstivation, spreading during anthesis, afterwards connivent, and the throat constricted, becoming indurated in fruit as well as the urceolate tube which incloses the utricle. COROLLA none. STAMENS inserted on the throat of the calyx, twice as many as its lobes ; those opposite the lobes (or rarely fewer) antheriferous ; the alternate ones reduced to mere sterile filaments, or sometimes perfect : ANTHERS introrse, two-celled, didymous, the cells somewhat diverging at the base, opening longitudinally. OVARY one-celled : STYLES 2, distinct, stigmatose for the whole length of the inner side. OVULE solitary, campylotropous, resupinate on the *recurved* apex of a long and filiform funiculus which rises from the base of the cell ; the micropyle superior.

FRUIT a hyaline UTRICLE inclosed in the indurated tube of the calyx. SEED resupinate, lenticular, rostellate, smooth. EMBRYO coiled into a complete ring, surrounding the central

farinaceous albumen : RADICLE and the linear slender COTYLEDONS superior; the latter occupying the side next to the funiculus!

HERBS of small size and insignificant appearance, dichotomous and cymose; with the linear or subulate opposite leaves connate at the base, entirely destitute of stipules; the small flowers subsessile in the forks of the branches, forming leafy or bracteate paniculate or corymbose cymes.

ETYMOLOGY. From *σκληρός*, *hard*, and *άνθος*, *flower*; in allusion to the induration of the fructiferous calyx.

GEOGRAPHICAL DISTRIBUTION. Natives of the temperate regions of both hemispheres : but probably not truly indigenous to the United States.

NOTE. This genus of insignificant weeds has been assumed as the type of a separate order; but it differs from the Illecebreæ only in wanting the stipules. Many Illecebreæ have the fructiferous calyx equally indurated; and the ensuing genus shows a similar union of the sepals into a tube. Mr. Sprague, however, notices that the ovule is *retrorsely resupinate* in *Scleranthus*, the radicle therefore occupying the side of the seed remote from the funiculus; but *introrsely resupinate* in those *Paronychieæ* which have the seed inverted, the radicle accordingly lying next the funiculus.

PLATE 102. *SCLERANTHUS ANNUUS*, *Linn.*; — of the natural size.

1. A branchlet, with a flower, a bud, and leaves, magnified.
2. A magnified flower, with the calyx cut away and spread open.
3. Vertical section of the pistil, magnified, showing the ovule in place.
4. Magnified stamen, seen from the outside.
5. Same, seen from the inside, showing the dehiscence of the anther.
6. Fructiferous calyx, enlarged.
7. Seed with its funiculus, magnified.
8. Vertical section through the fructiferous calyx and the seed, in place, (the delicate utricle not represented,) showing the embryo coiled around the albumen.

PLATE 103.

SIPHONYCHIA, *Torr. & Gr.*

Calyx fere ad medium 5-fidus; tubo obovato, fructifero utriculum membranaceum includente; lobis petaloideis planis, vel apice incurvis, muticis. Stamina 5 et petala subulata (potius filamenta sterilia) fauci calycis inserta. Stylus gracilis apice bilobus. Semen e funiculo basilari introrsum resupinato-pendulum; radícula supera; cotyledonibus funiculo aversis. — Herba longe humifusa; foliis planis bistipulatis, internodiis multo brevioribus.

SIPHONYCHIA, *Torr. & Gray, Fl. N. Am. 1. p. 173.*

PARONYCHIÆ *Sect., Endl. Gen. 5202.*

HERNIARIÆ *Sp., Nutt. in Sill. Jour. 5. p. 291.*

CALYX five-cleft to near the middle; the ovoid tube herbaceous, somewhat indurated in fruit; the lobes petaloid (white), oblong, very obtuse, plane and entirely inappended, imbricated in æstivation, the apex more or less inflexed. PETALS (or rather sterile stamens) inserted on the throat of the calyx opposite the sinuses, subulate, exactly resembling the filaments. STAMENS inserted on the throat of the calyx, as many as its lobes, and opposite them: FILAMENTS subulate: ANTHERS didymous, introrse, two-celled; the cells opening longitudinally. OVARY ovoid-oblong, one-celled: STYLE slender, exerted, two-lobed at the apex; the lobes introrsely stigmatose. OVULE solitary, campylotropous, pendulous on the *incurved* apex of a long filiform funiculus which rises from the base of the cell; the micropyle superior.

FRUIT a hyaline UTRICLE, inclosed in the calyx-tube. SEED lenticular, smooth, resupinate on the incurved apex of the funiculus. EMBRYO coiled into a nearly complete ring, sur-

rounding the central farinaceous albumen : RADICLE superior ; the slender COTYLEDONS occupying the side remote from the funiculus.

HERB annual, with widely spreading procumbent stems, and oblanceolate leaves, much shorter than the slender internodes. Stipules scarious, distinct, subulate. Flowers in terminal glomerate cymules, white.

ETYMOLOGY, &c. Composed of *σιφων*, a tube, and the name of the related genus *Anychia* ; from which it differs by the gamophyllous calyx, no less than by its resupinate seed, &c.

GEOGRAPHICAL DISTRIBUTION. The single species is a native of the Southern Atlantic States, in sandy soil.

NOTE. What are termed the petals are surely the same organs as the "sterile stamens" of *Scleranthus*.

PLATE 103. *SIPHONYCHIA AMERICANA*, Torr. & Gray; — a branch, of the natural size (from Augusta, Georgia).

1. A magnified flower.
2. Same, with the calyx cut away and spread open.
3. A detached stamen, more magnified ; inside view.
4. Magnified pistil, with a part of the walls of the ovary vertically cut away, showing the ovule in place.
5. A seed with a part of the funiculus, magnified.
6. Vertical section of the same, showing the annular embryo surrounding the albumen.

PLATE 104.

ANYCHIA, *Michx.*

Calyx 5-partitus, herbaceus, utriculo minor ; sepalis ad apicem subcucullatis, dorso minime corniculatis. Corolla nulla. Stamina 2-5 imo calyci inserta. Stigmata 2 sessilia. Semen erectum ; radícula infera. — Herbæ diffusæ, ramosissimæ ; foliis planis breviter bistipulatis ; floribus minimis in dichotomiis subsessilibus.

ANYCHIA, Michx. Fl. 1. p. 112 (excl. spec.). Juss. Mem. Mus. 2. p. 389.

DC. Prodr. 3. p. 369. Torr. & Gray, Fl. N. Amer. 1. p. 172.

QUERLE Sp., Linn. Sp. 1. p. 90. Gärtn. Fr. t. 128.

QUERIA, Nutt. Gen. 1. p. 158.

PARONYCHIE Sect., Endl. Gen. 5202.

Forked Chickweed.

CALYX herbaceous, not indurated with age, of five almost distinct plane SEPALS, imbricated in æstivation, their tips a little cucullate and minutely corniculate or mucronulate posteriorly. COROLLA entirely wanting. STAMENS from 2 to 5, inserted on the very base of the sepals and opposite them (when only two opposed to the two exterior sepals): FILAMENTS filiform: ANTHERS two-celled, didymous, introrse ; the cells opening longitudinally. OVARY globose-ovoid, minutely pubescent, one-celled: STYLES 2, short, united below, stigmatose on the inner face. OVULE solitary, amphicampylotropous, borne on the summit of a short and straight basilar funiculus.

FRUIT a membranaceous UTRICLE, larger than the calyx. SEED obovate-lenticular, smooth, erect. EMBRYO coiled into a nearly complete ring, surrounding the albumen: the RADICLE inferior.

HERBS annual, erect or procumbent, diffuse, repeatedly forked ; the internodes almost capillary. Leaves obovate or

lanceolate, plane, herbaceous. Stipules very small, distinct, subulate, scarious. Flowers minute, subsessile, solitary in the forks of the leafy branches, or somewhat cymulose on the ultimate ramifications.

ETYMOLOGY. Name abbreviated from that of the related genus *Paronychia*, q. v.

GEOGRAPHICAL DISTRIBUTION. A genus of two, or perhaps three, species of humble weeds, belonging exclusively to Eastern North America, extending from Canada to Texas.

PLATE 104. *ANYCHIA DICHOTOMA*, *Michx.*, β . *CAPILLACEA*, *Torr.*; — a branch of the natural size.

1. Diagram of the flower. (The dark ring represents the space between the walls of the ovary and the solitary ovule.)
2. A calyx, enlarged.
3. A node with an open flower, &c. (the left-hand leaf shows the stipules), magnified.
4. Magnified stamen, seen externally.
5. Same, seen from the inside.
6. Pistil, magnified.
7. Vertical section of the same, showing the erect, somewhat transverse ovule.
8. Utricle with the persistent calyx, magnified.
9. Seed, in its natural position, magnified.
10. Vertical section of the same, through the embryo and albumen.
11. The embryo detached, with the cotyledons separated.

PLATE 105.

PARONYCHIA, *Tourn., Juss.*

Calyx 5-partitus, exinvolueratus; sepalis conformibus, ad apicem cucullatis vel convolutis, æqualiter aristatis seu mucronatis, fructiferis clausis utriculum includentibus. Petala minima, setiformia, vel nulla, cum staminibus sæpius 5 imo calyci inserta. Stylus apice bifidus. Semen e funiculo basilari introrsum pl. m. resupinato-pendulum; radícula supera seu adscendente. — Herbæ diffusæ vel cæspitosæ; stipulis interfoliaceis scariosis argenteis.

PARONYCHIA, Tourn. Inst. Juss. in Mem. Mus. 1. p. 388. DC. Prodr. 3. p. 370 (excl. § 3). Torr. & Gray, Fl. 1. p. 169 (excl. § 3). Endl. Gen. 5202 (excl. § Siphonychia & Anychia).

ILLECEBRI Sp., Linn.

ANYCHIE Sp., Michx. Fl. 1. p. 112, ex parte.

PLOTTZIA, Arn. in Lindl. Introd. Nat. Syst. ed. 2. p. 441.

Whitlow-wort.

CALYX of five similar herbaceous or partly scarious SEPALS, usually coriaceous when old, united at the base, slightly imbricated in æstivation. PETALS (or rather sterile stamens) 5, setiform, rarely triangular, inserted on the base of the calyx alternate with its divisions, sometimes abortive or wanting. STAMENS 5 (rarely fewer) inserted on the base of the calyx opposite its divisions: FILAMENTS subulate, persistent: ANTHERS introrse, two-celled, the cells opening longitudinally. OVARY globular or oblong, one-celled: STYLE slender or short, two-cleft at the apex or two-parted, the lobes stigmatose down the inner face. OVULE solitary, amphicampylotropous, borne on the summit of a basilar funiculus which rises from the base of the cell, with the micropyle at first inferior, or at length usually introrsely resupinate.

FRUIT a membranaceous UTRICLE inclosed in the persistent connivent calyx. SEED globular, oblong or lenticular, ascending, or more commonly more or less resupinate-pendulous. EMBRYO coiled into a complete or incomplete ring around the farinaceous albumen: the RADICLE ascending, or when the resupination is complete, superior, occupying the side next the free funiculus.

HERBS low and diffuse, usually cæspitose; the flowering stems dichotomous or cymose. Leaves opposite, various in form; the interfoliaceous stipules separate or united, silvery-scarious, usually large and conspicuous, the uppermost surrounding the flowers like bracts. Flowers small, crowded in glomerate or rarely somewhat open cymes.

ETYMOLOGY. Παρωνυχία, an ancient name for a whitlow, and for an herb thought to cure it.

GEOGRAPHICAL DISTRIBUTION. Natives of the warmer parts of the temperate zone of the northern hemisphere; the greater part belonging to the Mediterranean region. Seven species are known in the Southern United States and the dry region towards the Rocky Mountains. One of them extends northward to the Saskatchewan, lat. 53°. Another (here figured), which belongs to the Southern Alleghany Mountains, has recently been detected on the White Mountains of New Hampshire.

PLATE 105. PARONYCHIA ARGYROCOMA, Nutt.;—a branch in flower, drawn from a plant brought from the White Mountains of New Hampshire, by the late Mr. Oakes.

1. An expanded flower, magnified.
2. Calyx laid open, showing the stamens, very short petals, &c.
3. A stamen, more magnified, outside view.
4. The same, seen from within.
5. Pistil from which the calyx (2.) is cut away, more magnified.
6. Vertical section of its ovary, &c., showing the nearly erect ovule.
7. Ovule detached and more magnified.
8. Magnified utricle with the fructiferous calyx; the latter laid open.
9. Detached seed (in the same position as in the utricle), more enlarged.
10. Vertical section of the same, through the embryo and albumen.
11. Embryo of the same, detached, and somewhat straightened.

PLATE 106.

LÆFLINGIA, L.

Sepala sensim subulata, exteriora utrinque unisetosa. Petala minima vel nulla. Stamina 3–5. Capsula unilocularis, polysperma. Embryo rectiusculus. — Folia subulata; stipulis adnatis in setas liberas demum productis. Flores sessiles.

LÆFLINGIA, Linn. in Act. Holm. 1758. p. 15. t. 1. Læfl. Iter. t. 1. f. 1.
Cav. Ic. 1. t. 94 & 148. DC. Prodr. 3. p. 380. Endl. Gen. 5210.
Hook. Ic. Pl. t. 285.

CALYX of five distinct and rigid herbaceous SEPALS, imbricated in æstivation, narrowed above into long subulate tips, the three exterior furnished usually on both sides about the middle with a setiform lobe; the two interior rather smaller and entire, with more scarious margins. PETALS 3 to 5, minute, or wanting. STAMENS as many as the sepals, and opposite them, inserted on their very base: FILAMENTS short: ANTHERS didymous, two-celled, introrse, the cells opening longitudinally. OVARY ovoid-trigonous, one-celled, with a columnar basilar placenta: STYLES 3, short, more or less united, or none. OVULES indefinite, amphitropous, ascending on the free central placenta.

CAPSULE conical, membranaceous, three-valved; the valves nearly opposite the three interior sepals. Seeds numerous, lenticular, smooth, amphitropous. EMBRYO barely arcuate, dorsal, applied to the outside of the farinaceous albumen: COTYLEDONS rather short: RADICLE inferior.

HERBS annual, depressed, of small size and insignificant appearance, glandular-puberulent and viscid; the short subulate or setaceous leaves commonly fasciated in the axils. Stipules connate with the base of the leaf, their tips only free in the form of a setaceous tooth on each side, like the appendages of the outer sepals, which are of the same na-

ture. Flowers small and inconspicuous, sessile in the forks of the stem and in the axils, solitary or ternate.

ETYMOLOGY. Dedicated to the discoverer of the original species, *Peter Lafling*, a pupil of Linnæus, and sent by him to Spain.

GEOGRAPHICAL DISTRIBUTION. There are three recognized species of the genus; two of them natives of the southwestern borders of Europe, while the third belongs to the analogous region of the New World, namely, to Texas and California.

PLATE 106. *LÆFLINGIA SQUARROSA*, *Nutt.*; — a Texan specimen.

1. Diagram of the flower.
2. A node with a pair of leaves and flower, magnified.
3. An expanded flower, magnified (pentandrous, apetalous).
4. A stamen, more magnified; inside view.
5. Vertical section of the pistil, magnified, showing the ovules, &c.
6. Dehiscent capsule, in the calyx, magnified.
7. A magnified seed. (Micropyle not rostellate.)
8. Longitudinal section of the same, displaying the embryo applied to the outside of the albumen, but little curved.

PLATE 107.

STIPULICIDA, *Michx.*

Sepala late scarioso-marginata, retusa, petalis spathulatis inferne utrinque bidenticulatis subbrevia. Stamina 5. Stylus 3-lobus. Capsula unilocularis, circiter 20-sperma. Embryo hemicyclicus. — Caulis pluries dichotomus, fastigiatus, setaceus; floribus in apice ramulorum capitellato-glomeratis; foliis radicalibus spathulatis, caulinis minimis subulatis; stipulis adnatis pectinato-laciniatis.

STIPULICIDA, Michx. Fl. 1. p. 20. t. 6. Nutt. Gen. 1. p. 29. DC. Prodr. 3. p. 375. Torr. & Gray, Fl. N. Am. 1. p. 173. Endl. Gen. 5215.

CALYX of five almost distinct SEPALS, which are cuneate-oblong, with a rigid axis and scarious-petaloid (white) margins (the inner more broadly scarious), imbricated in æstivation, persistent. PETALS 5, rather longer than the calyx, imbricated in æstivation, hypogynous, spatulate, the dilated claw minutely two-toothed on each side above the base, marcescent. STAMENS 5, alternate with the petals, hypogynous: FILAMENTS filiform, short: ANTHERS introse, two-celled; the cells oblong, opening longitudinally. OVARY globose-ovoid, one-celled, with a basilar columnar placenta: STYLE short, three-lobed; the lobes stigmatose along the whole inner face. OVULES numerous, amphitropous, ascending.

CAPSULE somewhat exceeding the calyx, globular, chartaceous, three-valved, about twenty-seeded. SEEDS borne on the columnar free placenta, smooth, compressed, inequilateral, almost anatropous. EMBRYO dorsal, curved into nearly a semicircle around the convex side of the farinaceous albumen: RADICLE inferior.

HERB low and very slender, from an apparently annual root, the stems repeatedly dichotomous, the capillary corym-

bose branchlets terminated by a close cluster of several small sessile (white) flowers, apparently leafless; the cauline leaves being all reduced to minute subulate bracts, which are transversely connected by means of a scarious incisely multifid somewhat deciduous stipular membrane.

ETYMOLOGY. Name composed of *stipula*, the stipule, and *cado*, to cut; in allusion to the incised stipules.

GEOGRAPHICAL DISTRIBUTION. The single species is restricted to the Atlantic border of the United States, from North Carolina to Florida; growing in dry, sandy soil.

PLATE 107. *STIPULICIDA SETACEA*, Michx.; — of the natural size.

1. Diagram of the flower.
2. An expanded flower, magnified.
3. A sepal from the same (one of the inner).
4. A petal from the same, showing the lateral teeth.
5. A stamen, more magnified, inside view.
6. Outside view of the same.
7. Vertical section through the ovary, placenta, receptacle, &c.
8. A detached ovule, more magnified.
9. Magnified dehiscent capsule, with the calyx and marcescent petals.
10. A seed, more highly magnified.
11. Vertical section of the same, showing the embryo curved half round the albumen.

PLATE 108.

SPERGULARIA, *Pers.*

Sepala herbacea. Petala 5, ovalia, raro abortiva. Styli 3-5. Capsula unilocularis, 3-5-valvis, polysperma; valvis dum sepalis numero æqualibus iisdem alternis. Embryo incomplete annularis. — Folia sæpius fasciculata, nec rite verticillata, carnosula; stipulis scariosis conspicuis.

SPERGULARIA, *Pers. Ench.* 1. p. 504 (Sect. *Arenariæ*). *Cambess. in St. Hil. Fl. Bras.* 2. p. 171. t. 110. *Endl. Gen.* 5218.

BALARDIA, *Cambess. in op. cit.* 2. p. 180. t. 111.

LEPIGONUM, *Fries. Wallb. Fl. Gothob.* p. 45.

STIPULARIA, *Haworth, Synops.* p. 104.

SPERGULA, *Sect. SPERGULARIA, Torr. & Gray, Fl. N. Am.* 1. p. 175.

ARENARIE *Sp. stipulatæ, Linn., etc.*

Spurrey-Sandwort.

CALYX of five herbaceous SEPALS, united barely at the base, imbricated in æstivation, persistent. PETALS 5, oval or obovate, usually conspicuous (rarely wanting), slightly perigynous, imbricated in æstivation. STAMENS 10, inserted into a slightly perigynous annular disk, or frequently by abortion 5, alternate with the petals, sometimes reduced to three, two, or one: FILAMENTS subulate: ANTHERS introrse, two-celled, the cells opening longitudinally. OVARY one-celled: STYLES 3 to 5, distinct or nearly so, the inner face stigmatose. OVULES indefinite, borne on a columnar central basilar placenta, amphitropous.

CAPSULE chartaceous, ovoid, one-celled, three- or five-valved; the valves, when five, alternate with the sepals. SEEDS numerous, lenticular-compressed, often surrounded by a scarious or winged margin. EMBRYO uncinatè or incompletely annular, partly surrounding the farinaceous albumen.

HERBS depressed, with the leaves more or less fleshy, filiform or setaceous, commonly fasciated in the axils, but not

verticillate; the scarious stipules conspicuous, the adjacent ones often united into one. Flowers pedicellate, terminal, by the evolution of the branches becoming lateral: pedicels refracted after anthesis, at length again upright. Corolla purple, rose-color, or white.

ETYMOLOGY, &c. The name is taken from *Spergula*; to which the genus is more nearly related than to *Arenaria*. Their stipules at once distinguish them from the *Arenariæ*; their embryo, the position of the valves of the capsule, and the want of verticillate leaves, from *Spergula*.

GEOGRAPHICAL DISTRIBUTION. Natives of the sea-shore in most parts of the world, either strictly littoral, or sometimes found in sandy soil at some distance inland, but scarcely extending beyond the influence of a saline soil.

PLATE 108. *SPERGULARIA RUBRA*, *Pers.* (Waste fields, Cambridge.)

1. Diagram of the flower.
2. Flower, with a leafy branch, magnified.
3. A stamen, magnified, inside view.
4. The same, outside view.
5. The pistil, magnified.
6. The same, the ovary and placenta longitudinally divided.
7. Dehiscent capsule with the persistent calyx, magnified.
8. A seed, more magnified.
9. Vertical section of the same, and of the contained embryo and albumen.

PLATE 109.

SAGINA, *L.*

Petala integra, sæpe obsoleta seu nulla. Ovarium uniloculare. Styli tot quot sepala, iisdem alterni! Capsula polysperma 4–5-valvis, valvis integerrimis sepalis oppositis! — Herbæ pusillæ, exstipulatæ, foliis filiformibus vel subulatis.

SAGINA, Linn. Gen. 176. Bartl. Ord. Nat. p. 305. Torr. & Gray, Fl. N. Am. 1. p. 177. Fenzl in Ann. Wien. Mus. 1. p. 43. Endl. Gen. 5224. Fenzl in Ledeb. Fl. Ross. 1. p. 338.

ALSINELLA, Dillen. Gen. 6.

SPERGULÆ Sp. exstipulatæ, Linn. et Auct.

SPERGELLA, Reichenb. Fl. Germ. p. 110.

Pearlwort.

CALYX of four or five nearly distinct SEPALS, imbricated in æstivation, herbaceous, a little fleshy, persistent. PETALS as many as the sepals and alternate with them, hypogynous, entire, deciduous, often small and inconspicuous, sometimes altogether wanting. STAMENS as many as the sepals, and opposite them, or twice as many, inserted on the lobes of a hypogynous disk: FILAMENTS filiform: ANTHERS introrse, two-celled, the cells opening longitudinally. OVARY ovoid, one-celled: STYLES 4 or 5, alternate with the sepals, short, the whole inner face stigmatose. OVULES numerous, ascending on slender funiculi which rise from a central columnar placenta, amphitropous.

CAPSULE one-celled, four–five-valved to the base; the membranaceous valves opposite the sepals, entire. SEEDS numerous, pyriform-lenticular, or somewhat reniform, smooth, naked at the hilum. EMBRYO curved more than half round the outside of the farinaceous albumen.

HERBS of small size, diffuse or depressed, destitute of stipules; the opposite leaves subulate or filiform. Flowers small, terminal or lateral, often nodding on the apex of the strict and slender peduncle.

ETYMOLOGY. *Sagina*, fattening, food; — these little plants being supposed to be nourishing to cattle.

GEOGRAPHICAL DISTRIBUTION, &c. Natives of the colder and temperate parts of the northern hemisphere, sparingly, if at all truly, indigenous in the southern hemisphere. The species here figured (as well as *S. apetala*) has probably been introduced from the Old World, although it has the appearance of being indigenous in Rhode Island, Connecticut, &c. But *S. nodosa* and *S. Linnæi* (*Spergula saginoides*, *L.*) are certainly indigenous north and west of the limits of the United States proper, as also, probably, is *S. Elliottii*, *Fenzl* (*Spergula decumbens*, *Ell.*), in the Southern States. *S. fontinalis*, *Short & Peter*, is thought by *Fenzl* to be an apetalous form of *Stellaria crassifolia*. *S. erecta*, *Linn.* (*Mœnchia*, *Ehrh.*), is now referred to *Cerastium*. — The Linnæan *Sagina* was founded on the tetramerous species alone; the pentamerous ones having been referred to, and until recently retained in, *Spergula*, from which they differ in the position of the valves of the capsule, as well as in the want of stipules.

PLATE 109. *SAGINA PROCUMBENS*, *Linn.*; — from Rhode Island, *Olney*.

1. Diagram of the flower. (The central cross represents the stigmas, which alternate with the valves of the capsule, and with the sepals.)
2. An expanded flower, magnified. (Tetramerous.)
3. Hypogynous disk (with the base of the filaments) detached and more magnified.
4. Stamen (with the lobe of the disk) still more enlarged; outside view.
5. The same, seen from within, and showing the dehiscence of the anthers.
6. Pistil, magnified.
7. The same, with the ovary and central placenta vertically divided.
8. An ovule detached, more magnified.
9. Dehiscent capsule and calyx of a pentamerous flower, magnified.
10. Magnified seed.
11. Vertical section of the same, and of the arcuate embryo, albumen, &c.

PLATE 110.

HONKENYA, Ehrh.

Flores subpolygami. Petala integerrima. Stamina 10, disco conspicuo glanduloso 10-lobo inserta. Ovarium subtriloculare (v. 4-5-) loculare. Styli 3-5. Capsula unilocularis, 3-5-valvis; valvis integerrimis, dum sepalis numero æqualibus iisdem alternis. Semina pauca, fundo loculi inserta, rostellata. — Herba arenarum littoris, succulenta; foliis ovalibus; floribus solitariis.

HONKENYA, Ehrh. Beitr. 2. p. 231 (1788). Reichenb. Fl. Germ. p. 568.

Torr. & Gray, Fl. N. Am. 1. p. 176. Endl. Gen. 5229. Fenzl in Ledeb. Fl. Ross. 1. p. 357.

AMMODENIA, Gmel. Fl. Sibir. 4. p. 160 (nomine tantum indicatum).

AMMADENIA, Ruprecht, Fl. Samoj. Cisural. p. 25.

ADENARIUM, Raf. in Desv. Jour. Phys. 89. p. 259 (1818).

AMMONALIA, Desvaux, ex Endl. Gen.

HALIANTHUS, Fries, Fl. Hall. p. 75.

ARENARIA peploides, Linn. et Auct.

Sea-Sandwort.

FLOWERS described as polygamo-diœcious, but with us perfect. CALYX of five thick and fleshy ovate SEPALS, imbricated in æstivation, united at the base, persistent. PETALS 5, perigynous, spatulate-obovate, unguiculate, as long as the calyx, imbricated in æstivation. STAMENS 10, alternately opposite the sepals and the petals, inserted into the sinuses of a conspicuous 10-lobed and glandular slightly perigynous disk, those opposite the sepals rather longer than the others: FILAMENTS filiform-subulate: ANTHERS two-celled, introrse, the cells opening longitudinally. OVARY ovoid, more or less completely three-five-celled, the dissepiments soon breaking away from the walls and adhering to the more persistent columella: STYLES as many as the cells, usually 3 or 4, short, stigmatose on the inner face. OVULES few, arising from the

very base of each cell around the naked columella, amphicampylotropous.

CAPSULE ovoid, fleshy, one-celled, few-seeded, three-valved, sometimes five-valved, the entire valves then alternate with the sepals. SEEDS large, erect, lenticular-pyriform, with a sinus at the naked basilar hilum; the micropyle rostellate-produced. EMBRYO hippocrepiform with the extremities approximated, almost inclosing the farinaceous albumen: RADICLE and the slender COTYLEDONS inferior.

HERB perennial, succulent, growing in the sands of the sea-shore, with numerous quadrangular stems from a common creeping rootstock; the leaves decussate, ovate or oblong, very thick and fleshy, sessile. Stipules none. Flowers solitary, axillary or terminal, short-peduncled. Petals white.

ETYMOLOGY. Dedicated to *Honkeny*, a German botanist.

GEOGRAPHICAL DISTRIBUTION. A well-marked genus of a single species (the *H. oblongifolia*, Torr. & Gr., of the Northwest Coast passing by insensible gradations into the ordinary form), which is indigenous to the arctic and northern temperate shores of the Old and the New World; on the Atlantic coasts extending southward in the United States to lat. 40°, in Europe to lat. 30°, N.

NOTE. The flowers are perfect and similar in all the specimens we have examined. Nor do we notice any albumen exterior to the embryo. — The name indicated by Gmelin would have taken precedence if noticed in time: but it can hardly be said that the genus was established by him.

PLATE 110. *HONKENYA PEPOIDES*, Ehrh.; — a flowering stem of the natural size. (Coast of New England, *Oakes*, *Olney*.)

1. An expanded flower, magnified, showing the disk, &c.
2. A detached petal, more enlarged.
3. Magnified stamen, inside view.
4. Outside view of the same.
5. Magnified longitudinal section of the whole flower, showing the insertion of parts, the naked columella, &c.
6. An ovule detached and more magnified.
7. Dehiscent capsule, with the persistent calyx, enlarged.
8. Seed, more magnified.
9. Vertical section of the same, through the embryo and albumen.

PLATE 111.

ALSINE (*Tourn.*), *Wahl.*

Petala integerrima, rariusve retusa. Stamina 10. Ovarium uniloculare. Styli 3. Capsula polysperma, usque ad basim 3-valvis; valvis integerrimis sepalis interioribus oppositis. Semina estrophiolata. — Folia plerumque setacea, subulata seu linearia, exstipulata.

ALSINE, Gærtn. Fr. t. 129. Wahl. Fl. Lapp. p. 129 (excl. spec.). Fenzl in Endl. Gen. 5227 & Ledeb. Fl. Ross. 1. p. 341; non Linn.

ARENARIÆ Sp., CHERLERIA (Hall.) et MINUARTIA (Lœfl.), Linn. et Auct. GRENIERA, Gay in Ann. Sci. Nat. (ser. 3.) 4. p. 27.

Three-valved Sandwort.

CALYX of five (or rarely four) almost distinct SEPALS, imbricated in æstivation, persistent. PETALS as many as the sepals and alternate with them, somewhat perigynous, imbricated in æstivation, entire, very rarely retuse or obcordate, sometimes obsolete. STAMENS twice as many as the sepals (very rarely fewer), inserted into a hypogynous or obscurely perigynous more or less glandular-lobed disk: FILAMENTS filiform or subulate: ANTHERS introrse, two-celled, the cells opening longitudinally. OVARY one-celled: STYLES 3, one opposite each of the two outermost sepals, the other alternate with the third and fifth sepals, very rarely as many as the sepals and opposite them, the inner face stigmatose. OVULES indefinite, borne on a central columnar placenta, amphitropous.

CAPSULE one-celled, chartaceous, dehiscent quite to the base into as many quite entire valves as there are styles, usually three, when they are as nearly as may be opposite the three inner sepals; rarely as many as the sepals, when they are alternate with them. SEEDS numerous, globose-reniform, campylotropous, not strophiolate, the crustaceous testa smooth, granulated or muricate. EMBRYO coiled into a most-

ly incomplete ring around the outside of the farinaceous albumen.

HERBS usually cæspitose and with subulate or setaceous leaves, destitute of stipules. Flowers solitary or cymose, white, rarely rose-color.

ETYMOLOGY. The name is derived from *ἄλσος*, a *grove*, in allusion to the situations many species affect.

GEOGRAPHICAL DISTRIBUTION. A genus of many species, all natives of the temperate and frigid regions of the northern hemisphere.

NOTE. *Alsine* was a general name applied by Tournefort and his predecessors to all the Chickweeds. Linnæus restricted the name to *A. media* and *A. setgetalis*, one of which is a *Stellaria*, the other a Linnæan *Arenaria* of the stipulate section, that is, a *Spergularia*. Wahlenberg reëstablished the genus on its substantial character, viz. the capsule dehiscant into three separate and entire valves; and the acute Fenzl has adopted and confirmed it, after excluding, of course, the stipulate species (*Spergularia*) and *A. peplodes* (*Honkenya*). Into this genus fall all the *Arenarias* of the *Flora of North America* that are truly indigenous within the geographical limits to which this work extends, excepting *A. lateriflora*, which is a *Mœhringia*;—leaving no representative with us of *Arenaria* proper (the pod of which opens at the apex by twice as many teeth as there are styles) besides the naturalized *Arenaria serpyllifolia*. To *Alsine* also belong some of our species which, on account of their obovate petals, have been referred to *Stellaria*, viz. *A. Nuttallii* (*Stell. Nuttallii*, *Torr. & Gr.*, *Alsine Drummondii*, *Fenzl, ined.*), *A. macropetala* (*Stell. macropetala*, *Torr. & Gr.*), and *A. Walteri* (*Stellaria uniflora*, *Walt.*).

PLATE 111. *ALSINE SQUARROSA*, *Fenzl* (*Arenaria*, *Michx.*);—from the Pine barrens of New Jersey.

1. Diagram of the flower in a transverse section of the bud.
2. An expanded flower, magnified.
3. External view of a stamen, more magnified.
4. Internal view of the same.
5. Magnified vertical section of the pistil, placenta, receptacle, &c.
6. An ovule detached and more highly magnified.
7. Dehiscent capsule, in the calyx, enlarged.
8. A seed, more magnified.
9. Vertical section of the same, through the embryo and albumen.

PLATE 112.

MÆHRINGIA, L.

Petala integerrima. Stamina 8 v. 10. Ovarium 2–4-loculare: styli totidem. Capsula in valvas recurvatas duplo styliorum numero dehiscens. Semina plura, strophiolata. — Folia extipulata, patula, ovata, oblonga, seu linearia.

MÆHRINGIA et ARENARIE Sp., Linn. Gen. et Auct. (Gartn. Fr. t. 129).

MÆHRINGIA, Fenzl in Endl. Gen. 5235, & in Ledeb. Fl. Ross. 1. p. 371. Torr. Fl. N. Y. 1. p. 96.

CALYX of four or five herbaceous SEPALS, united at the base, imbricated in æstivation, persistent. PETALS as many as the sepals and alternate with them, more or less perigynous, obovate or oblong, entire, imbricated (or occasionally convolute!) in æstivation, deciduous. STAMENS twice as many as the petals (8 or 10): FILAMENTS subulate, pubescent or smooth, inserted into the edge of a nearly hypogynous disk: ANTHERS introrse, two-celled, the cells opening longitudinally. OVARY plainly divided in *M. lateriflora* into as many cells as there are styles by manifest dissepiments: STYLES 3 (opposite the two outer sepals and the sinus between the third and fifth), sometimes 2 or 4, the inner face stigmatose. OVULES rather numerous, borne on a central columnar placenta, amphitropous.

CAPSULE membranaceous, one-celled, dehiscent into twice as many valves (usually 6) as there are styles. SEEDS few or rather numerous, reniform, campylotropous, smooth and shining, distinctly strophiolate at the hilum. EMBRYO coiled around the outside of the farinaceous albumen into a nearly complete ring.

HERBS with flaccid stems, and spreading, usually broad and flat leaves, destitute of stipules. Peduncles terminal, often becoming lateral by the evolution of an axillary branch. Flowers white.

ETYMOLOGY. Dedicated to *Mehring*, a German physician and botanist, of the time of Linnæus.

GEOGRAPHICAL DISTRIBUTION, &c. A genus founded on a tetramerous plant (*M. muscosa*, *Linn.*), but now extended so as to comprise a number of usually pentamerous species;—all natives of the colder portions of the northern hemisphere.

NOTE. The ovary of *M. lateriflora* is three-celled, and plainly shows (what appears to be a general rule when there are three carpels in a pentamerous flower) that two of the carpels are placed opposite the two exterior sepals, while the third necessarily opposes, not the third sepal, but the sinus between it and the fifth.

PLATE 112. *MÈHRINGIA LATERIFLORA*, *Fenzl*;—of the natural size.

1. Diagram of the flower, in transverse section of a bud, showing the three-celled ovary, &c. (The petals in this instance were convolute in æstivation, as in the *Sileneæ*; but they are usually imbricated.)
2. An expanded flower, enlarged.
3. Magnified vertical section through the ovary, receptacle, &c.
4. Stamen, more magnified, outside view.
5. Inside view of the same.
6. An ovule, more magnified.
7. Dehiscent capsule in the calyx, enlarged.
8. A seed, with the cellular strophiole, magnified.
9. Vertical section of the same, through the crustaceous testa, the coiled embryo, and the albumen.

PLATE 113.

STELLARIA, L.

Petala bifida, seu abortu minima v. nulla. Stamina 8, vel 10, v. abortu pauciora. Ovarium uniloculare. Styli sæpius 3. Capsula ovoidea, in valvas duplo stylorum numero ultra medium dehiscens. Semina estrophiolata. — Folia patentia, exstipulata.

STELLARIA, Linn. Gen. 563 (excl. sp.). Gærtn. Fr. t. 130. Fenzl in Endl. Gen. 5240, & in Ledeb. Fl. Ross. 1. p. 375.

SPERGULASTRUM, Michx. Fl. 1. p. 275.

LARBEREA, St. Hil. in Mem. Mus. Par. 2. p. 261.

Chickweed. Stichewort. Starwort.

CALYX of five or sometimes four herbaceous SEPALS, united only at the base, imbricated in æstivation, persistent. PETALS as many as the sepals and alternate with them, more or less perigynous, deciduous, two-cleft or two-parted, or when small rarely entire, sometimes wanting. STAMENS twice as many as the sepals (8 or 10), or by abortion fewer (3 to 5), inserted into a more or less manifest perigynous disk: FILAMENTS subulate or filiform: ANTHERS introse, two-celled, opening longitudinally. OVARY one-celled: STYLES 3 (respectively opposite the two outer sepals and the sinus between the third and fifth), sometimes 4 or even 5, rarely only 2, filiform, the whole inner face stigmatose. OVULES numerous, borne on a more or less elongated central placenta, amphitropous.

CAPSULE membranaceous, globose or ovoid-oblong, one-celled, splitting to the base or beyond the middle into twice as many valves as there are styles, or at first into three valves (placed as in Alsine) which are soon two-cleft. SEEDS indefinite, or sometimes very few, campylotropous, smooth or granulated; the hilum not strophiolate. EMBRYO coiled into a complete ring, or nearly so, around the outside of the farinaceous albumen.

HERBS usually diffuse, destitute of stipules; the leaves opposite, spreading or reflexed, usually plane, sometimes petioled. Flowers peduncled, solitary or cymose. Petals white.

ETYMOLOGY. Name from *stella*, a star, from the appearance of the spreading petals.

GEOGRAPHICAL DISTRIBUTION. A genus of numerous species, widely distributed over the world, but (with the exception of *Stellaria media*, which has accompanied man everywhere) nearly restricted to the temperate and colder regions.

PLATE 113. *STELLARIA LONGIFOLIA*. *Muhl.*; — a flowering stem.

1. A flower, enlarged.
 2. A detached petal, more magnified.
 3. A stamen, seen from within, equally magnified.
 4. Magnified vertical section through the ovary, placenta, receptacle, &c.
 5. Capsule in the calyx, enlarged.
- 6-8. *STELLARIA BOREALIS*, *Bigelow*.
6. Dehiscent capsule and calyx, enlarged.
 7. A seed, more magnified.
 8. Vertical section of the same, through the embryo and the albumen.

PLATE 114.

CERASTIUM, L.

Petala obovata vel bifida. Stamina 10, raro pauciora. Ovarium uniloculare. Styli tot quot sepala (sæpius 5), iisdem opposita. Capsula cylindracea seu elongata, apice in dentes duplo styliorum numero dehiscens. Semina estrophiolata. — Folia plana, exstipulata.

CERASTIUM, Linn. Gen. 585. Gærtn. Fr. t. 130. Fenzl in Endl. Gen. 5241, & in Ledeb. Fl. Ross. 1. p. 396.

Mouse-ear Chickweed.

CALYX of five, or very rarely four, nearly distinct herbaceous SEPALS, imbricated in æstivation, persistent. PETALS as many as the sepals and alternate with them, obscurely perigynous, obovate, two-cleft, or emarginate, very rarely entire, imbricated in æstivation. STAMENS twice as many as the sepals, or rarely of only the same number, obscurely perigynous: FILAMENTS filiform or subulate: ANTHERS two-celled, introrse, opening longitudinally. OVARY one-celled: STYLES as many as the sepals and opposite them, or very rarely fewer, the whole inner face stigmatose. OVULES numerous on an elongated central placenta, amphitropous.

CAPSULE membranaceous, longer than the calyx, usually cylindrical and prolonged, straight or curved, sometimes cylindraceous-conical, one-celled, dehiscent at the apex only by twice as many teeth as there are styles or sepals, the teeth or their margins commonly revolute. SEEDS numerous, campylotropous; the crustaceous testa granulated or papillose; the hilum not strophiolate. EMBRYO coiled into a complete or incomplete ring around the outside of the farinaceous albumen.

HERBS usually pubescent or woolly, branching, with flat exstipulate leaves, and cymose, or rarely solitary, pedunculate flowers. Petals white.

ETYMOLOGY. The name is taken from *κέρας*, a *horn*; in allusion to the shape of the exerted and often curved capsules.

GEOGRAPHICAL DISTRIBUTION. Widely diffused over the world, chiefly in the colder and temperate regions of the northern hemisphere. *C. vulgatum* and *viscosum*, originally natives of the Old World, have accompanied man everywhere. They are all insignificant weeds. The species illustrated is one of the few that are truly indigenous in the United States proper.

PLATE 114. *CERASTIUM NUTANS*, *Raf.*; — a small specimen, of the natural size.

1. Diagram of the flower. (The five little circles of the inner ring indicate the position of the styles.)
2. An expanded flower, enlarged.
3. A stamen, magnified, inside view.
4. Pistil with the ovary, receptacle, &c., vertically divided; magnified.
5. Dehiscent capsule, with the calyx, enlarged.
6. A seed, more magnified.
7. Vertical section of the same, through the embryo and the albumen.

PLATE 115.

SILENE, *L.*

Calyx ebracteolatus 5-dentatus. Petala 5 (æstivatione contorta) cum staminibus 10 carpophori apici hypogyne inserta. Styli 3. Capsula basi sæpius 3-ocularis, apice in dentes duplo stylium numero dehiscens.

SILENE, Linn. Gen. 772. Oth in DC. Prodr. 1. p. 367. Fenzl in Endl. Gen. 5248 (cum Silenanth. § Saponariæ) & in Ledeb. Fl. Ross. 1. p. 303.

Catch-fly. Campion.

CALYX tubular, cylindrical, clavate, or nearly campanulate, 5-toothed, persistent; the teeth or short lobes imbricated in æstivation. PETALS 5, with long and linear claws, inserted on the summit of the short or usually elongated stipe (carpophore) on which the ovary is raised; the dilated lamina entire or cleft, naked, or crowned at the base with a two-cleft appendage, convolute in æstivation. STAMENS 10, inserted with the petals, those opposite them with the filaments more or less evidently adnate to the base of their claws: ANTHERS introrse, versatile, two-celled, the cells opening longitudinally. OVARY three-celled (rarely four–five-celled) at the base, very rarely one-celled throughout: STYLES 3 (rarely 4 or 5), filiform, stigmatose down the inner face. OVULES numerous, borne on a central columnar placenta, horizontal, amphitropous.

CAPSULE inclosed in the calyx or exserted, rarely strictly one-celled, usually imperfectly divided at the base into as many cells as there are styles, dehiscent at the apex by twice that number of teeth. SEEDS numerous, reniform; the crustaceous testa smooth, granulated, or muricate. EMBRYO coiled more than half-way around, or completely surrounding, the farinaceous albumen.

HERBS of diverse habit, with opposite or rarely verticillate leaves, and variously cymose flowers. Stipules none. Petals white, rose-color, or purple.

ETYMOLOGY. The name is said to be derived from *σίαλον*, *saliva*, in allusion to the viscid exudation of many species;—from which the English name of *Catch-fly* is also derived.

GEOGRAPHICAL DISTRIBUTION, &c. The Mediterranean basin is the great focus, not only of this large genus, but of the whole pink tribe: a few belong to the warmer temperate region of North America, but a greater number of them are Western. Some are arctic or alpine. *Silene* is, also, the sole genus of its tribe indigenous to the United States: but several species of *Lychnis*, *Saponaria*, and *Dianthus* ornament our gardens; and one, the *Lychnis Githago* (*Corn-Cockle*), is a well-known weed in grain-fields.

PROPERTIES. The root of *Silene Virginica*, a species allied to that here figured, has some reputation as an anthelmintic. Some species are homely weeds; others bear handsome flowers.

PLATE 115. *SILENE PENNSYLVANICA*, Michx.;—of the natural size.

1. Diagram of the flower, with a section of the ovary towards the base.
2. Vertical section of the flower enlarged, displaying its organs.
3. A detached pistil entire, enlarged.
4. A magnified stamen, seen from the outside.
5. The same, seen from within.
6. An ovule detached and more magnified.
7. Dehiscent capsule, in the calyx, of the natural size.
8. Vertical section of the same enlarged, showing the stipe, seeds, &c.
9. A magnified seed.
10. Vertical section of the same through the embryo, albumen, &c.

ORD. MALVACEÆ.

Herbæ, frutices, rariusve arbores, mucilaginosæ, pubescentissime stellata, foliis simplicibus alternis stipulatis: dicotyledoneæ, dichlamydeæ, hypogynæ, *polyandri-monadelphæ*, 5-polygynæ; calyce 5-sepalo æstivatione valvato; corolla 5-petala æstivatione convoluta, petalis basi cum imo tubo staminum connatis; *antheris reniformibus unilocularibus*; granulis pollinis hispidulis; seminibus amphitropis parce albuminosis; embryone curvato, cotyledonibus foliaceis chrysalideo-contortuplicatis.

MALVACEÆ, Juss. Gen. p. 271 (excl. § 5-7). R. Brown in Tuckey, Cong. p. 428. Kunth, Diss. Malv. p. 1. DC. Prodr. 1. p. 429. Endl. Gen. p. 978. Lindl. Veg. Kingd. p. 368.

THE MALLOW FAMILY belongs to a well-marked natural group (the Columniferae of Linnæus), the plants of which agree in having the calyx valvate and the corolla convolute in æstivation; the stamens monadelphous in a column, or else more or less pentadelphous; the embryo large, with foliaceous cotyledons; and the leaves alternate and stipulate. The proper Mallow Family is readily distinguished from the other Columniferae by its strictly monadelphous stamens, one-celled reniform anthers, and simple leaves.

This important, although not very large, family occurs in all parts of the world except the frigid zone. It is most copiously represented within the tropics and in the hotter parts of temperate regions, thence gradually diminishing in number towards the poles. There are more species in the northern than in the southern temperate zone; and more in the New than in the Old World.

The Malvaceæ of temperate regions are nearly all herbs, one ornamental shrub, the *Hibiscus Syriacus*, forming the principal exception; but within the tropics shrubby or even arborescent forms are common. Their pubescence is usually stellate, as shown in Plate 122, Fig. 1. The leaves are almost always petioled, usually palmately veined, and often lobed, but never truly compound. They are always furnished with a pair of stipules, which, however, are sometimes deciduous. The peduncles are axillary, and com-

monly articulated above the middle, or just beneath the flower. In many cases each flower is subtended by an involucrel of three or several, or rarely only one or two bractlets, forming what is usually denominated an exterior calyx; the importance of which has been over-estimated in the systematic arrangement of the order.

The calyx and the corolla are almost without exception pentamerous. The former is herbaceous and persistent, and the sepals, which are strictly valvate in the bud, are more or less united towards the base. The petals are commonly more or less oblique or inequilateral, as is usually the case when their æstivation is convolute. Their insertion is hypogynous; but their short claws are connate with the base of the staminal column, which union also gives to the corolla the appearance of being slightly gamopetalous.

The explanation of this union is given by the investigations of M. Duchatre upon the organogeny of the flower in Malvaceæ.* He has shown that the petals and stamens (at least those which ordinarily appear in Malvaceæ) are identical in origin, both being developed from five original papillæ alternate with the calyx-segments and next within them, therefore morphologically representing the corolla. These, by parallel and collateral deduplication, give rise each to a petal and a cluster of stamens; and the union of these five clusters constitutes the staminal column. This view is beautifully exemplified by the genus *Sidalcea* (Plate 120), recently proposed by myself,† in which the column is not resolved into simple filaments, but bears five petaloid lobes or phalanges of stamens, situated opposite the petals, into the base of which a vascular communication may be traced. That the anthers of each lobe are the result of the collateral deduplication of a single organ is evident on inspection of those cases in which the phalanges are two-cleft, and their divisions again two-forked, &c., until we reach the separate anthers; as in Plate 120, Fig. 9. Such stamens, perfectly resolved down to the column, compose the andrœcium of *Modiola* (Plate 128), in which the five component phalanges are more or less discernible, of *Napæa* (Plate 119), &c. The same, further multiplied by transverse deduplication so as to form several series usually becoming free at more or less unequal heights, constitute, perhaps, the entire andrœcium of most other Malvææ. But what has become of the true staminal verticil, the parts of which should alternate with the petals? M. Duchatre has detected this in the five lobes or teeth which terminate the naked apex of the column in such Malvaceæ as *Pavonia*, *Hibiscus*, *Malvaviscus* (Plate 131, Fig. 7), &c., and which, when the column is short, may be seen to alternate with the petals. This, again, is confirmed by *Sidalcea*, in which the column, prolonged above the sympetalous phalanges, terminates in antheriferous filaments, or in phalanges the principal, or five exterior, lobes of which apparently alternate with the phalanges of the outer column, and therefore with the petals themselves.

* In *Annales des Sciences Naturelles*, 3^{me} ser. 4. p. 123.

† *Planta Fendleriana*, p. 18.

The anthers are reniform and one-celled by the confluence of the two lobes at their organic apex, as is shown by Plate 128, Fig. 3. The line of dehiscence is therefore transverse around the convex side, and the anther becomes two-valved. The cell of course exhibits, at an early stage, the septum which divides into two compartments the two loculi of the normal anther, the edge of which terminates in the line of dehiscence (Plate 117, Fig. 5). The grains of pollen are uniformly globose, and their coat minutely hispid; as in Plate 117, Fig. 6.

The flowers are hermaphrodite, except in the solitary case of *Napæa* (Plate 119), which is dioecious.

The pistils, from five (or very rarely fewer) to twenty or more in number, are more or less united in a ring around a central receptacle. The exception to this in the tribe *Malopeæ*, where the carpels are aggregated without apparent order into a head, is shown by Duchatre to arise from the ring becoming deeply five-lobed in the course of its development, the reëntering angles being carried inwards and upwards so as to produce an apparent capitulum as the ovaries enlarge and accommodate themselves to the space.

The styles are usually combined at the base, or sometimes nearly to the summit. They correspond in number with the ovaries; except in *Pavonia* and its allies, where the branches of the style and the stigmas are twice as many as the ovaries or the cells of the compound ovary, — a character which defines a well-marked natural group, the tribe *Urneæ*.

In the larger portion of the order, forming the tribe *Malvæ* as characterized in the following conspectus, the mature carpels separate from each other with more or less facility, and from the persistent central receptacle. A small portion of the surface of the inner angle or base of the carpel usually remains adherent to the receptacle, or to the base of the calyx. The stigmas are by all authors said to be capitate throughout the family; but this is not the case in what I have termed the *Eumalvæ*, which include all the European, and a considerable portion of the North American representatives of this tribe. In these, the styles, or their uncombined portions, are stigmatose throughout their whole length down the inner face, as in *Caryophyllacæ*.

In the tribe *Hibiscææ*, the carpels, usually of the same number as the petals, are strictly combined into a several-celled compound ovary, and the fruit is a proper loculicidal capsule, the valves bearing the dissepiments upon their middle, and commonly leaving no central axis.

The embryo nearly fills the seed, but is involved in a small quantity of mucilaginous, or at length fleshy albumen. It is incurved or inflexed, and the broad and foliaceous cotyledons are more or less plaited together in the middle, and then infolded in the opposite direction, often enwrapping the base of the radicle.

The plants of the Mallow Family are uniformly destitute of noxious qualities, and nearly all of them yield a bland mucilage. On this account they are largely used as emollients and demulcents. The principal officinal plant for this purpose in Europe is the Marsh Mallow (*Althæa officinalis*): but

the Okra or Gombo (*Abelmoschus esculentus*), a well-known ingredient in soups, &c., in warm climates, is still more mucilaginous. Nearly all Malvaceæ have a tough fibrous bark, which, in several plants of different parts of the world, is employed as a substitute for hemp. Of these the most important is *Hibiscus cannabinus*, which produces the *Sun-hemp* of India. But far the most important product of the family is *cotton*, which consists of the long hairs that cover the seeds in the genus *Gossypium*; a tropical genus of great ambiguity as to the number of species, but which was originally given both to the New and to the Old World.

Into the subjoined arrangement I have introduced all the admitted genera of the order. Several of them are known to me only by the published characters.

CONSPECTUS OF THE TRIBES AND GENERA.

TRIBE I. MALOPEÆ. — Carpels indefinite, crowded together in a 5-lobed or amorphous head, uniovulate. Radicle inferior. (None are North American.)

* Styles stigmatose down the inner face.

MALOPE, *Linn., Cav.* Mediterranean.

* * Styles terminated by a capitate stigma.

KITAIBELIA, *Willd.* Southeastern Europe.

PALAVA, *Cav.* Peru.

TRIBE II. MALVEÆ. — Carpels as many as the stigmas (5–20 or more), uniovulate or few-ovulate, disposed in a ring around a central axis, from which they at length separate. Column antheriferous at the summit.

Subtribe I. EUMALVEÆ. — Styles stigmatose down the inner face. Carpels uniovulate, numerous. Ovule peritropous-ascending.

* Staminal column simple.

+ Involucrel 6–9- (rarely 3-) cleft.

ALTHEA, *Linn., Cav.* Europe and Asia.

LAVATERA, *Linn.* European.

SAVINIONIA, *Webb & Berthel.* Canaries.*

NAVEA, *Webb & Berthel.* Canaries.*

+ + Involucrel 3-phyllous or wanting. Flowers perfect.

MALVA. (Plate 116.) Petals obovate. Carpels cochleate-reniform, mucicous, conformed to the seed.

CALLIRHOË. (Plates 117, 118.) Petals truncate, often erose-toothed. Carpels more or less beaked; the cell containing a dorsal process between the seed and the hollow beak.

* Although in the generic characters the stigmas are said to be "capitellate," it is evident from the figures that they are just as in *Malva*.

+++ Involucel none. Flowers diœcious.

NAPÆA. (Plate 119.) Diœcious. Calyx 5-toothed. Stamens 15-20 in a single series.

* * Stamineal column double, the outer pentadelphous.

SIDALCEA. (Plate 120.) Involucel none. Carpels 5-9.

Subtribe II. SIDEÆ. — Stigmas terminal, capitate. Carpels uniovulate.

* Ovule peritropous-ascending. Radicle inferior.

MALVASTRUM. (Plates 121, 122.) Involucel often inconspicuous and caducous or wanting.

* * Ovule resupinate-pendulous. Radicle superior. Involucel none.

SIDA. (Plate 123.) Carpels 5-15, erect, partly included in the calyx, indehiscent or 2-cleft at the apex, at length separating from the axis.

ANODA. (Plate 124.) Carpels numerous, united in a depressed stellari-form pod, the dissepiments obliterated before dehiscence.

LAWRENCIA, *Hook.* South Australia.

CRISTARIA, *Cav.* Peru and Chili.

GAYA, *Kunth.* Tropical America.

BASTARDIA, *Kunth.* (*Bastardia* § 1. *Abutiloides*, *Endl.*) Tropical America.

Subtribe III. ABUTILEÆ. — Stigmas capitate. Carpels 2-9-ovulate.

* Involucel none.

ABUTILON. (Plates 125, 126.) Carpels 3-9-ovulate, not bilocellate, somewhat 2-valved, scarcely separating from the axis.

WISSADULA, *Medik.* Tropical America and Asia.

* * Involucel usually present.

MELIPHLEA, *Zuccarini.* Mexico.

SPHERALCEA. (Plate 127.) Carpels 2-3-ovulate, not bilocellate, tardily separating from each other and from the axis.

MODIOLA. (Plate 128.) Carpels 2-ovulate, separable; the cells divided by a transverse partition.

TRIBE III. URENEÆ. — Carpels or cells of the ovary half as many as the stigmas (viz. 5, the stigmas 10), uniovulate. Radicle inferior.

* Fruit 5-coccous; the carpels opposite the petals.

+ Flowers in an involucrate capitulum.

MALACHRA. (Plate 129.) Proper involucel none. Involucre 3-several-leaved.

+ + Flowers not capitate.

URENA, *Linm.* (Cocci glochidate.) Tropical, chiefly of the Old World.

PAVONIA. (Plate 130.) Involucel 5-15-leaved. Cocci naked, or sometimes 3-awned.

* * Fruit baccate; the cells opposite the sepals.

MALVAVISCUS. (Plate 131.) Petals convolute-coarctate. Column exerted.

TRIBE IV. HIBISCEÆ, *Endl.* (excl. *Malvaviscus*). — Carpels as many as the stigmas, 3–10 (usually 5), combined into a loculicidal few-many-seeded (or rarely indehiscent) capsule; the dissepiments borne on the middle of the valves. Column antheriferous for a great part of its length, naked and 5-toothed at the apex.

* Cells of the ovary uniovulate. Involucel polyphyllous.

KOSTELETZKYA. (Plate 132.) Capsule depressed, 5-celled, 5-seeded.

DECASCHISTIA, *Wight & Arn.* India.

* * Cells of the ovary 2-many-ovulate. Involucel 3-polyphyllous.

THESPESIA, *Correa.* Tropical Asia and Oceanica.

SERRÆA, *Cav.* (Senra, *DC.*) Arabia and Egypt.

FUGOSIA, *Juss.* Tropical America and Africa.*

ABELMOSCHUS, *Medik.* Tropical Asia and America.

HIBISCUS. (Plate 133.) Involucel polyphyllous. Calyx persistent, not spathaceous. Capsule 5-celled, 5-valved; the cells few-many-seeded.

GOSSYPIUM, *Linn.* Tropical Asia and Africa.

* * * Cells of the ovary 4–6-ovulate. Involucel minute, or none.

LAGUNARIA, *Don.* Norfolk Island.

LAGUNEA, *Cav.* Tropical Asia and Africa.

* Mr. Bentham mentions a Texan species; but none has fallen under my observation.

PLATE 116.

MALVA, Tourn.

Involucellum 3-phyllum, persistens. Petala obcordata. Styli intus longitudinaliter stigmatosi. Fructus polycoccus; carpellis cochleato-reniformibus, nuticis, monospermis, in orbem dispositis, indehiscens, ab axi centrali secedentibus. Semen reniforme loculum implens. Embryo subannularis: radicula centripeto-infera. — Flores nunquam flavi.

MALVA, Tourn. (excl. spec.). Gray, Pl. Fendl. in Mem. Amer. Acad. (n. ser.) 4. p. 16.

MALVÆ Sp., Linn. Gen. 841. Lam. Ill. t. 582. Gærtn. Fr. t. 136. Cav. Diss. 2 & 5. DC. Prodr. 1. p. 430. Adr. Juss. in St. Hil. Fl. Bras. 1. p. 213. Torr. & Gray, Fl. N. Am. 1. p. 225 (no. 1, 2). Endl. Gen. 5271.

Mallow.

CALYX involuclate with three (rarely two) distinct and persistent bracts, forming an outer calyx, five-cleft, herbaceous, the segments valvate in æstivation, persistent. PETALS 5, alternate with the segments of the calyx, obcordate or somewhat two-lobed, spreading, convolute in æstivation, hypogynous, their thickened and dilated claws adnate to the base of the staminal column, twisted together after anthesis, at length deciduous. STAMENS indefinite, hypogynous, monadelphous in a tubular simple column, the dilated base of which incloses the ovaries, and is connected with the claws of the petals, and from the summit of which the short FILAMENTS singly become free: ANTHERS reniform, one-celled (at first two-celled by the partition which normally divides the cavity of the anther-cell), opening by a continuous line around the convex side so as to become two-valved. POLLEN globose, the whole surface hispid. OVARIES 9 to 20, united in a circle around a central receptacle: STYLES as many as the ovaries, filiform, united below, their distinct

portion stigmatose (minutely hispid) for the whole length on the inner face. OVULE solitary in each carpel, amphitropous, peritropous-ascending; the micropyle inferior.

FRUIT circular, depressed, consisting of a ring of round-reniform or cochleate and compressed-wedge-shaped crustaceous or coriaceous entirely beakless carpels, which cohere until ripe by plane faces, and at length fall away from each other and from the conspicuous central axis (receptacle), indehiscent, or rarely bursting irregularly at the ventral sinus. SEED reniform, campylotropous, conformed to the cell, which it completely fills; the testa crustaceous, smooth. EMBRYO incurved into an incomplete ring around the scanty soft or mucilaginous albumen: COTYLEDONS broad and foliaceous, somewhat infolded: RADICLE centripetal-inferior.

HERBS (of the Old World) with rounded and often palmate petiolate and stipulate leaves. Flowers axillary, usually fascicled; the corolla white, rose-color, or purple, never yellow. Peduncles articulated near the apex.

ETYMOLOGY. An ancient Latin name, said to come from *μαλάχη*, *soft*, in allusion to the emollient properties of the Mallow.

PROPERTIES. The herbage is mucilaginous. Some species are popularly employed as demulcents, particularly *M. sylvestris*; but they are inferior to the Marsh Mallow (*Althæa officinalis*).

GEOGRAPHICAL DISTRIBUTION. The genus *Malva*, as here restricted, is indigenous to the Old World alone; *M. rotundifolia*, although so common, being doubtless an introduced plant in the United States, as is *M. borealis* in California and New Mexico. It is here illustrated for the purpose of contrasting its characters with *Callirrhœ*, &c.

PLATE 116. *MALVA ROTUNDFOLIA*, *Linn.*; — a leaf and axillary flowers.

1. Vertical section through all the parts of a flower, magnified.
2. Vertical section through the fruit and receptacle, dividing one seed and embryo; magnified.
3. One of the carpels detached, magnified.
4. A seed detached, equally magnified.
5. Fruit of *M. BOREALIS*, *Wallm.*, a similar section, equally magnified.
6. A detached carpel of the same, showing the rugose back.

PLATE 117, 118.

CALLIRRHÖË, Nutt.

Involucellum nullum vel 1–3-phyllum. Petala cuneiformia, truncata, apice sæpius fimbriato-crosa. Carpella rectiuscula, rostro brevi crasso demum cavo intus processu dorsali ligulæformi aucta. Embryo arcuatus. Cætera fere Malvæ. — Radix sæpissime napiformis vel tuberosa.

CALLIRRHÖË, Nutt. in Jour. Acad. Philad. 2. p. 181. Gray, Pl. Fendl. in Mem. Amer. Acad. (n. ser.) 4. p. 16.

NUTTALLIA, Bart. Fl. N. Amer. 2. t. 62. Hook. Exot. Fl. t. 171, 172, & Jour. Bot. 1. p. 196 (non Torr. & Gr.).

MALVÆ Sp., Torr. & Gray, Fl. N. Am. 1. p. 225.

CALYX naked, or involucellate with from one to three herbaceous bracts, five-cleft, persistent; the segments triangular or lanceolate, acuminate, three-nerved, valvate in æstivation. PETALS 5, hypogynous, convolute in æstivation, broadly cuneiform, truncate, the dilated extremity commonly erose-denticulate or fimbriate, their claws adnate to the base of the staminal column. STAMENS indefinite, monadelphous in a simple short column, the dilated base of which is adnate to the claws of the petals, hypogynous; FILAMENTS separately becoming free in several series from the summit of the column: ANTHERS reniform or oblong, one-celled, opening by a longitudinal line along the convex side. POLLEN globose, hispid. OVARIES 10–20, united in a circle around a central receptacle: STYLES as many as the ovaries, filiform, united below, their distinct portion stigmatose (minutely hispid) for the whole length on the inner face. OVULE solitary in each carpel, amphitropous, peritropous-ascending, the micropyle pointing to the base of the cell.

FRUIT formed of a depressed ring of more or less beaked crustaceous and indehiscent or somewhat two-valved carpels,

which cohere by plane faces, but at length fall away separately from the conspicuous central receptacle; the more or less incurved beak hollow at maturity, its cavity separated from that of the body of the carpel by an internal tongue-shaped dorsal process! SEED reniform, smooth. EMBRYO arcuate-incurved in or partly round the soft or mucilaginous albumen: COTYLEDONS broad and foliaceous, cordate, infolded together: RADICLE centripetal-inferior, or rarely (in *C. alcæoides* and *C. pedata*) more or less ascending by the partial resupination of the seed.

HERBS (of North America) with mostly simple stems from a large and thickened fusiform or napiform perennial (rarely annual) root. Radical leaves rounded or cordate, lobed or incised, the cauline usually palmately or pedately cleft or parted. Stipules free. Peduncles axillary or somewhat umbellate-clustered, commonly elongated, often articulated near the apex. Flowers showy, red-purple or flesh-colored.

ETYMOLOGY. *Καλλιρρόη*, the daughter of the river Achelous, &c. Perhaps Mr. Nuttall drew the name from *κάλλος*, *beautiful*, and *ῥοιά* or *ῥοά*, whence *Rhas*, the *Corn Poppy*, which *C. Papaver* so much resembles in the appearance of the flowers as to suggest the specific name to Cavanilles, who informs us that the French colonists of Louisiana called the plant by the same appellation, viz. *Coquelicot*.

PROPERTIES. Nearly all the species are ornamental on account of their large and finely colored corolla. *C. Papaver* is prized as a showy perennial in the gardens. *C. involucrata*, *C. digitata*, and *C. pedata* are not less beautiful. The fleshy roots of all the species are farinaceous; those of *C. macrorhiza* are used for food by the Indians.

GEOGRAPHICAL DISTRIBUTION. A genus of seven known species, belonging to the warmer temperate portion of the United States, west of the Alleghenies and east of the Rocky Mountains. Nearly all of them are found in Texas and the plains of the Arkansas and Plate; one species (*C. triangulata*) extending northeast to Illinois and Wisconsin; another (*C. Papaver*) southeast to Florida.

NOTE. The history of this genus is briefly given in the *Plantæ Fendlerianæ*, above cited. Mr. Nuttall established it on two exinvolucellate species, viz. *C. digitata* and *C. pedata*, and indicated it as differing from *Sida* in habit rather than in technical character. Soon afterwards Dr. W. P. C. Barton substituted the name of *Nuttallia*, and figured the former species as *Nuttallia digitata*. Drawings and specimens having been sent to Dr.

Hooker, at Glasgow, he figured the two species, viz. *N. digitata* and *N. pedata*, in the *Exotic Flora*. He soon identified the *Malva Papaver*, *Car.*, as a third species of the genus, notwithstanding its involucre of from one to three bracts, which, however, are frequently remote from the calyx or wanting; and, in the *Journal of Botany*, I. p. 196, shortly afterwards added to the genus another involucellate species, the *Malva triangulata* of Leavenworth;—at the same time suggesting that these two should be restored to *Malva*, and two exinvolucellate species be referred to *Sida*. As the radicle proved to be inferior in all of them, they were all referred to *Malva* in the *Flora of North America*, along with a third involucrate species (the *Nuttallia involucrata*, *Nutt.*); and a remarkable Rosaceous genus was dedicated to Mr. Nuttall in a subsequent portion of that work. Recently, in revising this group, I had occasion to point out the characters which distinguish this genus from *Malva*, viz. the more or less beaked fruit, with an internal process across the base of the beak, and the truncate petals; and I accordingly restored the original name of *Callirrhœ*;* defining the species anew, and introducing two more exinvolucellate species, namely, *C. macrorhiza* (*Sida macrorhiza*, *James*), which had been taken as a variety of *C. pedata*, and *C. alcæoides* (the little known *Sida alcæoides*, *Michx.*), which, like *C. pedata*, has the ripe seed so depressed by the internal process that the radicle becomes ascending, although the ovule is not at all resupinate. Since the earlier sheets of the *Planta Fendlerianæ* were printed, *C. digitata* has also flowered with us, from Texan seeds, and complete indigenous specimens with ripe fruit have been examined, enabling me now to point out the true difference between this species and *C. pedata*, and to correct some errors in the synonymy.†

* *Calliroe*, *Link, Handb.*—a section of *Amaryllis* (*Belladonna*, *Sweet.*), and is, I believe, of later date. The prior use of the name in Zoölogy will not be held to forbid its restoration in Botany.

† *C. PEDATA*: radice gracili annua (an semper?); foliis membranaceis 5-7-fidis, segmentis cuneatis dilatatis laciniato-lobatis incisive, floralibus 3-5-partitis segmentis lanceolatis sæpe incis; stipulis ovatis; pedunculis in racemum foliosum elongatum digestis; involucello nullo; petalis crosso-crenatis; carpellis levibus dorso trilobato-cristatis, rostro maximo minus incurvo.—*Gray, Pl. Fendl.* p. 17. *Nuttallia pedata*, *Nutt. in Hook. Exot. 3. t. 172*. *Malva pedata*, *Torr. & Gray, Fl. N. Am. 1. p. 226*, excl. syn. "*N. digitata*, *Bart.*"—Some indigenous specimens are three feet high; and in cultivation it attains the height of four or five feet, leafy to the top, and producing a long succession of handsome flowers from the axils of the leaves. The petals are deep cherry-red, with a tinge of purple, decidedly smaller than those of *C. digitata*, being less than an inch in length. The root is not thickened in any of my indigenous specimens, nor does it show a tendency to become so in the living plant. I suppose the plant is truly an annual or a biennial.

C. DIGITATA: subglauca; radice crassa sæpe napiformi; caule simplici (vix sesquipedali); foliis radicalibus primariis rotundato-cordatis crenato-lobatis vel 5-fidis, sequentibus caulinisque pedato-5-7-partitis, segmentis linearibus plerumque elongatis integerrimis seu 2-3-fidis, floralibus parvis sæpe integerrimis; stipulis lanceolatis; pedunculis subcorymbosis; involucello nullo; petalis apice fimbriatis; carpellis reticulato-rugulosis dorso vix cristatis, rostro breviusculo inflexo.—*Nutt. in Jour. Acad. Philad. 2. p. 181*; *Gray, Pl. Fendl. l. c.* *Nuttallia digitata*, *Bart. Fl. N. Am. 2. t. 62*; *Hook. Exot. Fl. 3. t. 171*. *Malva digi-*

PLATE 117. *CALLIRRHÖE INVOLUCRATA*, Gray;—summit of a prostrate stem, in flower and fruit, from a live plant raised in the Cambridge Botanic Garden, from Arkansan seeds.

1. Transverse section of a flower-bud, enlarged, showing the æstivation and arrangement of parts. (In one instance the petals were seen to be irregularly imbricated in æstivation.)
2. Vertical section of the flower, magnified, showing the insertion, &c.
3. A stamen from the bud, more magnified.
5. The same, with the anther cut across, showing the normal partition.
6. Grain of pollen (hispid, as in all Malvaceæ), highly magnified.
7. The gynæcium, enlarged, the rest of the flower cut away.
8. An ovule detached and magnified.
9. Receptacle in fruit, with one ripe carpel left in place, magnified.
10. Magnified transverse section of the receptacle and a portion of the ripe carpels; one of them showing a section of the seed and embryo.
11. Vertical section of a ripe carpel, seed, and embryo, magnified; showing the internal dorsal process, the hollow beak, &c.
12. A seed detached entire, equally magnified.
13. An embryo detached entire, showing the way it is curved and the cotyledons folded back upon each other above, and infolded below, as in most Malvaceæ.

PLATE 118. *CALLIRRHÖE PEDATA*;—summit of a flowering branch and a primordial radical leaf, from a live plant raised from Texan seeds (*Wright*), of the natural size (a small specimen).

1. Vertical section of a flower, magnified, showing the ovules, &c.
2. Receptacle with half the ripe carpels in place, magnified.
3. Posterior view of a ripe carpel, showing the 3-lobed crest, magnified.
4. Vertical section of the same and of the contained seed, embryo, &c., showing the conspicuous dorsal process at the base of the large beak, the at length ascending radicle, &c.
5. Vertical section of a carpel of *CALLIRRHÖE PAPAVER* magnified.
6. Carpel of *CALLIRRHÖE TRIANGULATA*, enlarged.
7. Vertical section of the same, showing a less conspicuous internal process below the beak.

tata, *Torr. & Gray, Fl. l. c.* *Nuttallia cordata*, *Lindl. Bot. Reg. t. 1938*, ex icone.—The figure in the *Botanical Register* (which I had wrongly referred to *M. triangulata*) certainly belongs to the present species, as the naked calyx, the fimbriate edge of the petals and their (pink) color show. But the radical leaves figured are only the primary ones, and are all undivided. The corolla in this species is less red and considerably larger than that of *C. pedata*, but smaller than in *C. Papaver*: the petals are from an inch to an inch and a quarter in length, and their whole summit is finely and beautifully fringed. In the fruit, as in other respects, the species is intermediate between *C. pedata* and *C. Papaver*, but is abundantly distinct from either. Since these characters have been verified, there is no room to doubt that the *Nuttallia digitata* figured by Barton truly represents this species, and not the *C. pedata*, as was assumed in the *Flora of N. America*. Although it sometimes flowers the first season from the seed, yet the root early becomes napiform, or thickened fusiform, and is perennial.

