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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.

By ASA GRAY, M. D.,  
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OF THE IMPERIAL ACADEMY NATURE CURIOSORUM; OF THE  
BOTANICAL SOCIETY OF RATISBON, &c., &c.

VOL. I.  
PLATES 1-100.

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TO

FRANCIS BOOTT, M. D., F. L. S.,

THIS VOLUME IS INSCRIBED,

IN TOKEN OF THE

SINCERE REGARD AND ESTEEM

OF HIS FRIEND,

ASA GRAY.

ERRATA.

- Page 11, line 27, dele "*Hamadryas*."  
" " " 35, after "*Ficaria*" add "*Hamadryas*."  
" 20, " 11, dele " (reversed)."

## P R E F A C E .

THE design of this work is to illustrate the Botany of the United States by figures, with full analyses, of one or more species of each genus, accompanied by descriptive generic characters and critical observations. The figures in all cases are drawn directly from nature, by Mr. Sprague, and from the living plant whenever that is practicable. In almost every instance, the whole plant, or a branch or smaller portion, in flower and often also in fruit, is delineated of the natural size ; and the microscopical analyses, as numerous as the compass of an octavo page will allow, are so chosen as to display the principal floral characters of the genus, from the æstivation of the flower-bud to the fruit, the seed, and the embryo. When needful, on account of size or of subgeneric diversity, two plates are devoted to the illustration of a single genus. On the other hand, characters which are uniform or nearly so throughout a whole order are not repeated upon every plate.

The illustrations are not drawn from various orders and classes at random or convenience ; but the natural families are taken up in regular sequence, according to the arrangement now most prevalent among botanists (following very nearly, though not implicitly, the order adopted in the *Flora of North America* by Dr. Torrey and myself), and all our genera of each family are published together, in their proper places ; thus rendering the volumes systematically complete, as they appear. This plan, which has never been carried out, so far as I am aware, in any extensive publication of the kind, while it should increase the immediate usefulness and value of the work, at the same time renders still more onerous what is at best a

formidable undertaking. The plan and nature of this publication are obviously such as to preclude all expectation of emolument. It is our determination, however, to carry on the work to its completion (in about ten volumes like the present), if the patronage received shall warrant the hope of a moderate remuneration to the artist. The ample and rapidly accumulating materials at my disposal, both of specimens in the Herbarium, and of living North American plants in the Botanic Garden under my charge, and the prompt assistance offered by a large number of zealous correspondents, while they afford unusual advantages for the purpose, render me increasingly desirous to turn them to useful account by prosecuting an undertaking which may serve to facilitate the more thorough study of Botany in this country, and perhaps contribute in some degree to the general advancement of the science.

The higher character of the later as compared with the earlier executed analyses, as well as the further improvement which will be manifest to the experienced botanist in the second volume, — now in an advanced state of preparation, — is attributable to the increasing botanical knowledge of the self-taught artist who is associated with me in the work. And, although I am alone responsible for the text, I must in justice add, that whatever of original value these illustrations may be found to possess is largely owing to the scientific insight and the careful investigations of Mr. Sprague, as well as to his skill and accuracy in delineation. ●

The plates are *engraved* upon stone, in a style (capable of further improvement) well adapted to this class of subjects, by Mr. Joseph Prestele, a worthy artist, formerly of Munich, but now and for several years past resident at Ebenezer, near Buffalo, New York.

As to geographical extent, this work is intended to comprise all the genera which have indigenous representatives within the States of the Federal Union as now constituted. It therefore includes Texas, but not the country west of the organized States of Arkansas and Missouri.

ASA GRAY.

CAMBRIDGE, April 20, 1848.

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## ORD. RANUNCULACEÆ.

Herbæ vel suffrutices (succo aqueo acridi) exstipulatæ, plerumque dissectifoliæ, dicotyledonæ, polypetalæ seu monochlamydeæ, hypogynæ, polyandræ; carpellis discretis (indefinitis vel paucis, raro solitariis); seminibus exarillatis; embryone in basi albuminis corneo-carnosi minimo.

RANUNCULACEÆ, JUSS. DC. Syst. 1. p. 127. Endl. Gen. p. 843.

THE CROWFOOT FAMILY presents so many gradations and diversities of form and character, that it cannot readily be defined, although there is no question as to its boundaries, nor any other hypogynous and polyandrous family with which any of the genera are likely to be confounded. The principal diversities it presents are brought sufficiently into view in the subjoined conspectus of our genera, arranged under their proper tribes. It should be mentioned, as exceptional to the ordinal character, that *Zanthorhiza* has few and definite stamens, which is also the case, although less constantly, in several other genera: and in *Nigella* the ovaries are more or less united.

An acrid principle, which is mostly dissipated in drying or by heat, pervades the whole order; so that the fresh herbage, roots, &c., are poisonous. Many have showy flowers, and are cultivated for ornament.

While engaged in preparing the drawings for these illustrations, during the spring and summer of 1846, Mr. Sprague directed my attention to the fact, that in all our *Ranunculaceæ* with a solitary suspended ovule, the raphe is dorsal, or external, that is, on the side next the dorsal suture of the carpel, and not on the side of the ovulum which is next the placenta, where it properly belongs, according to the general rule long since laid down by Mr. Brown.\* I find that this anomaly has been noticed by Schleiden,† and recently by Barneoud,‡ who, however, has not very clearly indicated the peculiarity. It would appear that it arises from the very early reversion of an ovule like that of *Ranunculus*, developed from the upper part of the ventral suture, at a point which in subsequent growth becomes the summit of the cell; and thus, like the case of later reversion in *Euonymus*, long since

\* In King's *Narrative*, App. 2. p. 549.

† In Wiegmann's *Archiv für Naturgesch.* 1839, p. 285. t. 8.

‡ In *Ann. Sci. Nat.* for November, 1846 (published only in the spring of 1847).

pointed out by Mr. Brown (and which may also be observed in several other instances), serves to confirm the general rule. The analogous eversion of the raphe, in many Rhamneæ, is shown by Mr. Bennett to arise from the lateral torsion of the funiculus: but "the object of this displacement," he concludes, "it is difficult to conjecture."\* Perhaps some light may be thrown upon it by the present cases, in which the design of this arrangement may, I think, be distinctly perceived; namely, to facilitate the fertilization of the ovule, by placing its foramen in juxtaposition with the placenta, or that portion of the carpel (the confluent edges of the infolded metamorphosed leaf) which is in the ovary a direct continuation of the stigmatic surface or lines of the style,† and through which impregnation is effected. A glance at the analyses on Plates 2 to 5, especially those of *Hepatica* (Plate 5, fig. 4) and *Myosurus* (Plate 8, fig. 6, &c.), will render this evident, and show that, if the ovule were brought into the normal position, its orifice would be thrown to the side of the cell farthest from that through which the fecundating influence is communicated.

In the case of *Rhamnus*, where a solitary anatropous ovule arises from the very base of each cell, a broad ventral funiculus, interposed between the foramen and the placental surface, may readily be conceived to offer an obstruction to fertilization, while the subsequent lateral torsion of this funiculus would bring these parts into the most favorable position. Where there is a pair of ovules, as in *Celastrus*, no displacement is needful for the attainment of this end; since the raphe is *originally lateral* in such cases, that is, the two raphes are applied face to face, or very nearly. This equally occurs in horizontal collateral ovules, as in *Magnolia*, Plate 22, and no less so where they consist of many pairs, as in *Helleborineæ* generally, or even where the numerous ovules are not collateral. Indeed, this may be assumed as the typical condition; the ovules, which are a growth from the placental margins of the infolded leaf, being themselves likewise folded inwards, thus bringing their raphes next the suture.

In no instance do we find the pericarp of the monospermous species coherent with the integument of the seed, as described by De Candolle and by Endlicher.

### CONSPECTUS OF THE TRIBES AND GENERA.

TRIBE I. CLEMATIDÆ. — Sepals valvate-induplicate in æstivation, colored, deciduous. Petals none or stamen-like. Ovaries numerous, forming a head of achenia in fruit. Ovule solitary, suspended; the raphe dorsal. — Chiefly frutescent vines, climbing by their petioles. Leaves opposite.

ATRAGENE. (Plate 1.) Petals, or staminodia, shorter than the calyx.

Achenia caudate with the plumose-hairy persistent style.

CLEMATIS. (Plate 2.) Petals none. Persistent style plumose or naked.

\* In Horsefield's *Planta Javan. Rar.* p. 131.

† Brown, in *Pl. Javan. Rar.* pp. 108 - 110, note.

TRIBE II. ANEMONEÆ. — Sepals imbricated in æstivation, colored, deciduous. Petals none, or rarely some small and flat staminodia. Ovaries several or numerous, forming achenia in fruit. Ovule solitary, suspended; the raphe dorsal (except in *Trautvetteria*). — Erect perennial herbs. Floral leaves often opposite or whorled, forming an involucre.

PULSATILLA. (Plate 3.) Petals small and glandular, like transformed stamens. Achenia caudate with long plumose-hairy styles. Otherwise as in *Anemone*.

ANEMONE. (Plate 4.) Petals none. Achenia beaked with the naked or hairy style. Cauline leaves forming an (usually compound or dissected) involucre, and sometimes involucels, remote from the flower.

HEPATICÆ. (Plate 5.) Petals none. Achenia pointed with a short naked style. Involucre of 3 sepaloïd leaves placed close under the flower, at the summit of the otherwise naked and simple scape, imitating a calyx. Otherwise as in *Anemone*.

THALICTRUM. (Plate 6.) Petals none. Achenia ribbed, 3-winged, or inflated, tipped with a sessile stigma or short naked style. Involucre none, or like the other leaves. (Ovule and seed suspended.)

TRAUTVETTERIA. (Plate 7.) Petals none. Sepals very caducous. Achenia inflated, 4-angled, tipped with a recurved-uncinate stigma. Involucre none. Ovule and seed erect; the raphe ventral.

TRIBE III. RANUNCULEÆ. — Sepals imbricated in æstivation, often herbaceous, deciduous. Petals conspicuous, imbricated in æstivation. Ovaries numerous, forming achenia in fruit. Ovule solitary. — Herbs. Cauline leaves alternate.

Subtribe I. ADONIDEÆ. — Ovule and seed suspended; the raphe dorsal. — § 1. Petals inappendiculate. *Adonis*, *Hamadryas*, *Knoveltonia*? § 2. Petals with a tubular or glandular base or claw. *Aphanostemma*, *Callianthemum*, *Cyrtorhyncha*, and

MYOSURUS. (Plate 8.) Sepals spurred at the base. Petals linear-spatulate. Achenia spiked on a long receptacle. — Minute annuals. Leaves all radical, linear.

Subtribe II. FICARIEÆ. — Ovule and seed ascending or erect; the raphe ventral. Petals squamiferous or foveolate at the base. — *Ceratocephalus*, *Ficaria*, and

RANUNCULUS. (Plate 9.) Sepals 5, deciduous. Achenia compressed, pointed, in a globular or cylindrical head.

TRIBE IV. HELLEBORINEÆ. — Sepals imbricated in æstivation, petaloïd, mostly deciduous. Petals tubular, bilabiate, spurred, stamen-like, or none. Ovaries few or several, follicular in fruit. Ovules few or many; the raphes collateral. — Leaves all alternate.

\* Flower regular. Follicles several-seeded. Herbs.

CALTHA. (Plate 10.) Petals none. Follicles several, compressed, sessile, many-seeded. — Leaves undivided.

- TROLLIUS.** (Plate 11.) Petals indefinite, small and stamen-like, hollowed near the base. Follicles numerous, cylindraceous, pointed with the subulate style, sessile, many-seeded. Leaves palmately-parted.
- ISOPYRUM.** (Plate 12.) Petals 5, minute and tubular, or, in subgen. *Encmion*, none. Follicles 2-20, sessile, few-several-seeded. — Leaves 2-3-ternately divided.
- COPTIS.** (Plate 13.) Petals 5 or 6, small, unguiculate, hollowed at the apex or hooded in the middle. Follicles 3-10, conspicuously stipitate, several-seeded. — Leaves 1-3-ternately divided, all radical.
- AQUILEGIA.** (Plate 14.) Petals 5, larger than the sepals, produced below into a large hollow spur. Follicles 5, sessile, crowned with filiform styles, many-seeded. — Leaves 2-3-ternately divided.
- \* \* Flower irregular and unsymmetrical. Follicles several-seeded. Herbs.
- DELPHINIUM.** (Plate 15.) Sepals 5; the outer one larger and spurred. Petals small, of two kinds; two of them produced into a spur which is received into the spur of the calyx; the two others unguiculate.
- ACONITUM.** (Plate 16.) Sepals 5; the outer and larger one galeate, inclosing two small incurved-saccate petals raised on long claws: the other petals minute and stamen-like, or none.
- \* \* \* Flower regular and symmetrical. Follicles several, by abortion 1-seeded. Shrubby.
- ZANTHORHIZA.** (Plate 17.) Sepals 5, spreading. Petals 5, short, unguiculate, 2-lobed, hollowed at the apex. Stamens 5 or 10. Style becoming lateral in fruit. Seed pendulous. — Suffruticose; the pinnately-divided leaves and racemes from scaly buds.

**TRIBE V. CIMICIFUGÆ.** — Sepals imbricated in æstivation, petaloid, eadueous. Petals small and plane, or none. Ovaries 1-15, baccate or follicular in fruit. Ovules 2-many; the raphes collateral. — Herbs. Leaves all alternate.

**HYDRASTIS.** (Plate 18.) Sepals 3, very eadueous. Petals none. Ovaries numerous, imbricated in a head, 2-ovuled, baccate in fruit. Seeds 1 or 2, ascending. — Flower solitary. Leaves palmately lobed.

**ACTEA.** (Plate 19.) Sepals 3-5. Petals, or staminodia, 4-8, oblong or ovate, entire. Ovary solitary. Berry many-seeded. Seeds flat, horizontal. — Raceme short. Leaves 2-3-ternately compound.

**CIMICIFUGA.** (Plate 20.) Sepals 4-5. Petals, or staminodia, 3-5, mostly 2-cleft or forked at the apex. Ovaries 1-8. Follicles several-many-seeded. — Raceme virgate.

**TRIBE VI. PÆONIÆ.** with a coriaceous-foliaceous and persistent imbricated calyx, ample plane petals, and a fleshy hypogynous disk around the base of the few ovaries, which form leathery follicles in fruit, comprises the genus *Pæonia* alone; of which there are no species indigenous within the limits of the United States.

## PLATE 1.

## ATRAGENE, L.

Petala (seu staminodia) plurima, angusta, calyce 4-sepalo breviora. Styli persistentes barbati. Gemmæ squamosæ. — Cætera omnia Clematidis.

ATRAGENE, Linn. Gen. 695. Juss. Gen. p. 232. Endl. Gen. 4769.  
CLEMATIS, Sect. ATRAGENE, DC.

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CALYX of 4 petaloid membranaceous SEPALS, spreading, valvate with the edges more or less induplicate in æstivation, deciduous. PETALS, or rather sterile stamens, numerous, hypogynous, much shorter than the calyx, spatulate or undguiculate, mostly bearing traces of an anther, passing by gradual transition into the proper stamens. STAMENS indefinite, hypogynous, in several series: FILAMENTS flattened: ANTHERS fixed by the base, innate, or nearly so, two-celled, opening longitudinally. PISTILS numerous (about 20), capitate-imbricated on the globular receptacle, distinct: OVARY one-celled, one-ovuled, prolonged into a large STYLE, which is densely hairy below: STIGMA unilateral, occupying the inner (ventral) side of the naked summit of the style. OVULE suspended from the apex of the cell, anatropous, with the raphe dorsal!

FRUIT a head of sessile ACHENIA, bearing the persistent and elongated plumose-bearded styles: RECEPTACLE scrobiculate. SEED suspended, conformed to the cell. ALBUMEN between corneous and fleshy. EMBRYO minute, next the hilum, oblong: RADICLE thick, superior; the COTYLEDONS about their length, approximate.

SUFFRUTICOSE plants, climbing by their leaf-stalks; with opposite trifoliolate or biternately compound leaves, developed from scaly buds. Leaflets toothed or entire. Flowers large (blue-purple or yellowish-white), solitary on single

naked peduncles, appearing with the leaves in spring from the same axillary bud, terminating the abbreviated branch, the crowded leaves of which often appear, at first sight, as if verticillate around the stem of the preceding year (whence the improper name of *Clematis verticillaris*, DC.). Involucre none.

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ETYMOLOGY. *Αθραγένη*, a name of Theophrastus, probably for *Clematis Vitalba*, L. (DC.)

PROPERTIES. The watery juice is acrid, as in most of the family; the acidity dissipated in drying.

GEOGRAPHICAL DISTRIBUTION. Natives of the northern and cold or mountainous regions of the northern hemisphere, in North America extending southward to lat. 36°, both along the Alleghany and the Rocky Mountains.

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PLATE 1. *ATRAGENE AMERICANA*, Sims: — a flowering branch, of the natural size.

1. Sepal detached.
2. A petal somewhat enlarged, seen from within.
3. Another petal, seen from without.
- 4, 5, 6. Stamens somewhat magnified; fig. 5, inside view.
7. Pistils; the rest of the flower removed from the receptacle.
8. Separate pistil, enlarged.
9. Vertical section of an ovary, more magnified, showing the suspended ovule with its raphe on the dorsal side.
10. Pistil in fruit, enlarged to four times the natural size; the achenium divided to display the seed.

## PLATE 2.

## CLEMATIS, L.

Petala nulla. Sepala 4, petaloidea, æstivatione valvata, marginibus sæpe induplicatis. Achenia stylo persistente nudo seu barbato caudata. — Herbæ vel suffrutices oppositifoliæ, sæpius petiolis petiolulisve scandentes.

CLEMATIS, Linn. Juss. Gen. p. 232. Endl. Gen. 4763. Gärtn. Fr. t. 74.

**Virgin's Bower.**

CALYX of 4 (or rarely 6 to 8) petaloid SEPALS, valvate, and usually with the margins induplicate in æstivation, deciduous. PETALS none. STAMENS indefinite, hypogynous: FILAMENTS filiform: ANTHERS linear or oblong, fixed by their base, innate or slightly extrorse, the cells opening longitudinally by a lateral line. PISTILS indefinite (15 to 30 or more), crowded on the globular or flattish receptacle: OVARY one-celled and one-ovuled, tapering into a hairy or nearly naked STYLE; the STIGMA unilateral (on the inner side) at its apex. OVULE suspended from the summit of the cell, anatropous; the raphe dorsal.

FRUIT a head of sessile ACHENIA, which are coriaceous, compressed; the persistent style naked, pubescent, or more commonly forming a plumose-hairy tail. SEED conformed to the cell, usually compressed: testa coriaceous, thickish; the inner integument membranaceous. ALBUMEN corneous-fleshy. EMBRYO minute, next the hilum: COTYLEDONS short: RADICLE thick, superior (pointing to the base of the style).

SUFFRUTICOSE plants, climbing by the twisting of their leaf-stalks, or upright herbs, with fibrous perennial roots; the opposite leaves either trifoliolate, pinnate, or sometimes simple. Buds not scaly. Flowers axillary or terminal, panicled-cymose or solitary (blue, purple, white, or cream-color), perfect. or sometimes polygamo-dicæous; the peduncles na-

ked, or rarely (in the foreign section *Cheirosopsis*) with two bractlets, forming an involucre under the flower.

ETYMOLOGY. *Κληματίς*, a little *Vinc-branch* or *twig*, applied by Dioscorides to a plant of this, or some other genus, with long and lithe stems.

PROPERTIES. Acrid, and even blistering when applied in a fresh state to the skin. Some species are used as rubefacients or vesicants.

GEOGRAPHICAL DISTRIBUTION. Widely diffused over the world; principally in the warmer temperate zone of the northern hemisphere.

DIVISION. The native species of the United States are conveniently divided into two sections: the first comprising those which, like our *Common Virgin's Bower* (*C. Virginiana*, *L.*), bear rather small, white or cream-colored, polygamo-dioecious flowers, in clusters or paniced cymes: the second including those with larger and solitary flowers, and more or less thick and leathery sepals; — of which our plate, drawn from a plant cultivated in the Botanic Garden at Cambridge, affords a good illustration.

PLATE 2. *CLEMATIS CRISPA*, *Linn.*; \* — summit of a branch in flower and fruit, of the natural size.

1. Transverse section of the sepals, to show their æstivation and thickness.
2. Vertical section of a flower.
- 3, 4. Stamens magnified, front and back view.
5. A pistil, magnified. (It should have been more hairy.)
6. Vertical section of the ovary, more magnified, with the ovule in place.
7. Ovule detached, and more highly magnified.
8. A ripe achenium, vertically divided, and displaying the seed in place; with the persistent caudate style: enlarged.
9. Vertical section of a seed, magnified, showing the two integuments, the albumen, and the embryo.
10. Embryo detached, and highly magnified (turned, as in all the ensuing cases of the kind, so as to bring the radicle downwards).

\* The *C. crispa* of De Candolle, *Syst.* 1. p. 162 (spec. hort. Audub.), is a form, or near ally, of *C. Viticella* or *C. campaniflora*, and undoubtedly not an American plant. This accounts for his placing the species in the section *Viticella*, and for his remark under *C. campaniflora*. The fruit, in the rude figure of Dillenius, upon which Linnæus founded the species, is delineated as if the persistent styles were perfectly naked and glabrous, while the description merely states that they are not plumose. They are usually about as hairy as here represented. — Dr. Lindley (in *Bot. Reg.* for 1846, Vol. 32. t. 60) has lately attempted to elucidate this species and its allies, but not, in all respects, with the best success. There is here merely room to state that *C. cylindrica*, *Bot. Mag.* t. 1160, is surely the same as the *C. Viorna*, *Andr. Bot. Rep.* (which Lindley says is *C. Hendersonii*); and that the *C. crispa*, *Bot. Mag.* t. 1892, is not *C. reticulata*, but clearly the same as his own *C. crispa* (which will be found not to have a "short-tailed mucronate fruit") and the one here figured; of which the *C. cordata*, *Bot. Mag.* t. 1816, is merely a variety.

## PLATE 3.

PULSATILLA, *Tourn.*

*Achenia stylis elongatis barbato-plumosis caudata. Petala, seu staminodia glandulæformia, staminibus breviora, sæpius plurima. Sepala 6. Cætera ut Anemones.*

PULSATILLA (Banhin), *Tourn. Inst. t. 143. Willd. Enum. p. 580. Ledeb. Fl. Alt. 2. p. 367.*

ANEMONES *Sp. Linn. Lam. III. t. 496. Gærtn. Fr. t. 74. Schkuhr, Handb. t. 50. DC. Syst. 1. p. 189. Endl. Gen. 4773. Pritzel in Linnæa, 15. p. 565.*

**Pasque-Flower.**

CALYX of 6 petaloid membranaceous SEPALS, imbricated in æstivation in two series, silky-hairy externally, at length deciduous. PETALS, or rather sterile stamens, gland-like, sessile or unguiculate, very small, shorter than the fertile stamens, or none. STAMENS indefinite, in several series, hypogynous: FILAMENTS filiform, glabrous: ANTHERS short, fixed by the base, neither extrorse nor introrse; the cells opening lengthwise laterally. PISTILS numerous, capitate on the globular or hemispherical receptacle: OVARY one-celled, one-ovuled, prolonged from the apex into a hairy STYLE many times exceeding the ovary; the STIGMA unilateral at its naked summit. OVULE suspended, anatropous; the raphe dorsal.

FRUIT a head of many sessile ACHENIA, which are caudate with the elongated and persistent plumose-bearded styles: RECEPTACLE (gynophore) hemispherical. SEED suspended from the summit of the cell, oblong. ALBUMEN between corneous and fleshy. EMBRYO minute, next the hilum, cordate, the short COTYLEDONS spreading: RADICLE superior.

HERBS, with fusiform or thickened and ligneous perennial roots bearing abbreviated caudexes at their summit; whence is emitted, from a kind of scaly bud, a vernal, simple, one-flowered, involucrate scape, and soon afterwards, or at the

same time, a tuft of radical ternately-dissected leaves. Petioles dilated at the base; their withered remains persistent. Involucre distant from the flower, soon remote, from the elongation of the fructiferous peduncle; in *EUPULSATILLA* simply multifid from the confluence of its three verticillate leaves into a cup or ring at the base, the linear segments uniform; or, in *PREONANTHUS* (*P. alpina*) of three distinct, short-petioled leaves, resembling the radical ones. Flowers large (2 to 3 inches broad): sepals purplish, violet, white or rarely sulphur-color. Stems and young leaves, &c., villous.

ETYMOLOGY obscure. The popular name of *Pasque-flower* was given in Europe, because the blossom appears at Easter.

PROPERTIES. Acrid and poisonous, at least when fresh. Some species have been esteemed in obstinate cutaneous diseases, chronic ophthalmia, &c.

GEOGRAPHICAL DISTRIBUTION. Northern and colder regions of the Old World, especially on mountains or elevated plains; two species (one of each subgenus) extending into North America, of which one reaches the western part of the United States proper. — Pritzel, misled by the name which Nuttall gave to our species (*Anemone Ludoviciana*), and not aware that the whole country which borders on the Missouri River was formerly called Upper Louisiana, has wrongly extended the geographical range down to the present limits of Louisiana (lat. 33° - 29°). Along the Rocky Mountains, however, this plant does extend as far southward as lat. 36°; Mr. Fendler having gathered fine specimens at Santa Fé.

PLATE 3. *PULSATILLA PATENS*, Mill.; — from Wisconsin specimens furnished by Mr. Lapham, of the natural size at the time the flower opens: the leaves as yet scarcely appearing.

1. Diagram of the æstivation of the calyx.
- 2, 3. Petals, so called, magnified to the same degree as
4. A stamen.
5. A pistil, magnified.
6. Another pistil, with the ovary divided, showing the ovule.
7. Ovule detached, more highly magnified.
8. Receptacle in fruit, with three of the caudate achenia still attached.
9. An achenium, with its persistent style, thrice the natural size.
10. Same divided, showing the seed in place.
11. Vertical section of the seed magnified, showing the embryo, in place.
12. Embryo detached, highly magnified.

## PLATE 4.

ANEMONE, *Tourn.*

Calyx 4 – 20-sepalus, æstivatione imbricatus. Petala seu stamina sterilia nulla. Achenia stylis brevibus (nudis lanatisve) parum mutatis coronata. Involucrum a flore remotum, foliis radicalibus conforme.

ANEMONE, *Tourn.* Inst. t. 147. Willd. Enum. p. 581. Ledeb. l. c.

**Wind-Flower.**

CALYX of 5 to 20, rarely 4, petaloid SEPALS, imbricated in æstivation, spreading, deciduous. PETALS none. STAMENS indefinite, hypogynous: FILAMENTS filiform, glabrous: ANTHERS fixed by the base, rather extrorse, or innate, the cells opening longitudinally. PISTILS numerous (rarely 15 to 20), capitate-imbricated on the globular, conical-oblong, or cylindrical receptacle (gynophore): OVARY one-celled, one-ovuled: STYLE short, stigmatose from the apex downward along the inner side. OVULE suspended, anatropous; the raphe dorsal.

FRUIT a head of sessile compressed ACHENIA, tipped with the straight or uncinatè, short and unchanged or scarcely elongated, naked or woolly styles. RECEPTACLE naked or hairy. SEED suspended from the summit of the cell. ALBUMEN between corneous and fleshy. EMBRYO minute, next the hilum, cordate: RADICLE superior.

HERBS, with perennial roots or rootstocks, upright stems, which are simple and naked, except the 3-leaved involucre, and one-flowered, or umbellately several-flowered, or sometimes producing lateral involucrellate peduncles from the axils of the involucrell leaves, which may again fork or branch at the two-leaved involucrell. Involucrell leaves usually palmately lobed, or tri – quinate compound, remote from the flower (at the base of the peduncles), resembling the proper or radical leaves. Petioles dilated at the base. Flowers

(sepals) commonly showy and white, or tinged with blue or purple, sometimes red.

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ETYMOLOGY. Ἄνεμώνη, the ancient name; from ἄνεμος, *the wind*, because the blossom was thought to open only when the wind blows.

PROPERTIES. The juice is an acrid poison, as in the foregoing genera.

GEOGRAPHICAL DISTRIBUTION. Extratropical in both hemispheres, principally in the northern; and more than half the 73 known species are indigenous between the parallels of 40° and 50°, north latitude.

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PLATE 4. ANEMONE PENNSYLVANICA, *Linn.*, — of natural size early in the season; without the base of the stem or the radical leaves.

1. A stamen, enlarged.
2. A pistil, enlarged.
3. The same, with the ovary divided, displaying the ovule.
4. Ovule detached (reversed), and more magnified.
5. Head of carpels in fruit, of the natural size.
6. Separate achenium, enlarged.
7. Enlarged achenium divided, so as to show the cell and the seed.
8. Vertical section of a more magnified seed, showing the minute embryo in place.

## PLATE 5.

HEPATICA, *Dill.*

Involucrum triphyllum, integrifolium, flori proximum, eodem minora, calycem referentia. Cætera ut Anemones. — Gemmæ radicales squamosæ, primo vere scapos unifloros, tandem folia simplicia tri- (rarius 5–7-) loba, prominentes.

HEPATICA, Dillen. Nov. Gen. 108. Linn. Hort. Cliff. p. 233. Haller, Helv. 1156. DC. Syst. 1. p. 215. Torr. & Gray, Fl. 1. p. 14.

ANEMONE HEPATICA, Linn. Sp. Sect. HEPATICA, Koch, Pritzel, l. c.

**Liver-Leaf.**

CALYX of 6 to 9, rarely 12, oblong petaloid SEPALS, imbricated in æstivation in two or three rows, spreading, early deciduous. PETALS none. STAMENS indefinite, hypogynous: FILAMENTS filiform, glabrous: ANTHERS oval, slightly extrorse, the cells opening lengthwise at or near the margins. PISTILS 12 to 20, crowded on the convex summit of the receptacle (gynophore): OVARY one-celled, one-ovuled, apiculate with a very short STYLE, which is stigmatose down the inner side. OVULE suspended from the summit of the cell, anatropous; the raphe dorsal.

ACHENIA in a small loose head, at length short-stipitate (in *H. acutiloba*), ovate-oblong, compressed, not margined, hairy, pointed with the short naked style. RECEPTACLE of the fruit nearly hemispherical, pilose-alveolate. SEED suspended, conformed to the cell, which it fills. ALBUMEN, EMBRYO, &c., as in *Anemone*.

ACAULESCENT dwarf herbs, with fibrous perennial roots, producing from radical scaly buds, in earliest spring, simple one-flowered scapes, and soon after several 3–5-lobed heart-shaped leaves, which become thick or coriaceous in the course of the summer, and last through the winter, until their successors begin to unfold. Vernation involute-plicate.

Involucre close to the flower, and imitating a calyx, formed of three ovate and entire sepaloïd leaves, rather shorter than the sepals, longer than the head of fruit with its short stalk (the pedicel), persistent. Sepals blue, violet, purple, often pale or nearly white, handsome.

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ETYMOLOGY and PROPERTIES. From *ἥπατικός*, *affecting* or *belonging to the liver*, on account of a fancied resemblance in the shape of the leaves; whence, according to the old "doctrine of signatures," it was inferred to be a potent remedy for affections of the liver. It is still a celebrated popular remedy for various diseases; but it is endowed with no active properties beyond the slight acidity of the recent plant, and a mild astringency with a little mucilage.

GEOGRAPHICAL DISTRIBUTION. Natives of the colder temperate zone of the northern hemisphere, extending northward to the limit of trees. Growing in rich woods, covered in winter by the fallen leaves, above which the handsome flowers rise and unfold almost as soon as the snow leaves the ground.

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PLATE 5. *HEPATICACUTILOBA*, DC., — of the natural size: the right-hand scape in young fruit.

1. Stamen magnified, seen from without.
2. Inside view of the same.
3. A pistil, magnified.
4. Vertical section of a pistil, magnified, showing the ovule.
5. Ovule detached, equally magnified.
6. Vertical section through an achenium and the included seed, magnified, bringing to view the minute embryo next the hilum.

## PLATE 6.

THALICTRUM, *Tourn.*

Calyx 4–7-sepalus, æstivatione imbricatus. Petala nulla. Achenia 3–15, ecaudata, plurisulcata seu vesiculoso-inflata: stigma plerumque sessili. (Semen suspensum.)—Flores sæpe polygamo-dioici. Involuerum nullum, aut (in *T. anemonoide* solum) foliiforme, a floribus remotum.

THALICTRUM, Linn. Gen. 697. DC. Syst. 1. p. 163. Endl. Gen. 4772.

**Rue-Anemone. Meadow-Rue.**

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CALYX of 4 or 5, rarely (in *T. anemonoides*) 7 to 10, petaloid SEPALS, imbricated in æstivation, spreading or reflexed, caducous or deciduous. PETALS none. STAMENS indefinite, hypogynous: FILAMENTS capillary, filiform, clavate, or petaloid-dilated: ANTHERS fixed by the base, strictly innate, various in form; the cells opening longitudinally. PISTILS 3 to 15, crowded on the small receptacle: OVARY one-celled, one-ovuled: STIGMA usually sessile. OVULE suspended, anatropous; the raphe dorsal.

ACHENIA sessile or stipitate, longitudinally sulcate or many-angled, or inflated (in § *Tripterium* alate-triquetrous), pointed by the persistent stigma or its base. ALBUMEN between fleshy and corneous. EMBRYO minute, next the hilum: RADICLE superior.

HERBS, with perennial, usually fibrose roots, erect stems, and ternately-compound or supradecomposed leaves; the petioles and their branches often auriculate-dilated at the base: leaflets falling away separately by an articulation. Involucre none (the cauline leaves alternate), except in *T. anemonoides*. Flowers usually small, in compound panicles or corymbs, rarely racemose or umbellate, greenish, yellowish, or white, seldom purplish, often diœcio-polygamous.

ETYMOLOGY. *Θάλικτρον*, an ancient name, of obscure derivation.

PROPERTIES. The roots are scarcely acrid, and often yield a bitter and yellow coloring matter.

GEOGRAPHICAL DISTRIBUTION. This genus, of about 50 known species, is widely distributed through the northern temperate zone; a few are also found, in a corresponding climate, on the Himalaya Mountains and the equatorial Andes.

DIVISION. The genus comprises a variety of forms, and greatly needs revision. The North American species belong to three groups, viz. :—

- § 1. *THALICTRUM* proper. — Achenia sulcate-angled, ovoid or oblong, chiefly sessile, the seed conformed to the cell. Stigma elongated. Sepals caducous, shorter than the stamens. — Roots fibrose. Stems mostly branching and fistulous, alternate-leaved. Involucre none. Flowers small, mostly panicled, often diœcio-polygamous or strictly diœcious.
- § 2. *SYNDESMON*, *Hoffmansegg*. — Achenia and seed as in § 1. Stigma depressed. Sepals 5 - 10, longer than the stamens, merely deciduous. — Root grumous, or fasciculate-tuberous. Stem simple, leafless, except an involucre at the summit, like that of *Anemone*; consisting of 2 or 3 trifoliolate leaves with long-petiolulate leaflets, but destitute of common petioles, thus simulating a whorl of 6 or 9 long stalked simple leaves. Flowers few and umbellate, or single, pretty large, showy, perfect.
- § 3. *PHYSOCARPUM*, *DC.* — Achenia stipitate, inflated, veiny-striate or even, the cell much larger than the seed. Sepals merely deciduous. — Roots fibrose. Stems usually branching, alternate-leaved. Flowers corymbose, scattered, perfect or polygamous.

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PLATE 6. Fig. 1-8. *THALICTRUM (SYNDESMON) ANEMONOIDES*, *Michx.*

1. A stamen, magnified.
2. A separate pistil, magnified.
3. Transverse, and 4, vertical section of the same.
5. Detached ovule, magnified.
6. Head of ripe achenia, enlarged.
7. Separate achenium, enlarged.
8. Vertical section of the same, and of the seed, showing the embryo.
9. Enlarged flower of *T. (PHYSOCARPUM) CLAVATUM*, *DC.* (*Gray, in Sill. Jour.* 42. p. 17); — from the mountains of North Carolina.
10. A magnified stamen, from the same.
11. A pistil, magnified.
12. Vertical section of the same, showing the ovule.
13. Ovule, more magnified.
14. Vertical section of an achenium, seed, and embryo.
15. Embryo detached and much more magnified.

## PLATE 7.

TRAUTVETTERIA, *Fisch. & Mey.*

Calyx 3 – 5-sepalus, æstivatione imbricatus, sepalis concavis caducissimis. Petala nulla. Achenia plurima, utriculata, membranacea, dolabriformi-quadrangulata. Semen e basi adscendenti-erectum! Embryo majuscula! — Folia palmatifida. Involucrum nullum.

TRAUTVETTERIA, Fischer & Meyer, Ind. Sem. Petrop. 1835. p. 22.

TOFF. & Gray, Fl. N. Am. 1. p. 37. Endl. Gen. 4798.

HYDRASTIS, Lam. Ill. t. 500; non Linn.

CIMICIFUGÆ Sp., Michx. Fl. 1. p. 316.

CALYX of 3 to 5 orbicular and strongly concave SEPALS, imbricated in æstivation (when four in number, as is most common, two are exterior and two interior in the bud, but sometimes two are overlapped on one edge by the outer one, and the fourth is interior), petaloid (greenish-white), very caducous. PETALS none. STAMENS indefinite, hypogynous, in several series, much longer than the pistils, all perfect, white: FILAMENTS thickened upward or clavate: ANTHERS short, pointless; the elliptical cells separate, somewhat extrorsely adnate, opening longitudinally. PISTILS indefinite (20 or more), capitate on the short receptacle: OVARY compressed, gibbous, one-celled, one-ovuled: STIGMA recurved, unilateral. OVULE erect, ascending from the base of the cell, anatropous; the strong raphe ventral.

ACHENIA capitate, numerous, sessile, broadly ovate, gibbous, beaked by the recurved-uncinate persistent stigma or short style, utricular and membranaceous, entirely smooth and even, except the four prominent narrow ribs, which are one dorsal, the other ventral, bordering the acute angles, and the two others lateral, forming obtuse angles, the transverse section exactly rhombic: the ripe fruit inclines to open at one of the sutures. SEED very much smaller than the cell,

erect or ascending from next its base at the inner angle, obovate-oblong, smooth. EMBRYO oblong-linear, fully one third the length of the firm fleshy albumen: RADICLE inferior, next the hilum: COTYLEDONS narrowly oblong.

HERBS, smooth throughout or nearly so, perennial, with simple, or sparingly corymbose, fistulous stems from matted fibrose rootstocks, few alternate leaves, the upper small and bract-like, and rather handsome corymbose flowers. Radical leaves ample, long-petioled, palmately veined, palmately 5-11-cleft, with the lobes irregularly incised and toothed; the veins and veinlets conspicuous underneath, freely reticulated.

ETYMOLOGY. Dedicated to *E. R. Trautvetter*, a well-known botanist, now Professor at Kiev, in Southern Russia.

GEOGRAPHICAL DISTRIBUTION. The original species is found along shaded streams, throughout the Alleghany Mountains from Virginia southward, and along their western confines: it also occurs sparingly in Illinois, and apparently reappears in Northern Oregon. A second, but imperfectly known species has been recently indicated by Siebold and Zuccarini in Japan.

OBSERVATION. The genus seems to be about equally allied to *Thalietrum* and to *Hydrastis*.

PLATE 7. *TRAUTVETTERIA PALMATA*, *F. & M.*;—the upper part of a flowering plant, of the natural size. (From living specimens introduced into the Cambridge Botanic Garden from the mountains of Carolina.)

1. Diagram of the eustomary aestivation of the sepals.
2. Enlarged head of pistils, with one stamen remaining.
3. Stamen enlarged, seen from the inside.
4. Same, seen from the exterior.
5. Detached pistil, enlarged.
6. Same, with the ovary vertically divided, showing the ovule in place.
7. Ovule magnified.
8. Heads of fruit, natural size.
9. Utricular achenium, enlarged.
10. Transverse section of the same, and of the seed.
11. Vertical section of the same; the seed in place.
12. Magnified vertical section of the seed, showing the slender embryo, which is unusually large for this order, in the albumen.

## PLATE 8.

MYOSURUS, *Dill.*

Sepala basi deorsum calcarata. Petala calyce breviora, angusta, ungue filiformi ad apicem tubuloso-nectarifera. Achenia plurima, trigona, supra gynophorum elongatum spicata. Semen suspensum. — Acaulescentes, annuæ, pusillæ; foliis linearibus integerrimis, scapo unifloro.

MYOSURUS, Dillen. Nov. Gen. 106. Linn. Gen. 394. Gärtn. Fr. t. 74.  
Schkuhr, Handb. t. 88. DC. Syst. 1. p. 229. Endl. Gen. 4780.

**Mouse-tail.**

CALYX somewhat petaloid, imbricated in æstivation: SE-PALS 5, rarely 6 or 7, regular, oblong or spatulate, sessile, the base prolonged downward below the insertion into a pendent spur, deciduous. PETALS as many as the sepals and alternate with them, smaller than they, hypogynous, raised on a slender claw which is somewhat tubular and nectariferous at its summit; the narrowly oblong lamina plane, not longer than the claw. STAMENS 5 to 20, hypogynous: FIL-AMENTS filiform: ANTHERS oblong, slightly extrorse, the cells opening longitudinally. PISTILS very numerous, or 20 to 25, imbricated-spiked on a prolonged receptacle (gynophore): OVARY inserted by the whole length of the ventral suture, compressed, one-celled, one-ovuled: OVULE anatropous, suspended from the summit of the cell; the raphe dorsal: STYLE subulate, as long as the ovary, naked, stigmatose from the apex downward on the inner side.

FRUIT an elongated (cylindrical, linear, or oblong) spike of ACHENIA imbricated on the filiform and angled receptacle, thickened and somewhat corky in texture at maturity, broadest on the back, which is rhomboidal with thickened edges and a somewhat carinate medial line; the sides cuneiformly converging to the ventral edge, which is minutely

hairy, and inserted by its whole length, blunt in *M. minimus* (the short style not enlarging in fructification but incorporated with the back of the carpel), or in *M. aristatus*, *Benth.*, forming a projecting beak. SEED oval, conformed to the cell, suspended from its upper outer angle. ALBUMEN fleshy. EMBRYO minute, next the hilum, cordate, the short COTYLEDONS separated: RADICLE superior.

ACAULESCENT annuals or biennials, small and inconspicuous, with narrowly linear and entire radical leaves, and a naked one-flowered scape. Flower small, greenish-yellow: the receptacle very early exerted and prolonged.

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ETYMOLOGY. Name composed of  $\mu\upsilon\varsigma$ , a mouse, and  $\omicron\nu\acute{\rho}\acute{\alpha}$ , tail; from the appearance of the long spike of carpels in fruit.

GEOGRAPHICAL DISTRIBUTION, &c. The species of the valley of the Mississippi and northwestward, from which our figure is derived, appears not to be distinct from the common European and North Asiatic plant: but a second species, remarkable for its few and aristate carpels, has recently been detected in the Rocky Mountains by Mr. Geyer, as well as on the Andes of Chili.

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PLATE 9. *MYOSURUS MINIMUS*, *Linn.*; — from Missouri specimens; of the natural size.

1. Flower, enlarged.
2. Detached sepal, enlarged.
3. Detached petal, equally enlarged.
4. A stamen, enlarged; outside view.
5. Detached pistil, magnified.
6. Vertical section of the same, showing the ovule.
7. Receptacle in fruit, enlarged; all the upper achenia removed.
8. Achenium detached, seen laterally.
9. Transverse section of the same, more magnified.
10. Vertical section of the same, showing the seed in place.
11. Vertical section of the seed, magnified, showing the embryo.
12. Embryo, highly magnified.

## PLATE 9.

RANUNCULUS, *L.*

Sepala exappendiculata. Petala plana, dilatata, basi intus squamula vel foveola instructa. Achenia plurima, compressa, mucronata seu rostrata, supra gynophorum globosum cylindricumve capitata. Semen erectum.

RANUNCULUS, Linn. (excl. sp.) Hall. Helv. 2. p. 63. DC. Prodr. 1. p. 26. Torr. & Gray, Fl. N. Am. 1. p. 26. Endl. Gen. 4733.

**Crowfoot. Buttercup.**

CALYX herbaceous or slightly colored, imbricated in æstivation, regular; the SEPALs 5 (rarely 3 or 4), concave, deciduous. PETALS 5 (rarely more or fewer), alternate with the sepals, usually much larger than they, imbricated in æstivation, hypogynous, plane, dilated, the contracted base furnished on the inner side with a nectariferous depression or small adherent scale, deciduous. STAMENS hypogynous, indefinite, rarely few (5 or more): FILAMENTS filiform: ANTHERS short, extrorsely adnate, the cells opening longitudinally. PISTILS indefinite, capitate on a globular or cylindrical receptacle (gynophore): OVARY compressed, one-celled, one-ovuled: STYLE short, subulate: STIGMA occupying the inner side at its apex. OVULE erect or ascending from the inner angle next the base of the cell, anatropous; the raphe ventral.

FRUIT a head of compressed or turgid ACHENIA, pointed or beaked with the persistent and naked style. SEED erect, conformed to the cell. EMBRYO minute at the base of the corneous-fleshy albumen, next the hilum: RADICLE inferior.