PLATE 119.

NAPÆA, *Clayt.*

Flores dioici! Involucellum nullum. Calyx teres, 5-dentatus. Tubus stamineus simplicissimus, ad apicem in filamenta 15–20 uniserialia solutus. Styli intus longitudinaliter stigmatosi. Fructus 8–10-coccus, depressus; carpellis subreniformibus muticis, monospermis, ab axi secedentibus. Semen reniforme. Radicula centripeto-infera. — Herba procera, foliis palmato-multifidis laciniatis maximis, floribus umbellato-fasciculatis parvis.

NAPÆA, Clayt. Fl. Virg. ed. 1, & ed. 2. p. 102. Linn. Gen. 838, ex parte. Gray, Man. Bot. N. U. S. p. 69, & Pl. Fendl. p. 20.
SIDÆ Sp., Cav., DC., Torr. & Gray, Fl. N. Am.

Glade Mallow.

FLOWERS diœcious. CALYX naked (not involucllate), terete, somewhat turbinate, rather deeply five-toothed, the triangular teeth valvate in æstivation, persistent. PETALS 5, obovate, entire, convolute in æstivation, hypogynous, their claws adnate to the base of the staminal column. STER. FL. STAMENS 15 to 20, monadelphous in a simple hypogynous column, the dilated base of which coheres with the claws of the petals: FILAMENTS a single series at the summit of the column, short: ANTHERS reniform, (by confluence) one-celled. PISTILS abortive. FERT. FL. Staminal column 15–20-lobed at the apex, not antheriferous. OVARIES 8 or 10, united in a circle around a central receptacle: STYLES as many as the ovaries, united below, the distinct portion filiform, stigmatose (minutely hispid) for the whole length of the inner face. OVULE solitary in each carpel, peritropous-ascending, amphitropous; the micropyle pointing to the base of the cell.

FRUIT depressed, formed of a ring of eight or ten chartaceous cuneate-reniform and beakless (barely apiculate) smooth

carpels, which at length separate and fall away from the small central axis, finally bursting on the inner edge or tardily two-valved. SEED reniform, smooth. EMBRYO arcuate-incurved in soft albumen: COTYLEDONS ovate, foliaceous, somewhat infolded: RADICLE centripetal-inferior.

HERB tall and coarse, from a perennial root, with large palmately 7-11-parted alternate leaves; the lobes acuminate, pinnatifid-incised and toothed. Stipules ovate, free. Flowers small, umbellate-fascicled at the summit of the flowering branches, together forming an ample corymbose panicle. Petals white.

ETYMOLOGY. Named by Clayton from *ῥάπη*, a wooded valley or mountain glade, or, poetically, the nymph of the groves, alluding to the situations in which the plant grows.

GEOGRAPHICAL DISTRIBUTION, &c. Only a single species of the genus is known, which was discovered in the Valley of Virginia, growing in rich calcareous soil, and is also found in similar situations in Pennsylvania, Ohio, and Illinois. Linnæus added, as a second species, the *N. hermaphrodita* or *N. lævis*, well known in the gardens (a plant of uncertain, though said to be of North American, origin), which, notwithstanding considerable resemblance in habit, is a genuine *Sida* (*S. Napæa*, *Cav.*), and from which the original *Napæa* is abundantly distinguished by its inferior radicle, introrsely stigmatose styles, and diœcious flowers.

PLATE 119. *NAPÆA DIOICA*, *Linn.*;—branch from a pistillate plant cultivated in the Botanic Garden, Cambridge.

1. Vertical section of a staminate flower, enlarged. (Ohio, *Sullivant.*)
- 2, 3. Magnified stamens from the same.
4. Vertical section of a pistillate flower, enlarged, showing the sterile staminal column, the styles, ovules, &c.
5. An ovule detached and more magnified. (Micropyle inferior.)
6. Fruit of the natural size. (From Ohio, *Sullivant.*)
7. The same (with the calyx) enlarged; one carpel (9.) removed.
8. A side view of a seed, magnified.
9. Detached carpel cut across, as well as the contained seed, showing a transverse section of the embryo,—magnified as in fig. 7.
10. Vertical section of the seed (8.) and of the embryo, magnified.
11. Embryo detached entire, magnified.

PLATE 120.

SIDALCEA, *Gray*.

Involucellum nullum. Tubus stamineus duplex! nempe in phalanges 5 exteriores petalis oppositas, atque circiter 10 angustiores interiores, vel filamenta subindefinita per paria coalita, solutus. Styli intus longitudinaliter stigmatosi. Fructus 5-9-coccus, carpellis reniformibus monospermis ab axi secedentibus. Semen reniforme. Radicula centripetoinfera. — Herbæ (Am. Bor.-Occ.), floribus paniculato-racemosis, purpureis, roseis, seu albis.

SIDALCEA, Gray, Pl. Fendl. in Mem. Amer. Acad. n. ser. 4. p. 18.

SIDÆ Sp., Lindl., Nutt., Torr. & Gray, Fl. N. Am. 1. p. 234, no. 10, 14-17.

CALYX naked (destitute of an involucl), persistent; the five sepals united at the base, valvate in æstivation. PETALS 5, obovate or obcordate, convolute in æstivation, hypogynous, their claws adnate to the base of the stamineal column. STAMENS monadelphous in a column which gives off about the middle or near the apex a series of five broad and membranaceous phalanges, situated opposite the petals (convolute in æstivation), each bearing from four to eight anthers on very short filaments, and at the summit divides into an inner set of about ten narrow and usually diantheriferous phalanges, or into about twenty filaments, most of which are united below in pairs: ANTHERS one-celled, as in the order. OVARIES 5 to 9, united in a circle around a central receptacle: STYLES as many as the ovaries, united below, filiform, stigmatose the whole length of the inner face. OVULE solitary in each carpel, peritropous-ascending, the micropyle inferior.

FRUIT of five to nine membranaceous reniform carpels, which are mucous, or apiculate with a short soft beak, one-seeded, separating from the central receptacle when ripe.

opening by laceration at the inner edge, or tardily somewhat two-valved. SEED reniform. EMBRYO arcuate-incurved, partly surrounding the soft albumen: COTYLEDONS foliaceous, cordate, conduplicate-infolded: RADICLE inferior.

HERBS mostly hairy or hirsute, with rounded and commonly palmately-cleft or parted leaves, free stipules, and usually virgate stems, terminated by a raceme or racemose panicle of purple, rose-colored, or white flowers.

ETYMOLOGY. Name compounded of *Sida* and *Alcea*, the ancient names of two allied Malvaceous genera.

GEOGRAPHICAL DISTRIBUTION, &c. A genus of eight described species (vide *Planta Fendleriana*, l. c.) indigenous to Southern Oregon, California, and New Mexico; therefore not falling within the geographical range of this work, but introduced here for the purpose of illustrating its remarkable staminal column, by which the genus is strikingly distinguished from all other true Malvaceæ. From the want of an involucre the species formerly known have been referred to *Sida*, along with other heterogeneous forms.

PLATE 120. *SIDALCEA DIPLOSCYPHA*, Gray: — flowers, &c., of the natural size, from a Californian specimen by Fremont.

1. Diagram of the æstivation, &c. of the flower, with a magnified cross section of the compound ovary. (The exterior phalanges of stamens are seen to be convolute in the bud, as well as the petals, and the inner to consist of ten smaller phalanges in two series, five alternating with the exterior set, and five placed opposite them.)
2. The staminal column entire, magnified; the large and petaloid exterior phalanges spreading; the summits of the styles exerted from the centre of the 2-antheriferous inner phalanges.
3. Vertical section of the same and of the ovary, &c., more magnified.
4. Mature fruit, with the segments of the calyx cut off, magnified.
5. Side view of a detached carpel, more magnified.
6. Vertical section of the same, and of its seed and embryo.
7. The embryo detached entire, and more magnified.
8. The same, with the cordate cotyledons spread out flat.
9. *SIDALCEA CANDIDA*, Gray (Santa Fé, Fendler); — the staminal column magnified. (The twice-forked outer phalanges show that each arises from the repeated deduplication of one fundamental stamen.)
10. *SIDALCEA DELPHINIIFOLIA*, Gray (California, Hartweg); — staminal column and styles, magnified; the phalanges erect, as in the bud.
11. Fruit magnified (calyx cut away), half the carpels removed, to show the receptacle, and one divided vertically to show the seed.
12. One of the carpels bursting on the inner side.

PLATE 121, 122.

MALVASTRUM, Gray.

Involucellum nullum vel 1-3-phyllum. Stigmata terminalia, capitellata. Ovulum in loculis solitarium, peritropo-
adscendens. Fructus 5-20-coccus, carpellis muticis rostratis
ab axi secedentibus. Semen reniforme. Embryo
arcuatus vel annularis; radícula centripeto-infera.

MALVASTRUM, Gray, Pl. Fendl. in Mem. Amer. Acad. (n. ser.) 4. p. 21.

MALVÆ et SIDÆ Sp., Auct.

CALYX naked or furnished with an involucl of from one
to three subulate and deciduous bractlets, or sometimes with
a conspicuous three-leaved persistent involucl, five-cleft,
persistent; the segments valvate in æstivation. PETALS 5,
hypogynous, usually oblique or obliquely emarginate, convo-
lute in æstivation. STAMENS indefinite, monadelphous in a
simple column, the base of which is united with the claws
of the petals, hypogynous: FILAMENTS all arising from the
summit of the column: ANTHERS reniform, one-celled, open-
ing around the whole CONVEX side. OVARIES 5 to 20, united
in a circle around a central receptacle: STYLES as many as
the ovaries, united below; STIGMAS terminal, capitate. OVULE
solitary in each carpel, peritropous-ascending, amphitropous,
the micropyle inferior.

FRUIT a ring of coriaceous or crustaceous reniform one-
seeded carpels, which at length separate from each other and
from the central axis, and open by rupture on the inner edge,
or are indehiscent, or sometimes two-valved, pointless or ros-
trate, and sometimes bearing two tubercles or short spines on
the back. SEED reniform. EMBRYO curved into a semicircle
around a little soft albumen, or incompletely annular: COTY-
LEDONS broad and foliaceous, cordate, conduplicate-infolded:
RADICLE centripetal-inferior.

HERBS or low shrubby plants, with alternate stipulate leaves, and axillary or racemose, spicate or glomerate flowers. Corolla flame-colored, orange-colored, or yellow.

ETYMOLOGY. Name prolonged from *Malva*; given by De Candolle to his section of that genus which included the true Mallows as well as many which are referrible to the present genus, as constituted in *Plantæ Fendlerianæ*, l. c.

GEOGRAPHICAL DISTRIBUTION, &c. The genus comprises a considerable number of species, chiefly American, and indigenous to the warmer parts of the country, from the plains of Missouri to those of Paraguay and the Andes of Chili. It probably should also comprise the *Malvæ* δ *Capenses* of De Candolle; but it has no European representatives.

NOTE. The species have been variously referred, those with a small or caducous involucl, or none at all, to *Sida*, from which they differ in their ascending ovule and inferior radicle; those with a manifest involucl usually to *Malva*, from which their capitate stigmas at once distinguish them.

PLATE 121. *MALVASTRUM COCCINEUM*, *Gray*;—branch of a flowering plant raised from seeds brought from Missouri by *Mr. Sprague*.

1. Flower-bud, with the (caducous) 2-bracteolate involucl, enlarged.
2. Vertical section, more magnified, showing the ascending ovules, &c.
3. Summit of a style with its capitate stigma, more magnified.
4. Fruit with the calyx (from Fendler's Santa Fé specimens), enlarged.
5. Same, more magnified, with only one carpel left on the receptacle.
6. Seed, magnified.
7. Vertical section of a carpel, seed, and contained embryo, more magnified.
8. Embryo detached entire, magnified.

PLATE 122. *MALVASTRUM WRIGHTII*, *Gray*;—branch in flower, from Texas, *Wright*; of the natural size.

1. Some of the stellate pubescence of the leaves, magnified.
2. Flower-bud, with the persistent involucl, enlarged.
3. Vertical section through the flower, showing the ovules, &c., magnified.
4. An anther, more magnified.
5. Summit of a style and capitate stigma, more magnified.
6. Fruit and fructiferous calyx, of the natural size. (Carpels dehiscent.)
7. The same, with all but one carpel removed from the axis, magnified.
8. Vertical section of a carpel, seed, and embryo, magnified.
9. Seed entire, magnified.
10. Embryo extracted entire, magnified.
11. The same, with the cotyledons spread out.

PLATE 123.

SIDA, L., Kunth.

Involucellum nullum. Stigmata terminalia, capitellata. Ovulum in loculis solitarium, resupinato-pendulum! Fructus 5–15-coccus, calyce subinclusus; carpellis erectis, nudis, apice sæpe bivalvibus, ab axi tarde secedentibus. Semen subtrigonum. Embryo conduplicatus; radícula supera!

SIDA, Linn. Gen. 837, excl. spec. Kunth in H. B. K. Nov. Gen. & Sp. 5. p. 256, excl. spec. Adr. Juss. in St. Hil. Fl. Bras. 1. p. 173. Gray, Pl. Fendl. 1. c. p. 22.

MALVINDA, Medik. Malv. 23.

SIDÆ Sp., DC., Prodr. 1. p. 459. Torr. & Gray, Fl. N. Am. 1. p. 231.

CALYX naked (destitute of an involucl), or very rarely subtended by one or three bractlets, usually angled in the bud, five-cleft, the segments valvate in æstivation. PETALS 5, usually oblique, convolute in æstivation, hypogynous, deciduous. STAMENS numerous, monadelphous in a simple hypogynous column, the dilated base of which is united with the claws of the petals: FILAMENTS all arising from the summit of the column: ANTHERS reniform, one-celled, opening by a semicircular line, two-valved. OVARIES 5 to 15, united around a central receptacle: STYLES as many as the ovaries, united below: STIGMAS terminal, capitate. OVULE solitary in each carpel, borne on the inner angle near the summit of the cell, nearly anatropous, resupinate-pendulous, the raphe therefore dorsal or external, and the micropyle ascending next the axis.

FRUIT of 5 to 15 erect and straight or incurved one-seeded (beaked or beakless) carpels, which are more or less included in the persistent calyx, indehiscent or usually two-valved at the apex, and tardily separate at maturity from the central axis. SEED suspended, often somewhat trigonous, or with a sinus at the hilum which is directed to the summit

of the cell. ALBUMEN little, mucilaginous or fleshy. EMBRYO abruptly bent (the curvature inferior) so that the flexuose-biplicate foliaceous COTYLEDONS are incumbent on the RADICLE, which lies next the inner angle of the carpel and points to its apex!

HERBS, or sometimes shrubby plants, with usually undivided alternate leaves, narrow stipules, and axillary solitary or clustered flowers. Peduncles articulated. Petals yellow, white, or rarely purple.

ETYMOLOGY. An unexplained name, used by Theophrastus and the early botanists.

GEOGRAPHICAL DISTRIBUTION. Chiefly tropical or subtropical plants, the greater number American. Several species are indigenous in the Southern United States, especially in Texas; one or two of them occur as weeds in the Northern States, but were probably introduced from the South.

NOTE. In the *Planta Fendleriana* I have indicated three sections of the genus, but I have not at present the means of ascertaining whether they will embrace all the genuine species known.

PLATE 123. *SIDA SPINOSA*, Linn. ; — branch in flower, of the natural size.

1. Diagram of the æstivation of the sepals and petals, and section of the ovary (the cells of which are opposite the petals.)
2. A petal enlarged.
3. Vertical section of the flower, magnified, displaying the union of the base of the petals with the column of stamens, the resupinate-pendulous ovules, capitate stigmas, &c.
4. An anther, more magnified.
5. An ovule detached, more magnified.
6. Fruit with the persistent calyx, enlarged.
7. Back view of one of the carpels (dehiscent at the apex).
8. Vertical section of the same, and of the suspended seed.
9. Seed entire, magnified.
10. Embryo detached entire, magnified.

PLATE 124.

ANODA, Cav.

Calyx in fructu patentissimus. Capsula polycocca, superne depresso-plana, stellariformis; carpellis radiantibus parietibus demum oblitteratis apertis. Cætera fere Sidæ.

ANODA, Cav. Diss. 1. p. 38. t. 10, 11, & Ic. 5. t. 431. Kunth, l. c. p. 265.
DC. Prodr. 1. p. 458. Schlecht. in Linnæa, 11. p. 205. Endl.
Gen. 5287.

CALYX naked (destitute of an involucl), deeply five-cleft; the segments valvate in æstivation. PETALS 5, obovate, convolute in æstivation, hypogynous. STAMENS numerous, monadelphous in a simple hypogynous column, the dilated base of which is united with the claws of the petals: FILAMENTS all arising from the summit of the column: ANTHERS reniform, one-celled, two-valved. OVARIES numerous (10 to 20), closely united in a depressed ring around a central receptacle: STYLES as many, united below: STIGMAS terminal, capitate. OVULE solitary in each carpel, resupinate-pendulous from the summit of the inner angle of the cell, almost anatropous; the raphe therefore dorsal and superior; the micropyle centripetal-superior.

FRUIT of 10 to 20 closely combined radiate-spreading carpels, subtended by the spreading persistent calyx, orbicular, strongly depressed (the upper surface flat, the lower convex); the carpels usually beaked on the back, indehiscent, the whole interior parietes or dissepiments obliterated, the remainder at maturity falling away from the dilated receptacle in the form of a kind of replum. SEED nearly horizontal, the raphe or hilum superior; the testa crustaceous. EMBRYO inflexed or incurved in sparing albumen: COTYLEDONS foliaceous, cordate, replicate-inkfolded: RADICLE centripetal-superior.

HERBS usually hirsute, with alternate angulate or hastate-lobed leaves on slender petioles, subulate stipules, and solitary axillary peduncles bearing single flowers. Corolla violet, white, or yellow.

ETYMOLOGY. The origin and application of the name are not explained by Cavanilles. It has been thought to come from *ávodos*, *impassable*, *impervious*; the application of which is not apparent. But Schlechtendal (in *Linnaea*, 11, p. 205) has directed attention to the true source of the name, which is mentioned by Burmann (*Thesaur. Zeyl.* p. 1) as the Ceylonese generic appellation of *Abutilon* and some other allied plants.

GEOGRAPHICAL DISTRIBUTION. A genus of six or seven known species, all natives of Mexico. One of them was also found growing spontaneously around Lima, by Dombey; and it has recently been gathered by Dr. Riddell in Texas, where it is doubtless indigenous. *A. cristata*, *Schlecht.* (*A. triloba* and *A. Dilleniana*, *Cav.*) has long been in cultivation.

NOTE. *Anoda* is a tolerably well-marked genus, differing from *Sida* in the depressed stellate fruit, from *Abutilon* in the solitary ovules, and from both in the obliteration of the dissepiments of the originally many-celled capsular fruit, the firmer exterior part of each carpel at length falling away from the axis like a kind of replum, usually carrying the seed with it. — The column is slightly five-lobed at the summit, (the lobes opposite the petals, in the normal mode of *Malvaceæ*.) and the styles also show a tendency to form five parcels, which are deflexed between the divisions of the stamens. — The species are not yet well distinguished.

PLATE 124. *ANODA HASTATA*, *Cav.*, *Schlecht.*;—from an incomplete specimen gathered in Texas by Riddell, combined with a cultivated specimen in flower and fruit.

1. Vertical section of the column, pistil, &c., magnified.
2. Transverse section of the compound ovary, magnified.
3. Enlarged transverse section through the receptacle in fruit, with the remaining part of one carpel, or valve, and its seed, in place; the dissepiments or sides of the carpels being entirely obliterated.
4. A similar valve and seed from the opposite side, equally enlarged.
5. A similar valve, detached.
6. Vertical section of a seed and embryo, magnified.
7. Embryo entire (brought into a vertical position), magnified.

PLATE 125, 126.

ABUTILON, Tourn., Gærtn.

Involucellum nullum. Stigmata capitellata. Ovula in loculis 3, raro 4–9, omnia seu inferiora patula vel resupinato-pendula. Fructus 5–polycoccus; carpellis unilocellatis subbivalvibus, ab axi vix secedentibus. Radicula adscendens vel centripeta. — Folia cordata.

ABUTILON, Tourn. Dill. Elth. (excl. spec.). Gærtn. Fr. 2. p. 251. t. 135.
 Kunth in H. B. K. Nov. Gen. & Sp. 5. p. 270. t. 474. Adr.
 Juss. in St. Hil. Fl. Bras. 1. p. 196. t. 40–42. Torr. & Gray,
 Fl. 1. p. 230. Endl. Gen. 5292.

SIDÆ Sp., Linn., Cav., L'Her., DC.

BASTARDIE Sp., Adr. Juss. Endl. l. c.

Indian Mallow. Velvet-leaf.

CALYX naked (destitute of an involucl), five-cleft, persistent; the segments valvate in æstivation. PETALS 5, obovate, often retuse, convolute in æstivation, hypogynous, their claws coherent with the base of the staminal column, at length deciduous. STAMENS indefinite, monadelphous in a simple column, the dilated hypogynous base of which is united with the claws of the petals: FILAMENTS usually all arising from the summit of the column: ANTHERS reniform, one-celled, opening by a semicircular line around the convex side, two-valved: POLLEN (as in the whole order) globose, hispid. OVARIES 5 to 20 or more, closely united in a circle around a central receptacle, not divided by any false partition or internal process: STYLES of the same number as the ovaries, united below: STIGMAS terminal, capitate. OVULES from 3 (or rarely fewer?) to 9 in each carpel, affixed to its inner angle above or about the middle, amphitropous or almost anatropous; the uppermost ascending or patulous, the lower more or less resupinate-pendulous (as in Sida).

FRUIT a whorl of 5 to 20 or more united follicular carpels, which scarcely separate from each other or from the central axis at maturity, usually invested below by the persistent calyx, their summits often radiate-spreading, rostrate or pointless, coriaceous or membranaceous, dehiscent by the ventral suture at the apex, and frequently also by the dorsal suture, each three–six-seeded, or by abortion one–two-seeded, the cell destitute of any internal process or partition. SEEDS round-reniform or subclavate-reniform, the lower resupinate-pendulous, the upper often horizontal, or, when there are several, ascending, the umbilical sinus superior or dorsal: testa crustaceous, smooth, or minutely hairy. EMBRYO incurved, in sparing fleshy albumen: COTYLEDONS very broad, foliaceous, cordate, biplicate and infolded, partly inclosing the RADICLE, which is centripetal or in the lower seeds centripetal-superior.

HERBS, or sometimes shrubs, or even trees in the tropics, often tomentose or velvety with a fine stellate pubescence. Leaves alternate, palmately veined, almost always cordate, serrate or entire, rarely lobed. Stipules free, deciduous. Peduncles axillary, solitary or several, one–several-flowered, articulated below the apex, sometimes paniculate by the reduction of the upper leaves of the branches to bracts. Corolla yellow or orange.

ETYMOLOGY. The name is of unknown origin or meaning, probably Oriental: it appears to have been introduced by Dodoneus and Bauhin. The genus has commonly been united to *Sida*.

GEOGRAPHICAL DISTRIBUTION. A genus of numerous species, which belong chiefly to the tropical regions of the Old and the New World. Three or four species are indigenous to the southern borders of the United States, namely, in Florida and Texas; and one (the common *Indian Mallow* or *Velvet-leaf*), a native of India, has escaped from gardens and become sparingly naturalized around dwellings and by the road-side in the Northern States.

PROPERTIES. These plants possess the demulcent qualities of the whole family; and in India and Brazil some species are employed in popular medicine the same way as is the officinal Marsh Mallow in Europe.

NOTE. The carpels, when only five in number, are opposite the sepals, at least in the species here figured (Plate 125); while in *Sida spinosa*, and I believe in other species, they are situated opposite the petals. — When the ovules are only three in number they are either placed one above the other, as in *A. Avicennæ*, or, more commonly, the two upper are collateral, as shown in Plate 125, Fig. 1 and Fig. 5. From this species and its allies, *Wissadula*, *Medik.*, appears to differ only in having a partition across the cell above the lower seed.*—I do not possess sufficient materials for properly characterizing the sections into which the genus *Abutilon* is to be divided. The type of one of them (*Gayoides*), with vesicular mucous fruit, is *Sida crispa*, *Linn.*, which, having three ovules (and usually two seeds) in each carpel (Plate 126), cannot be a species of *Bastardia*, to which genus *Adrien de Jussieu* referred it.† To the same group, on account of its entirely similar aspect and structure, excepting the one-seeded carpels, I should refer the *Bastardia nemoralis*, *Adr. Juss.*,‡ and thus restrict the latter genus to the original species with a suspended seed (the section *Abutiloides*, *Endl.*). *Abutilon trichopodium*, *Ach. Rich.*,§ which is also a native of Key West, is very closely allied to *A. crispum*, but appears to be distinct.

PLATE 125. *ABUTILON VELUTINUM*, *n. sp.*; — a branch of the natural size, in flower and ripe fruit; from Texan specimens, wild and cultivated.

1. Transverse section of a flower-bud (to show the æstivation), and of the ovary, magnified. The section passes through the upper part of the ovary, so as to exhibit the pair of collateral ovules which occupy the upper portion of each cell.
2. Magnified vertical section of a flower, showing the ovules in their natural position. (One of each upper pair is concealed by its fellow.)
3. A detached ovule more highly magnified.
4. Enlarged vertical section through the dehiscent fruit and the investing calyx, dividing one of the five carpels so as to exhibit two of the seeds in place.
5. Vertical section through the back of one of the carpels and the three seeds it contains, to show their position, viz. two of them collateral in the upper and broader part of the cell.

* I have seen no representative of this genus. I have, indeed, a flowering specimen of *Sida periplocifolia*, *β. Caribæa*, *DC.*, from Key West, which *Ach. Richard* (who does not describe the internal structure of the fruit), in the *Botany of La Sagra's* work on Cuba, holds, I suppose incorrectly, to be identical with the Oriental *S. periplocifolia*, *Linn.*; but the ovary exhibits no trace of transverse partitions; so that the Caribbean species is a true *Abutilon*.

† In *St. Hilaire, Fl. Bras. Merid.* 1. p. 194.

‡ *Op. cit.* p. 195, t. 39.

§ In *La Sagra, Hist. Cub.*, part. *Bot. Pl. Vasc.* p. 155, t. 17.

6. Vertical section through a seed and embryo, magnified.
7. Transverse section of the same, showing how the cotyledons are folded.
8. Embryo detached entire and magnified.

PLATE 126. *ABUTILON (GAYOIDES) CRISPUM*, *Don*; — branch from a Texan specimen, in flower and fruit; of the natural size.

1. Vertical section of a flower, magnified; showing the three ovules in each cell.
2. An ovule detached, more highly magnified.
3. Vertical section of the fruit, enlarged; one carpel showing two seeds.
4. A seed more magnified.
5. Vertical section of the same, displaying the embryo.
6. Embryo detached and more magnified.
7. The same, with the cotyledons spread out.

PLATE 127.

SPHÆRALCEA, *St. Hil.*

Involucellum 2–3-phyllum, setaceum, sæpe deciduum. Stiginata capitellata. Ovula in loculis 2–3. Fructus subglobosus polycoccus; carpellis unilocellatis, 3–1-spermis, superne 2-valvibus, tardius inter se solubilibus et ab axi secedentibus. Embryo arcuatus. Radicula infera, vel sem. superioris centripeto-supera.

SPHÆRALCEA, *St. Hil. & Adr. Juss.* in *Pl. Us. Bras.* t. 52, & *Fl. Bras.*

1. p. 209. *Torr. & Gray, Fl. 1.* p. 228. *Endl. Gen.* 5272.

PHYMSIA, *Desv.* in *Hamilt. Prodr. Fl. Ind. Occ.* p. 43, ex *Endl.*

MALVÆ Sect. SPHÆROMA, *DC. Prodr. 1.* p. 435.

SPHÆROMA, *Schlecht.* in *Linnæa*, 11. p. 352.

CALYX involucellate with two or three usually deciduous subulate or setaceous bracts, five-cleft, persistent; the segments valvate in æstivation. PETALS 5, obovate or obovate, often oblique, convolute in æstivation, hypogynous, their claws united with the base of the staminal column. STAMENS indefinite, monadelphous in a simple hypogynous column: FILAMENTS all arising from its summit: ANTHERS reniform. OVARIES 15 to 20, closely united in a ring around a central receptacle, destitute of any internal process or partition: STYLES 15 to 20, united below: STIGMAS capitate. OVULES 2 or 3 in each carpel, peritropous; the upper one ascending, the lower descending.

FRUIT of 15 to 20 compressed carpels, united in a globular ring, truncate at the summit; the carpels compressed, straight, excised at the insertion, often pointed, membranaceous or coriaceous, two-valved at the summit and frequently splitting down the whole length of the dorsal suture, tardily separating from each other and from the central receptacle. SEEDS 2, 3, or by abortion solitary in each car-

pel, reniform, peritropous. EMBRYO semicircular-incurved in fleshy albumen: COTYLEDONS foliaceous, cordate, plaited in the middle and infolded: RADICLE centripetal-inferior, or in the upper seed centripetal-superior.

HERBS or shrubs, mostly hoary with a stellate pubescence, with alternate and usually lobed or toothed leaves, and axillary flowers. Stipules subulate, deciduous. Corolla vermilion, flesh-colored, or violet.

ETYMOLOGY. Name compounded of *σφαῖρα*, a *sphere*, and *Alcea*, an ancient name of Mallow, in allusion to the spherical fruit.

GEOGRAPHICAL DISTRIBUTION. Natives of the warmer temperate and subtropical regions of America, in both hemispheres; the greater part Mexican. One species extends north to the Arkansas River; another is found farther north in Oregon. None of them are yet known to occur within the geographical limits of this work; but they may be expected in Western Texas.

PLATE 127. *SPHERALCEA MINIATA*; — summit of a branch from Fendler's Santa Fé collection; of the natural size.

1. Diagram of the æstivation of the calyx and corolla.
2. Vertical section of a flower, magnified.
3. Fruit, with the persistent calyx.
4. The same, with the calyx spread open and all but one carpel removed.
5. Vertical section of a carpel and its two seeds, more magnified.
6. Seed detached, more magnified.
7. Vertical section of the same and of the embryo.
8. Embryo detached entire, and still more magnified.

PLATE 128.

MODIOLA, *Mœnch.*

Involucellum 3-phyllum persistens. Stamina 10–20. Stigmata terminalia introrsum subcapitata. Fructus poly-coccus; carpellis reniformibus, dorso cuspidatis, apice 2-valvibus, ab axi secedentibus, intus processu septiformi transverse divisus, locellis monospermis. Radicula centripeto-infera. — *Herbæ humifusæ.*

MODIOLA, *Mœnch.* *Meth.* p. 620. *Adr. Juss. in St. Hil. Fl. Bras. I.* p. 210. t. 43. *Torr. & Gray, Fl. N. Am. I.* p. 228.

MALVÆ *Sect. MODIOLA, DC. Prodr. I.* p. 435.

CALYX involucellate with three foliaceous and persistent bracts, five-parted, persistent; the segments valvate in æstivation. PETALS 5, obovate, convolute in æstivation, their claws united with the base of the staminal column. STAMENS 10 to 20, monadelphous nearly to the summit in an urceolate column; the short FILAMENTS in a single series, when only ten in number united in pairs so as to form five forked phalanges, when more numerous with separate filaments interposed: ANTHERS reniform, or somewhat didymous and at first two-celled. OVARIES 14 to 20, united in a ring around a central receptacle, each divided in the middle by a kind of transverse partition, the chambers each one-ovuled: STYLES united below, subclavate: STIGMAS terminal but introrse, oblong-capitate. OVULES 2 in each carpel, amphitropous, peritropous, the micropyle of both inferior.

FRUIT a depressed ring of rather coriaceous carpels, which at maturity separate from each other and from the dilated central receptacle; each strongly reniform, cuspidate on the back, two-valved at the top, two-seeded, the seeds separated by the valve-like process which forms a transverse partition, or the upper seed sometimes abortive. SEEDS reniform.

EMBRYO in fleshy albumen, arcuate: COTYLEDONS foliaceous, cordate, plaited together and infolded: RADICLE centripetal-inferior, or in the lower seed, from the strong incurvature of the base of the carpel, more or less ascending.

HERBS, usually procumbent and spreading or creeping, hirsute with simple hairs, with alternate palmately-lobed and incisely-toothed leaves, somewhat adnate stipules, and small purplish flowers on solitary and simple axillary peduncles, which are articulated near the apex.

ETYMOLOGY. From *modiolus*, a little measure, alluding to the shape of the fruit.

GEOGRAPHICAL DISTRIBUTION. A genus of a few humble weeds, belonging to the warmer parts of Eastern America, from Virginia to Buenos Ayres.

NOTE. The union of the short filaments in phalanges, as described and figured in A. St. Hilaire's *Flora Brasiliensis*, is barely observable in *M. Caroliniana* (*M. multifida*, *Mærch*). The radicle is inferior in both seeds.

PLATE 128. *MODIOLA CAROLINIANA*; — branch, of the natural size, from a plant raised in the Botanical Garden, Cambridge, from seeds sent from Florida.

1. Diagram of the æstivation.
2. Vertical section of a flower, magnified, laying open one ovary.
3. An anther, more magnified (plainly formed of two confluent cells).
4. A detached pistil more magnified, the ovary vertically divided.
5. Fruit and receptacle vertically divided, magnified; one of the carpels and its seeds divided, showing the embryos in place, the transverse partition, &c.
6. A seed more magnified.
7. Section of the same across the cotyledons and the radicle.
8. Embryo detached entire, magnified; the cotyledons somewhat infolded.

PLATE 129.

MALACHRA, L.

Flores in capitulum pedunculatum pluriflorum, involuero 3-pleiophyllo cinctum, dispositi. Involucellum proprium nullum. Cætera fere Pavoniæ. — Herbæ pilis pungentibus hispidæ.

MALACHRA, Linn. Gen. 1266. Jacq. Ic. Rar. t. 548, 549. Cav. Diss. 2. t. 33. f. 2 (excl. reliq.). DC. Prodr. 1. p. 441. excl. spec. 3, 5, 10, & 14. Adr. Juss. in St. Hil. Fl. Bras. 1. p. 216. Endl. Gen. 5291. Ach. Rich. Fl. Cub. 1. p. 117.

CALYX not involucellate, five-cleft, persistent; the segments three-nerved, valvate in æstivation. PETALS obovate, oblique, convolute in æstivation, hypogynous, their claws united with the base of the staminal column. STAMENS definite (about 20), monadelphous in a simple hypogynous column, which is shorter than the corolla and naked, often five-toothed, at the apex: FILAMENTS short, all emitted singly from just below the apex of the column: ANTHERS reniform, one-celled. OVARIES 5, situated opposite the petals, more or less united in a ring around a central axis: STYLES united into one, which is ten-cleft at the summit: STIGMAS 10, capitate. OVULE solitary in each carpel, peritropous-ascending from the inner angle near the base of the cell; the micropyle inferior.

FRUIT pentacocous; the achenia-like one-seeded carpels obovate-wedge-shaped, very obtuse and pointless, falling away separately from a slender axis, dehiscent at the base or along the ventral suture from below upwards. SEED conformed to the cell, obovate-triangular, erect, slightly excised at the hilum; the testa crustaceous. EMBRYO large, somewhat incurved in the scanty albumen: COTYLEDONS broad and foliaceous, cordate, plicate in the middle and chrysaloid-infolded: RADICLE inferior.

HERBS, or rarely somewhat shrubby plants, growing in wet places, hispid with sharp bristly hairs, and the stems usually marked with tomentose-pubescent lines. Leaves long-petioled, rounded, usually palmately lobed. Stipules free. Peduncles axillary, terminated by a head of five or more sessile flowers, which are inclosed by an involucre of three or more cordate floral leaves. The head frequently exhibits several setaceous bracts, some of which consist of the stipules of the involucral leaves; but there is no involucre at the base of the calyx. Corolla yellow, or white with a tinge of red.

ETYMOLOGY. From *μαλάχη*, an ancient name of some Malvaceous plant, probably the Hollyhock, so called on account of its emollient properties.

GEOGRAPHICAL DISTRIBUTION. A genus of a few chiefly tropical plants, both of the Old and the New World. The sole representative in the United States has recently been detected in Texas by Mr. Charles Wright.

PLATE 129. *MALACHRA MEXICANA*, *Schrader?* — a portion of a stem with a leaf, peduncle, &c., of the natural size; from a specimen cultivated in the Cambridge Botanic Garden from seeds of the Texan plant.

1. One of the three leaves of the involucre, of the natural size.
2. Diagram of the six-flowered capitulum. The smallest figures are sections of the stipular bractlets.
3. Vertical section of the column, ovary, &c., magnified.
4. The pistil magnified, with the 5-celled ovary cut across.
5. The 5-coecous fruit, in the calyx, magnified.
6. The same, vertically divided; two carpels taken away.
7. One of the separated carpels, equally magnified.
8. Vertical section of the same, and of its seed and embryo.
9. A seed detached entire, magnified.
10. The embryo detached entire, magnified.

PLATE 130.

PAVONIA, *Cav.*

Involucellum 5–15-phyllum, persistens. Stamina sæpius indefinita. Stigmata 10, capitata. Fructus 5-coccus; carpellis acheniiformibus monospermis, fere discretis (nudis vel apice 3-aristatis). Radicula infera. — Pedunculi uniflori.

PAVONIA, Cav. Diss. 3. p. 132. t. 45–49. Lam. Ill. t. 585. Adr. Juss. in St. Hil. Fl. Bras. 1. p. 220. t. 44–47. Endl. Gen. 5275.

PAVONIA, LOPIMIA, LEBRETONIA, GOETHEA, etc., Nees & Mart., DC.

MALACHE, Trew, Ehret. t. 50.

THORNTONIA, Reichenb. Consp. p. 202.

CALYX persistent, involucellate with from five to fifteen persistent bracts, five-cleft; the segments valvate in æstivation. PETALS obovate, convolute in æstivation, spreading; or sometimes convolute-connivent, the claws united with the base of the staminal column. STAMENS numerous, rarely few or definite, monadelphous in a simple column, which is shorter or a little longer than the corolla, and naked and five-toothed at the apex; the FILAMENTS arising from towards its summit or from nearly the whole length of the column: ANTHERS reniform. OVARIES 5, situated opposite the petals, more or less united in a five-lobed ring around a small central axis: STYLES united into one, which is ten-cleft at the summit: STIGMAS terminal, capitate, minutely hispid. OVULE solitary in each carpel, peritropous-ascending from the inner angle towards the base of the cell; the micropyle inferior.

FRUIT pentacoccous; the acheniiform carpels united barely at the base and obovate or rounded, or rarely by contiguous plane faces, dry, crustaceous or coriaceous, naked or sometimes armed at the apex with three retrorsely hispid awns, separating at maturity, indehiscent, or somewhat two-valved. SEED solitary, ascending, conformed to the cell, obovate-

reniform, acute at the base. ALBUMEN little or none. EMBRYO incurved: COTYLEDONS foliaceous, cordate, plicate in the middle and chrysaloid-infolded: RADICLE inferior.

SHRUBS, or rarely herbaceous plants, with alternate and petioled stipulate leaves, and usually solitary flowers on axillary peduncles. Corolla yellow, white, rose-color, or red.

ETYMOLOGY. Dedicated to *Joseph Pavon*, a Spanish botanist who accompanied Dombey and Ruiz to South America, and became one of the authors of the *Flora Peruviana*.

GEOGRAPHICAL DISTRIBUTION. A genus of a considerable number of species, mostly with handsome flowers, nearly restricted to tropical America and India. Two Mexican species extend into Texas; and another, the *Malva Le Contei* of Buckley (in *Sill. Jour.* 45, p. 176), resembling the Brazilian *P. hastata*, *Cav.*, was found by Major Le Conte in Georgia.

NOTE. *Pavonia*, as left by *Adr. Jussieu*, who has best characterized it, exhibits a series of forms which too closely connect it with *Urena* on the one hand, and with *Malvaviscus* on the other. The typical state of the genus is well represented by our figure. The *Pavonia Urenoidea* of *Jussieu* (§ *Typhalea*, *DC.*) have the cocci tipped with three retrorsely barbed awns; while *Urena* has them hispid or eelinate all over the back with glochidate bristles, has fewer anthers usually on very short filaments, and a five-cleft involucl. But *P. Le Contei*, *Torr. & Gray, ined.*, with naked carpels has also (judging from flowers which are not in good condition) very few and sessile anthers, and the five leaflets of the involucl are a little united. *P. Drummondii*, *Torr. & Gray, Fl.*, on the other hand, having convolutely connivent (scarlet) petals, and a filiform exserted and soon spirally twisted column, to which may be added a fruit which is at first fleshy, although separable into five cocci, belongs to the *P. Malvariscoidea* of *Jussieu* (*Malvaviscus*? § *Anotea*, *DC.*, but the petals are auriculate). This group should probably be restored to *Malvaviscus*, or form a distinct genus.

PLATE 130. *PAVONIA WRIGHTII*, *n. sp.*; — a branch in flower and fruit, of the natural size, from a plant raised in the Botanic Garden from seeds sent from Texas by *Mr. Charles Wright*.

1. Diagram of the æstivation, position, &c. of the parts of the flower.
2. Vertical section of the flower, magnified.
3. The five ovaries, with the base of the compound style, magnified.
4. Fruit, with the calyx and involucl, enlarged.
5. A separate carpel, seen laterally, more magnified.
6. Vertical section of the same, and of the contained seed and embryo.
7. Magnified embryo; and 8. the same with the cotyledons spread out.

PLATE 131.

MALVAVISCUS, *Dill.*

Involucellum 7–12-phyllum. Petala inæquilatera basi hinc lobulo aucta, erecta, in tubum convoluta. Tubus stamineus filiformis longe exsertus. Stigmata 10, capitata. Fructus baccatus 5-ocularis, oculis monospermis. Radicula infera.

MALVAVISCUS, *Dill.* *Elth.* p. 210. t. 170. *Cav. Diss.* 3. p. 131. t. 48. *Kunth in H. B. K. Nov. Gen.* 5. p. 283. *DC. Prodr.* 1. p. 445 (excl. sect. 2?). *Endl. Gen.* 5278. *A. Rich. Fl. Cub.* 1. p. 131. t. 14.

ACHANIA, *Swartz, Fl. Ind. Occ.* 2. p. 1222.

CALYX subtended by an involucl of seven to twelve linear persistent bracts, five-cleft, persistent; the segments valvate in æstivation. PETALS 5, inequilateral, auriculate by a small lobe towards the base on one side, hypogynous, strongly convolute in æstivation, not expanding, but remaining erect and spirally convolute into a sort of tube, the claws united with the base of the stamineal column. STAMENS indefinite, monadelphous; the column long and filiform, much exserted, becoming spirally twisted, its naked apex five-toothed: FILAMENTS short, emitted in several series from the upper part of the tube: ANTHERS oblong or reniform, opening round the convex side. OVARIES combined into a five-celled globular compound ovary; the cells opposite the sepals: STYLES united into one, which is ten-cleft at the apex: STIGMAS 10, terminal, capitate or truncate, minutely hispid. OVULE solitary from the inner angle of each cell, amphitropous, peritropous, the micropyle inferior.

FRUIT baccate, depressed-globose, usually five-grooved, five-celled; the cells one-seeded. SEED ascending, obovate. "EMBRYO arcuate in very sparing mucilaginous albumen:

COTYLEDONS foliaceous, plaited and infolded: RADICLE inferior."

SHRUBS, with alternate stipulate usually rounded and obscurely lobed leaves, and axillary peduncles bearing single showy flowers. Corolla usually blood-red or scarlet.

ETYMOLOGY. Name compounded of *Malva*, mallow, and *viscus*, bird-lime, or something glutinous, from the mucilaginous or pulpy character of the fruit.

GEOGRAPHICAL DISTRIBUTION. Natives of Tropical America, one species growing in the warmer part of Texas. *M. Floridanus*, *Nutt.*, is, I believe, an *Hibiscus*.

NOTE. None of the indigenous specimens of *M. Drummondii* I have examined show the fruit, nor has it yet been produced upon the specimens in cultivation in the Botanic Garden, where the plant flowers freely through the summer.

PLATE 131. *MALVAVISCUS DRUMMONDII*, *Torr. & Gray*;—branch in flower, of the natural size, from a plant raised from Texan seeds.

1. Diagram of the æstivation and position of the parts of the flower, with a magnified cross-section of the ovary.
2. Section of the convolute corolla in flower.
3. A petal detached, of the natural size.
4. An anther, magnified.
5. Flower vertically divided through the column, the ovary, &c., enlarged.
6. Ovule detached and more magnified.
7. Summit of the staminal column, showing the naked five-toothed apex.
8. Fructified ovary, with the calyx and involucre, of the natural size.
9. An immature seed, enlarged.

PLATE 132.

KOSTELETZKYA, *Presl.*

Ovarii loculi uniovulati. Capsula depressa 5-sperma. Cætera fere Hibisci.

KOSTELETZKYA, Presl, Rel. Hænk. 2. p. 130. t. 70. Endl. Gen. 5276.

HIBISCI Sect. PENTASPERMUM, DC. Prodr. 1. p. 447 (excl. spec.). Torr. & Gray, Fl. N. Am. 1. p. 236.

CALYX involuclate with from seven to ten subulate or setaceous persistent bracts, five-cleft; the segments valvate in æstivation. PETALS 5, convolute in æstivation, obovate, spreading, hypogynous, their claws united with the base of the staminal column. STAMENS indefinite, monadelphous; the column slender, its naked apex five-toothed: FILAMENTS short, emitted from nearly the whole length of the upper half or more: ANTHERS reniform, one-celled, two-valved. OVARIES 5, combined into a five-celled compound ovary; the cells opposite the sepals: STYLES united into one nearly to the summit, there five-cleft: STIGMAS depressed-capitate. OVULE solitary and ascending from near the base of the inner angle of each cell, nearly anatropous, the micropyle inferior.

FRUIT a depressed-orbicular CAPSULE, more or less five-angled, coriaceous, five-celled, five-seeded, loculicidally five-valved; the valves alternate with the persistent sepals, bearing the dissepiment on their middle, leaving only a short central axis. SEED ascending, somewhat reniform; the crustaceous testa smooth. EMBRYO arcuate in sparing albumen: COTYLEDONS foliaceous, cordate, plaited and chrysaloid-infolded: RADICLE inferior.

HERBS, sometimes suffruticose, with the alternate petioled leaves hastate, sagittate, or the lower cordate, sometimes lobed. Stipules setaceous, deciduous. Peduncles axillary.

solitary, one-flowered, often racemose or paniculate at the summit of the branches from the reduction of the leaves to bracts, articulated below the apex. Flowers rose-color, purple, or yellowish, not very large.

ETYMOLOGY. Dedicated, I suppose, to a Bohemian botanist, *Kosteletzky*.

GEOGRAPHICAL DISTRIBUTION. The genus consists of several chiefly American, tropical or subtropical species, the greater number Mexican. One species only, *K. Virginica* (*Hibiscus Virginicus*, *Linn.*), is known in the United States, which is common on the coast from Virginia southward, and is sparingly found as far north as Long Island.

PLATE 132. *KOSTELETZKYA VIRGINICA*, *Presl*;— a branch in flower and fruit, of the natural size.

1. Diagram of the position and æstivation of the envelopes of the flower, (with a magnified transverse section of the ovary).
2. Vertical section through the column, ovary, receptacle, &c., magnified.
3. An anther, more magnified.
4. Capsule, dehiscent, with the calyx, &c., enlarged.
5. One of the valves of the same, seen from within.
6. A seed, more magnified.
7. Embryo detached entire, still more magnified.

PLATE 133.

HIBISCUS, *L.*

Involucellum polyphyllum. Ovarium 5-loculare, loculis pluriovulatis: stigmata 5, capitata. Capsula 5-loculare, calyce (non longitudinaliter fisso) stipata, loculicide 5-valvis; loculis oligo-polyspermis.

HIBISCUS, Linn. Gen. 846 (excl. spec.). Gærtn. Fr. 2. p. 250. t. 134. DC. Prodr. 1. p. 446 (excl. sect. plur.). Adr. Juss. in St. Hil. Fl. Bras. 1. p. 242. Endl. Gen. 5277.

KETMIA, Tourn., Adans.

Rose-Mallow.

CALYX involucellate with numerous (usually ten or more) subulate or filiform persistent bracts, five-cleft, not spathaceous and deciduous after flowering; the segments valvate in æstivation. PETALS 5, obovate, usually spreading, convolute in æstivation, the claws united with the dilated base of the staminal column. STAMENS indefinite, monadelphous; the column usually elongated or filiform, five-toothed at the naked apex, hypogynous; the FILAMENTS emitted from the greater part of its length: ANTHERS reniform, two-valved. OVARIES 5, combined into a five-celled compound ovary, the cells opposite the sepals: STYLES united into one nearly to the apex, there five-cleft: STIGMAS 5, depressed-capitate (rarely connate), commonly hispid. OVULES several or numerous from the inner angle of each cell, horizontal or ascending, anatropous or nearly so.

FRUIT a five-celled CAPSULE, stipate by or included in the persistent calyx, loculicidally five-valved; the valves alternate with the sepals, bearing the dissepiments on their middle, leaving no, or scarcely any, central axis. SEEDS numerous, or by abortion few in each cell, horizontal, or when few ascending, obovate or globular; the testa crustaceous, smooth,

squamulose, or hairy. EMBRYO arcuate in mucilaginous or fleshy albumen: COTYLEDONS foliaceous, cordate, plaited and chrysaloid-infolded: RADICLE centripetal or inferior.

HERBS, or often shrubs or trees, with alternate lobed or undivided leaves, and axillary peduncles which are usually articulated towards the apex and bear single large and showy flowers. Stipules often deciduous.

ETYMOLOGY. *Ἴβίσκος*, an ancient name of the Marsh Mallow, applied by Linnæus to an allied genus.

GEOGRAPHICAL DISTRIBUTION. A genus of a considerable number of species, the greater part tropical or subtropical. Eight or ten species are indigenous to the warmer regions of the United States; one of which extends north along the coast to New England, and another to Ohio and Pennsylvania.

PROPERTIES, &c. Several are highly ornamental in cultivation. All have the tough bark and the mucilaginous qualities of the order.

NOTE. The *Okra* (*H. esculentus*, *Linn.*), so well known as a demulcent and for its culinary uses, and *H. Manihot*, *Linn.*, belong to the genus *ABELMOSCHUS*, *Medik.*, characterized by its tubular spathaceous calyx, which splits down one side and is, with the involucrel, deciduous. Of this no indigenous representatives are known in the United States, except *Hibiscus Collinsianus*, *Nutt.* (if that be distinct from *A. esculentus*), of which I have no specimen for illustration.

PLATE 133. *HIBISCUS MOSCHEUTOS*, *Linn.*; — a flower and floral leaf, of the natural size (the bases of the peduncle and petiole united).

1. Diagram of the æstivation of the floral envelopes.
2. Flower, with the column, ovary, &c., vertically divided, enlarged.
3. An anther, magnified.
4. An ovule, more magnified.
5. Transverse section of an ovary, magnified.
6. Dehiscent capsule and calyx, of the natural size.
7. A seed, enlarged.
8. Transverse section of the same. (The cotyledons should have been shown plaited on the back.)
9. Embryo detached entire, more magnified.

ORD. BYTTNERIACEÆ.

Arbores, frutices, rariusve herbæ; æstivatione corollæ inderdum valvari; staminibus definitis, iisdem sepalis antepositis sæpissime sterilibus vel abortivis; *antheris bilocularibus, loculis parallelis*; granulis pollinis lævibus; ovario e carpellis 3–5 conjunctis composito 3–5-loculari, rariusve simplici. — Cætera fere Malvacearum.

BYTTNERIACEÆ, R. BROWN in Flinders, Voy. 2. p. 540. DC. Prodr. 1. p. 481, excl. § 1. Endl. Gen. p. 995. Lindl. Veg. Kingd. p. 363.

MALVACEÆ Tr. BÜTTNERIÆ, St. Hil. Fl. Bras.

BÜTTNERIACEÆ, HERMANNIACEÆ, & DOMBEYACEÆ, Bartl.

THE BYTTNERIACEÆ constitute one of the tropical families which have been separated from the Malvaceæ of Jussieu, but which manifestly belong to the same natural group with the proper Mallow Family. From the latter this order is at once distinguishable by its two-celled anthers, the cells of which are distinct and parallel, its smooth pollen, and usually few fertile stamens. The carpels are also uniformly few in number and perfectly consolidated into a compound pistil, or in some cases reduced to one simple pistil. From the Sterculiaceæ, taken collectively, no absolute character has been indicated to distinguish them. Dr. Lindley, indeed, in his recent work cited above, through some mistake, states that the anthers of Byttneriaceæ are turned inwards, and rests his diagnosis upon this character; but the anthers are plainly extrorse in the greater part, if not in all, of the plants of the family.

The exterior stamens, which constitute the fertile series when there is only one, are situated opposite the petals and are usually coherent with their base, just as in Malvaceæ. Each single stamen of *Melochia* (Plate 131), therefore, is plainly equivalent to one of the five fascicles of which the Malvaceous column, when examined in an early stage, is seen to be composed, and doubtless originates from a simple deduplication of the petal to which its base coheres; while the interposed series of sterile filaments, in *Melochia* reduced to five teeth alternate with the petals (Plate 131, Fig. 4), represent the true stamineal verticil, and correspond with the five naked lobes at the summit of the column of *Malvaviscus* (Plate 131) and of the *Hibisceæ*.

The Byttneriaceæ belong to the intertropical regions of both worlds, to Australia, and to the Cape of Good Hope. Two plants of the family, however, both of the tribe Hermanniæ, extend northward to lat. 30° in Texas, and therefore claim a place in this work.

In their sensible properties these plants accord with Malvaceæ, both as to the mucilaginous juice and the toughness of the fibrous bark. The greater part are also pervaded, more or less, by a bitter and somewhat astringent extractive substance; and the seeds yield a fatty oil. By far the most important product of the order is *chocolate*, one of the most nutritious of vegetable substances, which is made from the roasted seeds of *Theobroma Cacao* (a tree which forms whole forests in Equatorial America). The shells, or crustaceous integuments of the seed, partake of the same qualities, and are used as a substitute for chocolate itself or for coffee.

PLATE 134.

MELOCHIA, L.

Calyx 5-fidus. Petala obovato-spathulata. Stamina 5, petalis opposita, monadelphæ. Ovarium brevissime stipitatum aut sessile, 5-loculare; loculis superposite 2-ovulatis: styli 5, basi connati. Capsula membranacea, pyramidato-pentagona, secus angulos acutatos loculicide 5-valvis. Embryo rectus.

MELOCHIA, Linn. Gen. 829 (excl. spec.). Jacq. Hort. Vindob. t. 30. Gærtn. Fr. t. 113. Cav. Diss. 6 t. 172. f. 1. DC. Prodr. 1. p. 490. Endl. Gen. 5337.

MELOCHIÆ Sp., St. Hil. Fl. Bras. 1. p. 156.

CALYX five-cleft, persistent; the segments valvate in æstivation. PETALS 5, hypogynous, alternate with the segments of the calyx, oblong-obovate or spatulate, very obtuse, erect-spreading, convolute in æstivation, deciduous. STAMENS 5, opposite the petals and shorter than they, hypogynous: FILAMENTS filiform or subulate, monadelphous at the base into a short tube which is connate with the claws of the petals opposite the filaments, and often bears five alternate interposed teeth or small lobes which represent a series of abortive filaments: ANTHERS oblong, extrorse, two-celled; the cells parallel, obtuse at both ends, opening longitudinally for their whole length. POLLEN globular, smooth. OVARY sessile or nearly so, of five united pistils, five-celled; the cells placed opposite the petals, two-ovuled: STYLES 5, united below, introrsely stigmatose at the summit. OVULES two in each cell, inserted one above the other on the inner angle, amphitropous, ascending, the micropyle inferior.

CAPSULE membranaceous, often pyramidal, five-angled with the salient angles compressed or produced, five-celled, loculicidally deliscent through the projecting angles; the

dissepiments borne on the middle of the valves, and tardily separating from the filiform axis. SEEDS 2, or by abortion solitary, in each cell, obovate, ascending, amphitropous or partly anatropous, not incurved; the testa smooth and crustaceous. EMBRYO straight in the axis of the fleshy albumen and nearly of its length: COTYLEDONS broad and foliaceous, round-reniform, plane: the RADICLE terete, inferior.

SHRUBS, or sometimes herbs, the pubescence, if any, stellular; with alternate and ovate or oblong serrate leaves, on distinct petioles, and small stipules. Peduncles terminal or opposite the leaves, bearing an umbellate fascicle of small flowers. Corolla violet, purple, or white.

ETYMOLOGY. A name of uncertain origin, thought by Linnæus to have come, by the accidental change of a letter, from *μολόχη*, an ancient name of some Mallow-plant.

GEOGRAPHICAL DISTRIBUTION. A genus of tropical American plants, as now restricted; one widely diffused species, however, extends northward into Texas, beyond lat. 30°.

PLATE 134. *MELOCHIA PYRAMIDATA*, *Linn.*;—a branch of the natural size, in flower and fruit; raised in the Botanic Garden, Cambridge, from Texan seeds.

1. Diagram of the æstivation, and of the position of the stamens.
2. Magnified section through the base of the flower-bud, showing the cohesion of the base of the petals with the short tube of filaments, also the position of the cells of the ovary.
3. Vertical section of a flower (dividing one cell of the ovary and showing its ovules), enlarged.
4. Two stamens, with a portion of the ring at the base and the interposed teeth, or rudimentary sterile filaments, magnified.
5. Transverse section of an anther, more magnified.
6. Grains of pollen, highly magnified.
7. A capsule enlarged.
8. Transverse section of the same in dehiscence, more magnified.
9. A seed magnified.
10. Transverse section of the same, cutting across the cotyledons.
11. Embryo detached entire, and more magnified.

PLATE 135.

HERMANNIA, Tourn.

Calyx 5-fidus. Petala obovato-spathulata, unguibus sæpius involutis. Stamina 5, petalis opposita; filamentis dilatatis planis, basi monadelphis; antheræ loculis acuminatis. Ovarium stipitatum, 5-loculare; loculis multiovulatis. Capsula loculicide 5-valvis. Semina plurima, reniformia. Embryo arcuatus.

HERMANNIA, *Tourn.* Inst. t. 432. Dill. Elth. t. 147. Linn. Gen. 628.
 Juss. Gen. p. 289. Cav. Diss. 6. t. 177-182. DC. Prodr. 1. p. 493. Endl. Gen. 5340.

CALYX five-cleft, persistent, often vesiculose-inflated in fruit; the segments valvate in æstivation. PETALS 5, convolute in æstivation, alternate with the segments of the calyx, spathulate or obovate, erect-spreading, hypogynous, deciduous, the usually dilated claw with involute or convolute margins. STAMENS 5, opposite the petals and shorter than they, hypogynous: FILAMENTS flat and dilated, monadelphous at the base around the stipe of the ovary into a ring which is adnate to the very base of the claws of the petals: ANTHERS extrorse, connivent, sagittate, two-celled; the cells acuminate and often tipped with a minute gland, opening longitudinally for the whole length. OVARY stipitate, five-celled, the cells (at least in the American species) opposite the sepals: STYLES more or less distinct, or united into one, introrsely stigmatose at the apex. OVULES numerous in two series from the inner angle of each cell, anatropous or amphitropous, ascending or horizontal.

CAPSULE coriaceous or nearly membranaceous, usually five-lobed, five-celled, loculicidal, the dissepiments adhering to the middle of the valves. SEEDS several or numerous in each cell, reniform; the testa coriaceous or crustaceous, often

pitted. EMBRYO arcuate, or almost hippocrepiform, in fleshy albumen: COTYLEDONS foliaceous, flat: RADICLE slender, centripetal.

SHRUBS, or nearly herbaceous plants, usually hoary or hirsute with stellular pubescence; the leaves alternate, stipulate. Peduncles axillary, one-many-flowered; the pedicels commonly articulated. Flowers yellow, or sometimes purple.

ETYMOLOGY. Dedicated by Tournefort to *Paul Hermann*, Professor of Botany at Leyden in the latter part of the seventeenth century.

GEOGRAPHICAL DISTRIBUTION. This genus belongs to the Cape of Good Hope (where it is numerous in species): with the exception of two plants recently detected in Mexico and Texas, which appear to be truly congeneric with South African *Hermannia*. Of one of them (No. 802 of Coulter's Mexican collection) Mr. Benthams informs me he has long possessed a specimen from the Montpellier Garden, under the (apparently unpublished) name of *Hermannia Brasiliensis*, *Delile*. It is most likely the "*H. inflata*, *Link & Otto*," mentioned in Steudel as a Mexican species, as its fructiferous calyx is remarkably inflated. The other species (in which the calyx is not thus inflated) was gathered by Dr. Gregg near Buena Vista, in Northern Mexico, and previously on the Rio Colorado in Texas, north of lat. 31°, by Mr. Lindheimer; from whose indigenous specimens it is here figured. It has been raised from his seed in the Botanic Garden of Harvard University; but the plants have not yet flowered. The corolla is purple or violet-colored in both species.

PLATE 135. *HERMANNIA TEXANA*, *n. sp.*; — a branch of the natural size, in flower and fruit.

1. Diagram of the flower in a transverse section.
2. A petal enlarged; inside view.
3. A stamen magnified, seen from the outside.
4. Inside view of the same.
5. Vertical section through the ovary, tube of united filaments, receptacle, &c., magnified. (The tube of filaments is more or less connate with the stipe of the ovary.)
6. Transverse section of a dehiscent capsule, enlarged.
7. A seed, more magnified. (Testa strongly pitted.)
8. Vertical section of the same through the albumen and embryo.
9. Embryo detached entire, with the cotyledons separated, more magnified.

ORD. TILIACEÆ.

Arbores, rarissime herbæ; *calyce* valvari *deciduo*; æstivatione corollæ quandoque imbricativa; staminibus sæpius indefinitis, discretis seu 5-adelphis, toro plerumque stipitiformi vel glanduloso insertis; *antheris bilocularibus*, granulis pollinis lævibus; fructu nunc abortu uniloculari:—cætera fere Malvacearum.

TILIACEÆ, JUSS. Gen. p. 290 (excl. gen.). Kunth, Diss. Malv. p. 14.
Bartl. Ord. Nat. p. 338. Endl. Gen. p. 1004. Lindl. Veg. Kingd. p. 371.

TILIACEÆ & ELÆOCARPEÆ, JUSS. in Ann. Mus. II. p. 31. DC. Prodr. I. p. 503, 519. Wight, Ill. Ind. Bot. p. 79. t. 33-35.

THE LINDEN FAMILY, represented in the northern temperate zone by the well-known genus of handsome trees the name of which it bears, is however principally tropical. Of its thirty recognized genera, all but *Tilia* itself, and a single species of *Corchorus*, which barely reaches our southern frontier, belong to the torrid zone and to the sultriest regions beyond the tropic of Capricorn. They are principally trees, often of great size and with handsome foliage and flowers; a few are shrubs, and still fewer are humble herbs.

In sensible properties, as well as in floral structure, Tiliacæ nearly resemble the Mallow Family. They have a similar mucilaginous juice, a very tough inner bark, and are entirely destitute of unwholesome qualities. Some yield a succulent and edible fruit. The berries of *Grewia sapida*, &c., are pleasantly acid, and are ingredients of sherbet. The bark and foliage are more or less astringent. The wood is light and usually soft, but very fine-grained: that of Linden is much esteemed for wainscoting and carving. "The excellent light timber called Trineomalec-wood, employed in the construction of the Massoola boats of Madras, is furnished by *Berrya Ammonilla*." *Grewia elastica* of India affords a timber which is highly valued for its strength and elasticity, and is used for bows, shafts, &c. The tough fibrous inner bark, or *bass*, of the European Linden furnishes the well-known Russian mats. *Gunny-bags* are made from the rudely prepared bark of *Corchorus capsularis*, which also yields the long and glossy Indian fibre called *jute*, a substitute for hemp and flax. "Ten years ago," according to

a statement in Hooker's *Journal of Botany and Kew Garden Miscellany* for January, 1849, "the use of this fibre was unknown in Europe, but now it is imported into Great Britain to the pecuniary amount of 300,000 pounds sterling annually."

The Lindens form an ample and compact head of handsome foliage, and are therefore much prized as shade-trees. The charcoal of the wood is used in making gunpowder. It is said that a little sugar may be obtained from the vernal sap; and the fragrant flowers yield the finest honey.

This order is at once distinguished from the Mallow Family by its deciduous calyx, its distinct or at least scarcely monadelphous stamens, which are inserted on a manifest hypogynous torus, and by the two-celled anthers; from Byttneriaceæ by their indefinite and not monadelphous stamens. The petals in *Tilia* are sometimes quincuncially imbricated in æstivation, as represented in Plate 136, Fig. 1; but in the same species they are as frequently convolute, except that the first petal is entirely exterior, and occasionally the fifth is wholly interior. It may be remarked, as a general rule, that the æstivation of the corolla does not furnish such constant characters as that of the calyx.

The embryo of *Tilia* differs from that of Malvaceæ in having the cotyledons revolute, or rolled together in the direction averse from the hilum.

Recurring to what has been stated as to the position and origin of the stamens in the two preceding orders, it will appear evident from the diagram in Plate 136, Fig. 1, that, in the American Lindens, the petaloid scales or staminodia, with the adherent cluster of stamens, originate from the deduplication of the petals before which they respectively stand.

PLATE 136.

TILIA, Tourn.

Petala 5, subspathulata, calyce 5-sepalo longiora, æstivatione imbricata seu convolutivo-imbricata. Stamina plurima 5-adelpha, nempe in phalanges 5 cum staminodiis petaloideis totidem petalis oppositas connata, vel discretis staminodiis nullis. Ovarium 5-loculare; loculis 2-ovulatis. Nux septis oblitteratis unilocularis, 1-2-sperma. — Arbores, foliis cordatis; pedunculo plurifloro bractea ligulata inferne adnato.

TILIA, Tourn. Linn. Gen. 606. Gærtn. Fr. 2. t. 113. Venten. Mon. in Mem. Inst. 1802. t. 1-5. Michx. f. Sylv. t. 131-133. Spach in Ann. Sci. Nat. 2. ser. 2. p. 331. t. 15. Endl. Gen. 5373.

Linden. Lime-tree. Basswood.

CALYX of five lanceolate or oblong **SEPALS**, valvate in æstivation, rather coriaceous, deciduous. **PETALS** 5, alternate with the sepals, hypogynous, oblong-spatulate, quincuncially imbricated, or convolute with one petal exterior, or sometimes with one wholly interior, in æstivation, deciduous. **STAMENS** indefinite, inserted on a short hypogynous torus: **FILAMENTS** filiform, distinct or nearly so, or (in the American species) collected into five phalanges and more or less united at the base with each other and with a hypogynous petaloid scale (staminodium), which stands before each petal and resembles it, except in its smaller size: **ANTHERS** fixed by the middle, extrorse, two-celled; the oblong cells separate, or often disjoined by the forking of the filament, opening longitudinally on the outside. **POLLEN** smooth, simple. **OVARY** ovoid, five-celled, the cells opposite the sepals: **STYLE** columnar, five-toothed at the dilated apex, the lobes introrsely stigmatose. **OVULES** 2 in each cell, peritropous-ascending from the middle of its inner angle, almost collateral, between amphitropous and anatropous, the micropyle centripetal-inferior.

FRUIT nut-like, woody-coriaceous, globular or ovoid, sometimes five-ribbed, indehiscent, one-celled by the obliteration of the dissepiments, one—two-seeded. SEED obovate, semi-anatropous, ascending; the testa cartilaginous. EMBRYO in the axis of dense fleshy albumen, large: COTYLEDONS foliaceous, reniform or cordate, palmately five-veined and five-lobed, somewhat plaited in the middle, revolute in the direction contrary to the hilum: RADICLE nearly straight, inferior.

TREES, with the alternate and two-ranked ample leaves usually obliquely cordate or truncate at the base, petioled, acuminate, serrate, and with membranaceous caducous stipules. Peduncles axillary, connate to the middle with the axis of a large membranaceous and somewhat colored veiny ligulate bract, ebracteolate, terminated by a cyme of few or many yellowish or whitish flowers.

ETYMOLOGY. The classical Latin name of the genus.

GEOGRAPHICAL DISTRIBUTION, &c. The known Lindens, about a dozen in number, and not very distinctly characterized, are about equally divided between the temperate region of the Old World (Europe and Northwestern Asia) and Eastern North America. Being timber-trees, they are restricted to our forest-region, and it seems do not again appear on the Western side of our continent. One is known from the elevated parts of Mexico. The American species all have the stamens in five clusters around as many petal-like organs; while the European, except one Hungarian species, are destitute of this organ, and their stamens are distinct or obscurely pentadelphous.

PLATE 136. *TILIA AMERICANA*, *Linn.*; — a branch in flower.

1. Diagram, from a cross section of a flower-bud. (Petals imbricated.)
2. A stamen-cluster, with the petaloid staminodium, enlarged; inside view.
3. Inside, and 4. outside view of a stamen, more magnified.
5. Pistil enlarged, on its hypogynous torus or receptacle.
6. Vertical section of the ovary of the same, showing the ovules of two cells.
7. An ovule, detached and more magnified.
8. Fruit, with a part of the bract, of the natural size.
9. Transverse section of a fruit and its contained seed, enlarged.
10. A magnified seed.
11. Vertical section of the same through the embryo.
12. Embryo detached entire, the cotyledons partly spread, more magnified.

PLATE 137.

CORCHORUS, *Tourn.*

Petala 5, obovata vel spatulata, calyci æqualia seu breviora, æstivatione convoluta. Stamina indefinita, rariusve petalis numero dupla, discreta. Ovarium 2 – 5-loculare; loculis biserialim pluriovulatis. Capsula sæpius elongato-siliquæformis, loculicide 2 – 5-valvis, polysperma. — Herbæ vel suffrutices, pedunculis brevissimis oppositifoliis uni – paucifloris.

CORCHORUS, *Tourn.* Inst. t. 135. *Linn. Gen.* 675. *Lam. Ill.* t. 478. *Gärtn. Fr.* 1. t. 64, & 2. t. 179. *DC. Prodr.* 1. p. 504. *St. Hil. Fl. Bras.* 1. p. 279. t. 55. *Endl. Gen.* 5371.

CALYX of five lanceolate SEPALS, valvate in æstivation, deciduous. PETALS 5, alternate with the sepals, hypogynous, oblong-obovate or spatulate, shorter than the sepals or of about the same length, convolute in æstivation, deciduous. STAMENS indefinite, or sometimes definite, rarely only twice as many as the petals, deciduous: FILAMENTS filiform, distinct, equally inserted around the edge of an urceolate hypogynous torus: ANTHERS introrse, two-celled; the cells parallel and apposite, oblong, opening longitudinally. OVARY two – five-celled (at first sometimes imperfectly so): STYLE subulate or filiform: STIGMA terminal, infundibular-dilated, the edge crenulate. OVULES numerous in two series, covering the internal angle of each cell, collateral, (their raphes side by side,) anatropous, pendulous.

CAPSULE commonly siliquæform and elongated, two – five-celled, sometimes extended at the apex into as many short horns, loculicidally two – five-valved; the dissepiments adhering to the middle of the valves, leaving no central axis. SEEDS numerous in two series in each cell, angled, often quadrangular, pendulous; the testa crustaceous. EMBRYO large, in the axis of fleshy albumen, variously folded together: COTYLEDONS foliaceous, entire: RADICLE superior.

HERBS, or sometimes shrubby plants; with alternate and serrate petioled leaves, usually deciduous stipules, and very short one – few-flowered peduncles opposite the leaves. Flowers small, yellow.

ETYMOLOGY. *Κόρχορος*, or *Κόρκος*, is an ancient name of the Wild Asparagus, or some other wild herb, of unexplained meaning.

GEOGRAPHICAL DISTRIBUTION. Natives of the tropics, both of the Old and of the New World, one or two species extending into the southern border of the northern temperate zone. Thus *C. siliquosus* is found in Louisiana and Alabama.

PROPERTIES. *Corchorus olitorius* is used in the East as a pot-herb. The bark of several species yields a useful fibre; that of *C. capsularis*, as remarked under the order, furnishes the material of gunny-bags, and the *jute* fibre of India.

NOTE. The common *Corchorus Japonicus* of the gardens should not be confounded with this genus, as it belongs even to an entirely different family. As originally brought to Europe and this country, it was known only in the *double-flowered* state, and was doubtfully referred to *Corchorus* on account of some general resemblance in foliage. But long before specimens with perfect flowers were known in Europe, it was shown to belong to the Rosaceæ by De Candolle, who gave to it the name of *Kerria Japonica*.

PLATE 137. *CORCHORUS SILIQUOSUS*, *Linn.*; — a branch in flower and fruit, of the natural size.