HERBS of various habit and foliage, the cauline leaves, when present, alternate. Petioles dilated at the base. Involucre none. Flowers solitary, terminating the stem and branches, usually showy, yellow or sometimes white, very rarely purple.

ETYMOLOGY. An ancient Latin name, the diminutive of *Rana*, a frog, also applied by Pliny to aquatic species of this genus, which inhabit similar places.

PROPERTIES. The fresh juice is very acrid and poisonous, so much so in many species as to blister the skin or produce ulcers. But the acrid principle is so far dissipated in drying, that the Buttercups, which abound in every old meadow, are apparently innocuous in the hay.

GEOGRAPHICAL DISTRIBUTION. A genus of about 200 described species, dispersed over almost every part of the world; but chiefly belonging to temperate and frigid regions, and to the northern hemisphere.

DIVISION. The white-flowered aquatic species bear a nectariferous pit on the yellowish base of the petal, in place of the adherent scale; and the achenia are wrinkled transversely; these form the section *BATRACHIUM*, DC. The sections *Ranunculastrum*, *Hecatonia*, and *Fchinella*, of De Candolle, which all have the squamula on the base of the petals, are distinguished by characters of less moment, and may rather be taken as subdivisions of the higher group, *RANUNCULUS* proper.

NOTE. The genus *Hamadryas*, which on p. 11 was referred to the Subtribe Adonideæ, on the authority of the character "ovulo unico pendulo" by Endlicher, has an erect ovule, and must stand next to *Ranunculus*; as is well shown by Dr. Hooker (*Flora Antarctica*, p. 227. t. 85).

PLATE 9. *RANUNCULUS FASCICULARIS*, Muhl.; — natural size, with its fasciculate thickened roots. (From a plant indigenous at Cambridge: a common vernal species.)

1. Sepal detached and moderately enlarged.
2. Petal, equally enlarged; inside view.
3. Stamen enlarged; inside view.
4. Same, seen from the outside.
5. A pistil detached and magnified.
6. Same, with the ovary divided, showing the ovule.
7. Ovule, more magnified.
8. Vertical section through a head of pistils in fruit, enlarged.
9. An achenium, magnified.
10. Vertical section of an achenium and the inclosed seed, magnified, showing the embryo.

## PLATE 10.

## CALTHA, L.

Calyx 4 – 10-sepalus, petaloidens, regularis, deciduus. Petala plane nulla. Folliculi 5 – 15, sessiles, compressi, patentes, polyspermi. — Folia rotundata vel cordata, indivisa.

CALTHA, Linn. Gærtn. Fr. t. 118. DC. Syst. I. p. 306 (excl. § 1).

POPULAGO, Tourn. Inst. p. 273. t. 145.

**Marsh Marigold.**

CALYX regular, imbricated in æstivation: SEPALs petaloid, ovate or oblong, spreading, plane, deciduous. PETALS entirely wanting. STAMENS indefinite, hypogynous: FILAMENTS filiform: ANTHERS oblong, innate or slightly extrorse, the cells opening longitudinally at the margins. PISTILS 5 to 15, sessile on the small or depressed receptacle, one-celled, many-ovuled: STYLE none, or a short point stigmatose on the inner side. OVULES indefinite, occupying the ventral suture in two rows, horizontal, anatropous; their raphes collateral (next the suture, or face to face).

FRUIT follicular. FOLLICLES as many as the ovaries, or by abortion fewer, verticillate, or when numerous capitate, soon divergently spreading, sessile, short-pointed, coriaceo-membranaceous in texture, compressed, dehiscent by the whole length of the ventral suture, soon opening flat, bearing a row of seeds upon each margin. SEEDS horizontal, oval, the smooth and rather thick testa extended into a wing-like border at the raphe and chalaza. ALBUMEN fleshy. EMBRYO minute, next the hilum: COTYLEDONS very short, separate.

HERBS smooth, with simple or sparingly branched fistulous stems, or scapes, rising from perennial and often creeping rootstocks, and bearing several or solitary, terminal, large and showy vernal flowers. Calyx golden-yellow, or rarely white. Leaves ample, rounded, crenate-toothed or entire,

veiny, mostly cordate or reniform; the few cauline or the uppermost nearly sessile, alternate; the radical ones long-petioled. Petioles dilated and sheathing, and often stipuliform at the base.

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ETYMOLOGY. From *κάλυθος*, a *goblet*, in allusion to the golden flower-cup, or calyx, of the common species.

PROPERTIES. Somewhat acrid when fresh. The vernal herbage of the common *C. palustris* is largely used in this country as a pot-herb, under the erroneous, but widely diffused, name of *Cowslips*: the acidity is destroyed by boiling.

GEOGRAPHICAL DISTRIBUTION. A genus of few species, widely distributed through the colder temperate and frigid zones of the northern hemisphere, inhabiting wet places. — The singular, oligandrous and oligospermous, antarctic species are surely of a different genus.

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PLATE 10. *CALTHA PALUSTRIS*, *Linn.*; — upper part of a flowering plant; of the natural size.

1. Stamen, magnified; inside view.
2. The same, outside view.
3. A pistil, enlarged.
4. Vertical section through the ovary of the same.
5. Ovule, magnified.
6. Head of follicles, of the natural size.
7. Follicle, opening by the ventral suture.
8. Same, after dehiscence, the seeds discharged.
9. Seed, magnified.
10. Vertical section of the same, showing the embryo in the albumen.
11. Embryo, more magnified.

## PLATE 11.

## TROLLIUS, L.

Calyx 5 – polysepalus, petaloideus, regularis, deciduus. Petala 5 – 20, parva, nectariformia, ligulata, basi intus subtubulosa. Folliculi sessiles, plurimi, cylindracei, polyspermi. — Herbæ Ranunculi facie, foliis palmatifidis.

TROLLIUS, Linn. Gen. 700. Gærtn. Fr. t. 118. Lam. Ill. t. 499. Salisb. in Linn. Trans. 8. p. 302. DC. Syst. 1. p. 311. Endl. Gen. 4787. GEISSENIA, Raf. in New York Med. Rep. (5.) 2. p. 450.

**Globe-Flower.**

CALYX petaloid, regular, imbricated in æstivation: SEPALs 5 to 20, orbicular or obovate, remaining incurved, so as to give a globular form to the flower (whence the popular name for *T. Europæus*), or spreading, deciduous. PETALS 5 to 20, hypogynous, small, little exceeding or shorter than the stamens, which they somewhat resemble, ligulate or linear-spatulate, thickish, gland-like, slightly unguiculate, somewhat excavated or tubular on the inner side next the base, deciduous. STAMENS indefinite, hypogynous: FILAMENTS filiform: ANTHERS short, innate, the cells opening laterally, or slightly introrse. PISTILS 9 to 30, sessile on the globular summit of the receptacle (gynophore): OVARY one-celled, many-ovuled, tapering into a short STYLE; the STIGMA unilateral at its summit. OVULES numerous, anatropous, horizontal in two rows occupying the whole length of the ventral suture; their raphes collateral (face to face).

FRUIT follicular. FOLLICLES 9 to 30, capitate, closely sessile, erect or barely spreading, coriaceous, nearly cylindrical, transversely veiny from the dorsal rib, from which is exerted the subulate short style, deliscent through the ventral suture from the apex downward. SEEDS horizontal, in two rows, 5 to 10 in each, ovoid or angled: the smooth and

coriaceous testa conformed to the nucleus; the raphe not appendaged. EMBRYO minute at the base of the fleshy albumen, cordate; the RADICLE next the hilum.

HERBS smooth, with much the aspect of *Ranunculus*; the mostly simple and fistulous stems rising from fibrose-fascicled blackish roots, and terminated by solitary large flowers. Leaves alternate, palmately 5-7-parted, with the cuneiform divisions incisely cleft and toothed; the uppermost nearly sessile. Petioles dilated at the base, and more or less clasping. Flower yellow.

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ETYMOLOGY. Thought to be derived from the German *trollen*, *to roll*, from the globular shape of the flower in the original European species, the *Globe-flower* of the gardens; — a name by no means appropriate for the other species, in which the floral envelopes are more or less widely expanded.

PROPERTIES. Slightly acrid. T. Europæus, especially, is cultivated for its showy vernal flowers.

GEOGRAPHICAL DISTRIBUTION. Natives of the colder portion of the northern hemisphere, in moist and shady places; one species in Europe, five in Northern Asia, and one in North America.

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PLATE 11. *TROLLIUS LAXUS*, *Salisb.*; — summit of a flowering plant (Botanic Garden, from W. New York); natural size.

1. A petal, magnified; seen externally.
2. Same, seen from within.
3. Side view of the same (badly engraved).
4. A stamen, magnified; seen externally.
5. Same, seen from the inner side.
6. Pistils, the rest of the flower removed from the receptacle; enlarged.
7. A pistil, detached.
8. Transverse section of the ovary of the same.
9. Vertical section of the same.
10. Head of fruit; of the natural size.
11. Detached follicle, dehiscient; inside view.
12. A seed, magnified.
13. Vertical section of the same, displaying the embryo.

## PLATE 12.

## ISOPYRUM, L.

Calyx 5-6-sepalus, petaloideus, regularis, deciduus. Petala 5, brevissima, nectariformia, basifixæ, seu nulla. Folliculi sessiles, 2-20, membranacei, compressi, oligo-polyspermi. — Folia ternatim composita, Thalictri facie.

ISOPYRUM, Linn. Juss. Gen. p. 232. Gært. Fr. t. 65. Schkuhr, Handb. t. 153. DC. Syst. I. p. 323. Ledeb. Fl. Alt. 2. p. 298. Torr. & Gray, Fl. N. Am. I. p. 660.

Subgen. ENEMION. — Petala nulla. Ovula pauca, 1-seriata.

ENEMION, Raf. in Jour. Phys. 91. p. 70. Torr. & Gray, l. c. p. 29. Endl. Gen. 848.

CALYX petaloid, regular, imbricated in æstivation: SEPALs 5, sometimes 6, spreading, ovate, deciduous. PETALS, in species of the Old World, very short and tubular, 1-2-lipped, in the North American none. STAMENS numerous, hypogynous: FILAMENTS filiform or flattened: ANTHERS innate, the oblong cells opening on the margins longitudinally. PISTILS few or several; sessile on the globular receptacle: OVARY one-celled, pointed with the distinct STYLE, which is stigmatose from the apex down the inner side. OVULES anatropous, few (3 to 10) in a single series and more or less ascending, or numerous in two rows and horizontal, with the raphes collateral.

FOLLICLES 3 to 20 (rarely solitary), membranaceous, veiny or reticulated, more or less compressed, beaked with the subulate style, dehiscent through the ventral suture. SEEDS few or numerous, mostly horizontal; the testa crustaceous, smooth or minutely pubescent, or sometimes granulate-scabrous. EMBRYO minute, next the hilum, at the base of the fleshy albumen.

HERBS of small size, with fibrous, and sometimes grumous roots, slender stems, and ternately-compound alternate leaves.

Leaflets lobed. Petioles commonly auriculate-dilated at the base, forming a small stipuliform appendage on each side. Flowers white or light yellow, small or middle-sized, terminating the stem and branches.

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ETYMOLOGY and PROPERTIES. A name given by Dioscorides to a Grecian plant (probably *Fumaria capreolata*), formed of ἴσος, *equal*, and πύρος, *wheat*. Slightly acrid plants, of no known importance.

GEOGRAPHICAL DISTRIBUTION. A genus of few species, sparingly scattered over the northern temperate zone. The two North American species are remarkable for being apetalous: that of the United States has just the aspect of the European *I. thalictroides*, *L.*; while the Californian species is more like the Siberian *I. fumarioides*, *L.* Two other species belong to the Altaic and Himalayan Mountains, and a seventh to Japan.

NOTE. The analyses in Plate 12 having been made from dried specimens, with aid of a former sketch in which this point was not particularly attended to, we are not sure that the raphe is correctly represented as ventral; but the ovules, which are only two or three in number, are certainly superposed in a single series.

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PLATE 12. *ISOPYRUM (ENEMION) BITERNATUM*, Torr. & Gray;— plant from Ohio (*Sullivant*), of the natural size.

1. A stamen, magnified.
2. The pistils, on the receptacle, magnified.
3. Vertical section of a pistil, magnified.
4. Pistils in fruit, the ripe follicles divaricate; enlarged.
5. A seed, magnified; showing the thick raphe.
6. Vertical section of the same, displaying the embryo at the base of the albumen.

## PLATE 13.

COPTIS, *Salisb.*

Calyx 5-6-sepalus, petaloideus, regularis, deciduus. Petala totidem, unguiculata; apice lamina glandulæformia dilatato-cucullata, nunc caudato-appendiculata. Folliculi 3-10, longe stipitati, stellato-patentes, oligospermi. — Acaulescentes, foliis trifoliolatis ternatimve compositis, scapoque nudo uni-paucifloro, e rhizomate flagelliformi fibrilloso.

COPTIS, *Salisb.* in *Linn. Trans.* 8. p. 305. *DC. Syst.* 1. p. 321. *Torr. & Gr. Fl. N. Am.* 1. p. 23. *Endl. Gen.* 4792.

HELLEBORI *Sp.*, *Linn. Amœn.* 2. p. 355. t. 4. etc.

CHRYZA, *Raf. in Desv. Jour. Bot.* 2. p. 170, & *New York Med. Rep.*

COPTIS, CHRYSOCOPTIS, & PTEROPHYLLUM, *Nutt.*

**Gold-thread.**

CALYX petaloid (white or greenish-white), regular, imbricated in æstivation: SEPALS ovate-oblong or linear, spreading, or at length reflexed, early deciduous. PETALS as many as the sepals and alternate with them, hypogynous, unguiculate, equalling or shorter than the stamens; the gland-like apex thickened, cucullate-dilated and inappendiculate, or produced into a filiform caudate appendage much exceeding the stamens. STAMENS 13 to 30, shorter than the sepals, hypogynous: FILAMENTS filiform: ANTHERS oval, innate, the cells opening longitudinally. PISTILS 3 to 10, verticillate, at first short-stipitate or almost sessile and erect, but spreading and the stipe elongating after fecundation: OVARY one-celled, several-ovuled, pointed with a short and often recurved STYLE, which is stigmatose down the inner face. OVULES 10 to 24, anatropous, horizontal in two series; the raphes collateral.

FOLLICLES 3 to 10, ovate or oblong, raised on slender stipes, membranaceous, few- (4-10-) seeded. SEEDS small, horizontal, oval; the smooth and shining testa conformed or nearly so to the nucleus. EMBRYO minute, at the base of the albumen, cordate; the RADICLE next the hilum.

ACAULESCENT, low and slender, smooth and shining herbs ; with trifoliolate or ternately-decompound radical leaves, on slender petioles, and a 1 - 4-flowered naked (minutely 1 - 2-bracteate) scape, rising in early spring from a kind of scaly bud, borne at the extremity of a long and filiform, extensively creeping, orange-colored, fibrillose rhizoma. Leaves persistent through the winter : leaflets incised and toothed.

ETYMOLOGY. From κόπτω, *to cut*, alluding to the divided leaves.

PROPERTIES. The yellow rootstocks and roots are intensely bitter : the infusion is used as a tonic, and as a topical application to aphthous ulcerations.

GEOGRAPHICAL DISTRIBUTION. Natives of the colder northern temperate zone, in damp shady woods and bogs. One species extends round the world ; the others are Northwest American and Asiatic.

DIVISION, &c. In a specimen of *Chrysocoptis occidentalis*, *Nutt.*, from Geyer's Oregon collection, the petals are constructed just as in *C. asplenifolia* ; that is, the lamina is glandular-thickened and more or less encullate next the apex of the claw, and then continued upwards into a very long, ligulate-filiform tail ; — thus leaving no real distinction between *Chrysocoptis* and the section *Pterophyllum*. Furthermore, the two Japanese species recently described by Zuccarini resemble the latter, except that their petals are not thus prolonged. It appears, therefore, that only two subgenera can now be characterized, viz.

§ 1. *CHRYSA*. (*Chryza*, *Raf.*) — Sepals oval. Petals very small, glandulaiform, obconical-dilated and cucullate at the apex, not appendiculate. — Scape 1-flowered. Leaves simply trifoliolate. (*C. trifolia*.)

§ 2. *CHRYSOCOPTIS*. (*Chrysocoptis* & *Pterophyllum*, *Nutt.*) — Sepals linear or narrowly ligulate. Petals with an involute-cucullate lamina, either elliptical and inappendiculate, or produced into a long filiform appendage. — Scape 2 - 4-flowered. Leaves 1 - 2-ternately compound.

PLATE 13. *COPTIS TRIFOLIA*, *Salisb.* ; — flowering plant, natural size.

1. Flower, enlarged.
- 2, 3. Magnified petals ; the former an inside, the other an outside view.
4. A stamen, magnified.
5. Pistils and receptacle, magnified.
6. One of the pistils, detached.
7. Transverse section, and 8, vertical section, of the same.
9. Fruit (shorter-stalked than usual), of the natural size.
10. A seed, magnified.
11. Vertical section of the same, showing the embryo.

## PLATE 14.

AQUILEGIA, *Tourn.*

Calyx 5-sepalus, petaloideus, regularis, deciduus. Petala 5, consimilia, margine limbi obliqui affixa, inter sepala deorsum in calcar cavum infundibuliforme longe producta. Folliculi 5, conniventes, sessiles, polyspermi. — Caules paniculato-ramosi: folia bi-triternata.

AQUILEGIA, *Tourn. Inst. t. 242. Linn. Gen. 681. Gærtn. Fr. t. 118. DC. Syst. 1. p. 333. Endl. Gen. 4795.*

**Columbine.**

CALYX petaloid, regular, imbricated in æstivation: SEPALS 5, spreading, ovate or oblong, deciduous. PETALS 5, all similar in size and shape, hypogynous, inserted by the inner margin or lip of the oblique expanded limb, alternate with the sepals, and produced backwards between them into a long infundibuliform-tubular spur. STAMENS indefinite, hypogynous, obscurely collected into 5 to 10 clusters: FILAMENTS filiform and elongated; some of the innermost abortive, destitute of anthers, and converted into membranaceous scales which collectively surround the ovaries: ANTHERS oval, innate, the cells opening lengthwise laterally. PISTILS usually 5, sessile, erect or appressed: OVARY cylindraceous, one-celled, many-ovuled: STYLE filiform, elongated: STIGMA unilateral at the apex. OVULES indefinite, occupying the whole length of the ventral suture in two series, horizontal, anatropous; the raphes collateral.

FOLLICLES usually 5, sessile, erect and appressed, nearly cylindrical, veiny, tipped with the slender persistent styles, dehiscent through the ventral suture from the apex downward. SEEDS numerous, in two series, horizontal, small, oval, smooth and shining; the crustaceous testa conformed to the nucleus. EMBRYO minute, at the base of the corneous-fleshy albumen, cordate; the RADICLE next the hilum.

HERBS, with erect and usually paniculate-branching stems, from thickened and fibrose perennial roots; the alternate leaves bi-trinately compound; and the large and showy flowers singly terminating the stem and branches. Lower leaves long-petioled; the uppermost sessile, or reduced to bracts. Petioles more or less dilated at the base. Leaflets roundish, incisedly lobed, glaucous underneath.

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ETYMOLOGY. Name from *aquila*, an eagle; perhaps in allusion to some fancied resemblance of the spur-shaped petals (*nectaries* of the older botanists) to talons.

PROPERTIES, &c. Rather bitter and astringent, but the seeds are acrid. — The common European Columbine (*A. vulgaris*, *L.*) is cultivated in every garden as an ornamental flower; and our own wild species, which everywhere adorns our rocks and sterile hills in spring, is equally showy, and much more elegant and graceful.

GEOGRAPHICAL DISTRIBUTION. A genus of nearly 30 known species, distributed over the cooler portions of the northern temperate zone. Only one species is indigenous within the proper United States.

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PLATE 14. *AQUILEGIA CANADENSIS*, *Linn.*; — summit of a stem in flower and fruit, of the natural size.

1. A sepal, detached.
2. A petal, detached.
3. One of the sterile filaments.
- 4, 5. Stamens.
6. An anther, enlarged.
7. The pistils, on the receptacle.
8. A pistil, magnified; the ovary divided longitudinally.
9. A separate pod at maturity.
10. A seed, magnified.
11. Vertical section of the same, showing the embryo in the albumen.
12. Embryo separated, and highly magnified.

## PLATE 15.

DELPHINIUM, *Tourn.*

Calyx 5-sepalus, petaloideus, irregularis; sepalo extimo majore basi calcarato. Petala 4, biformia (nonnunquam inter se coalita); 2 superiora in appendicem calcariformem inter calcar calycinum retrusum producta. Folliculi 1-5, polyspermi. — Folia palmatifida vel bi-triternatisecta.

DELPHINIUM, *Tourn.* Inst. t. 241. Linn. Gen. 861. Gærtn. Fr. t. 65.  
Schkuhr, Handb. t. 145. DC. Syst. 1. p. 340. Endl. Gen. 4796.

**Larkspur.**

CALYX petaloid, of 5 irregular SEPALS, imbricated in æstivation; the larger and upper sepal (outermost in the bud) produced backwards from the base into a large hollow spur; the others plane, spreading, all deciduous. PETALS 4, smaller than the sepals, hypogynous, irregular and unsymmetrical, in two pairs; the upper produced backwards from the insertion into spurs which are received into the spur of the calyx; the lower unguiculate, often with the lamina two-cleft: or all four petals coalescent into one body of irregular form in § *Consolida* (which is also remarkable for having a single pistil). STAMENS numerous, hypogynous, short and included: FILAMENTS subulate from a dilated base: ANTIERS oval, innate, the cells opening longitudinally. PISTILS 3 or 5, sometimes only one, sessile: OVARY one-celled, many-ovuled: STYLE subulate: STIGMA unilateral at the (entire or two-toothed) apex. OVULES indefinite, horizontal in two series, occupying the whole length of the ventral suture, anatropous; the raphes collateral.

FOLLICLES sessile, chartaceous, pointed with the short style, few-many-seeded, dehiscent down the ventral suture. SEEDS in two series, horizontal; the rather fleshy or spongy

testa conformed to the nucleus. EMBRYO minute at the base of the fleshy albumen : RADICLE next the hilum.

HERBS, with upright and usually branching stems, alternate and palmately five-parted or bi-triternately dissected leaves, and showy flowers, commonly in a terminal raceme or panicle. Petioles dilated at the base. Pedicels often bracteolate. Roots annual, biennial, or perennial, then frequently fasciculate-thickened.

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ETYMOLOGY. The ancient name, from *δελφίν*, a *dolphin*; in allusion to the shape of the flowers.