1. A flower-bud, enlarged.
2. Transverse section of the same diagram (showing the æstivation, &c.).
3. An expanded flower, magnified.
4. A petal, more magnified.
5. A magnified stamen, seen from the outside.
6. The same, seen from within.
7. Pistil, with its torus or receptacle, magnified.
8. Vertical and transverse section of the same, more magnified, showing the arrangement of the ovules.
9. A detached ovule, more enlarged; its raphe towards the eye.
10. Upper part of a dehiscent pod, enlarged, showing the seeds, &c.
11. Vertical and transverse section of the pod before dehiscence, enlarged, showing the embryo in the seeds, &c.
12. A separate seed, inverted, more magnified.
13. Embryo detached and magnified, brought into the same position as the seed in fig. 12.

ORD. TERNSTRÖMIACEÆ.

Arbores vel frutices speciosi, foliis alternis simplicibus penninerviis exstipulatis: dicotyledoneæ, dichlamydeæ, hypogynæ, polyandri-sub-1-5-adelphæ; calycis corollæque æstivatione imbricativa; filamentis basi coalitis in annulum seu in phalanges petalis antepositis, basi eorum adnatis; antheris introrsis bilocularibus; capsula 2-5-loculari sæpissime loculicida; embryo majusculo recto seu curvato in albumine carnoso parvo, aut in exalbuminosis maximo.

TERNSTRÖMIACEÆ, DC. in Mem. Soc. Genev. 1. p. 293, & Prodr. 1. p. 523 (excl. gen.). Cambess. in Mem. Mus. 16. p. 401. Wight, Ill. p. 89. Endl. Gen. p. 1017 (excl. Trib. 1 & 3, &c.). Lindl. Veg. Kingd. p. 396.

TERNSTRÖMIÆ & THEACEÆ, Mirb. Bull. Philom. 1813.

CAMELLIÆ, DC. Theor. Elem. ed. 1, & Prodr. 1. p. 529.

THE TEA FAMILY, as this may be appropriately named, from its most important plant, while evidently related to the foregoing Columniferous orders, is readily distinguished from all of them by the imbricative æstivation both of the calyx and the corolla, and generally by the want of stipules. On the other hand, it is most nearly allied to the Guttifere or Clusiaceæ; from which its alternate leaves, colorless and not resinous juice, herbaceous calyx, prevailing pentamerous flowers, and a different embryo, are obvious distinguishing characters. From Aurantiaceæ, to a dubious section of which Jussieu referred several of the genera, these plants differ by their simple and usually not pellucid-punctate leaves, strongly imbricated floral envelopes, capsular fruit, &c.

The Ternströmiaceæ are all elegant shrubs or trees, with simple and entire, or barely serrate, exstipulate leaves, which are distinctly articulated with the stem, and usually large and showy, white or sometimes red or rose-colored flowers. The capsules are almost always thick and woody.

Two genera, each of two species so distinct as to constitute subgenera, represent this family in North America. They are confined to the eastern border of the United States, from Virginia to Texas. In the corresponding part of the Old World, namely, in Japan, China, and the Himalayan region,

are four or five genera of few species, among which are the familiarly known and most important plants of the order, the Tea and the Camellia. The remaining and much larger portion of the order belongs almost without exception to Tropical America and Southeastern Asia. Of the sensible qualities of the tropical species little is known, except that their bark is astringent and sometimes used by the tanner, and their buds and young leaves are mucilaginous. The properties of tea, which is prepared from the young leaves of two species, or perhaps varieties, of *Thea*, are well known. The infusion contains mucilage, a bitter extractive, resin, gallic acid, tannin, and a peculiar highly azotized substance called *theine*, on which, and on an ethereal subnarcotic principle, its grateful and slightly stimulating properties depend. The Tea-plant belongs to a temperate region; when cultivated in a hot climate, as at Penang, its mildly stimulating properties are said to become narcotic. The Camellia is scarcely if at all distinguishable as a genus from *Thea*, and doubtless is endowed with very similar qualities. From the fleshy embryo of the seeds, especially of *Camellia oleifera*, an excellent table oil is expressed.

PLATE 138, 139.

STUARTIA, *Catesby*.

Sepala 5, raro 6, ovata seu lanceolata. Petala 5–6, obovata, crenulata, ima basi annulo staminum adnata. Stamina ima basi monadelphæ. Ovarium 5-loculare; loculis 2-ovulatis. Ovula adscendentia, anatropa. Capsula ovoidea, lignoso-crustacea, loculicide 5-valvis. Semina in loculis 1–2, lenticularia; testa crustacea nucleo conformis, nunc margine membranaceo cincta. Embryo in albumine parum copioso rectus; cotyledonibus ovalibus planis radícula gracili infera brevioribus. — Frutices grandiflori, foliis membranaceis deciduis.

STUARTIA, *Catesb. Car.* 3. t. 13. *Linn. Gen.* 847. *Lam. Ill.* t. 593.
L'Her. Stirp. Nov. t. 73, 74. *Torr. & Gray, Fl. N. Am.* 1. p. 223.
Hook. Bot. Mag. t. 3918. *Endl. Gen.* 5423, & *Suppl.* 2. p. 81.
Zucc. Fl. Japon. 1. p. 181. t. 96.

MALACHODENDRON, *Mitch. Gen. in Ephem. Nat. Cur.* 1748.

STEWARTIA & MALACHODENDRON, *Cav. Diss.* 5. p. 302. t. 158, 159. *Juss. Gen.* p. 275 & 292. *DC. Prodr.* 1. p. 528.

CALYX one–two-bractcolate, of five, or occasionally six, foliaceous ovate or lanceolate SEPALS, regularly imbricated in æstivation, silky-pubescent, persistent. PETALS 5, or occasionally 6, alternate with the sepals, imbricated in æstivation, obovate, with more or less crenulate margins, silky-pubescent externally, hypogynous, connected at the very base only by means of the stamens, deciduous. STAMENS indefinite, in three or four series, shorter than the petals: FILAMENTS subulate-filiform, monadelphous at the very base in an entire ring which is connate with the base of the petals: ANTHERS fixed by the middle, introrse, two-celled, the oblong cells opening longitudinally. POLLEN-grains simple, globular, smooth. OVARY compound, ovoid or globular, five-celled,

the cells opposite the petals when these are five in number : STYLES 5, distinct or united into one : STIGMAS short and introrsely terminal, or in *S. Virginica* united into a five-crenate and five-radiate compound stigma. OVULES two in each cell, ascending from its inner angle next the base, at first collateral or nearly so, obovoid, anatropous, the micropyle inferior.

CAPSULE globular, sometimes five-angled and pointed, five-celled, loculicidally five-valved ; the valves with the adherent dissepiments more or less thickened and woody-crustaceous, leaving a small columella after dehiscence, or none at all. SEEDS in pairs, or by abortion solitary in each cell, ascending, one a little above the other, obovate-lenticular ; the testa thick and crustaceous, smooth and conformed to the nucleus, or else, in *S. pentagyna*, surrounded by a narrow wing-like margin. ALBUMEN fleshy, rather copious. EMBRYO straight in the axis of the albumen and of nearly its length : COTYLEDONS broadly oval, somewhat cordate, foliaceous, plane : RADICLE slender, rather longer than the cotyledons, inferior.

SHRUBS, with membranaceous and alternate, usually serrulate leaves, more or less pubescent with soft and simple downy hairs, articulated with the stem and deciduous, destitute of stipules. Flowers large and showy, axillary, solitary, on short peduncles. Corolla white or cream-color.

ETYMOLOGY. Dedicated by Catesby to *John Stuart*, Marquis of Bute, who was distinguished in his day as a botanist. His name not unfrequently occurs in the published Correspondence of Linnæus.

GEOGRAPHICAL DISTRIBUTION, &c. This beautiful genus consists of two species, indigenous to the Atlantic States, which, although similar in other respects, differ so much in the pistil and fruit, that they have been viewed as separate genera ; and a third species has recently been detected in Japan. Our species are well deserving of cultivation as ornamental flowering shrubs. *S. pentagyna*, which is indigenous to the eastern slope of the Alleghany Mountains, is perfectly hardy in England, and at Philadelphia, where it freely ripened the fruit for which I am indebted to my obliging correspondent, Miss Morris, for the opportunity of figuring, in these illustrations.

DIVISION. Endlicher, in the second supplement to the *Genera Plantarum*, has added a third section, *Adelphonema*, for the Japanese *Stuartia monadelpha* of Zuccarini; but his distinguishing character (the union of the base of the filaments into a ring) belongs equally to the American species; and, except that the stigmas are distinct, it seems to be a strict congener of our *S. Virginica*. But the fruit, which may afford some distinctive character, is unknown. The three species may for the present be disposed under the two subgenera, viz.:—

§ 1. *STUARTIA*, Cav. — Styles entirely united into one. Sepals and slightly crenulate petals only 5. Capsule subglobose, pointless, the valves extremely thickened. Seeds with a smooth and shining testa, not at all margined. — *S. Virginica*, Cav. (*S. Malachodendron*, Linn.)* and *S. (Adelphonema, Endl.) monadelpha*, Zucc.

§ 2. *MALACHODENDRON*, Cav. — Styles 5, distinct. Sepals and especially the crenulate petals oftener 6. Capsule ovate, acuminate, rather sharply five-angled; the valves and the adherent dissepiments less thickened, on dehiscence leaving little or no central axis or columella. Seed with a somewhat wrinkled epidermis, which extends into a slight wing around the whole margin. — *S. pentagyna*, L'Her. (*Malachodendron ovatum*, Cav.)

PLATE 138. *STUARTIA VIRGINICA*, Cav.; — a branch in flower, of the natural size.

1. Posterior view of a flower, showing the calyx and the two bractlets.
2. Diagram of æstivation, &c., from a cross section of a flower-bud.
3. Enlarged vertical section through the ovary (leaving the style and stigmas entire), receptacle, calyx, the base of the corolla and stamens (two of which are left), showing the union of the filaments with the base of the petals, the insertion of the ovules, &c.
4. The stamens cut away at their insertion to show the monadelphous ring at the base, enlarged.
5. Capsule, with the persistent calyx, of the natural size.
6. Vertical section of the same, showing the seeds of two cells, in place.
7. Transverse section of the same in dehiscence (showing the very thick valves), and of the contained seeds.
8. Transverse section of a seed, magnified, showing the thickness of the crustaceous testa, the plane cotyledous, &c.
9. Vertical section of the same, displaying the embryo entire in the axis of the albumen.

* The original *Malachodendron* of Mitchell, with whom the name commences, was probably this species, the original *Stuartia* of Catesby; but having been taken up by Cavanilles as the generic name of the pentagynous species, which must always be distinguished as a subgenus at least, it is liable to produce confusion if retained both as a specific name in one section and as the subgeneric name of the other. It should therefore give place to the later specific name of *S. Virginica*, Cav.

PLATE 139. STUARTIA (MALACHODENDRON, Cav.) PENTAGYNA, L'Her. ; —
a branch of the natural size, in flower ; from an imperfect specimen
gathered in the Southern Alleghanies by Mr. Buckley, aided by
Hooker's figure in *Bot. Mag.* t. 3918.

1. Pistil, &c., vertically divided through the ovary and base of the flower,
&c., showing the connection of the stamens with the base of the
petals, the ovules, &c. ; magnified.
2. Capsule slightly dehiscent, with the persistent calyx, of the natural size.
3. Transverse section of the capsule and seeds.
4. Lateral view of one of the valves, with the seeds in place.
5. Vertical section of a seed, magnified, showing its narrow, wing-like
margin, and the embryo, with its very slender radicle, in the axis of
the albumen.
6. The same, divided transversely, through the cotyledons, &c.

PLATE 140 - 142.

GORDONIA, Ellis.

Sepala 5, rotundata, concava, coriacea. Petala 5, obovata, ima basi coalita et phalangibus staminum adnata. Stamina pentadelphica. Ovarium 5-loculare; loculis 4 - 8-ovulatis. Ovula anatropa resupinato-pendula. Capsula sublignosa loculicide 5-valvis, columella centrali persistente. Semina in loculis 2 - 4, angulata, vel dorso alata. Embryo exalbuminosus, rectiusculus; cotyledonibus longitudinaliter flexuosoplicatis; radícula brevi supera. — Arbusculæ grandifloræ, foliis perennantibus aut deciduis.

GORDONIA, Ellis in Phil. Trans. 60. p. 518. t. 11. Catesb. Car. t. 44. Linn. Mant. p. 570. Walt. Fl. Car. p. 177. Cav. Diss. 5. p. 307. t. 161, 162. Juss. Gen. 1. p. 275. Venten. Hort. Malmais. t. 1. DC. Prodr. 1. p. 528 (excl. sect. 2). Michx. f. Sylv. 1. t. 59. Cambess. in Mem. Mus. 16. p. 408. t. 16. Torr. & Gray, Fl. N. Am. 1. p. 223. Endl. Gen. 5424.

FRANKLINIA, Marsh. Arbust. Amer. p. 48.

LACATHEA, Salisb. Parad. Lond. t. 56.

Loblolly Bay.

CALYX (usually subtended by three or four caducous bractlets below the flower) of five rounded and concave coriaceous sepals, minutely silky-tomentose, ciliate, quincuncially imbricated in æstivation, persistent. PETALS 5, alternate with the sepals, obovate, concave, silky-puberulent on the back, quincuncially imbricated in æstivation, hypogynous, united with each other at the base and with the phalanges of the stamens, deciduous. STAMENS very numerous, shorter than the petals, pentadelphous, the five clusters or the thickened lobes from which the filiform filaments arise placed before the petals and connate with their base: ANTHERS fixed near the base, introrse, two-celled, the oblong cells opening longitudinally. PISTIL of five entirely combined carpels:

OVARY five-celled, the cells opposite the petals: STYLE columnar, five-crenate at the apex: STIGMA five-rayed. OVULES anatropous, 4 to 8 in each cell, resupinate-pendulous from the inner angle in two series, collateral, imbricated, the dorsal raphe flattened or produced superiorly; the micropyle centripetal-superior.

CAPSULE ovoid, minutely silky, ligneous, five-celled, loculicidally five-valved from above downwards; the upper part of the dissepiments borne on the middle of the valves, while the lower remains coherent with the persistent columella (which is angled or narrowly winged by the five projecting placentæ), and at length breaks away from the base of the valves. SEEDS 2 to 8 in each cell, pendulous; the woody testa produced above (on the side of the raphe) into more or less of a wing. ALBUMEN none. EMBRYO (in *G. Lasianthus*) filling the cavity of the seed, almost straight: COTYLEDONS oval, subcordate, thin or nearly foliaceous, flexuose-biplicate; the RADICLE short, centripetal-superior.

SHRUBS, or small trees; with the oblong-lanceolate or lanceolate-obovate leaves ample, pinnately veined, more or less serrulate, exstipulate, coriaceous and persistent, or in *G. pubescens* thinner and deciduous, separating from the stem by a distinct articulation. Buds not perulate. Peduncles axillary, one-flowered. Flowers large and showy, white.

ETYMOLOGY. This fine genus, founded on *G. Lasianthus*, the *Loblolly Bay* of the Southern States, was so named by Dr. Garden, as stated in a letter to Ellis, "in honor of my old master, *Dr. James Gordon*, at Aberdeen, a very ingenious and skilful physician and botanist, who first initiated me into these studies, and tinctured my mind very early with a relish for them."* But from the *Philosophical Transactions*, and from Ellis's correspondence with Linnæus, it appears that the honor was transferred to *James Gordon*, the celebrated nurseryman of that day, at Mile End near London. The name of *Franklinia*, given by Marshall to the *G. pubescens*, (which is not unlikely to be restored as a genus,) was a compliment to Benjamin Franklin.

GEOGRAPHICAL DISTRIBUTION. The *Loblolly Bay* is indigenous to the low country from Virginia to Florida, growing in swamps or moist, turfy soils. The *G. pubescens* is very local in the southern part of Georgia and

* *Correspondence of Linnæus*, by Sir J. E. Smith, Vol. I. p. 378.

the adjacent portion of Florida. Whether the Indian species distinguished as genera by Korthals, &c., referred as sections to this genus by Endlicher (Suppl. 3. p. 94), are correctly associated with it, I have not the means of knowing, and have therefore left them out of view.

PROPERTIES. Our two species are very ornamental shrubs or small trees in cultivation (and *G. pubescens* is hardy as far north as Philadelphia, and flowers through the summer); but they are applied to no other use; except that the bark of the Loblolly Bay has been used for tanning. According to Elliott, "the bark is said to be nearly if not quite equal to that of the oak for the uses of the tanner; and its wood resembles mahogany in color, but its grain is rather too coarse to be used for fine articles of furniture."

NOTE. The five phalanges of stamens evidently arise, like those of *Tilia*, &c., from the deduplication of the petals. In *G. pubescens* the stamens are truly pentadelphous, but the filaments of each cluster appear to arise immediately from the face of the petal, while in *G. Lasianthus* they are borne on a fleshy and deeply five-lobed cup, the lobes of which are partly free from the petals. The fine capsules of *G. pubescens* which ripened last autumn at Laurel Hill, Philadelphia (and for which I am indebted to Miss Morris), contained well-formed seeds, widely different in form from those of the typical species, but in none was an embryo found.

DIVISION. Unless the internal structure of the seed of *G. pubescens* should prove materially different from that of the Loblolly Bay, it should be retained merely as a subgenus of *Gordonia*, characterized as follows:—

§ 1. *GORDONIA* proper. — Filaments short, arising from the partly free summit and inner surface of the five thickened lobes, which are confluent at the base into a fleshy cup. Capsule pointed with the base of the short style; the valves entire. Seeds 4 or by abortion 2 in each cell, pendulous from its inner angle towards the base, the testa extended upwards into a conspicuous membranaceous wing. — *G. Lasianthus*, *L.*

§ 2. *FRANKLINIA*, *Marsh.* (*Læathea*, *Salisb.*) — Filaments elongated, directly connate with the bases of the petals. Style elongated, deciduous. Ovules 6 to 8 in each cell, downwardly imbricated, the raphe somewhat widened but not winged. Capsule loculicidally 5-valved from the obtuse apex to below the middle, and also septucidally 5-valved from the base to near the middle. Seeds 6–8 or by abortion fewer in each cell, closely packed together on the whole length of the salient axile placenta, angled by mutual pressure, the loose testa scarcely if at all produced into a wing. Embryo unknown. — *G. pubescens*, *L'Her.*

PLATE 140. *GORDONIA LASIANTHUS*, *Linn.*; — a branch with an expanded flower and a flower-bud, of the natural size; from a plant in the Botanic Garden, brought from Wilmington, North Carolina.

1. Diagram, in a transverse section of a flower-bud. (The three outer lines represent the bractlets on the apex of the peduncle.)

2. Vertical section of the pistil, receptacle, andrœcium, &c., showing the much thickened phalanges connate with the base of the petals.
3. A petal of the natural size, with one of the adherent phalanges, cut away from its connections and seen from within.
4. The andrœcium of the natural size; the calyx, corolla, &c., cut away.
5. A stamen enlarged, seen from within.
6. The same, seen from the outside.
7. The pistil and receptacle, enlarged.

PLATE 141. *GORDONIA LASIANTHUS*, *Linn.*; — Fig. 1–10.

1. Unexpanded corolla seen from below, to show the union of petals.
 2. Vertical section through the ovary and receptacle, enlarged.
 3. Side view of an ovule magnified, showing its dorsal, ascending wing.
 4. The four ovules of one cell, as seen from the outside, magnified.
 5. Capsule nearly full-grown, with the persistent calyx.
 6. Capsule mature and dehiscent, of the natural size; the calyx removed.
 7. Vertical section of the same, showing how the base of the dissepiment separates from the upper part and remains adherent to the columella.
 8. A ripe seed, enlarged.
 9. The same, more enlarged, with most of the wing cut away, and the integuments divided, showing the embryo in place.
 10. Embryo magnified, transversely divided, showing the plaited cotyledons.
- 11–14. *GORDONIA (FRANKLINIA) PUBESCENS*, *L'Her.*; — the mature fruit.
11. A seed, apparently ripe and sound, magnified.
 12. Capsule (and calyx) of the natural size, showing the lines of dehiscence.
 13. Capsule dehiscent both from the summit and the base.
 14. Columella or central axis of the same, winged above by the five placentæ, and below by the persistent portion of the dissepiments, the remainder of which adheres to the valve, as seen on one of them placed to the right.

PLATE 142. *GORDONIA PUBESCENS*, *L'Her.*; — a branch in flower, of the natural size. (Sent from Laurel Hill, near Philadelphia, by *Miss Morris*.)

1. Enlarged transverse section of the ovary and of the calyx.
2. Inside view of a petal, with its adherent cluster of stamens.
3. Pistil, with the receptacle, magnified.
4. The same, with the base of the calyx, corolla, &c. divided vertically, as well as the ovary, showing the union of the stamens with the base of the petals, the ovules, &c.
5. Lateral view of a detached ovule, magnified, showing the broad but wingless raphe.
6. The ovules of one cell seen from the outside, magnified.

* * * The fruit is delineated at the foot of plate 141.

ORD. LINACEÆ.

Herbæ (v. frutices) integrifoliæ: dicotyledoneæ, hypogynæ, symmetricæ, regulares, 5-4-meræ; æstivatione calycis persistentis imbricativa, corollæ 4-5-petalæ convolutiva; staminibus basi monadelphis petalis numero æqualibus iisque alternis, sæpius cum 5 alternantibus abortivis seu brevioribus; stylis pl. m. discretis; ovario 3-5-loculari, loculis septo dorsali subbilocellatis 2-ovulatis; seminibus anatropis suspensis parce albuminosis; embryone recto, cotyledonibus planis.

LINÆE, DC. Theor. Elem. ed. 1. p. 89, & Prodr. 1. p. 423. Endl. Gen. p. 1170. Planchon in Hook. Lond. Jour. Bot. 6. p. 588.

LINACEÆ, Lindl. Introd. ed. 2. & Veg. Kingd. p. 485.

LINÆE & HUGONIACEÆ, Wight & Arn. Prodr. F. Ind. Or. p. 72, 174. Wight, Ill. t. 32 & 60.

THE FLAX FAMILY, established upon the genus *Linum*, with *Radiola* (a European herb which differs little from the Flax except in its quaternary flower), Dr. Planchon has recently enlarged by the addition of *Hugonia*, a genus of Indian shrubs, and of one or two more tropical arborescent genera. The light which these throw upon the affinities of the family, however, does not appear to invalidate the remark of De Candolle, that the order is about equally allied to Caryophyllaceæ (Elatinaceæ), Malvaceæ, and Geraniaceæ (or Oxalidaceæ). The ordinal characters are sufficiently illustrated by the typical genus.

The common Flax, a native of Southeastern Europe and Western Asia, and from time immemorial cultivated for the use of man, is far the most important plant of the order, and illustrates the sensible properties which are common to the whole. The delicate and tenacious fibre of the inner bark furnishes flax, the most important of all vegetable textile substances, except cotton. The herbage is somewhat bitter and purgative. The seeds yield by infusion a most abundant muceilage, employed as a demulcent and emollient, and by expression a fixed oil (linseed oil), which is largely used in the arts, especially as the vehicle of paints. The flowers in most species are handsome.

Eighty-one species of the typical genus are enumerated in the recent monograph of Dr. Planchon, which are so distributed that there are some in every district of the temperate zone; while within the tropics they are found only where elevation gives an equivalent climate. There are none in the frigid zones. Five or six species are indigenous to the United States, of which *L. Virginianum* is the most widely diffused. The others belong principally to the region west of the Mississippi, especially southward. Dr. Planchon divides the genus into four subgenera and eight subordinate sections. *Reinwardtia*, *Dumort.*, comprises the trigynous shrubby *Linums* of the earlier authors, all natives of India.

PLATE 143.

LINUM, *Tourn.*

Flores 5-meri, 5-andri (filamentis interjectis sterilibus seu obsoletis), 5-gyni. Capsula 5-cocca; coccis semisepto dorsali subbilocellatis, aut complete 2-locellatis, locellis monospermis. Albumen tenue. — Stipulæ nullæ vel glandulæformes.

LINUM, *Tourn.* Linn. Gen. 389 (excl. spec.). Dill. Gen. 7. Lam. Ill. t. 219. Gærtn. Fr. 2. p. 146. t. 112. Schk. Handb. t. 87. DC. Prodr. 1. p. 423. Endl. Gen. 6056 (excl. spec.). Planchon in Hook. Lond. Jour. Bot. 7. p. 165.

CLIOCocca, Babingt. in Ann. & Mag. Nat. Hist. 7. p. 217.

Flax.

CALYX of five herbaceous entire SEPALS, quincuncially imbricated in æstivation, persistent. PETALS 5, hypogynous, their claws sometimes slightly united, obovate, convolute in æstivation, caducous. HYPOGYNOUS GLANDS 5, opposite the sepals and next the base of the fertile filaments, or 10, the additional ones opposite the sterile filaments. STAMENS hypogynous, monadelphous at the base: fertile FILAMENTS 5, alternate with the petals, subulate or setaceous; the sterile alternate with these, reduced to subulate interposed teeth, or often obsolete: ANTHERS two-celled, introrse, the cells opening longitudinally. OVARY globular, five-celled, the cells opposite the petals, more or less vertically divided by an inflexion of the dorsal suture which forms an imperfect partition, sometimes becoming completely ten-celled in this way: STYLES 5, distinct, or united at the base, occasionally combined almost to the summit: STIGMAS terminal and capitate, or more or less linear and introrse. OVULES a single collateral pair, pendulous from the inner angle near the apex of each cell, anatropous, the raphe ventral.

CAPSULE septicidal, separating into five incompletely two-celled and two-seeded coriaceous cocci which become two-

valved at the apex, or, when completely ten-celled, separating into ten one-seeded indehiscent cocci, leaving no central axis. SEED suspended, oval or obovate, compressed, with a smooth coriaceous testa. EMBRYO straight or nearly so, more or less surrounded by thin mucilaginous or fleshy albumen: COTYLEDONS plane, fleshy, foliaceous in germination, their edges directed to the axis of the fruit: RADICLE superior.

HERBS, or suffruticose plants, with slender and rigid stems, entire and sessile usually veinless oblong or linear leaves, which are alternate or irregular, opposite or verticillate, without stipules, but often with a pair of glands in their place. Flowers paniculate-cymose, usually secund; the peduncles opposite the leaves or bracts, or extra-axillary, articulated under the calyx. Corolla blue, yellow, or white, ephemeral.

ETYMOLOGY. The classical Greek and Latin name of the Flax, and of the thread made from it.

PROPERTIES, &c. These have been mentioned in the account of the order.

PLATE 143. *LINUM VIRGINIANUM*, *Linn.*; — summit of a stem in flower and fruit, of the natural size.

1. Diagram of the aestivation, with a section of the ten-celled ovary.
2. Two of the stamens seen from within, with a part of the monadelphous ring, showing the scarcely apparent rudiments of the interposed sterile filaments; magnified.
3. Pistil, the ovary vertically divided, showing the ovules, magnified.
4. An ovule detached and more magnified.
5. Capsule with the persistent calyx, magnified.
6. A transverse section of the same, more magnified (10-coccos).
7. A magnified seed (inverted, the hilum turned downward).
8. Vertical section of the same, displaying the embryo and the sparing albumen.
9. *LINUM PERENNE*, *Linn.*; — magnified transverse section of the calyx and (five-celled) ovary.
10. Flower of the same, with the calyx and corolla removed; showing the teeth which represent the sterile filaments, the introrse stigmas, &c.
11. *LINUM BERLANDIERI*, *Hook.*; — a flower, of the natural size.
12. A glandular-fringed sepal, and 13. a petal, of the same, seen from within.
14. The stamens and pistil (styles united), with the hypogynous glands, &c., enlarged; the calyx and corolla removed.

ORD. OXALIDACEÆ.

Herbæ, rarissime arbores, succo acidulo, foliis alternis digitatis pinnatisve, foliolis sæpius obcordatis: dicotyledoneæ, hypogynæ, symmetricæ, 5-meræ, 10-andræ, regulares; æstivatione calycis persistentis imbricativa, corollæ convolutiva; staminibus pl. m. monadelphis; ovario 5-loculari; stylis discretis; fructu capsulari seu baccato; seminibus anatropis pendulis, testa arilliformi; embryone in axi albuminis parci rectus, cotyledonibus planis.

OXALIDÆ, DC. Prodr. 1. p. 689. Bartl. Ord. Nat. p. 351. Meisn. Pl. Vasc. p. 57. Endl. Gen. p. 1171.

OXALIDACEÆ, Lindl. Introd. Nat. Syst. ed. 2. p. 140, & Veg. Kingd. p. 488, excl. gen.

THE WOOD-SORREL FAMILY consists of the large genus *Oxalis*, which is widely diffused through the temperate and warmer parts of the world, with *Averrhoa*, *L.*, an Indian genus of trees with baccate fruit. These plants are distinguished from the related families (namely, from the preceding and the two succeeding) by their sour juice; their alternate and compound leaves; their regular perfectly symmetrical and decandrous flowers with more or less monadelphous stamens; their capsular or baccate fruit with no central axis produced into a beak, and no dorsal partitions; and the aril-like external integument of their seeds, with a large and straight embryo in the axis of sparing albumen.

The leaves close at nightfall, like those of the *Mimosæ*, and are not unfrequently sensitive to the touch, especially in the pinnated species of *Oxalis*, to which De Candolle, on this account, applied the name of *Biophytum*.

The acidity, which is the only marked property of these plants, is owing to oxalic acid (in the form of binoxalate of potash), which is formed in the herbage; so largely in *Oxalis Acetosella*, that five hundred pounds of the fresh plant are said to yield four pounds of the pure salt. The baccate fruit of *Averrhoa*, also, is extremely sour; it is used for pickles in the East Indies, and a less acid cultivated form is an article of food. Several American species of *Oxalis* bear edible tubers. "*O. crenata*, found in Colombia.

bears tubers like a potato, and is one of the plants called Arracacha : the tubers are insipid, and not worth cultivation : the stalks of the leaves are intensely acid, and make an agreeable preserve. Another species, the *Oxalis Deppei*, has, however, fleshy roots, quite free from acidity, and abounding in a matter analogous to that of salep. These roots are as large as small parsnips, and are becoming esteemed for culinary purposes." *Lindl.* The tubers of *O. crassicaulis*, which resemble Jerusalem artichokes, of *O. esculenta*, &c., possess similar qualities.

PLATE 144.

OXALIS, *L.*

Capsula 5-loba, loculicida; loculis mono-oligospermis. Testa seminum carnosa, e tegmine interiore costato elasticæ dissiliente. — Folia sæpissime 3-foliolata, raro abrupte pinnata.

OXALIS, Linn. Gen. 582. Gærtn. Fr. 2. t. 113. Jacq. Monogr. Ox. p. 4. Zuccarini, Monogr. Ox. Amer. in Münch. Denkschr. 1825 & 1831. St. Hil. Fl. Bras. 1. p. 104. Endl. Gen. 6058.

OXALIS & BIOPHYTUM, DC. Prodr. 1. p. 689, 690.

Oxys, Tourn. Inst. p. 88. t. 19.

Wood-Sorrel.

CALYX of five erect SEPALS, quincuncially imbricated in æstivation, persistent. PETALS 5, larger than the sepals, obovate, somewhat unguiculate, hypogynous, convolute in æstivation, deciduous. STAMENS 10, hypogynous, the five opposite the petals shorter than the others: FILAMENTS subulate, flattened, dilated below, and more or less monadelphous: ANTHERS short, fixed by the middle, introrse, at length resupinate, two-celled, the oval or oblong cells opening longitudinally. PISTIL of five united carpels: OVARY often raised on a short gynophore, five-lobed, five-celled, the cells opposite the petals: STYLES 5, distinct, sometimes united at the base, usually hairy: STIGMAS capitate, clavate, or dilated, often two-lobed or laciniate. OVULES few or solitary from the inner angle of each cell, pendulous, anatropous, the raphe ventral.

FRUIT a columnar or ovoid herbaceo-membranaceous CAPSULE, five-lobed, five-celled; the cells not separating from the axis, dehiscent on the back (loculicidal). SEEDS few or solitary in each cell, pendulous, obovate, margined with a distinct raphe; the exterior integument (testa) fleshy, loose and aril-like, splitting down on the side opposite the raphe, separating from the crustaceous usually costate and trans-

versely rugose inner integument, and elastically recurved. EMBRYO straight or nearly so, about the length of the thin and fleshy albumen: COTYLEDONS oval, flat, foliaceous: RADICLE superior.

HERBS low and often acaulescent, with a sour watery juice, and alternate commonly digitately trifoliolate leaves on slender petioles, circinate in veneration; the leaflets almost always obovate or two-lobed. Stipules rarely present. Peduncles umbellately or cymosely few-many-flowered. Foliage sometimes sensitive, usually drooping or closing at nightfall.

ETYMOLOGY. The name is derived from ὄξύς, *sour*, from their acid taste.

GEOGRAPHICAL DISTRIBUTION. This large genus is widely distributed over the world, but far the greater part are natives of Tropical America and of the Cape of Good Hope. A few species belong to the northern temperate zone: there are none in the frigid zone.

PROPERTIES. These are detailed in the account of the order.

PLATE 144. *OXALIS VIOLACEA*, *Linn.*;— of the natural size, with the bulb as in summer, producing numerous subterranean branches, and a thickened root below: on the left an earlier state of the bulb is represented.

1. Diagram of the flower.
2. Pistil, with the ring of stamens laid open; magnified.
3. A magnified sepal, with its glandular tip; outside view.
4. A magnified stamen; inside view.
5. Vertical section of a pistil, magnified.
6. An ovule, more magnified.
- 7-11. *OXALIS STRICTA*, *Linn.*;— the fruit and seed.
7. Dehiscent capsule, enlarged.
8. A seed (inverted), more magnified.
9. The same, with the arilliform testa spontaneously separated.
10. Transverse section of the same, with the testa just separating.
11. Embryo detached and more magnified.

ORD. ZYGOPHYLLACEÆ.

Herbæ, frutices, v. arbores, ligno durissimo, foliis oppositis pinnatis epunctatis stipulatis: dicotyledoneæ, polypetalæ, hypogynæ, regulares, plerumque pentameræ, decandræ; æstivatione calycis et corollæ sæpissime imbricativa; ovario 2-10-loculari; stylis in unicum coalitis; embryone in albumine corneo (rarius exalbuminoso) magno recto seu rectiusculo.

ZYGOPHYLLÆ, R. Br. in Flind. Voy. 2. p. 545, & in Denham, Appx. p. 27. DC. Prodr. 1. p. 703. Adr. Juss. in Mem. Mus. 12. p. 450.

ZYGOPHYLLACEÆ, Lindl. Introd. Nat. Syst. ed. 2. p. 133, & Veg. Kingd. p. 478.

RUTACEARUM Sect. 1, Juss. Gen. p. 296.

THE BEAN-CAPER FAMILY is well distinguished from the allied orders, especially from Rutaceæ, of which it formerly made a part, by its opposite and pinnate dotless leaves, with intermediate stipules, and the corneous albumen of the seed; but this is destitute of albumen in two genera. It bears the closest resemblance to Geraniaceæ and Oxalidaceæ. From Geraniaceæ (with which *Kallströmia* agrees in having a prolonged and persistent beak-like axis to the fruit, and even in the convolute æstivation of the petals), the Zygophyllaceæ differ in their straight or straightish embryo, with plane cotyledons and a superior radicle. From Oxalidaceæ they are distinguished by their combined styles, distinct stamens, and opposite leaves.

One leaf of each pair is commonly smaller than the other, or rarely abortive, as in *Chitonina*.

In this, as in the allied families, the stamens of the series which is opposed to the petals (and which in *Kallströmia* adhere to their bases) are exterior: accordingly they are taken by Brongniart and others as a deduplication of the petals; and the late appearance of the petals, mentioned by Jussieu, favors this explanation. But, on the opposing view, the five hypogynous glands, which alternate with the petals and form the first verticil within them, are more naturally held to represent the normal, primary series of stamens; those opposite the petals consequently make the second series, and the five inner, alternating with these, the third series. The membranaceous

scales attached to the base of the filaments on the inner side, in several genera, are undoubtedly a deduplication of the stamens.

This family consists of about fifteen known genera, no one of which is numerous in species. The greater part belong to the warmer portion of the northern temperate zone, where they are more abundant in the Old World than in the New. The remainder are tropical, with a few at the Cape of Good Hope, one genus in New Holland, and two or three in Chili and Paraguay. Guaiacum, which comprises all the trees of the order, belongs to America, near the tropic of Cancer.

The wood, bark, &c., of all Zygophyllaceous plants contain an acrid and bitter, more or less resinous principle, and the herbage usually exhales an ungrateful odor. That of *Zygophyllum Fabago* is sometimes employed as a vermifuge, and its flower-buds as a substitute for capers. The ligneous plants of the order are remarkable for the extreme hardness of their wood. That of one or more species of *Guaiacum* furnishes the *Lignum Vitæ* of commerce, the hardest and heaviest wood known, and which never splits, owing to the diagonal crossing of the successive layers, in the same way as in our *Nyssa*. From this wood is obtained the *guaiacum* of the shops, a resinous, acrid-bitter substance, partly soluble in water, so well known in medicine as an alterative, &c.

CONSPECTUS OF THE UNITED STATES GENERA.

TRIBE I. TRIBULÆ. — Seeds destitute of albumen.

TRIBULUS. (Plate 145.) Calyx deciduous. Fruit of five transversely plurilocellate few-seeded cocci, leaving no central axis when they separate.

KALLSTRÖMIA. (Plate 146.) Calyx persistent. Fruit of ten one-seeded cocci which separate at maturity from a prolonged central axis.

TRIBE II. ZYGOPHYLLÆ. — Seeds with a hard albumen.

LARREA. (Plate 147.) Filaments appendaged by a two-cleft scale. Fruit separating into five indehiscent cocci. Seed with a membranaceous testa. Cotyledons narrow, parallel with the axis.

GUAIACUM. (Plate 148.) Filaments naked. Fruit rather fleshy, 2-5-lobed, the angles acute or wing-like. Testa fleshy, separable. Cotyledons broad, contrary to the axis.

GUAIACIDUM. (Subgen., Plate 149.) Filaments appendiculate with a small scale: otherwise as in *Guaiacum*.

PLATE 145.

TRIBULUS, *Tourn.*

Calyx 5-sepalus deciduus. Filamenta nuda. Ovarium 5-loculare; loculis 3-5-ovulatis. Fructus 5-coccus; coccis axi centrali nullo demum sejunctis, indehiscensibus, dorso tuberculatis vel spinosis, intus inter semina superposita oblique transversim 2-5-locellatis, locellis monospermis. Embryo exalbuminosus: cotyledones axi parallelæ. — Herbæ diffusæ; foliis abrupte pinnatis, altero sæpius minore.

TRIBULUS, *Tourn. Inst.* p. 265. t. 141. *Linn. Gen.* 532. *Schk. Handb.* t. 115. *Gærtn. Fr.* 1. p. 335. t. 169. *DC. Prodr.* 1. p. 703 (excl. spec.). *Adr. Juss. in Mem. Mus.* 12. p. 451. t. 14. f. 1. *Endl. Gen.* 6030.

Caltrops.

CALYX of five lanceolate herbaceous SEPALS, scarcely united at the base, quincuncially imbricated in æstivation, deciduous. PETALS 5, obovate, spreading, hypogynous, larger than the sepals, quincuncially imbricated in æstivation, deciduous. STAMENS 10, hypogynous; the five opposite the petals exterior and usually a little longer than the others; the five alternate with these subtended by a gland at their base on the outside: FILAMENTS filiform, naked (destitute of a scale): ANTHERS cordate or oblong, introrse, fixed by the middle, two-celled, the cells opening longitudinally. PISTIL of five united carpels: OVARY sessile, its base surrounded by an urceolate ten-lobed disk, clothed with appressed hairs, five-celled; the cells opposite the petals, three-five-locellate by obliquely transverse septa: STYLE short and thick: STIGMAS 5, large, more or less connate, parallel or somewhat radiate, opposite the sepals (alternate with the cells). OVULES 3 to 5 in each cell, superposed in a single series (one in each compartment), obliquely pendulous from the inner angle, anatropous, the raphe ventral.

FRUIT depressed, five-angular, tuberculate or spinose, separating at maturity into five thick and bony indehiscent cocci, leaving no central axis; the cocci divided internally by oblique transverse septa into from three to five one-seeded compartments. SEEDS obliquely pendulous, oblong-obovate; the membranaceous testa marked with a filiform raphe and a circular chalaza. ALBUMEN none. EMBRYO conformed to the testa: COTYLEDONS oval, fleshy, parallel with the raphe and axis: RADICLE short, conical, centripetal-superior.

HERBS diffuse or procumbent; with abruptly pinnate opposite leaves, one of which alternately is smaller than the other. Stipules subulate or lanceolate, membranaceous. Flowers solitary, on terminal peduncles, which become lateral and as if axillary from the smaller leaf of each pair, owing to the repeated evolution of the branch from the axil of the larger leaves. Petals yellow, or rarely white.

ETYMOLOGY. *Τρίβολος*, an ancient name of *Trapa natans*, so called from its triangular prickly nut (from *τρῖς*, *three*, and *βάλλω*, *to strike or wound*), also applied to *T. terrestris*, on account of its prickly fruit.

GEOGRAPHICAL DISTRIBUTION. A genus of a few species indigenous to the Mediterranean region, and within the tropics of the Old World, and of one indigenous to tropical America, which extends northward to the coast of Florida and Texas; namely, *T. cistoides*, *L.*, which has been incorrectly referred to *Kallströmia*.

PLATE 145. *TRIBULUS CISTOIDES*, *Linn.*; — a flowering branch (from Florida), of the natural size.

1. Diagram of the flower.
2. The pistil, with the hypogynous disk and glands, magnified.
3. Vertical section of the same, with the stamens, petals, &c. in place.
4. An ovule detached and more magnified.
5. The 5-coccos fruit, of the natural size.
6. Vertical section of one of the cocci and of its seeds, enlarged.
7. A detached seed magnified; the raphe toward the eye.
8. Vertical section of the same, cutting through the raphe.
9. Embryo detached and magnified.

PLATE 146.

KALLSTRÖMIA, *Scop.*

Calyx 5 – 6-sepalus persistens. Filamenta 10 – 12, nuda. Ovarium 10 – 12-loculare; loculis uniovulatis. Fructus 10 – 12-coccus; coccis ab axi stylifero persistente seccidentibus, monospermis, indehiscentibus. Embryo exalbuminosus: cotyledones axi contrariæ. — Herbæ Tribuli facie.

KALLSTRÖMIA, Scop. *Introductio*. p. 937. Wight & Arn. *Prodr. Ind. Or.* 1. p. 145. Torr. & Gray, *Fl. N. Am.* 1. p. 213. Endl. *Gen.* 6031.

TRIBULI Sp., Linn., Jacq., etc.

EHRENBURGIA, Mart. *Nov. Gen. & Sp. Bras.* 2. p. 72. t. 163.

HETEROZYGIS, Bunge, *Vers. Altai. Pflanz.* p. 82, fide Endl.

CALYX of five or six lanceolate or subulate SEPALS, scarcely united at the base, imbricated in æstivation, persistent. PETALS 5 or 6, obovate or obcordate, spreading, hypogynous, larger than the sepals, imbricated or convolute in æstivation, deciduous. STAMENS 10 or 12, hypogynous; those opposite the petals exterior, more or less adnate to their base, and separating with them; the alternate ones (opposite the sepals) smaller, subtended by a gland at their base externally: FILAMENTS subulate-filiform, naked (destitute of a scale): ANTHERS introrse, two-celled, the cells opening longitudinally. OVARY sessile, ten – twelve-celled, the cells twice as many as the sepals, destitute of transverse septa: STYLE columnar or subulate from a conical base: STIGMA subcapitate, thick, vertically ten – twelve-grooved. OVULES solitary in each cell and pendulous from its inner angle, anatropous or semi-anatropous, the micropyle superior.

FRUIT pyramidal and angled, muricate or roughened externally, separating at maturity into ten or twelve bony and indehiscent one-seeded cocci, leaving a thick and persistent styliferous central axis. SEED filling the cells, obovate; the testa membranaceous. ALBUMEN none. EMBRYO conformed

to the testa: COTYLEDONS obovate, rather fleshy, their edges directed to the raphe and to the axis of the fruit: RADICLE conical, superior.

HERBS branching and diffuse, hairy, with the habit, inflorescence, and foliage of *Tribulus*; the leaves sometimes alternate by the abortion of one of each pair. Stipules subulate. Flowers yellow or red.

ETYMOLOGY. Named in honor of some obscure botanist.

GEOGRAPHICAL DISTRIBUTION, &c. This small genus, which is nearly restricted to tropical America, was founded on the *Tribulus maximus*, *Linn.*, of the West Indies, also widely indigenous in Mexico, Texas, &c., and sparingly naturalized in the Southern Atlantic States. With this, a hexamerous Brazilian species has recently been associated; and a third, as yet undescribed, occurs in Coulter's Mexican collection, and probably the same is in the collection made by Major Emory. The specific name of *K. maxima* is far from appropriate, as it is the humblest and smallest-flowered species known; but it seems that this is the Linnæan plant. It is not clear whether the pistil is ten-carpellary, or whether there are five carpels, with the cells divided by a spurious dorsal partition, as in the Flax.

PLATE 146. *KALLSTRÖMIA MAXIMA*, *Torr. & Gr.*;—a branch, of the natural size, in flower and fruit.

1. Diagram of the flower (with the petals convolute in æstivation), including a transverse section of the ten-celled ovary.
2. Enlarged flower, with the petals and the five larger stamens that adhere to them, removed.
3. A petal, with its stamen, enlarged.
4. One of the smaller stamens, enlarged.
5. Pistil and receptacle, vertically divided, magnified.
6. One of the ovules more magnified.
7. Fruit, with the calyx, enlarged; two of the cocci detached.
8. One of the detached cocci of the same.
9. The same, vertically divided through the seed and embryo.
10. Embryo of the same, detached entire (inverted); the cotyledons a little opened.

PLATE 147.

LARREA, *Cav.*

Calyx 5-sepalus deciduus. Stamina 10; filamentis squama 2-fida auctis. Ovarium breviter stipitatum, 5-loculare; loculis 5-6-ovulatis. Fructus tomentosus, profunde 5-lobus, in nucas 5 evalues scedens. Seminis testa tenuissima. Embryo in albumine corneo rectiusculus: cotyledones angustoblongæ, raphi axique parallelæ. — Frutices humiles; foliis resinosis pinnatisectis vel 2-lobis; floribus solitariis luteis.

LARREA, Cav. in Ann. Cienc. Nat. 2. p. 119. t. 18, 19, & Ic. 6. p. 36. t. 559, 560. DC. Prodr. 1. p. 705. Adr. Juss. in Mem. Mus. 12. p. 456. t. 15. f. 5. Endl. Gen. 6038. Moricand, Pl. Nouv. Amer. t. 48. Torr. in Emory, Rep. p. 138. t. 3.

Gobernadora. Creosote-plant.

CALYX of five ovate or obovate and somewhat unequal SEPALS, scarcely united at the base, quincuncially imbricated in æstivation, deciduous. PETALS 5, obovate or lanceolate-spatulate, hypogynous, more or less unguiculate, quincuncially imbricated in æstivation, longer than the calyx, deciduous. STAMENS 10, hypogynous, inserted at the base of a small somewhat ten-lobed disk, nearly equal, five of them opposite and five alternate with the petals: FILAMENTS filiform, connate below with the outside of a two-cleft and sometimes laciniate-toothed membranaceous scale: ANTHERS cordate-oblong, fixed above the base, introrse, two-celled, the cells opening longitudinally. PISTIL of five united carpels: OVARY somewhat stipitate, globular, hairy, five-celled; the cells alternate with the petals: STYLES united, sometimes separable at maturity: STIGMAS 5, minute. OVULES usually 6 in each cell, pendulous in pairs from its inner angle, anatropous, but the slender micropylar extremity produced upwards beyond the attachment of the funiculus; the raphe ventral.

FRUIT villous or tomentose, globular, deeply five-lobed, separating (from a filiform axis in *L. Mexicana*) into five indehiscent cocci. SEED solitary by abortion, oblong, somewhat incurved, marked with a narrow acute raphe; the micropyle produced beyond the hilum, superior; the testa very thin and smooth. EMBRYO slightly incurved in nearly corneous albumen and almost of its length: COTYLEDONS narrowly oblong, flattish, parallel with the raphe and with the axis of the fruit: RADICLE rather slender, superior.

SHRUBS evergreen, strong-scented, exuding a balsam, usually with low, much-branched stems, and nodose-articulated distichous and mostly alternate branchlets. LEAVES opposite, equal, consisting of a single pair, rarely of several pairs, of inequilateral leaflets which are more or less united at the base; the common petiole short or none. Stipules persistent. Peduncles short, terminal, one-flowered. Flowers yellow.

ETYMOLOGY. Dedicated to *J. A. H. de Larrea*, a Spanish ecclesiastic.

GEOGRAPHICAL DISTRIBUTION. The three species described by Cavanilles are found on the Cordilleras of Chili and Paraguay; the fourth (which Moricand has identified with the *Zygophyllum tridentatum*, DC.) is common through the interior of Northern Mexico and New Mexico, extending to the Upper Arkansas (*Major Emory*) and to Southern Texas, *Mr. Wright*.

PROPERTIES. They exude a heavy-scented, balsamic resin, esteemed in the Cordilleras for bruises, &c. The northern species, called *Gobernadora* or *Guamis* by the Mexicans, and *Creosote-plant* by the Anglo-Americans, from its scent, is used for dysuria and for rheumatism.

PLATE 147. *LARREA MEXICANA*, *Moric.* (*L. glutinosa*, *Engelm.*); — a branchlet, of the natural size. (Chiefly from Gregg's specimens.)

1. Diagram of the flower.
2. A magnified stamen and scale, seen from within; and 3. from without.
4. Pistil and receptacle, magnified.
5. Magnified vertical section through the ovary and base of the flower.
6. An ovule more magnified, showing its tubular apex.
7. A fruit of the natural size.
8. The same, magnified, with two of the cocci removed.
9. One of the cocci of the same detached.
10. Vertical section of the same, and of the seed and contained embryo.
11. The seed entire, more magnified.
12. The embryo entire, with the cotyledons opened, magnified.

PLATE 148, 149.

GUAIAACUM, *Plumier*.

Calyx 5-sepalus, deciduus. Stamina 10; filamentis nudis. Ovarium plus minusve stipitatum, 2-5-loculare, loculis 8-10-ovulatis. Fructus subcarnosus, 2-5-locularis, profunde 2-5-angulatus, angulis compressis acutatis. Seminis testa incrassata, carnosâ. Embryo in albumine corneo-cartilagineo tenuissime rimoso rectus: cotyledones ovaies, marginibus raphen (aximque fructus) spectantes. — Arbores ligno durissimo; foliis abrupte pinnatis 1-7-jugis; foliis coriaceis reticulato-venosis; floribus cæruleis vel purpurascensibus.

GUAIAACUM, Plum. Gen. p. 79. t. 17. Linn. Gen. 518. Lam. Ill. t. 342. Gærtn. Fr. 2. t. 113. DC. Prodr. 1. p. 706. Adr. Juss. in Mem. Mus. 12. p. 456. t. 16. f. 7. Lindl. in Bot. Reg. 1839. t. 9. Endl. Gen. 6041.

Subgen. ? GUAIAACIDIUM. — Filamenta basi squamulæ brevi accreta. — Folia 5-14-juga. Flores nonnunquam 4-meri S-andri.

Lignum-Vitæ Tree.

CALYX of five (rarely four) ovate SEPALS, slightly united at the base, imbricated in æstivation, deciduous. PETALS as many as the sepals, and longer than they, obovate, more or less unguiculate, imbricated in æstivation, deciduous. STAMENS 10, hypogynous, five opposite and five alternate with the petals, shorter than they: FILAMENTS subulate or filiform, naked, or in the subgenus bearing a short membranous scale on the inside: ANTHERS cordate-oblong or sagittate, fixed near the base, introrse, two-celled, the cells opening longitudinally. PISTIL of two or five united carpels: OVARY raised more or less on a thick stipe or gynophore, two-

five-lobed, two – five-celled : **STYLE** subulate, acute : **STIGMA** minutely two – five-toothed, or entire. **OVULES** 8 or 10 in each cell, pendulous in pairs from its inner angle, anatropous, with the micropylar extremity produced into a slender tubular projection, so as to appear as if suspended by its middle on the slender or filiform funiculus; the raphe ventral.

FRUIT between coriaceous and fleshy, smooth, strongly two – five-angled; the angles acute or wing-like, at length more or less septical. **SEEDS** by abortion solitary in each cell, suspended, ovoid, anatropous; the testa thick and fleshy, separating from the nucleus, which is invested with a very thin and indistinct closely adherent tegmen. **ALBUMEN** corneous-cartilaginous, very hard, the surface marked by minute grooves which penetrate deeply in lines (rimose). **EMBRYO** straight or nearly so in the axis of the albumen, and almost equalling it in length: **COTYLEDONS** oval, foliaceous, or a little fleshy, plane, their edges directed to the raphe and to the axis of the fruit: **RADICLE** short, conical, superior.

TREES or shrubs, with very hard wood, which is mostly imbued with a peculiar resinous principle; the branches alternate, commonly nodose-articulated. Leaves opposite, and often also a pair on an abortive axillary branch, thus appearing fascicled, abruptly pinnate, petioled, more or less persistent; the leaflets from one to several pairs, coriaceous, entire, reticulate-veined, smooth and shining. Peduncles terminal, solitary or geminate, one-flowered, rarely several-flowered. Flowers rather large, blue or purplish.

ETYMOLOGY. *Guaiaco*, or *Guaiacan*, is the aboriginal name of the *Lignum Vitæ*. It is said to be a corruption of *Hoaxacan*, the original Mexican appellation.

GEOGRAPHICAL DISTRIBUTION. A genus of several species, all of them natives of the West Indies and of the adjacent parts of the American continent. *Guaiacum sanctum*, *Linn.*, has been found on Key West, by *Mr. Blodgett*, and probably likewise grows on the peninsula of East

Florida. *G. angustifolium*, *Engelm.*, belongs to Western Texas and Northern Mexico.

PROPERTIES. All the species are remarkable for their very dense and heavy, close-grained wood. *Lignum Vita*, so well known in the arts as well as in medicine, is the wood of *G. officinale* or of *G. sanctum*, one or both. It is the hardest and heaviest wood known (its specific gravity being 1.333, so that it sinks at once in water), and, owing to the diagonal crossing of the fibres, it never splits. The officinal *Gum Guaiacum* is obtained either by natural exudation from the living tree, or by heating the wood and distilling off the resin. It is what has been termed a gum-resin, of bitter and acrid stimulant properties, and has long been famous in medicine as an alterative and sudorific, &c. The foliage is employed in the West Indies instead of soap, to scour and whiten floors.

DIVISION. The true species of *Guaiacum* have the filaments entirely naked: but in the *Zygophyllum arboreum* of Jacquin, referred to this genus by De Candolle, and the recently characterized *G. angustifolium*, *Engelm.*,* they are appendiculate with a small scale! These species, being somewhat peculiar in habit and foliage, may be separated as a genus; but the other floral characters accord so completely with *Guaiacum* that it seems more proper to distinguish them only as a subgenus, although the presence or absence of these appendages is taken to be of generic importance in this family. Their cotyledons are placed contrary to the axis, while those of *Portiera*, *Ruiz & Pav.*, as figured by Adr. de Jussieu, are parallel with it, like those of *Larrea*. — *G. sanctum* (often confounded with *G. officinale*), here figured for comparison, is not found within the strict geographical limits of this work. *G. angustifolium*, *Engelm.*, is here figured partly from Lindheimer's Texas specimens, but principally from a Northern Mexican specimen of Dr. Gregg's collection, which furnished mature fruit. †

PLATE 148. *GUAIACUM SANCTUM*, *Linn.*; — a flowering branch, of the natural size, from Key West.

1. Diagram of the flower.
2. External view of a stamen, magnified.
3. The same, seen from the inner side.
4. Magnified vertical section of the pistil, &c., with two stamens.
5. An ovule detached and more magnified.
6. Immature fruit, enlarged. (Ripe fruit not seen.)

* In Wislizenus's *Memoir of a Tour to Northern Mexico*, (Senate Document, 1848,) Botanical Appendix, p. 113.

† Specimens in fine fruit, gathered in Southern Texas, have just reached me, from Mr. Wright.

PLATE 149. GUAIACUM (GUAIACIDIUM) ANGUSTIFOLIUM, *Engelm.*; — a branch of the natural size, in flower and young fruit.

1. Diagram of the flower.
2. External view of a stamen and its seale, magnified.
3. Internal view of the same.
4. The pistil, magnified.
5. Vertical section of the same, and of the base of the stamens, petals, &c.
6. An ovule detached and more magnified.
7. The fruit, of the natural size.
8. Vertical section of the same, dividing the seed and embryo in one cell ; showing the seed entire in the other.
9. Transverse section of the fruit, and of its two seeds.
10. The embryo detached entire, enlarged.

ORD. GERANIACEÆ.

Herbæ vel suffrutices, nodis tumidis, foliis oppositis alternisve plerumque palmatilobis stipulatis: dicotyledoneæ, hypogynæ, symmetricæ, pentameræ; æstivatione calycis persistentis imbricativa, corollæ sæpius convolutiva; staminibus 10 submonadelphis, exterioribus brevioribus sæpe anantheris petalis oppositis; ovariis biovulatis stylisque gynophoro columnæformi prælongo adnatis, fructu elasticæ solutis; seminibus solitariis exalbuminosis; embryo conduplicato, cotyledonibus magnis flexuoso-convolutis.

GERANIA, Juss. Gen. p. 268.

GERANIOIDEÆ, Vent. Tab. 3. p. 170.

GERANIACEÆ, DC. Fl. Fr. & Prodr. 1. p. 637. Endl. Gen. p. 1166.
Lindl. Veg. Kingd. p. 493.

THE GERANIUM FAMILY is well known through the wild species of Cranesbill, or the true Geraniums, of Europe and North America, and by the Pelargoniums of the Cape of Good Hope, the most common of house-plants. From the related families with which it accords in the general plan and structure of the flowers it is readily distinguished by the prolonged axis (gynophore), to which the surrounding carpels cohere both by their ovaries and their long styles, and from which they separate at maturity, usually from below upwards; the elastically recurved or spirally twisting styles carrying the carpels away with them. The seeds are destitute of albumen; and the embryo has the large cotyledons convolutely folded together and bent down upon the short radicle. The lower leaves are constantly opposite; the upper sometimes alternate.

The æstivation of the corolla is convolutive only as the general rule. It is occasionally quincuncially imbricative in the common species of all three genera, and every gradation between the two modes may often be found in different flowers on the same plant.

In this, as in the foregoing family, the stamens which stand before the petals (here shorter than the others) are an exterior series, and hence are reckoned by some botanists as a deduplication of the corolla. But it is more

likely that the five hypogynous glands, alternate with the petals, represent the primary staminal verticil, the shorter and often sterile stamens the second, and the larger stamens the third verticil.

This order consists of about five hundred known species, comprised in four genera, namely : — 1. *Geranium*, which belongs principally to the northern temperate zone, especially to Europe and Northern Asia, has ten perfect stamens, and the styles in fruit are simply revolute from the base upwards, and not bearded within. 2. *Erodium*, which is widely diffused over the warmer temperate and subtropical regions of the whole Old World, and sparingly also in the New, and is distinguished by having only five antheriferous stamens, and styles which are bearded inside and spirally twisted in fruit. 3. *Monsonia*, of Southern Africa, which has fifteen perfect stamens and the fruit of *Erodium* or *Pelargonium*. 4. *Pelargonium*, a large genus which belongs to the southern hemisphere, and entirely to the Cape of Good Hope, with the exception of one or two Australian and Oceanic species; and is characterized by the more or less irregular corolla, and the spurred calyx (the spur wholly adnate to the pedicel); the perfect stamens less than ten.

An astringent principle pervades the order, as is manifest especially in the root of our *Geranium maculatum*. This is also accompanied, in many cases, by an aromatic ethereal oil, upon which their odor depends; that of *Pelargonium roseum*, obtained by distillation, is used for adulterating attar of roses. The juice contains considerable mucilage, and in many *Pelargoniums* is acidulated with a free acid. The flowers of most species are handsome; but only the *Pelargoniums* are much cultivated.

The roots of *Geranium* are purely astringent. Those of our *G. maculatum*, which is the species most used in medicine, contain much gallic acid and tannin, the latter, according to Dr. Bigelow, in larger proportion than in kino. They are so astringent that the plant is called *Alum-root* in some parts of the country, and has a high reputation as a remedy for chronic dysentery, bowel-complaints, aphthous ulcerations, &c.

PLATE 150.

GERANIUM, *Tourn.*, *L'Her.*

Flores regulares. Filamenta 10 omnia antherifera. Aristæ carpellorum a basi ad apicem ab axi rostriformi elastice solutæ, revolutæ, intus nudæ. — Folia sæpius palmatifida.

GERANIUM, *Tourn.* (excl. spec.). *Linn. Gen.* 832 (excl. spec.). *Cav. Diss.* 4. t. 76-99. *L'Her. Geran.* t. 36-40. *DC. Prodr.* I. p. 639. *St. Hil. Fl. Bras.* I. p. 100. *Endl. Gen.* 6046.

Cranesbill.

side geraniaceae

CALYX of five nearly equal and distinct herbaceous SEPALS, quincuncially imbricated in æstivation, not produced or tubular at the base, persistent. PETALS 5, alternate with the sepals, equal, usually obovate or obcordate, somewhat unguiculate, hypogynous, convolute, or frequently one petal wholly exterior, or in the same plant occasionally quincuncially imbricated in æstivation, caducous. HYPOGYNOUS GLANDS 5, alternate with the petals. STAMENS 10, hypogynous, inserted in two series on the short receptacle; the five exterior opposite the petals, and shorter than the five interior, which are opposite the sepals and the glands: FILAMENTS all antheriferous, subulate, flattened-dilated below, distinct to the base, or usually somewhat monadelphous, persistent: ANTHERS oblong, fixed by the middle, introrse, versatile; two-celled, destitute of any manifest connective, the cells opening longitudinally. PISTIL of five carpels (opposite the petals) united to a prolonged and columnar central axis (gynophore) which extends almost to the apex of the styles: OVARIES two-ovuled: STYLES distinct at the summit, their inner face stigmatose. OVULES collateral and pendulous (always?) from about the middle of the inner angle of the cell, anatropous or semianatropous; the raphe ventral; the micropyle superior.

FRUIT of five membranaceous follicular carpels, with their

inner face partly imbedded in excavations of the dilated base of the long and beak-like central axis, from which they separate at maturity, and are ruptured on the inner face, remaining attached to the base of the persistent and indurated flattened styles; which separate from the prolonged 5-angular axis or beak from below upwards, and are circinate recurved, their inner face smooth or rarely a little hairy. SEED by abortion solitary in each carpel, pendulous, anatropous or half anatropous, the crustaceous testa usually reticulated or pitted, destitute of albumen. EMBRYO conformed to the seed: COTYLEDONS large and foliaceous, convolutedly folded together so that the transverse section is like a letter S; the RADICLE short, conical, inflexed upon the cotyledons and applied to them near one of their margins, descending.

HERBS, rarely suffrutescent plants, usually caulescent, with tumid nodes, and opposite (or the uppermost sometimes alternate) stipulate leaves, which are usually rounded and palmately lobed or parted, rarely ternately or pinnately dissected. Peduncles terminal, or becoming alar or lateral, one - two-flowered, four-bracteate at the origin of the pedicels. Flowers purple, reddish, or white.

ETYMOLOGY. The name is derived from γέρας, *a crane*, from a fancied resemblance of the prolonged axis of the fruit to the beak of that bird.

★
PLATE 150. GERANIUM MACULATUM, *Linn.*; — a flowering branch.

1. Diagram of a flower, with the corolla convolute in æstivation.
2. Diagram of the calyx and corolla, with one petal exterior in æstivation.
3. Flower enlarged, the calyx and corolla removed, showing the glands, &c.
4. A long and a short stamen, more magnified.
5. The pistil and receptacle, magnified.
6. Vertical section of the base of the same, more magnified.
7. One of the ovules detached and more magnified than those in fig. 6.
8. The fruit with the calyx, of the natural size, the dehiscent carpels borne on the upwardly recurved styles.
9. A seed, magnified.
10. A transverse section of the same.
11. Embryo detached and divided across the cotyledons, magnified.

PLATE 151.

ERODIUM, *L'Her.*

Filamenta 5 breviora ananthera. Aristæ carpellorum sæpius ab apice ad basin elastice solutæ, intus barbata, inferne spiraliter tortæ. Cætera Geranii. — Folia plerumque pinnatisecta.

ERODIUM, L'Her. Geran. t. 2-6. Willd. Sp. 3. p. 625. DC. Fl. Fr. 4. p. 838, & Prodr. l. c. St. Hil. Fl. Bras. 1. p. 96. Endl. Gen. 6045.
GERANII Sp., Tourn., Linn., etc.

Storksbill.

CALYX of five nearly distinct and equal herbaceous SEPALS, quincuncially imbricated in æstivation, not produced or tubular at the base, persistent. PETALS 5, hypogynous, alternate with the sepals, equal, somewhat unguiculate, convolute or sometimes quincuncially imbricated in æstivation, caducous. HYPOGYNOUS GLANDS 5, alternate with the petals. STAMENS 10, hypogynous, inserted in two series on the short receptacle; the five exterior opposite the petals, sterile (destitute of anthers) and shorter than the five fertile, which are opposite the sepals and the glands: FILAMENTS dilated below, membranaceous, persistent, distinct or slightly monadelphous: ANTHERS oblong or cordate, introrse, two-celled, the cells opening longitudinally. PISTIL, &c., as in Geranium. OVULES two in each ovary, inserted one above the other on the middle of its inner angle, anatropous, pendulous, or the upper resupinate-ascending.

FRUIT of five small coriaceous (and internally deliscent or often indelhiscent) achenia-like carpels, awned by the long and indurated persistent styles; which at maturity separate elastically from the long and slender beak-like axis, commonly from the apex downwards, and are villous with strong hairs along the inner face, the lower part twisting spirally.

SEED solitary in each carpel, becoming half-anatropous by the greater development of its upper portion, the raphe ventral and occupying the lower half of the seed, which is therefore peritropous-pendulous (not ascending), destitute of albumen; the testa smooth. EMBRYO filling the seed, conduplicate: COTYLEDONS narrowly oblong, sometimes (in *E. moschatum*) pinnatifid, usually flexuose-convolute, incumbent on the descending RADICLE, which reaches the hilum.

HERBS, rarely suffrutescent plants; with opposite stipulate leaves (one usually smaller than the other), which are more commonly pinnate and bipinnately parted or lobed, rarely palmately lobed. Peduncles terminal, or becoming lateral as if arising from the axil of the smaller leaf, umbellately two-several-flowered, with an involucrel of four bracts at the origin of the pedicels. Flowers usually purple or white.

ETYMOLOGY. The name is taken from *ερωδιός*, a heron or stork, from a fancied resemblance of the beak of the fruit to the long bill of those birds.

NOTE. *E. cicutarium*, which sparingly occurs in the United States, was, I doubt not, introduced from Europe; and I suspect that it was likewise introduced with cattle into the plains of California and Oregon, where it is widely diffused, so as to be a characteristic plant. *E. macrophyllum*, Hook. & Arn., appears to be truly indigenous in California, as is the related species here figured in Texas. Its later flowers are apetalous!

PLATE 151. *ERODIUM TEXANUM*, n. sp. :— summit of a flowering plant, of the natural size, from Texan specimens of *Lindheimer* and *Wright*.

1. Diagram of the flower (the petals in the specimen quincuncially imbricated in æstivation!), with a transverse section of the ovary.
2. The stamens and pistil, glands, &c., magnified.
3. A sterile filament, separated.
4. An inside, and 5. an outside view of a perfect stamen, magnified.
6. Pistil with the hypogynous glands, magnified.
7. Vertical section of the same, showing the ovules.
8. An ovule detached and more magnified.
9. Fruit and calyx, the bearded styles separating from the beak, enlarged.
10. One of the achenia-like carpels, with the base of the style, magnified.
11. The same (with less of the style), more magnified, vertically divided through the seed and embryo.
12. Seed extracted entire and magnified.
13. Magnified embryo, cut across to show the convolute cotyledons, &c.

ORD. BALSAMINACEÆ.

Herbæ simplicifoliæ exstipulatæ, caule succo aqueo turgido: dicotyledoneæ, hypogynæ, pentandræ, irregulares; perianthio colorato asymmetrico postice saccato; staminibus superne connato-cohærentibus; ovario 5-loculari, loculis 2-pluriovulatis; fructu sæpius capsulari elasticè dissilientibus; seminibus exalbuminosis anatropis; embryone recto, cotyledonibus magnis crassis.

BALSAMINEÆ, A. Rich. in Dict. Hist. Nat. 2. p. 173. DC. Prodr. 1. p. 685. Bartl. Ord. Nat. p. 422. Kunth in Mem. Soc. Hist. Nat. Par. 3. p. 384, & Fl. Berol. 1. p. 82 Röper, Flor. Bals. (1830), & in Linnæa, 9. p. 119. Wight & Arn. Prodr. Ind. Or. 1. p. 134. Arn. in Linnæa, 9. p. 112. Wight, Ill. Ind. Bot. p. 156. t. 61. Bernh. in Linnæa, 12. p. 669. Endl. Gen. p. 1173.

BALSAMINACEÆ, Lindl. Introd. Nat. Syst. ed. 2. p. 138, & Veg. Kingd. p. 490.

THE BALSAM OR JEWEL-WEED FAMILY comprises only the large genus *Impatiens*, Linn., with *Hydrocera*, a small East Indian genus, which has more symmetrical flowers and a drupaceous fruit.

Its nearest affinities are with the Oxalidaceæ and Linaceæ, especially the former, from which it differs most strikingly by its remarkably irregular and strictly pentandrous flowers. A character in which *Impatiens* accords with most *Zygophyllaceæ* has apparently been overlooked or misunderstood, namely, the internal membranaceous appendages of the filaments. These five subulate appendages are connivent and more or less coherent over the summit of the pistil. In our native species, they cover the stigma so closely as entirely to prevent the access of the pollen in the greater part of the fully developed flowers, which consequently fall away unfertilized; but sometimes the growing ovary pushes the stigma through the apex of this cap so as to secure its fertilization. Meanwhile the fruit is chiefly produced from a succession of small flower-buds, in which apparently no such appendages are interposed between the anthers and the stigma, and in which the ovary is fertilized at a very early period, while the floral envelopes are yet minute and almost regular. The gravid ovary as it enlarges detaches the

rest of the bud from the receptacle and carries it upwards on its apex, like the calyptra of a Moss. These minute fertile flower-buds, which begin to be produced earlier than the ordinary blossoms, were several years since pointed out to me by Dr. Torrey in our native species, and are mentioned in his *Flora of the State of New York*. They had already been noticed in the European Touch-me-not by Mr. Weddel;* but I am not aware that the frequent sterility of the ordinary, conspicuous flowers, and its cause, had been observed.

Several more or less conflicting opinions prevail respecting the morphology of the irregular floral envelopes in this family, and how they are to be divided between the calyx and the corolla. Those of Röper and of Kunth are best sustained; and differ chiefly (when the flower, which Kunth takes as it hangs resupinate on the stalk, is brought into its proper position) as respects the anterior, emarginate leaf of the flower. This Röper counts as a petal, referring to the calyx only the two lateral sepals and the spur; the two anterior sepals which are needed to complete its symmetry being abortive or wanting in *Impatiens*. The view of Kunth, and also of Arnott, who consider this organ as a pair of sepals united by their contiguous margins, is that which is adopted in this work. It accords better than any other with the more regular, though minute, fertile flower-buds (Plate 153, Fig. 5), in which I observe no organs corresponding to the rudimentary anterior sepals of Röper; but I have no opportunity of comparing it with *Hydrocera*.

The plants of this family are not endowed with any important useful properties. Their succulent stems abound with a watery juice, which is slightly acrid, and is said to be diuretic. The blossoms are usually ornamental.

* Vide Adr. de Jussieu, *Monographie des Malpighiacées*, p. 85.

PLATE 152, 153.

IMPATIENS, *L.*

Sepalum posticum maximum saccato-calcaratum. Petala 4 per paria connata, seu 2 inæqualiter bipartita. Capsula carnosu-cartilaginea; valvis a placenta centrali persistente elasticè dissilientibus.

IMPATIENS, Linn. Gen. 1008. Lam. Ill. t. 725. Schkuhr, Handb. t. 270.

Wight & Arn. Prodr. Ind. Or. 1. p. 135. Endl. Gen. 6060.

BALSAMINA, Tourn. Inst. p. 418. t. 235. Juss. Gen. p. 270. Gärtn. Fr. 2. p. 151. t. 113.

BALSAMINA & IMPATIENS, Rivin. Tetrap. Irreg. 4. p. 146. DC. Prodr. 1. p. 685.