PROPERTIES. Acrid and bitter, especially the seeds. — The active properties are owing to a peculiar principle, called *delphinia*, which especially abounds in *D. Staphysagria*, *L.*, of Southern Europe. The seeds of this species, under the name of *stavesacre*, have long been used as a popular remedy against parasitic vermin. — Several very ornamental species of Larkspur are common in cultivation.

GEOGRAPHICAL DISTRIBUTION. A genus of about 70 known species, distributed throughout the northern temperate zone, chiefly in the warmer and unwooded portions.

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PLATE 15. DELPHINIUM TRICORNE, *Michx.* (from Ohio); — natural size, but shortened; showing both flowers and fruit.

1. Flower with the sepals detached and displayed.
2. One of the upper petals, a little enlarged.
3. One of the lower petals; inside view.
4. A stamen, enlarged.
5. The pistils and receptacle, magnified.
6. Transverse section of an ovary, magnified.
7. Vertical section of the same.
8. A seed, magnified.
9. Vertical section of the same, displaying the minute embryo at the base of the albumen.

## PLATE 16.

ACONITUM, *Tourn.*

Calyx 5-sepalus, petaloideus, irregularis; sepalo extimo amplo cassidæformi, lateralibus orbiculatis, anticis oblongis. Petala 2 superiora longe unguiculata, apice cucullifera, sub casside recondita; 3 inferiora minima, unguiformia, vel sæpe obsoleta. Folliculi 3-5, polyspermi. — Folia palmatifida.

ACONITUM, *Tourn. Inst.* t. 239, 240. *Gärtn. Fr.* t. 65. *Schkuhr, Handb.* t. 145. *DC. Syst.* 1. p. 364. *Endl. Gen.* 4797.

**Monk's-hood. Wolf's-bane.**

CALYX petaloid, of 5 unequal and irregular SEPALS, imbricated in æstivation, deciduous or marcescent; the upper one (called the GALEA) much larger than the others and covering them in the bud, helmet-shaped; the two lateral broad and rounded; the two lower smaller and oblong. PETALS 2, concealed under the galea, consisting of a very small oblong and emarginate lamina, produced backwards into a short and incurved callous spur, and raised on a very long and slender claw; the 3 lower minute and resembling sterile filaments, or wanting. STAMENS numerous, hypogynous: FILAMENTS short, subulate from a membranaceous dilated base, above recurved-spreading: ANTHERS short, innate or slightly introrse (extrorse, *Ledeb.*), the cells opening longitudinally. PISTILS 3 to 5, sessile: OVARY one-celled, many-ovuled: STYLE subulate: STIGMA unilateral at the apex, often two-toothed. OVULES indefinite, horizontal in two series, occupying the whole length of the ventral suture; the raphe collateral.

FOLLICLES sessile, chartaceous or membranaceous, oblong, tipped with the short style, many-seeded, dehiscence down the ventral suture. SEEDS horizontal, in two series; the thickened and spongy testa rugose, often appearing as if

squamigerous. EMBRYO minute, at the base of the fleshy albumen: RADICLE next the hilum.

HERBS, either erect, reclining, or trailing; with perennial, often tuberous or thickened and fascicled roots, and simple or branching leafy stems, bearing large and showy flowers in terminal racemes or panicles. Leaves alternate, palmately 3-5-parted or cleft; the divisions usually incised or many-cleft. Petioles mostly dilated at the base. Pedicels bracteolate.

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ETYMOLOGY. 'Ακόνιτρον, the ancient name; by some supposed to be derived from *Acone*, a town in Bithynia. The popular name of *Monk's-hood* is evidently derived from the shape of the upper sepal, especially in the section *Napellus*; and that of *Wolf's-bane*, from the use which was made of some species in Europe for poisoning wolves.

PROPERTIES. Deadly narcotico-acrid poisons, especially the root, owing to the presence of a peculiar alkaloid principle, which has been called *aconita*. The leaves of several species have been used in medicine. — Several are cultivated for their showy flowers.

GEOGRAPHICAL DISTRIBUTION. A genus of 30 or 40 described species, natives of the northern temperate zone, chiefly in the colder regions or on mountains. The two species of the United States (namely, *A. reclinatum*, *Gray*, which is nearly white-flowered, and allied to the European *A. Lycoctonum*, and *A. uncinatum*, *L.*) belong to the Alleghany Mountains, or nearly so.

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PLATE 16. *ACONITUM UNCINATUM*, *Linn.*, — summit of a stem in fruit and flower; of the natural size.

1. Flower with the sepals and (two) petals detached.
2. Diagram of the aestivation of the calyx.
3. Vertical section through the enlarged flower, dividing the galea, showing one petal in place, &c.
4. A magnified stamen; inside view.
5. The same, seen from the outer side.
6. A-pistil, magnified.
7. The same, with the ovary divided longitudinally.
8. Transverse section of the same.
9. An ovule, more magnified.
10. A seed, magnified.
11. Vertical section of the same.
12. Embryo, detached, and highly magnified.

## PLATE 17.

ZANTHORHIZA, *Marshall*.

Calyx 5-sepalus, coloratus, regularis. Petala 5, brevia, glandulæformia, breviter unguiculata, apice dilatata truncato-biloba. Stamina 5-10. Folliculi 5-10, stylum brevem cito dorsalem gerentes, abortu monospermi. Semen pendulum, raphe ventrali. — Suffrutex nanus; caulibus intus flavis; racemis compositis pendulis, deinde foliis pinnatisectis, e gemma terminali squamosa primo vere erumpentibus.

XANTHORHIZA, Marsh. Arbust. Amer. p. 168. Endl. Gen. 4803.

ZANTHORHIZA, L'Her. Stirp. p. 79. t. 38. Juss. Gen. p. 234. Barton, Elem. Bot. t. 12. DC. Syst. 1. p. 386. Torr. & Gray, Fl. N. Am. 1. p. 40.

**Shrub Yellow-root.**

CALYX colored (dark and dull purple), imbricated in æstivation, regular; the SEPALS 5, lanceolate-ovate, acute, spreading, deciduous. PETALS 5, alternate with the sepals and much smaller than they, hypogynous, gland-like, fleshy, raised on a short claw; the dilated roundish lamina emarginate-two-lobed, the upper face excavated-glandular. STAMENS 5, alternate with the petals, or sometimes 10, hypogynous: FILAMENTS short: ANTHERS introrse, the elliptical cells separated below by the thickened connective, opening longitudinally. PISTILS 5 to 10, sessile: OVARY oblong-ovate, one-celled: STYLE subulate, incurved, stigmatose down the inner face. OVULES a single pair (rarely more?) borne on the middle of the ventral suture, collateral, anatropous, at first horizontal, soon pendulous, and with the raphes ventral.

FOLLICLES 5 to 10, oblong, membranaceous, ventricose-compressed, becoming gibbous by unequal growth, in such a manner that the ovuliferous or middle portion of the ventral suture in the ovary becomes the summit of the pod, and the short persistent style, which marks the original apex,

becomes deeply dorsal: ventral suture tardily dehiscient. SEED solitary (by the abortion of one of the ovules), pendulous from the apparent summit of the pod, scarcely one fourth its length, oblong-obovate, smooth and even, marked with a narrow ventral raphe. ALBUMEN fleshy. EMBRYO minute; the RADICLE next the hilum.

SHRUB low, with long yellow roots and creeping rootstocks, sending up simple or sparingly branched woody shoots (one or two feet in height), which are strongly marked with half-annular scars left from the dilated bases of the fallen (alternate) leaves, terminated by a kind of scaly bud; from which arise, in early spring, the panicled or compound slender and drooping racemes, and the pinnately 3-7-foliate leaves; the former a little precocious, and occupying the base of the branch of the season. Leaflets membranaceous, sessile, ovate or oblong, incised and toothed, often 2-3-cleft or parted. Flowers small, numerous, dark purple, sometimes polygamous. Bracts and bractlets subulate, minute.

ETYMOLOGY AND PROPERTIES. Name compounded of *ξανθός*, *yellow*, and *ρίζα*, *root*; in allusion to the color of the roots, which, as also the inner bark, wood, and pith, are pervaded with a bright yellow coloring matter, said to have been employed by the aborigines as a dye: it is intensely bitter, and has been used as a tonic.

GEOGRAPHICAL DISTRIBUTION. The single species of the genus belongs to the United States alone, and chiefly to the vicinity of the Alleghany Mountains, growing on rocky and shaded banks along streams.

PLATE 17. *ZANTHORHIZA APHIFOLIA*, *L'Her.*; — the summit of a flowering stem; of the natural size. (Botanic Garden, Cambridge.)

1. A flower, enlarged.
2. A petal, magnified; back view.
3. Same, seen from above.
4. A stamen, magnified; inside view.
5. The pistils, magnified.
6. Vertical section of one of them, showing the ovules.
7. Vertical section of a fertilized ovary, magnified.
8. The ripe follicles, thrice the natural size.
9. Vertical section of a follicle, magnified, showing the single seed.
10. Seed, more magnified.
11. Vertical section of the same, showing the embryo.

## PLATE 13.

HYDRASTIS, *L.*

Calyx 3-sepalus, petaloideus, caducissimus. Petala nulla. Ovaria plurima, 2-ovulata, in capitulum congesta; fructu baccata rubiformi. — Caulis uniflorus, e rhizomate flavo, di-triphyllus; foliis palmatifidis.

HYDRASTIS, Linn. Gen. 704. DC. Syst. 1. p. 217. Barton, Veg. Mat. Med. 2. t. 26. Hook. Bot. Mag. t. 3019, 3232. Torr. & Gray, Fl. 1. p. 40. Endl. Gen. 4777.

WARNERIA, Mill. Ic. 2. p. 190. t. 235.

**Yellow Puccoon. Orange-root.**

CALYX of 3 thin and membranaceous ovate SEPALS, imbricated in æstivation, greenish-white, caducous when the flower opens. PETALS none. STAMENS indefinite, hypogynous: FILAMENTS filiform, somewhat thickened upwards: ANTHERS innate, or slightly extrorse; the oblong cells separated by a thickish connective, opening longitudinally. PISTILS 12 to 20, capitate and sessile on the short receptacle: OVARY ovate, fleshy, one-celled, two-ovuled: STYLE short and thick: STIGMA bilamellate, terminal. OVULES at first collateral, borne on the middle of the ventral suture, ascending, between anatropous and amphitropous.

FRUIT consisting of the baccate matured ovaries densely capitate-imbricated on the oblong receptacle, bright crimson, and resembling a raspberry. SEEDS single or two (one above the other) in each carpel, broadly obovate, turgid, inserted by a linear hilum; the crustaceous testa smooth and shining. ALBUMEN fleshy and oily. EMBRYO minute, next the micropyle: RADICLE inferior (pointing to the base of the fruit).

HERB with a thick, knotty rhizoma (imbued with a yellow juice), sending up in early spring a long-petioled leaf and a simple stem, which is naked below, alternately two-

(or rarely three-) leaved near the summit, and terminated by a greenish-white flower. Leaves rounded-cordate, becoming large (4 to 10 inches broad) after flowering, and somewhat resembling those of the Grape-vine, palmately 5-7-cleft, toothed and doubly serrate, veiny; the upper near the flower and sessile; the lower petioled. Petioles dilated at the base.

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ETYMOLOGY unexplained. Possibly from ἵδωρ, *water*, and δράω, *to act*; in allusion to the medicinal properties of the plant.

PROPERTIES much like those of Zanthorhiza. The bitter rootstock is tonic, and apparently somewhat narcotic. Its yellow juice was used by the aborigines for dyeing.

GEOGRAPHICAL DISTRIBUTION. The single species is a native of the Northern United States and Canada, in damp woods.

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PLATE 18. HYDRASTIS CANADENSIS, *Linn.*; — natural size, in flower; the caducous sepals fallen. (Botanic Garden, Cambridge.)

1. Diagram of the æstivation of the calyx.
2. A fallen sepal, enlarged.
3. A stamen, magnified.
4. A pistil, magnified.
5. Vertical section of the ovary of the same.
6. An ovule, more magnified.
7. Pistils in fruit; natural size.
8. Vertical section of the same.
9. A seed, magnified. (The hilum in this, as also in the next figure, is wrongly represented. It is not so salient, but is linear and longer, and extends downward nearly to the smaller end of the seed.)
10. Vertical section of the same, showing the embryo.
11. Embryo detached, highly magnified.

## PLATE 19.

## ACTÆA, L.

Calyx 3 – 5-sepalus, petaloidens, caducus. Petala seu staminodia 4 – 10, plana, integerrima, spatulata. Ovarium unicum, baccatum, polyspermum. Semina horizontalia. — Folia bi – triternatisecta. Racemus brevis.

ACTÆA, Linn. Gærtn. Fr. t. 114. Fisch. & Meyer, Ind. Petrop. 1835. p. 20. Torr. & Gray, Fl. N. Am. 1. p. 35. Endl. Gen. 4799.

ACTÆA, Sect. CHRISTOPHORIANA, DC. Syst. 1. p. 384.

CHRISTOPHORIANA, Tourn. Inst. p. 299, t. 154.

**Baneberry.**

CALYX of 3 to 5 ovate and concave petaloid SEPALS, imbricated in æstivation, regular, caducous. PETALS 4 to 10, shorter and much smaller than the sepals, flat, spatulate or oblong, more or less unguiculate, hypogynous. STAMENS indefinite, hypogynous: FILAMENTS filiform: ANTHERS innate, slightly introrse, the oval cells separated by a narrow connective, opening longitudinally. PISTIL single, sessile: OVARY ovoid-oblong, grooved at the ventral suture, one-celled, many-ovuled: STIGMA sessile, depressed-dilated, somewhat two-lobed. OVULES very numerous, horizontal, in two series, occupying the whole length of the ventral suture, anatropous; the raphes collateral.

FRUIT a many-seeded oval BERRY, usually with a groove at the ventral suture. SEEDS very numerous, horizontal, flat (depressed), and somewhat semicircular, closely packed in two series, filling the cell; the thickish and coriaceous testa smooth and even. EMBRYO minute, next the hilum, at the base of the fleshy albumen, cordate.

HERBS, with perennial matted roots, and usually tuberous and knotty rootstocks, sending up in spring mostly simple stems, bearing one or two alternate bi – triternately-compound leaves, and an oblong or ovoid terminal raceme of

white flowers. Radical leaves similar to the cauline, but larger. Petioles dilated at the base. Leaflets ovate, acute, sharply incised and toothed, commonly 2-3-lobed. Braets minute. Raceme more or less elongated in fruit; the berries bright red, purple, or white.

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ETYMOLOGY. Ἄκτῆα, an ancient name of the Elder; transferred by Linnaeus to this genus.

PROPERTIES. Nauseous and acrid-narcotic, poisonous, especially in a fresh state, both the root and the berries.

GEOGRAPHICAL DISTRIBUTION. A genus of few species, distributed over the cooler portion of the northern temperate zone, chiefly in rich woods.

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PLATE 19. *ACTEA RUBRA*, Willd.; — summit of a young flowering plant, the leaf as yet small, and a fruiting raceme; natural size.

1. Expanding flower.
2. Expanded flower.
3. A sepal, enlarged.
4. A petal, enlarged.
5. A stamen, enlarged.
6. The pistil, enlarged, on the receptacle.
7. Same, with the ovary divided vertically.
8. Transverse section of the same.
9. An ovule, more magnified.
10. A fruit, of the size of nature.
11. Same, divided vertically.
12. Same, divided transversely, and down the back, to display the seeds.
13. A seed, enlarged, with the upper face presented to the eye.
14. Section of the same, showing the embryo at the base of the albumen.
15. Embryo, more magnified.

## PLATE 20.

CIMICIFUGA, *L.*

Calyx 4–5-sepalus, petaloideus, caducus. Petala seu staminodia 1–8, unguiculata, biloba. Ovaria 1–8. Folliculi polyspermi; seminibus horizontalibus depressis, aut verticalibus compressis. — Folia bi–triteratisecta. Racemi virgati.

Subgen. *MACROTYS*. — Petala tenuiter unguiculata, fere plana. Stigma sessile, depressum. Folliculi solitarii, rarius 2, sessiles, ovoidei; seminibus horizontalibus depressis *Actææ*.

*MACROTYS*, Raf. in *Med. Rep.* l. c. & *Desv. Jour. Bot.* (1808) 2. p. 170.

*BOTROPHIS*, Raf. *Med. Fl.* 1. p. 85. *Fisch. & Mey. Ind. Petrop.* 1835. p. 20.

*ACTÆA*, Sect. *MACROTYS*, DC. *Syst.* 1. p. 383.

*CIMICIFUGA*, Sect. *MACROTYS*, Torr. & Gray, *Fl. N. Am.* 1. p. 36.

**Black Snake-root. Black Cohosh.**

Subgen. *CIMICIFUGA vera*. — Petala sæpius concava, fundo pl. m. nectarifera. Folliculi 2–8, stipitati, compressi, stylo tenui apiculati (stigmatem minuto); seminibus verticalibus lateraliter compressis, testa squamulis membranaceis echinata.

*CIMICIFUGA*, Linn. *Gen.* 1282, & *Amœn. Acad.* 7. p. 193. t. 4.

*ACTÆA*, Sect. *CIMICIFUGA*, DC. l. c.

*CIMICIFUGA* & *ACTINOSPORA*, *Fisch. & Mey. l. c.* *Endl. Gen.* 4801–2.

**Bugbane.**

*CALYX* of 4 or 5 ovate or orbicular and concave petaloid *SEPALS*, imbricated in æstivation, regular, caducous. *PETALS* 1 to 8, small, hypogynous, unguiculate, plane, or more or less concave and nectariferous near the base, usually two-lobed or two-horned at the apex, sometimes attenuated or imperfectly antheriferous, and evidently appearing as transformed *STAMENS*. *STAMENS* very numerous, hypogynous, in many series on the oblong receptacle: *FILAMENTS* filiform, elongated: *ANTHERS* short, innate or obscurely introrse. *PIS-TILS* 1 to 2, sessile and with a depressed terminal stigma in

§ *Macrotys*; or subulate with the acute style, which is minutely stigmatose unilaterally, commonly stipitate. OVULES numerous, horizontal, in two series on the whole length of the ventral suture, anatropous; the raphes ventral.

FOLLICLES in § *Macrotys* ovoid, turgid, sessile, and filled with numerous depressed-flattened (horizontal) smooth seeds, as in *Actæa*; or else compressed and membranaceous, with fewer and laterally compressed (vertical) seeds; their testa thickly clothed all over with slender squamulose projections. EMBRYO minute, next the hilum, at the base of firm albumen.

HERBS, with tall stems from matted and knotty rootstocks, ample bi-ternate leaves much as in *Actæa*, and virgate racemes, either simple or paniced. Flowers white, the odor unpleasant.

ETYMOLOGY and PROPERTIES. Name from *cimer*, a bug, and *fugo*, to drive away; the Siberian species being employed as a bug-bane. The sensible properties are much as in *Actæa*, but with more bitterness. The Black Snake-root is a famous Indian antidote against the bite of venomous snakes.

GEOGRAPHICAL DISTRIBUTION. A genus of few species, natives of the cooler parts of the northern temperate zone, chiefly in Asia and N. America.

NOTE. *Maerotys* should probably rank as a genus; but *Actinospora* appears not to be distinguished by characters of equal importance.

PLATE 20. Fig. 1-13. CIMICIFUGA (MACROTYS) RACEMOSA, *Ell.*; — a lateral raceme, &c. (Botanic Garden, Cambridge.)

1. A flower-bud, somewhat enlarged.
2. An outer, and 3, an inner, sepal, enlarged; inside view.
4. A petal or staminodium, enlarged.
5. A stamen, enlarged, inside view; and 6, an outside view of the same.
7. Pistil and receptacle, magnified.
8. Vertical section of the same.
9. An ovule, magnified, the upper face presented to the eye.
10. A portion of the raceme in fruit; natural size.
11. Transverse and vertical section of a pod, showing the seeds.
12. A seed, magnified.
13. Section of the same, showing the minute embryo.
14. Enlarged flower of CIMICIFUGA AMERICANA, *Michx.* (from the Alleghanies); — most of the stamens and the petals except one removed.
15. The five long-stalked follicles of the same; natural size.
16. A dehiscent follicle and seeds, enlarged.
17. A seed, more magnified.
18. Transverse section of the same.
19. Vertical section of the same, showing the minute embryo.

## ORD. MAGNOLIACEÆ.

Arbores vel arbusculæ (acri-amaræ et aromaticæ) simplici-foliæ, dicotyledoneæ, hypogynæ, symmetricæ, polyandræ seu monadelphæ; perianthio concolori plerumque trimero tri-pluriseriali, *æstivatione imbricato*, mox deciduo; carpellis discretis vel in syncarpium imbricato-coadunatis; *seminibus exarillatis*; embryo in basi *albuminis homogenei* minimo.

MAGNOLIÆ, Juss. Gen. p. 280.

MAGNOLIACEÆ & WINTEREÆ, R. Br. ex DC. Syst. 1. p. 548.

MAGNOLIACEÆ & SCHIZANDRACEÆ, Blume, Fl. Jav. Endl. Lindl.

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THE MAGNOLIA FAMILY, which comprises some of our most ornamental trees, belongs almost exclusively to the eastern side of both continents, and chiefly to the warmer portion of Eastern North America and to the corresponding part of Asia. It has no representatives in Europe or in Africa, and none in Western North America. There are some tropical species, on both sides of the equator; and two genera are extratropical in the southern hemisphere, namely, in South America and in New Zealand and Southern Australia; but one of them, the Drimys, or Winter's Bark, has a surprisingly extensive range; the same species, according to Dr. J. D. Hooker, extending through 86 degrees of latitude, from near the southern limit of phænogamous vegetation to New Grenada and even to Mexico!

The family, enlarged as here proposed, so as to include the Schizandreae as well as Winteræ, need be compared only with the order Dilleniaceæ of the southern hemisphere, on the one hand, and with the Anonaceæ, on the other. From the former it is *absolutely* distinguished only by its exarillate seeds, but generally by the trimerous floral envelopes and caduceous calyx also. From the latter it is separated by the solid and homogeneous (not ruminated or lamellar) albumen, and by the imbricated æstivation of the corolla.

An aromatic principle, due to a pungent ethereal oil and its resin, pervades the family. This is most abundant and pure in the Winteræ; but is also manifest in Schizandra, at least in the fruit and seeds, and not less so in the Magnoliæ, although covered by a bitter principle. It is likewise indicated by the minute pellucid dots of the leaves, or at least of the petals, &c.; and by the "glandular dots or disks" on the woody tissue, which, although comparatively few and minute in Magnolia and Liriodendron, are beautifully marked in Schizandra, — quite as much so, indeed, as in Illicium and Drimys.

While the Winterææ, long since separated by Brown, are now generally reunited to Magnoliaceæ, the Schizandreæ of Blume have been admitted almost without question as a distinct order, and have even been arranged by Lindley in a different alliance. Yet the latter are at least as nearly related to the Winterææ as these are to the true Magnolia Family; and the only absolute character which distinguishes them (namely, the capitate or spiked, instead of simply verticillate or single, carpels) is one in which they accord with Magnoliaceæ proper. The stamens are not always monadelphous in Schizandreæ, nor are the flowers always declivous, if Hortonia belongs to the group; while, on the other hand, one of the four Winteraceous genera is polygamous. It appears evident, therefore, either that the Winterææ of Brown should be extended so as to embrace the Schizandreæ, and be ordinarily distinguished by the total absence of stipules, or else that the whole should be united in one family. Remembering that a few Dilleniaceæ have stipules like those of Magnolia, while the rest are exstipulate, and convinced that the sensible properties as well as the floral characters of the plants in question invite the union, I propose to adopt the latter alternative, and to arrange under the order Magnoliaceæ these three suborders, as follows.

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SUBORD. I. WINTEREÆ. (Ord. WINTEREÆ, *R. Br.* 1818.)

Flowers perfect, or sometimes polygamo-diœcious. Pistils simply verticillate, or reduced to one. Stamens distinct. — Stipules none. Leaves frequently verticillate-crowded or opposite, sempervirent, rarely serrate. Bark, seeds, &c., pungent-aromatic. (*Illicieæ*, *DC. Prodr.* 1825.)

ILLICIUM. (Plate 21.) Follicles numerous, stellate, 1-seeded.

SUBORD. II. SCHIZANDREÆ. (Ord. SCHIZANDREÆ, *Blume.*)

Flowers monœcious or diœcious. Pistils imbricated-spicate or capitate. Stamens in a cluster, monadelphous or distinct (in *Schizandra* definite). — Stipules none. Leaves entire or toothed. Stems often sarmentose. Mucilaginous, the seeds aromatic. — *Sphærostemma*, *Kadsura*, and

SCHIZANDRA. (Plate 22.) Stamens 5, monadelphous in a 5-lobed disk.

SUBORD. III. MAGNOLIEÆ, *DC.*, *Endl.*

Flowers perfect, large. Pistils imbricated-spicate on an elongated gynophore. Stamens distinct. Seeds in the deliscent species baccate, and at length hanging by an extensile cord of spiral vessels. Stipules conspicuous, forming the teguments of the bud, successively involving the conduplicate leaves in vernation, deciduous after their expansion, leaving annular scars on the terete branches. Bitter-aromatic.

MAGNOLIA. (Plates 22, 23.) Carpels coriaceous-baccate, adherent to the receptacle, dehiscent by the dorsal suture. Anthers introrse.

LIRIODENDRON. (Plate 24.) Carpels samaræform, indehiscent, deciduous from the receptacle at maturity. Anthers extrorse.

## PLATE 21.

ILLICIUM, *L.*

Flores hermaphroditi. Sepala 3 vel 6. Petala 9–30, tri–pluriseriata. Stamina indefinita: antheræ introrsum adnatæ. Folliculi plurimi, drupacei, circa columnam brevissimam arete verticillati, stellato-patentes, denique bivalves, monospermi. — Arbusculæ sempervirentes, Anisum spirantes.

ILLICIUM, Linn. Gen. 611. Ellis, in Phil. Trans. 60. p. 524. Gärtn. Fr. t. 69. Lam. Ill. 1. 493. DC. Syst. 1. p. 440. Sieb. & Zucc. Fl. Jap. 1. p. 5. t. 1. Torr. & Gray, Fl. N. Am. 1. p. 42. Endl. Gen. 4743.

**Star-Anise.**

FLOWERS perfect. CALYX of 3 or 6 petaloid SEPALS, imbricated in æstivation, caducous. PETALS 9 to 30, imbricated in æstivation in 3 or several series, the inner successively narrower, hypogynous, spreading, deciduous. STAMENS indefinite (12 to 40) in several series, hypogynous, spreading: FILAMENTS short and fleshy: ANTHERS adnate, introrse; the two oblong cells contiguous or nearly so, opening longitudinally. PISTILS 6 to 18, compressed, crowded in a circle, closely sessile, and broadly inserted around a central short and conical prolongation of the receptacle: OVARY one-celled, one-ovuled: STYLE subulate, recurved, stigmatose down the inner edge. OVULE ascending from some part of the ventral suture, anatropous, the raphe ventral.

FRUIT a whorl of distinct drupaceous FOLLICLES, stellately divaricate, compressed, woody-crustaceous at maturity, when the thin sarcocarp dries up, dehiscent by the whole length of the ventral suture, at length two-valved. SEED ascending from the base of the cell, which it fills, obovate, compressed-lenticular, the hilum lunulate; the crustaceous testa very smooth and shining, brittle (loosely adhering to the obscurely sculptured surface of the spongy-membranaceous in-

ner integument). EMBRYO very minute, at the base of the fleshy and oily, homogeneous albumen.

SHRUBS or low trees, entirely glabrous, spicy-aromatic; the evergreen leaves alternate or irregularly crowded and opposite, petioled, oblong, entire, coriaceous, minutely pellucid-dotted under a lens. Stipules entirely absent. Peduncles from axillary or terminal buds, one-flowered. Flower dark red-purple in *I. Floridanum*, in the others yellowish.

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ETYMOLOGY. From *illicio*, to entice;—perhaps from the properties of the *Anisette de Bordeaux*, which is flavored by the fruit of the Chinese *I. anisatum*, the Star-Anise of the shops.

PROPERTIES. Spicy-aromatic and carminative, especially the bark, leaves, and fruit. The latter yields a fragrant oil like that of Anise, for which it is substituted. The foliage of the Japanese *I. religiosum* is said to be poisonous; and *I. parviflorum* has the same reputation in Alabama (where it is called “Poison Bay”), probably without good reason.

GEOGRAPHICAL DISTRIBUTION. Of the four known species, two are natives of China and Japan, and two of the southeastern extremity of the United States.

NOTE. The buds of *I. religiosum*, according to the figure and description by Zuccarini, are perulate, and the ovule rises from the very base of the cell. The leaf-buds of *I. Floridanum* are perfectly naked, green, and acute; and the ovule is attached to the inner angle of the cell above the base.

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PLATE 21. *ILLICIUM FLORIDANUM*, *Ellis*;—a flowering branch, natural size; from a plant cultivated in the Cambridge Botanic Garden.

1. A sepal, detached.
- 2–6. Petals of the several series, beginning with the exterior and broader.
7. A stamen, magnified, viewed from within or above.
8. A grain of pollen, highly magnified, showing a triple band.
9. Vertical section through the receptacle and whorl of the pistils, laying open one of the ovaries, and displaying the ovule; enlarged.
10. The mature fruit; natural size.
11. Seed, of the natural size.
12. The same, magnified, with the testa partly broken away, to show the uneven surface of the inner integument.
13. Vertical section of the same, through the allumen, showing the minute embryo.

## PLATE 22.

SCHIZANDRA, *Michx.*

Flores monoici, sæpius pentameri! nempe: Sepala 5. Petala 5. Stamina 5, brevissima, dilatata, in orbem 5-lobum monadelphæ: antheræ loculis connectivum latissimum cuneiforme marginantibus valde sejunctis. Carpella plurima, 2-ovulata, imbricato-capitata; fructifera baccata, supra gynophorum demique elongatum pedunculiforme laxè spicata. — Frutex sarmentosus, foliis deciduis.

SCHIZANDRA, Michx. Fl. 2 p. 18. t. 47. Bot. Mag. t. 1413. DC. Syst. I. p. 544. Bart. Fl. N. Am. 1. t. 13. Torr. & Gray, Fl. N. Am. I. p. 46, 662. Endl. Gen. 4733.

FLOWERS monœcious; the floral envelopes, &c., of the sterile and fertile flowers alike. SEPALs usually 5, quincuncially imbricated in æstivation, sometimes 6, rotund-ovate, concave, membranaceous with rather scarious margins, somewhat colored (greenish-white, above sometimes tinged with red), deciduous; the two exterior smaller. PETALs 5, quincuncially imbricated in æstivation (rarely 6, when they are imbricated in two series), hypogynous, oblong-obovate, spreading, rather fleshy, abruptly thickened at the contracted base, crimson, copiously sprinkled with pellucid dots, deciduous. STER. FL. STAMENS 5, opposite the petals, their short and broad FILAMENTS monadelphous, so as to form a circular and flat 5-cleft disk, occupying the whole centre of the flower: ANTHERS with their two cells adnate to the margins of the dilated-cuneiform connective, much smaller than it, thus widely disjoined, and those of adjacent anthers brought into contact, but not at all connate, neither extrorse nor introrse, opening longitudinally (toward the cleft). FERT. FL. PISTILs indefinite, closely imbricated-capitate on the oblong receptacle, distinct: Ovary ovoid, sessile, one-celled, two-

ovuled, obliquely narrowed into a short beak, which is stigmatose for the whole length down the inner side. OVULES collateral, inserted on the ventral suture above the base, just opposite the lower termination of the decurrent stigma, globular, nearly amphitropous.

FRUIT of several (6 to 12, the rest abortive) globular baccate carpels, loosely spicate on the much elongated gynophore, 1-2-seeded. SEEDS superposed when both ripen, horizontal, reniform, with a very short raphe in the sinus; the testa crustaceous. ALBUMEN fleshy and oily, homogeneous. EMBRYO minute, next the hilum: COTYLEDONS very short.

SHRUB sarmentose; with ash-colored bark; the leaves alternate, ovate, pointed, long-petioled, entire or sparingly denticulate, the teeth glandular-tipped, veiny, thin and membranaceous, beautifully punctate with pellucid dots under a lens, deciduous. Stipules none. Buds small, scaly. Peduncles filiform, solitary in the axils of the lower leaves of the branch of the season, naked, one-flowered. Flowers small (half an inch in diameter), crimson. Berries red; the fructiferous receptacle elongating to 2 or 3 inches in length.

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ETYMOLOGY. From  $\sigma\chi\acute{\iota}\zeta\omega$ , *to cut*, and  $\alpha\acute{\nu}\eta\rho$ , *for anther*; the disk formed of the united stamens being cleft, as it were, between the anthers.

PROPERTIES. Mucilaginous, the fruit and seeds rather pungent-aromatic.

GEOGRAPHICAL DISTRIBUTION. South Carolina to Texas, in damp woods.

NOTE. The two exterior sepals might be taken for bractlets, and then, when there is a sixth petal, the floral envelopes would be trimerous: but the stamens appear to be uniformly five.

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PLATE 22. SCHIZANDRA COCCINEA, Michx.; — portion of a stem, natural size, with both kinds of flowers. (Louisiana, Dr. Hale.)

1. Diagram of a staminate flower.
2. A sepal, and 3, a petal, enlarged; inside view.
4. The disk of united stamens, enlarged.
5. One of the stamens, separated.
6. Head of pistils, enlarged; and 7, vertical section of the same.
8. Vertical section of a pistil, more magnified, showing the ovules, &c.
9. Elongated receptacle and carpels in fruit.
10. Section of one of the baccate carpels.
11. A seed, enlarged; and 12, a section of the same, displaying the embryo.
13. Embryo, detached, and more magnified.

## PLATE 23, 24.

## MAGNOLIA, L.

Sepala 3. Petala 6-12. Antheræ introrsum adnatæ. Carpella indefinita, imbricato-spicata, 2-ovulata; fructifera coriaceo-baccata, in gynophoro elongato persistentia, sutura dorsali dehiscentia. — Arborea speciosæ, gemmis stipularibus teretis; stipulis membranaceis, vernatione folia conduplicativa recta invicem claudentes.

MAGNOLIA, Linn. Gen. 690. Gærtn. Fr. t. 70. Michx. f. Arb. 3. t. 1-7. DC. Syst. 1. p. 449. Torr. & Gr. Fl. N. Am. 1. p. 42. Zuccar. Pl. Nov. (in Act. Acad. Monac.) fasc. 2. p. 65. t. 3, 4. Endl. Gen. 4737.

SEPALs 3, colored and more or less resembling the petals, spreading or reflexed, early deciduous. PETALS 6 to 12, in two to four series, imbricated in æstivation (disposed, along with the sepals, in a regular spiral  $\frac{3}{8}$  order), hypogynous, concave, erect-converging, or a little spreading, early deciduous. STAMENS indefinite, imbricated in many series upon the stipitiform base of the prolonged receptacle, short, caducous: FILAMENTS proper very short, continued into a linear fleshy connective which is produced beyond the anther into a blunt point: ANTHER adnate to its inner face (introrse), two-celled; the cells linear, opening longitudinally. PISTILs indefinite, densely imbricated on the upper part of the receptacle (the gynophore): OVARIES fleshy, one-celled, pointed with a short recurved STYLE, which is stigmatose on the inner face. OVULES 2, collateral (rarely 3), borne at the inner angle of the cell, horizontal, anatropous; the broad raphes face to face: primine thick and fleshy; the secundine thinner.

FRUIT (syncarpium) in the form of a fleshy strobile or cone; the more or less coalescent imbricated carpels becoming baccate, and the endocarp at length ligneo-coriaceous,

firmly persistent on the elongated receptacle, at length dehiscent down the back, two-seeded. SEEDS hanging by a delicate, extensile cord of unrolled spiral vessels (contained in the short and fleshy funiculus and placenta), large, globular, drupaceous; the fleshy testa very thick and at length pulpy (scarlet or bright red); the tegmen bony-crustaceous, widely grooved on the inner side and at the summit (corresponding with the broad, impressed raphe and chalaza). EMBRYO minute, at the base of the fleshy and oily homogeneous albumen; the short and thick RADICLE next the hilum: COTYLEDONS short.

TREES, or sometimes shrubs, with very showy and usually large blossoms and foliage; the leaves entire, or merely auriculate at the base, feather-veined, deciduous, or sometimes persistent through the winter, when thin often indistinctly pellucid-punctate, alternate, or by approximation often appearing as if whorled, on stout petioles, which, separating by a distinct articulation, leave broad scars on the otherwise smooth and terete branches. Flowers solitary, terminal, white or greenish-yellow, rarely purplish. Buds terete, acute; their integuments formed entirely of the ample membranaceous stipules: these are adnate to the base of the petiole, and involute, with their opposite edges united; each pair thus inclosing the succeeding conduplicate leaf with the rest of the bud to which it is longitudinally appressed, deciduous as the leaves successively unfold, leaving their scars upon the branch in the form of narrow rings. Cone of fruit usually red or rose-color at maturity.

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ETYMOLOGY. This superb genus is dedicated to *Magnol*, Professor of Botany at Montpellier at the close of the seventeenth century, and who first indicated natural families in botany. — The name was originally given by Plumier to a West Indian tree of the order, the type of the genus *Talauma*, *Juss.*, and which was confounded by Linnæus with the allied plants which now bear the name.

PROPERTIES. Bitter and slightly aromatic, with some acidity; the bark, especially of the root, and also the cones and seeds, have been employed as a stimulant tonic. The flowers of some species are highly fragrant.

**GEOGRAPHICAL DISTRIBUTION.** Natives of Eastern North America, and of Eastern Asia, namely of Japan, China, and Nepaul. The seven species of the United States are confined to the vicinity of the Alleghany Mountains, and to the country eastward and southward of them, crossing the Mississippi only near the seaboard. The small Magnolia (*M. glauca*) occurs along the Atlantic border plentifully as far north as New Jersey, and is also found on Cape Ann, Massachusetts, lat.  $42\frac{1}{2}^{\circ}$ ; while the Cucumber Tree (*M. acuminata*), an inland species, reaches the southern shore of Lake Ontario, which is the northern limit of the genus (a little above lat.  $43^{\circ}$ ). The splendid and fragrant *M. grandiflora*, belongs exclusively to the low country of the Southern States. The Umbrella Tree (*M. Umbrella*), which extends northward to Pennsylvania, and the allied *M. Fraseri*, chiefly belong to moist and wooded valleys along and near the mountains; while *M. cordata* and *M. macrophylla* very sparingly occur in the middle country of the Southern States. There are, besides, at least two Mexican species.

**NOTE.** Our illustrations clearly demonstrate that the baccate exterior integument of the seed is formed of the primine of the ovule; and therefore is not an arillus; as so excellent a botanist as my friend, Professor Zuccarini, has endeavoured to maintain,\* and as is assumed by Lindley,† and by Endlicher.‡

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**PLATE 23.** *MAGNOLIA GLAUCA*, *Linn.*;—a branch in flower of the Northern variety, from Gloucester, Massachusetts; of the natural size.

1. Diagram of the æstivation of the calyx and corolla (the ninth petal wanting, as is not uncommonly the case).
2. Vertical section through the whole receptacle, stamens, and pistils; enlarged.
3. A stamen, detached and magnified; inside view, showing the introrsely adnate anther.
4. Vertical section of two pistils, magnified. The lower exhibits both ovules; their raphe face to face: in the upper cell, the anterior ovule has been cut away.
5. An ovule seen laterally, more magnified.
6. The same, with the raphe towards the eye.
7. Vertical section of the same, through the raphe; showing some of its spiral vessels, the true position of the chalaza, the thick and fleshy primine, which becomes the baccate integument of the seed, &c.

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\* *Plantarum Nor. vel minus Cogn. Hort. Bot. et Herb. Reg. Monac.* fasc. 2. p. 63-70.

† *Vegetable Kingdom*, 417.

‡ At least in *Enchiridion Botanicum*, p. 427, 428.

PLATE 24. *MAGNOLIA UMERELLA*, Lam. (Botanic Garden, Cambridge.)

1. Cone of ripe fruit, of the natural size; some of the carpels dehiscent; one of the seeds hanging by its cord of spiral vessels.
2. Longitudinal section of the same.
3. A detached dehiscent carpel (the exterior fleshy portion dried up).
4. Transverse section of a seed, placed with the raphe towards the eye.
5. Vertical section of the same, passing, as in fig. 4, through the exterior baccate integument, the less thick and bony inner integument, and the albumen; showing also the embryo next the hilum.
6. Embryo, much magnified.
7. Summit of a branch terminated by a bud, in autumn; the outermost pair of stipules removed, to exhibit one of the longitudinally folded leaves.
8. The outer pair of stipules, detached from the bud, fig. 7.
9. Transverse section of the bud, cutting across the stipular envelopes, the conduplicate leaves, and the parts of the flower which they surround.

## PLATE 25.

## LIRIODENDRON, L.

Sepala 3, deflexa. Petala 6, campanulato-conniventia. Antheræ extrorsum adnatæ. Carpella indefinita, 2-ovulata, samaræformia, stylis plano-compressis, in strobilum conico-cylindricum dense imbricata, sicca, indehiscentia, denique ab gynophoro gracili lignoso persistente decidua. — Arbor eximia; foliis sinuato-quadrilobis truncatis, vernatione Magnoliæ, sed recurvato-inversis atque gemma complanata.

LIRIODENDRON, Linn. Gen. 689. Schkuhr, Handb. t. 147. Gærtn. Fr. t. 178. Bigel. Med. Bot. t. 31. Endl. Gen. 4740.

TULIPIFERA, Herm. Hort. Lugd. p. 612. Adans. Fam. 2. p. 365.

**Tulip-tree.**

SEPALs 3, colored (greenish-white or yellowish), imbricate in æstivation, reflexed, early deciduous. PETALS 6, imbricated in two series in æstivation, very broad, nearly erect, so as to form a somewhat bell-shaped corolla, hypogynous, deciduous. STAMENS indefinite, hypogynous in several series, nearly as long as the petals, deciduous: FILAMENTS filiform: ANTHERS elongated-linear, adnate to the outer face of the connective (*extrorse*), two-celled; the cells contiguous, opening longitudinally. PISTILS very numerous, closely imbricated upon the prolonged receptacle (gynophore) into a fusiform column as long as the petals: OVARY sessile by a broad insertion, one-celled, two-ovuled: STYLE laterally winged (or flattened anteriorly and posteriorly), entirely appressed: the STIGMA unilateral at its summit, cristate, recurved. OVULES collateral, pendulous from near the middle of the ventral suture, anatropous, their raphes face to face.

FRUIT a fusiform cone or strobile, composed of the closely imbricated samaræform carpels, which at maturity fall away from the elongated and bodkin-shaped persistent woody axis:

these are dry and indehiscent, lanceolate, somewhat ligneous, consisting of a small, laterally compressed pericarp, which is strongly 4-ribbed; the ventral and dorsal ribs forming the axis, and the lateral ones confluent into the margins, of the large and wing-like obcompressed style. SEEDS 2, or by abortion solitary, pendulous; the thin testa dry and coriaceous, marked with a narrow salient raphe. ALBUMEN fleshy. EMBRYO minute, next the hilum; the RADICLE superior.

A TREE of large size and elegant aspect; with the smooth leaves alternate, long-petioled, feather-veined, deciduous, angulate-four-lobed, and appearing as if truncate at the apex by a broad and shallow notch. Flowers solitary and terminal, very large (greenish-yellow marked with orange), in the bud inclosed by the last pair of stipules in the form of a two-valved caducous spathe. Vernation as in Magnolia, except that the oval stipular buds are compressed and very obtuse, and the leaves are bent down on the petiole so that their summits are brought to the base of the bud. Stipules nearly flat, oblong, obtuse, free from the petiole, deciduous.

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ETYMOLOGY. Name compounded of *λίριον*, a lily or tulip, and *δένδρον*, tree; from the tulip-like flowers.

PROPERTIES. Same as of Magnolia; but the bitter, tonic bark is less aromatic. The light, fine-grained wood is largely used by cabinet-makers, &c., under the name of *White-wood*, or *White and Yellow Poplar*.

GEOGRAPHICAL DISTRIBUTION. Nearly throughout the United States proper, in rich soil, attaining the greatest size in Ohio, Kentucky, &c.

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PLATE 25. LIRIODENDRON TULIPIFERA, Linn.; — branch in flower; also with an unfolding leaf-bud; natural size.

1. Diagram of the æstivation of the calyx and corolla.
2. Longitudinal section through the receptacle, pistils, &c.; natural size.
3. A detached pistil, natural size.
4. Summit of the same, magnified; showing the stigma.
5. Vertical section of the ovary, magnified; showing the ovules.
- 6, 7. Ovules, magnified.
8. Ripe cone of fruit; natural size; the lowest carpels fallen.
9. One of the separated carpels.
10. Vertical section of the pericarp, through one of the seeds; magnified.

## ORD. ANONACEÆ.

Arbores (subacri-aromaticæ) simplicifoliæ, exstipulatæ, foliis alternis integerrimis penninerviis: dicotyledoneæ, hypogynæ, regulares, hermaphroditæ, polyandræ; perianthio trimero triseriali, nempe; calyce trisepalo, corolla hexapetala duplici serie, *æstivatione valvata*; carpellis indefinitis, raro paucis, discretis vel in syncarpium confluentibus; embryone in basi *albuminis ruminati* minimo.