Balsam. Touch-me-not. Jewel-weed.

CALYX petaloid, deciduous, apparently of four, but really of five SEPALS, the two anterior being united into one, very irregular; the two lateral sepals exterior and at first valvate in æstivation, or soon incumbent, the others smaller than they, often minute; the posterior one (nectary of Linnæus) very large, saccate and usually spurred at the base, often resembling the cornucopiæ in shape, its margins incumbent upon the anterior in æstivation; the two anterior (and innermost in æstivation) united into one, which is notched at the apex, orbicular and concave or gibbous. PETALS hypogynous, lateral, deciduous, two in number and alternating with the two lateral and the posterior sepals, deeply and unequally two-cleft or two-parted, usually considered to represent four petals (the two superior and the two lateral) united in pairs, the anterior petal wanting; the two lateral lobes or petals smaller than the others and exterior, so as to cover their edges in æstivation. STAMENS 5, hypogynous, alternate with the cells of the ovary, short: FILAMENTS broad and thickish, connivent, somewhat coherent, furnished with a membrana-

ceous subulate appendage which arises from the inner face towards the summit; these five appendages are connivent or coherent over the apex of the pistil, where they retain the stamens after they separate from their insertion: **ANTHERS** oval or cordate, fixed by the base, introrse, two-celled (the cells distinct, or sometimes connate-confluent at their apex, opening longitudinally or obliquely down the inner face. **POLLEN-grains** oval, simple. **OVARY** five-celled, the cells alternate with the sepals and with the stamens: **STYLE** none: **STIGMA** small, sessile, entire or minutely five-toothed. **OVULES** few or several in a single series and pendulous from the inner angle of each cell, anatropous; the raphe thickened, sometimes produced beyond the chalaza, ventral.

CAPSULE oblong, prismatic or nearly terete, becoming one-celled by the obliteration of the dissepiments, with a thick and fleshy axis or placenta, bursting elastically when ripe by loculicidal dehiscence (usually from the base upwards) into five valves; the valves thick, with a fleshy exocarp and an almost cartilaginous epicarp, often splitting in two longitudinally, strongly revolute (in the Balsams), or twisting spirally (in the Touch-me-not), as the pod falls in pieces. **SEEDS** few or several in each cell, pendulous from the central axis, oval, with a fleshy and often four-ribbed testa, destitute of albumen. **EMBRYO** straight, filling the cavity of the seed: **COTYLEDONS** oval, thick and fleshy, or plano-convex: **RADICLE** very short, superior.

HERBS, commonly annual, with succulent stems, and alternate, or sometimes opposite or verticillate, simple pinnately-veined leaves, destitute of stipules. **PEDUNCLES** axillary, one-flowered, or racemously several-flowered. Flowers variously colored, articulated with the apex of the pedicel, commonly resupinate-pendulous, so that the great saccate-spurred sepal appears to be inferior. Many of the large and fully developed flowers fall away without forming fruit; while others, especially the earlier ones, become fertilized in the bud while yet minute; when the growth of the fertilized ovary detaches and carries up on its apex, like a calyptra, the

unexpanded flower-bud. The development of the floral envelopes being arrested at an early period, these flowers are spurless and less irregular (and their filaments are nearly, if not entirely, destitute of the internal appendages), so that their morphological structure is more readily made out than in the conspicuous flowers.

ETYMOLOGY. From the Latin word *impatiens*; so called in allusion to the sudden bursting of the pods, especially when touched. The popular name of Touch-me-not alludes to the same peculiarity.

GEOGRAPHICAL DISTRIBUTION. One species of this genus is indigenous in Europe and Northern Asia; two are natives of North America; while the remainder, fully a hundred in number, belong to the tropical or subtropical regions of the Old World, especially on the slopes of mountains, the greater part to Eastern Asia. They flourish only in moist and shady places.

PROPERTIES. These are of no importance, although the European species was formerly employed as a diuretic. The Garden Balsam (*Impatiens Balsanina*, *L.*), an Indian species, is a well-known ornamental annual, the flowers of which double with great facility, and sport into numerous variegated forms.

PLATE 152. *IMPATIENS FULVA*, *Nutt.*; — summit of a branch both in flower and fruit, of the natural size. (From Cambridge, Massachusetts.)

1. Diagram of the flower, brought into its true position as respects the axis, the transverse line underneath denoting the position of the bract.
2. The sepals and petals displayed in their relative position; the flower here exhibited in the inverted or resupinate-pendulous position in which it naturally hangs on the stem, so as to bring the spur or sac anterior.
3. Vertical section of a flower through the spur, the stamens, and the ovary, enlarged.
4. A flower with the sepals and petals removed, showing the connivent stamens, magnified.
5. One of the stamens seen from within, showing the dehiscence of the anther, and the internal membranaceous appendage of the filament; magnified.

PLATE 153. *IMPATIENS FULVA*: — further analyses of the flower and fruit.

1. Stamens in their natural position, discharging their pollen, magnified.
2. Vertical section through the stamens and pistil, more magnified, showing the ovules, and how the internal appendages of the stamens together embrace the summit of the pistil.
3. An ovule detached, and more magnified; its thickened raphe projecting beyond the chalaza.
4. Stamens and pistil, magnified; the upper portion of the two filaments next the eye cut away, and the connivent appendages turned back from the pistil so as to show its summit.
5. Highly magnified transverse section, or diagram, of one of the minute, prematurely fertilized flower-buds; the line underneath denoting the position of the bract. (The two lateral sepals valvate and inclosing all the rest of the flower.)
6. The sepals and petals of the same, displayed in their normal position; namely, with the sepal that represents the spur in the ordinary flowers (here barely concave) next the axis; highly magnified.
7. A fertilized flower-bud of the same kind, with its bract, magnified.
8. The same, with the enlarging ovary carrying away the undeveloped floral envelopes on its summit, magnified.
9. The same at a later period, the fertilized ovary much more enlarged.
10. A ripe capsule, of the natural size.
11. The same after dehiscence, with one seed detached, and others still attached to the persistent axis; the spirally twisted valves cohering to the apex of the axis.
12. A seed, magnified.
13. The same transversely divided, showing the thick cotyledons.
14. The same vertically divided contrary to the cotyledons.
15. Embryo of the same, divided through the short radicle, showing the plumule, &c.

ORD. LIMNANTHACEÆ.

Herbæ parvulæ Tropæoloideæ; foliis pinnatisectis; floribus omnino symmetricis et regularibus 6- v. 10-andris; ovulis erectis; radícula infera.

LIMNANTHÆ, R. Br. in Lond. & Edinb. Phil. Mag. 1833. Lindl. Bot. Reg. t. 1673. Meisn. Pl. Vasc. p. 135. Endl. Gen. p. 1175.

LIMNANTHACEÆ, Lindl. Introd. Nat. Syst. ed. 2. p. 142. Torr. & Gray, Fl. N. Am. 1. p. 209.

TROPÆOLACEÆ, Tr. LIMNANTHÆ, Lindl. Veg. Kingd. p. 366.

THE LIMNANTHES FAMILY was founded by Mr. Brown, (who first detected its real affinities,) upon two plants only, each the type of a genus; namely, *Floerkea*, an inconspicuous annual of the Northern United States, and *Limnanthes Douglasii* of California, which, brought into cultivation from seeds sent to England by the lamented Douglas, who discovered it, is now a well-known annual in our gardens. The latter bears abundance of pretty white flowers with a pale-yellow centre. Recently two additional species of *Limnanthes* have been discovered in California, by Mr. Hartweg and by the enterprising Fremont, one of which has pure white, the other rose-colored blossoms.

This small family is closely allied to the Indian-Cress Family, or Tropæolaceæ (of which the *Tropæolum majus*, the Nasturtium of the gardens, is a familiar representative), and perhaps should be combined with it, as has been done by Lindley, notwithstanding the dissimilarity of external appearance. For this dissimilarity is chiefly owing to the irregularity of the flowers of *Tropæolum*; while those of *Limnanthes* and *Floerkea* are perfectly regular, as well as symmetrical. In this respect, therefore, they differ only as the Hellebore or the Columbine differs from the Larkspur and the Aconite, which nevertheless evidently belong, not only to the same order, but to the same tribe. A more important distinction, however, is to be found in the insertion and direction of the ovule and seed, which are erect from the base of the cell in the present family, but suspended in Tropæolaceæ.

The embryo has the same structure in both: the cotyledons are very large, so as to fill the whole seed, thick and fleshy, plano-convex, or even hemispherical, extended below their insertion so as to be deeply auriculate at the base, and forming a narrow cavity in which the very short radicle is entirely concealed.

The sensible qualities of the Limnanthaceæ likewise accord with those of the Tropæolaceæ, both having the peculiar volatile acidity and well-known pungent taste of the Cress or Mustard Family. The fleshy fruits of the Garden Nasturtium are accordingly used as a substitute for capers. But the few and insignificant plants of the present family are of no economical account; except that all the species of *Limnanthes* would be ornamental in cultivation.

PLATE 154.

FLOERKEA, *Willd.*

Sepala 3. Petala 3, oblonga, calyce breviora. Stamina 6. Ovaria 3, vel abortu pauciora. — Herba tenella, parviflora; foliis sæpius 5-foliolatis.

FLOERKEA, Willd. in N. Berl. Schrift. 3. p. 148. Nutt. Gen. 1. p. 228.
Lindl. in Hook. Jour. Bot. 1. p. 1. t. 1. R. Br. in Lond. & Edinb. Jour. Sci. 1833. Torr. & Gray, Fl. N. Amer. 1. p. 210.
Endl. Gen. 6065.

False Mermaid.

CALYX of three herbaceous SEPALS, united at the base, a little imbricated in æstivation, persistent. PETALS 3, oblong, shorter than the calyx, inserted on the margin of a fleshy perigynous disk which fills the base of the calyx, its thin edge produced into three minute lobes, alternate with the petals. STAMENS 6, three alternate with the petals and inserted just within the lobes of the disk, and three opposite them, marcescent: FILAMENTS subulate, distinct; those opposite the sepals at first longer than the others: ANTHERS globular, didymous, fixed near the base, introrse, two-celled, the cells opening longitudinally. PISTIL of three carpels (placed opposite the sepals), or sometimes only two, united by their styles: OVARIES globose, cohering only at their base to an axis: STYLE central, two-three-cleft at the summit: STIGMAS terminal, capitate. OVULE solitary in each ovary, erect from its base, anatropous.

FRUIT of three, or by abortion one or two, fleshy and tuberculate-roughened globular achenia. SEED filling the cell, the membranaceous testa cohering with the pericarp, destitute of albumen. EMBRYO large; the COTYLEDONS thick and fleshy, plano-convex: RADICLE very short, inferior, entirely included within the notched base of the cotyledons: PLUMULE conspicuous.

HERB small and inconspicuous, decumbent, a little succulent, annual; the alternate leaves petioled, destitute of stipules, pinnately five-foliolate, or the upper trifoliolate or three-parted; the leaflets lanceolate or oblong, entire or sometimes two-three-cleft. Flowers small, solitary, on slender axillary peduncles; the minute petals white.

ETYMOLOGY. Dedicated by Willdenow to *Floerke*, an obscure German botanist.

GEOGRAPHICAL DISTRIBUTION. The single species of this genus grows in marshes, and along the moist banks of streams, in the Northern and Western United States.

PLATE 154. *FLOERKEA PROSERPINACOIDES*, Willd.;—an entire plant, in fruit and flower, of the natural size.

1. Diagram of the flower.
2. An open flower, magnified.
3. Vertical section of a flower, more magnified.
4. A stamen magnified, seen from within.
5. The same, seen from the outside.
6. Fruit (only two carpels ripened) and the persistent calyx, magnified.
7. A carpel transversely divided, showing the cotyledons.
8. The same vertically divided, so as to cut away one cotyledon.

ORD. RUTACEÆ.

Herbæ alternifoliæ, exstipulatæ, glanduloso-punctatæ : dicotyledoneæ, hypogynæ, dichlamydeæ, regulares, 4 – 5-meræ, diplostemonæ, hermaphroditæ ; æstivatione imbricativa ; ovario gynophoro brevi vel disco glanduloso insidente 2 – 5-lobo 2 – 5-loculari ; stylis in unicum connatis ; capsulæ lobis introrsum dehiscentibus ; seminibus reniformi-arcuatis 2-pleiospermis ; embryone in axi albuminis carnosi pl. m. arcuato, idem longitudine æquante.

RUTACEÆ, Juss. Gen. p. 296, ex parte. Endl. Gen. p. 1159.

RUTEÆ, Adr. Juss. in Mem. Mus. 12. p. 461.

RUTACEARUM pars, DC. Prodr. 1. p. 709. Lindl. Veg. Kingd. p. 469.

THE RUE FAMILY, taken in the restricted sense, belongs to the Old World (and to the Mediterranean region, with one genus in Nepal and Japan), with the solitary exception of the recently discovered and still unpublished Texan plant which forms the subject of the next illustration. It is distinguished from the Zygophyllacæ by the exstipulate alternate leaves dotted with pellucid glands ; and from Zanthoxylacæ by their perfect flowers. The Diosmeæ are not sufficiently distinguished by the spontaneous separation of the epicarp from the endocarp of the fruit, and the generally exalbuminous seeds.

The sensible qualities of Rutaceous plants are exemplified by the common Rue. Their strong odor, nauseous bitterness, and acidity are due to the volatile oil with which the herbage is charged. The Spanish *Ruta montana* is so acrid, that it is said to blister the hands that gather it through three pairs of gloves, and produces ulcerous pustules when applied to the naked skin. The oil of Rue is a powerful stimulant and antispasmodic, and a dangerous emmenagogue and vermifuge ; in over-doses it is an acrid-narcotic poison. Notwithstanding their almost fetid odor, the leaves of the fresh plant were used by the Romans as a condiment ; and they are still employed in some parts of Southern Europe to flavor salads.

The Diosmeæ, in which similar sensible qualities prevail, although less acrid and often tonic and febrifugal, are much more numerous in genera and species than the proper Rutacææ. With the exception of the *Fraxinella*,

indigenous to Southern Europe, they belong to the southern hemisphere, and especially to the Cape of Good Hope and Australia. The few of the New World, however, are tropical, principally Brazilian. The odorous leaves of the Bucku plants, or true *Diosmeæ* of South Africa, are antispasmodics, diuretics, &c. But the American species furnish the most important medicines; such, especially, as the Angostura bark, which is thought to be the produce of *Galipea cusparia*, and which in South America is esteemed as the most valuable of all febrifuges, "being adapted to the most malignant bilious fevers; while the fevers in which *Cinchona* is chiefly administered are simple intermittents, for the most part unattended with danger. The Indians also use the bruised bark as a means of intoxicating fishes; which is a very singular coincidence with what is mentioned by Dr. Saunders, of the same use being made of the *Cinchona* bark by the Peruvians." *Lindley*.

PLATE 155.

RUTOSMA, *Nov. Gen.*

Calyx 4-lobus, persistens. Petala 4, concaviuscula, integerrima. Stamina 8, petalis breviora. Ovarium 2-lobum, 2-loculare, disco 8-lobo eporoso insidens, fructiferum breviter stipitatum; loculis 8-ovulatis. Stylus gracilis: stigma capitatum, integrum. — Herba graveolens, humilis; caulibus e radice crassa simpliciusculis; foliis linearibus integerrimis; inflorescentia racemiformi.

CALYX four-cleft, much shorter than the corolla, herbaceous, persistent. PETALS 4, alternate with the lobes of the calyx, oval, dotted like the rest of the plant with large pellucid glands, not unguiculate, entire, inserted on the base of the thickened hypogynous disk, convolute-imbricated in æstivation, barely spreading in anthesis, deciduous. STAMENS 8, inserted on the disk just within the petals and shorter than they, or the longer ones (the four opposite the sepals) nearly equalling them in length: FILAMENTS subulate-filiform, naked: ANTHERS oval, introrse, fixed by the base, glandular-apiculate; the cells apposite, opening longitudinally. HYPOGYNOUS DISK produced above the insertion of the stamens and around the base of the ovary into eight equal glandular lobes, which are not nectariferous-punctate as in RUTA. OVARY at first sessile on the disk, obcordate-two-lobed, two-celled, the cells opposite two of the sepals: STYLE central, long and slender, undivided, deciduous: STIGMA ovoid-capitate, entire. OVULES 8 in each cell, pendulous (or the uppermost resupinate ascending) from a thickened axile placenta which projects into the cells, anatropous.

CAPSULE coriaceous, raised on a short stipe above the disk, deeply obcordate-two-lobed, somewhat flattened contrary to

the partition, the lobes dehiscent down their inner side to their junction. SEEDS 8, or by abortion fewer, in each cell, amphitropous, reniform; the testa crustaceous, muricate-scabrous. EMBRYO arcuate in the axis of thin fleshy albumen, nearly of its length: COTYLEDONS narrowly oblong, rather fleshy, parallel with the hilum: RADICLE about the length of the cotyledons, superior.

HERB low, dotted all over with glands, exhaling the strong odor of Rue, with numerous nearly simple stems arising from a stout and perpendicular perennial root, beset with simple and entire filiform-linear alternate exstipulate leaves, racemously floriferous above; the short-pedicelled flowers all extra-axillary, therefore terminal, becoming lateral by the successive evolution of axillary buds. Petals yellow.

ETYMOLOGY, PROPERTIES, &c. Name composed of $\rho\upsilon\tau\eta$, the Rue, and $\delta\sigma\mu\eta$, scent. It has just the odor, and doubtless the other sensible properties, of the Garden Rue. The genus is very nearly allied to Ruta and Aplophyllum; but differs from the former in its plane petals, shorter stamens, eight-lobed disk without nectariferous pores, and muricate seeds; and from both by the two-celled ovary.

GEOGRAPHICAL DISTRIBUTION. This single representative of the proper Rue Family in the New World was recently discovered in Western Texas by Mr. Lindheimer and by Mr. Wright. Dr. Gregg also gathered it at Monterey, in Northern Mexico, where it is called *Ruda del Campo*.

PLATE 155. RUTOSMA TEXANA, *n. sp.*; — a small plant, in flower and fruit, of the natural size; from Lindheimer's collection.

1. Diagram of the flower.
2. The summit of a flowering stem, enlarged, showing the glands of the stalks, leaves, and parts of the flower.
3. Anther, with the summit of the filament, magnified; outside view.
4. The same, seen from within.
5. Pistil with the eight-lobed disk, &c., magnified.
6. Vertical section of the same, showing the insertion of the organs, &c.
7. An ovule, more magnified.
8. Dehiscent capsule, with the persistent calyx and disk, magnified.
9. The same, with the capsule and some of the seeds vertically divided.
10. A seed, more magnified.
11. Vertical section of the same, and of the embryo, more magnified.
12. Embryo detached and magnified.

ORD. ZANTHOXYLACEÆ.

Frutices vel arbores Rutoideæ, interdum aculeatæ; foliis pellucido-punctatis sæpissime pinnatis; floribus abortu unisexualibus; carpellis discretis, vel pl. m. in ovarium compositum coalitis, 2-4-ovulatis; fructu carnoso 1-5-cocco, rarius samaroideo; embryone recto.

ZANTHOXYLÆ, Nees & Mart. in Nov. Act. Acad. Nat. Cur. 1823. Adr. Juss. in Mem. Mus. 12. p. 422, 497 (Subord. Rutacearum). Endl. Gen. p. 1145.

ZANTHOXYLACEÆ, Torr. & Gray, Fl. N. Am. 1. p. 213.

XANTHOXYLACEÆ, Lindl. Introd. Nat. Syst. ed. 2. p. 135, & Veg. Kingd. p. 472. Wight, Ill. Ind. Bot. p. 165. t. 66.

PTELEACEÆ, Kunth in Ann. Sci. Nat. 2. p. 345.

THE PRICKLY-ASH FAMILY consists of trees and shrubs, principally of tropical regions and in great part American. It is represented in the United States by three species of the typical genus, two of which belong to our Southern Atlantic border, and one (the common Prickly Ash) to the Northern States, and by two species of *Ptelea*, one of which extends northward to the Great Lakes. They are not found north of the tropic of Cancer on the western side of our continent, nor in the Old World, except in China and Japan, of which the *Ailanthus*, or Tree of Heaven, which flourishes so famously in the United States as a shade-tree, is a native. The *Ailanthus*, however, although appended to this family, having no dots in the leaves nor albumen in the seeds, and solitary ovules, is not thought properly to belong to it.

This family is distinguished from Rutaceæ and the Diosmeæ by the monoëcious or diëcious flowers; and from Anacardiaceæ by the pellucid dots of the leaves, geminate ovules, albuminous seeds, straight embryo, &c.

Pungent aromatic qualities with bitterness prevail in the order. They are due to an ethereal oil and its resin, which is contained in the pellucid oil-receptacles which dot the leaves and the fruit, and to a bitter-acrid crystallizable substance, called *Xanthopierite*, with a yellow coloring matter, which are principally contained in the bark. The properties of all the species of *Zanthoxylum* accord with those of our Prickly Ash. The leaves are fra-

grant and pungent to the taste; the fruits are as pungent as pepper; the bark, which is the officinal portion, is acrid-aromatic and very bitter. It is a powerful stimulant and somewhat tonic, much used in chronic rheumatism, and as an irritant it is popularly employed to relieve the toothache. The Southern *Z. Carolinianum* possesses identical properties, but is more powerfully acrid. Some exotic species are valued as febrifuges, others as antidotes to poisons.

The typical genus, *Zanthoxylum*, comprises between fifty and one hundred known species, of which the greater part belong to tropical America, several to the equinoctial regions of the Old World, and three to the Atlantic United States, one of which (the original species) extends northward to Canada.

PLATE 156.

ZANTHOXYLUM, Colden, L.

Flores abortu dioici aut monoici. Stamina petalis numero æqualia et alterna. Pistilla totidem vel pauciora, gynophoro subgloboso seu cylindrico insidentia. Folliculi carnosi 1–2-spermi. Semina nitida. — Rami aculeati. Folia pinnata.

ZANTHOXYLUM, Colden, Pl. Coldenh. p. 68. Linn. Gen. 150. H. B. K.

Nov. Gen. & Sp. 6. p. 1. DC. Prodr. 1. p. 725. Adr. Juss. l. c.

Torr. & Gray, Fl. N. Am. 1. p. 214, 680. Endl. Gen. 5972.

FAGARA, Linn. Adans. Fam. 2. p. 364. Lam. Ill. t. 84.

PTEROTA, P. Browne, Jam. p. 189.

OCHROXYLUM, Schreb. Gen. 508.

KAMPFMANIA, Raf. in N. Y. Med. Repos. (hex. 2.) 5. p. 350.

Prickly Ash. Toothache-tree.

FLOWERS by abortion diœcious or monœcious. CALYX of four or five, rarely three, herbaceous or petaloid SEPALS, much smaller than the corolla, distinct or united at the base, imbricated in æstivation, deciduous, in one species obsolete. PETALS as many as the sepals, usually five or four, hypogynous, imbricated in æstivation, deciduous. STER. FL. STAMENS as many as the petals and alternate with them, inserted just within them at the base of an ovoid gynophore, which bears the rudiments of from one to five abortive pistils on its summit: FILAMENTS filiform or subulate: ANTHERS introrse, two-celled, the cells opening longitudinally. FERT. FL. STAMENS none or rudimentary. PISTILS as many as the petals and opposite them, or fewer, sometimes reduced to one, borne on the summit of the fleshy globular or cylindrical gynophore, connivent, sometimes a little united below: OVARIES two-ovuled: STYLES short or slender, connivent or somewhat connate towards the summit: STIGMAS introrsely capitate or clavate. OVULES 2, collateral, pendulous from the middle of the inner angle of the cell, anatropous, the raphe ventral.

FRUIT of as many fleshy cartilaginous or drupaceous folli-

cles as there are pistils, or by abortion fewer, sessile or stipitate, punctate, one – two-seeded, splitting down the ventral suture, or at length two-valved. SEED pendulous from the apex of the placental edge of the carpel, which inclines to separate from the valves, between amphitropous and anatro-pous, ovoid or globular, black and shining; the testa thin and a little fleshy, at length brittle and transparent, covering a thick crustaceous integument. EMBRYO straight, in the axis of fleshy albumen and nearly of its length: COTYLEDONS broadly oval or orbicular, foliaceous: RADICLE short, superior.

TREES or shrubs, commonly armed with stipular prickles; the alternate or rarely opposite leaves mostly pinnate, often fascicled; the petiole sometimes prickly, rarely alate; the leaflets entire or serrulate, punctate with pellucid dots. Flowers small, greenish or whitish, fasciculate, spicate, or cymose, the clusters or cymes axillary or terminal.

ETYMOLOGY. Name from *ξανθός*, *yellow*, and *ξύλον*, *wood*. *Xanthoxylum* is the proper orthography, but the other form was adopted by Linnæus.

NOTE. The genus was founded on our Northern *Prickly Ash*, here figured, which has a single perianth, usually described as a calyx. But as the stamens alternate with its parts, just as with the petals of *Z. Carolinianum*, I take it for the corolla, and suppose that the calyx is abortive. Our subgenera are:

- § 1. EUZANTHOXYLUM. (*Zanthoxylum*, *Colden.*) — Calyx abortive. Petals (bearded at the tip), stamens, and pistils 5. Flowers in lateral fascicles.
- § 2. OCHROXYLUM. — Sepals, petals, and stamens 5. Pistils 3.
- § 3. PTEROTA. — Sepals, petals, and stamens 4. Pistils 1–2. Petiole winged.

PLATE 156. ZANTHOXYLUM AMERICANUM, *Mill.*; — branch of a staminate plant in flower, and of a pistillate plant taken a little later.

1. A pistillate flower; 2. a staminate flower, enlarged.
3. Vertical section of the latter, showing the abortive pistils, &c.
4. Enlarged pistillate flower, with the perianth laid open.
5. Vertical section of one of the pistils, magnified, showing one ovule.
6. Transverse section of an ovary, through both ovules, magnified.
7. An ovule, more magnified.
8. Fruit, of the natural size. (Two pistils abortive, the others stipitate.)
9. The same enlarged, two carpels dehiscent. 10. A seed, magnified.
11. Vertical, and 12. transverse section of the seed and embryo, magnified.
13. Diagram of a staminate flower of ZANTHOXYLUM CAROLINIANUM.
14. Expanded staminate flower of the same, magnified.

PLATE 157.

PTELEA, L.

Flores polygami, 4–5-andri. Ovarium 2-loculare, stylo brevi superatum: stigma 2-lobum. Fructus samaroides, 2-locularis; loculis abortu monospermis. — Frutices inermes; foliis plerumque 3-foliolatis; floribus cymosis.

PTELEA, Linn. Gen. 152. Mill. Ic. t. 211. Lam. Ill. t. 84. Gärtn. Fr. t. 49. DC. Prodr. 2. p. 84. Adr. Juss. in Mem. Mus. l. c. p. 510. t. 26. Torr. & Gray, Fl. N. Am. 1. p. 214. Endl. Gen. 5977.
BELLUCIA, Adans, Fam. 2. p. 344.

Shrub Trefoil.

FLOWERS by abortion polygamous. CALYX of four or five small and nearly distinct SEPALS, at first imbricated in æstivation, deciduous. PETALS 4 or 5, hypogynous, much longer than the calyx, imbricated in æstivation, widely spreading, deciduous. STAMENS as many as the petals and alternate with them, hypogynous, in the sterile flowers as long as the corolla, in the fertile shorter and with smaller or imperfect anthers: FILAMENTS subulate, thickened below, hairy on the inside: ANTHERS ovate or cordate, introrse, two-celled; the cells opening longitudinally. PISTIL abortive in the sterile flowers, in the fertile raised on a short and thick gynophore: OVARY compressed, two-celled: STYLE short: STIGMA two-lobed. OVULES 2 in each cell, inserted one above the other, but close together, on the middle of their inner angle, amphitropous; the upper one of each cell only becoming fertilized, with the micropyle superior; the lower pushed downwards by the other, so that its micropyle becomes centrifugal.

FRUIT a two-celled samara, surrounded by a broad and reticulated wing, orbicular, indehiscent: the cells one-seeded. SEED oblong, amphitropous, the short raphe ventral and basilar, with a smooth or somewhat wrinkled coriaceous testa. EMBRYO straight in the axis of fleshy albumen (nearly of its

length): COTYLEDONS oval-oblong, plane: RADICLE short, superior.

SHRUBS, or small trees, unarmed; with alternate or sometimes opposite trifoliolate, or rarely pinnately quinquefoliolate leaves, without stipules; the leaflets ovate or oblong, entire or serrulate, punctate with pellucid dots. Flowers small, greenish-white, in terminal cymes or compound corymbs. (Pistil sometimes tricarpeillary and three-winged.)

ETYMOLOGY. Πτελέα, an ancient name of the Elm-tree, transferred to this genus on account of the winged key-fruit, which resembles that of the Elm.

GEOGRAPHICAL DISTRIBUTION. This genus consists of one species indigenous to the Middle, Southern, and Western United States, and one in Florida, and two or three others in New Mexico and Mexico.

PROPERTIES. The bark and foliage is bitter and strong-scented, and is reputed to be anthelmintic. The fruit is said to be used as a substitute for hops.

PLATE 157. PTELEA TRIFOLIATA, *Linn.*; — a flowering branch of the natural size.

1. Diagram of a tetramerous flower.
2. A tetramerous sterile flower, enlarged.
3. Vertical section of the same.
4. A stamen more magnified, seen from the outside.
5. The same, seen from the inner side.
6. A pentamerous fertile flower, enlarged.
7. A fertilized pistil, magnified, the ovary transversely divided.
8. Vertical section of the same.
9. An ovule, more magnified.
10. A fruit, of the natural size.
11. A magnified seed, from the right-hand cell, in its natural position.
12. Vertical section of the same, showing a small, probably not fully grown embryo at the apex of the albumen.
13. This embryo detached and more magnified (inverted).*

* The seeds examined appeared to be mature; but the embryo was probably arrested in its development. *Adr. de Jussieu* has represented it, as described above, with large and flat cotyledons, occupying nearly the whole length of the albumen.

ORD. OCHNACEÆ.

Frutices vel arbores, alternifoliæ, gynobasicæ, ligno amarissimo; a Zanthoxylaceis foliis simplicibus epunctatis ovarisque uniovulatis, a Simarubaceis simplicifoliis embryonis radicula intra cotyledones haud retracta et filamentis esquamatis, diversa.

OCHNACEÆ, DC. in Ann. Mus. 17. p. 398, & Prodr. 1. p. 735. Bartl. Ord. Nat. 383. Meisn. Pl. Vasc. p. 66. Endl. Gen. p. 1141. Lindl. Veg. Kingd. p. 474.

THE OCHNACEÆ constitute a small family of trees or shrubs, natives of tropical India, Africa, and America; the greater portion belonging to the New World. The most northern genus is *Castela*, which is principally West Indian, but one species is found in Northern Mexico and along the coast of Texas. This has neither the large and fleshy gynophore nor the united styles of the rest of the family, and is the type of the tribe *Casteleæ*, which has extrorse anthers, a pendulous and albuminous seed, and usually polygamous flowers; in all these points (except in the direction of the anthers) and in other particulars agreeing with the *Zanthoxylaceæ*; but differing from them in the simple and entire coriaceous leaves being entirely destitute of pellucid dots and of aromatic qualities, and also in the uniovulate carpels. The tribe *Ochneæ*, on the other hand, has perfect flowers, introrse anthers, and erect seeds, which are destitute of albumen. It is hardly to be distinguished from the entire-leaved plants of the *Simarubaceæ*, or *Quassia* Family; except that in the latter the seed is pendulous, the short radicle is retracted within the base of the large cotyledons, as in *Floerkea* (Plate 154) and the *Nasturtium*; and the filaments are furnished with an internal appendage or petaloid scale, in the manner of most *Zygophyllaceæ* (Plates 147, 149).

The sensible qualities of this family entirely coincide with its relationship. The species are all endowed with the pure and intense bitterness, without aromatic properties, of the *Simarubaceæ*, as exemplified by the officinal *Quassia*-wood.

The wood of *Castela Nicholsoni*, the subject of our illustration, which represents this order in Texas and Northern Mexico, is very bitter. In Antigua it is said to be as bitter as that of *Quassia* itself. The oil expressed from the seeds of a species of *Gomphia* is used in salads in Brazil.

Simaruba glauca, *DC.*, (with perhaps one or two other West Indian *Simarubaceæ*;) grows on Key West; but I am not aware that it has been met with on the mainland, or elsewhere within the limits of the United States proper.

PLATE 158.

CASTELA, *Turpin.*

Flores polygamo-dioici, axillares, 4-meri, 8-andri. Antheræ extrorsæ, longitudinaliter dehiscentes. Ovarium gynophoro brevissimo insidens, profunde 4-lobum. Styli 4. Drupæ 4, patentés. Radicula supera. — Frutices spinescentes, foliis subsessilibus coriaceis integerrimis.

CASTELA, Turpin in Ann. Mus. 7. p. 78. t. 5. DC. Prodr. 1. p. 738.
Hook. Bot. Misc. 1. p. 271. t. 56. Torr. & Gray, Fl. N. Am. 1.
p. 680. Endl. Gen. 5956.

Goatbush.

FLOWERS by abortion polygamo-diœcious. CALYX small, of four ovate or triangular SEPALS, united at the base, deciduous. PETALS 4, oval, concave, much larger than the sepals, hypogynous, imbricated in æstivation, deciduous. STAMENS 8, inserted alternate with and opposite the petals into the base of a very short gynophore or hypogynous disk: FILAMENTS subulate: ANTHERS cordate-ovate, fixed near the base, extrorse, two-celled, the cells opening longitudinally for their whole length: they are similar but smaller in the fertile flowers. PISTIL wanting or abortive in the sterile flowers; in the fertile seated on the very short gynophore, of four carpels united only at the axis: OVARY deeply four-lobed, four-celled, the cells opposite the petals: STYLES distinct or united at the base, acute, revolute, stigmatose down the inner face. OVULE solitary and pendulous in each cell, anatropous.

FRUIT consisting of four distinct and widely spreading substipitate drupes, or by abortion fewer; the rugose or pitted compressed endocarp at length two-valved after the fleshy exocarp dries up. SEED solitary, conformed to the

cell, obovate, pendulous, anatropous, with the micropyle a little produced, the testa membranaceous. EMBRYO large, in thin fleshy albumen: COTYLEDONS broad and flat, foliaceous: RADICLE short, superior.

SHRUBS low, with spinescent branches, also bearing spines in the axils, and sessile alternate leaves, of a thick and rigid texture, shining above, silvery-canescens underneath, mucronate, entire, with revolute margins. Stipules none. Flowers small, solitary or somewhat fasciated in the axils of the leaves, sessile, "saffron-colored," the fruit red.

ETYMOLOGY. Dedicated to *M. Castel*, author of a poem upon plants.

GEOGRAPHICAL DISTRIBUTION. A genus of three or four known species, mostly natives of the Antilles; one of which is also found on the coast of Texas (by Drummond and Mr. Wright), in Northern Mexico (by Dr. Gregg), and in the Galapagos Islands, according to Dr. J. D. Hooker. They grow in arid places.

PROPERTIES. These plants are intensely bitter; but are not applied to any known use.

PLATE 158. *CASTELA NICHOLSONI*, *Hook.*, probably also *C. erecta*, *Turpin*; — branch of a plant with staminate flowers, of the natural size (from Texas, *Wright*).

1. An unexpanded staminate flower, magnified.
2. Diagram of the same.
3. Vertical section of the same, more magnified.
4. A separated sepal of the same.
5. A separated petal.
6. A stamen more magnified, seen from within.
7. The same, seen from the outside.
8. A fertile flower, magnified, copied from *Hooker, l. c.*
9. Fruit, of the natural size, from a North-Mexican specimen of *Dr. Gregg*.
10. Enlarged vertical section of a drupe and its seed.
11. A seed detached and magnified.
12. Embryo (inverted), more magnified.

ORD. ANACARDIACEÆ.

Frutices vel arbores alternifoliæ, epunctatæ, exstipulatæ, succo resinoso seu viscoso-lacteo fætæ: dicotyledoneæ, dichlamydeæ, hypogyno-perigynæ, sæpius abortu polygamæ, 4-5-meræ, iso-diplostemoneæ, regulares; æstivatione imbricativa; ovario unico uniloculari, stylo simplici vel 3-fido; ovulo unico funiculo filiformi e basi loculi adscendenti libero, nunc parieti adnato, inserto; fructu drupaceo; semine exalbuminoso; cotyledonibus plano-convexis planisve sæpius radiculæ curvatæ seu uncinatæ accumbentibus vel incumbentibus.

ANACARDIÆ, R. Br. in Tuckey, Congo, p. 431. Bartl. Ord. Nat. p. 395.

ANACARDIACEÆ, Lindl. Introd. Nat. Syst. ed. 2. p. 166. Endl. Gen. p. 1127.

TEREBINTHACEARUM Genera, Juss. p. 368. DC. Prodr. 2. p. 62.

TEREBINTHACEÆ, Kunth in Ann. Sci. Nat. 2. p. 333.

THE CASHEW or SUMACH FAMILY consists of trees or shrubs; which are distinguished from the allied orders by their clammy or resinous juice (which is usually milky or colored, and blackens on exposure to the air); their alternate leaves destitute of pellucid dots and of stipules; their usually polygamous regular flowers; their one-celled ovary (commonly surmounted by three short styles or stigmas), with a single ovule borne on a funiculus which rises from the base of the cell; their indehiscent and commonly drupaceous fruit; and the exalbuminous embryo with broad and flat or plano-convex cotyledons. There are some exceptions, and some doubt as to the limits of the family, of which it is not needful here to speak. In several points, especially through Pistacia, the Anacardiaceæ are manifestly allied to the Walnut Family; which Endlicher has accordingly placed by its side in his class Terebinthineæ, notwithstanding the monochlamydeous or aelchlamydeous and amentaceous sterile flowers, in virtue of which it is usually retained near the Cupuliferae.

The present family is chiefly tropical, in America, Africa, and India, although the largest genus, Rhus, belongs in great part to the warmer temper-

ate regions. It is the only genus in the United States ; but two allied genera occur in California. In the Old World, *Pistacia* and two species of *Rhus* are natives of the Mediterranean region.

The resinous juice is the most characteristic product of this family. That of *Pistacia Lentiscus* and *P. Atlantica* hardens into the well-known resin called Mastich ; while the fragrant and balsamic Scio turpentine is yielded by *P. Terebinthus*. In most cases the resinous juice is caustic or highly poisonous, as in our two venomous species of *Rhus*, and in allied Japanese species, as well as in many tropical trees of the order. This juice, turning dark-colored on exposure to the light and air, forms a natural black varnish, which is sometimes also used to lacquer various kinds of ware. The black varnish called Japan Lacquer, is obtained from *Stagmaria verniciflua* in the Indian archipelago ; a tree which the inhabitants of Sumatra consider it dangerous to sit or sleep beneath the shade of. Species of *Semecarpus*, *Melanorrhœa*, &c., yield similar, more or less poisonous varnishes in various parts of India. The fleshy receptacle of *Anacardium occidentale* and the kernel of the seed (the Cashew-nut) are edible, the latter being a substitute for almonds, yet its shell or rind, which has to be carefully separated or destroyed by roasting, like the juice of the bark, is so acrid that it blisters the skin. Of more importance as articles of food are pistachio-nuts, of the Levant and Northern Africa, the seeds of *Pistacia vera* and *P. Atlantica*, which are free from noxious qualities, and from which a bland oil also is expressed. Another tree of this family, the *Mangifera Indica*, notwithstanding the active properties of its juices, yields one of the most famous and luscious fruits of the tropics, namely, the mango, a stone-fruit which is as highly prized in tropical as the peach is in temperate countries.

The properties of the genus *Rhus* are more particularly mentioned under that genus.

PLATE 159, 160.

RHUS, Tourn.

Flores polygami, mono-dioici. Calyx 5-partitus. Petala 5, inter calycem et discum pl. m. perigynum inserta. Stamina 5. Ovarium subglobosum, stylis brevibus stigmatibusve obtusis 3 superatum. Ovulum ex apice funiculi filiformis liberi appensum. Drupa exsucca. Cotyledones radiculæ superæ accumbentes.

RHUS, Linn. Gen. 369. Lam. Ill. t. 207. Gærtn. Fr. 1. t. 44. DC. Prodr. 2. p. 66. Torr. & Gray, Fl. 1. p. 216. Endl. Gen. 5905.

RHUS, COTINUS, & TOXICODENDRON, Tourn. Inst. p. 610.

РОСОПНОРУМ, Necker, Elem. 934.

Sumach. Poison Oak. Poison-Tree.

FLOWERS by abortion polygamo-dioecious or polygamo-monœcious, or rarely perfect. CALYX of five SEPALS, united at the base, equal, quincuncially imbricated in æstivation, usually persistent. Disk fleshy, surrounding the base of the ovary but free from it, coherent with the very base of the calyx, annular or five-lobed, the lobes opposite the petals. PETALS 5, alternate with the sepals, equal, sessile, inserted under the margin of the disk where it becomes free from the calyx (perigynous), quincuncially imbricated in æstivation, deciduous. STAMENS 5, alternate with the petals, inserted on or just under the margin of the disk: FILAMENTS subulate, distinct: ANTHERS oblong or didymous, introrse, two-celled, the cells opening longitudinally; in the fertile flowers usually smaller and more or less imperfect. OVARY in the sterile flowers abortive; in the fertile ovoid or globular, sessile, one-celled: STYLES 3, short, sometimes almost none: STIGMAS terminal, obtuse, or depressed-capitate. OVULE solitary, anatropous, resupinate-suspended from the incurved apex of a long filiform funiculus which rises from the base of the cell; the micropyle superior.

FRUIT a small and dry or nut-like DRUPE, smooth, granulated, or hairy; the sarcocarp thin and juiceless; the endocarp bony or crustaceous, smooth or striate. SEED conformed to the cell, which it fills, amphitropous, commonly transverse, somewhat reniform, the hilum superior; testa membranaceous or thickish. ALBUMEN none. EMBRYO filling the seed: COTYLEDONS oval or oblong, flat, nearly foliaceous, usually transverse: RADICLE short, lying on the side next the funiculus, superior, incurved or uncinatè and lying against the edge of the cotyledons (cotyledons accumbent); in *R. Cotinus*, where the apex of the fruit becomes lateral from unequal development, the radicle is descending.

TREES or shrubs, sometimes climbing by rootlets, yielding a resinous, or sometimes viscous-milky, often caustic juice. Leaves alternate, pinnate with a terminal leaflet, or pinnately trifoliolate, rarely simple, destitute of stipules, commonly deciduous. Flowers small, white or greenish, in axillary or terminal panicles, often thyrsoïd, rarely in catkin-like spikes, more commonly diœcious than monœcious.

ETYMOLOGY. The ancient Greek and Latin name of the genus.

GEOGRAPHICAL DISTRIBUTION. This rather large and polymorphous genus is widely distributed over the temperate and subtropical regions of the world, but is most abundant in North America, Japan, and at the Cape of Good Hope. A few species are tropical. Ten species are known within the United States proper; and one other abounds in Oregon and California, where it takes the place of our *R. Toxicodendron*. The Californian *Rhus* (*Malosma*) *laurina*, *Nutt.*, belongs to the originally Chilian genus *Lithrea*, of Miers.

DIVISION. The following subgenera are represented in the United States, viz.:—

§ 1. *COTINUS*, *Tourn.*—Flowers perfect. Drupes semi-obcordate, glabrous, veiny, the apex brought down on one side; the radicle therefore descending (as in *Geranium*).—Leaves simple. Panicles ample and loose, most of the pedicels abortive and becoming much elongated, plumose-villous. (To this section belongs *R. Cotinus*, the Venetian Sumach or Smoke-tree of our gardens, and the closely allied *R. cotinoides*, *Nutt.*, which Mr. Buckley found in Alabama.)

§ 2. *SUMAC*, *DC.* (excl. spec.)—Flowers more or less polygamous, in a terminal thyrsoïd panicle. Drupes ovoid or globular, red or crimson,

clothed, at least when young, with acid glandular hairs; the putamen smooth. — Leaves pinnate.

§ 3. *TOXICODENDRON*, *Tourn.* — Flowers polygamo-diœcious, in loose and slender axillary panicles. Drupes globular, glabrous, white, or dun-colored; the putamen striate or ridged. — Leaves pinnate or trifoliolate.

§ 4. *LOBADIUM*, *Raf.* (*Turpinia*, *Raf.* *Schmalzia*, *Desv.*) — Flowers polygamo-diœcious, in short ament-like spikes, rather preceding the leaves, each subtended by a scale-like bract. Disk deeply five-lobed, conspicuous. Drupes ovoid-lenticular, hairy, acid, reddish. — Leaves trifoliolate.

NOTE. If *R. Cotinus* has incumbent cotyledons, as figured in Maout's excellent *Atlas Élémentaire de Botanique*, p. 139, this with the other characters should suffice for the restoration of the Tournefortian genus *Cotinus*. I doubt if this is really the case, but possess no fruit quite perfect enough to settle the point.

PROPERTIES. These are very similar in all our subgenera, except *Toxicodendron*. The bark and the bruised foliage are aromatic or strong-scented and astringent. Those of the Sumachs abound in tannic acid, and are used in tanning morocco leather. The bark of *R. Cotinus* and of *R. Coriaria* has been used as a febrifugal tonic. The wood is orange-colored and yields a dye, while the bark is employed as a mordant. The fruit of all the Sumachs, especially of *R. typhina* and *R. glabra*, is pleasantly but sharply acid; the acidity, which principally resides in the hairs or glands of the surface, is said to be owing to bimalate of lime. The bark and young wood yield when wounded a viscous or resinous and usually milky juice, which immediately turns yellowish, and finally brown, on exposure to the air. *R. Copallina* was thought to yield one of the resins known under the name of Gum Copal, but this is not the case. None of the Sumachs appear to be poisonous. It is probably through some mistake that this quality has been attributed to *R. pumila*, *Michx.*, which belongs to the section Sumac as characterized above. But in the section *Toxicodendron*, not only the juice, but even the effluvium spontaneously exhaled under the influence of a hot sun, is well known to be extremely venomous to many people, although others may handle the plants with impunity. Our two poisonous species, which abound throughout the United States, are *R. Toxicodendron* (the Poison Vine, Poison Oak, or Poison Ivy), and *R. venenata* (the Poison Sumach, or Poison-Tree, inappropriately termed Poison Dogwood or Poison Elder). The effects of the poison, which commence several hours after exposure, are violent itching, with tumefaction of the affected parts, especially of the face, followed by burning pain, fever, and a vesicular eruption. These symptoms reach their height on the fourth or fifth day, and the cuticle desquamates as the pain and swelling subside. The juice of these plants blackens on exposure to the air, and forms an indelible ink, and a natural dark varnish. The brilliant black varnish of Japan is the juice of *R. vernicifera*, a species nearly allied to our *R. venenata*, with which it was confounded by Linnæus, and endowed with similar venomous properties.

PLATE 159. RHUS (SUMAC) GLABRA, *Linn.*; — a small panicle and leaf, somewhat reduced in size.

1. A sterile flower, enlarged.
2. One of the stamens, more magnified, inside view.
3. The same, seen from the outside.
4. Vertical section of a sterile flower, enlarged, showing the disk, the abortive pistil, &c.
5. A fertile flower, enlarged (the sepals proportionally longer).
6. Vertical section of the same, showing the disk, the somewhat imperfect stamens, and the ovule, &c.
7. The ovule detached, with the long ascending funiculus from the apex of which it hangs, more magnified.
8. The fertilized pistil, more enlarged, surrounded by the disk, the calyx and corolla removed.
9. A drupe, with the calyx, enlarged.
10. Transverse section of the same and of the embryo, more enlarged.
11. Vertical section of the same, and of the seed and embryo.

PLATE 160. RHUS (LOBADIUM) AROMATICA, *Ait.*; — a flowering branch of the sterile plant, cultivated in the Botanic Garden, Cambridge; of the natural size.

1. Diagram of a flower: the line underneath indicating the position of the bract; the circle above, that of the axis of the inflorescence.
2. A magnified sterile flower, with its bract and a pair of bractlets, seen from the inner side.
3. Vertical section of the sterile flower, magnified.
4. An outside view of a stamen, more magnified.
5. An inside view of the same.
6. Pistil of a fertile flower, with the abortive stamens and deeply-lobed disk, magnified.
7. Vertical section of a fertile flower, magnified, showing the disk, the ovule, &c.
8. The ovule, with its funiculus, more magnified.
9. Drupes, of the natural size.
10. A drupe, with the persistent calyx and corolla, enlarged.
11. Vertical section of the same, and of the seed and embryo, more magnified.
12. A seed detached entire, with a part of its funiculus, magnified.
13. The embryo detached, with the cotyledons separated, more magnified.

ORD. VITACEÆ.

Frutices sarmentosi, cirrhis oppositifoliis scandentes, succo aqueo, stipulis deciduis: dicotyledoneæ, subhypogynæ, regulares; calyce brevissimo; petalis 4-5 æstivatione valvatis caducis; *staminibus* 4-5 *oppositipetalis*; ovario 2-loculari; *ovulis in quoque loculo geminis collateralibus* erectis; stigmate unico; bacca 1-4-sperma; seminibus osseis; *embryone minimo* in basi albuminis dense carnosi, radícula infera.

VITES, Juss. Gen. p. 267.

VINIFERÆ, Juss. in Mem. Mus. 3. p. 444.

VITACEÆ, Lindl. Introd. Nat. Syst. ed. 2. p. 30, & Veg. Kingd. p. 439.

SARMENTACEÆ, Venten. Tabl. p. 167.

AMPELIDEÆ, Kunth in H. B. K. Nov. Gen. & Sp. 5. p. 223. DC. Prodr.

1. p. 627. Wight, Ill. Ind. Bot. p. 159. t. 57, 58. Endl. Gen. p. 796.

THE VINE FAMILY, although its particualar affinities and place in the series are not well made out, is readily distinguished by the very short and often truncate calyx, the valvate æstivation of the corolla, the stamens as many as the petals and inserted opposite them on the outside or under the edge of a fleshy or glandular disk (this is absent in *Ampelopsis*), which girds the base of, and sometimes adheres to, the two-celled ovary, with two erect collateral ovules in each cell; the berry with from one to four bony seeds; and the minute embryo at the base of hard fleshy albumen. It consists of woody plants, climbing by tendrils, which, like the peduncles, are opposite the leaves; the leaves therefore alternate, or some of the lower opposite; and with small greenish flowers in thyrsoid cymes or panicles. The branchlets are tumid at the nodes, where they often separate readily. The Indian and South African genus *Leea*, which connects this family with *Meliaceæ*, bears no tendrils, and has monadelphous stamens and a 3-6-celled ovary with a single ovule in each cell, introduces certain exceptions into the ordinal character, which I have not here taken notice of.

Although the true Grapes are plants of the northern temperate region, belonging to Middle Asia and to North America, yet the greater part of this small order is found within the tropics and in the East Indies.

The Grape-vine exemplifies the general properties which pervade the order ; although the true Grapes alone, and indeed only a portion of these, bear the edible berries, which, with their fermented juice, constitute the sole important products of the family. The leaves and young shoots are also acid, and more or less astringent. The fruits and the foliage of some Indian species of *Cissus* are acrid. The stem of the Grape is strongly charged with aqueous sap in the spring, which flows very copiously when wounded.

Grapes contain several acids (the tartaric, malic, citric, and racemic), the peculiar sugar called grape-sugar, mucilage, and more or less of some astringent principle, in proportions varying greatly, not only in different species, but also in the same species under different circumstances of climate or culture. In the warmer portions of the region of grape-culture, they contain so large a proportion of sugar that they are dried in the sun as raisins ; and those of a small, seedless variety are currants (*Corinths*) of the shops. The Grape of the Old World is the only species of much importance to man. The frost-grapes of the United States are extremely acerb ; and the fox-grapes have a strong musky flavor and a tough pulp. But some varieties worthy of cultivation, and with the advantage of being indigenous to our climate, have been produced in cultivation from our *Vitis Labrusca* ; such are the Isabella Grape, Catawba Grape, &c.

PLATE 161.

VITIS, *Tourn.*

Petala disco 4-5-lobo s. glanduloso extus inserta, apice cucullato-induplicato calypratum cohærentia et basi soluta, vel sub anthesi patentia.

VITIS, *Tourn.* Inst. p. 613. t. 384. Schkuhr, *Handb.* t. 49. *Gærtn. Fr.* t. 106. R. Br. ex *Wight & Arn. Prodr. Ind. Or.* 1. p. 124. *Torr. & Gray, Fl. N. Am.* 1. p. 243.

VITIS & CISSUS, *Linn.* DC. 1. c. *Endl. Gen.* 4566, 4567.

Grape-Vine.

CALYX very short, truncate, or obsoletely 5-4-toothed, the inside filled with a fleshy torus which expands around the base of the ovary into a 5-4-lobed hypogynous disk. PETALS 5 or sometimes 4, inserted under the edge of the disk, equal, concave, valvate in æstivation, their summits frequently induplicate and lightly cohering, when the whole corolla separates from the base before expansion and falls away together, sometimes expanding in the ordinary way, early deciduous. STAMENS as many as the petals and opposite them, inserted just within them: FILAMENTS subulate or filiform, distinct, deciduous: ANTHERS cordate-ovate, fixed near the middle, introrse, two-celled; the cells opening longitudinally. OVARY two-celled, or accidentally three-celled, sessile, its base surrounded by and sometimes coherent with the fleshy disk, the lobes or glands of which are alternate with the stamens: STYLE short or none: STIGMA terminal, depressed, somewhat peltate, or slightly two-lobed. OVULES 2 in each cell, erect from its base, collateral, anatropous, the raphe next the axis.

FRUIT a two-celled (or by abortion one-celled) globular berry; the cells two-seeded or by abortion one-seeded. SEEDS erect, obovate or somewhat obcordate; the membranaceous testa covering a thick and bony inner integument, which is strongly induplicate on each side of the raphe and more or

less so on the middle of the opposite side ; the cartilaginous-fleshy albumen thus appearing three-lobed on the transverse section. EMBRYO very small, next the hilum : COTYLEDONS short and flat : RADICLE conical, inferior.

SHRUBS climbing by tendrils, the branchlets tumid at the nodes. Leaves alternate, or the lowest opposite, petioled, usually orbicular-cordate and palmately-lobed or angled, sometimes palmately or pedately parted, rarely quinately or bipinnately compound. Stipules membranaceous, deciduous. Tendrils and peduncles opposite the leaves. Flowers small, greenish, very numerous, often umbellate-fascicled in compound and thyrsoid panicles or cymes. The North American species are mostly diœcio-polygamous.

ETYMOLOGY. The classical Latin name of the Grape.

GEOGRAPHICAL DISTRIBUTION, DIVISION, &c. The true Grapes, which bear edible fruit, consist chiefly or entirely of the *Vitis vinifera* of the Old World, a native of the Caucasian region, but early carried westward by man ; and of a few North American species, of little economical importance, indigenous to the Atlantic region of the United States. These are pentandrous, or only accidentally tetrandrous species, with the induplicate tips of the petals cohering in the bud, so that the corolla is thrown off from the base without expanding ; and the disk appears in the form of five nearly or quite distinct lobes or fleshy glands alternate with the stamens. Besides these, there are numerous tropical and subtropical species, the greater number Asiatic, with three in the Southern United States, which bear small and inedible berries and tetramerous or pentamerous flowers, the corolla usually expanding before it falls off, and with a conspicuous annular or cup-shaped disk either lobed or toothed, sometimes (as in *V. bipinnata*) coherent with the ovary. These, when tetrandrous, form the Linnæan genus *Cissus* ; to which pentandrous species have also been referred when they have divided leaves, or an expanding corolla. But these characters are not presented in any constant combination which serves to characterize a genus distinct from *Vitis*.

PLATE 161. *VITIS LABRUSCA*, *Linn.* ; — cultivated (Isabella Grape).

1. A flower-bud, magnified ; one of the petals detached at the base.
2. Diagram of the same, showing the æstivation and position of parts.
3. Vertical section of the unopened flower, more magnified.
4. A magnified flower with the corolla, 5, thrown off.
6. Fruit, of the natural size. 7. Vertical section of a berry.
8. A seed detached and enlarged.
9. A transverse, and 10. a longitudinal, section of the same.
11. The embryo (from fig. 10) more magnified.

PLATE 162.

AMPELOPSIS, *Michx.*

Petala 5, sub anthesi patentia. Discus plane nullus!—
Folia digitata 5-foliolata.

AMPELOPSIS, Michx. Fl. 1. p. 159, excl. spec. DC. Prodr. 1. p. 633, excl. spec. 1-2, 4-7. Torr. & Gray, Fl. N. Am. 1. p. 245.

HEDERÆ Sp., Linn. Spec. 1. p. 202.

Virginian Creeper. American Ivy.

CALYX very short, turbinate, truncate, obscurely five-crenate, fleshy. PETALS 5, cucullate, thick and fleshy, hypogynous, valvate in æstivation, induplicate at the apex, separating from the apex to the base in anthesis, spreading, deciduous. STAMENS 5, opposite the petals and shorter than they, hypogynous, deciduous: FILAMENTS subulate: ANTHERS oblong, fixed near the base, introrse, two-celled, the cells opening longitudinally. Disk entirely wanting! OVARY ovate, sessile on a very short hypogynous torus into which the petals and stamens are inserted, two-celled: STYLE none: STIGMA depressed-capitate. OVULES 2 in each cell, collateral, erect from the base, anatropous, the raphe next the axis.

FRUIT a spherical two-celled berry; the cells two-seeded or by abortion one-seeded. SEEDS obovate, with a membranaceous testa covering a thicker bony integument, which is strongly induplicate longitudinally on each side of the raphe, and a little incurved on the opposite side; the cartilaginous-fleshy albumen thus appearing deeply three-lobed on the transverse section. EMBRYO very small, next the hilum in the base of the albumen: COTYLEDONS ovate, flat, shorter than the inferior RADICLE.

SHRUBBY vine extensively climbing by tendrils; the branches tumid and readily separable at the nodes. Leaves alternate, with membranaceous caducous stipules, digitately

quinquefoliolate; the leaflets oblong, acuminate, coarsely serrate. Peduncles and tendrils opposite the leaves. Flowers perfect, small, greenish, in paniculate cymes. Berries dark-colored.

ETYMOLOGY. The name is compounded of *ἄμπελος*, the Greek name of the Vine, and *ὅψις*, *likeness*.

GEOGRAPHICAL DISTRIBUTION, &c. This genus, as here restricted, embraces only a single species, the well-known Virginian Creeper, which is common throughout the originally forest region of Eastern North America, from Canada to Florida and Texas. It is distinguished equally from *Vitis* and from *Cissus* (if the latter be admitted as a genus) by the total absence of any hypogynous disk or glands.

PROPERTIES. This common vine is used in this country as a substitute for Ivy, to mantle walls, &c., over which it spreads rapidly and luxuriantly. The bright green foliage, as well as the pedicels of the fruit, turn to a deep crimson in autumn. The berries are eaten by birds.

PLATE 162. *AMPELOPSIS QUINQUEFOLIA*, *Michx.*; — a flowering branch, of the natural size.

1. Diagram of the flower.
2. A flower-bud, enlarged.
3. An expanded flower, enlarged.
4. A stamen, more magnified, inside view.
5. The same, seen from the outside.
6. Vertical section of a flower, magnified.
7. Two berries, with their stalks, of the natural size.
8. Vertical section of a berry, magnified, dividing one seed.
9. A detached seed, more magnified.
10. A transverse section of the same.
11. An embryo, highly magnified, the cotyledons a little opened.

ORD. RHAMNACEÆ.

Frutices seu arbusculæ simplicifoliæ, stipulis parvis vel obsoletis: dicotyledoneæ, perigynæ, regulares, 4-5-andræ; *calyce* libero seu adhærente *æstivatione valvato*; *staminibus petalis æstivatione involuto-complicatis numero æqualibus et iisdem oppositis, margini disco perigyno insertis*; *ovulis solitariis erectis* in quoque loculo ovarii 1-4-ocularis; fructu drupaceo v. 2-4-cocco; *embryone magno recto* in axi albuminis parci carnosî; cotyledonibus carnosîs seu foliaceis planis vel marginibus recurvis, radícula brevi infera.

RHAMNORUM Genera, Juss. Gen. p. 376.

RHAMNÆ, R. Br. in Flind. Voy. 2. p. 554. DC. Prodr. 2. p. 29. Brongn. in Ann. Sci. Nat. 10. p. 320. Endl. Gen. p. 1094.

RHAMNACEÆ, Lindl. Introd. Nat. Syst. 2. p. 107, & Veg. Kingd. p. 581.

THE BUCKTHORN FAMILY consists of small trees or shrubs, with alternate, or rarely opposite, simple leaves, and small and regular tetrandrous or pentandrous flowers. The family is readily distinguished from all others by the valvate æstivation of the calyx; the separately involute æstivation of the petals (which, however, are occasionally wanting); the position of the stamens before the petals, or alternate with the lobes of the calyx; the insertion of the petals and stamens upon the margin of a conspicuous perigynous disk, which lines the calyx-tube, usually surrounds the ovary or its base, and sometimes coheres with it; the erect and (with a single and doubtful exception) solitary ovule in each cell; and the large and straight embryo in scanty albumen, with broad cotyledons and an inferior radicle. The flowers are either perfect, or by abortion polygamo-monœcious or diœcious. The fruit is drupaceous, or sometimes capsular or nut-like. The seeds are very rarely, if ever, arillate.

The points of resemblance to Byttneriaceæ, noticed by Mr. Brown when he established the present family on its proper basis, go to show that the position of the stamens before the petals is to be explained in Rhamnaceæ in the same manner as in the former order (*vide supra*, p. 83).

Mr. Bennett* has explained the mode in which the originally internal

* In Horsefield's *Plante Javanicæ Rariores*, p. 131.

raphe of the ovule becomes lateral, or even external, in several genera of this family, namely, by the twisting of the short funiculus. This displacement is best observed in *Rhamnus*, in which it is easy to see that the raphe of the ovule is internal, while in the seed the groove in which it is received is exterior.

This family, comprising about forty genera and two or three hundred known species, is represented in almost every flora except the arctic and antarctic; but is most abundant in the warmer part of the temperate zones and along the borders of the tropics. In the southern hemisphere the greater number are South African and Australian, and are of peculiar forms. The North American genera all belong to the tribe *Franguleæ*.

A bitter extractive principle abounds in the bark, with more or less astringency and acidity. Some are purgative or emetic, while others, as the Quina of Brazil (*Discaria febrifuga*), yield an extract which is valued as a tonic and febrifuge. The bark and root sometimes yield a coloring matter, as also do the rather mucilaginous, nauseous, and often cathartic fruits of several species of *Rhamnus*. But the fruit of *Zizyphus*, especially of the Lotebush and Jujube, is esculent. The dried leaves of *Sageretia theezans* are used by the poorer classes in China as a substitute for tea: those of *Ceanothus Americanus* have been similarly employed in this country.

CONSPECTUS OF THE UNITED STATES GENERA.

- * Drupe baccate or fleshy; the putamen bony, one-three-celled. Ovary immersed in the thickened disk.
- ZIZYPHUS. (Plate 163.) Calyx-tube expanded, connate with the base of the ovary. Petals 5. Drupe baccate; the putamen 1-3-celled. Albumen almost wanting. Cotyledons very thick and fleshy.
- CONDALIA. (Plate 164.) Calyx free. Petals none. Putamen one-celled.
- BERCHEMIA. (Plate 165.) Calyx free. Petals 5, entire. Putamen crustaceous, 2-celled.
- * * Drupe baccate; the putamen separating into 2-4 nutlets. Calyx free.
- SAGERETIA. (Plate 166.) Disk thick and fleshy, surrounding the ovary. Drupe 3-pyrenous. Cotyledons plane. Leaves opposite.
- FRANGULA. (Plate 167.) Disk thin, lining the calyx-tube. Drupe 2-4-pyrenous. Seeds not sulcate; raphe lateral. Cotyledons plane, fleshy.
- RHAMNUS. (Plate 168.) Disk thickened at the margin, lining the calyx-tube. Drupe 2-4-pyrenous. Seeds sulcate on the back, the raphe in the groove (dorsal). Cotyledons foliaceous, their margins revolute.
- * * * Fruit at first drupaceous, soon dry and tricoecous.
- CEANOTHUS. (Plate 169.) Calyx colored; the lobes inflexed, shorter than the unguiculate petals and filiform filaments. Seeds not sulcate. Cotyledons plane.

PLATE 163.

ZIZYPHUS, *Tourn.*

Calyx 5-fidus, tubo expanso inferne cum basi ovarii connato. Petala obovata, unguiculata, patentia. Ovarium disco plano immersum, 2-3-loculare. Drupa baccata; putamine osseo 2-3- vel abortu 1-loculari loculis monospermis. Embryo fere exalbuminosus; cotyledonibus magnis crassis. —Frutices spinescentes, floribus in cymulis axillaribus, fructu eduli.

ZIZYPHUS, *Tourn.* Inst. p. 627. t. 403. Lam. Ill. t. 185. Gærtn. Fr. I. t. 43. DC. Prodr. 2. p. 19. Brongn. in Ann. Sci. Nat. 10. p. 354. t. 13. f. 2. Endl. Gen. 5717.

RHAMNI Sp., Linn., Pall., Desf.

Jujube. Lotc-bush.

CALYX flat, with a very short and broadly turbinate tube, which is adnate to the base of the ovary, five-cleft; the lobes triangular, carinate in the middle on the upper side, valvate in æstivation. Disk broad and nearly flat, surrounding the ovary and more or less adnate to it, and lining the expanded tube of calyx, somewhat five-angled. PETALS 5, short, inserted on the margin of the disk at the angles, alternate with the sepals, unguiculate, obovate, cucullate, complicate-infolded around the stamens in æstivation, at length widely spreading, deciduous. STAMENS 5, inserted with the petals and opposite them, about their length or longer, spreading, deciduous: FILAMENTS subulate: ANTHERS didymous, two-celled, introrse, the cells opening longitudinally. OVARY nearly immersed in the disk, two-three-celled: STYLES two or three, distinct or united below: STIGMAS introrse or terminal. OVULES solitary in each cell, erect from the base, anatropous, the raphe next the axis.

FRUIT a mucilaginous-fleshy DRUPE, girt at the base by the persistent calyx, or by its tube from which the limb is

circumscissile; the putamen thick and bony, ovoid or lenticular, two–three-celled with a single erect seed in each cell, or by abortion one-celled and one-seeded, indehiscent. SEED not grooved, with a thin membranaceous testa. ALBUMEN wanting, or an extremely thin layer. COTYLEDONS very large, thick and fleshy, plane (not involute): RADICLE small, inferior.

SHRUBS, with rigid and more or less spinescent branches, alternate and nearly distichous triplinerved leaves, and small axillary greenish flowers, in little cymes or umbellate fascicles which seldom exceed the petiole. Stipules one or both spinescent, or minute, and often caducous.

ETYMOLOGY. Said to come from *Zizouf*, the Arabic name.

GEOGRAPHICAL DISTRIBUTION. A pretty large, chiefly subtropical genus, belonging principally to the Old World, especially to the Mediterranean, Arabian, and East Indian regions. A few have been detected in tropical America, and one in Texas and on the northeastern borders of Mexico; namely, the *Rhamnus obtusifolius*, *Hook.*, the flowers and fruit of which have recently been obtained by Messrs. Lindheimer and Wright.

PROPERTIES. The fruit in this genus is destitute of the purgative or active qualities which generally prevail in the family; that of several species is esteemed as an article of food. The drupes of the Lote-bush (*Z. Lotus*), which gave its name to the ancient Lotophagi, are still gathered for food by the Arabs in Barbary. From *Z. vulgaris* and *Z. Jujuba* is obtained the well-known gummy extract called jujube paste. Two Brazilian species with edible fruit are known. That of the species here figured is said by Dr. Gregg to be edible, but rather astringent. Its fruit is formed in Texas the year after flowering, as noticed by Mr. Wright.

PLATE 163. *ZIZYPHUS OBTUSIFOLIA* (*Rhamnus obtusifolius*, *Hook. in Torr. & Gray, Fl. 1. p. 685**); from Texas, *Lindheimer*.

1. A magnified flower, seen from above, showing the disk, &c.
2. A petal and stamen, more magnified.
3. Vertical section of the flower, magnified.
4. Magnified section of a drupe (by abortion one-celled) and of the embryo.
5. Transverse section of the same, showing the vestiges of the second cell.
6. The embryo, magnified.

* Also *Paliurus Texanus*, *A. Scheele in Linnæa*, 21, p. 580 (1848).

PLATE 164.

CONDALIA, *Cav.*

Calyx patens, 5-fidus. Petala nulla. Ovarium liberum, disco crasso arete cinctum, 1-2-loculare: styli in unum conati. Drupa carnosa; putamine osseo uniloculari monospermo. — Suffrutices ramosissimi, glaberrimi, ramis spinescentibus, floribus axillaribus.

CONDALIA, Cav. Anal. Cienc. Nat. 1. p. 29. t. 4, & Ic. 6. p. 16. t. 525. DC. Prodr. 2. p. 28. Brongn. in Ann. Sci. Nat. 10. p. 355. t. 12. f. 3. Hook. Ic. Pl. t. 287. Torr. & Gray, Fl. N. Am. 1. p. 685. Endl. Gen. 5718.

CALYX flat and open, with a very short turbinate tube, five-cleft, rarely four-cleft, the lobes ovate, valvate in æstivation, carinate-one-nerved on the inside. Disk thick and fleshy, flat, adnate to and filling the tube of the calyx, surrounding the ovary, but free from it or nearly so. PETALS none. STAMENS 5, rarely 4, inserted into the edge of the disk alternate with the lobes of the calyx, shorter than they, deciduous: FILAMENTS subulate-filiform: ANTHERS introse, fixed by the middle, two-celled, the oblong cells opening longitudinally. OVARY free, nearly immersed in the disk, two-celled with a solitary erect ovule in each cell, or in *C. obovata* usually one-celled and one-ovuled: STYLES united into one: STIGMA small and entire, or in *C. obovata* thickish and three-lobed. OVULE erect from the base of the cell, anatropous.

DRUPE ovoid or globose, girt at the base by the entirely persistent calyx or its persistent tube, fleshy; the putamen thick and bony, one-celled, sometimes imperfectly two-celled, indehiscent, one-seeded. SEED subglobose, with a smooth and very thin testa, not sulcate. EMBRYO surrounded by a rather thin layer of fleshy albumen: COTYLEDONS oval, flat, rather fleshy: RADICLE short, inferior.

SHRUBS much branched, glabrous, with spinescent branchlets. Leaves alternate, pinnately veined, obovate or oblong, subsessile, rather coriaceous, deciduous. Stipules minute and caducous. Flowers small, greenish-white, solitary or two or three in a fascicle in the axils of the leaves, on very short peduncles.

ETYMOLOGY. The genus was dedicated to *Ant. Condal*, a Spanish physician, who accompanied Læfling in his journey up the Orinoco.

GEOGRAPHICAL DISTRIBUTION, &c. *Condalia* was founded by Cavanilles upon a single Chilian undershrub, the *C. microphylla*; to which Sprengel added the dubious *C. paradoxa*, from Monte Video, which probably belongs to some very different genus. The Texan plant, recently figured by Hooker, appears to be a genuine species of the genus, although it has much larger leaves, sometimes tetramerous flowers, the ovary as well as the drupe commonly only one-celled, and the whole calyx persistent. It forms a shrub of considerable size, and in Northern Mexico, according to Dr. Gregg, it becomes a tree of twenty feet in height. The genus is scarcely sufficiently distinct from *Zizyphus*; from which it differs principally in the absence of petals, the entirely free ovary, and the pinnate venation of the leaves.

PROPERTIES. The black fruit of *C. obovata*, called *capul* by the Mexicans, like that of *Zizyphus*, is edible, sweet and pleasant, according to the memoranda of Dr. Gregg, who found it from Matamoros to Monterey.

PLATE 164. *CONDALIA OBOVATA*, *Hook.*; — a branch of the natural size, in flower and unripe fruit; from Texas, *Wright*.

1. Diagram in a cross-section of a flower-bud and ovary.
2. A flower, a flower-bud, part of a leaf, &c., magnified.
3. Vertical section of a flower, magnified, showing the solitary ovule.
4. A stamen more magnified, outside view.
5. The same, seen from within.
6. A drupe, with the persistent calyx, of the natural size.
7. The same, enlarged.
8. Vertical section of the same through the seed and embryo, magnified.
9. Transverse section of the same.
10. Magnified transverse section of a drupe, which exhibited the vestige of a second cell.
11. Embryo detached, more magnified.
12. Diagram of a flower of *CONDALIA MICROPHYLLA*, with its two-celled ovary.

PLATE 165.

BERCHEMIA, *Neck.*

Calyx 5-fidus, tubo brevi hemisphærico. Petala sessilia, integerrima, calycem æquantia. Ovarium disco crasso semiimmersum, liberum, 2-loculare. Drupa oblonga; putamine crustaceo 2-loculari, 2-spermo. — Frutices sæpius scandentes, foliis simpliciter lineato-penninerviis, floribus axillaribus et in paniculis terminalibus.

BERCHEMIA, Necker, Elem. Bot. 800. DC. Prodr. 2. p. 22. Brongn. in Ann. Sci. Nat. 10. p. 356. t. 13. f. 1. Wight & Arn. Prodr. Ind. Or. 1. p. 163. Hook. & Arn. Bot. Beech. t. 37. Torr. & Gray, Fl. N. Am. 1. p. 260. Endl. Gen. 5719.

RHAMNI Sp., Linn. Jacq. Ic. Rar. t. 336.

ZIZYPHI Sp., Willd., Pursh, Ell.

CENOPLEA, Hedw. f. Gen. 1. p. 151.

CENOPLIA, Schultes, Syst. Veg. 5. p. 332.

Supple-Jack.

CALYX deeply five-cleft, with a very short hemispherical tube; the lobes somewhat petaloid, erect or spreading, valvate in æstivation; the base persistent. DISK thick and fleshy, lining the tube of the calyx, and surrounding the ovary but free from it. PETALS 5, obovate or lanceolate, sessile, entire, usually acute, about the length of the lobes of the calyx and inserted alternate with them into the edge of the disk, involute around the stamens in æstivation, concave or cucullate-infolded, deciduous. STAMENS 5, opposite the petals and inserted with them, usually shorter than they: FILAMENTS subulate: ANTHERS ovate or cordate, two-celled, introrse, fixed below the middle, the cells opening longitudinally. OVARY half immersed in the disk, free, ovoid, two-celled: STYLES united into one: STIGMAS 2. OVULE solitary in each cell, erect from its base, anatropous, the raphe next the axis.

FRUIT an oblong or ovoid DRUPE, with a thin sarcocarp, or sometimes nearly juiceless; the crustaceous putamen two-celled. SEED solitary in each cell, oblong, erect, with a membranaceous testa, not grooved; the raphe lateral, or at length dorsal. EMBRYO in the axis of fleshy albumen and of about the same length: COTYLEDONS narrowly oblong, flat and thin, parallel with the dissepiment: RADICLE short, inferior, slightly curved toward the axis.

SHRUBS erect, or often twining or climbing, with the alternate leaves oval or oblong, entire or nearly so, strongly pinnately veined; the veins numerous and nerve-like, approximate, oblique, straight and simple, connected by minute transverse veinlets. Stipules subulate, minute. Flowers small, greenish-white, perfect or somewhat polygamous, solitary or cymulose in the axils of the upper leaves, and in slender terminal panicles; the drupes blackish or purple.

ETYMOLOGY. The name, which is not explained by Necker, is supposed to commemorate some obscure botanist.

GEOGRAPHICAL DISTRIBUTION. The genus, which is well marked in habit, consists of one species indigenous to the Southern United States, a few in subtropical North America, and several in tropical Asia.

PROPERTIES. The fresh stems of our species are very lithe and tough; whence the popular name.

NOTE. In *B. volubilis* we do not find the seed to be stipitate; the embryo is surrounded by a very distinct albumen; and this is closely invested by a thin and delicate testa, which is not adnate to the pericarp.

PLATE 165. *BERCHEMIA VOLUBILIS*, DC.; — a branch in flower, of the natural size.

1. Diagram of the æstivation and position of the parts of the flower.
2. An expanded flower, magnified.
3. A vertical section of a flower, magnified.
4. Vertical section of a fertilized pistil, disk, &c., magnified.
5. A stamen more magnified, seen from the outside.
6. The same, seen from the inside.
7. Fruit of the natural size.
8. A magnified vertical section of a mature drupe, dividing both seeds.
9. A transverse section of the same.
10. The embryo detached, more magnified.

PLATE 166.

SAGERETIA, *Brongn.*

Calyx 5-fidus, tubo urceolato. Petala obovata calyce breviora. Ovarium disco crasso cupulæformi subinclusum, liberum, 3-loculare. Drupa baccata, 3-pyrena. Semina exsulca. Cotyledones planæ. — Frutices ramis virgatis, foliis suboppositis laxe penninerviis, floribus spicatis.

SAGERETIA, Brongn. in ANN. Sci. Nat. 10. p. 359. t. 13. f. 2. Torr. & Gray, Fl. N. Am. 1. p. 263. Endl. Gen. 5720.

CALYX five-cleft, with an urceolate or hemispherical tube; the lobes ovate, acute, carinate in the middle of the upper side, valvate in æstivation. DISK thick and fleshy, cup-shaped, filling the tube of the calyx to which it adheres, closely surrounding the ovary but free from it. PETALS 5, inserted on the margin of the disk, alternate with the lobes of the calyx and shorter than they, obovate, often emarginate, more or less unguiculate, involute around the stamens in æstivation, cucullate or concave, deciduous. STAMENS 5, inserted with the petals and opposite them, about their length: FILAMENTS subulate: ANTHERS ovate, two-celled, fixed near the base, introrse, the cells opening longitudinally. OVARY ovate, nearly immersed in the disk, free, three-celled: STYLE very short and thick, three-grooved: STIGMAS 3, depressed-capitate. OVULE solitary in each cell, erect from its base, anatropous, the raphe next the axis.

FRUIT a globose baccate DRUPE, tripyrenous; the pyrenæ coriaceous, smooth and even, not grooved, obovate, indehiscent, filled with the seed. EMBRYO in the axis of thin fleshy albumen: COTYLEDONS flat and plane: RADICLE inferior.

SHRUBS with slender and virgate branches, spinescent branchlets, and mostly opposite oblong or lanceolate and ser-

rotate leaves, on short petioles, their venation loosely pinnately veined and reticulated. Stipules minute, deciduous. Flowers very small, greenish, crowded and often glomerate in slender axillary and terminal rigid spikes.

ETYMOLOGY. Dedicated by Brongniart to *Cl. Sageret*, a French horticulturist and vegetable physiologist.

GEOGRAPHICAL DISTRIBUTION. Chiefly tropical or subtropical plants, the greater part natives of Equinoctial America and Eastern Asia. One species extends up the coast from Florida to North Carolina.

NOTE. The fruit was not described by Brongniart. It is here figured from some sketches, made by Dr. Torrey at the time the Rhamnaceæ were prepared for the *Flora of North America*, which show that it is much nearer that of *Rhamnus*, or rather *Frangula*, than that of *Berchemia*. Better materials and further details are still needed.

PLATE 166. *SAGERETIA MICHAUXII*, *Brongn.*; — a flowering branch, of the natural size; from Florida.

1. Diagram of the flower.
2. An open flower, magnified.
3. An exterior view of a stamen, more magnified.
4. The same, seen from the inner side.
5. A petal spread out, magnified.
6. Vertical section of a flower, magnified.
7. A drupe, of the natural size.
8. The same, enlarged.
9. One of the pyrenæ, seen from the outside, magnified.
10. Transverse section of the same, and of the embryo.

* * The figures 7-9 are copied from sketches made by Dr. Torrey.

PLATE 167.

FRANGULA, *Tourn.*

Calyx 5- (rarissime 4-) fidus, tubo urceolato intus disco tenui vestito. Petala brevia seu brevissima. Ovarium liberum, 2-4-loculare. Drupa baccata, 2-4-pyrena. Semina exsulca, raphæ laterali. Cotyledones carnosæ planæ.— Frutices vel arbusculæ; foliis alternis penninerviis, venis rectis oblique parallelis; floribus semper hermaphroditis.

FRANGULA, *Tourn.* Inst. p. 612. t. 383. Mœnch, *Meth. Suppl.* p. 271.

Reichenb. *Fl. Germ.* 1. p. 488. Bennett in *Pl. Jav. Rar.* p. 131.

RHAMNI Sect. FRANGULA, *Linn. Gen.* 265. (*Gærtn. Fr.* t. 110. *Schkuhr, Handb.* t. 46.) *DC. Prodr.* 2. p. 26. *Brongn. in. Ann. Sci. Nat.* 10. p. 362. t. 13. f. 5. *Endl. Gen.* 5722.

Alder-Buckthorn.

CALYX five-cleft, rarely four-cleft, with an urceolate or campanulate tube; the lobes ovate or triangular, more or less petaloid, and carinate-one-nerved within, valvate in æstivation, deciduous by a circumscissile line after flowering, leaving the persistent cupulate tube at the base of the fruit. DISK a thin lining to the tube of the calyx, not surrounding the ovary. PETALS inserted into the edge of the disk alternate with the lobes of the calyx, much smaller than they, erect, obovate, unguiculate, often emarginate, cucullate, involute around the stamens in æstivation, deciduous. STAMENS as many as the petals and opposite them, short: FILAMENTS subulate: ANTHERS didymous, two-celled, introrse, the cells opening longitudinally. OVARY free, two-four-celled: STYLES commonly united into one: STIGMAS two to four, distinct or somewhat united. OVULE solitary in each cell, erect from the base, anatropous; the raphe at first next the axis.

FRUIT a globular baccate drupe. two-four-celled, containing from two to four (commonly three) cartilaginous one-seeded pyrenæ, which are convex on the back, perforated

at the base. SEED erect, filling the nucules (pyrenæ), convex (not at all grooved or excavated) on the back; the char-
taceous or membranaceous testa somewhat adnate to the
putamen; the raphe lateral, next to one margin of the coty-
ledons. EMBRYO large, surrounded by a thin layer of fleshy
albumen: the broad COTYLEDONS flat or plano-convex, usually
fleshy, not at all revolute, parallel with the axis: RADICLE
very short, inferior, turned a little from the hilum.

SHRUBS, or small trees, unarmed; with the deciduous or
sometimes coriaceous and persistent leaves alternate, petioled,
strongly pinnately veined; the primary veins equal, parallel,
straight or a little curved, running obliquely and without
branching from the midrib to the margin. Stipules minute,
deciduous. Flowers all perfect, white, sometimes reddish,
clustered in axillary cymules or umbels.

ETYMOLOGY. Probably from *frango*, to break, in allusion to the brittle-
ness of the stems.

PROPERTIES. The bark of *F. vulgaris* yields a yellow coloring matter,
and is purgative, acrid, and bitter. The drupes are more or less purgative.

GEOGRAPHICAL DISTRIBUTION, &c. This Tournefortian genus, which is
surely distinct from *Rhamnus*, as Mr. Bennett has remarked, belongs to the
northern temperate region; three species are natives of Europe and North-
ern Asia; one, of the Azores; and one, *F. California*, with coriaceous
leaves and large dipyrrenous fruit, of California, namely, *Rhamnus Californi-
cus*, *Esch.*, and *R. oleifolius*, *Hook.*, to which must be added, apparently as
varieties only, the *R. laurifolius* and *R. leucodermis*, *Nutt.*, and even *R. to-
mentellus*, *Benth.*

PLATE 167. FRANGULA CAROLINIANA: — a branchlet in flower.

1. A flower magnified.
2. A petal: 3. inside view of a stamen, more magnified.
4. Vertical section of a flower, magnified.
5. Pistil magnified, with the three-celled ovary transversely divided.
6. A drupe, of the natural size.
7. Transverse section of the same, magnified, showing the flat cotyledons.
8. One of the cocci, seen from the inner side, more magnified.
9. Vertical section of the same, and of the seed and embryo.
10. A seed detached and magnified, showing the lateral raphe.
11. Embryo detached entire, magnified.

PLATE 168.

RHAMNUS, *Tourn.*

Calyx 4-fidus, rarius 5-fidus, tubo urceolato intus disco tenui s. margine incrassato vestito. Petala exigua vel nulla. Ovarium liberum, 2-4-loculare. Drupa baccata, 2-4-pyrena. Semina dorso sulcata, rraphe dorsali. Cotyledones foliaceæ, revolutæ. — Frutices vel arbusculæ, foliis vage penninerviis, floribus viridulis dioicis vel polygamo-subdioicis.

RHAMNUS & ALATERNUS, *Tourn. Inst.* p. 593. t. 366.

RHAMNI Sp., *Linn. DC. Prodr.* 2. p. 23. *Brongn. l. c.* *Endl. Gen.* 5722.

CERVISPINA, *Dillen. Nov. Gen.* t. 8. *Mœnch, Meth.* p. 686.

MACORELLA, *Neck. Elem.* 2. p. 122.

CARDIOLEPIS, *Raf. Neog.* 1825, p. 2.

Buckthorn.

CALYX four-cleft, rarely five-cleft, with an urceolate tube; the lobes valvate in æstivation, deciduous. Disk lining the tube of the calyx, thin below, more or less thickened upwards, entirely free from the ovary. PETALS as many as the lobes of the calyx and shorter than they (usually very small), inserted alternate with them into the thickened margin of the perigynous disk, unguiculate, frequently emarginate or two-lobed, concave or cucullate, involute around the stamens in æstivation, deciduous, often wanting. STAMENS, &c., as in *Frangula*. OVARY free, ovoid, two-four-celled: STYLES united below: STIGMAS 2 to 4, terminal, obtuse. OVULE solitary and erect from the base of each cell, anatropous; the raphe at first next the axis, but soon by torsion of the short funiculus becoming lateral, and in the seed dorsal.

FRUIT a globular and baccate two-four-celled drupe, containing as many separable and cartilaginous pyrenæ, which when ripe incline to open along the ventral and sometimes on the dorsal suture, conformed to the seed. SEED obovate,

with a cartilaginous testa, grooved longitudinally on the outer side, the raphe in the groove. EMBRYO in the axis of fleshy albumen, of about its length: COTYLEDONS oval or orbicular, foliaceous, parallel to the axis and the raphe, their margins recurved on each side of the groove so as to become navicular: RADICLE very short, inferior, turned a little from the hilum.

SHRUBS or small trees, sometimes with spinescent branches; the leaves mostly alternate, loosely pinnately veined. Stipules linear or subulate, caducous. Flowers small, greenish, axillary, usually fascicled or cymose-clustered, rarely racemose, either strictly polygamo-dioecious, or (as in *R. lanceolatus*) subdioecious, both kinds of flowers with well-formed stamens and often fruit-bearing, but the styles in the substerile flowers much shorter than in the others.

ETYMOLOGY. *Ῥάμνος*, the ancient Greek name of the Buckthorn.

PROPERTIES. The fruit and bark are purgative. Those of the common Buckthorn (*R. catharticus*, a European species, much used for hedges in the Northern United States) are drastic. From their unripe fruit the water-color called *sap-green* is prepared. "French berries," the fruit of *R. infectorius*, &c., are employed in calico-printing, and in dyeing morocco leather yellow.

GEOGRAPHICAL DISTRIBUTION. Principally natives of the Northern temperate zone, the greater part belonging to the Old World. The only well-determined species of the United States are *R. lanceolatus* (including *R. Shortii*, *Nutt.*, and *R. parvifolius*, *Torr. & Gr.*) and *R. alnifolius*, *L'Her.*; the latter pentandrous, apetalous, the seeds with a shallow but manifest dorsal groove and the cotyledons recurved in the manner characteristic of the genus.

PLATE 163. *RHAMNUS LANCEOLATUS*, *Pursh.*; — Pennsylv., *Prof. Green.*

1. A flowering branchlet of the truly fertile plant, of the natural size.
2. A similar flowering branchlet of the substerile plant.
3. Diagram of the flower. (In the ovary the raphes are becoming lateral.)
4. A flower (from Fig. 2), magnified; and 5. with the calyx divided.
6. A petal, spread out and more magnified.
7. A magnified stamen seen from the outside, and 8. from the inside.
9. A truly fertile flower (from Fig. 1), magnified.
10. Vertical section of the same, more magnified.
11. A branch in fruit, of the natural size; from the mountains of Virginia.
12. Vertical section of a drupe through the seeds and embryo, magnified.
13. Transverse section of the same, showing the recurved cotyledons, &c.
14. A seed, the dorsal groove towards the eye, cut across, and magnified.
15. Embryo spread out, magnified. (Cotyledons truly foliaceous.)

PLATE 169.

CEANOTHUS, L.

Calyx coloratus, 5-fidus, tubo ovario pl. m. adnato, lobis conniventibus. Petala calycem superantia, longe unguiculata, cucullata, patenti-deflexa. Stamina exserta. Fructus 3-coccus; coccis crustaceis bivalvibus. Cotyledones planæ.

CEANOTHUS, Linn. Gen. 267 (excl. spec.). Mill. Ic. t. 57. Brongn. in Ann. Sci. Nat. 10. p. 369. t. 15. f. 4. Hook. Fl. Bor. Am. 1. p.

124. t. 45. Torr. & Gray, Fl. N. Am. 1. p. 264. Endl. Gen. 5726.

CEANOTHUS Sect. EUCEANOTHUS, DC. Prodr. 2. p. 31.

FORRESTIA, Raf. in N. Y. Med. Rep. (hex. 5.) 2. p. 350.

New Jersey Tea. Red-root.

CALYX colored, five-cleft, with a hemispherical or turbinate tube; the lobes triangular, membranaceous and petaloid, valvate in æstivation (the bud five-lobed), usually remaining inflexed or connivent, deciduous by a circumscissile line, leaving the persistent tube at the base of the fruit. Disk fleshy or spongy, thickened upwards, adnate to the calyx-tube and closely surrounding the ovary, with which it is usually more or less coherent. PETALS 5, inserted on the thickened margin of the disk alternate with the lobes of the calyx, much longer than they, exserted, deflexed or widely spreading in flower, conspicuously unguiculate, the limb cucullate, infolded around the stamens in æstivation, deciduous. STAMENS 5, inserted with the petals and opposite them, as long as the petals or longer, often persistent: FILAMENTS filiform: ANTHERS didymous or four-lobed, introrse, two-celled, the cells opening longitudinally. OVARY three-celled, immersed in the disk, and often adnate to it, sometimes three-angled, the angles often surmounted by a fleshy protuberance or a gland: STYLES 3, commonly united below into one: STIGMAS introrse or terminal. OVULE solitary in each cell, erect from its base, anatropous, the raphe next the axis.

FRUIT three-lobed, three-celled, tricocous, girt at the base by the persistent and commonly adnate base of the calyx, at first drupaceous, but the usually thin sarcocarp soon dries up; the endocarp dehiscent into three crustaceous or cartilaginous at length two-valved cocci. **SEED** solitary in each cell, erect, with a broad basilar caruncle at the hilum, obovate-lenticular, with a smooth crustaceous testa, not sulcate; the raphe ventral. **EMBRYO** in the axis of fleshy albumen, of nearly its length and width: **COTYLEDONS** oval or obovate, thin and flat: **RADICLE** very short, inferior.

SHRUBS, or suffruticose plants, sometimes spinescent; with alternate (rarely opposite) usually serrulate leaves. Stipules minute and caducous. Flowers perfect, small, but usually handsome, being collected in umbel-like fascicles, which are aggregated into dense thyrsoïd cymes or panicles at the extremity of the branches; the pedicels as well as the calyx and corolla usually colored, white, blue, or sometimes yellowish.

ETYMOLOGY. *Κεάνωθος*, a name applied by Theophrastus to some prickly plant, and transferred by Linnæus to this genus, for no assigned reason.

PROPERTIES. The root of *C. Americanus* is dark red, and yields a cinnamon-colored dye. It possesses considerable astringency, as do the leaves, which were used during the American Revolution as a substitute for tea.

GEOGRAPHICAL DISTRIBUTION. This pretty large genus, as now limited, is entirely North American. Five species are natives of the United States, the rest belong to Oregon, Northern Mexico, and especially to California.

PLATE 169. *CEANOTHUS AMERICANUS*, *Linn.*; — a flowering branch.

1. Diagram of the flower. 2. A flower, magnified.
3. Vertical section of a flower, more magnified.
4. Side view of a petal and a stamen, still more magnified.
5. A magnified stamen, seen from the inner side.
6. An ovule, magnified.
7. A fruit, magnified, showing the thin and dry sarcocarp.
8. The same more magnified, dehiscent into three cocci and separating from the persistent base of the calyx.
9. Vertical section of a seed, at right angles to the cotyledons, magnified.
10. A magnified seed transversely divided, the inner side towards the eye.
11. Vertical section of the seed parallel with the cotyledons, displaying the embryo.

ORD. CELASTRACEÆ.

Frutices vel arbusculæ simplicifoliæ, stipulis minimis caducis: dicotyledoneæ, perigynæ, regulares, 4-5-meræ, 4-5-andræ, æstivatione calycis corollæque imbricativa; *staminibus petalis alternis* disco insertis; ovario libero 2-5-loculari, stylis in unum coalitis, loculis uni-pluriovulatis; seminibus anatropis in capsularibus arillatis; embryo in axi albuminis recto magno, cotyledonibus foliaceis planis.

CELASTRINEÆ, R. Br. in Flind. Voy. 2. p. 554. Brongn. in Ann. Sci.

Nat. 10. p. 323. Bartl. Ord. Nat. p. 378. Endl. Gen. p. 1085.

CELASTRACEÆ, Lindl. Introd. Nat. Syst. ed. 2. & Veg. Kingd. p. 586.

CELASTRINEARUM Trib. EUONYMEÆ, DC. Prodr. 2. p. 3.

RHAMNORUM Sect. 2, Juss. Gen. p. 377, excl. gen.

THE STAFF-TREE OR SPINDLE-TREE FAMILY is at once distinguished from the Buckthorn Family (from which Mr. Brown long since separated it), by the imbricative æstivation of the calyx and corolla, and by the stamens being alternate with the petals. The fleshy disk, moreover, is less perigynous, and the petals, large in proportion, are inserted by a broad base under its more or less free edge. The ovary, although often immersed in the disk, is free, or becomes so in fruit: its cells usually contain a pair of ovules, rarely a single, sometimes several. These are normally erect or ascending; but they occasionally become resupinate-suspended (as in one section of *Euonymus*, plate 171), the raphe thus becoming dorsal in the manner long ago shown by Mr. Brown,* and recently more fully explained by Mr. Bennett.† The Celastraceæ are likewise distinguished, at least the capsular genera, by their arillate seeds; the arillus usually forming a fleshy or pulpy sac which incloses the seed, or sometimes a cup or ring around its base. In *Euonymus* Dr. Planchon has shown that this fleshy covering is developed from the exostome of the ovule, and not from the funiculus, and he therefore names it a false arillus or *arillodium*.‡ But in *Celastrus*, if our analyses

* In the Appendix to King's *Narrative*, 2. p. 549. — The same resupination is seen in *Sida* (Plate 123), and in many other genera.

† In Horsefield's *Planta Javanica Rariores*, p. 131.

‡ In *Annales des Sciences Naturelles*, 3^{me} ser. 3. p. 281. t. 11.

(Plate 170, Fig. 9 and 12) are truthful, this covering must be a growth from the funiculus itself, or a true arillus.

The Aquifoliaceæ, which were formerly confounded with this family, are distinguished by the more or less monopetalous corolla, on the base of which, and not on a fleshy disk, the stamens are inserted, and especially by the solitary suspended ovules, and the minute embryo at the extremity of copious albumen.

Celastraceæ belong to the warmer portions of the temperate, and to the intertropical regions of both hemispheres. The greater part are subtropical and in the southern hemisphere, especially of the Old World. *Euonymus* is the only European and North Asiatic genus except a *Catha*? (*Celastrus Europæus*) in Granada; while this genus and *Celastrus* occur in the United States, and *Pachystima*, *Raf.* (*Oreophila*, *Nutt.*, not of Don) in the Rocky Mountains and in Oregon. *Myginda*, a West Indian genus, with drupaceous fruit, is found on Key West.

The sensible properties which prevail in this family are very similar to those of the *Rhamnaceæ*. They are astringent and bitter, but at the same time often pervaded with some stimulant, or more or less acrid or nauseous products, which are frequently emetic or cathartic. The fruit or seeds of *Euonymus* are said to poison sheep; but the drupes of an *Elæodendron* are edible. A fixed oil may be expressed from the seeds of several genera. The green leaves of *Catha edulis* (*Khât* of the Arabs), which is cultivated along with the Coffee-tree at Yemeu, &c., are greedily eaten by the Arabs, who attribute to them the power of producing extreme watchfulness, so that a man may stand sentry all night long without drowsiness. They also regard them as an antidote to the plague.

PLATE 170.

CELASTRUS, L.

Flores subdioici. Petala et stamina 5, in marginem disci cupulæformis inserta. Ovarium liberum 2-4-loculare, loculis 2-ovulatis. Semina erecta, arillo carnosio colorato inclusa. — Frutices scandentes, foliis alternis.

CELASTRUS, Linn. Gen. 270 (excl. spec.). Gärtn. Fr. t. 95. Schkuhr, Handb. t. 47 (fig. dextr.). Kunth in H. B. K. Nov. Gen. & Sp. 7. p. 64. Wight, Ill. Ind. Bot. t. 72. Torr. & Gray, Fl. N. Am. 1. p. 257. Endl. Gen. 5679.

Staff-tree. Waxwork. Shrubby Bittersweet.

FLOWERS diœcious, or diœcio-polygamous from the abortion of the stamens in one set of individuals and of the pistil in another. CALYX herbaceous, with a short urceolate or cup-shaped tube, five-cleft; the lobes quincuncially imbricated in æstivation, persistent. DISK perigynous, fleshy, cup-shaped, filling the tube of the calyx to which it adheres, and with a more or less free crenulate-lobed border. PETALS 5, inserted by a broad base just under the edge of the disk, alternate with the lobes of the calyx, much larger than they, oblong-obovate, spreading, deciduous, imbricated in æstivation, either quincuncially or with only one exterior and one interior. STAMENS 5, inserted into the edge of the disk alternate with the petals, shorter than they (in the fertile plant usually mere abortive rudiments): FILAMENTS subulate: ANTHERS oblong-sagittate or cordate, often mucronate-apiculate, fixed near the base, introrse, two-celled, the cells opening longitudinally. OVARY in the sterile flowers rudimentary in the bottom of the open disk; in the fertile flowers with the base closely surrounded by the disk, two-four- (usually three-) celled: STYLE thick: STIGMA two-four-lobed. OVULES two in each cell, erect from its base, collateral, anatropous, on short and fleshy cupulate funiculi; the raphes face to face.

FRUIT a globular and orange-colored two-four- (usually three-) celled CAPSULE, loculicidally dehiscent by as many valves; the valves coriaceous, bearing the thin dissepiments on their middle. SEEDS two or solitary in each cell, erect, inclosed in a fleshy scarlet ARILLUS, which is pervious only at the apex; the chartaceous testa marked by a slender raphe. EMBRYO straight in the axis of copious fleshy albumen, nearly of its length and breadth: COTYLEDONS foliaceous, oval, plane, parallel with the raphe: RADICLE short, inferior.

SHRUBS climbing, sometimes twining, unarmed; with alternate leaves, and rather small greenish-white flowers in axillary or terminal racemes or panicles, which are drooping in fruit. Stipules minute, setaceous, caducous. Pedicels articulated above the middle, minutely bracteate.

ETYMOLOGY. An ancient Greek name, of uncertain meaning.

GEOGRAPHICAL DISTRIBUTION. This genus, as now restricted, consists of our *C. scandens*, which is common throughout the United States proper, apparently of one or more Mexican species, of one East Indian, and perhaps of an African species. *C. Europæus*, *Boiss.*, is doubtless to be excluded.

PROPERTIES. Our *Waxwork* is sometimes planted as an ornamental climber, on account of the fruit, which is showy in autumn, when the orange-colored pods burst, so as to display the pulpy scarlet arillus that incloses the seeds. These are said to possess narcotic and stimulating properties. The seeds of the East Indian *C. paniculata* (*Malkungnee* of the natives) yield by destructive distillation a peculiar empyreumatic oil, of a bitter and acrid taste, which is highly valued by the native practitioners.

PLATE 170. CELASTRUS SCANDENS, *Linn.*; — branch of the staminate plant.

1. Diagram of the flower.
2. A staminate flower, with the articulated pedicel, magnified.
3. A vertical section of the same.
4. A magnified stamen, outside view; 5. an inside view.
6. A pistillate flower, magnified.
7. Magnified pistil, with the disk and the base of the calyx.
8. Vertical section of the same, showing the ovules, &c.
9. An ovule, and the forming arillus, more magnified.
10. Dehiscent fruits, of the natural size.
11. A seed in its pulpy arillus, magnified.
12. Vertical section of the same, through the raphe and cotyledons.
13. A seed extracted from the arillus, magnified. 14. Embryo magnified.

PLATE 171.

EUONYMUS, *Tourn.*

Flores hermaphroditi, 4–5-meri. Petala sub disco magno plano ovarium cingenti inserta. Stamina disco imposita; filamentis brevissimis. Ovula in loculis 2, adscendentia vel resupinata. Semina arillo colorato inclusa. — Frutices oppositifolii, floribus axillaribus cymosis.

EUONYMUS, Tourn. Inst. p. 617. t. 388. Linn. Gen. 271. Lam. Ill. t. 131. Gærtn. Fr. t. 113. DC. Prodr. 2. p. 3. Torr. & Gray, Fl. 1. p. 257. Endl. Gen. 5676. Bennett, Pl. Jav. Rar. p. 130. t. 28.

Spindle-tree. Strawberry-tree. Burning-bush.

FLOWERS perfect. CALYX flat, four–five-cleft, persistent; the lobes rounded, imbricated in æstivation. DISK large, thick and fleshy, perigynous, flat, quadrangular or somewhat five-angled, closely surrounding the ovary and more or less adherent to it. PETALS as many as the lobes of the calyx and inserted in their sinuses under the free border of the disk, much larger than the calyx, widely spreading, sessile by a broad base, imbricated in æstivation, deciduous. STAMENS as many as the petals and alternate with them, inserted on the upper surface of the flat disk: FILAMENTS very short, subulate, erect: ANTHERS introrse, didymous, two-celled; the cells nearly parallel, or oftener with their bases diverging so as to become transverse, opening lengthwise. OVARY immersed in the disk, three–five-celled: STYLE very short: STIGMA terminal, depressed, or three–five-lobed. OVULES anatropous, two in the inner angle of each cell, either next the base, when they are ascending, or nearer the summit, when they become pendulous by resupination, and the raphe therefore dorsal or external, at first collateral, and with the raphes contiguous (at least in *E. Americanus*, &c.), but at length more or less superposed.

FRUIT a three-five-lobed and three-five-celled fleshy and colored CAPSULE, either smooth or verrucose, loculicidally three-five-valved; the valves at length coriaceous, bearing the dissepiments on their middle. SEEDS two, or commonly solitary in each cell by the abortion of one ovule, ascending or resupinate-suspended, inclosed in a pulpy red arillus which is pervious at the apex, the testa smooth and chartaceous. EMBRYO straight, in the axis of fleshy albumen, of nearly its length: COTYLEDONS broad and flat, foliaceous, parallel with the raphe: RADICLE short, next the hilum.

SHRUBS or small trees, sometimes trailing; with mostly square branchlets, opposite and usually serrulate pinnately-veined leaves, minute and caducous stipules, and cymose (or rarely solitary) flowers on axillary peduncles. Petals greenish or dark purple. Capsules and arillus usually red.

ETYMOLOGY AND PROPERTIES. From $\epsilon\delta$, *good*, and $\beta\upsilon\omicron\mu\alpha$, *food*; a name ironically given, according to Tournefort, because the herbage or fruit of these plants was thought to be noxious to cattle.

GEOGRAPHICAL DISTRIBUTION, &c. This genus belongs almost entirely to the temperate regions of the northern hemisphere. Of our three or four species, one only extends westward to Oregon. *E. atropurpureus*, a highly ornamental shrub in autumn, when the bright red pods are ripe, is one of that section of the genus in which the ovules and seeds maintain their original position, and are ascending, with the raphe internal.

PLATE 171. *EUONYMUS AMERICANUS*, var. *OBOVATUS*, Torr. & Gr. (*E. obovatus*, Nutt.) ;—a branch in flower, of the natural size.

1. Section of the flower-bud, enlarged, showing the æstivation, &c.
2. A magnified flower, seen from above.
3. The same, seen from beneath.
4. Vertical section of a flower, more magnified, showing the ovules, &c.
5. A detached stamen, more magnified, seen from within.
6. An ovule much magnified, from a left-hand cell (resupinate).
7. Section of a half-grown fruit, showing the fertilized and abortive seeds.
8. A young seed more magnified, showing the growing arillus.
9. Dehiscent capsule, of the natural size.
10. A seed inclosed in its pulpy arillus, magnified.
11. The same, with the arillus longitudinally divided.
12. Vertical section of the seed and embryo across the cotyledons, magnified.
13. The embryo detached entire, magnified.

ORD. STAPHYLEACEÆ.

Frutices erecti, foliis oppositis pinnato-3 – 9-foliolatis stipulatis, foliolis serrulatis sæpe stipellatis; — a Celastraceis diversi foliis compositis, carpellis subdiscretis, et seminibus osseis sæpissime exarillatis; a Sapindaceis staminibus cum petalis sepalisque isomeris, embryo recto in albumine carnosio.

STAPHYLEACEÆ, Bartl. Ord. Nat. p. 351. Lindl. Introd. Nat. Syst. ed. 2. p. 121, & Veg. Kingd. p. 351. Endl. Gen. p. 1084.

CELASTRINEARUM Trib., DC. Prodr. 2. p. 2. Torr. & Gray, Fl. N. Amer. 1. p. 256.

THE BLADDER-NUT FAMILY, first admitted as a distinct order by Bartling, was arranged as a tribe of Celastraceæ by De Candolle. It is thought to be about equally related to the latter family and to the Sapindaceæ, in which Reichenbach places Staphylea. From the Celastraceæ these plants are distinguished by the pinnate or pinnately trifoliolate leaves, with the leaflets usually stipellate, the colored calyx, the completely or partially distinct carpels, and the bony seeds which (except in Euseaphis) are destitute of an arillus. From Sapindaceæ, with which they accord in habit, they are distinguished by their opposite leaves (which are of very rare occurrence in Sapindaceæ), their regular and symmetrical pentandrous flowers, and their straight embryo in fleshy albumen.

The family comprises only three admitted genera, of a small number of species, namely, *Turpinia*, *Vent.*, of the West and East Indies, with baccate fruit; *Euseaphis*, *Sieb. & Zucc.*, of Japan, with triple fleshy-coriaceous pods; and *Staphylea*, *L.*, with its inflated bladderly fruit. One species of the latter genus is given to Japan, one to Europe, and one to the Eastern United States. A species is also mentioned from Java. A Peruvian and two West Indian species, assigned to *Staphylea*, require confirmation.

In the little that is known of their sensible properties, they agree with the nearly related families. The oily seeds of the Bladder-nut are slightly purgative; and the fresh bark has a strong and rather unpleasant odor. The bark of the root of *Euseaphis staphyleoides* is bitter and astringent; and its infusion is used by the Japanese as a remedy for dysentery, chronic diarrhœa, &c. The fruit of *Turpinia* is edible.

The plants of the family are all upright shrubs or small trees, with neat foliage and rather handsome white or whitish blossoms. In the Bladder-nuts these are succeeded by the large and membranaceous strikingly inflated pods.

PLATE 172.

STAPHYLEA, L.

Flores hermaphroditi. Calyx coloratus, 5-partitus. Petala et stamina 5, erecta, margini disci perigyni 5-lobi inserta. Capsula 3-loba, membranacea, inflata, oligosperma. Semina ossea, exarillata. — Frutices; foliis trifoliolatis v. imparipinnatis, stipulatis et stipellatis; floribus cymuloso-racemosis.

STAPHYLEA, Linn. Gen. 374. Lam. Ill. t. 210. Schkuhr, Handb. t. 84. Gœrtn. Fr. t. 69. DC. Prodr. 2. p. 2. Torr. & Gray, Fl. 1. p. 256. Deless. Ic. 3. t. 51. Sieb. & Zucc. Fl. Jap. p. 180. t. 95. Endl. Gen. 5673.

STAPHYLODENDRON, Tourn. Inst. p. 616. t. 386.

BUMALDA, Thunb. Fl. Jap. p. 8.

Bladder-nut.

CALYX five-parted, colored; the segments flat, quincuncially imbricated in æstivation, erect, marcescent or persistent. Disk perigynous, fleshy, filling the short tube of the calyx, urceolate or depressed, five-lobed; the lobes before the petals. PETALS 5, spatulate or obovate, inserted on the margin of the disk alternate with the sepals, unguiculate, quincuncially imbricated in æstivation, erect, deciduous. STAMENS 5, inserted on the edge of the disk alternate with the petals: FILAMENTS filiform-subulate, pubescent towards the base: ANTHERS introrse, fixed near the middle, two-celled, the oblong cells parallel, opening longitudinally. PISTILS 3, or rarely 2, united by their inner angles at the base only, or for nearly their whole length: STYLES filiform, distinct and connivent, or more or less coherent: STIGMAS somewhat capitate or clavate. OVULES 6 or 8 in each ovary or cell, borne on its inner angle in two series, horizontal, collateral, anatropous; the raphes contiguous.

FRUIT a membranaceous and usually vesicular-inflated CAPSULE, three- (or two-) celled, three-lobed, or sometimes two-

lobed, the carpels united at the axis or sometimes only at the base, the lobes tardily dehiscent at the summit along the ventral suture. SEEDS by abortion few or solitary in each cell or carpel, horizontal or ascending, subglobose or lenticular-obovoid, truncate at the base, sessile; the testa thick and bony, polished; the raphe forming a ridge on one side. EMBRYO straight, in the axis of fleshy albumen, of nearly its length and width: COTYLEDONS oval or orbicular, flat and thin: RADICLE very short, next the hilum.

SHRUBS, with opposite and stipulate trifoliolate or pinnate leaves, with five to seven ovate or oblong serrulate leaflets, which are involute in veneration and setaceously stipellate. Stipules and stipels deciduous. Flowers white or cream-colored, rather showy, in terminal racemose or cymose drooping panicles. Pedicels bracteate, articulated above the middle.

ETYMOLOGY. The original name, *Staphylodendron*, of Tournefort, from *σταφύλη*, a *raceme* or *cluster*, and *δένδρον*, a *tree*, was abbreviated by Linnæus into *Staphylea*.

PROPERTIES. The Bladder-nuts are neat shrubs, with drooping and pretty, though not showy, white, vernal blossoms, which are replaced in summer by the large and bladdery pods.

PLATE 172. STAPHYLEA TRIFOLIA, *Linn.*; — a flowering branchlet of the natural size. (Cambridge Botanic Garden.)

1. Diagram of the flower (placed to the left of the axis, toward which the second sepal looks).
2. A flower, with its pedicel and bractlets, enlarged.
3. A petal, more enlarged.
4. Pistils, with the disk, &c., enlarged; the calyx-lobes cut away.
5. A stamen, enlarged, seen from the inside.
6. The same, seen from the outer side.
7. Magnified transverse section of the compound ovary, one of the cells also vertically divided, as is the disk and receptacle.
8. An ovule, more magnified.
9. The bladdery fruit, of the natural size.
10. The same, the upper part cut away, showing the cells and seeds.
11. A seed, enlarged.
12. A transverse section of the same.
13. A magnified vertical section of a seed, enlarged, showing the embryo.

ORD. MALPIGHIACEÆ.

Arbores vel frutices, sæpe scandentes, foliis oppositis integris penninerviis stipulatis, pilis dum adsunt medio affixis: dicotyledoneæ, hypogynæ, 5-meræ, plerumque 10-andræ *trigynæ*; *petalis unguiculatis penninerviis* sepalisque persistentibus æstivatione imbricatis; disco nullo; carpellis discretis aut plerumque in ovario 3-loculari connatis; *ovulis in loculis solitariis e funiculo pendente adscendentibus* sæpius unci-
formibus, *micropyle supera*; embryo exalbuminoso, cotyledonibus sæpissime conduplicatis vel homotrope convolutis.

MALPIGHIE, Juss. Gen. p. 252.

MALPIGHIACEÆ, Juss. in Ann. Mus. 18. p. 479. DC. Prodr. 1. p. 577.

Bartl. Ord. Nat. p. 385. Adr. Juss. in St. Hil. Fl. Bras. 3. p. 3.

& Monogr. (in Archiv. Mus. 3.) 1843. Endl. Gen. p. 1057.

Lindl. Veg. Kingd. p. 388.

THE MALPIGHIA FAMILY, which has recently been the subject of a most elaborate and able monograph by Professor Adrien de Jussieu, barely makes its appearance on the southern border of the United States. When the first volume of the *Flora of North America*, by Dr. Torrey and myself, was completed, no plant of the order was known to be indigenous within its limits. Recently, however, an undescribed species of *Galphimia*, which is remarkable for being nearly herbaceous, has been detected in the central parts of Texas, and the genus is accordingly here illustrated. Some other Mexican genera doubtless extend into the newly acquired territory between the Nueces and the Rio Grande. Indeed, I possess an imperfect specimen, gathered at Corpus Christi, of what appears to be *Malpighia glabra*, *Lin.*; and a West Indian species of *Byrsonima* also grows on Key West.

The order now comprises about forty-two genera, and over five hundred and fifty species; nearly all of them intertropical. A few are African, a somewhat larger number Asiatic and Polynesian; but far the greater portion are natives of the West Indies, Mexico, and South America, especially Brazil, where more than half of the known species are found.

The only extratropical family with which this need be compared is *Acera-*
ceæ, with which the earlier botanists confounded the species known to them

which have a winged, samaroid fruit. It is readily distinguished by the entire or barely serrulate leaves ; by the pubescence, when present, consisting of what have been termed Malpighiaceæ hairs, namely, fixed by the middle and appressed (Plate 173, fig. 12); by the thick glands (wanting in *Galphimia*) which are ordinarily borne on the back of the sepals ; by the conspicuously unguiculate and pinnately-veined petals ; by the absence of any glandular disk ; by the usually monadelphous stamens, and the trimerous gynæcium ; and especially by the solitary and peculiar ovules, which hang on a manifest, often elongated funiculus, against which they are reclined (and to which they often partly adhere, so as to exhibit various gradations between the orthotropous, campylotropous, and anatropous forms) ; the micropyle, and consequently the radicle, always superior. M. de Jussieu also remarks that when the embryo is coiled it is simply spiral ; the cotyledons not folded together in the middle, as in Maples, so as to make a double turn. The pedicels are articulated, which is not the case in the Maple Family.

In flowers of our *Galphimia* which were examined for delineation, the regular quincuncial arrangement extends from the calyx to the corolla in a simple spiral order ; the first petal being placed where it should be (making allowance for the change which occurs to bring the petals alternate with the sepals), namely between the first and fourth sepals ; but this, as Jussieu has remarked, is not the common case in the order.

M. de Jussieu has shown that the stamens which are opposed to the petals belong to an exterior series, and probably arise from a deduplication of the petals.

Of the sensible qualities of Malpighiaceæ little is recorded. The bark and the wood sometimes contain a red coloring matter. The bark abounds in tannin ; that of several species is used in Brazil by the tanners ; that of one species is employed in Cayenne as a febrifuge, and that of another as an astringent and as an antidote to the bite of snakes. The acidulated and somewhat astringent fruit of two or three species is eaten in the West Indies.

PLATE 173.

GALPHIMIA, *Cav.*

Calyx 5-partitus sæpissime eglandulosus. Petala 5, carinato-costata, denticulata. Stamina 10, omnia fertilia. Styli 3, filiformes, in stigma acutum desinentes. Capsula 3-loba, 3-coeca; coccis 2-valvibus. — Frutices v. fruticuli integrifolii; floribus racemosis flavis, deinde rubellis.

GALPHIMIA, Cav. Ic. 5. p. 61. t. 489, 563. H. B. K. Nov. Gen. & Sp. 5. p. 172. DC. Prodr. 1. p. 582. Griseb. in Linnæa, 13. p. 269. Bartl. in Linnæa, 13. p. 550. Adr. Juss. in St. Hil. Fl. Bras. 3. p. 70. t. 178, & Monogr. Malpigh. p. 67. t. 7. Endl. Gen. 5390. THRYALLIS, Linn. Gen. 533, fide Ad. Juss., non Mart.

CALYX five-parted, herbaceous, persistent; the segments equal, erect, usually destitute of glands, quincuncially imbricated in æstivation. PETALS 5, longer than the sepals, alternate with them, hypogynous, quincuncially imbricated in æstivation, at length widely spreading or reflexed, unguiculate, oblong-ovate or obovate, concave, commonly carinate with a thickish midrib, which is canaliculate above, pinnately veined, the margins denticulate, deciduous. STAMENS 10, hypogynous, five opposite the petals and five alternate with them, all fertile: FILAMENTS filiform-subulate from a dilated base, distinct or a little monadelphous, persistent: ANTHERS oval or cordate, pointless, introrse, fixed below the middle, glabrous, two-celled, the cells opening longitudinally. PISTIL of three combined carpels: OVARY globular, three-lobed, three-celled: STYLES 3, filiform, distinct, their tips incurved in the bud: STIGMAS terminal, minute. OVULE solitary in each cell, pendulous from the inner angle near its summit on a slender funiculus, against which it reclines and to a portion of which it commonly adheres, forming a short (internal) raphe, and so becoming semi-anatropous; the micropyle superior.

FRUIT capsular, three-lobed, tricocous; the coriaceous

cocci separating from each other, dehiscent down the carinate dorsal suture, at length two-valved. SEED solitary in each carpel, suspended, uncinately-rostellate at the micropyle; the smooth testa crustaceous, lined with a rather fleshy inner integument. ALBUMEN none. EMBRYO conduplicate; the RADICLE straight, superior, the curvature at the lower part of the nearly terete COTYLEDONS, which are incumbent on the radicle.

SHRUBS, or barely suffruticose plants, usually glaucescent. Leaves opposite, entire, or obscurely glandular-denticulate, biglandular near the base or at the apex of the short petioles, bistipulate. Stipules subulate, sometimes united at the base. Flowers smooth, disposed in a terminal raceme. Pedicels subtended by a small bract, articulated, bibracteolate. Corolla yellow or orange, turning reddish with age.

ETYMOLOGY. The name is an anagram of Malpighia.

GEOGRAPHICAL DISTRIBUTION. The genus comprises about a dozen known species, of which one is a native of Brazil, but all the others are Mexican. One nearly herbaceous species, collected in the neighbourhood of Monterey, New Leon, by Major Eaton and Dr. Edwards (communicated by Dr. Torrey), had already been detected in Texas by Mr. Lindheimer and Mr. Wright.

PLATE 173. *GALPHIMIA LINIFOLIA*, *n. sp.*; — summit of a flowering stem of the natural size, from Texas, *Wright*.

1. Diagram of the flower.
2. A magnified flower, with the pedicel, bractlets (at the base), and bract.
3. A stamen (from a bud), more magnified, inside view.
4. Magnified pistil, with one stamen on the receptacle, the calyx cut away.
5. Vertical section through the ovary, receptacle, and calyx; the petals and two stamens in place, magnified.
6. An ovule detached, more magnified.
7. The tricocccous fruit and persistent calyx and stamens, magnified.
8. A seed, magnified.
9. One of the cocci seen from the ventral side, more magnified.
10. Dorsal view of the same in dehiscence.
11. A magnified seed vertically divided, showing the two thick integuments and the embryo.
12. One of the centrally affixed hairs (like the pubescence of the whole order) from the summit of the stem, much magnified.

ORD. ACERACEÆ.

Arbores, foliis oppositis palmatinerviis et palmatilobis seu 3-5-foliolatis, venatione plicatis, stipulis nullis: dicotyledoneæ, regulares, *digynæ*; æstivatione imbricativa; petalis calycis 4-9-lobi decidui lobis numero æqualibus, vel abortu nullis, cum staminibus 4-12 disco glanduloso hypogyno seu perigyno insertis; ovario bilobo e carpellis 2 columellæ centrali adnatis composito; *ovulis geminis* facie ventrali amphitrope adnatis, *micropyle infera*; fructu c coccis samaroideis 2 monospermis; embryo exalbuminoso conduplicato, nunc spiraliter convoluto, cotyledonibus germinatione foliaceis.

ACERA, Juss. Gen. p. 50, & Ann. Mus. 18. p. 477.

ACERINEÆ, DC. Theor. Elem. ed. 2. p. 244, & Prodr. 1. p. 593. Endl. Gen. p. 1055.

ACERACEÆ, Lindl. Introd. Nat. Syst. ed. 2. p. 81, & Veg. Kingd. p. 387.

THE MAPLE FAMILY comprises only the typical genus *Acer*, with *Negundo*, which is scarcely distinct from it. *Dobinea*, a shrub of Nepal, is also appended to the order, but probably it does not truly belong to it. While the two orders to which it is related, namely, the Malpigiaceæ and the Sapindaceæ, are principally tropical, the Maple Family, on the other hand, is found in temperate regions alone. It is also restricted to the northern hemisphere. The Maples, of which there are sixty or seventy known species, are characteristic forest-trees of the northern temperate zone, both in the Old World and the New. They affect the eastern and interior parts of continents, with extreme climate, rather than the western; being most numerous in the United States and in Japan and Northern China; more numerous in the Atlantic United States and in the Rocky Mountains than in Oregon and California; and far more numerous in Japan and the Himalayan region than in Europe.

The second genus, *Negundo*, is not represented in Europe, and has been deemed to be peculiar to North America, where it occurs across the whole breadth of the continent, in three by no means well distinguished species, one of them belonging to the Middle and Southern United States (extending

eastward and northward to Pennsylvania and Michigan, and westward to the southern part of the Rocky Mountains), a second to California, and the third to the interior of Mexico. Recently the lamented Zuccarini has brought to light a fourth species indigenous to Japan, furnishing an additional illustration of the close analogy which exists between the vegetation of that country and that of the United States.

The larger Maples are fine timber-trees in their native forests, especially *A. saccharinum*, and are planted as favorite shade-trees. The limpid ascending vernal sap, perhaps of all the species, contains sugar, which is largely obtained by boiling from our well-known Sugar Maple, and to some extent from our White Maple. The Negundo also yields sugar. The proper elaborated juices of these trees become somewhat bitter and aerid as the vegetation advances, and in a few European species they are lactescent. The bark possesses some astringency; that of some European species is said to furnish the dyer reddish-brown and yellow colors.

The development of the ovules, and the mode in which they are attached to the placenta by nearly their whole inner face, is admirably illustrated by Adrien de Jussieu, in his *Monographie des Malpighiacées*, p. 137, plate 1, fig. 12-14. By the growth of the upper part of the ovule after fertilization, the seed becomes anatropous.

The mode in which the embryo of the Maples is folded or enrolled varies in different species, and will probably coincide with the marked differences in the inflorescence and flowers, so as to give characters to the sections of the genus. The cotyledons are more commonly incumbent than acumbent.

PLATE 174.

ACER, *Tourn.*

Flores polygami. Petala 5–8 (rarissime 4 s. 9–12), seu nulla. Stamina 8, rarius 4–7, v. 9–12. Samara dicocca; coccis dorso in alam margine inferiore incrassatam productis. — Folia simplicia, palmatiloba, rarissime palmatisecta.

ACER, *Tourn.* Inst. p. 615. t. 386. Linn. Gen. 1155 (excl. spec.). Gærtn. Fr. 2. t. 116. Schk. Handb. t. 351–353. Michx. f. Sylv. 1. t. 40–45. Spach in Ann. Sci. Nat. (ser. 2.) 2. p. 160. Torr. & Gray, Fl. N. Am. 1. p. 246. Endl. Gen. 5558.

Maple.

FLOWERS by abortion diœciously, or rarely monœciously, polygamous, occasionally truly perfect. CALYX colored, five- (rarely 4–12-) parted, sometimes only five-lobed, rarely cup-shaped and obscurely toothed, deciduous, the lobes imbricated in æstivation. Disk thick, glandular, annular and hypogynous, or cup-shaped and more or less perigynous, with the margins free, and usually lobed; the lobes (or glands) alternate with the stamens. PETALS wanting, or as many as the lobes of the calyx, and of the same color, alternate with them, inserted into the margin or base of the disk, equal, erect, slightly unguiculate, imbricated in æstivation, deciduous. STAMENS 8, or from 4 to 9 or 12, seldom agreeing in number with the petals or sepals, inserted on the summit or inside of the disk: FILAMENTS distinct, filiform, commonly shorter than the calyx in the fertile flowers and longer in the sterile: ANTHERS introrse, two-celled, the cells opening longitudinally; they are abortive or imperfect in the pistillate flowers. PISTIL of two carpels: their OVARIES united in the axis, compressed contrary to the dissepiment, wing-margined on the back: STYLES 2, linear-filiform, the whole inner face stigmatose. OVULES two in each cell, collateral, rarely su-

perposed, sessile, attached to the inner angle of the cell by nearly the whole length of one side, at length amphitropous by a very broad insertion, the micropyle inferior.

FRUIT a double SAMARA; the two carpels nut-like, coriaceous, flattish, at length separating from the small persistent axis, indehiscent, the back produced into a large membranaceous and reticulated wing, the lower margin of which is thickened. SEED solitary, or rarely two, in each cell, ascending or nearly horizontal, destitute of a funiculus, commonly anatropous. ALBUMEN none (the inner integument of the seed often fleshy). EMBRYO conduplicate, sometimes spirally convoluted; the COTYLEDONS variously plicate or folded, sometimes rugose-complicate, foliaceous, or often fleshy but foliaceous in germination, incumbent, oblique, or accumbent on the descending RADICLE.

TREES, sometimes shrubs, with limpid or seldom rather milky sap, terete branchlets, and scaly buds. Leaves opposite, exstipulate, simple, or in one species palmately trisected, palmately veined and usually lobed, deciduous. Flowers small, greenish, yellowish, or red; either in a terminal raceme or panicle, appearing with or later than the leaves, or in fascicles from separate lateral buds and preceding the leaves. Pedicels not articulated. Bracts usually minute and caducous.

ETYMOLOGY. The classical Latin name of the Maple.

PLATE 174. *ACER SACCHARINUM*, *Wangh.*; — branch of a staminate plant in flower, of the natural size; with

1-3. Some details from *ACER PENNSYLVANICUM*, *Linn.*, viz. :—

1. Diagram of a perfect flower. 2. A sterile flower, enlarged.
3. A vertical section of the same, magnified, showing the perigynous disk.
4. Sterile flower of *A. SACCHARINUM*, enlarged.
5. A stamen, more magnified.
6. A fertile flower of the same species, magnified.
7. Same, with the calyx laid open, showing the short stamens, disk, &c.
8. The pistil of the same, the other organs removed.
9. Vertical section of its ovary, more magnified. (Ovules advanced.)
10. Fruit, of the natural size; one carpel cut open to show the seed.
11. A magnified seed vertically divided through the coiled cotyledons.
12. Embryo detached entire, a little unrolled, magnified.

PLATE 175.

NEGUNDO, *Mœnch.*

Flores dioici. Calyx minimus, 4-5-fidus. Petala nulla. Stamina 4-5, rarius 6. Discus obsoletus. — Folia imparipinnata, 3-5-foliolata. Flores laterales; masculi fasciculati e gemmis aggregatis aphyllis, pedicellis capillaribus; fœminei racemosi. — Cætera Aceris.

NEGUNDO, *Mœnch. Meth.* p. 334. *Nutt. Gen.* 1. p. 253. *DC. Prodr.* 1. p. 596. *Torr. & Gray, Fl. N. Am.* 1. p. 249. *Hook. & Arn. Bot. Beech. t.* 77. *Endl. Gen.* 5559.

NEGUNDIUM, *Raf. in N. Y. Med. Repos. (hex. 2.)* 5. p. 350.

ACER *Negundo*, *Linn. Michx. f. Sylv.* 1. t. 46.

Ash-leaved Maple. Box-Elder.

FLOWERS strictly diœcious; the fertile without sterile stamens; the sterile destitute of a vestige of a pistil. CALYX very small, somewhat colored, deciduous, four-five-cleft, or in the fertile flowers four-five-parted; the lobes lightly imbricated in æstivation. PETALS none. DISK obsolete or none. STAMENS 4 or 5, rarely 6, hypogynous, exerted long before anthesis: FILAMENTS at length capillary: ANTHERS linear, fixed by the base, apiculate, innate or scarcely introrse, two-celled, the cells opening longitudinally. PISTIL of two carpels united at the axis: OVARY compressed contrary to the partition, two-lobed by the early growth of the wing on the back of each carpel: STYLES 2, filiform, united only at the base, stigmatose along the whole length of the inner face. OVULES two in each cell, collateral, attached by nearly the whole length of the inner face to the middle of the inner angle of the cell, becoming amphitropous or at length anatropous, the micropyle inferior.

FRUIT a double SAMARA, as in *Acer*; the carpels oblong, with a very large semi-obcordate wing. SEED by abortion of one of the ovules solitary, oblong, anatropous, ascending,

destitute of albumen. EMBRYO conduplicate; the oblong and flat foliaceous COTYLEDONS applied face to face, bent down near the middle, and obliquely incumbent upon the descending slender RADICLE.

TREES, with a light green bark on the young shoots, and scaly buds. Leaves opposite, exstipulate, petioled, pinnately tri-quinquefoliate; the leaflets induplicate in vernalion, ovate or oblong, petiolulate, pinnately veined, incisely toothed or lobed, membranaceous. Flowers small, greenish, pendulous, appearing with or a little before the leaves, from separate (and in the sterile plant usually aggregated) lateral buds; the staminate cymose-fascicled, on long and capillary pedicels; the pistillate racemose (the rachis more prolonged), on shorter (opposite) pedicels: the lowest bracts membranaceous, the upper minute, deciduous.

ETYMOLOGY. The name, so far as I know, first appears in the phrase, "Arbor exot., foliis fraxini instar pinnatis et serratis, *Negundo* perperam eredita," of Ray's *Hist. Plant.* I do not find that it is used as a popular name of the tree in any part of the United States.

GEOGRAPHICAL DISTRIBUTION, PROPERTIES, &c. These are mentioned under the order.

PLATE 175. *NEGUNDO ACEROIDES*, *Manch.*;— a staminate branchlet, in flower.

1. Raceme of a pistillate plant, in flower; of the natural size.
2. A staminate flower, magnified.
3. A stamen, more magnified.
4. A pistillate flower, magnified.
5. A transverse section of its ovary, showing the collateral ovules.
6. Magnified ovary, with the cells cut open, showing the ovules.
7. An ovule, more magnified.
8. The fruit, with one carpel cut open to show the seed; natural size.
9. A magnified seed, divided vertically, showing the embryo.
10. The embryo of the same, partly spread out.

ORD. SAPINDACEÆ.

Arbores, frutices, rarius herbæ scandentes, alternifoliæ, rarissime oppositifoliæ, exstipulatæ: dicotyledoneæ, sæpius unsymmetricæ, 4-5-meræ plerumque 7-9-andræ; æstivatione imbricativa; petalis et staminibus disco hypogyno v. subperigyno carnosio insertis, autheris longitudinaliter dehiscentibus; ovario 3-loculari, loculis 1-2-ovulatis; seminibus nunc arillatis exalbuminosis; embryo sæpiissime curvatis convolutivis, cotyledonibus incumbentibus carnosus.

SAPINDI, Juss. Gen. p. 246.

SAPINDACEÆ, Juss. in Ann. Mus. 18. p. 476. Cambess. in Mem. Mus. 18. p. 1. Endl. Gen. p. 1066. Lindl. Veg. Kingd. p. 382.

SAPINDACEÆ & HIPPOCASTANEÆ, DC. Theor. ed. 2. p. 244, & Prodr. 1. p. 597, 601.

THE SOAPBERRY FAMILY is principally tropical and altogether extra-European. In the southern portion of the United States, however, we have single representatives of three genera of true Sapindaceæ, which order, as usually restricted, has the leaves (with one exception) alternate, and the petals commonly appendaged by an internal deduplication. The Horsechestnuts and Buckeyes, which belong to the northern temperate zone in Asia and North America, have long been received as a distinct family, characterized by their opposite and digitate leaves, inappendiculate petals, and the geminate ovules, of which the upper one in each cell is ascending, the lower pendulous. But the distinction is completely destroyed by the recently discovered Texan genus, *Unguadia*, *Endl.*, which, with the fruit, the conferrimate cotyledons, and the general aspect and floral structure of Hippocastaneæ, has alternate and pinnate leaves, cristate-appendaged petals, and both ovules ascending. Besides, the geminate ovules of *Dodonæa* (Plate 182) are turned in the same way as those of the Horsechestnut. I cannot doubt, therefore, that the Hippocastaneæ should form a tribe merely of Sapindaceæ, as suggested by Endlicher, and recently adopted by Lindley.

Active or poisonous qualities prevail, especially in the root, bark, foliage, and the bitter seeds of this family; while the fruit, although in many cases

noxious, in others furnishes valued articles of the dessert. Among the latter are the delicious *Litchi*, *Longan*, and *Rambutan* of the Indian Archipelago, the baccate fruits of as many species of *Nephelium*; and the succulent arillus of the Akee-tree (*Cupania* or *Blighia sapida*) is a well-known article of food on the western coast of Africa. Even the seeds of *Dodonæa* and of a few other plants of the order are eatable. On the other hand, some yield a narcotic poison of such virulence that the South American Indians use them to envenom their arrows. Several are employed for stupefying fish. The Soapberries, and to some extent the seeds and roots of the North American Buckeyes, abound in a detergent, saponaceous matter, which lathers freely in water; whence they are used as a substitute for soap.

The plants of the order are nearly all trees or shrubs, or are shrubby, rarely herbaceous vines, climbing by tendrils, which belong to the inflorescence.

The *fourth* sepal (in the order of succession in the quincuncial aestivation) is directed to the axis of inflorescence in this family.

Three tribes are represented in the United States; which, commencing with the Hippocastaneæ, that they may stand next to the Maples, are defined in the following

SYNOPSIS OF THE UNITED STATES GENERA.

TRIBE I. HIPPOCASTANEÆ. — Ovules 2 in each cell. Cotyledons very thick and fleshy, partly soldered together. — Leaves (except in *Ungnadia*) opposite and digitate.

ÆSCULUS. (Plates 176, 177.) Calyx 5-lobed. Petals not appendaged.

Ovary sessile: the upper ovules ascending, the lower pendulous. —

Leaves opposite, digitate.

UNGNADIA. (Plates 178, 179.) Calyx 5-parted. Petals fimbriate-crested.

Ovary stipitate: both ovules ascending. — Leaves alternate, pinnate.

TRIBE II. SAPINDEÆ. — Ovules usually solitary. Embryo curved or biplicate, rarely straight. — Leaves (with one exception) alternate.

SAPINDUS. (Plate 180.) Calyx 5-parted. Petals 5, regular. Pistil central. Fruit baccate. Seed not arillate. — Leaves abruptly pinnate.

CARDIOSPERMUM. (Plate 181.) Calyx 4-parted. Petals 4, irregular; the appendage of two forms. Pistil eccentric in the flower. Capsule vesicular-inflated. Seeds marked with a heart-shaped arillus. — Leaves 1-3-ternate.

TRIBE III. DODONEÆ. — Ovules 2 or 3 in each cell. Embryo spirally convolute. — Leaves alternate.

DODONÆA. (Plate 182.) Calyx 4-5-parted. Petals none. Capsule 2-4-winged, septicial.

PLATE 176, 177.

ÆSCULUS, L.

Calyx 5-lobus, pl. m. inæqualis. Petala 4-5, inæqualia, inappendiculata. Stamina 5-8, sæpissime 7, disco annulari subunilaterali inserta. Ovarium sessile, 3-loculare; loculis 2-ovulatis; ovulis heterotropis. Capsula coriacea, 2-3-valvis, sæpius abortu 1-2-ocularis, 1-2-sperma. Cotyledones crassissimæ, conferruminatæ. — Arbores, foliis oppositis palmatim 5-9-foliolatis, floribus monoico-polygamis in thyrsos terminales dispositis.

ÆSCULUS, Linn. Gen. 462. Juss. Gen. p. 251. Torr. & Gray, Fl. N. Am. 1. p. 250. Endl. Gen. 5641.

HIPPOCASTANUM, Tourn. Inst. t. 612. Gærtn. Fr. 2. p. 135. t. 111.

PAVIA, Boerh. Hort. Lugd.-Bat. t. 260.

ÆSCULUS & PAVIA, DC. Prodr. 1. p. 597. Michx. f. Sylv. Amer.

ÆSCULUS, PAVIA, MACROTHYRSUS, & CALOTHYRSUS, Spach in Ann. Sci. Nat. (ser. 2.) 2. p. 52.

Horsechestnut. Buckeye.

FLOWERS monœcio-polygamous from the abortion of the pistil. CALYX campanulate or tubular, mostly oblique and gibbous at the base posteriorly, five-lobed, deciduous; the lobes more or less unequal, quincuncially imbricated in æstivation, the fourth posterior. PETALS 5, alternate with the lobes of the calyx, or often only 4 from the abortion of the anterior one, hypogynous, unequal, often dissimilar, declined or erect, inappendiculate, unguiculate, the margins of the claw or base of the lamina commonly involute, imbricated in æstivation, deciduous. DISK hypogynous, depressed, annular, usually lobed, more or less gibbous, or produced posteriorly. STAMENS from 6 to 8, very rarely 5, commonly 7, inserted on the disk, unequal: FILAMENTS subulate or filiform, more or less arcuate or declined, usually exerted: ANTHERS cordate-oblong or

elliptical, glandular-apiculate, fixed near the base, introrse, two-celled, the cells opening longitudinally. Ovary in the sterile flowers an abortive rudiment; in the fertile sessile, ovoid, three-celled: style slender, more or less curved: stigma terminal, undivided, commonly acute. Ovules two in each cell, borne on the middle of its inner angle, amphitropous, superposed; the upper ascending with the micropyle inferior, the lower pendulous with the micropyle superior. (Their direction is at first vague or various in different cells, but they assume these positions by the time the flower-bud is full-grown.)

Fruit a large leathery capsule, either echinate, or roughened, or smooth and unarmed, three-celled, with the cells (by the abortion of one ovule in each) one-seeded, or by suppression oftener one - two-celled and one - two-seeded (the vestiges of the abortive seeds and cells usually discernible at maturity), loculicidally two - three-valved. Seeds very large, globular when solitary, or when more than one flattened by mutual pressure, with a very smooth and shining coriaceous testa and a broad opaque hilum, not arillate. Albumen none. Embryo filling the seed: cotyledons very thick and fleshy, a little corrugate-complicate and more or less coherent by their contiguous faces (conferruminate), unequal, hypogæous in germination, incumbent on the short conical radicle, which points to the hilum; plumule conspicuous, two-leaved.

Trees, or sometimes shrubs, with large scaly buds, and opposite palmately compound deciduous leaves, destitute of stipules; the leaflets five to nine, lanceolate or ovate, serrate, pinnately veined, the primary veins straight and simple. Flowers showy, in an ample terminal thyrsus or panicle, appearing rather later than the leaves, racemose and nearly unilateral on the branches of the panicle, polygamous; those near the base of the branches of the inflorescence only perfect and fertile; the others sterile by the abortion of the ovary, but otherwise similar; the pedicels articulated. Bracts and bractlets minute, caducous. Corolla white, red, or yellow.

ETYMOLOGY. *Æsculus* is the ancient Latin name of some kind of Oak or other mast-bearing tree. It was transferred to this genus by Linnaeus (to the exclusion of the earlier and more appropriate name *Hippocastanum*, i. e. *Horsechestnut*), on account of the resemblance of the large seeds to chestnuts.

PROPERTIES. They are handsome ornamental trees or shrubs, but their timber is of no value. The bark is bitter, astringent, and it is thought febrifugal: it has also been used for tanning. The roots contain a mucilaginous saponifying matter; those of *Æ. Pavia* have been employed in Carolina as a substitute for soap. These, and the bruised branches and the seeds of this and the other Buckeyes exhale an unpleasant odor, and are imbued with a narcotic principle: when thrown into the water they intoxicate fish. The large farinaceous seeds contain a great deal of nourishment, which is rendered unavailable by the noxious, intensely bitter principle with which they are charged. Common horsechestnuts, nevertheless, with some precautions, are largely and advantageously used for fattening sheep in Switzerland. The Turks give them to horses affected with cough or asthma. Dr. Griffith (*Medical Botany*, p. 214) remarks that paste made from these seeds is preferable to any other, not only as possessing great tenacity, but likewise because no moths or vermin will attack any thing cemented with it. It is also stated that the starch, which may be so readily and copiously prepared from them, and from those of the Buckeyes, is superior to that of wheat.

GEOGRAPHICAL DISTRIBUTION AND DIVISION. The genus comprises about a dozen known species, all indigenous to the temperate parts of Asia and North America. It was founded on the common Horsechestnut, a native of the Caucasian region, long cultivated in the East, whence it was introduced into Western Europe nearly three centuries ago. The time and manner of its introduction are mentioned under the following genus.* A nearly allied species, with prickly fruit, is found in Northern China. The smooth-fruited species, which have usually been distinguished as a separate genus (*PAVIA*, of Boerhaave, &c.), belong, one to the Himalayan region, one to California, the others to the United States, principally along and near the Alleghany Mountains. *Æ. glabra*, the *Ohio* or *Pttd Buckeye*, here figured, has the ovary and young fruit echinate, like the Horsechestnut; but the mature pods are nearly or quite unarmed, and the flowers are those of *Pavia*.

PLATE 176. *ÆSCULUS GLABRA*, Willd. (also *Æ. pallida*, Willd.); — a small panicle, &c., of the natural size; from the Cambridge Botanic Garden.

1. Diagram of a perfect flower.
2. Vertical section of a sterile flower, enlarged, showing the abortive pistil.

* Vide page 211.

PLATE 177. *ÆSCULUS GLABRA*; — details of the flower and fruit.

1. One of the upper petals, enlarged.
2. One of the lower petals, enlarged, seen from the inside.
3. Outside view of the upper part of a stamen, magnified.
4. A magnified stamen, seen from the inner side.
5. Pistil and receptacle (showing the unilateral disk), magnified.
6. Transverse section of the ovary, more magnified.
7. Vertical section of the same, displaying the position of the ovules.
8. An ovule (one of the upper), magnified.
9. Transverse section of a fertilized ovary, less magnified than fig. 6; the single fertilized ovule filling its cell and pressing upon the others, which remain sterile.
10. The pod of the natural size, dehiscent.
11. Seed of the natural size, showing the large hilum.
12. Section of the same in the same position, dividing the radicle as well as the large cotyledons.
13. The embryo detached entire.

PLATE 178, 179.

UNGNADIA, *Endl.*

Calyx 5-partitus. Petala 4–5, subæqualia, unguibus apice comato-cristatis. Stamina 8–10, declinata, disco obliquo unilaterali cum stipite ovarii connato inserta. Ovula in loculis gemina, homotropa. Capsula 3-loba, 3-ocularis; loculis monospermis. Cotyledones crassissimæ, conferruminatæ. — Arbuscula Æsculoidea, *foliis alternis imparipinnatis*, floribus axillaribus polygamo-dioicis.

UNGNADIA, Endl. Atakt. t. 36, Nov. Stirp. Decad. 86, & Gen. 5640 (ex pl. ster.). Torr. & Gray, Fl. N. Am. 1. p. 253, & p. 634. Scheele in Linnæa, 21. p. 539.

FLOWERS diœcio-polygamous. CALYX of five nearly equal and herbaceous oblong-lanceolate SEPALS, somewhat irregularly united at the base only, quincuncially imbricated in æstivation (rarely of only four sepals?), deciduous. PETALS 4, the anterior one absent, or often 5, alternate with the sepals and quincuncially imbricated in æstivation (rarely six), hypogynous on the edge of a thickened and truncate torus, or obscurely perigynous from its union with the very base of the calyx, deciduous, unequal when there are five, when four nearly equal, unguiculate; the claws at length as long as the sepals, nearly erect, thickened, woolly, especially on the inner side, conspicuously appendaged at the summit with a fimbriate crest composed of short and fleshy tufted threads; the lamina obovate, spreading, often irregularly erose-crenulate. DISK an oblique fleshy lamina projecting on the posterior side of the flower and connate with the base of the stipe of the ovary, which it embraces. STAMENS 7 to 10, usually 8 or 9, inserted on the oblique edge of the disk, more or less declined; in the sterile flowers much exerted and unequal, the anterior shorter; in the fertile flowers all usually shorter

than the petals and nearly equal: FILAMENTS filiform: ANTHERS oblong, fixed near the base, introrse, two-celled, the cells opening longitudinally. OVARY raised on a slender stipe longer than itself, ovoid, three-celled; in the sterile flowers abortive and destitute of a style; in the fertile with the STYLE subulate-filiform, elongated, a little curved: STIGMA minute, terminal. OVULES two in each cell, borne on its inner angle near the middle, at first apparently collateral, soon superposed, between amphitropous and anatropous, both ascending and with the micropyle inferior.

FRUIT a large coriaceous CAPSULE, conspicuously stipitate, strongly three-lobed, smooth and unarmed, three-celled, loculicidally three-valved, the somewhat obcordate valves bearing the dissepiment on the middle. SEEDS, by the abortion of one (commonly the upper) ovule, solitary in each cell, large, nearly spherical, inserted by a broad and somewhat carunculate hilum, with a dark chestnut-brown very smooth and shining crustaceous testa, and a thin tegmen, peritropous, destitute of albumen. EMBRYO filling the seed: COTYLEDONS very thick and fleshy, almost hemispherical, slightly complicate and their contiguous faces more or less coherent with each other (conferruminate), hypogæous in germination, incumbent upon the very short and conical descending RADICLE, which points to the hilum.