ANONÆE, Juss. Gen. p. 283. Batsch, Tab. 118.

ANONACEÆ, Dunal, Monogr. DC. Syst. 1. p. 463. Blume, Fl. Jav. fasc. 7, 8. Alph. DC. Anon. in Mem. Soc. Genev. 5. p. 177. Endl. Gen. p. 830. Mart. Fl. Bras. fasc. 2.

THE CUSTARD-APPLE FAMILY is altogether intertropical, with the remarkable exception of the North American Papaw, which extends even to the southern shore of Lake Erie, and the three allied species indigenous to the Southern Atlantic States. The order very closely accords in general structure, as well as in the ternary triple perianth, with Magnoliaceæ; from which the valvate æstivation and the ruminated albumen essentially distinguish it. The sensible qualities, also, are much the same; but Anonaceæ have usually less tonic, and more acrid and nauseous properties. The bruised bark and foliage of our Papaw-trees exhale a heavy, disagreeable or fetid odor; as is likewise said to be the case with the tropical plants of the family which yield a bland esculent fruit.

The presence of an arillus appears to have been first noticed in the order by Prof. Alphonse De Candolle, who proposed to consider its presence as a character of generic value; and accordingly employed it in distinguishing his *Habzelia* from *Uuona*, &c.; also remarking that this organ was not known to exist in any Asiatic Anonaceous plant.\* Recently, Von Martius has shown that *Uvaria Brasiliensis*, the only South American species of which the fruit has been examined, is likewise furnished with arillate seeds.† Finally, the examination, last autumn, of fresh fruits of *Asimina triloba*, en-

\* *Mem. Anonac.* l. c. p. 8-13, &c.

† *Flora Brasiliensis: Anonac.* p. 39. t. 13 f. 2.

abled us to detect a thin and fleshy arillus which completely incloses the ripe seeds; and a dried fruit of *A. parviflora* exhibits manifest traces of a similar integument.

Our Papaws, therefore, offer an exception to De Candolle's remark, that those Anonaceæ which have arillate seeds along with a smooth pericarp are always highly aromatic.

I possess no means for determining whether the Asiatic original species of *Uvaria* are really destitute of such an arillus, which, confounded with the surrounding pulp, might have escaped detection as readily in these as it has in the American species. But, without laying stress upon the more or less imbricated æstivation of the corolla in *A. triloba* and *A. parviflora* (which is not very distinct in the young flower-bud, and is likely to occur in other cases where the petals are broadly ovate or rounded\*), it appears on every ground probable that our species are not congeneric with those of tropical Asia, and therefore that the genus *Asimina* should be restored. To avoid ambiguity, I have drawn its character entirely from our United States species, and principally from *A. triloba* and *A. parviflora* (of which alone I have seen the fruit); leaving it for future investigation to determine whether it is to embrace the few allied South American species, or whether these should be referred to *Poreeha*, *Ruiz & Pav.*, with which they all apparently agree in having their inner petals larger than the outer; while in ours the exterior petals are much larger than the interior.

The popular name of *Papaw* was doubtless given to the fruit of *Asimina triloba* from a fancied resemblance in the appearance or taste of the fruit to the true Papaw of tropical America (the fruit of *Carica Papaya*). *Asiminier*, from which *Asimina* was formed, is the name by which the fruit was known among the old French colonists.

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\* As, for instance, in *Uvaria Narum*, *Wight, Ill. Ind. Bot.* t. 5.

## PLATE 26, 27.

ASIMINA, *Adans.*

Petala exteriora patentia, interioribus majora. Stamina innumera, receptaculum sphæroideum pauci-pistilligerum tegentia. Baccæ abortu 1-3, sessiles, oblongæ; oligopleiospermæ. Semina horizontalia, depressa, plerumque biseriata, arillo membranacei-succoso inclusa.

ASIMINA, *Adans.* Fam. 2. p. 365. *Dunal*, *Anonac.* p. 81. *DC.* *Syst.* 1. c.

ANNONÆ *Sp.*, *Catesb.* *Car.* 2. t. 85. *Linn.* 1. c. *Schkuhr*, *Handb.* 1. 149.

ORCHIDOCARPUM, *Michx.* *Fl.* 1. p. 329.

PORCELLÆ *Sp.*, *Pers.* *Syn.* 2. p. 95. *Pursh*, *Fl. Am. Sept.* 2. p. 383.

UVARIE *Sp.*, *Blume.* *Torr. & Gray*, *Fl. N. Am.* 1. p. 44.

Papaw. (*Asiminiæ*.)

CALYX of 3 ovate SEPALS, much smaller than the corolla, valvate in æstivation, deciduous. PETALS 6, in two series, each set rather imbricated than truly valvate in æstivation (at least the margins, especially of the exterior, overlap more or less), hypogynous; the three exterior widely spreading; the three inner (opposite the sepals) much smaller and nearly erect; all rather fleshy, veiny and rugulose, roundish, ovate, or obovate-oblong, closely sessile, enlarging considerably after expansion, deciduous. STAMENS innumerable, densely packed together and covering the spheroidal receptacle: FILAMENTS extremely short, thick: ANTHERS extrorsely adnate to the fleshy connective, which is much longer than the proper filament, and is terminated by a broad and dilated-truncate glandular tip; the cells oblong or linear, separate, opening longitudinally. POLLEN of spheroidal grains lightly united in fours. PISTILS 3 to 15, sessile on the summit of the receptacle, protruding from the centre of the globose mass of stamens, distinct: OVARY one-celled: STYLE short or none: STIGMA unilateral at the tip. OVULES 4 to 20, horizontal in two series on the ventral suture, anatropous; the raphes towards the suture.

FRUIT baccate, only one to three of the carpels ripening, sessile or slightly stipitate, thick, oval or oblong, smooth and even, or indistinctly torulose. SEEDS horizontal, depressed, in *A. triloba* occupying two regular series (4 to 9 in each), in *A. parviflora* also several and more or less biseriate (in *A. pygmæa* and *A. grandiflora* from the paucity of the ovules undoubtedly very few or solitary), at maturity entirely inclosed in a pulpy-membranaceous arillus! nestling in the soft flesh of the fruit: testa crustaceo-coriaceous, smooth and even: inner integument rather fleshy, adhering to the testa, its numerous folds or membranous appendages projecting transversely into the corneous albumen nearly to the axis, dividing it into lamellæ (i. e. ALBUMEN ruminated). EMBRYO minute, next the hilum, to which the cylindrical RADICLE is directed: COTYLEDONS short.

SHRUBS or small trees; with alternate and entire feather-veined leaves, conduplicate in vernation; and solitary (vernal) dingy-colored flowers from separate axillary buds, nodding, on a short peduncle. Stipules none. Bud-scales minute and caducous. Pubescence rusty-color, caducous.

PLATE 26. *ASIMINA TRILOBA*, *Dunal*; — vernal branch in flower; natural size. (From Ohio, *Sullivant*, and Pennsylvania, *Prof. Baird*.)

1. Diagram of the floral envelopes (of the expanded flower).
2. A sepal; 3, an outer, and 4, an inner petal, natural size.
5. A stamen, enlarged, seen from within; and 6, from the outside.
7. Stamens and pistils; the calyx and corolla only removed.
8. Enlarged vertical section, through the receptacle.
9. Transverse section of a magnified ovary; 10, a vertical section.
11. An ovule, more magnified.

PLATE 27. The fruit and seeds (fresh specimens from *Prof. Baird*).

1. Peduncle and receptacle bearing 3 ripe carpels; natural size.
2. Longitudinal section of a ripe carpel.
3. Transverse section, showing two of the seeds in place; one of them divided, showing the embryo at the base of the albumen (the lamellæ of which plainly extend nearly to the centre in the dried seeds).
4. Detached seed, enveloped in its closed pulpy arillus.
5. Same, with the arillus cut open and extended.
6. Embryo, magnified.

## ORD. MENISPERMACEÆ.

Sarmentosæ exstipulatæ, alternifoliæ (foliis palmatierviis): dicotyledoneæ, hypogynæ; floribus parvulis unisexu-  
libus; perianthio concolori plerumque trimero bi- octo-seriali,  
æstivatione alternatim imbricato; staminibus oppositipetalis  
vel subindefinitis; carpellis paucis uniovulatis; fructu dru-  
páceo; embryone majusculo in albumine parco, cum semine  
fructuque incurvato.

MENISPERMA, Juss. Gen. p. 234.

MENISPERMOIDEÆ, Vent. Tabl. 3. p. 78.

MENISPERMÆ VERÆ, DC. Syst. 1. p. 508. excl. § 1.

MENISPERMACEÆ, DC. Prodr. 1. p. 95 (excl. Trib. 1 & 3). Endl. Gen. p.  
825. excl. Subord. 2.

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THE MOONSEED FAMILY is a small group, of about sixteen recognized genera and two hundred species, belonging principally to the intertropical regions of Asia and America. There are only three species known in the United States, or, indeed, in all extratropical North America; and these pertain to as many distinct genera. One of them extends northward to Canada: the others are confined to the warmer part of the country.

They are all climbing or twining vines, with woody stems, at least at the base (although our Moonseed dies down nearly to the ground at the north); bearing alternate, palmately-veined and usually lobed or angled, often pettate leaves, on slender petioles, destitute of stipules; and with small, diœcious or polygamous flowers, borne in axillary racemes or panicles. Their commonly trimerous floral envelopes, of more than two series, which in many cases are not readily distinguishable into calyx and corolla, and the tendency towards indefinite stamens, and more than one pistil, are characters which show the near alliance of Menispermaceæ with the foregoing orders, and especially with Anonaceæ, some of which have few stamens and pistils; while the position of the stamens when definite before the petals, with the imbricated pluriseriate arrangement of the floral envelopes, indicates their affinity with Berberidaceæ. They are at once distinguished from both these families by their habit, unisexual flowers, and especially by their large embryo in sparing albumen, and the peculiar incurvation of the drupaceous

fruit. The æstivation of the corolla is not valvate, as in the former, nor do the anthers open by valves, as in the latter order.

The nature of the change in form which the ripening ovary undergoes was indicated by Colebrooke, in the *Transactions of the Linnæan Society*, Vol. 13, p. 51; and, subsequently, by Auguste St. Hilaire, in his *Flora Brasiliensis Meridionalis*.

The structure of the wood, which is either zoneless, or destitute of annual layers, is admirably elucidated by Decaisne (*Mém. Lardizab.* in *Archives du Muséum*).

Menispermaceæ afford both bitter tonic and narcotic principles; the former principally in the root, of which the officinal *Columbo-root* furnishes the most important example: the latter prevail in the fruit; as in the well-known *Cocculus-Indicus* berries (the fruit of *Anamirta Cocculus*), employed for poisoning fish and beer. These contain two venomous principles, namely, the deadly *picrotoxine* in the seed, and *menispermine* in the pericarp.

#### CONSPECTUS OF THE UNITED STATES GENERA.

**COCCULUS.** (Plate 28.) Stamens 6, distinct. Sepals and petals each 6. Ovaries 3-6. Drupe campylotropous: putamen bony.

**MENISPERMUM.** (Plate 29.) Stamens in ster. fl. 12-24, distinct. Sepals 4-8. Petals 6-8. Ovaries 2-4. Drupe campylotropous: putamen compressed, round-reniform, bony. Embryo slender, hippocrepiform; the linear-filiform cotyledons contiguous.

**CALYCARPUM.** (Plate 30.) Stamens in ster. fl. 12, distinct. Sepals 6, consimilar. Proper petals none. Ovaries 3, not incurved from the apex in ripening. Drupe deeply hollowed on the inner face, the section crescent-shaped. Putamen crustaceous. Embryo thin and flat, cordate-2-lobed; the broad cotyledons divergent.

## PLATE 23.

COCCULUS (*Pluk.*), *DC.*

Calyx 1–3-bracteolatus, 6-sepalus. Petala 6 (raro nulla).  
Stamina 6, discretata. Drupæ campylotropæ; putamine osseo,  
reniformi, annulari-arcuato, vel hippocrepico.

COCCULUS, Pluk. Mant. p. 52. DC. Syst. 1. p. 515 (excl. spec. & syn.  
Bauh.) Colebr. in Linn. Trans. 13. p. 57 (excl. *C. crispus*, etc.).  
Wight & Arn. Fl. Pen. Ind. Or. p. 11 (excl. spec.) Wight, Ill.  
Ind. Bot. 1. t. 7.

ABUTA, Barr. Aubl. Guian. p. 618. l. 250? (ex St. Hil. Fl. Bras. 1. p. 47.)

CHONDODENDRON, Ruiz & Pav. Prodr. Fl. Per. & Chil. p. 132 (1794).

BAUMGARTIA, Mœnch, Meth. p. 650 (1794. pl. ster.)

ANDROPHYLAX, Wendl. Hort. Herr. 3. t. 16.

WENDLANDIA, Willd. Spec. 2. p. 275 (1799. pl. fert.) Pursh, Fl. 1. p. 252.

FLOWERS diœcious or diœcio-polygamous. STER. FL. SEPALS 6, imbricated in æstivation in two series of three each, ovate or roundish, petaloid, at least the inner series, 1–3-bracteolate externally, deciduous. PETALS 6, smaller than the calyx, placed three of them opposite the outer and three opposite the inner sepals, thickish, sessile, ovate or obovate, more or less cucullate or incurved around the filaments, deciduous. STAMENS 6, opposite the petals; the FILAMENTS and 4-celled ANTHERS as in *Menispermum* (Plate 29). PISTILS none. FERT. FL. CALYX, COROLLA, &c., nearly as in the sterile plant. STER. STAMENS hypogynous, with more or less dilated filaments, bearing abortive anthers. PISTILS 3 to 6, sessile in a whorl, not raised on a gynophore: OVARY semiovate, one-celled, subulate with a short recurved STYLE which is narrowly stigmatose down the inner edge. OVULE amphitropous, borne on the middle of the ventral suture; the micropyle superior.

DRUPES (one or usually 2 to 5 ripening) sessile, baccate: the PUTAMEN, SEED, and EMBRYO, in our species (and the more nearly allied exotic ones) just as in *Menispermum*.

FRUTESCENT or woody vines; with usually twining stems; the leaves alternate, petioled, exstipulate, palmately 3-7-veined, rounded, entire or obscurely lobed. Flowers small, greenish-white or purplish, in axillary or supra-axillary racemose panicles. Bracts minute.

ETYMOLOGY. From the *Cocculus Indicus* of the shops, an old name (formed from *cocum*, a berry) adopted by Bauhin. But the plant that yields the official fruit which gave its name to the genus, as now received, has unfortunately been excluded from it, and forms the genus *Anamirta*.

OBSERVATIONS. The essential character given above has been made to conform to the genus as received by Colebrooke. The English description is drawn wholly from our own plant; which seems, however, to be truly congeneric with several Indian species, as it probably is with South American ones: but I have not seen the illustration of *Chondodendron convolvulaceum*, Pöpp. It is a pity that the name of *Cocculus* was not kept for the plant yielding the official fruit so called; in which case, one of the names applied to American species, cited above, would have taken due precedence for the present genus, whether it were found to embrace the bulk of those of the Old World or not. At all events, it will doubtless comprise none which present the character "cotyledones distantes," assigned by De Candolle; although apparently it should include *C. sepium*, *Colebr.*, with foliaceous cotyledons, as well as *C. Plukenetii*, *DC.*, with fleshy and semicylindrical ones.

PLATE 28. *COCCULUS CAROLINUS*, *DC.*; — branch of the sterile plant, natural size, from the Botanic Garden, Cambridge.

1. Diagram of the aestivation of the staminate flower.
2. Staminate flower, enlarged.
3. An outer sepal, and 4, an inner sepal, from the same.
5. A petal, and 6, a stamen, from the same.
7. A petal, with the stamen, enlarged; anther dehiscent.
8. Stamen, enlarged; the anther divided transversely before dehiscence.
9. Pistillate flower, enlarged.
10. A pistil, magnified; the ovary divided longitudinally.
11. Drupes from a single flower, with a lobed leaf, &c.; natural size.
12. Vertical section of a drupe and the inclosed seed and embryo; enlarged.
13. Putamen (the sarcocarp removed), enlarged.
14. Seed extracted, enlarged.
15. Embryo extracted, enlarged; showing the slender cotyledons, &c.

## PLATE 29.

MENISPERMUM, *Tourn.*

Calyx 4–8-sepalus. Petala 6–8. Stamina 12–21, discreta; antheris quadrilocellatis. Stigmata explanato-dilatata. Drupæ campylotropæ; putamine compresso, orbiculato-reniformi, osseo. Embryo in albumine putamini conformi gracilis, hippocrepicus; cotyledonibus contiguis radículaque anguste linearibus.

MENISPERMUM, *Tourn.* in Mem. Acad. Par. 1705. p. 237. Linn. (excl. sp.) Lam. Ill. t. 824. Mœnch, Meth. p. 277. Schkuhr, Handb. t. 337. DC. Syst. 1. p. 539. Torr. & Gr. Fl. N. Am. 1. p. 47. excl. § 2.

**Moonsced.**

FLOWERS diœcious. **STER. FL.** **SEPALS** 5 to 8, petaloid, thin and membranaceous, imbricated in æstivation, spatulate-oblong; the two exterior narrower, and rather to be counted as bractlets; all early deciduous. **PETALS** 6 to 8 (most commonly 7), shorter than the sepals, somewhat fleshy, orbicular-dilated from a short claw, cucullate-incurved, deciduous. **STAMENS** 12 to 21, much longer than the petals: **FILAMENTS** filiform, gradually thickened above: **ANTHERS** innate, of 4 globular cells before dehiscence, when the two proper didymous cells are confluent at the longitudinal suture. **PISTILS** entirely wanting. **FERT. FL.** **SEPALS** 4 to 6, broader and shorter than in the sterile flowers. **PETALS** as in the sterile, hypogynous, with about as many abortive stamens, at the base of the thickish cylindrical-oblong gynophore. **PISTILS** 2 to 4, sessile on the apex of the gynophore, distinct: **OVARY** semiovate, one-celled, one-ovuled: **STIGMA** sessile, thickened, fleshy, dilated, crenate-papillose, recurved. **OVULE** borne on the middle of the ventral suture, amphitropous, oblong; the micropyle superior (directed to the apex of the cell).

**DRUPE** baccate (one, or sometimes two or three, ripening

from each flower), somewhat stipitate, globular, excentric, marked by the vestige of the stigma near the base; the real apex of the pericarp being incurved or bent down upon itself during growth, like a campylotropous seed: the bony putamen accordingly annular-reniform, laterally compressed, smooth and as if excavated on each side, longitudinally two-grooved and transversely rugose-tuberculate round the circumference. SEED reniform, conformed to the cavity of the putamen: testa membranaceous. EMBRYO slender, terete, curved into rather more than a semicircle, or nearly in the form of a horseshoe, occupying the axis of the fleshy albumen, and almost of equal length: the long and slender RADICLE pointing to the organic apex of the fruit: COTYLEDONS very slender, incumbently contiguous.

SUFFRUTICOSE vines; the zoneless wood with few and very broad medullary rays. Leaves alternate, exstipulate, rounded, palmately veined and angulate-lobed, long-petioled, peltate near the cordate sinus. Flowers small, white, in small panicles. Peduncles more or less supra-axillary.

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ETYMOLOGY. From *μήνη*, the moon, and *σπέρμα*, seed.

PROPERTIES. The fruit is probably noxious, and the root tonic-demulcent.

GEOGRAPHICAL DISTRIBUTION, &c. The original species is common throughout the United States and Southern Canada; and the second, which very closely resembles ours, is Siberian. My specimens of the latter are *not apetalous* (as is said in *Torr. & Gray, Flora N. Amer. l. c.*).

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PLATE 29. MENISPERMIUM CANADENSE, *Linn.*: — flowering branch of the sterile plant; natural size.

1. Diagram of the æstivation of the floral envelopes.
2. Staminate flower, enlarged.
3. A sepal; 4, a petal, and 5, a stamen, enlarged.
6. Transverse section of an anther, enlarged.
7. A pistillate flower, enlarged.
8. Pistils, more magnified; with 2 sterile stamens.
9. Vertical section of a pistil, magnified.
10. A drupe, and receptacle; natural size.
11. Same, enlarged; upper part of the sarcocarp cut away.
12. Putamen; the upper part removed, showing two sections of the embryo.
13. Vertical section of the drupe and seed: embryo seen in place.
14. Seed detached; 15, embryo, detached; — all the latter magnified.

## PLATE 30.

CALYCOCARPUM, *Nutt.*

Sepala 6. Petala nulla. Stamina 12, discreta: antheræ biloculares introrsum adnatæ. Ovaria 3: stigma umbilicatum, radiato-multifidum. Drupa ovoidea, stigmate terminali notata: putamen læve, tenui-crustaceum, ventre profunde excavatum cymbiforme. Embryo lamellæformis, in albumine tenui leviter incurvus; cotyledonibus foliaceis per margines ad medium connatis, deinde divergentibus, late cordiformis; radícula brevissima superæ.

CALYCOCARPUM (Sect. MENISPERMI), Nutt. in Torr. & Gray, Fl. N. Am. 1. p. 43.

FLOWERS diœcious. CALYX minutely one-bracteolate at the base, of 6 equal and similar petaloid oblong-obovate SEPALS, in two series, imbricated in æstivation, spreading, deciduous. PETALS wanting. STER. FL. STAMENS 12, distinct, occupying the centre of the flower: FILAMENTS slender, slightly flattened and dilated upwards: ANTHERS introrsely adnate, strictly two-celled, the oval cells opening longitudinally down the inner face. FERT. FL. ABORTIVE STAMENS 6, short, with small and imperfect anthers. PISTILS 3, sessile, one-ovuled: OVARY fusiform, straight, terminated by an umbilicate and radiately laciniate dilated stigma. OVULE . . .

DRUPE oval, tipped by the vestige of the terminal stigma; the sarcocarp thin: putamen smooth, crustaceous, broadly convex on the back, very deeply and broadly excavated on the ventral face, so as to become cup-shaped or boat-shaped (the transverse section between crescent-shaped and horse-shoe form, the vertical section also crescent-shaped), lightly marked by dorsal and ventral sutures, which incline to open, and by which it may readily be separated into 2 half-carpels; the continuous cell very wide and shallow. SEED pendu-

lous from the upper part of the ventral suture, conformed to the cell, cymbiform; the hilum a little below the micropyle. EMBRYO in the axis and about two thirds the length of the fleshy albumen, which it almost separates into two thin plates, very thin and foliaceous, concave so as to conform to the shape of the albumen, slightly pointed at the radicular apex, which is also flat, divergently two-lobed at the other extremity, thus heart-shaped. Its peculiar form is evidently due to the lateral junction by their contiguous edges of the cotyledons, which were laterally separated like those of *Anamirta Cocculus*.