A SHRUB or small tree, with brittle wood, alternate imparipinnate leaves, destitute of stipules, deciduous, or sometimes persistent; the leaflets five or seven, or on the earlier leaves sometimes only three, ovate-lanceolate, acuminate, pinnately veined, reticulated, serrate, the terminal one conspicuously petiolulate. Flowers lateral, in small fascicles or simple corymbs, appearing with the leaves in early spring from the axils of the leaves of the preceding season, chiefly from separate buds, sometimes from the base of a leafy branch, rather large and showy. Corolla rose-colored. Pedicels articulated in the middle.

ETYMOLOGY. This remarkably interesting genus, which, with foliage not

unlike that of a Hickory, is in its flowers and fruit plainly allied to the Horsechestnut (from which it strikingly differs in its inflorescence, and its *alternate, pinnate* leaves), commemorates the *Baron Ungnad*, ambassador of the Emperor Rudolph II. to the Ottoman Porte, who, in the year 1576, sent the seeds of the common Horsechestnut to Clusius at Vienna, and thus first introduced that showy and now familiar tree into the West of Europe.

GEOGRAPHICAL DISTRIBUTION. The single known species belongs to Texas, where it is common, and where specimens of the staminate plant only were first gathered by the late Mr. Drummond. The fertile flowers and fruit have only recently been made known by Messrs. Lindheimer, Wright, &c.; from whose seeds I have raised young plants in the Cambridge Botanic Garden.

NOTE. The lamented Endlicher (intelligence of whose untimely decease has reached me while writing this article) characterized this genus from a staminate specimen alone (from Drummond's collection), which is figured in a work that few botanists have ever seen, on account of the purposely small number of copies that were printed. The fertile flowers and the fruit, although for several years known to us, have not until now been illustrated or described, except by Adolf Scheele, who has published a description, from Lindheimer's specimens, in the *Linnaea* during the past year. The flowers which Endlicher happened to examine were pentapetalous, which is not the more usual case, and he erroneously states the plant to form a large tree, whereas it is commonly a slender shrub, of five or ten feet in height, or at most a small tree. Misled by these discrepancies and by the differences of the two kinds of flowers, and, it would seem from his description, happening to possess *tetracepalous* as well as tetrapetalous flowers (although there are five sepals in all my Lindheimerian and other specimens), Mr. Scheele has wrongly introduced a second species, under the name of *U. heterophylla*. The leaflets vary from five, or even three on the earlier leaves, to seven.

PROPERTIES. The seeds are sweet-tasted, not unlike those of Walnuts, but have emetic properties, according to Mr. Lindheimer.

PLATE 178. *UNGNADIA SPECIOSA*, *Endl.*;— the staminate plant; a branch in flower, of the natural size, from Texas, *Lindheimer*.

1. Diagram of the flower. (The fourth sepal next the axis, the anterior petal wanting.)
2. An enlarged petal, inside view, to show the conspicuous fimbriate crest.
3. A magnified flower, with part of the calyx and petals cut away; showing the unilateral disk, &c.
4. A portion of the same, with the disk and the receptacle vertically divided.

PLATE 179. *UNGNADIA SPECIOSA*; — the fertile flower and the fruit.

1. A fertile flower, enlarged.
2. The same, more enlarged, with the calyx and corolla detached.
3. The ovary transversely divided, magnified.
4. Vertical section of a fertile flower, through the pistil, &c., magnified.
5. The two ovules of one cell, more magnified.
6. Magnified vertical section of a fertilized ovary; the upper ovules sterile.
7. A capsule, of the natural size, dehiscent.
8. One of its valves and a seed, seen from within.
9. A seed of the natural size, the hilum towards the eye.
10. The detached embryo in the same position, the radicle next the eye.
11. Vertical section of a seed and its embryo.
12. The embryo in the same position.

PLATE 180.

SAPINDUS, *Tourn.*

Calyx 5-partitus. Petala 5, regularia, intus sæpius squamula ancta. Stamina 8–10, disco regulari inserta. Ovarium centrale, 3-loculare; loculis uniovulatis; stylo unico. Fructus carnosus, 1–2- (rarissime 3-) lobus. Semen sphæricum, exarillatum; testa ossea. — Arbores, foliis abrupte pinnatis.

SAPINDUS, *Tourn. Inst.* p. 569. t. 440. *Linn. Gen.* 449. *Juss. Gen.* p. 247. *Lam. Ill.* t. 370. *Gærtn. Fr.* 1. t. 70. *DC. Prodr.* 1. p. 607. *Cambess. in St. Hil. Fl. Bras.* 1. p. 389. t. 81. *Deless. Ic.* 3. t. 37. *Wight, Ill. Ind. Bot.* t. 51. *Endl. Gen.* 5610.

Soapberry.

CALYX of five nearly equal SEPALS, a little united at the base, quincuncially imbricated in æstivation, deciduous. Disk fleshy, annular, regular, entire or crenate-lobed, hypogynous, or somewhat perigynous. PETALS 5, equal, alternate with the sepals, inserted under the thickened edge of the disk, more or less unguiculate, naked, or often appendiculate with an entire or two-cleft scale at the summit of the claw on the inside, quincuncially imbricated in æstivation, deciduous. STAMENS 8, sometimes 10, inserted on the disk immediately under the ovary, equal: FILAMENTS subulate or filiform: ANTHERS fixed near the base, introrse, two-celled, the cells opening longitudinally. OVARY central, sessile, three-lobed, three-celled: STYLES united into one: STIGMAS 3, connivent. OVULE solitary in each cell, anatropous or partly amphitropous, erect from the base, or ascending from the inner angle below the middle of each cell; the raphe ventral.

FRUIT fleshy or baccate, formed of a single globose carpel, the others being abortive; sometimes two such carpels ripen and are more or less connate at the base, or rarely all three, when the fruit is three-lobed. SEED solitary in each carpel,

which it fills, globose; the hilum inferior, naked (not arillate); the testa bony-crustaceous, smooth, black; the tegmen membranaceous or fleshy. ALBUMEN none. EMBRYO incurved (rarely straight); the COTYLEDONS thick and fleshy, incumbent: RADICLE very short, inferior or descending, near the hilum.

TREES, with alternate abruptly pinnate leaves, destitute of stipules (the leaflets alternate or opposite), and small polygamous flowers in axillary racemes or panicles, or, by the abortion of the uppermost leaves, in ample compound panicles terminating the branches. Corolla white or whitish.

ETYMOLOGY AND PROPERTIES. The name is compounded of *sapo* (soap) and *Indus*; in allusion to the detergent properties and use of the *soapberry*, the fruit of *S. saponaria*, which lathers freely in water and is used in the West Indies as a substitute for soap. It is said that "a few of them will cleanse more linen than sixty times their weight of soap." Pounded and thrown into water they intoxicate fish. The bark is bitter and tonic, but the berries of some African and Indian species are edible.

GEOGRAPHICAL DISTRIBUTION. Natives of the tropics in the Old and New World. There are two or three species along our Southern confines. One, which is common in Florida and Texas, and in Northern Mexico, extends northward to Arkansas and Georgia.

NOTE. The fruit of *Sapindus* is usually described as a drupe; but what is taken for the endocarp is certainly a bony testa in the species here figured, and in a Brazilian Soapberry I have examined.

PLATE 180. *SAPINDUS MARGINATUS*, Willd.;—branch with a leaf and one small panicle, of the natural size; from a Texan specimen.*

1. Diagram of a perfect flower, with the bractlet (anterior).
2. A perfect flower, magnified.
3. Inside view of a magnified petal, showing its two-cleft scale.
4. A magnified stamen, seen from the outside.
5. The same, seen from the inside.
6. Pistil (fructified), with the disk, magnified.
7. Vertical section through the pistil, disk, calyx, &c., showing the ovules, the insertion of the stamens, petals, &c.
8. An ovule more magnified.
9. Fruit of the natural size, the two abortive carpels at the base.
10. Vertical section of the fruit, seed, and embryo.
11. An entire seed, of the natural size.

* The narrowly winged rachis of the leaf, sometimes only obscurely margined, is not shown in the figure.

PLATE 181.

CARDIOSPERMUM, L.

Calyx 4-sepalus, sepalis exterioribus multo brevioribus. Petala 4, irregularia, intus squamula aucta; squamulis bifor-
mibus. Stamina 8. Discus in glandulas 2 petalis inferio-
ribus oppositas tumens. Ovarium excentricum; loculis uni-
ovulatis; stylo 3-fido. Capsula 3-gona, vesiculosa, 3-locularis,
loculicida. Semina arillo cordiformi notata; testa crustacea.
—Herbæ scandentes, pedunculis 2-cirrhis, foliis biternatis.

CARDIOSPERMUM, Linn. Gen. 498. Gærtn. Fr. 1. t. 79. Lam. Ill. t. 317.

DC. Prodr. 1. p. 106. Cambess. l. c. p. 348. Endl. Gen. 5598.

CORINDUM, Tourn. Inst. p. 431. t. 246.

Heart-seed. Balloon-vine.

CALYX of four herbaceous concave sepals, imbricated in æstivation, deciduous; the two exterior lateral, rounded, much shorter than the anterior and posterior. PETALS 4, unequal, alternate with the sepals and often somewhat coherent with them at the base, slightly perigynous, each furnished with a petaloid appendage which is connate with their base, imbricated in æstivation, the two upper exterior, these bearing a petaloid inequilateral scale which is destitute of a crest; the two anterior interior in the bud, more remote from the stamens, and bearing each an unguiculate scale which has an inflexed crested appendage on the inner side below the apex. Disk produced on the lower side exterior to the stamens into two rounded or elongated glands, one before each of the anterior petals. STAMENS 8, thrown by the anterior projection of the disk, with the pistil which they surround, towards the upper side of the flower: FILAMENTS distinct, or often monadelphous at the base, the anterior usually shorter: ANTHERS two-celled, introrse, the cells opening longitudinally. OVARY eccentric, often slightly stipitate, trian-

gular, three-celled: **STYLES** short, united at the base, stigmatose down the whole inner face. **OVULE** solitary in each cell, ascending on a thick funiculus from its inner angle near the middle, between anatropous and amphitropous.

CAPSULE membranaceous, vesicular-inflated, triangular or three-lobed, three-celled, tardily loculicidal. **SEED** one in each cell, globose; the short and thick funiculus expanded at the hilum into a small (usually heart-shaped) and thin arillus, which adheres to the blackish crustaceous testa. **ALBUMEN** none. **EMBRYO** convolute-incurved, and the large **COTYLEDONS** also transversely conduplicate above the middle, incumbent on the short and conical descending **RADICLE**.

HERBS, rarely suffrutescent plants, commonly climbing by tendrils, which arise from the peduncle below the inflorescence. Leaves alternate, biternately compound, destitute of stipules; the leaflets incised. Flowers perfect or diœcio-polygamous, small, racemose-paniculate on an axillary peduncle, which is usually bicirrhose at the summit: partial peduncles opposite: pedicels articulated in the middle. Corolla white.

ETYMOLOGY. Name composed of *καρδία*, *the heart*, and *σπέρμα*, *seed*, from the heart-shaped arillus borne at the hilum of the seed.

GEOGRAPHICAL DISTRIBUTION. The species are chiefly tropical American; one, which is widely diffused over the warmer parts of the world, is to all appearance indigenous in Louisiana and Texas. It is often cultivated in our gardens, under the name of *Balloon-vine*.

PROPERTIES. The mucilaginous roots are aperient and diaphoretic.

PLATE 181. *CARDIOSPERMUM HALICACABUM*, *Linn.*; — portion of a flowering stem, cultivated in the Botanic Garden from Texan seeds.

1. Diagram of the flower. 2. A magnified flower seen from underneath.
3. A magnified flower seen from above.
4. Inside view of one of the upper petals with its appendage, magnified.
5. Inside view of one of the lower petals and its appendage, magnified.
6. Inside view, and 7. outside view, of a stamen, magnified.
8. Vertical section of a flower, magnified.
9. The pistil, more magnified. 10. An ovule, still more magnified.
11. The inflated capsule, of the natural size.
12. A transverse section of the same, showing the seeds.
13. A seed and its arillus (seen laterally), enlarged.
11. Vertical section of the same, dividing the embryo.

PLATE 182.

DODONÆA, *L.*

Calyx 3–5-partitus. Petala nulla. Discus obsoletus. Stamina 5–8, v. plura. Ovarium 3–4-loculare; loculis 2-ovulatis; ovulo superiori adscendente, inferiori pendulo. Capsula membranacea, 2–4-alata, septicida. — Arbusculæ viscosæ.

DODONÆA, Linn. Gen. 855. Lam. Ill. t. 304. Cav. Ic. t. 327. Rudge in Linn. Trans. 11. t. 19, 20. DC. Prodr. 1. p. 616. Torr. & Gray, Fl. N. Am. 1. p. 255. Wight, Ill. Ind. Bot. t. 52. Endl. Gen. 5626.

CALYX of from three to five herbaceous or somewhat colored SEPALS, united at the base, imbricated in æstivation, nearly equal, deciduous. COROLLA wanting. DISK obsolete. STAMENS 5 to 8, or rarely more numerous, hypogynous: FILAMENTS very short, distinct: ANTHERS fixed by their base, thick, quadrangular, two-celled, introrse, the cells opening longitudinally. OVARY central, sessile or slightly stipitate, acutely three–four-angled, three–four-celled: STYLES united into one to the summit or nearly, the short lobes stigmatose on the inner face. OVULES two in each cell, borne on a thick placenta which projects from the middle of its inner angle, half anatropous, the upper ascending, the lower pendulous; the short raphe in both ventral.

CAPSULE membranaceous, reticulated, two–four-lobed, the lobes winged on the back, two–four-celled, septicidal, the carinate-winged valves at length falling away from the persistent two–four-winged attenuated axis. SEEDS one or sometimes two in each cell, tumid-lenticular, not arillate; the testa crustaceous. ALBUMEN none. EMBRYO spirally convolute, homotropous: COTYLEDONS fleshy, linear, incumbent: RADICLE linear or oblong, next the hilum.

SHRUBS or small trees, often viscous with a resinous exu-

dation ; the leaves simple and entire, or sometimes imparipinnate, destitute of stipules. Flowers polygamous, or sometimes all perfect, racemose, paniculate or glomerate, axillary or terminal, greenish or whitish.

ETYMOLOGY. The genus is dedicated to *Dodoens*, a Dutch botanist of the sixteenth century.

GEOGRAPHICAL DISTRIBUTION. The species are all tropical or subtropical, the greater number Australian. One very widely distributed species is found along our Southern confines.

PROPERTIES. The resinous exudation of *D. viscosa* is somewhat balsamic, and the seeds are said to be edible.

PLATE 182. *DODONÆA VISCOSA*, *Linn.*; — a branch in flower, of the natural size ; from Florida.

1. Diagram of the flower.
2. Vertical section of a flower, magnified, showing the ovules.
3. A magnified stamen, seen from the outside.
4. The same, seen from the inside.
5. Fruit, of the natural size.
6. Vertical section of the same, showing the seeds.
7. A seed enlarged.
8. Vertical section of the seed and spirally convolute embryo, magnified.

ORD. POLYGALACEÆ.

Herbæ vel frutices, foliis integerrimis exstipulatis: dicotyledoneæ, hypogynæ, hermaphroditæ, asymmetricæ, *irregulares, quasi papilionaceæ, mono-diadelphæ* corolla mediante, tubo stamineo subgamopetala postice fissa; *antheris unilocularibus poro apicis apertis; ovario 2-loculari, loculis uniovulatis*; seminibus sæpe carunculatis; embryo recto in albumine parco, cotyledonibus plano-convexis, radícula supera.

POLYGALÆE, Juss. in Ann. Mus. 14. p. 386. R. Br. in Flind. Voy. 2. p. 543. DC. Prodr. 1. p. 321. St. Hil. & Moq.-Tand. in Mem. Mus. 17. p. 313. Endl. Gen. p. 1077.

POLYGALACEÆ, Lindl. Introd. Syst. Nat., ed. 2. p. 84, & Veg. Kingd. p. 375.

THE MILKWORT FAMILY consists of the large genus *Polygala*, with five or six small genera which exhibit the same peculiar structure and *quasi papilionaceous* appearance of the flower. The structure, however, is essentially different from that of the true papilionaceous corolla. The latter consists of five petals; one posterior, the vexillum, two lateral, the wings, and two anterior, more or less coherent, forming the keel. Of the sepals, accordingly, one is directly anterior and two are posterior. The Polygalaceous flower is differently situated as to the position of the sepals and petals in respect to the axis of inflorescence, having the second sepal next the axis, after the more usual manner, and the first and third approximated on the anterior side of the flower; while the two lateral sepals, enlarged and petaloid, seem at first sight to belong to the corolla, and, appearing like the wings of the papilionaceous corolla, have received the same name. The corolla itself consists normally of five petals, two of which are necessarily posterior, one anterior, and two lateral; but the lateral are commonly minute or altogether abortive, and the two posterior are more or less combined anteriorly with the lower petal (which is saccate above and often crested), by means of their adhesion to the united filaments. The stamens are commonly monadelphous, with the tube open posteriorly, and often more or less cleft in the middle anteriorly, so as to divide the stamens equally into two phalanges, of

four, or rarely three, stamens in each. Sometimes they are plainly diadelphous, as in *Polygala paucifolia* (Plate 184), which is doubtless the normal plan in this family; the andrœcium of *P. Senega* (Plate 183, Fig. 4), consisting of two such phalanges united anteriorly. I suppose, moreover, that each phalanx answers to a single stamen, which is quadrupled, or occasionally only doubled or tripled, by collateral deduplication, in the same way as in *Fumariaceæ*.* Do they represent the two anterior, or the two lateral stamens? The simple anthers opening by a terminal orifice, which are characteristic of this family and the *Tremandrea*, are not essentially unlike those of a few *Leguminosæ*. But the dicarpellary pistil with a two-celled ovary, and the albuminous usually carunculate seeds, not to mention the hypogynous insertion of the corolla and stamens, draw a striking line of separation between these two families, which nevertheless closely approach each other through *Krameria*. On the other hand, the *Polygalaceæ* are thought to exhibit more points of resemblance with *Sapindaceæ* than with any other family, except the *Tremandrea*. In-so far as this approximation is based upon the apparent agreement in the prevalent number of the stamens (eight), it would have no real foundation if the type of *Polygalaceæ* is diandrous, with the number of anthers increased by deduplication, as is suggested above.

This family is widely diffused throughout the temperate and tropical parts of the world; and the typical, which is by far the largest genus, is equally widely distributed over the Old and New Worlds in both hemispheres. There are about thirty known species of *Polygala* in extratropical North America, nearly all of which belong to the United States proper. It is the only genus which occurs in this country.

Several plants of the family are employed in medicine, of which the most celebrated is our Seneca Snakeroot (*Polygala Senega*, *L.*), so called from its use by the aborigines of this country as an antidote to the poison of the rattlesnake. This "has been successfully employed as an emetic, a stimulant, an expectorant, a sudorific, a diuretic, and in fact to fulfil almost every indication." Others are very bitter and tonic, such as our *P. polygama* and *P. paucifolia*; while some are merely emetic, like a Brazilian species which forms one of the false *Ipecacuanhas*. Several species, of widely distant parts of the world, have the reputation of being antidotes to snake-bites. Saponaceous and detergent qualities prevail in *Monnina*, the bark of which is used by the Peruvians as a substitute for soap. The drupes of *Mundia*, of the Cape of Good Hope, are edible.

* *Vide* Vol. I. p. 118.

PLATE 183, 184.

POLYGALA, *Tourn., L.*

Sepala inæqualia, 2 lateralibus (alis) petaloideis maximis. Petala 3, in corollam postice fissam inferne coalita; anticum (carina) galeatum, cristatum. Stamina 8, rariusve 6, in phalanges 2 æquales antice pl. m. connatas corollæ adnatas coalita: antheræ uniloculares, poro apicis dehiscentes. Capsula compressa, membranacea, 2-locularis, 2-sperma, carunculata.

POLYGALA, *Tourn. Inst. t. 79. Linn. Gen. 851. Juss. Gen. p. 99. DC. Prodr. 1. p. 321. St. Hil. & Moq.-Tand. in Mem. Mus. 17. p. 313. t. 27, 28. Deless. Ic. 3. t. 15-18. Endl. Gen. 5647.*

CHAMÆBUXUS, *Dillen. Gen. t. 9.*

PSYCHANTHUS & TRICLISPERMA, *Raf. Speech. 1. p. 116, 117.*

Milkwort. Snakeroot.

CALYX of five distinct and very unequal SEPALS, persistent, or often (in *P. paucifolia*, &c.) deciduous, quincuncially imbricated in æstivation; the three exterior small and more or less herbaceous, two of these (the first and third) approximate and anterior, and one (the second) posterior (next the axis of inflorescence), larger, concave; the two interior (WINGS) lateral, much larger than the others and of a different shape and texture, colored like the petals. PETALS 5, the two lateral minute, or usually (always?) by their suppression only 3, hypogynous, irregular, imbricated in æstivation, the two posterior exterior in the bud, connivent, below coalescent by their anterior margins with the anterior petal, thus forming a kind of gamopetalous corolla, which is open on the upper side to the base; the anterior petal (called the KEEL) galeate above and inclosing the anthers and style in its cavity, sometimes three-lobed, more or less crested on the back. STAMENS 8, or sometimes 6, monadelphous or

diadelphous, usually in two equal phalanges, which are adnate to the corolla, one each side of the anterior petal, either unconnected except by means of the corolla (as in *P. paucifolia*, therefore diadelphous), or united anteriorly into one membrane (monadelphous): FILAMENTS distinct above, filiform: ANTHERS ovoid or cup-shaped, fixed by their base, opening at the apex by a large pore or a transverse cleft, one-celled, or when young sometimes two-celled. POLLEN of simple globular grains. DISK a posterior hypogynous gland, or rarely annular, often obsolete. OVARY laterally compressed, two-celled, the cells anterior and posterior: STYLE terminal, curved, ascending, thickened upwards, of very various forms, often lobed, usually compressed, either in the same plane as the ovary or in the contrary direction: STIGMA either terminal or lateral. OVULE solitary in each cell, pendulous from its inner angle near the summit, anatropous; the raphe ventral.

CAPSULE membranaceous, two-celled, compressed contrary to the dissepiment, obcordate, oval, or orbicular and emarginate, opening at the margins by loculicidal dehiscence. SEED solitary in each cell, suspended, with a crustaceous testa, appendaged at the hilum by a fleshy or spongy caruncle, which is frequently extended into two or three conspicuous lobes sometimes as long as the seed itself. EMBRYO large, nearly the length of the seed, straight, in the axis of rather thin or scanty and fleshy albumen: COTYLEDONS flat or plano-convex, fleshy: RADICLE short and conical, (or sometimes little shorter than the cotyledons themselves,) superior.

HERBS of small size, or in warmer regions shrubby plants; with a bitter aqueous, or in the roots sometimes milky, juice, and alternate, rarely opposite or verticillate, entire leaves, destitute of stipules. Flowers of various colors, subsolitary, or most commonly in terminal or rarely axillary spikes or racemes, which are often cymose or paniced. All the flowers are perfect; but in several species (such as *P. polygama* and *P. paucifolia*) the conspicuous flowers seldom mature fruit, while this is abundantly produced by others, which

are subterranean or next the ground, often of simpler and less irregular structure and with short styles, which are fertilized in the bud, in the manner of *Viola*, and of *Impatiens* (Plate 153, page 133), &c. Pedicels commonly articulated, bracteate, and mostly bibracteolate at or near the base.

ETYMOLOGY. A name applied to this genus by the earliest botanists, compounded of *πολύς*, *much*, and *γάλα*, *milk*; from the prevalent idea that these plants possessed the property of increasing the lacteal secretion.

GEOGRAPHICAL DISTRIBUTION, PROPERTIES, &c., are considered under the order.

NOTE. This large genus, comprising two or three hundred species, was arranged by De Candolle in eight sections, which now greatly need entire revision. Two of the more distinct forms which occur in the United States are here chosen for illustration. The hypogæous fertile flowers of *P. paucifolia* which we examined exhibited the corolla reduced to the keel-petal alone, to the margins of which the two phalanges of three stamens each directly adhere.

PLATE 183. *POLYGALA SENEGA*, *Linn.*; — a plant, of the natural size (Northern New York).

1. Diagram of the flower.
2. Vertical section of a flower, magnified, dividing the ovary and displaying the ovules.
3. The calyx spread out and magnified, seen from underneath.
4. Inside view of the corolla and stamens, spread out and magnified, the two phalanges united nearly to the summit.
5. An anther, with the distinct portion of the filament, magnified.
6. The pistil, seen laterally, with the receptacle, magnified.
7. Capsule, with the persistent calyx, magnified.
8. A magnified seed, showing its raphe and the two-horned caruncle.
9. A vertical section of the same, displaying the embryo.
10. Transverse section of the same and of the cotyledons.
11. The embryo detached (inverted), the large cotyledons separated, magnified.
12. Seed of *POLYGALA CRUCIATA*, *Linn.*; — magnified.
13. Transverse section of the same. (The albumen in this species is of equal thickness all round the embryo; but the engraver has wrongly represented it as thinner at the edges of the cotyledons, as is indeed the case in *P. Senega*.)

PLATE 184. *POLYGALA PAUCIFOLIA*, Willd. ;— of the natural size, in flower, and with the clandestine fructification at the base.

1. The sepals displayed, of the natural size.
2. Inside view of the corolla, spread open, and the stamens included in the keel, magnified.
3. One of the side-petals torn away, with one of the phalanges of stamens adherent to its edge.
4. Lateral view of the anterior petal (keel), from which the side-petals and the stamens have been separated.
5. The pistil, with the posterior gland of the disk, equally magnified.
6. The strongly concave posterior sepal, equally magnified.
7. A dehiscent anther, more magnified, showing its thin partition.
8. Lateral view of an anther, equally magnified.
9. The thickened apex of the style and stigma, seen laterally ; magnified.
10. Magnified vertical section of the ovary and receptacle, showing the ovules in place, with the forming lobes of the caruncle.
11. One of these ovules detached and more magnified.
12. Diagram of one of the clandestine fertile flowers ; the corolla reduced to the keel-petal.
13. A fructified pistil of the same, partly inclosed by its bract and the persistent calyx, magnified.
14. Calyx of the same displayed ; magnified.
15. Inside magnified view of its corolla, consisting of the anterior petal only, with the two triandrous phalanges adnate to its margins.
16. Its fertilized pistil, detached, magnified.
17. Dehiscent capsule, of the natural size.
18. Magnified transverse section of the same, and of the contained seeds.
19. A magnified seed, with its long three-horned caruncle.
20. Transverse section of the seed, magnified, with its thick, plano-convex cotyledons in the thin albumen. (The latter, which is not well represented by the engraver in this respect, is very thin or almost interrupted next the edges of the albumen.)
21. Vertical section of the seed, with its caruncle, magnified, showing the embryo in place.

ORD. KRAMERIACEÆ?

Suffrutices vel herbæ, a Polygalaceis diversæ, petalis 3 coalitis staminibusque *posticis*, pistillo simplici uniloculari 2-ovulato, semine ecaruncolato exalbuminoso, radícula intra cotyledones crassas recondita; a Leguminosis Cæsalpinieis, nullo modo distinctæ nisi foliis exstipulatis, *staminibus hypogynis, anticis deficientibus*.

KRAMERIACEÆ, Mart. Consp. p. 44.

PLATE 185, 186.

KRAMERIA, *Loefl., L.*

Char. ut ordinis monotypici.

KRAMERIA, Loefl. Iter. p. 195. Ruiz & Pav. Prodr. Fl. Peruv. t. 3. Juss. Gen. p. 425, & in Mem. Mus. 1. p. 390. DC. Prodr. 1. p. 341. St. Hil. & Moq.-Tand. in Mem. Mus. 17. t. 31 & 19. p. 336. St. Hil. Fl. Bras. 2. p. 73. t. 97. Hook. & Arn. Bot. Beech. p. 8. t. 5. Torr. & Gray, Fl. N. Am. 1. p. 134, & p. 671. Endl. Gen. 5656. Benth. Pl. Hartw. p. 13. A. Braun in Engelm. & Gray, Pl. Lindh. not. p. 4.

Rhatany.

CALYX of five more or less petaloid and unequal at length deciduous SEPALS, quincuncially imbricated in æstivation, often oblique or falcate; one of them (the first) nearly anterior and often gibbous at the base, and two (the second and fifth) posterior; one of the interior (the fifth) usually smaller than the others, or in some species wanting. PETALS 5, hypogynous, much smaller than the petals and alternate with them, dissimilar, of two forms, the fifth posterior and interior in æstivation; this and the two lateral approximate on the upper side of the flower, consimilar, unguiculate,

with a small and rounded sometimes nearly abortive lamina, distinct, or commonly with their long claws united at the base or for nearly their whole length; the two anterior petals lateral, remote, short and sessile, oblique, rounded or flabelliform, fleshy. STAMENS 4 (or by abortion fewer), occupying the posterior side of the flower, hypogynous; the FILAMENTS fleshy, curved, sometimes free and distinct, or nearly so, then obviously alternate with the petals, but the place of the anterior one vacant (or rarely, according to Engelmann, occupied by a sterile filament), sometimes the two middle or superior ones united, and the two lateral (which are often rather longer) distinct, sometimes all equally or unequally monadelphous, often adnate to the claws of the three posterior petals: ANTHERS fixed by their base, erect, two-celled, somewhat opening at the (occasionally tubular-produced) apex by a double or single pore. POLLEN of simple globose grains. DISK none. PISTIL single and simple, sessile: OVARY ovoid or globular, gibbous, silky-hirsute, one-celled, with a single placental line occupying the side next the axis of inflorescence and often projecting a little into the cell: STYLE obliquely terminal, subulate or filiform: STIGMA terminal, simple. OVULES 2, collateral, pendulous from near the summit of the cell, anatropous.

FRUIT woody-coriaceous or crustaceous, indehiscent, globose, echinate with strong prickles (which are either glochidate at the apex, as in *K. cytisoides*, or retrorsely scabrous), one-celled by the abortion of one ovule, one-seeded. SEED pendulous, globular, conformed to the cell, not at all carunculate or appendaged; the testa smooth and membranaceous; the small and naked hilum connected by a narrow raphe with a very broad chalaza. ALBUMEN none. EMBRYO conformed to the seed, which it fills, straight: COTYLEDONS thick and fleshy, plano-convex, strongly auriculate-produced at the base: RADICLE superior, near the hilum, conical, entirely concealed by the extended base of the cotyledons: PLUMULE manifest.

SUFFRUTICOSE plants, silky-villous, with numerous diffuse or decumbent stems arising from thickened fleshy roots; the

leaves alternate, destitute of stipules, simple and sessile, or in one species palmately trifoliate. Flowers purplish, axillary, sometimes collected in a leafy raceme. Peduncles bibracteate above the middle or next the flower, articulated just above the bracts.

AFFINITY, &c. Jussieu, who in the *Genera Plantarum* left Krameria among the *Plantæ incertæ sedis*, afterwards arranged it with the genera allied to Polygala, observing, however, that the structure of the flower differed in some respects, and that the seed was destitute of albumen. Mr. Brown, in the Appendix to *Flinders's Voyage*, directly referred it to the Polygalææ; but it is evident from his remarks upon the essential distinctions between this family and the Leguminosæ, that he regarded the odd sepal to be posterior, and the three unguiculate petals to be anterior. This is the view of their position which is taken by St. Hilaire and Moquin-Tandon, and which is corrected by Hooker and Arnott, in the *Botany of Beechey's Voyage*, who state, on the contrary, that "the relative position of the sepals and petals to the axis of the spike or bractea is scarcely different from what exists in the Leguminosæ, where Sir J. E. Smith seems disposed to fix this genus." Endlicher, who adopts St. Hilaire's view of the position of the floral organs, appends the genus to Polygalææ. So does Lindley, in the *Vegetable Kingdom*, although he has copied Hooker and Arnott's figure, with the diagram, in which the organs are laid down in their real position. Next, the relationship to Polygala has been maintained by Bentham (in *Plantæ Hartwegianæ*, p. 13) upon new grounds; he taking the four larger sepals, the lower of which he conceives to be double, to constitute the entire calyx, and the fifth or smaller one, which is sometimes wanting, as the sole vestige of the corolla; the three unguiculate petals and the two lateral stamens he takes for the normal series of the andrœcium; and the two upper stamens, with the two fleshy organs, for an inner staminal series. To this it is justly replied by Professor Braun (in some remarks that are known to me only by Dr. Engelmann's note, in *Plantæ Lindheimerianæ*, p. 4), that the fleshy petals cover the lateral stamens in æstivation, and therefore cannot belong to an interior circle. Braun and Engelmann also state that in *K. lanceolata* there is occasionally an anterior sterile filament alternate with the lower petals, completing the symmetry of the flower, which they consider as that of a pentandrous Leguminosa. When they remark that this lower stamen answers to the free tenth stamen of papilionaceous flowers, however, they only mean that it is the odd one, and analogous to it, not that it occupies the same position; for that stamen is posterior. This leads me to remark, that the only important character I can mention to distinguish Krameria from Leguminosæ Cæsalpiniæ (with which it appears exactly to accord in the æstivation of the corolla), except that the stamens and petals are truly hypogynous, lies in the order of the suppression of the stamens. When

those of Leguminosæ are irregularly reduced, it is the posterior which become sterile or disappear, while in this genus the anterior stamen is suppressed. But even this character is invalidated; in the first place, by the manifest tendency of the posterior stamens next to suffer reduction, as is shown by their usually smaller size and by the disappearance of one of them (as I suppose) in *K. triandra*; and secondly, by the rare occurrence of the same order of suppression in the Leguminosæ, as in *Dialium* (so admirably illustrated by Mr. Bennett*) and *Casparea*. The trifoliolate leaves of *K. cytisoides*, noticed by Lindley as indicating an affinity with Sapindaceæ, may with at least equal propriety be adduced in favor of the relationship with Leguminosæ. Whether *Krameria* is actually to be incorporated into the latter family or not is still an open question; but it is certain that it does not belong to Polygalaceæ. From that family it is plainly excluded by the monocarpellary pistil, the relation of the sepals and petals to the axis, the posterior situation of the stamens, the collateral ovules, and the exalbuminous seed.

ETYMOLOGY. The genus was dedicated by Loeffling, a pupil of Linnæus, to two German botanists, of the name of *Kramer*, one of them author of a *Flora* of Lower Austria.

GEOGRAPHICAL DISTRIBUTION. A genus of several species, natives of Chili, Peru, Brazil, and Mexico, with one species in the West Indies, and one in Florida, Arkansas, and Texas. The latter is nearly herbaceous, but has a large and strong somewhat ligneous root. During the last summer Mr. Wright found a second truly suffruticose species on the southern frontier of Texas, which is probably the *K. pauciflora* of De Candolle.

PROPERTIES. The roots contain a red coloring matter, are very astringent and somewhat mucilaginous, with only slight bitterness. The Rhatany-root of commerce is furnished by the Peruvian *Krameria triandra*. Chemically analyzed, it is found to contain a very large percentage of tannin, and a peculiar acid called by Peschier the *Krameric*, upon which its styptic properties are supposed to depend. The roots, or an extract prepared from them, are largely exported from Peru to Portugal, where they are used to adulterate port-wine. The powder is commonly used in Peru as a tooth-powder, and it is an ingredient of many preparations of the kind. In medicine it is employed as an astringent. The roots of the West Indian *K. Ixina* have been likewise employed for the same purposes. Those of our *K. lanceolata*, which are often more than three feet long, are endowed with similar properties, and might be substituted for the officinal article, which is a profitable export from Peru.

PLATE 185. *KRAMERIA LANCEOLATA*, Torr.;—short flowering stems, with a portion of the root, of the natural size.

1. An expanded flower, enlarged.

* In Horsefield's *Plantæ Javanicæ Rariores*, p. 136.

PLATE 186. Details of the flower and fruit.

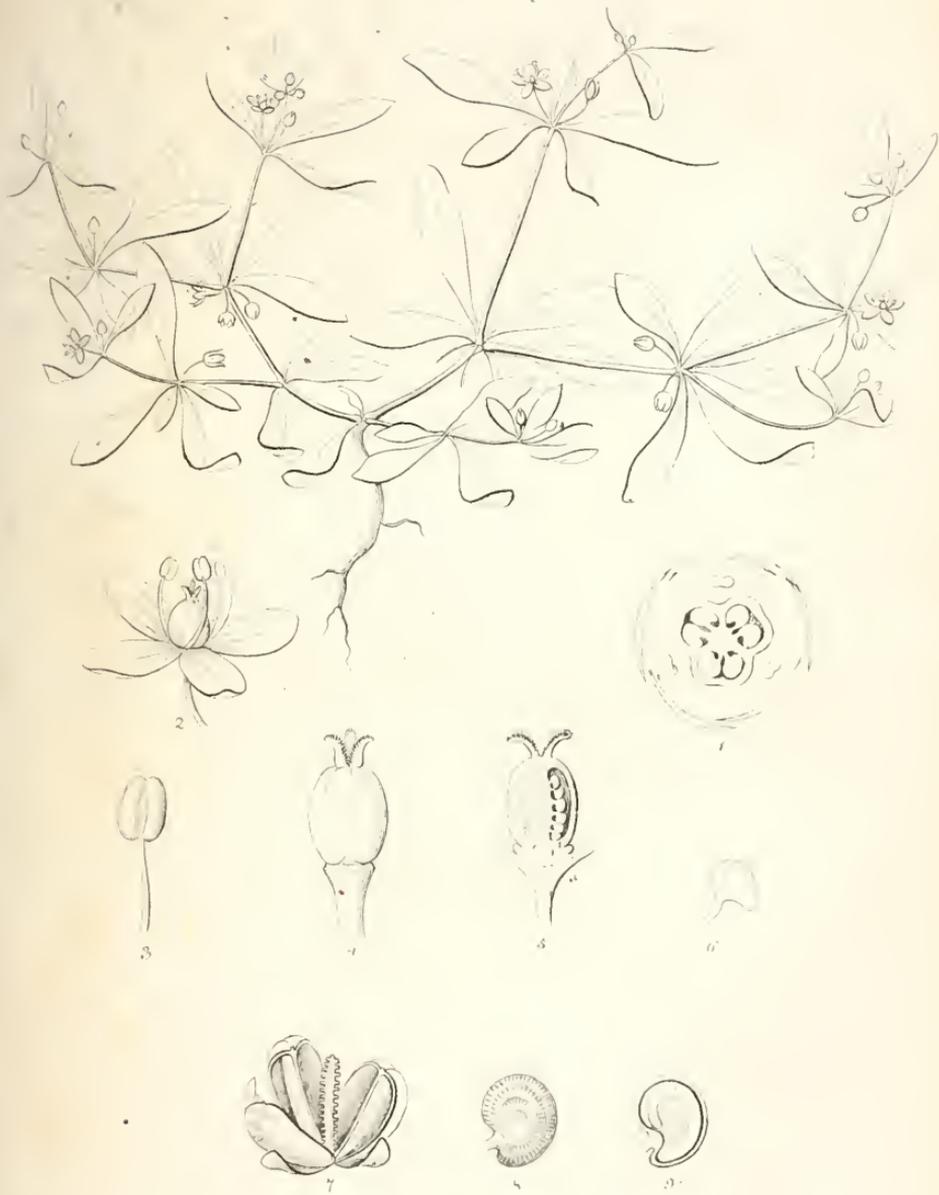
1. Diagram of the flower of *K. secundiflora*, DC. (*K. Ixina*, *Benth.*), with the bract and bractlets.
2. Calyx of the same, outspread and enlarged, seen from underneath.
3. Diagram of the flower of *K. lanceolata*, with the bract or floral leaf anterior, the two bractlets lateral; the shaded circle above indicates the position of the axis of inflorescence. The section of the ovary shows the collateral ovules.
4. Calyx outspread and enlarged, seen from underneath.
5. The three upper petals, their claws combined, magnified.
6. One of the lower fleshy or glandular petals, magnified.
7. The four monadelphous stamens, magnified.
8. An anther more magnified, cut across to show the partition.
9. The pistil, with the receptacle, magnified.
10. Magnified vertical section of the flower through the pistil, showing the union of the filaments with the combined claws of the petals, one of the ovules, &c.
11. An ovule more magnified.
12. A fruit, of the natural size.
13. Vertical section of the same, and of the seed and embryo, contrary to the width of the cotyledons, enlarged.
14. The seed, detached and magnified, showing the raphe and chalaza.
15. Vertical section of the same parallel with the cotyledons, so as to cut away one of the latter.

* * * ABUTILON VELUTINUM, Plate 125, p. 67, is doubtless *A. holosericeum*, *Scheele in Linnæa*, 21. p. 471 (1848), described, in some points incorrectly, from Lindheimer's specimens.

PAVONIA WRIGHTII, Plate 130, p. 76, would appear to be *P. lasiopetala*, *Scheele in Linnæa*, *l. c.*

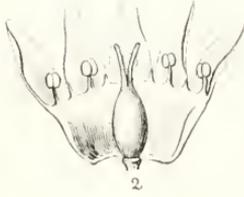
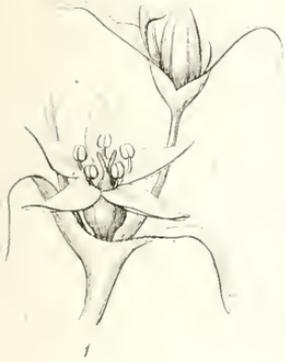
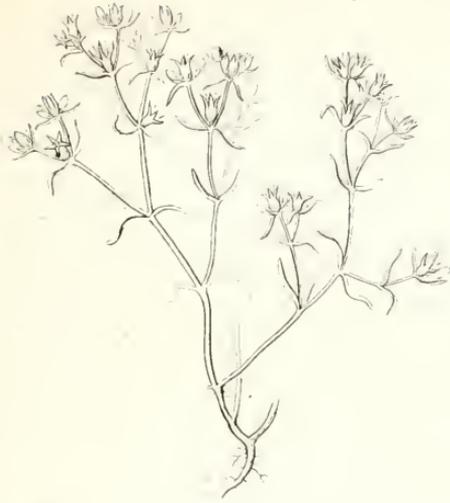
MALVASTRUM WRIGHTII, *Gray, Pl. Fendl.*, Plate 121, p. 60, is described by Scheele under the name of *Malva aurantiaca*.





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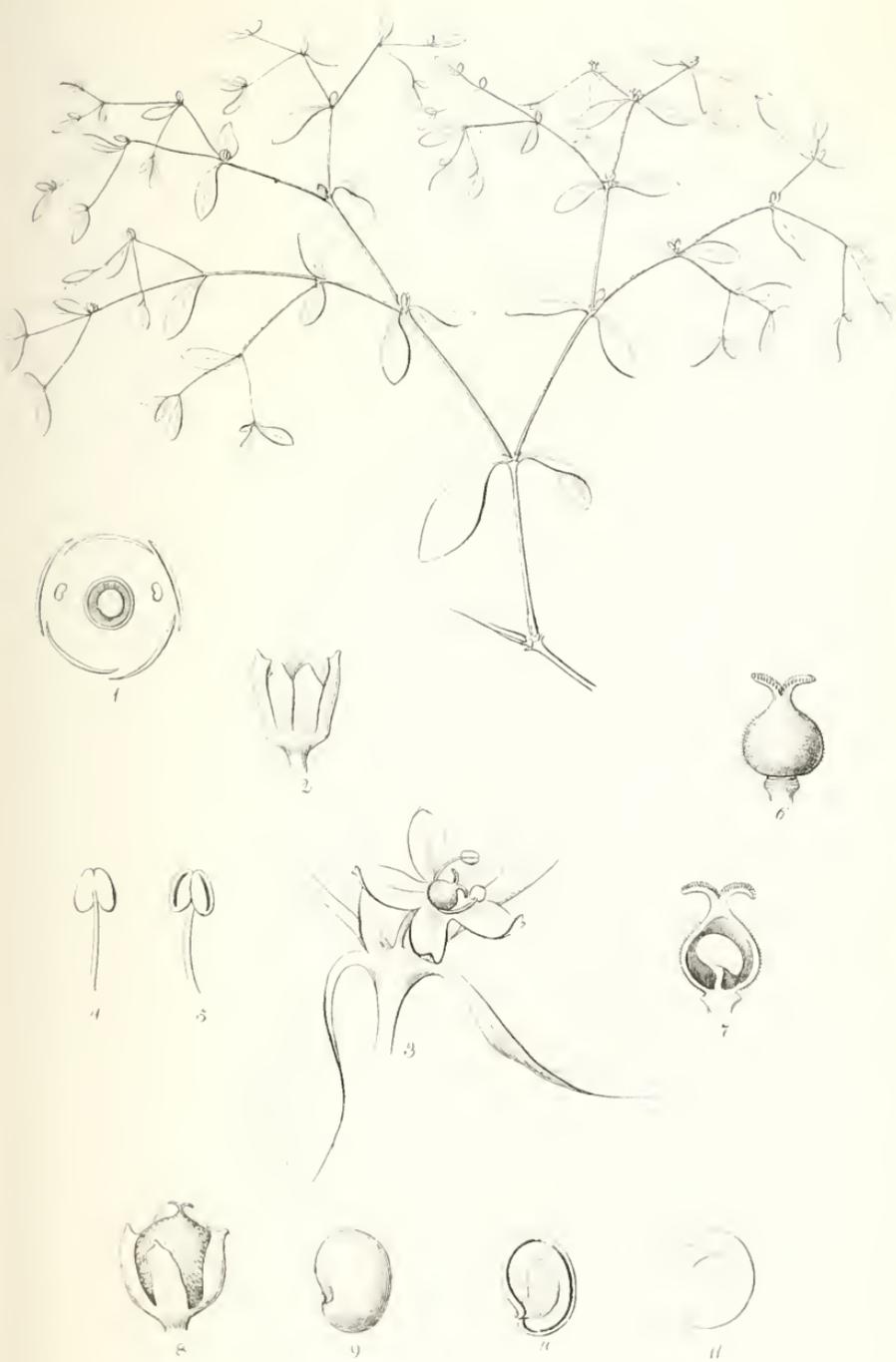


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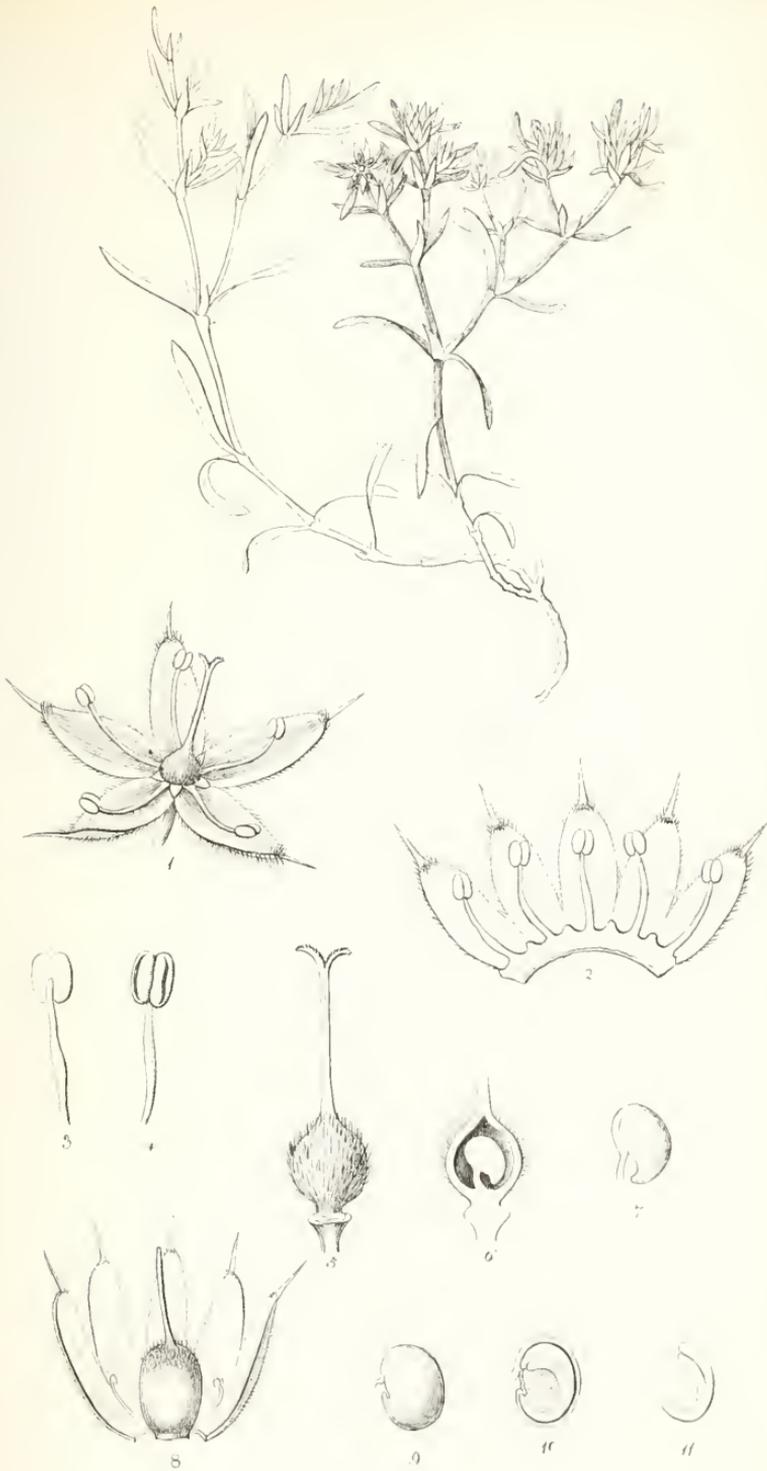
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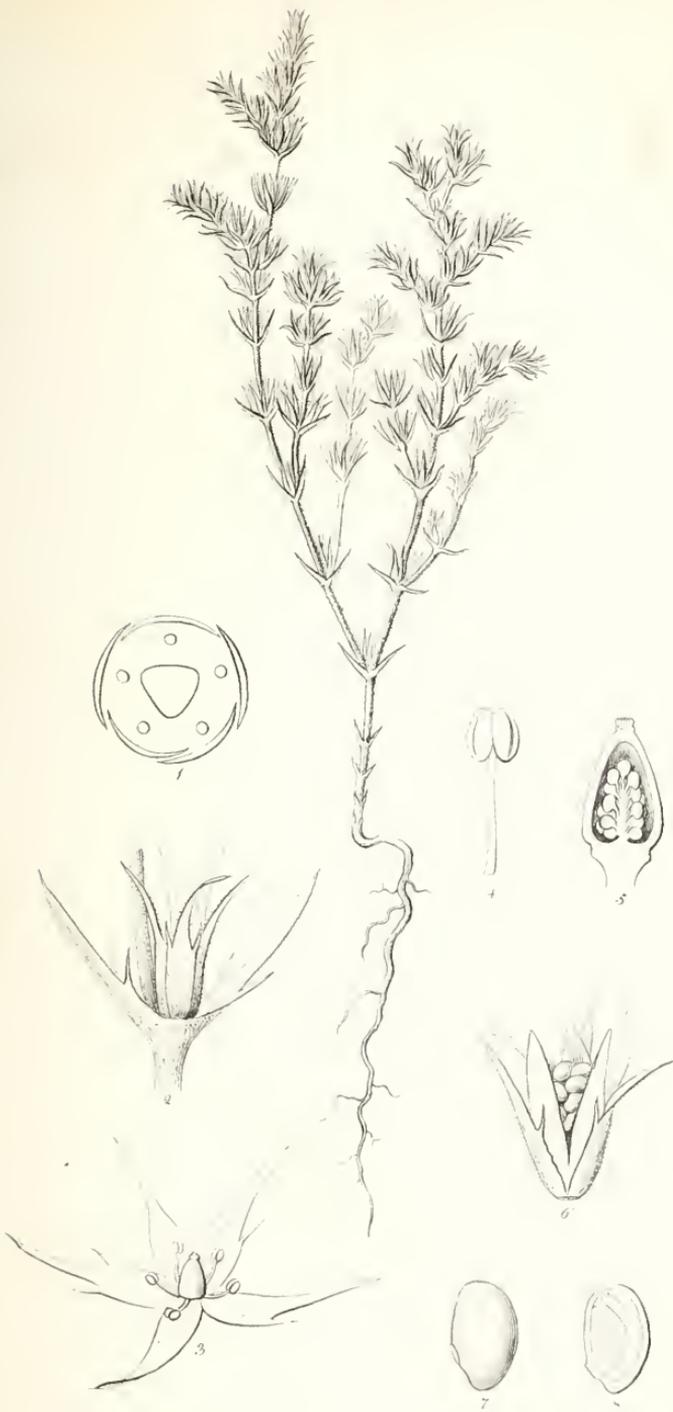
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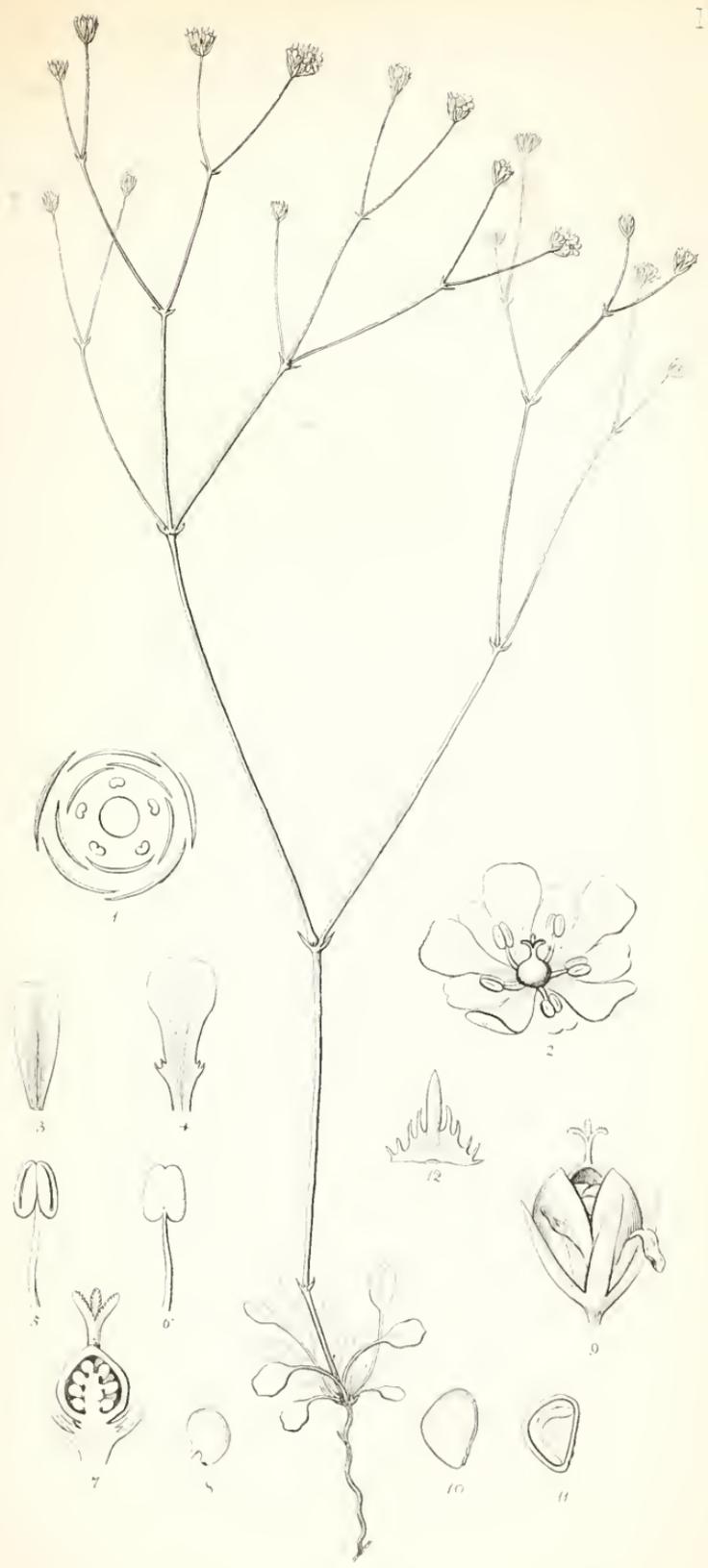
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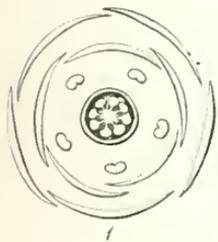
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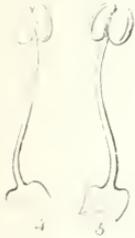
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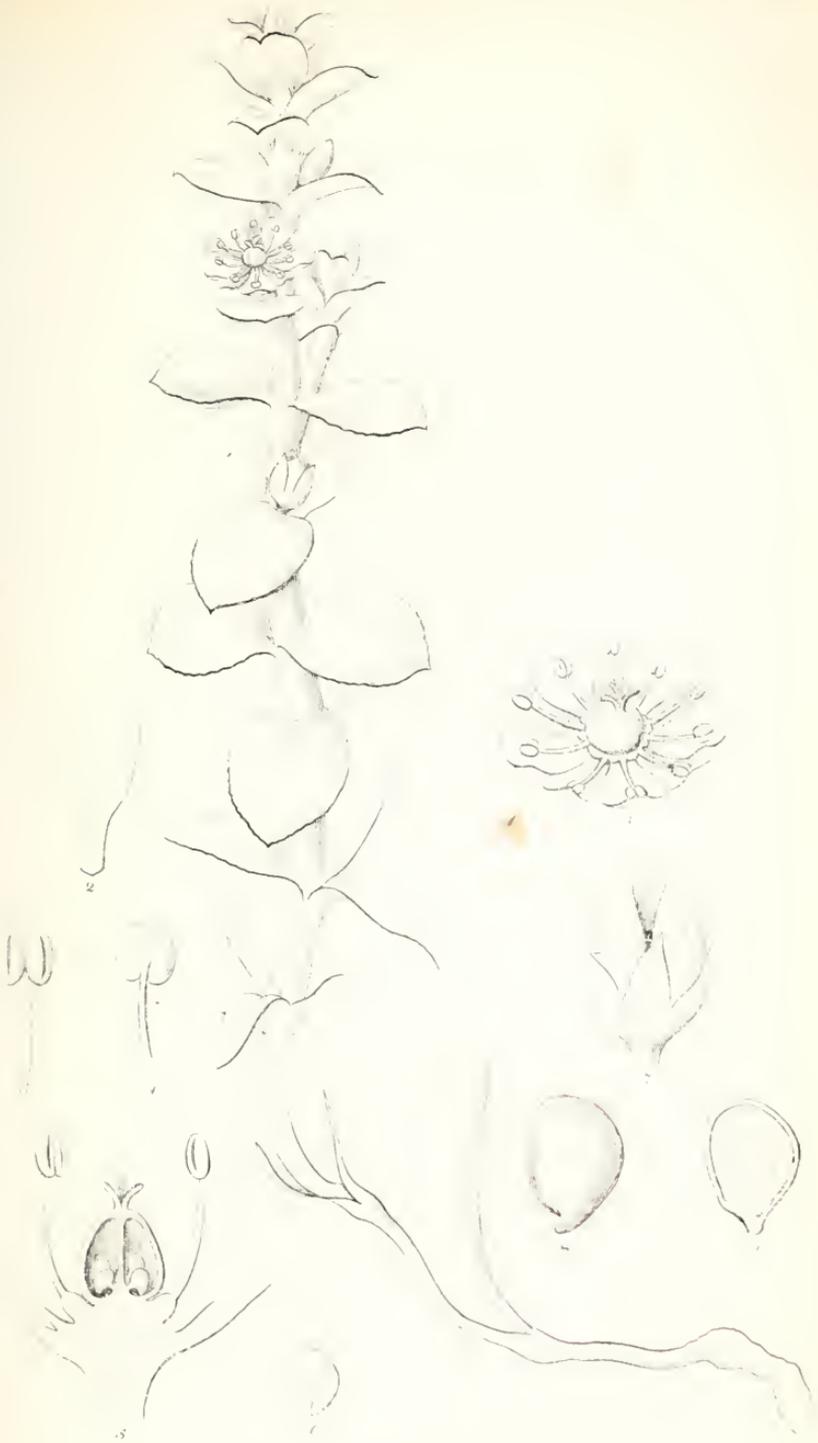
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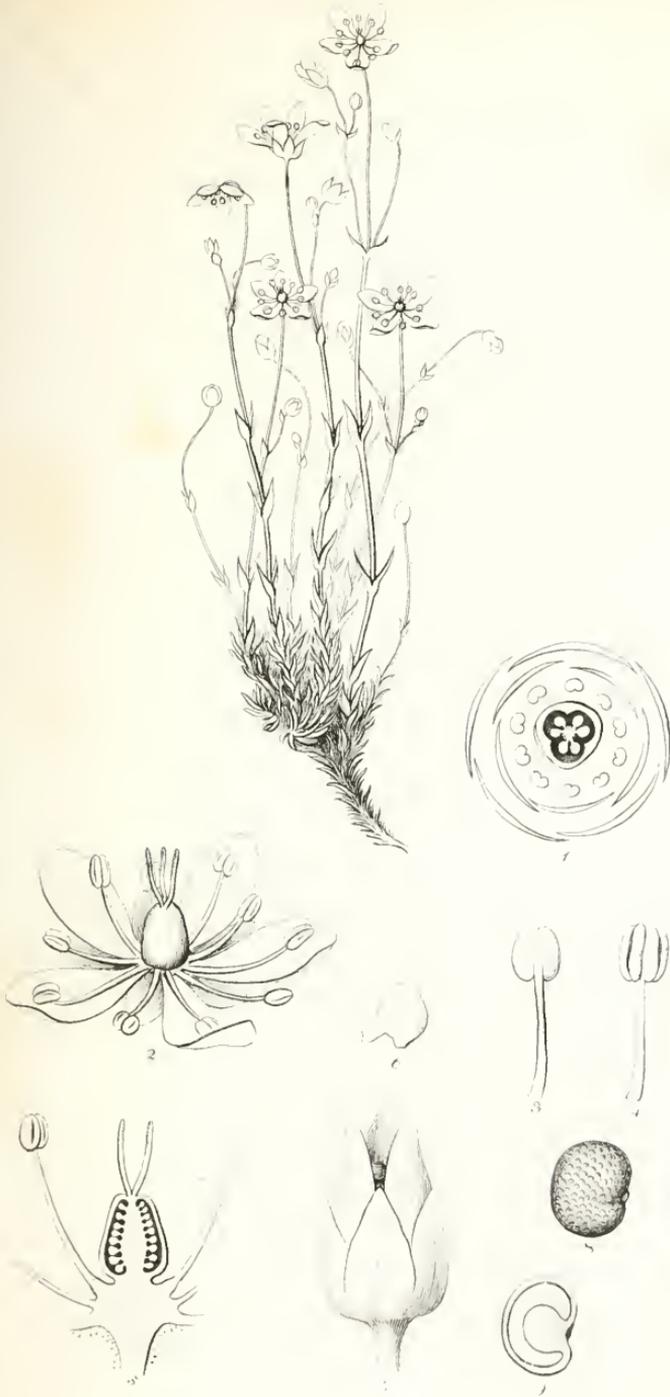
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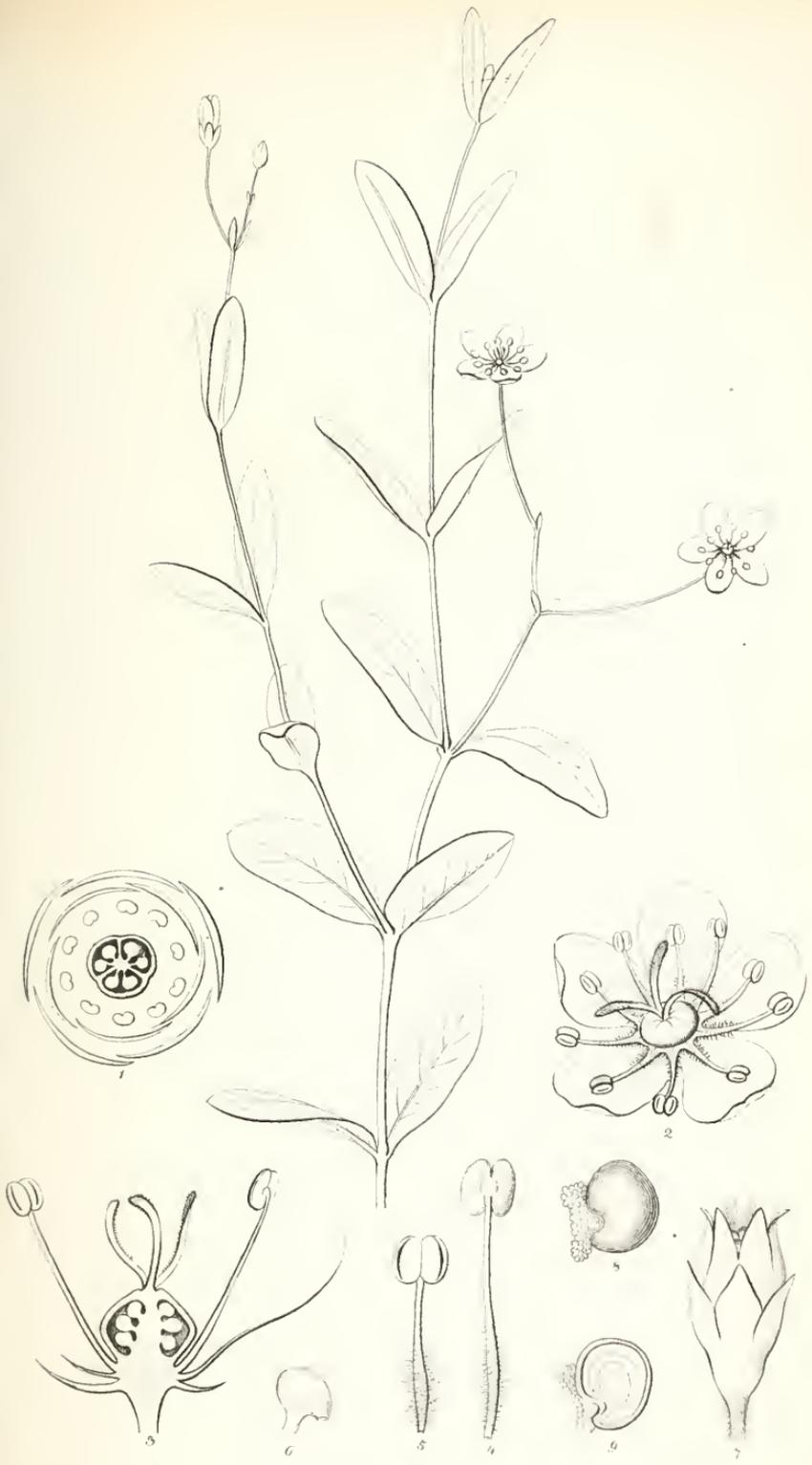




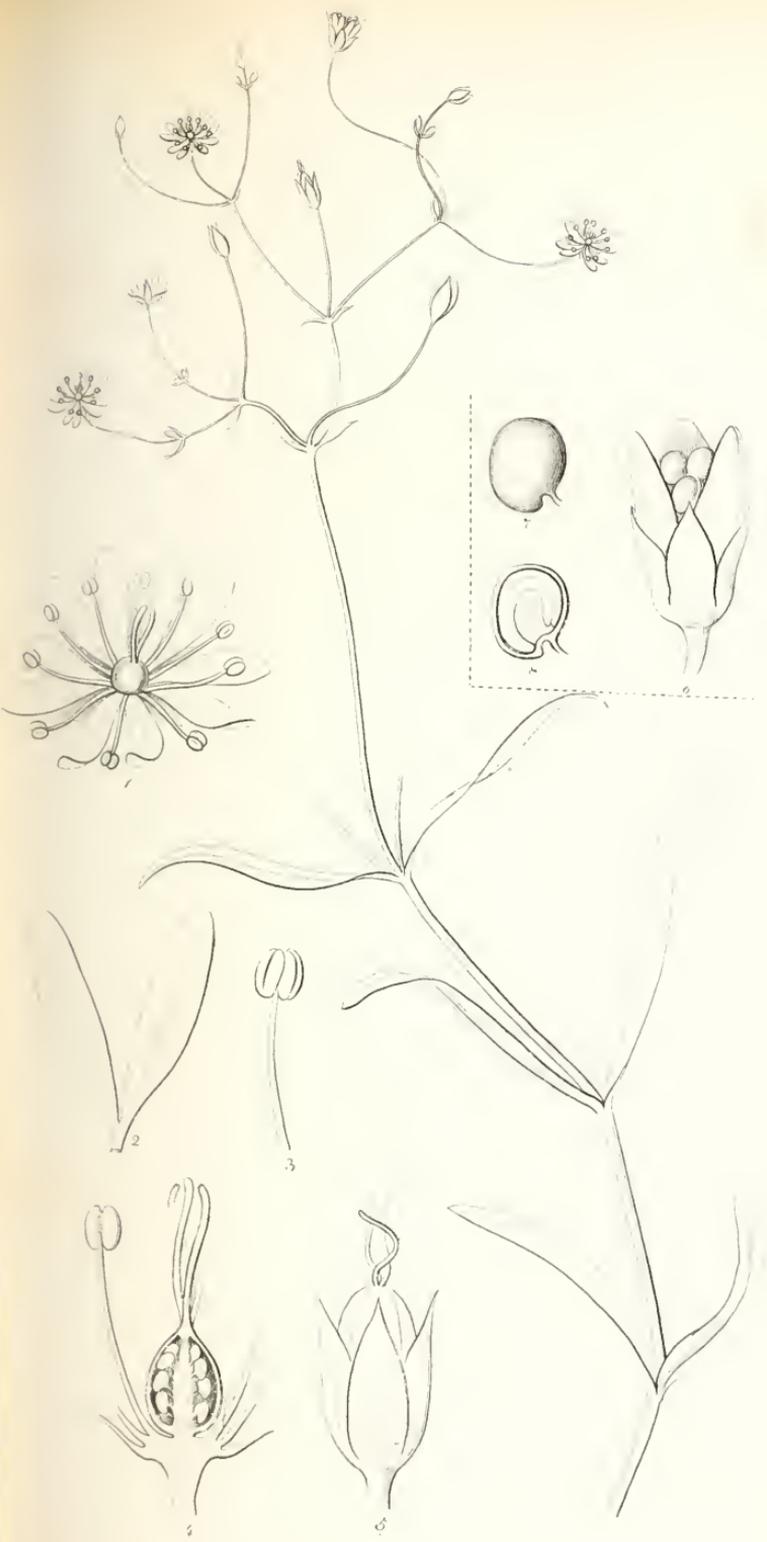
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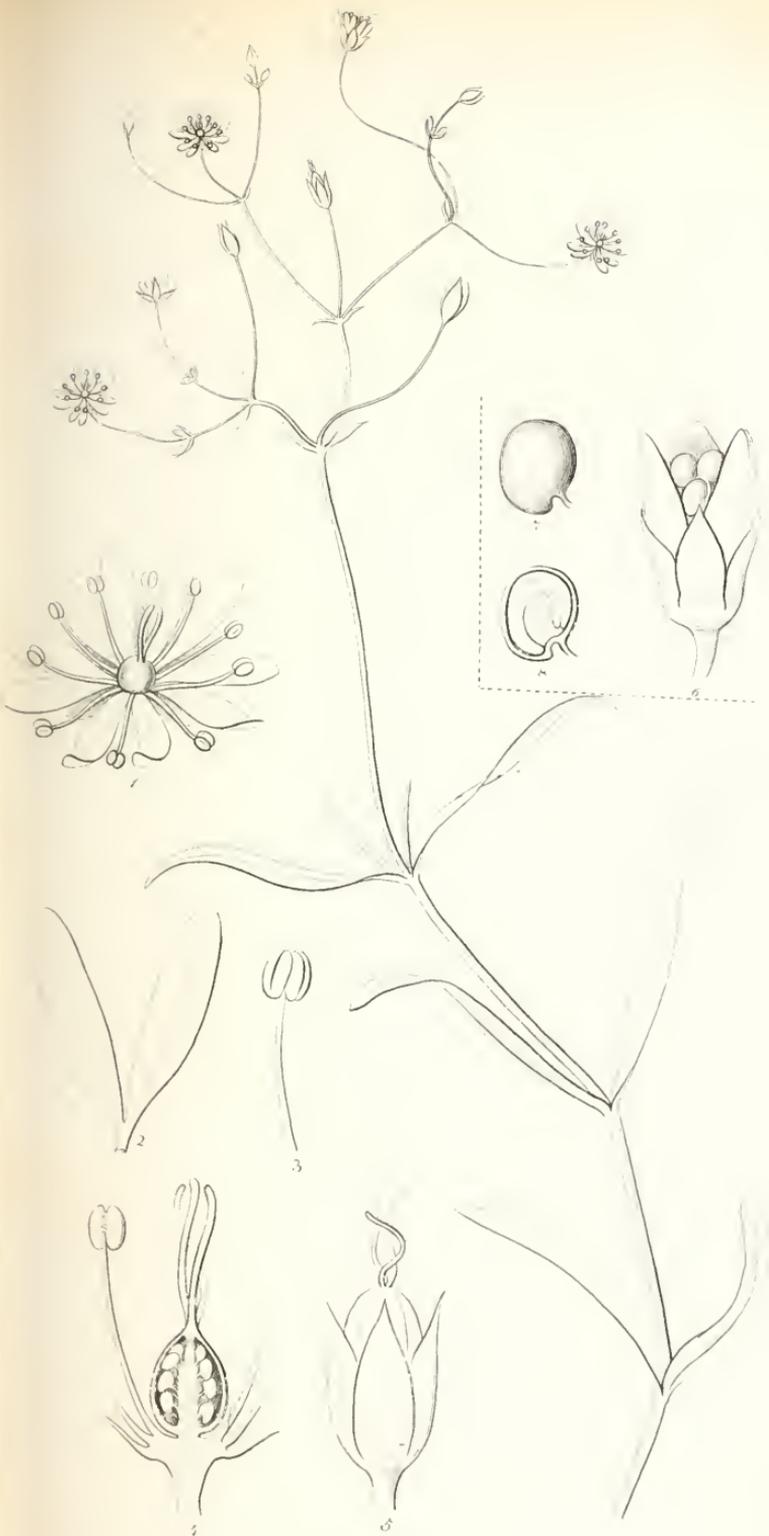
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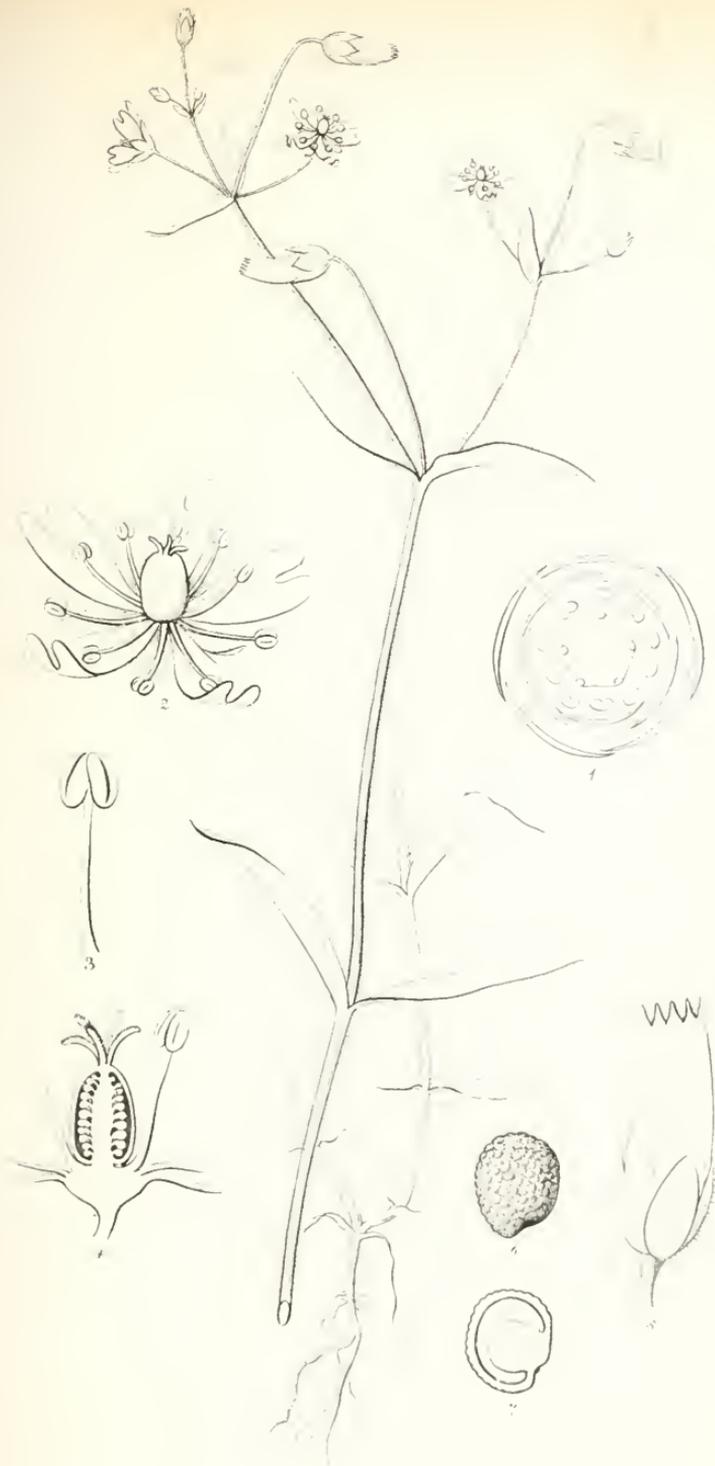
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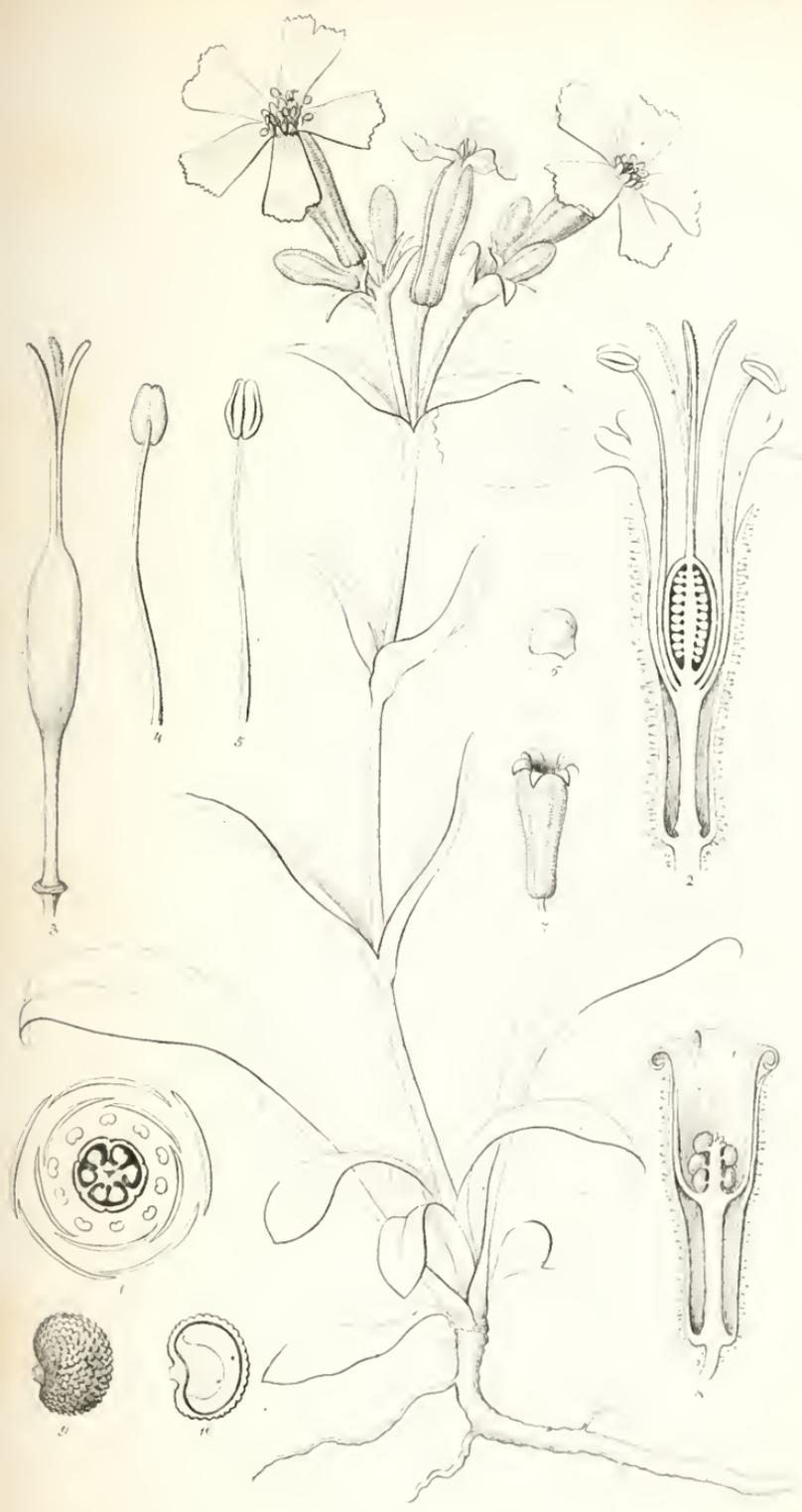


STELLARIA.

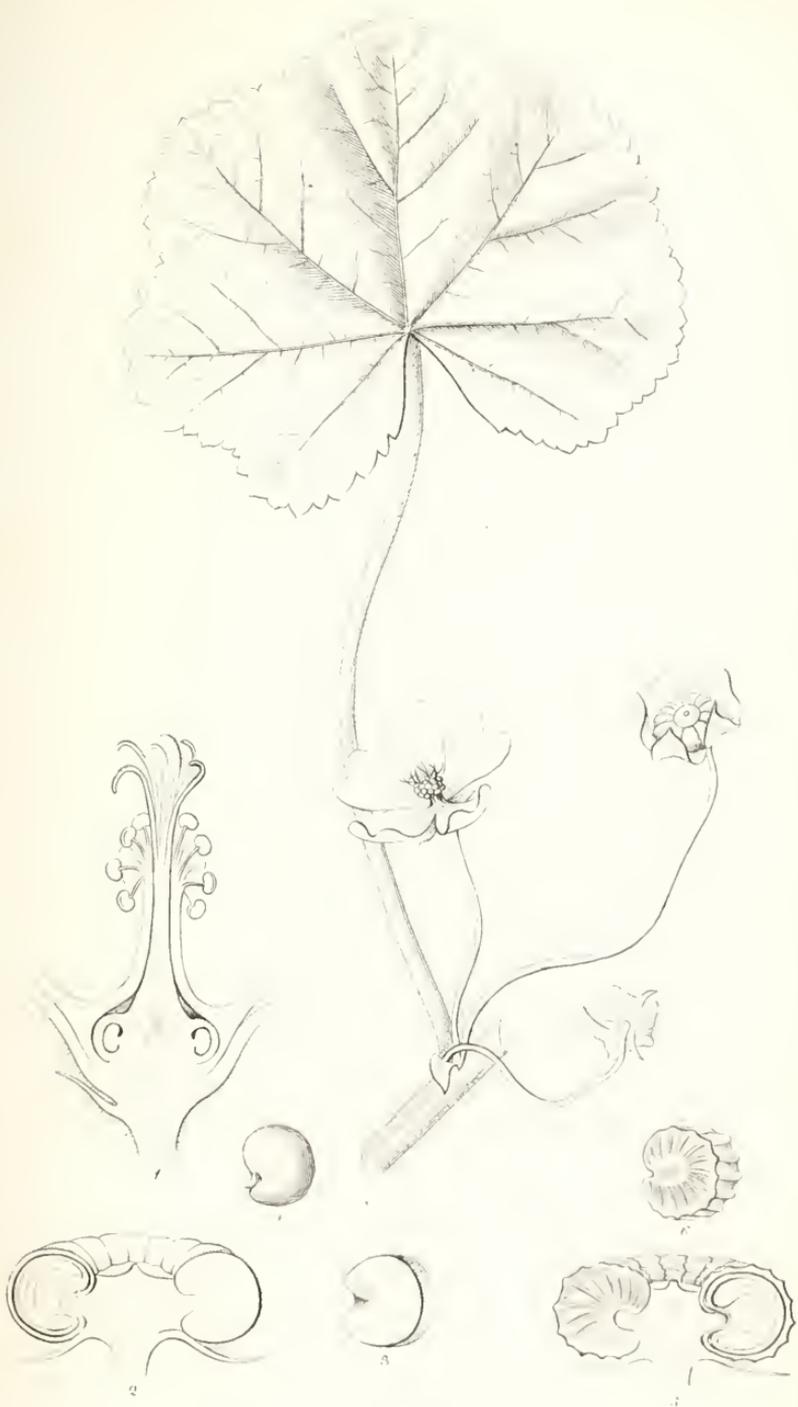


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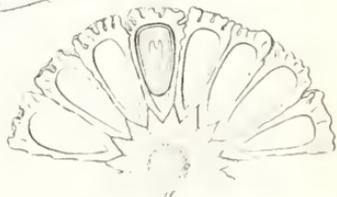
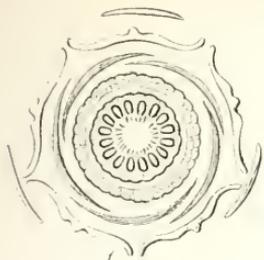
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OF THE
UNIVERSITY OF ILLINOIS

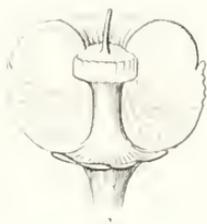
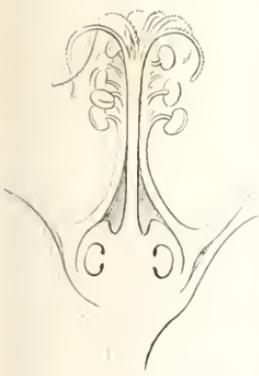


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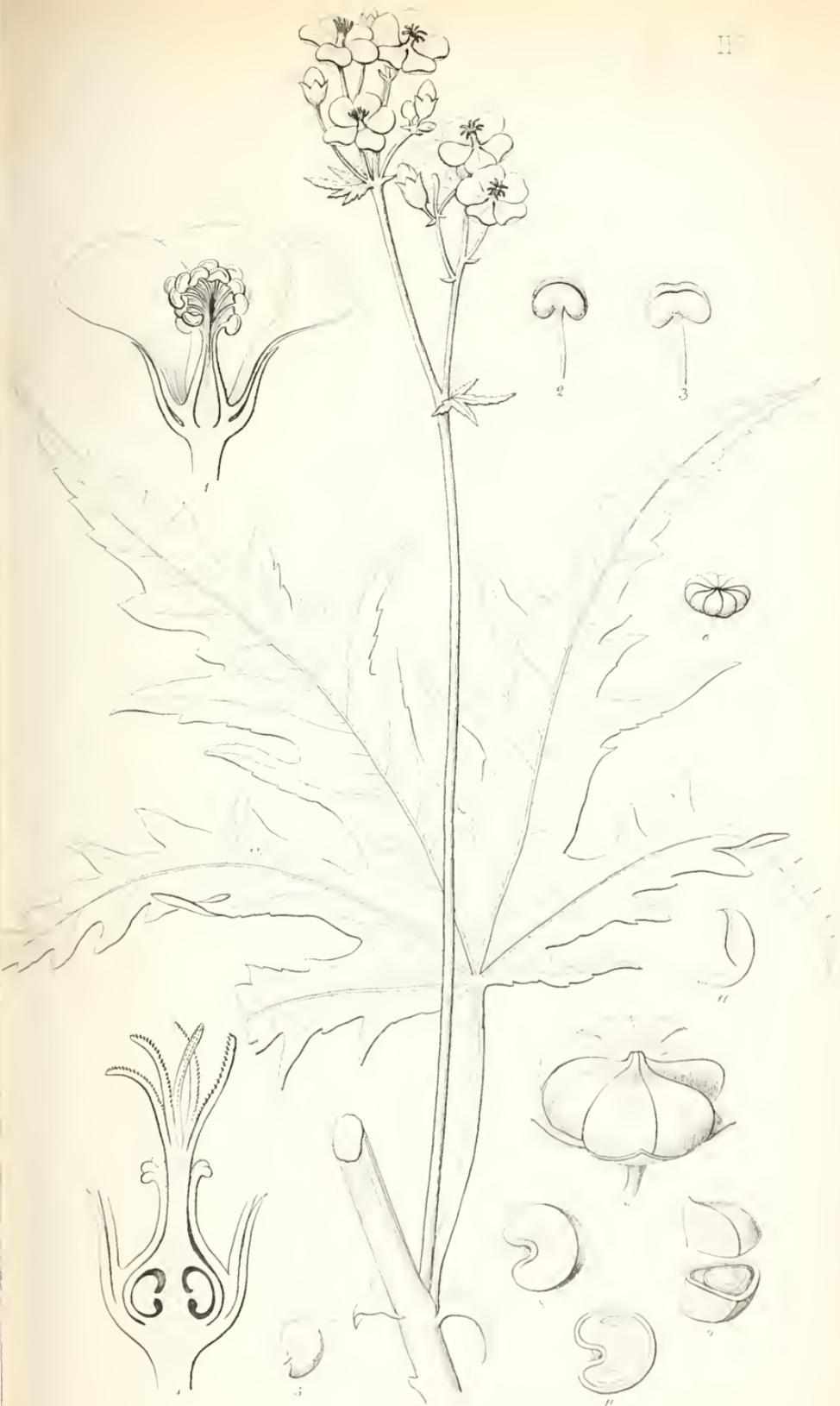
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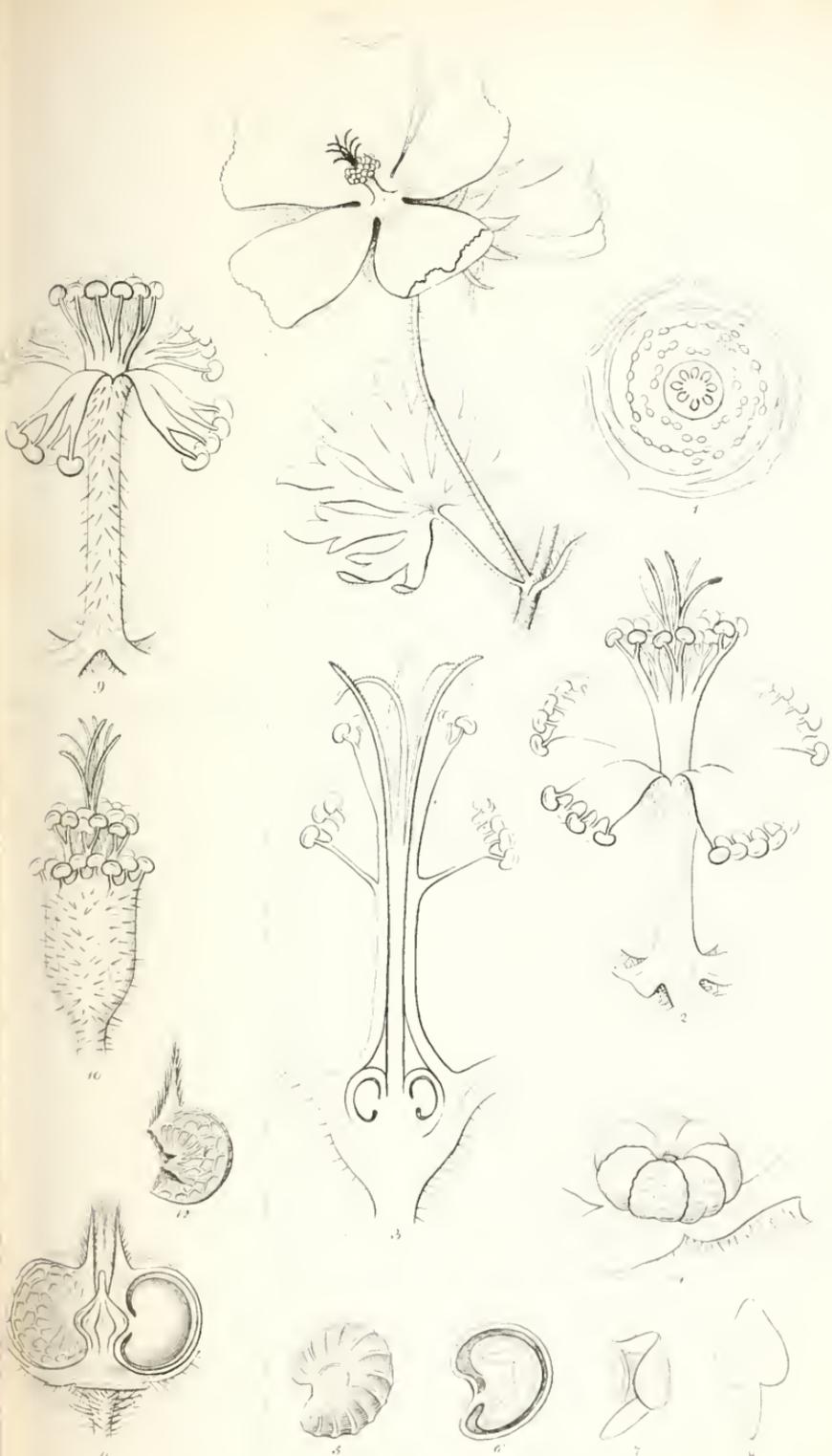


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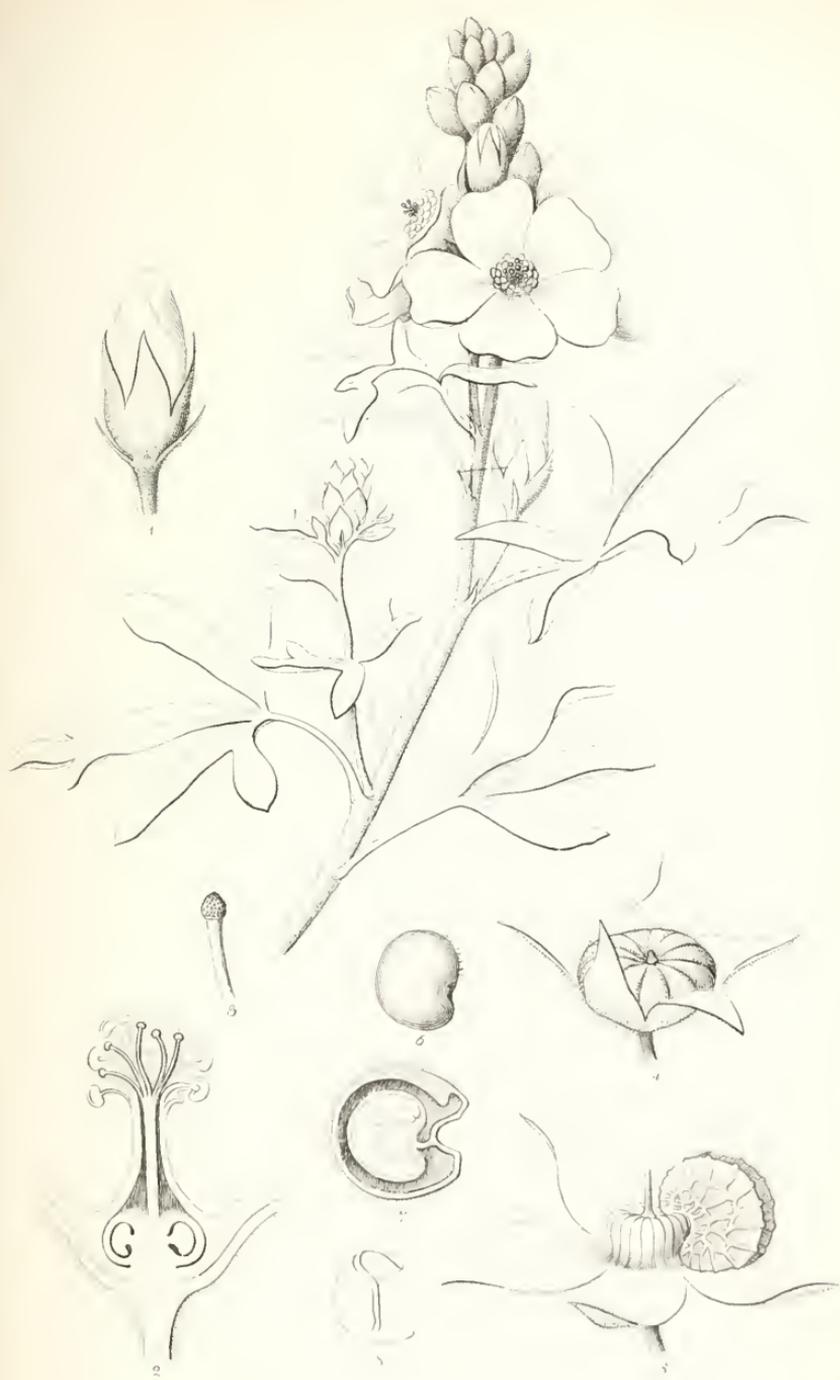


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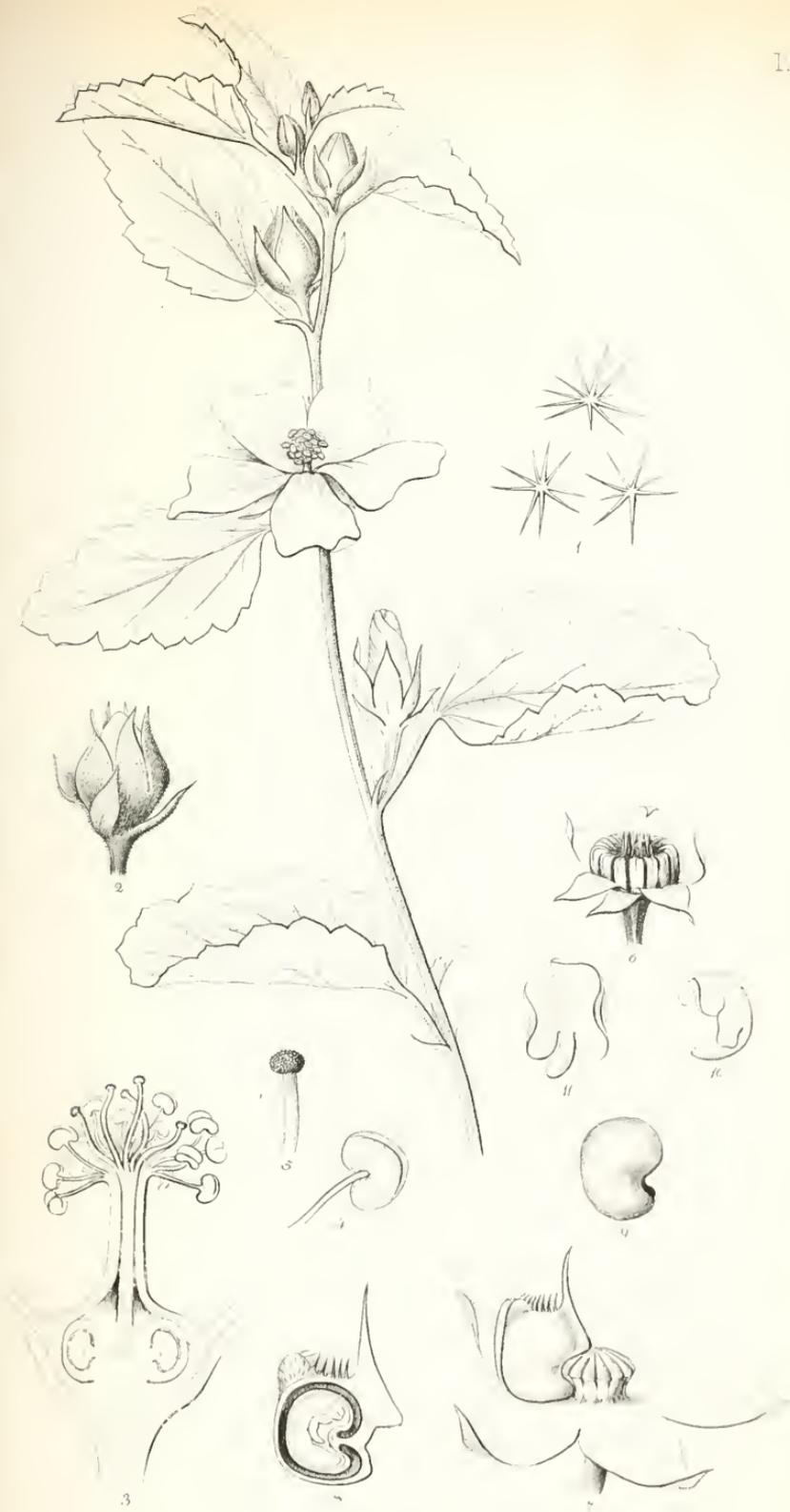
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1875

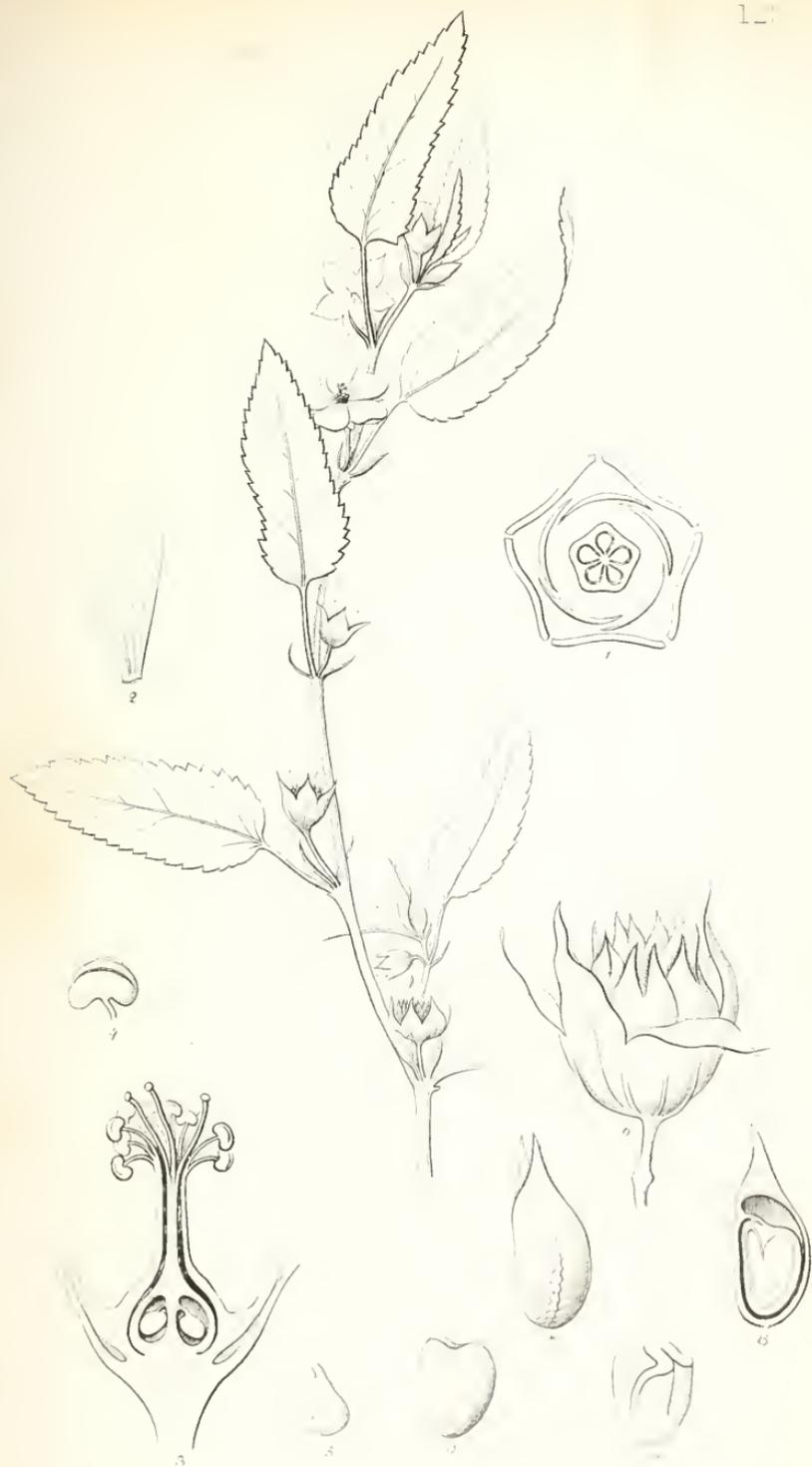


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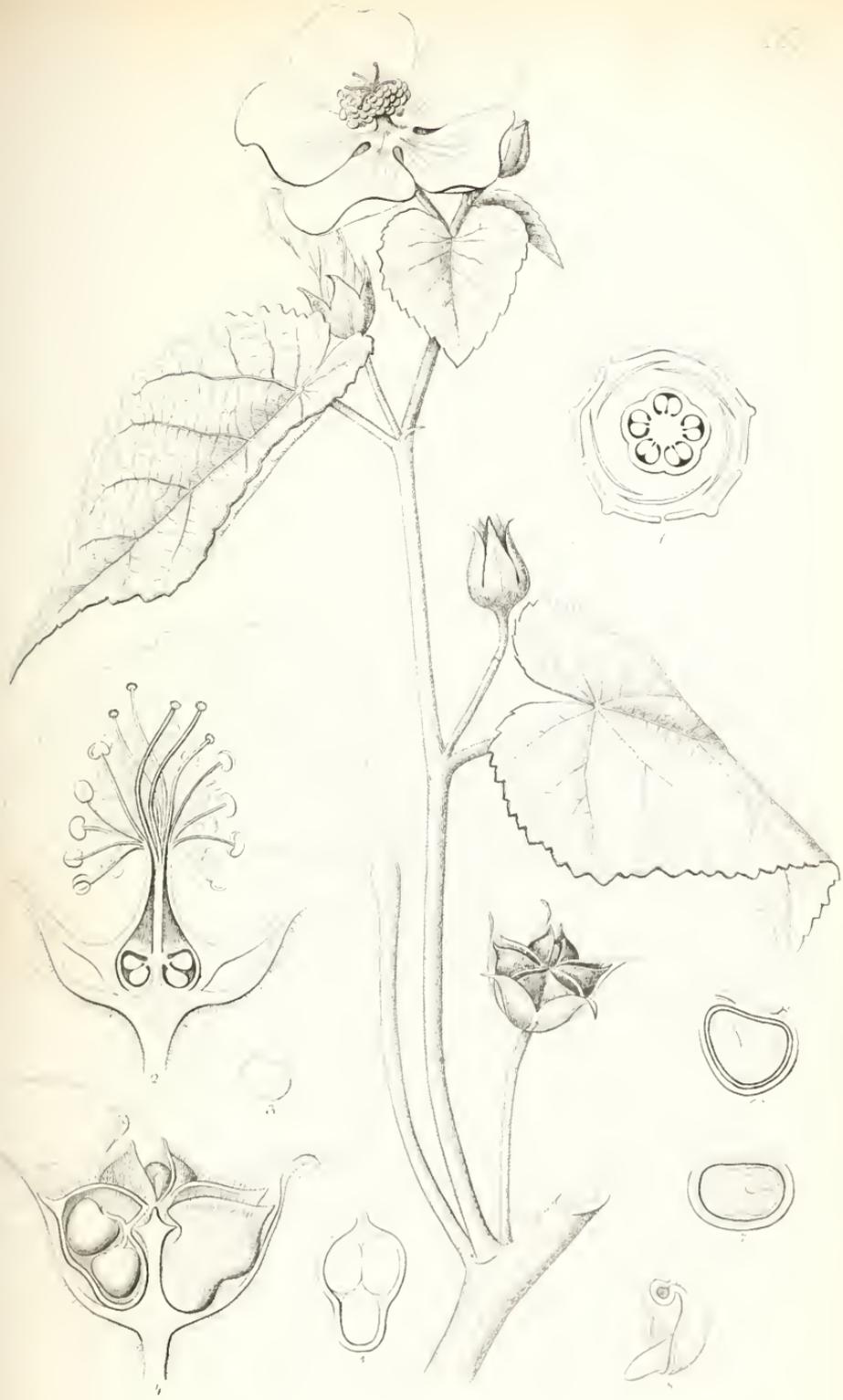


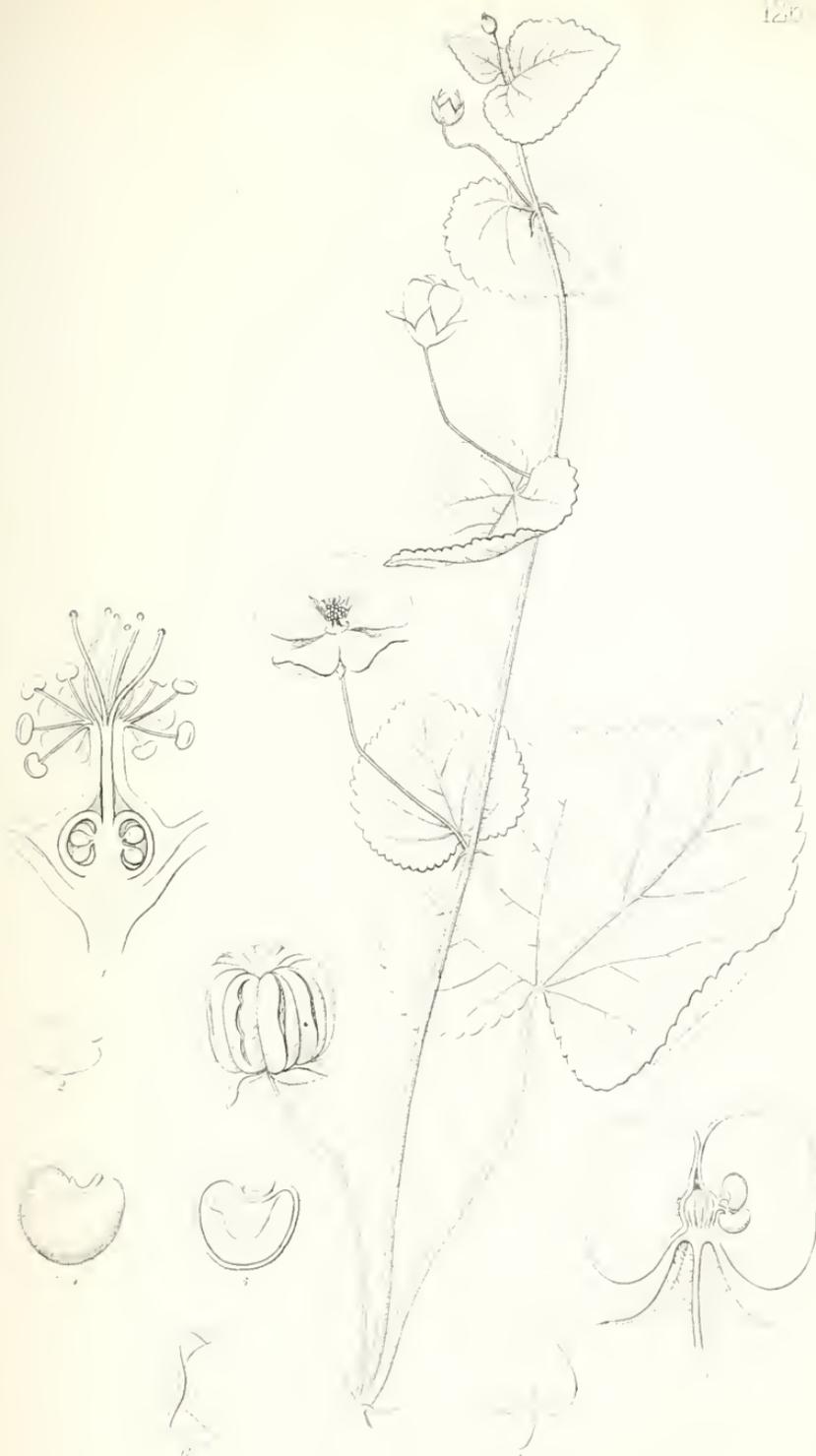


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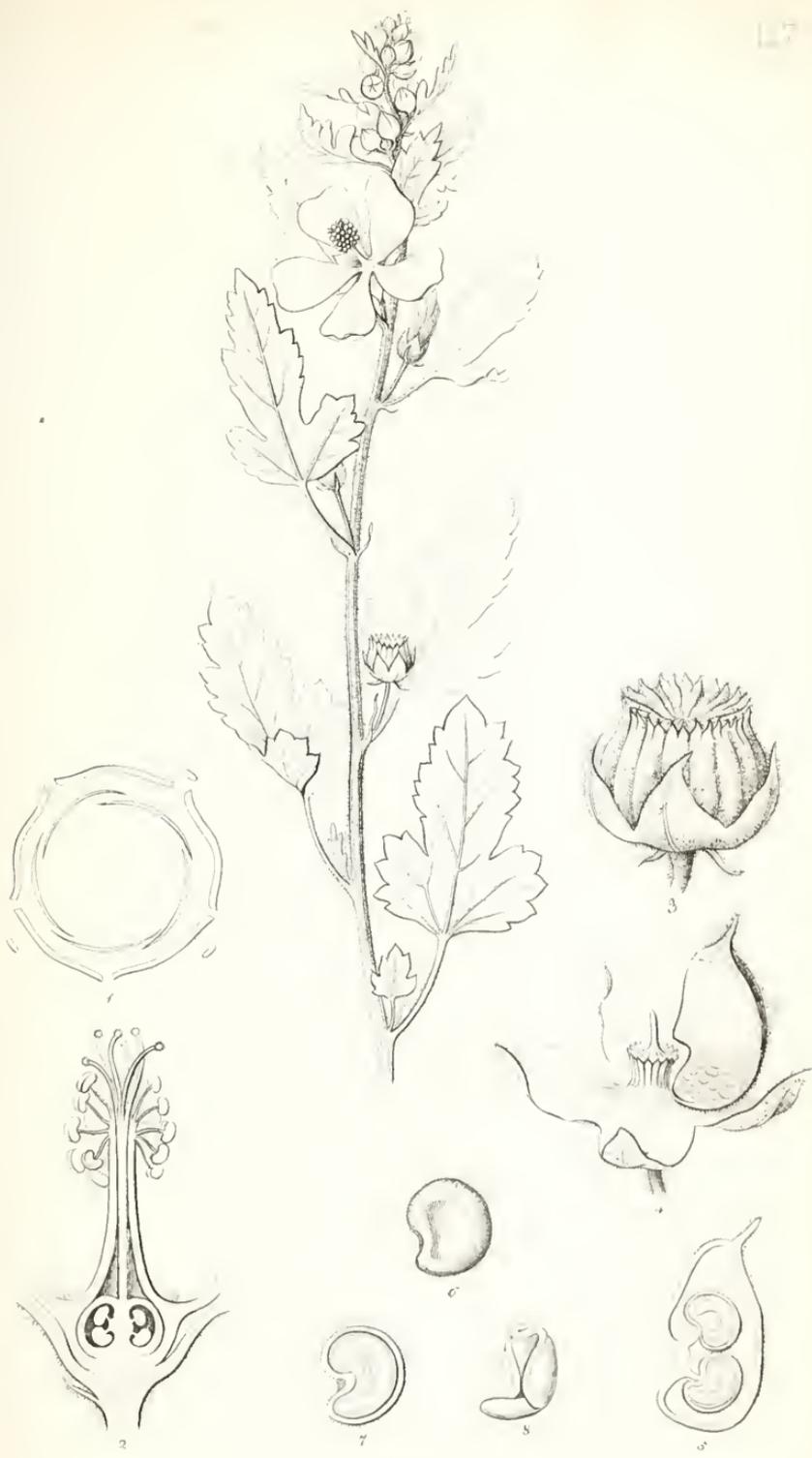




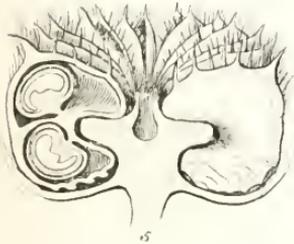
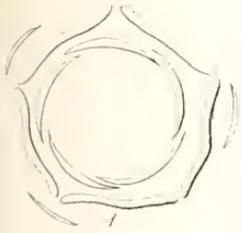




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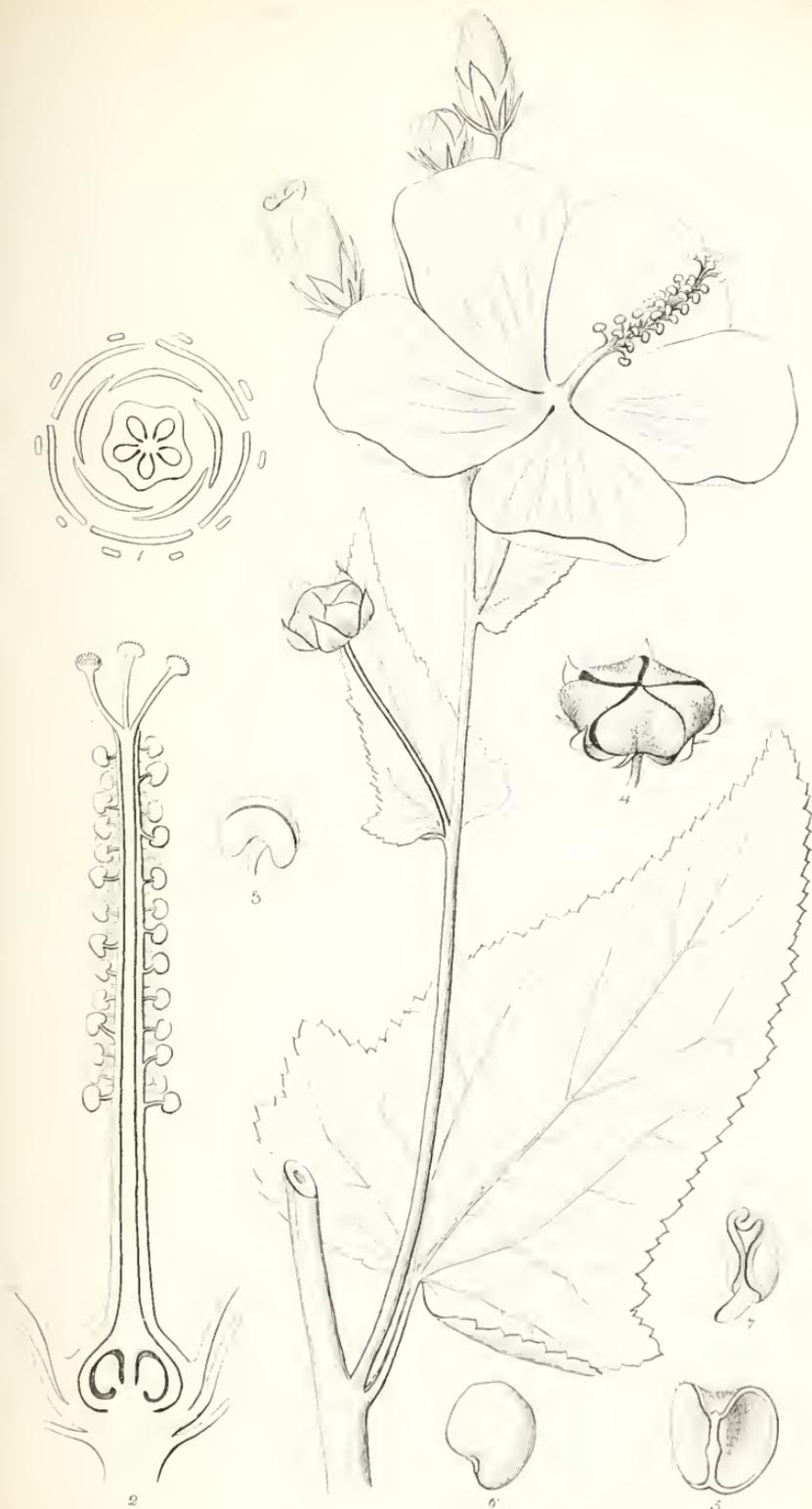
PLANTAE SINGAP. 127







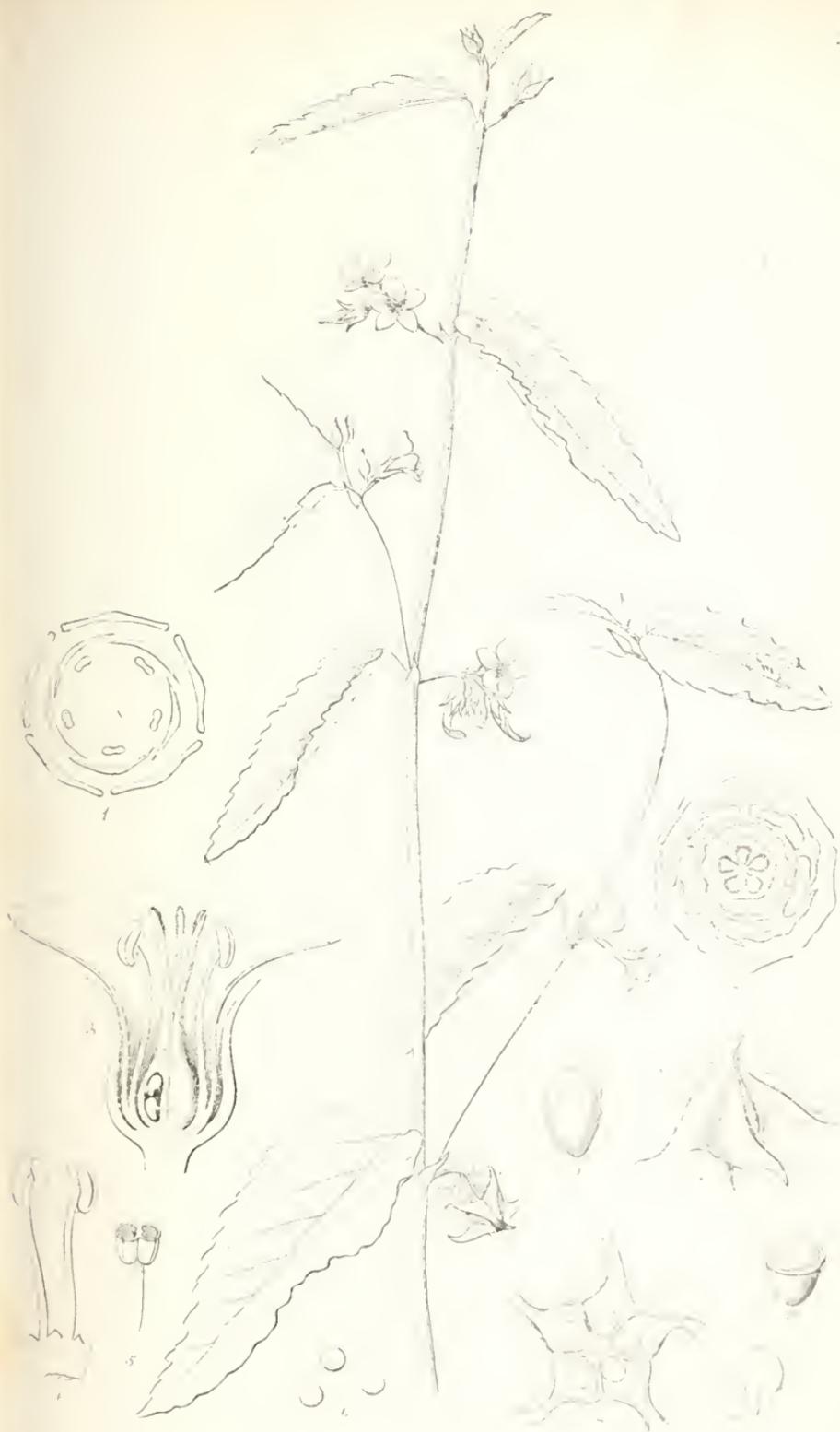
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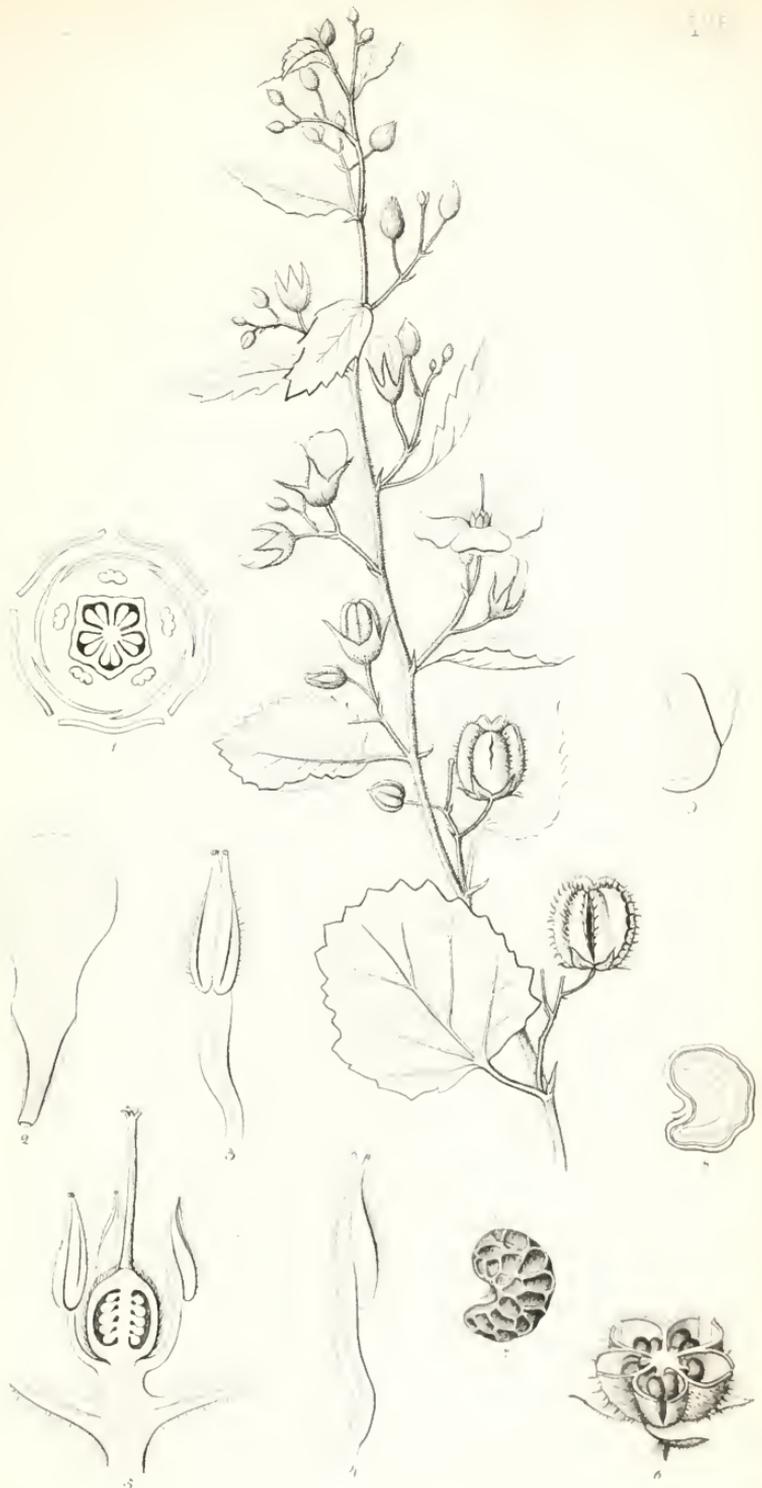
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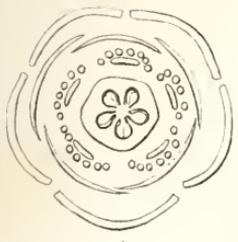
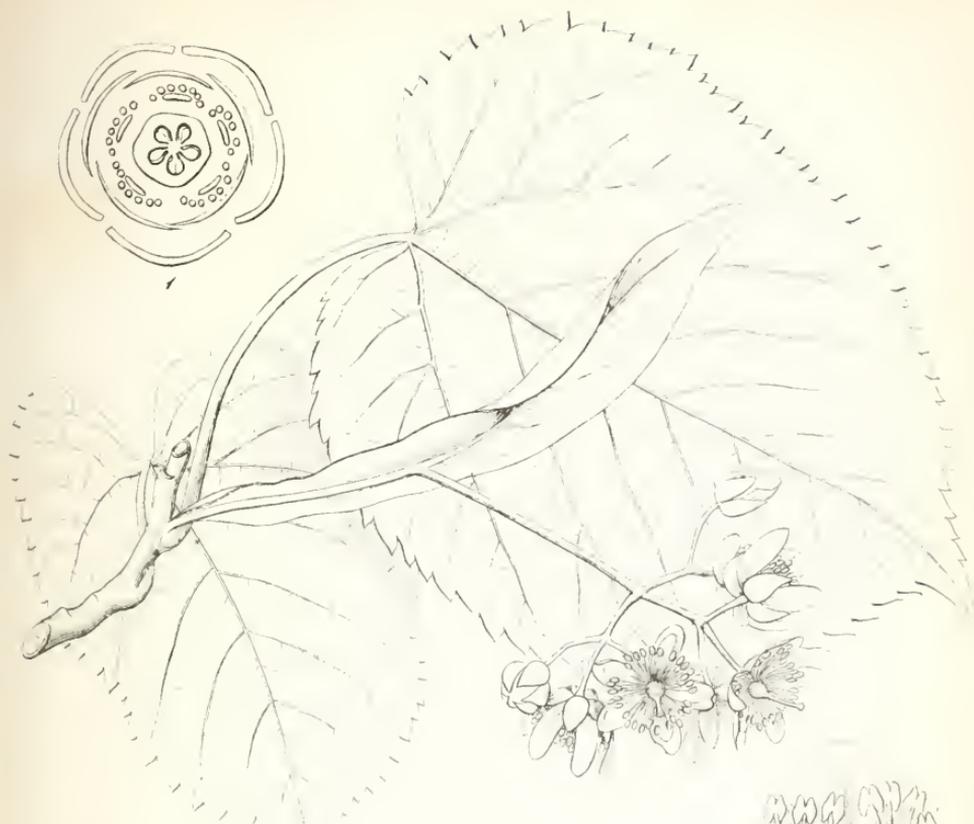
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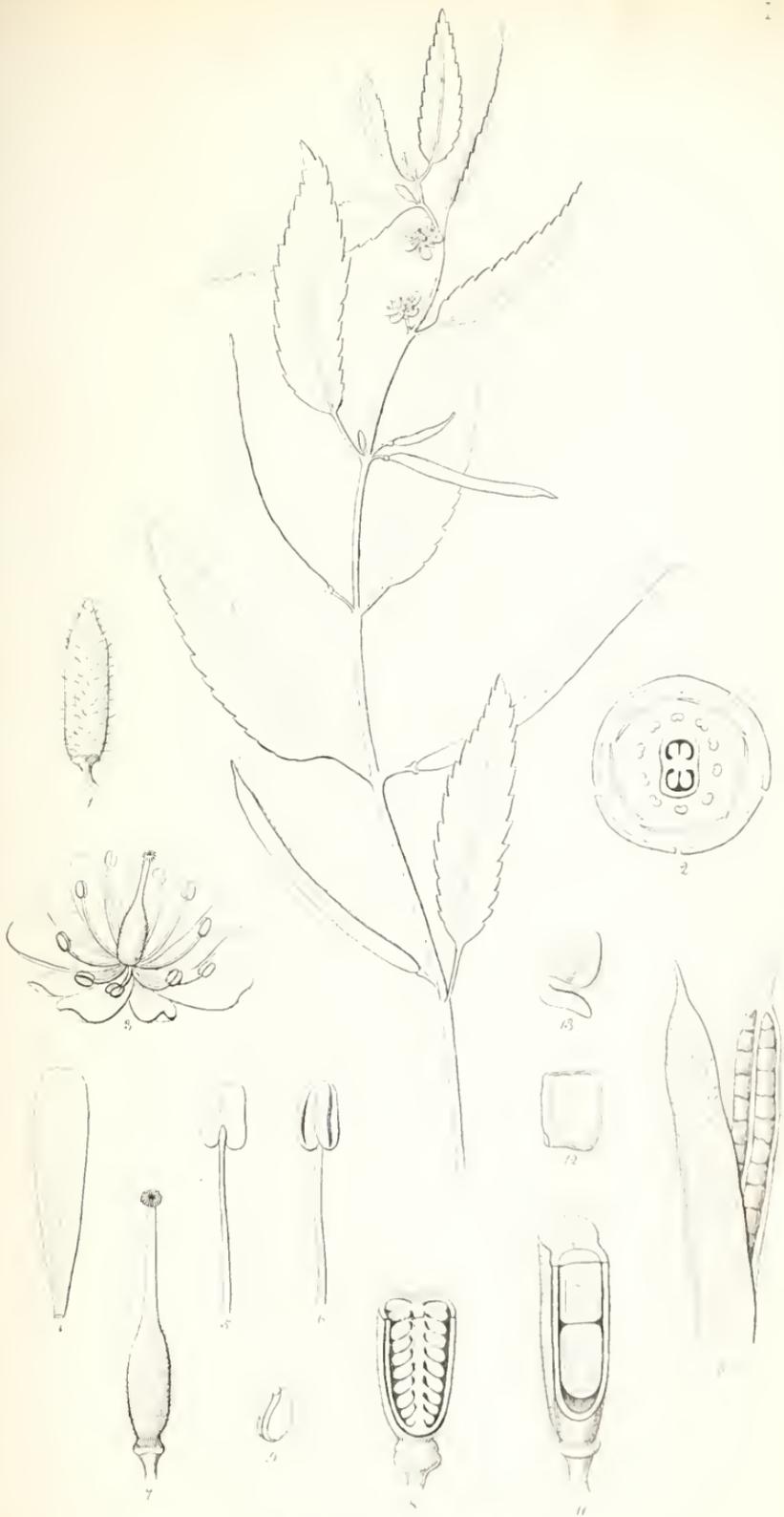
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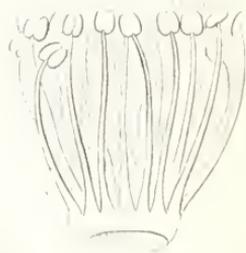
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TILTA



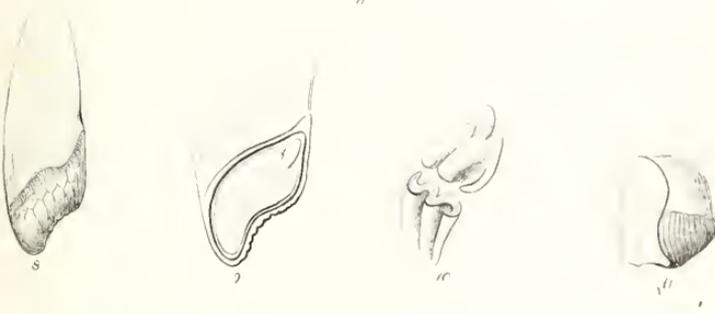
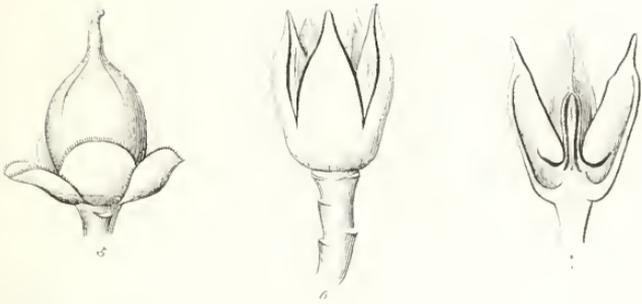
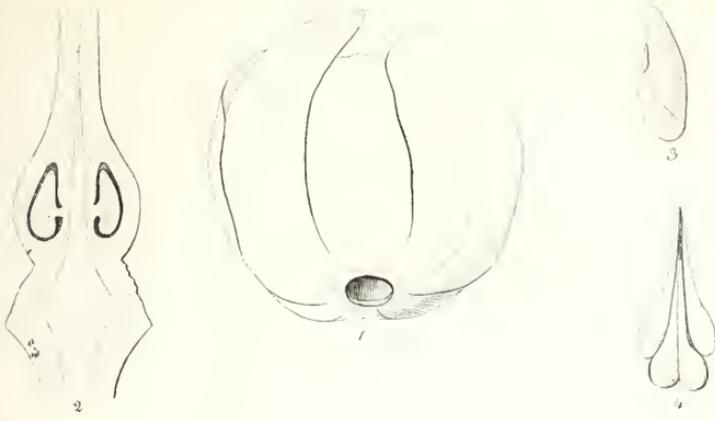
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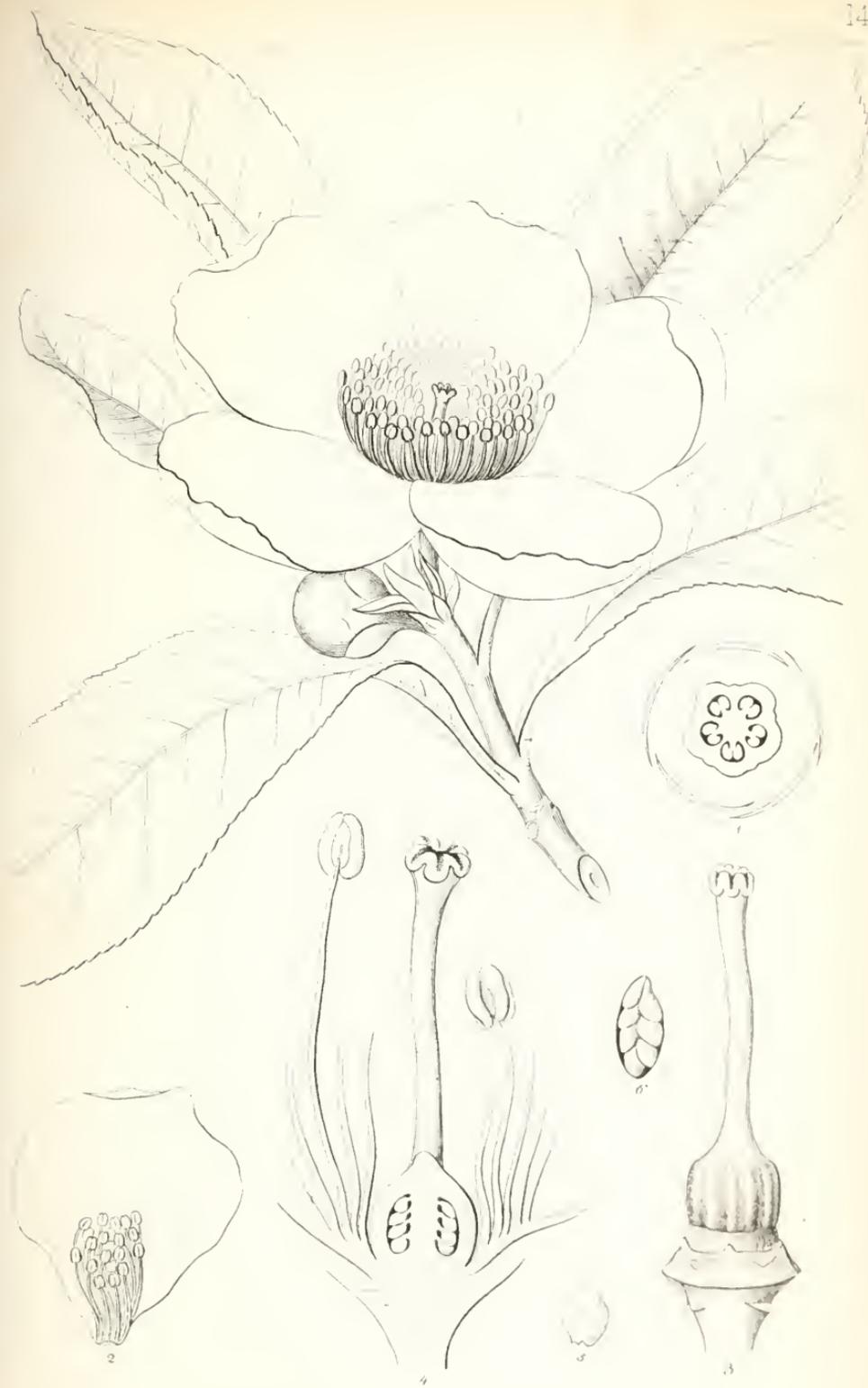




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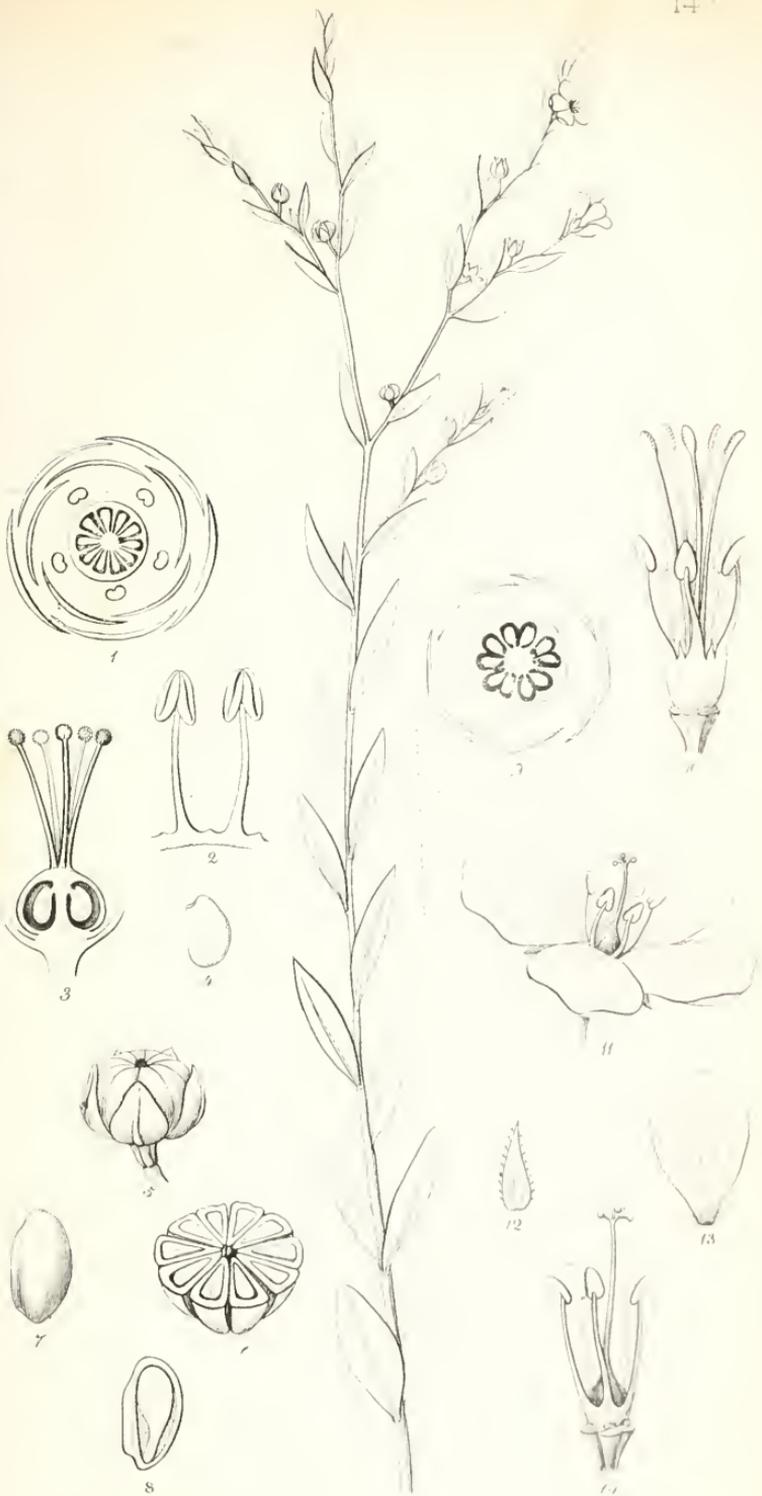
1871

1872



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THE UNIVERSITY OF CHICAGO
PRESS



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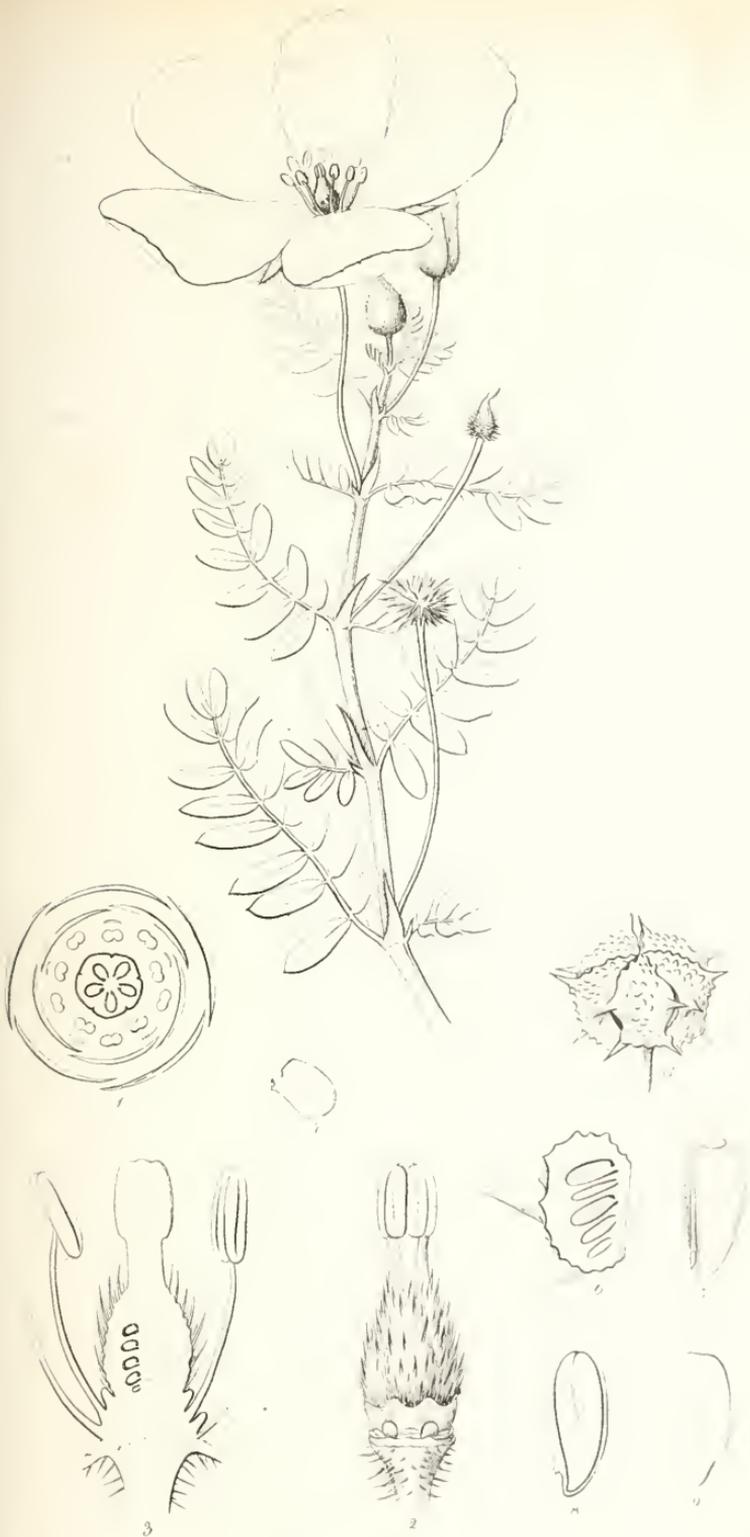