VINE woody, climbing or twining; with alternate and exstipulate palmately-veined and 3-5-lobed membranaceous leaves (the lobes acuminate, sometimes wavy-toothed), cordate at the base, on long petioles. Flowers small, greenish-white, in racemose panicles: peduncles supra-axillary, slender.

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ETYMOLOGY. From κάλυξ, a husk, or covering, or flower-cup, and καρπός, fruit; a name evidently meant to designate the cup-shaped shell of the fruit.

GEOGRAPHICAL DISTRIBUTION. The single known species belongs to the Southern States west of the Alleghanies.

NOTE. A genus manifestly allied to *Anamirta*, and also to *Cocculus crispus*, DC., judging from the analyses given by Colebrooke.

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PLATE 30. CALYCOCARPUM LYONI; — leaf, panicle, &c., of a sterile plant (from Texas, Mr. Charles Wright); natural size.

1. A staminate flower, enlarged.
2. Bracteole; and 3, a sepal, enlarged.
4. A stamen, enlarged; inside view.
5. A pistillate flower, enlarged. (*Herb. Torrey*; as also the following.)
6. A pistil, more magnified.
7. Drupe, natural size; and 8, same, divided transversely.
9. The putamen; the excavated inner face turned to the eye.
10. Section of the same through the sutures, cutting the seed and embryo.
11. A transverse section of the putamen a little below the middle, passing through the two cotyledons lying separately in the thin albumen.
12. Embryo, of the natural size, spread out nearly flat.

## ORD. BERBERIDACEÆ.

Frutices ligno flavo, vel herbæ, foliis plerumque compositis alternis: dicotyledoneæ, hypogynæ, polypetalæ, hermaphroditæ, symmetricæ; sepalis petalisque trimeris, aut 2-4-meris, tripli-multiplici serie æstivatione alternatim imbricatis; staminibus oppositipetalis; antheræ loculis valvula sursum revoluta dehiscentibus; ovario unico monocarpellari pauci-multiovulato; fructu baccato, rarius capsulari; embryone in albumine carnosio vel corneo.

BERBERIDES, Juss. Gen. p. 286.

BERBERIDÆ, Vent. R. Br. in Tuckey, Voy. p. 411. Endl. Gen. p. 851.

BERBERIDÆ & PODOPHYLLACEÆ, Trib. 1, DC. Syst. & Prodr. l. c.

BERBERACEÆ & PODOPHYLLEÆ, Lindl. Introd. Nat. Syst. ed. 2.

BERBERIDACEÆ, Torr. & Gray, Fl. N. Am. 1. p. 49.

THE BARBERRY FAMILY, well marked as it is by the imbricative arrangement of the floral envelopes, and the stamens in a ternary, or sometimes binary or quaternary order in two series of each set, so that the petals taken together stand opposite as many sepals, and the stamens likewise opposite these, — and also by the valvular dehiscence of the anthers, and the single pistil, — yet presents the following exceptions, in plants which, nevertheless, certainly belong to this order. 1. The anther-cells open by a longitudinal line in *Nandina*, and also in *Podophyllum*. 2. In *Podophyllum peltatum* (but not in *P. hexandrum*) the stamens are twice the number of the petals. 3. In *Achlys* the stamens are indefinite, the ovule solitary, and the floral envelopes altogether wanting (just as in *Trochodendron*, *Zucc.*, among *Magnoliaceæ* *Winterææ*). 4. In *Jeffersonia*, the sepals (4 or 5 in number) form a single series, and are fewer than the petals.

The position of the petals and definite stamens in *Menispermaceæ* is, of course, to be explained in the same manner as in the *Barberry Family*; and this arrangement is not to be confounded with the different case of *Vitaceæ*, &c., where a single series of stamens is opposed to a simple whorl of petals.\*

\* The difference has been pointed out by Adr. de Jussieu, *Cours Élém. Bot.* 8 386, 794

The close alliance of the Berberidaceæ to the preceding orders is admitted by all botanists, perhaps, except Dr. Lindley, who has at length proposed a widely different arrangement, which is evidently based upon peculiar grounds, by no means compatible with ordinary views of botanical affinity.\*

The family consists of about 12 genera, all of few or single species, excepting *Berberis* itself, distributed over the northern temperate zone, chiefly in the cooler parts, and extending southward along mountain ranges only. In America the genus *Berberis* is also represented at the southern extremity of the continent. The berries are usually acid and edible or harmless; the foliage is often acid; the bark and roots of the woody species are astringent, and the roots of one or two are drastic.

The compact wood of *Berberis trifoliolata* exhibits very broad medullary rays, much wider, towards the circumference of old stems, than the woody wedges themselves, which fork sparingly, after the manner of some *Aristolochias*. The annual layers are indistinct. Young stems of *Nandina* exhibit a similar structure.

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#### CONSPECTUS OF THE UNITED STATES GENERA.

\* Anthers opening by uplifted valves.

+ Shrubs. Embryo nearly as long as the albumen: cotyledons foliaceous.

BERBERIS. (Plate 31.) Stamens and petals 6. Stigma umbilicate.

Berry one—few-seeded. — Leaves or leaflets spinulose-toothed.

+ + Herbs. Embryo small or minute: cotyledons thick.

LEONTICE ð CAULOPHYLLUM. (Plate 32.) Stamens and petals 6. Ovary

2-ovuled, bursting and evanescent after fertilization. Seeds drupaceous. — Leaves 3-ternate.

DIPHYLLEIA. (Plate 33.) Stamens and petals 6. Berry few-seeded. —

Flowers cymose. Cauline leaves 2, peltate, deeply 2-cleft, 7—9-lobed.

JEFFERSONIA. (Plate 34.) Stamens and petals 8. Pod opening trans-

versely half round, many-seeded. Seeds with a lateral arillus. — Scape naked, 1-flowered. Leaves 2-parted.

\* \* Anthers not opening by uplifted valves.

PODOPHYLLUM. (Plates 35, 36.) Petals 6—9: the stamens twice their

number (in Amer. species). Berry large, many-seeded. Seeds on a very thick lateral placenta, inclosed in a pulpy arillus. — Flower solitary, in the fork of the two peltate palmately-lobed leaves.

CROOMIA. (Plate 37.) Genus of doubtful affinity.

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\* *Veg. Kingd.* p. 432—445. — In his *Berberid* alliance, Dr. Lindley combines, as the nearest allies of *Berberidacea*, the *Droseracea*, *Fumariacea*, *Vitacea*, *Cyrtillacea*, &c. He excludes, however, from the Barberry Family the genus *Podophyllum*, “which some botanists fancy should stand here”; — a fancy which originated with Mr. Brown, and which does not appear extraordinary when that genus (and especially its hexandrous species) is compared with *Jeffersonia* and *Diphylleia*.

## PLATE 31.

BERBERIS, *L.*

Calyx 6-sepalus, extus 3-2-bracteolatus. Petala 6, concava, intus pl. m. biglandulosa. Stamina 6. Stigma peltatum, umbilicatum. Bacca oligosperma, seminibus erectis. Embryo magnus, cotyledonibus subfoliaceis ellipticis. — Frutices, foliis sæpe spinulosis; floribus racemosis.

BERBERIS, Bauhin. Linn. Gen. 442. Gartn. Fr t. 42. Hook. Fl. Bor-

Am. 1. p. 28. Torr. & Gray, Fl. 1. p. 49. Endl. Gen. 4811.

BERBERIS & MAHONIA, Nutt. Gen. 1. p. 210. DC. Syst. 2. p. 18.

ODOSTEMON, Raf in Amer. Month. Mag. 1819. p. 192.

**Barberry.**

CALYX calyculate with 3 or sometimes 2 close-pressed bractlets: proper SEPALS 6, in two series, alternatively imbricated in æstivation, orbicular or obovate, concave-spreading, more or less petaloid, deciduous. PETALS 6, opposite the 6 sepals, imbricated in æstivation in two series, hypogynous, obovate, concave-connivent, unguiculate or sessile, marked with two thickened glands, or more or less conspicuous glandular spots, at the base of the lamina inside, deciduous. STAMENS 6, hypogynous, opposite the petals and shorter than they: FILAMENTS thick, articulated with the receptacle, spreading under the petals in the expanded flower, starting forward towards the pistil with a sudden jerk when touched with a point next the base on the inner side (thus projecting the pollen upon the stigma): ANTHERS two-celled; the cells somewhat extrorsely adnate to the thick connective, nearly the whole face separating as a valve which is lightly hinged at the apex. OVARY ovoid, one-celled, marked with a projecting placental line inside (toward the axis): STYLE short and thick or none: STIGMA orbicular and peltate, umbilicate, entire. OVULES 2 to 9, erect from the base of the placental line, towards which the raphes are all turned.

BERRY oblong or globular. SEEDS 1 to 9, erect, oblong, with a crustaceous testa and a narrow raphe. EMBRYO in the axis and occupying nearly the whole length of corneous-fleshy albumen, straight or nearly so: RADICLE slender, inferior: COTYLEDONS elliptical, flat and nearly foliaceous, parallel with the raphe, shorter than or equalling the radicle in length.

SHRUBS, with yellow wood and inner bark, deciduous or persistent 1-many-foliolate alternate leaves; their petioles dilated at the base. Stipules adnate, commonly minute, caducous. Leaflets articulated, veiny, usually spinulose-toothed or ciliate-serrate. Flowers yellow, racemose.

ETYMOLOGY. From the Arabic name of the berries of the Barberry.

PROPERTIES. These well-known berries are pleasantly acid and astringent. The yellow bark and wood furnishes a dye, and is astringent, and seems also, with the root, to contain a principle (*berberine*) which is cathartic.

DIVISION. To the two recognized subgenera, I may here add a third.

§ 1. BERBERIS proper. — Filaments usually inappendiculate. Primary leaves mostly converted into triple, quintuple, or simple prickly spines; the secondary fascicled in the axils of these, unifoliolate (articulated above the scale-like base which represents the real petiole), subsessile.

§ 2. TRILICINA. — Filaments inappendiculate. Unarmed: leaves all evolute, digitately 3-foliolate: leaflets sessile on the apex of the common petiole. (*B. trifoliolata*, *Moric.*)

§ 3. MAHONIA, *Nutt.* — Filaments appendiculate with two salient teeth at the apex. Unarmed: leaves all evolute, pinnately 5-17-foliolate.

PLATE 31. BERBERIS CANADENSIS, *Pursh*; — part of flowering stem, natural size, from the Cambridge Botanic Garden.

1. Diagram of the flower (the upper side belongs next the axis).
2. A flower, enlarged.
3. An outer sepal; 4, an inner sepal, enlarged.
5. A petal, enlarged; inside view.
- 6, 7. Stamens, enlarged; the latter with the anther dehiscent.
8. Ovary transversely, and 9, vertically divided, magnified.
10. Berries, from a wild specimen. (Mountains of North Carolina.)
11. Vertical section of a berry, enlarged.
12. Magnified section of the seed and embryo.
13. Magnified embryo, turned flatwise, to show the broad cotyledons.

## PLATE 32.

LEONTICE, *L.*

Calyx 6-sepalus, petaloideus, interdum bracteolis calyculatus. Petala 6, nectariformia, dilatato-cucullata, sepalis multo minora. Stamina 6. Ovarium e basi 2-4-ovulatum. Pericarpium tenui-membranaceum inflatum, indehiscens, vel, —

Subgen. CAULOPHYLLUM, grossificatione seminum longe ante maturitatem ruptum, evanescens. Semina itaque nuda, drupacea. — Folium triternatum.

LEONTICES Sp., Linn. R. Br. in Linn. Trans. 12. p. 143. t. 7. DC. Syst. 2. p. 23. Decaisne in Nouv. Ann. Sci. Nat. 2. t. 12. Torr. & Gray, Fl. N. Am. 1. p. 52. Endl. Gen. 4810.

CAULOPHYLLUM, Michx. Fl. 1. p. 204. t. 21. Nutt. Gen. 1. p. 210.

**Blue Cohosh. Pappoose-root.**

CALYX calyculate with 3 close-pressed bractlets: SEPALS 6, consimilar, imbricated in æstivation in two separate series, petaloid, ovate-oblong, flat, widely spreading or revolute, early deciduous. PETALS 6, hypogynous, one at the base of each sepal and very much shorter than it, fleshy and gland-like, viscid, unguiculate, cuneiform-dilated, the very broad and rounded summit involute, deciduous. STAMENS 6, hypogynous, opposite the petals and rather shorter than they: ANTHERS rather shorter than the filaments: the two oblong cells somewhat extrorsely adnate to the thickish connective; the greater part of the face separating in dehiscence as an uplifted valve. OVARY ovoid-oblong, one-celled, tapering into a subulate oblique STYLE, which is minutely stigmatose from the apex down the inner side. OVULES 2. collateral, erect from the base of the cell, raised and as if articulated on short fleshy funiculi, anatropous.

PERICARP very thin, ruptured soon after the floral envelopes fall by the pressure of the growing seeds, and then

shrivelling away. SEEDS (one or both maturing) therefore *naked*, stipitate on their thickened funiculi, spherical, large, with a fleshy at length baccate testa, appearing like drupes! ALBUMEN corneous, deeply umbilicate at the hilum, its vertical section deeply reniform. EMBRYO minute, partly received into a sort of cup formed by the folding of the tegmen in the axis of the umbilicate basal depression, cylindrical: RADICLE short, inferior, about the length of the thick cotyledons.

HERBACEOUS; the fleshy rootstock sending up in early spring a simple and naked stem, bearing near the summit a tritermately compound leaf destitute of a common petiole, and often a smaller and similar leaf at the very base of the terminal raceme or panicle. Leaflets 2-5-cleft at the apex, glaucous, as also the blue drupaceous seeds.

(Characters from the North American species only.)

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ETYMOLOGY, &c. Leontice is a name abbreviated by Linnæus from the *Leontopetalum* of Tournefort. *Caulophyllum*, which may very probably resume its generic rank, is formed of *καυλός*, *stem*, and *φύλλον*, *leaf*; the stem seeming to form a stalk for the single, large and compound leaf.

PROPERTIES. The root is an "Indian medicine," but its real qualities are unsettled. The albumen of the seed has been *proposed* as a substitute for coffee.

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PLATE 32. LEONTICE (*CAULOPHYLLUM*) *THALICTROIDES*, *Linn.*; — summit of stem, natural size when coming into flower. (Botanic Garden, Cambridge; May: from Western New York.)

1. Back view of a flower-bud, showing the 3 bractlets (*sepals* of authors).
2. Diagram of the aestivation, &c.
3. Enlarged flower, seen from above.
4. A bractlet; 5 and 6, sepals, enlarged.
7. Enlarged petal, from the outside; 8, inside view of the same.
- 9, 10. Magnified stamens, seen from the outside.
- 11, 12. Same, seen from the inner side.
13. Pistil, enlarged.
- 14, 15. Same, transversely and vertically divided.
16. Pistil, a week after the floral envelopes have fallen, enlarged.
- 17, 18. Same, still later; the pericarp ruptured by the growing seeds.
19. The two full-grown seeds on their funiculi; natural size.
20. Vertical section of one of them.
21. Embryo, detached, and highly magnified.

## PLATE 33.

DIPHYLLEIA, *Michx.*

Sepala 6, caducissima. Petala 6, ovalia, plana. Stamina 6. Bacca gibbosa, basin versus 2-4-sperma. Embryo majusecula. — Caulis alternatim diphyllus; foliis maximis, peltatis, bifidis, ambitu lobatis. Cyma terminalis.

DIPHYLLEIA, Michx. Fl. 1. p. 203. t. 19, 20. Bot. Mag. t. 1666. DC. Syst. 2. p. 39. Torr. & Gray, Fl. N. Am. 1. p. 52. Endl. Gen. 4808. Gray, in Sill. Jour. 42. p. 23.

CALYX of 6 thin and membranaceous roundish-oval SEPALS, imbricated in two series in æstivation, caducous when the corolla opens. PETALS 6, alternatively imbricated in æstivation, hypogynous, consimilar, larger than the sepals, roundish-obovate, sessile, not glandular, plane, spreading, early deciduous. STAMENS 6, hypogynous, opposite the sepals, shorter than they: ANTHERS oblong, longer than the terete filament; the cells somewhat extrorsely adnate to the connective, their face (except an inner margin) separating in dehiscence as an uplifted valve. OVARY oblong-ovoid, one-celled, nearly straight: STYLE very short: STIGMA terminal, circular, depressed, slightly grooved across the middle. OVULES 5 or 6, borne in two series near the base of the placental line which marks the inner side of the cell, ascending, globular, anatropous.

BERRY globular, somewhat gibbous, apiculate with the nearly sessile stigma, unilaterally 2-4-seeded; the flesh thin. SEEDS 2 to 4, ascending from near the base of the cell on the ventral side, oblong, gibbous, slightly curved; the testa fleshy-coriaceous. ALBUMEN fleshy, or corneous when dried. EMBRYO in the axis of the albumen, extending from the base nearly to the middle, slightly curved to correspond with the curvature of the seed: RADICLE inferior, slender; the COTYLEDONS nearly of its length, oblong, pretty thin, parallel with the raphe.

HERB of striking appearance, with much the habit of *Podophyllum*: the thickened and creeping rhizoma formed of distinct annual increments, sending up a stout alternately two-leaved flowering stem (terminated by a cyme of white blossoms), which separates at the base in autumn by a marked articulation, leaving a broad excavated scar, in the manner of the rootstocks of a Solomon's Seal. Leaves very large (1 to 2 feet broad when full grown), thin, palmately veined, reticulated, of dilated reniform or orbicular circumscription, deeply two-cleft, and the margins cut-lobed and toothed; the cauline excentrically, the radial centrally, petate on long and stout petioles. Berries blue, glaucous.

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ETYMOLOGY. From *δῖς*, *twice*, or *double*, and *φύλλον*, *leaf*.

PROPERTIES. UNKNOWN: probably much like those of *Podophyllum*.

GEOGRAPHICAL DISTRIBUTION. Restricted to shaded springy places, or the margin of mountain brooks, in rich and deep alluvial soil, along the Alleghanies from Virginia to Georgia. It flowers in May, while the leaves are yet but half grown.

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PLATE 33. *DIPHYLLEIA CYMOSA*, Michx.; — flowering stem and rhizoma, from plants cultivated in the Botanic Garden, Cambridge, and dried specimens, from the mountains of North Carolina: lower leaf cut away, the upper thrown back and reduced in size.

1. A magnified stamen, with the anther dehiscant; outside view.
2. A similar stamen, seen from the inner side.
3. A magnified pistil.
4. A vertical section of the same, showing the ovules.
5. An ovule, more magnified.
6. Transverse section of the ovary made towards the base.
7. A berry; and 8, a vertical section of the same, showing the seeds.
9. A seed, magnified; lateral view.
10. Vertical section of the same, displaying the embryo, &c.

## PLATE 34.

JEFFERSONIA, *Bart.*

Sepala 4, caduca. Petala 8, plana. Stamina 8. Capsula coriacea, obovata, polysperma, sub apice rima horizontali operculatim dehiscens. Semina pluriseriata, arillo laterali laciniato. — Scapus uniflorus nudus. Folia radicalia, bipartita, segmentis semicordatis.

JEFFERSONIA, Barton, in *Trans. Amer. Phil. Soc.* 3. p. 334. Michx. Fl. 1. p. 236. DC. *Syst.* 2. p. 34. Endl. *Gen.* 4807. Torr. & Gray, *Fl. N. Am.* 1. p. 53.

**Twin-leaf.**

CALYX of 4 (sometimes 3 or 5) linear-oblong petaloid SEPALS, imbricated in æstivation in a single series, caducous. PETALS 8, imbricated in æstivation in two series, hypogynous, oblong, sessile, plane, spreading, early deciduous. STAMENS 8, hypogynous, one before each petal: ANTHERS oblong, shorter than the filiform filaments, scarcely if at all extrorse; nearly the whole face of each cell separating as an uplifted valve. OVARY ovoid, slightly stipitate, one-celled, marked by a horizontal line around the back above the middle, tapering at the summit into a short STYLE: the STIGMA terminal, somewhat dilated and two-lobed. OVULES indefinite, borne in several rows on nearly the whole length of the broad ventral suture, somewhat ascending, anatropous.

FRUIT a coriaceous obovate pod, transversely dehiscent half-way round on the back, near the summit, by a revolute persistent lid, forming a broad lunate chink. SEEDS numerous in several series on the broad placenta, somewhat ascending, arillate; the ARILLUS unilateral at the base of the raphe, fleshy, laciniate: testa coriaceous. EMBRYO minute at the base of the fleshy albumen: COTYLEDONS short: RADICLE next the hilum.

HERB low, with matted fibrous roots, sending up, in early

spring, a tuft of two-parted peltately-veined radical leaves, on long petioles, and naked scapes terminated by a single white flower.

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ETYMOLOGY. Dedicated by Professor Barton to *Thomas Jefferson*.

PROPERTIES. The plant has a popular reputation in Ohio, under the name of *Rheumatism-root*, as a stimulant, diaphoretic, &c. (*Riddell, Synopsis.*) The seeds have an acrid taste, which is very persistent.

GEOGRAPHICAL DISTRIBUTION. The single species inhabits rich and cool woods, from Northern New York southward through the Alleghany Mountains, and in the Western States.

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PLATE 34. *JEFFERSONIA DIPHYLLO*, *Pers.*;— natural size in flower.  
(Botanic Garden, Cambridge.)

1. Diagram of the flower.
2. A stamen, magnified.
3. A stamen, more enlarged; the valves of the anther opening.
4. Same; the anther divided transversely before dehiscence; then 4-celled.
5. Pistil, magnified; dorsal view.
6. Same, seen from the inner or placental side.
7. Same, transversely divided, showing the 4-ranked ovules.
8. An ovule, more magnified.
9. A growing seed, with the arillus just appearing; enlarged.
10. The mature, dehiscent pod; natural size.
11. Same, with the seeds removed, and the back cut away to show the placenta.
12. A seed, with its arillus, magnified.
13. Vertical section of the same, showing the minute embryo at the base of the albumen.

## PLATE 35. 36.

PODOPHYLLUM, *L.*

Sepala 6, caducissima. Petala 6–9. Stamina petalis numero æqualia vel dupla; antheris longitudinaliter dehiscen-  
tibus. Bacca polysperma; seminibus in arillo pulposo nidu-  
lantibus. — Caulis apice uniflorus, diphyllus; foliis peltatis  
5–9-fidis.

PODOPHYLLUM, Linn. Gen. 643. DC. Syst. 2. t. 233. Bigel. Veg. Mat.  
Med. t. 35. Jacquem. Voy. t. 9. Endl. Gen. 4806.