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LIBRARY

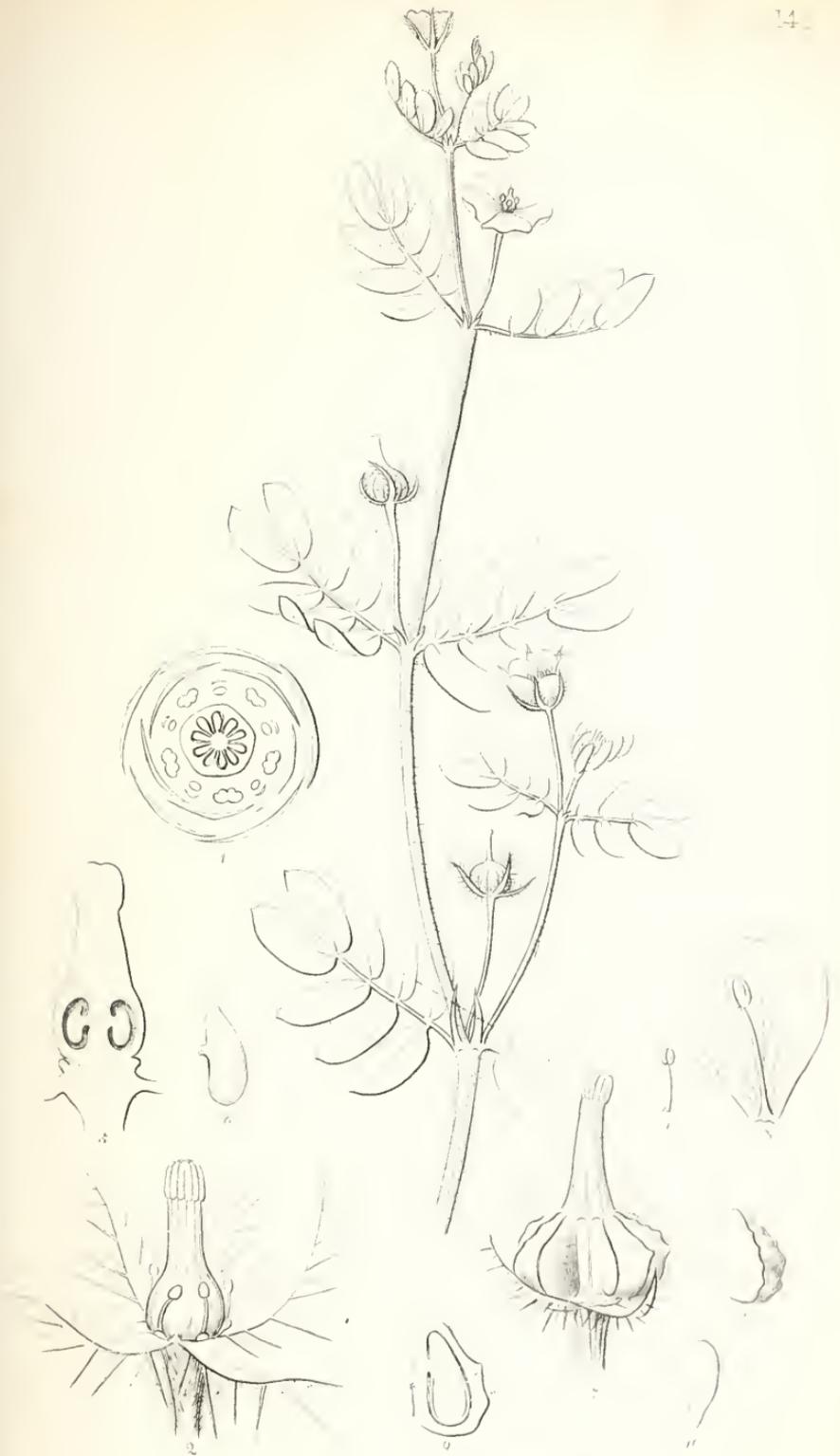


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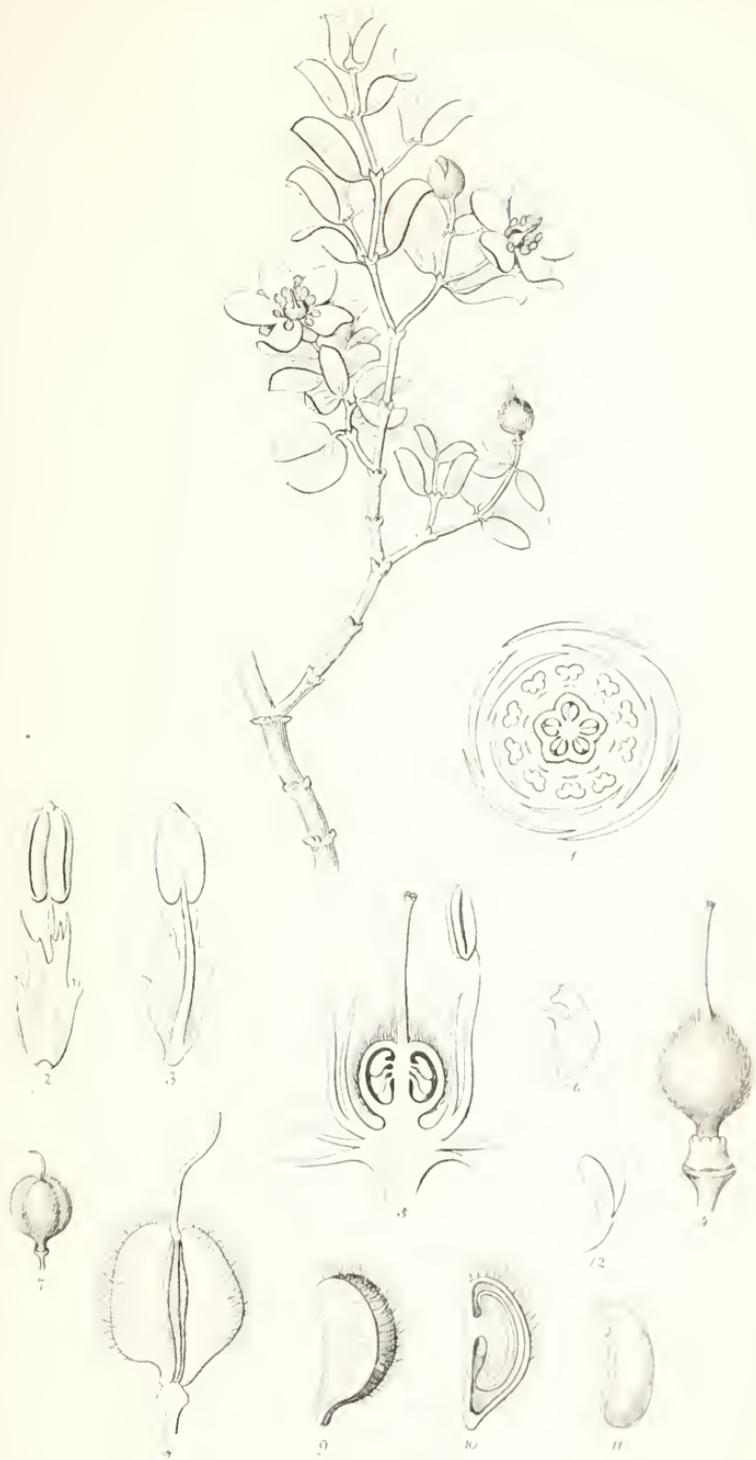
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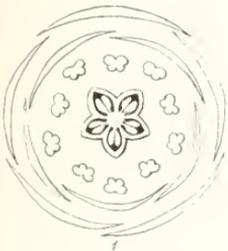
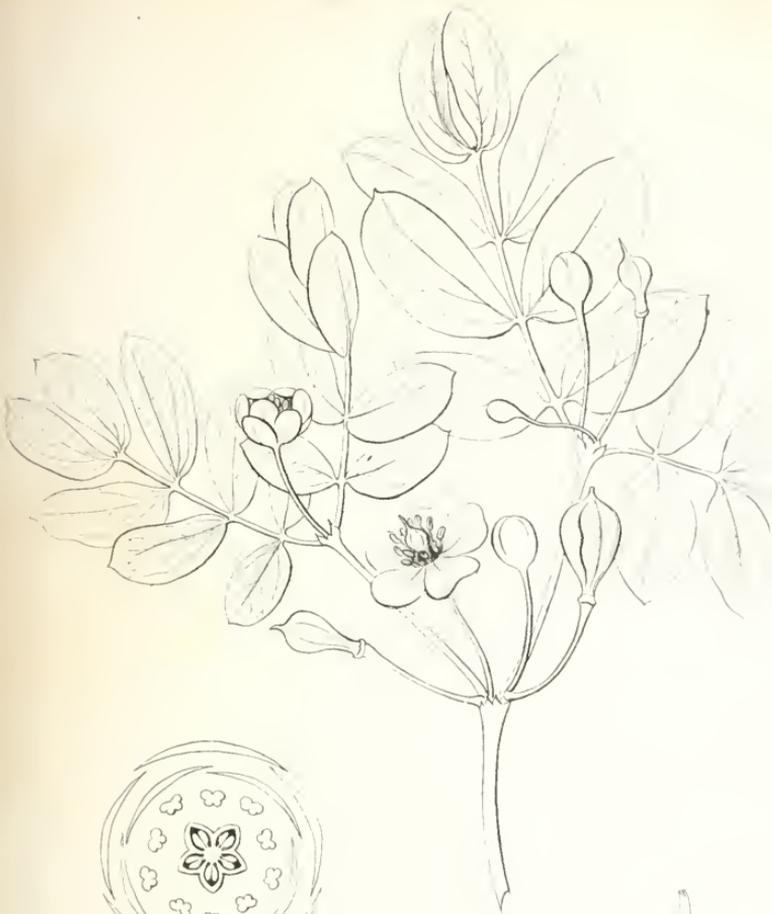
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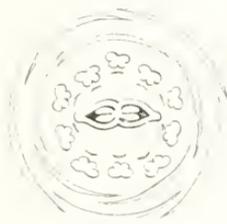
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THE HISTORY OF
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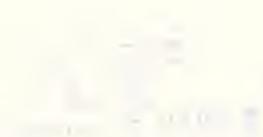


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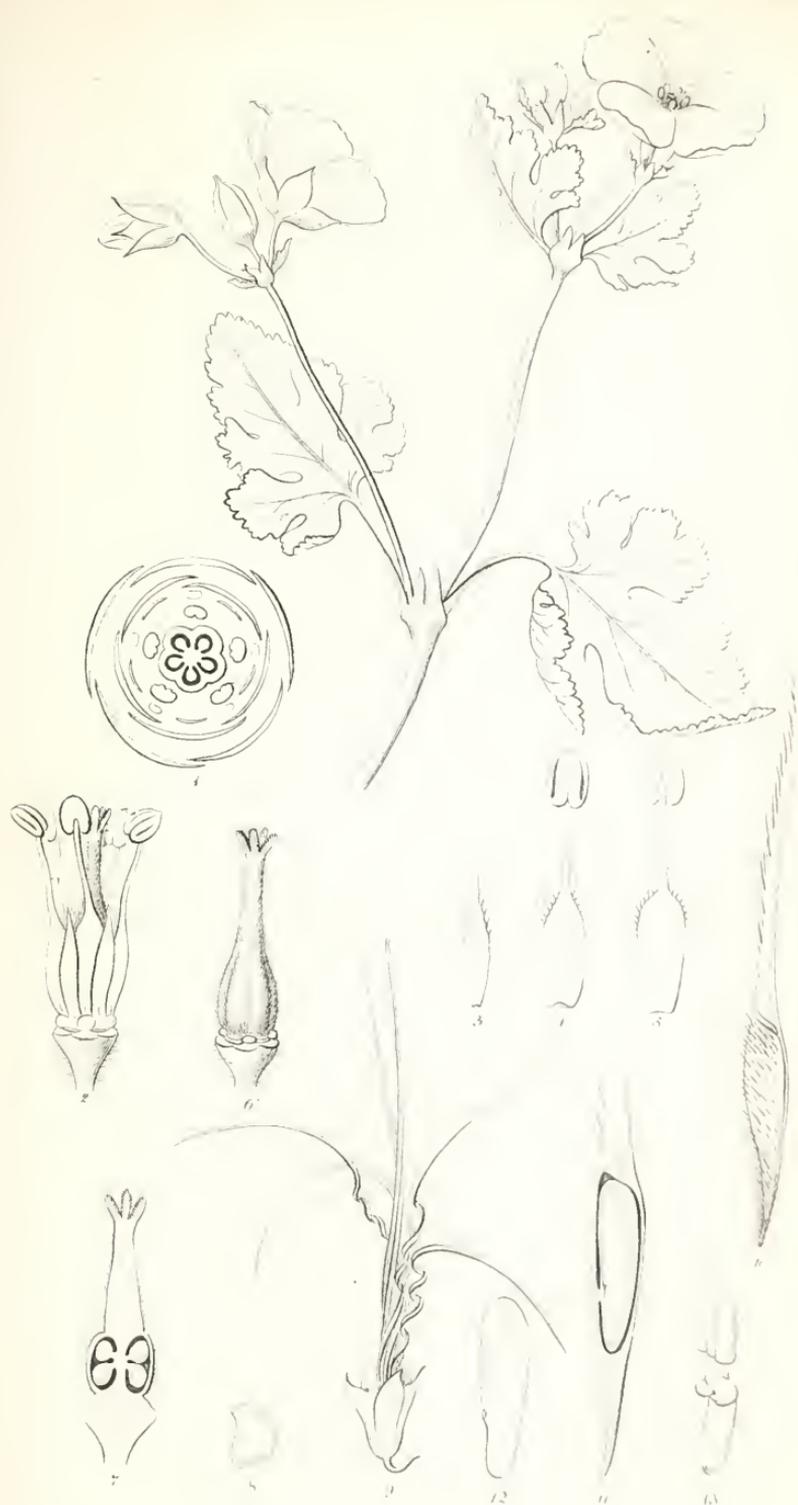
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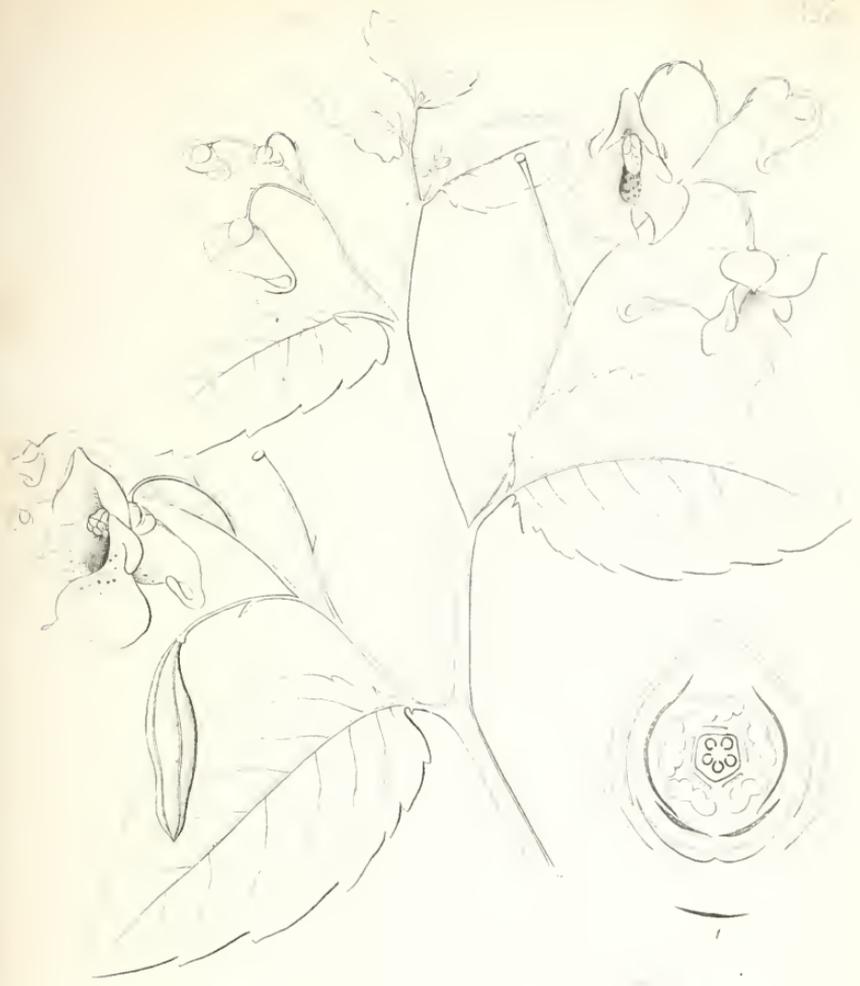
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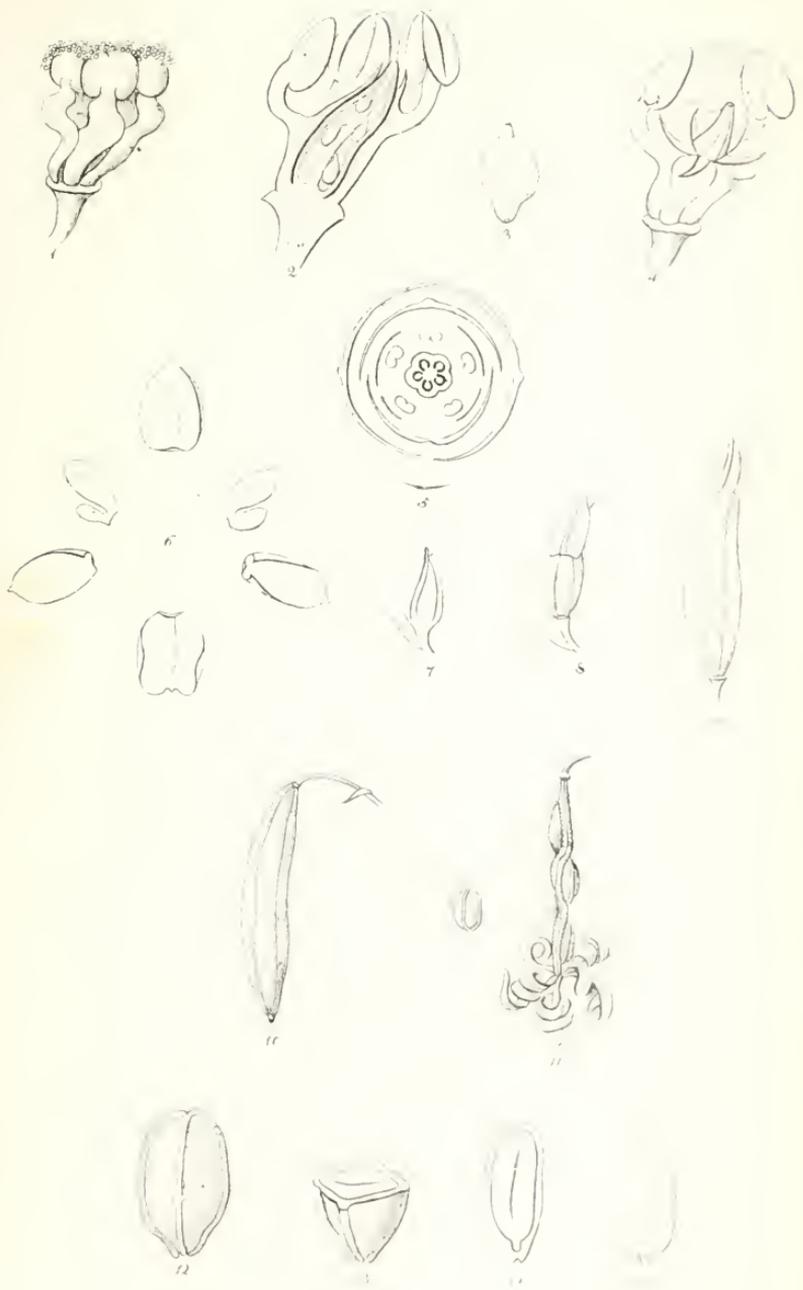
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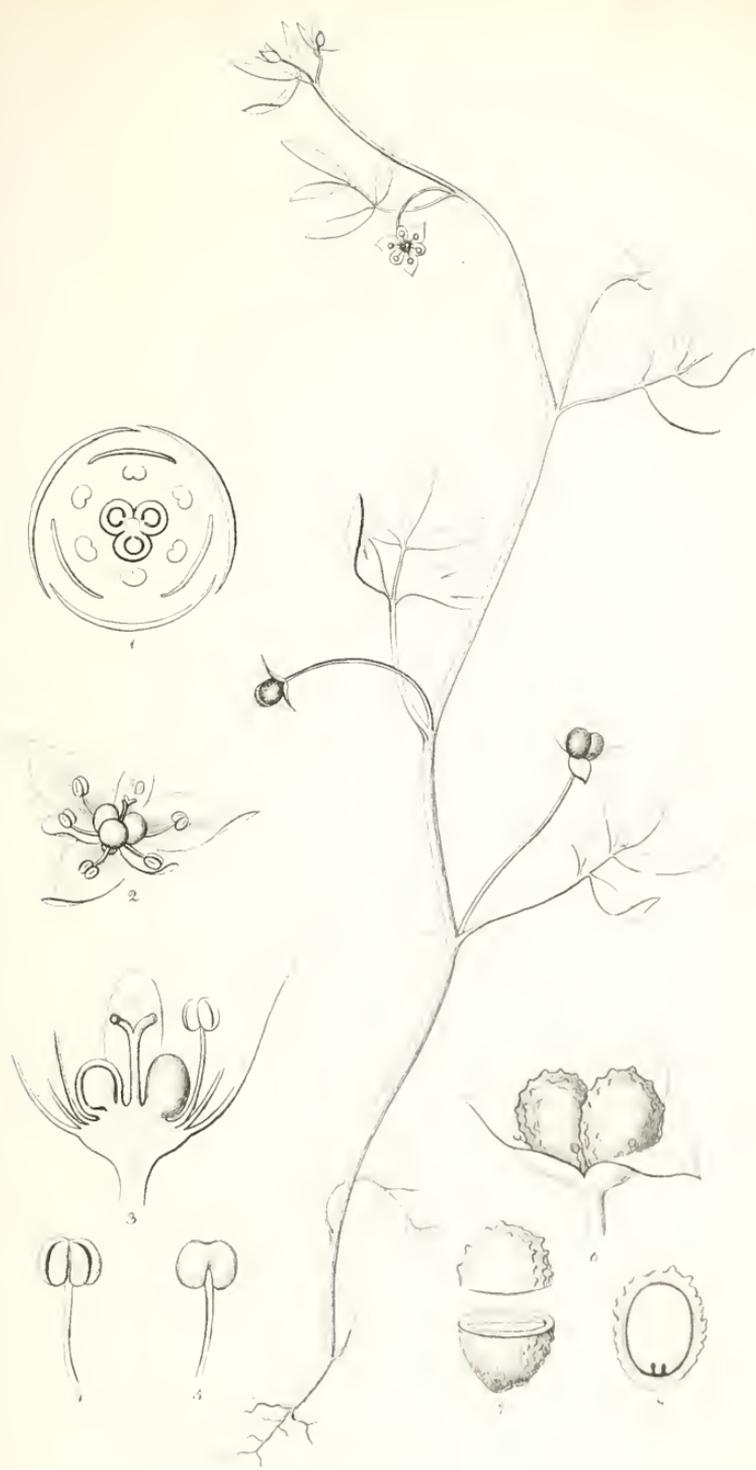
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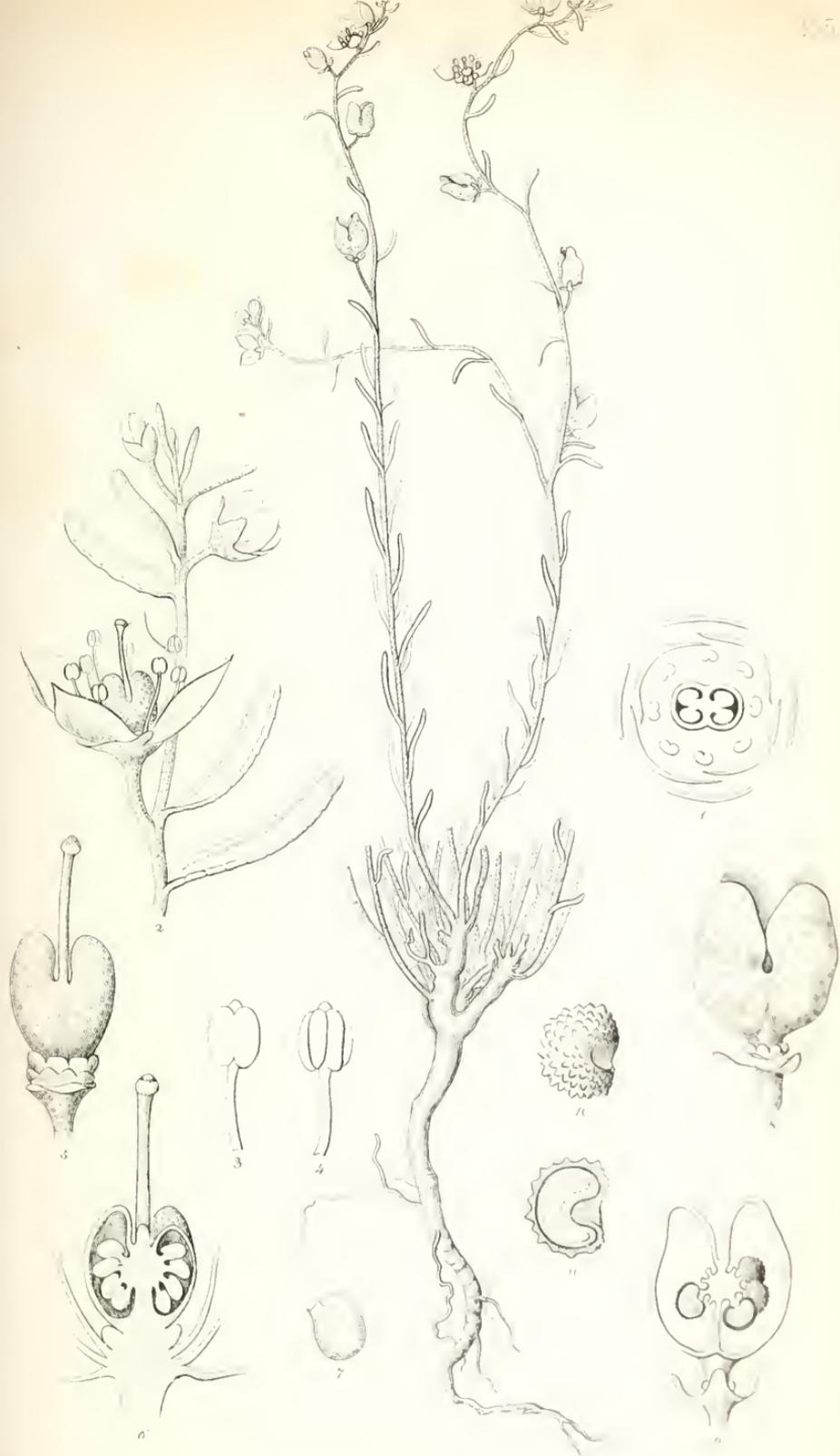
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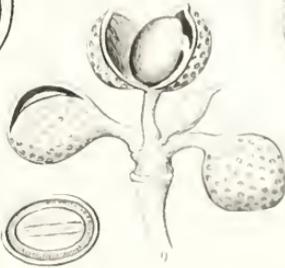
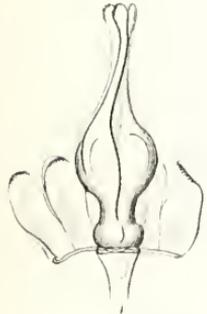
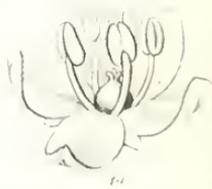
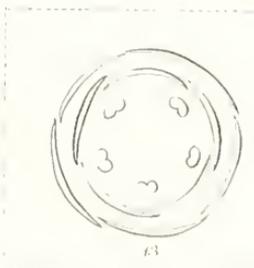


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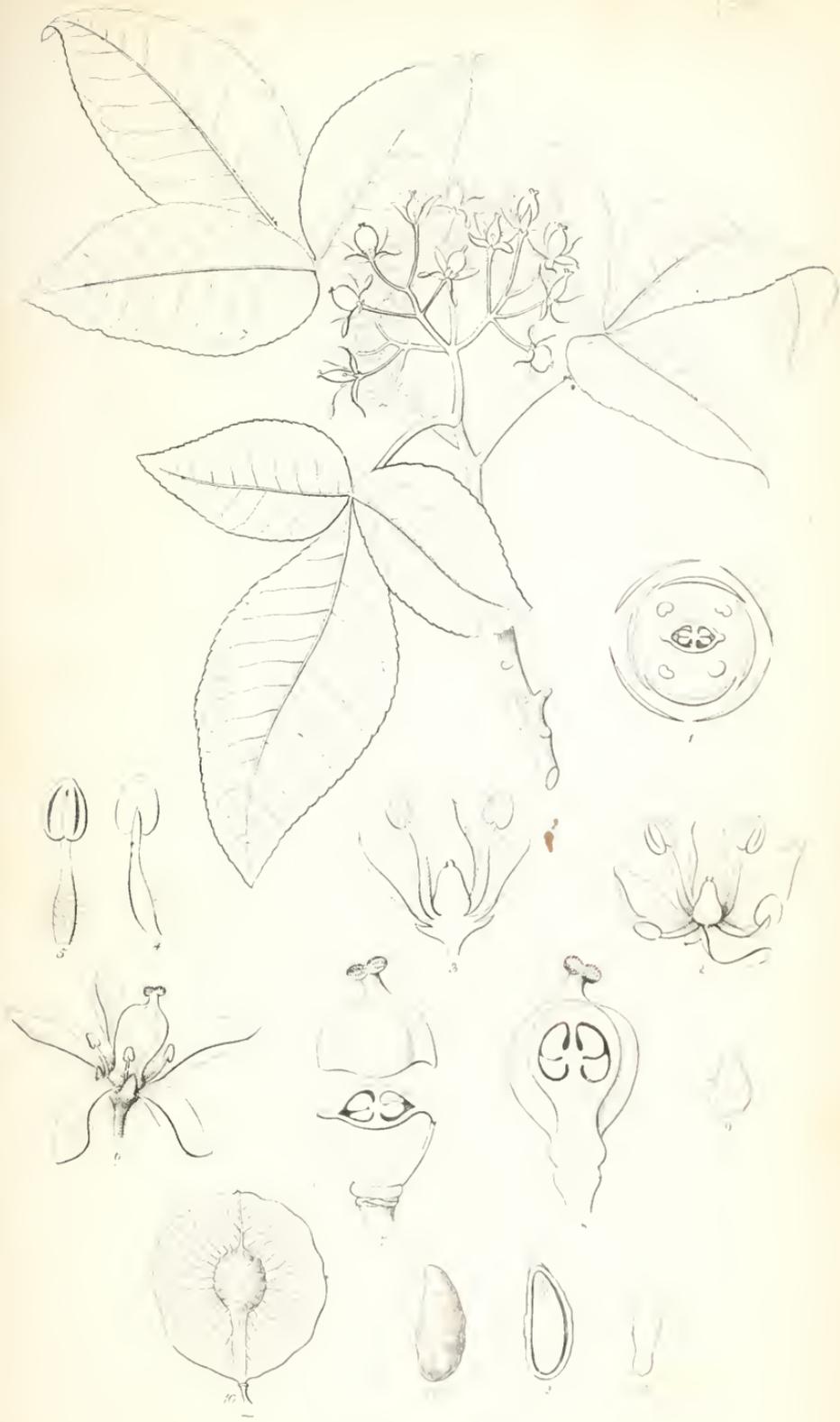






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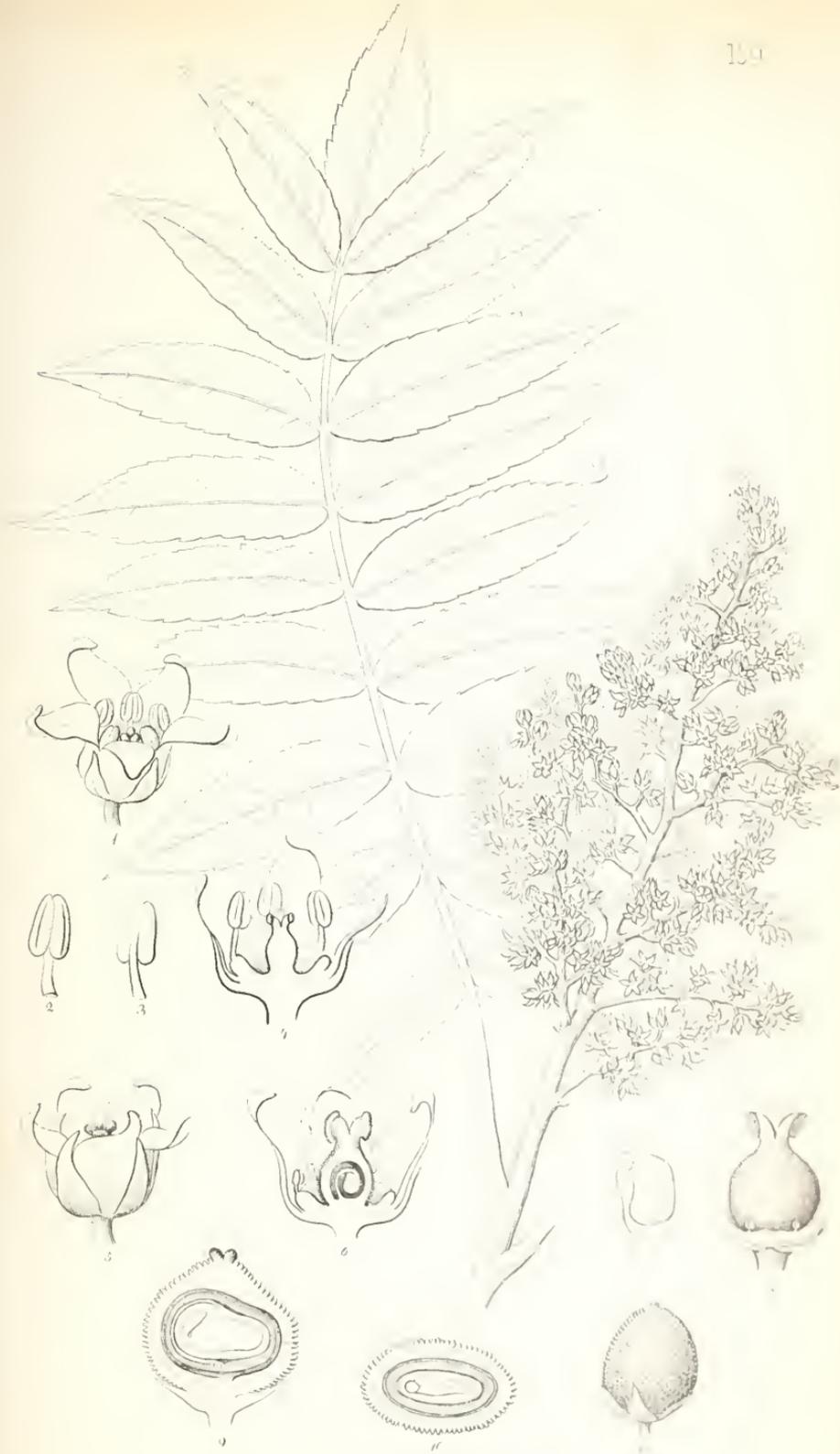




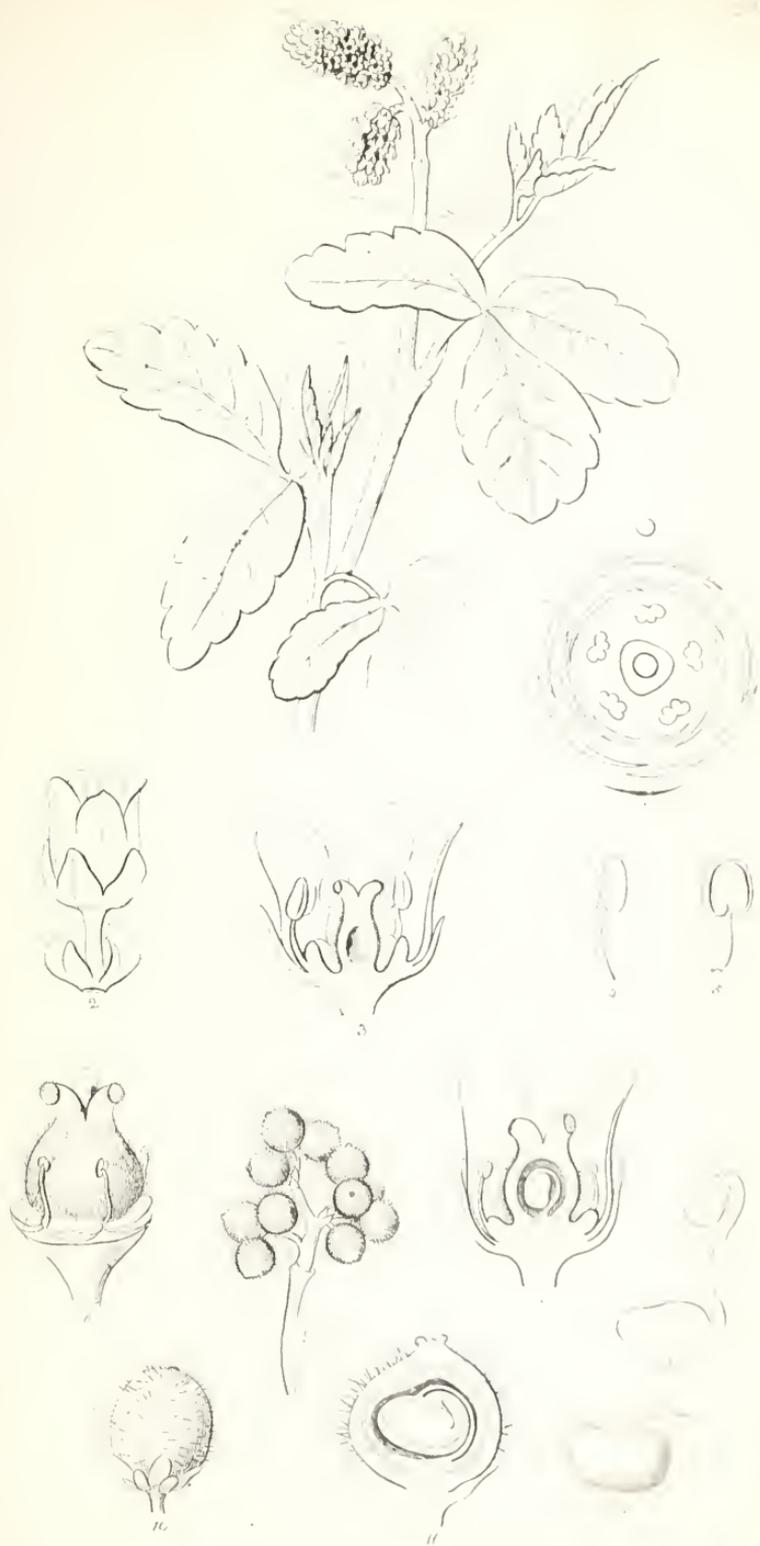
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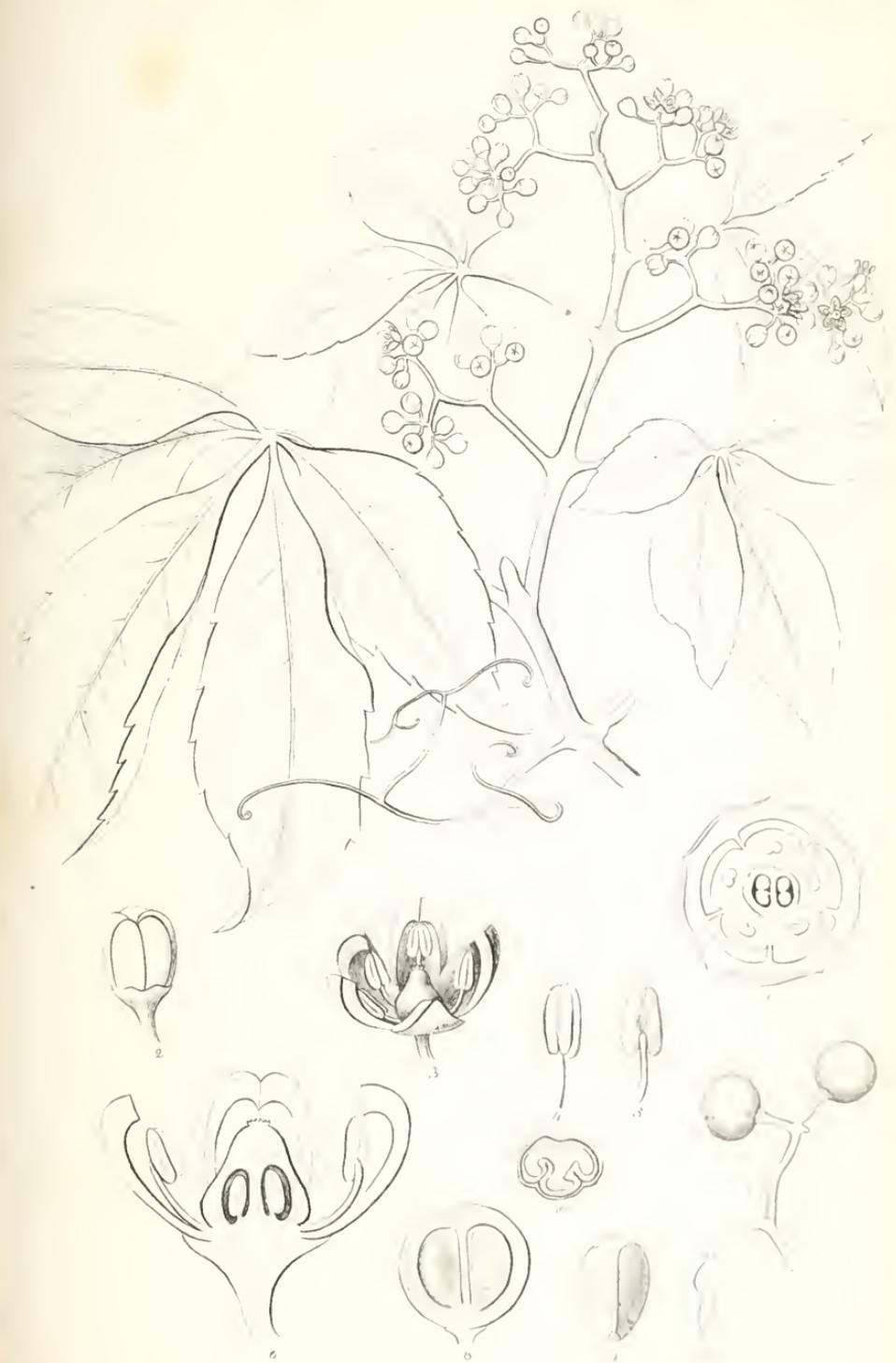
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RHIZOMORPH



RHUS LATIFOLIA



AMPELOPSIS

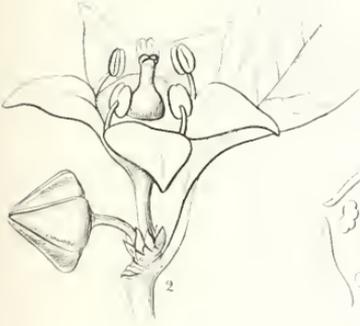


PLATE 12



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LEUCOPHYLLA

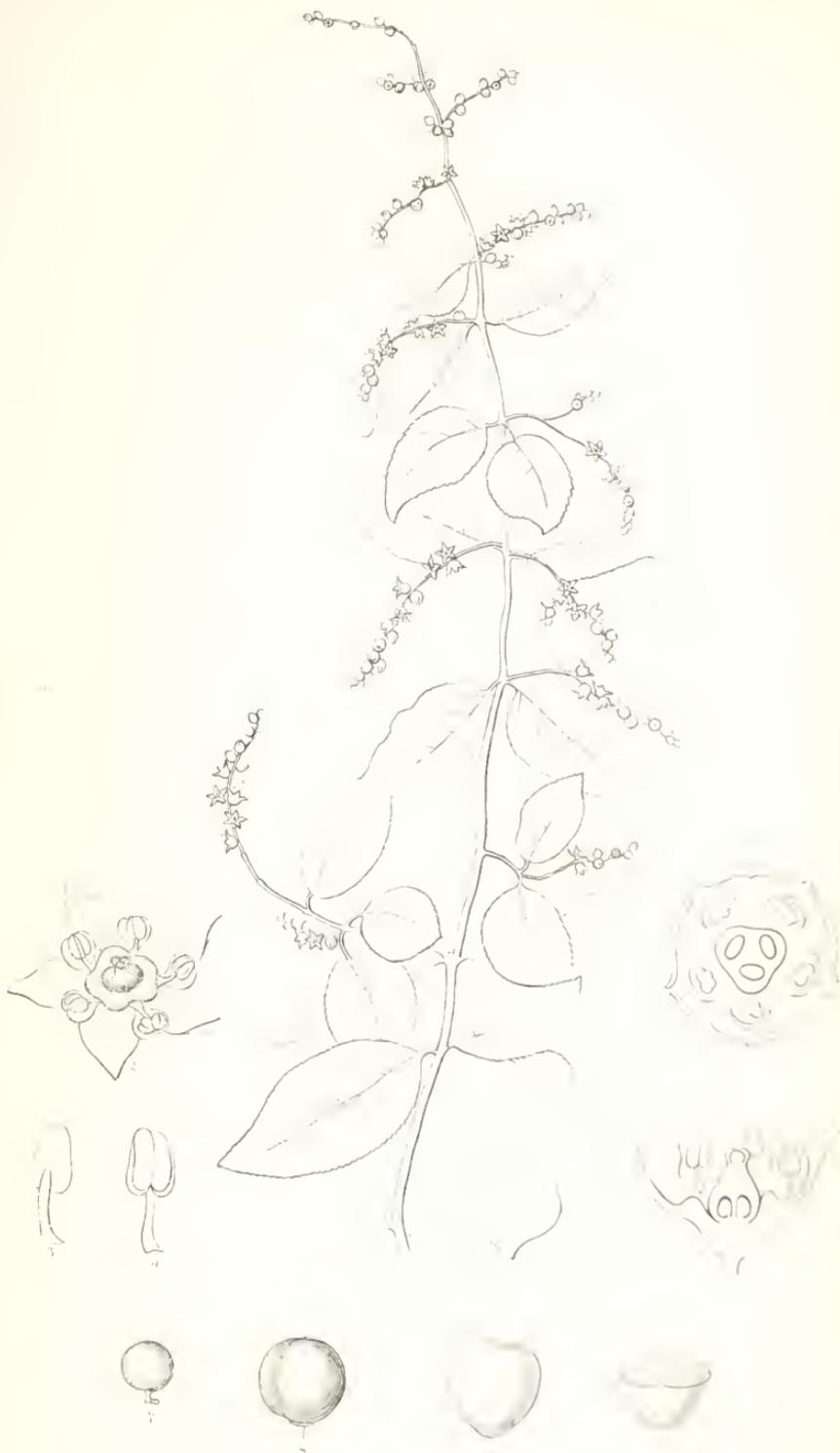




PLATE 10

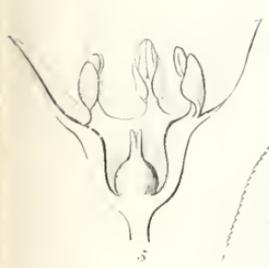


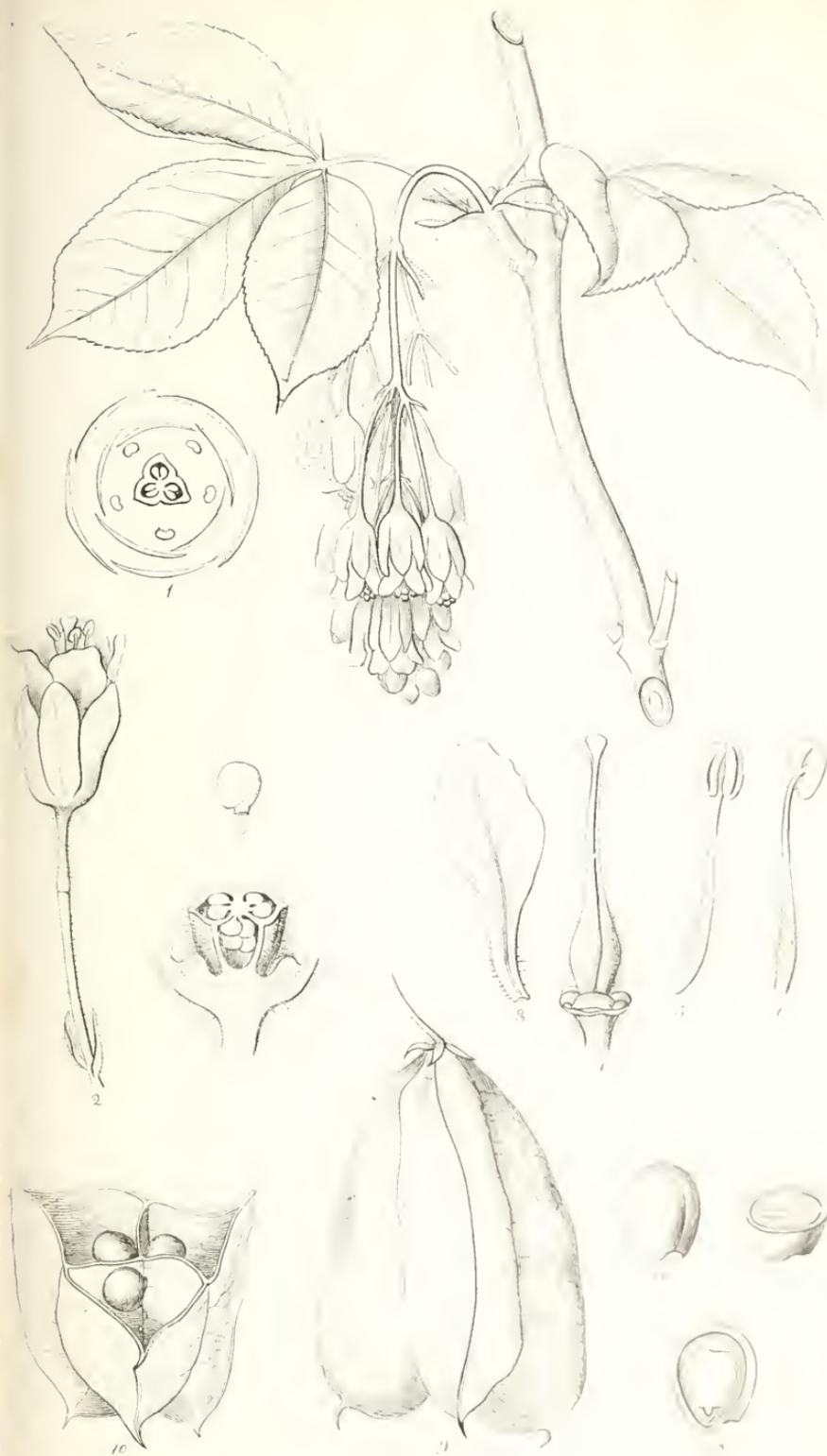
PLATE 11



JEAN THOU







STAPHYLEA



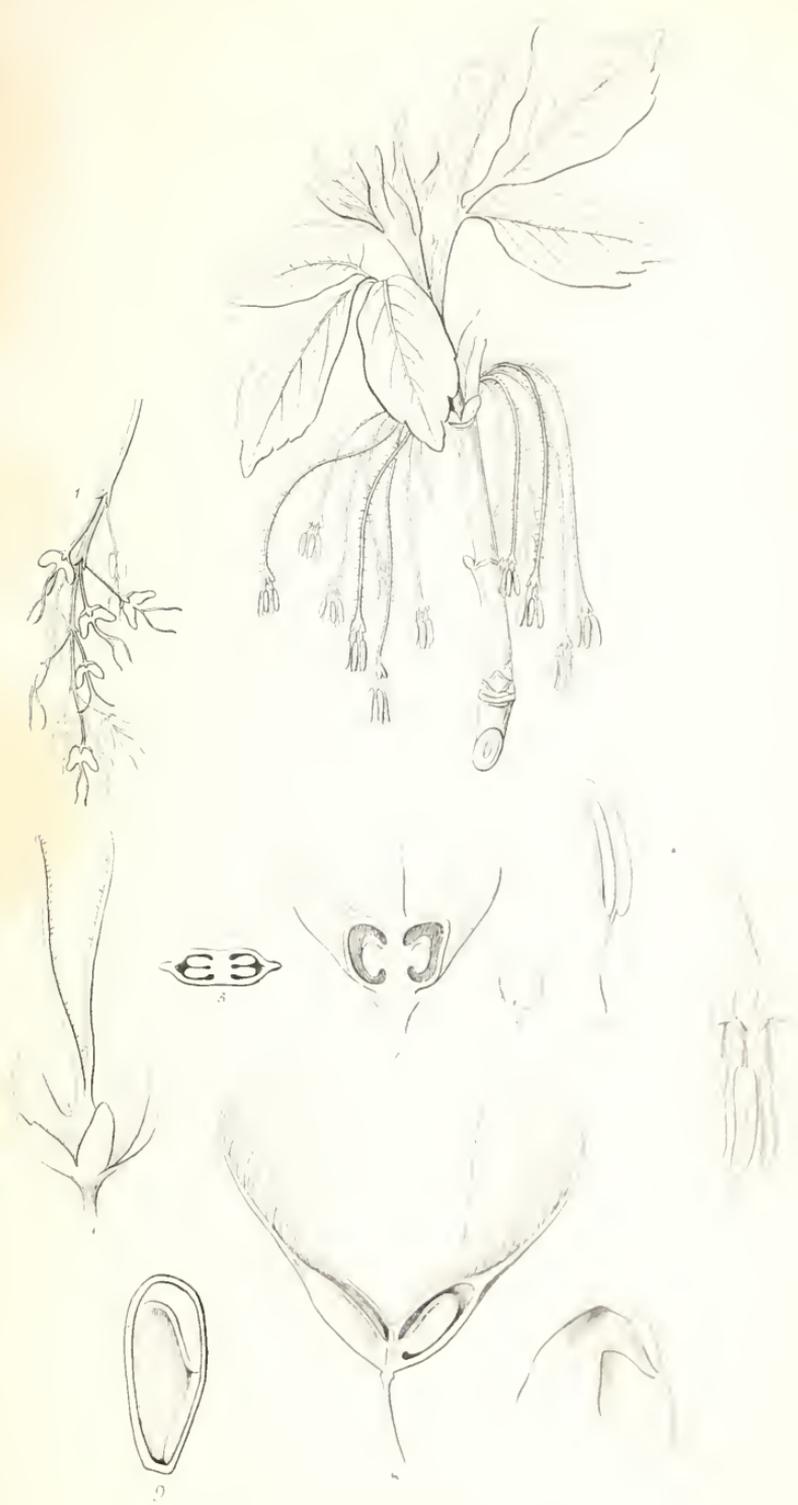
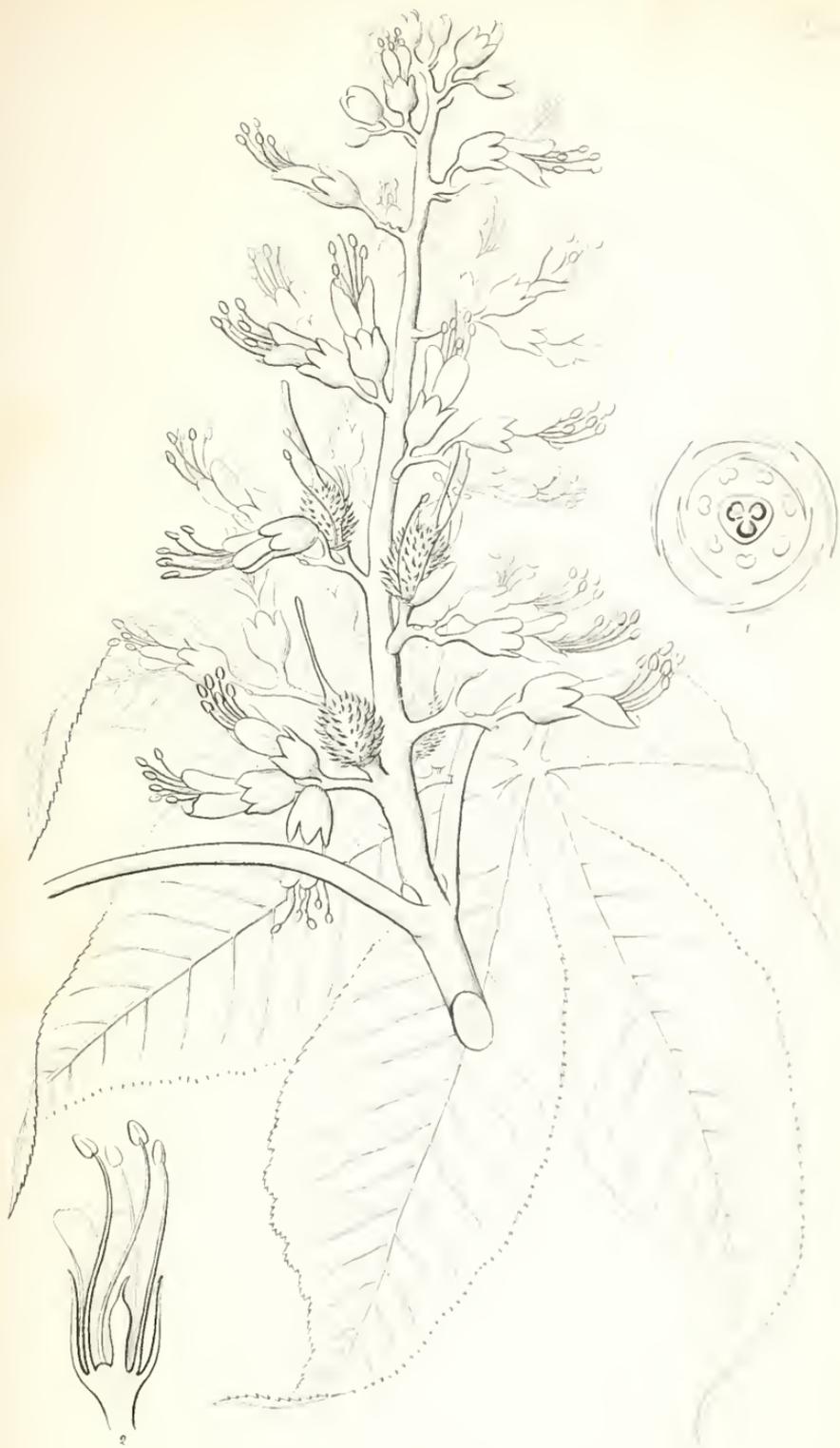


FIG. 1117



A. F. ...

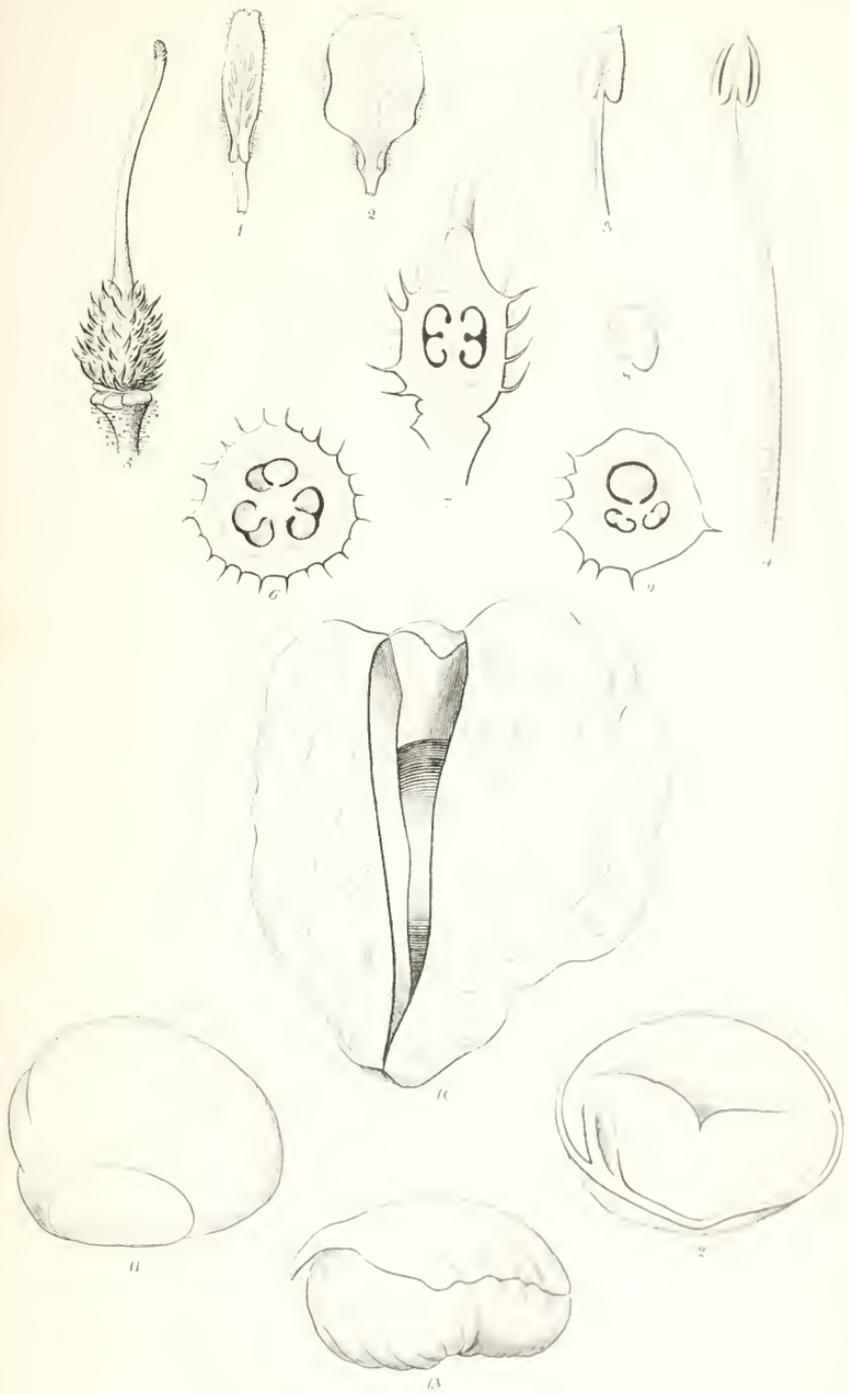
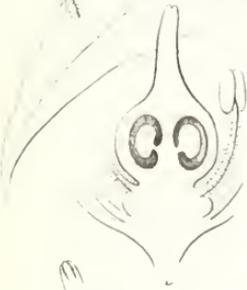
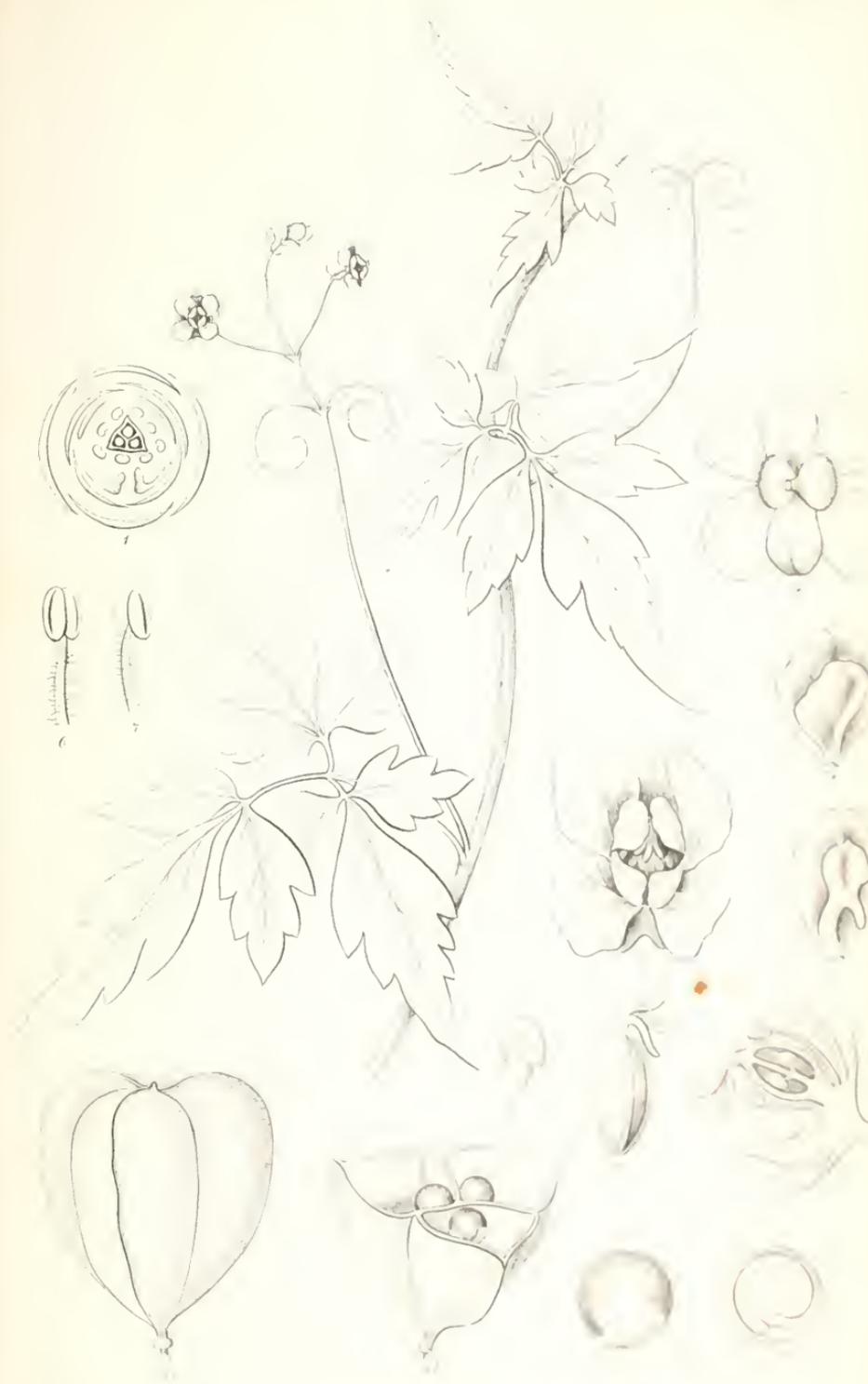


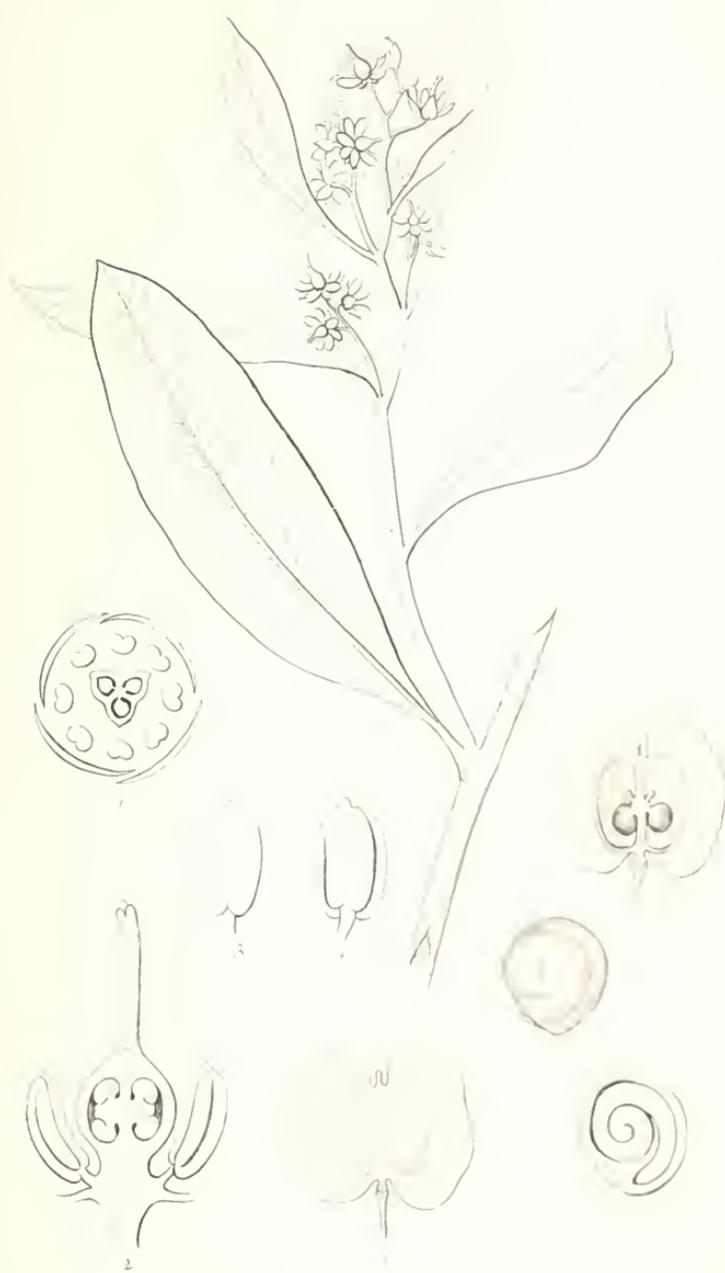
PLATE III.



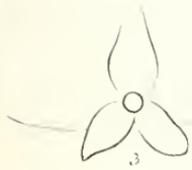








PLANTAE







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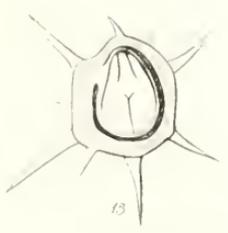
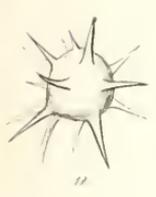
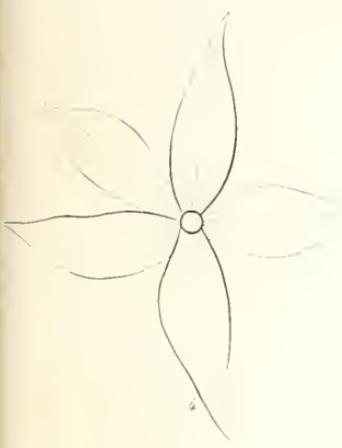
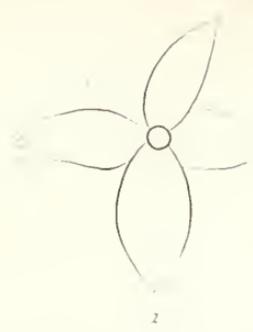
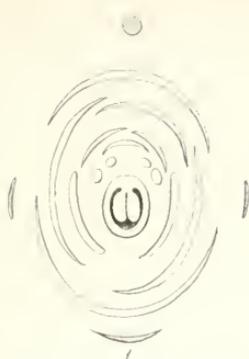
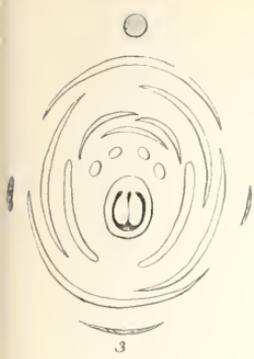


PLATE III

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