**May-Apple. Mandrake.**

CALYX (calyculate by 3 green bractlets which are cadu-  
cous before anthesis) formed of 6 very thin and membra-  
naceous obovate SEPALS, imbricated in two series in æstivation,  
caducous from the bud without expanding. PETALS 6 or 9,  
in two or three series, alternatively imbricated and slightly  
crumpled in æstivation, hypogynous, dilated-obovate, large,  
spreading, deciduous. STAMENS as many as the petals and  
opposite them in the Himalayan species, twice as many in  
the North American, hypogynous: FILAMENTS very short:  
ANTHERS oblong-linear, adnate; the cells opening longitudi-  
nally by a single extrorse line, as it were by a laterally  
hinged valve. OVARY ovoid, sessile, one-celled, crowned by a  
large and thick peltate and undulate-crested stigma. OVULES  
very numerous, covering the broad ventral placenta which  
occupies the whole length of the cell, crowded in about 5  
rows, horizontal, nearly amphitropous.

FRUIT a large ovate fleshy berry; the cell filled by the  
lateral placenta and the mass of pulpy ARILLI developed  
from its whole surface, inclosing the indefinite obovate  
seeds. EMBRYO small, at the base of fleshy albumen.

HERBS, with thick fibrous roots from creeping rootstocks,  
which send up in spring sterile stalks terminated by a single  
orbicular centrally peltate leaf, or two-leaved stems termi-

nated by a single large (white) flower, nodding on a short peduncle. Cauline leaves excentrically peltate, palmately 5-9-ribbed and deeply cleft; the lobes incised and toothed.

ETYMOLOGY. Name formed of *ποῦς*, a foot, and *φύλλον*, leaf; from a fancied resemblance of the leaves to the feet of a web-footed bird.

PROPERTIES. The mawkish fruit of the May-Apple is edible, and is said by Dr. Griffith to resemble that of *Passiflora edulis* in taste as well as in appearance: the herbage is poisonous: the root is a drastic cathartic.

GEOGRAPHICAL DISTRIBUTION. Our species (from which the above detailed character is drawn) is indigenous nearly throughout the United States: and there is another (*P. hexandrum*) in the mountains of Nepaul.

NOTE. The arillus was detected by Prof. Torrey several years ago, and is noticed in his elaborate *Flora of the State of New York*, 1. p. 35. The floral envelopes are first correctly described in my *Manual of the Botany of the Northern States*, in the Errata, p. 4. A singular discrepancy in respect to the size and shape of the embryo is shown on the annexed plate. As the fruit does not ripen in Eastern New England, we have been unable to multiply observations upon this point.

PLATE 35. *PODOPHYLLUM PELTATUM*, *Linn.*; — one leaf cut away.

1. Early flower-bud, the green bractlets expanded; natural size.
2. Flower-bud just before expansion, after the bractlets have fallen; the sepals separating from the base.
3. Diagram of the whole floral envelopes in the bud: the three outermost lines represent the bractlets; the six inner and wavy ones, the petals.
- 4, 5, 6. Stamens enlarged; the latter with the anther deliscent.
7. Cross-section of the last.
8. Pistil, enlarged.
9. Vertical section of the same, through the placenta.
10. Same, with the back cut away; and 11, cross-section in the same position.
12. An ovule, magnified.

PLATE 36. Fruit with dissections; natural size.

1. Ripe fruit: 2, a transverse section; and 3, a vertical section.
4. The pericarp cut away, showing the surface of the arillate mass.
5. Same, with the arilli and placenta transversely divided.
6. Magnified arillus divided, to show the included seed.
7. Magnified seed, taken from a New Jersey specimen.
8. Same, divided, showing the minute embryo.
9. This cordate embryo detached and more magnified.
- 10, 11. Magnified seed and its section, from Philadelphian specimens.
12. This much larger and longer embryo detached, and more magnified.

## PLATE 37.

CROOMIA, *Torr.*

Petala 4, persistentia. Petala nulla. Stamina 4, antheris introrsis longitudinaliter dehiscentibus. Ovarium 3-6-ovulatum; ovulis apice placentæ unilateralis e summo loculo pendulis. Pericarpium coriaceum demum bivalve. Semina 1-2, arillo criniformi obtecta. Embryo minimus. — Herba gracilis; foliis tenuibus, cordato-oblongis, integerrimis, 5-9-costatis, in apice caulis approximatis; pedunculis 2-3-floris.

CROOMIA, Torr. in Torr. & Gray, Fl. N. Am. 1. (Suppl.) p. 663.

CALYX of 4 broadly oval and nearly herbaceous SEPALS, imbricated in two series in æstivation (two exterior and two interior), persistent. PETALS none. STAMENS 4, hypogynous, one opposite each sepal: FILAMENTS stout: ANTHERS shorter than the filament, obliquely introrse, fixed by the middle, the oval or oblong cells opening by a longitudinal line down the inner side. OVARY ovate-globose, one-celled, tipped with a depressed and entire sessile STIGMA. OVULES 3 to 6, attached to the apex of a filiform placenta which is adherent to one side of the cell for the whole length, thus suspended, anatropous.

FRUIT globose-ovate, apiculate; the dry pericarp coriaceous, tardily two-valved from the apex; the valves parallel with the inner sepals. SEEDS mostly 2, suspended each by a short filiform funiculus, globose-oval, marked with a slender raphe terminating in a broad apical chalaza, covered, except the chalazal end, with a wig-shaped arillus composed of copious slender and fleshy threads. EMBRYO next the hilum in fleshy albumen, minute, globose-ovoid, obscurely two-lobed (if we mistake not) at the cotyledonar extremity.

HERB low and slender, from a horizontal creeping rhizoma. Stem simple, provided with two or three alternate

sheaths at the base, then naked to the summit where it bears 4 to 6 alternate and approximate or irregularly fascicled leaves, on slender petioles, and filiform peduncles in their axils. Leaves thin and membranaceous, cordate at the base, ovate-oblong, acuminate, entire, 5-9-ribbed, the ribs converging to the apex, and connected by copious transverse reticulated veinlets, as in *Smilax* or *Dioscorea*. Flowers 2 to 3, very small, greenish-white or tinged with purple. Pedicels subtended by small alternate bracts, slender, articulated above the middle; the summit becoming thickened in fruit.

ETYMOLOGY. The genus consists of a single species, dedicated by Professor Torrey to the memory of his friend, the late *Hardy B. Croom, Esq.*, the discoverer, who was also the author of a *Monograph of Sarracenia*, and of other botanical papers.

GEOGRAPHICAL DISTRIBUTION. The plant grows in woods in Middle Florida, where it has been gathered by Dr. Chapman, as well as by the lamented botanist whose name and services to science it commemorates. Mr. Buckley has also detected it in Alabama.

NOTE. For our knowledge of the ripe fruit, discovered since the first volume of the *Flora of North America* was published, we are indebted to Dr. Chapman and Mr. Buckley. Our analyses are taken partly from sketches made by Dr. Torrey, and kindly furnished for our use. We discovered the minute embryo in a single seed only, and are not certain whether it is dicotyledonous or not. In either case, the affinity of the genus remains obscure.

PLATE 37. *CROOMIA PAUCIFLORA, Torr.*; — from a small specimen.

1. Diagram of the flower.
2. A flower, just expanding, enlarged.
3. A flower, taken at a later period. (From a sketch by Dr. Torrey.)
- 4, 5. Stamens, taken from fig. 2; back and front views.
6. Pistil, magnified.
7. Vertical section of the same, showing the suspended ovules (but not so delineated as to exhibit the adnate placental cord, from the partly free apex of which they hang).
8. Pod, enlarged.
9. A deliscent pod, enlarged. (*Herb. Torr.*)
10. Vertical section of a pod, magnified, showing the two seeds.
11. A seed, with its comose arillus, more magnified.
12. Vertical section of the same, showing the minute embryo.
13. Detached embryo, more magnified (inverted, the hilar end down.)

## ORD. CABOMBACEÆ.

Herbæ aquaticæ foliis peltatis: dicotyledoneæ, polypetalæ, hypogynæ; sepalis, petalis, staminibus, pistillisque discretis definitis, ordine sæpissime ternario; æstivatione imbricativo; carpellis sutura dorsali 2-3-ovuliferis; seminibus atque embryone Nymphæacearum.

CABOMBÆÆ, Rich. Anal. Fr. (1808) & in Ann. Mus. 17. p. 230. t. 5. Endl. Gen. p. 412.

CABOMBACEÆ, Torr. & Gray, Fl. 1. p. 54. Lindl. Veg. Kingd. p. 412.

PODOPHYLLACEÆ, Trib. HYDROPELTIDEÆ, DC. Syst. 2. p. 36.

NYMPHÆACEÆ, Subord. HYDROPELTIDEÆ, Lindl. Introd. Nat. Syst. ed. 2.

HYDROPELTIDEÆ, Meisn. Gen. p. 6. Schleid. in Wiegm. Arch. 5. p. 230.

RANUNCULACEÆ, Trib. CABOMBÆÆ, Gardner, in Hook. Ic. Pl. 641.

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THE WATER-SHIELD FAMILY, which it is most convenient to regard as a separate order, is nevertheless only a simplified form of Nymphæaceæ, as has always been maintained by Mr. Brown,\* — the pistils of *Brasenia* being to that of *Nymphæa* just what those of *Platystemon*, *Benth.*, are to that of a Poppy. Viewed as distinct, it should stand between Ranunculaceæ and Nelumbiaceæ; but it is only from an overestimate of the external characters that it has been proposed to merge it in the former instead of the latter order. The seed and embryo exhibit precisely the peculiar structure of those of the Water-Lilies, as our illustrations clearly show.

The figure copied by Lindley (*Veget. Kingd.* p. 412) is either taken from an unripe seed of *Cabomba aquatica*, in which the cotyledons are not full-grown, and the walls of the inclosing sac are vastly thicker than afterwards; or else, which is more likely, the cotyledons have been mistaken for the sac, and the plumule for the entire embryo. In the accompanying section of the carpels, after Turpin, the ovules are placed on the wrong suture.

The anomalous attachment of the ovules to the *dorsal* suture of the ovary, first noticed by Mr. Brown in *Brasenia*, and recorded in his notes made upon the living plant in New Holland, which he had the kindness to show me,

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\* General Remarks in Flinders, *Voy.* p. 598; and in Horsfield's *Plantæ Javan. Rar.* p. 108.

is also explicitly mentioned by Salisbury, in 1806,\* and by Nuttall, in 1818.

The last-named author has also well described the circularly disposed airtubes, &c., of the stalks of *Brasenia*; which, however, are constructed nearly as in the stems of most aquatics; except that they are said by Schleiden and Lindley to be entirely destitute of spiral vessels.

The two genera of which the group consists are both represented in the United States, to which and to Eastern New Holland! *Brasenia* is confined; while *Cabomba* is divided between the Southeastern United States and the eastern side of South America near the equator.

The roots and herbage of these plants are mucilaginous, with some astringency. They are entirely destitute of acidity and of any noxious qualities.

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\* In König and Sims, *Annals of Botany*, 2. p. 74.

## PLATE 38.

CABOMBA, *Aubl.*

Sepala 3. Petala 3, breviter unguiculata, 2-auriculata. Stamina 6, antheris extrorsis. Ovaria 3, raro 2 v. 4: styli stigmatē depresso terminati. — Folia submersa capillaceo-multipartita; emersa integra.

CABOMBA, Aublet, Guian. 1. p. 321. t. 124. Rich. l. c. Juss. Gen. p. 46. DC. Syst. 2. p. 36. Gray, in Ann. Lyc. Nat. Hist. New York, 4. p. 46. Torr. & Gray, Fl. 1. p. 34. Endl. Gen. 5024. Gardn. in Hook. Ic. Pl. t. 641, 642.

NECTRIS, Schreb. Gen. 610. Pursh, Fl. 1. p. 239. Nutt. Gen. 1. p. 230.

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SEPALs 3, oval or obovate, petaloid, imbricated in æstivation, persistent. PETALS 3, hypogynous, alternate with the sepals and similar to them, but more or less unguiculate, with the base of the lamina auriculate on each side, imbricated in æstivation, spreading, persistent. STAMENS 6, shorter than the floral envelopes and inserted opposite them, hypogynous: FILAMENTS subulate: ANTHERS oval or oblong, the cells opening extrorsely lengthwise. PISTILs 3, sometimes 2 or 4, sessile: OVARY ovoid-oblong, one-celled: STYLE short, subulate: STIGMA terminal, depressed. OVULES usually 3, and inserted one on the ventral suture, one on the dorsal, and the third on some part of the wall of the cell near one or the other suture, anatropous, pendulous.

FRUIT (one or two carpels ripening) indehiscens, coriaceous, pointed with the persistent style, 1-3-seeded. SEEDS pendulous, ovoid or globose; the crustaceous testa cristate-ribbed or echinate-roughened by the projecting ends of the innumerable cells of which it is composed; a mamillæform portion at the hilum separates at maturity in the form of a minute cap (doubtless serving to facilitate the protrusion of the radicle in germination): inner integument thin and membranaceous. ALBUMEN farinaceous, filling the cavity of

the seed, except the hilar extremity, where it is depressed to make room for the lenticular sac (*vitellus, sac of the amnios*) which incloses the embryo, perforated by a central canal (the vestige of the extension of the sac in the ovule to the chalaza). EMBRYO small, lenticular, conformed to the sac, which it fills: RADICLE nearly obsolete, superior: the COTYLEDONS very thick and fleshy, much thicker than long, inclosing an oblong fleshy PLUMULE.

HERBS growing in ponds and slow streams, with slender stems, furnished under water with chiefly opposite palmately or peltately and filiformly many-parted leaves; the uppermost leaves floating, entire or emarginate, centrally peltate on long petioles. Flowers solitary on long axillary peduncles, white or yellowish.

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ETYMOLOGY. Apparently an aboriginal name.

GEOGRAPHICAL DISTRIBUTION. There are two species in Brazil and Guiana, and one in the Southern United States.

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PLATE 38. CABOMBA CAROLINIANA, *Gray*; — summit, of the natural size.

1. A flower, enlarged.
2. A sepal, enlarged.
3. A petal, equally enlarged; inside view.
4. A magnified stamen; seen from the outside.
5. Same, seen from the inner side.
6. The pistils, magnified.
7. A magnified pistil, the ovary divided longitudinally.
8. Fruiting pistil, with an infertile one; enlarged.
9. A magnified seed, with the hilar operculum, 10, detached.
11. Vertical section of the same, showing the embryonic sac at the extremity of the albumen.
12. A portion (the hilar end) of the same section, more magnified (and reversed), displaying the embryo, surrounded by the sac, which is seen in section, at the base of the albumen.
13. The embryo, detached, with the cotyledons separated, to show the plumule.

## PLATE 39.

BRASENIA, *Schreb.*

Sepala 3. Petala 3, sessilia, linearia, sepalis consimilia. Stamina 12–18 (vel 18–36?), antheris levissime introrsis. Ovaria 6–18: stigma unilaterale sessile. —Folia omnia natantia, integerrima, centro peltata.

BRASENIA, Schreber, Gen. 938 (1789). Nutt. Gen. 2. p. 23. Torr. & Gray, l. c. p. 55. Endl. Gen. 5025. Gray, Bot. N. U. S. p. 22.

HYDROPELTIS, Michx. Fl. 1. p. 324. t. 29 (1803). Rich. l. c. Salisb. in Ann. Bot. 2. p. 74. DC. Syst. 2. p. 37.

**Water-shield.**

SEPALs 3, or sometimes 4, narrowly oblong, imbricated in æstivation, herbaceous, colored inside, persistent. PETALS as many as the sepals and alternate with them, hypogynous, linear-oblong, sessile, not appendiculate, persistent. STAMENS 12 to 18, or sometimes more numerous, hypogynous: FILAMENTS filiform: ANTHERS linear-oblong, innate, the cells opening longitudinally by a slightly introrse line. PISTILs 4 to 18, capitate-crowded, sessile: OVARY oblong, one-celled, terminated by an oblong and brush-shaped introrse STIGMA of almost its own length. OVULES 2, superposed on the dorsal suture, pendulous, anatropous; the raphe towards the suture.

FRUIT (few or several of the carpels maturing) indehiscent, coriaceous, pointed with the persistent stigma, oblong or obovoid, usually only one (the upper) seed ripening. SEED ovoid, large; the crustaceous testa nearly smooth. ALBUMEN farinaceous, marked by a central canal, as in Cabomba. EMBRYO depressed-globular, filling the membranaceous sac which occupies and is partly imbedded in the hilar extremity of the albumen: RADICLE a mere papilla at the junction of the two very thick and fleshy COTYLEDONS, which lie parallel with the raphe (or anterior and posterior), and inclose an oblong two-lobed PLUMULE.

HERB growing in ponds and pools, sending up, from a fleshy prostrate rhizoma, long and forking stems bearing above alternate oval and entire centrally peltate leaves, involute in veneration, brought by the elongation of the petioles to the surface of the water, on which they float. Peduncles axillary, equally elongated, bringing the solitary dull purple flower to the surface, where it expands only in anthesis. The stalks and other submersed parts are covered, especially when young, with a thick coating of transparent jelly.

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ETYMOLOGY. *Brasenia* is unexplained; perhaps it was designed to commemorate some obscure German botanist. *Hydropeltis*, which, being unfortunately the later name, must give precedence to that imposed by Schreber, is the Greek equivalent of *Water-shield*.

GEOGRAPHICAL DISTRIBUTION. The single species is abundant throughout the United States and Upper Canada. It is most remarkable that what appears to be the same species is also a native of Eastern New Holland, where it was long ago detected by Mr. Brown!

NOTE. The jelly by which the stalks, &c., are thickly coated, I find to arise from the rapid formation and rupturing of successive epithelial cells, in the same way that mucilage is formed on the surface of animal mucous membranes. The rhizoma of *Brasenia* contains oblong and transversely annulated starch-grains of unusual size, the larger being  $\frac{1}{75}$  of an inch in length.

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PLATE 39. *BRASENIA PELTATA*, Pursh; — of the natural size.

1. Diagram of the sepals and petals (in the bud each set is imbricated).
2. Vertical section of a flower-bud, enlarged.
3. A magnified anther, seen obliquely from the outside.
4. The same; inside view, showing the slightly introrse dehiscence.
5. A magnified pistil, seen laterally; and 6, posteriorly.
7. Same, the ovary divided vertically, showing the dorsally inserted ovules!
8. An ovule, more magnified.
9. Fruit, with the persistent perianth; of the natural size.
10. A ripe carpel, enlarged.
11. Vertical section of the same, and of the ripe seed and embryo in its sac.
12. Vertical section of the hilar end of the seed (much more magnified) made at right angles to that in fig. 11, parallel to the cotyledons, one of which is cut away, and through the included 2-lobed plumule.
13. Similar section, cutting the cotyledons at right angles to fig. 12; or same as fig. 11, reversed and more magnified.
14. Embryo, magnified; the cotyledons opened, showing the plumule.

## ORD. NELUMBIACEÆ.

Herbæ aquaticæ insignes, Nymphæoideæ; at ovariis intra alveolos tori obconici segregâtis, uniovulatis, fructu nuciformibus; embryo exalbuminoso, plumula maxime evoluta.

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PLATE 40, 41.

### NELUMBIUM, *Juss.*

Character ut ordinis monotypici.

NELUMBIUM, *Juss. Gen.* p. 68. *Turp. in Ann. Mus.* 7. p. 210. t. 11. *Rich. Ibid.* 17. p. 249. t. 9. *DC. Syst.* 2. p. 43. *Wight, Ill. Ind. Bot.* t. 9. *Hook. Bot. Mag.* t. 3753. *Endl. Gen.* 5026.

NELUMBO, *Tourn. Inst.* 261. *Adans. Fam.* 2. p. 76. *Gærtn. Fr.* t. 19.

CYAMUS, *Salisb. in Ann. Bot.* 2. p. 75. *Smith, Exot. Bot.* 1. p. 59. t. 31, 32. *Barton, Fl. N. Am.* t. 63.

**Nelumbo. Sacred Bean. Water Chinquepin.**

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CALYX and COROLLA confounded, consisting of numerous SEPALS (the exterior) and PETALS imbricated in 5 or 6 series in æstivation, oblong or oval, the exterior shorter and less colored, early deciduous. STAMENS indefinite, hypogynous in several series below the enlarged torus, very deciduous: FILAMENTS short and slender: ANTHERS linear, elongated, introrsely adnate to the connective, which is prolonged at the apex into a conspicuous appendage; the cells contiguous, opening longitudinally. TORUS much enlarged above the stamens, obconical. OVARIES numerous (12 to 25), separately immersed in hollows of the flat upper surface of the dilated torus, ovoid, one-celled, one-ovuled (1-2-ovuled, *Endl.*), marked with a dorsal gibbosity: STYLE a short and thick neck: STIGMA peltate, umbilicate. OVULE suspended from the summit of the cell, anatropous; the raphe dorsal.

FRUIT consisting of 12 to 25 acorn-like nuts immersed in the hollows of the dry, top-shaped torus, tipped with the persistent stigma: the PERICARP coriaceous-crustaceous. SEED suspended, soon loose in the cell, globular: testa membranaceous. ALBUMEN none. EMBRYO filling the seed: RADICLE extremely short, superior: COTYLEDONS thick, fleshy, hemispherical, hollowed within, the two joined by their edges form a globose, albumen-like body, inclosing a highly developed green PLUMULE, which is covered by an extremely delicate membranous sheath, and consists of 2 or 3 ready-formed leaves with their petioles inflexed.

HERBS growing in water; with very large and orbicular entire centrally peltate leaves, and solitary long-peduncled flowers, floating on the surface or raised above it, arising from a prostrate tuberous rhizoma. Vernation involute.

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ETYMOLOGY. *Nelumbo*, the Ceylonese name of the Oriental species.

PROPERTIES and AFFINITY. Same as of *Nymphæacææ*; of which *Nelumbium* is only a peculiar apocarpous form, with the embryo in a further developed, or as it were germinating, state, at the expense of the albumen. — The seeds and the farinaceous rootstocks are edible.

GEOGRAPHICAL DISTRIBUTION. Of this genus, so remarkable for the great size of the leaves and flowers, there are perhaps two species indigenous to the warmer parts of Asia, and one in the United States, and also in Jamaica.

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PLATE 40, 41. *NELUMBium LUTEUM*, Willd.; — from specimens from the Delaware River, communicated by *Miss Dix* and *Miss Morris*.

1. A leaf; a small one, and considerably reduced.
2. Flower-bud and peduncle; of the natural size.
3. Flower of the natural size, showing the summit of the torus, &c.
4. Vertical section of the torus and receptacle, dividing one of the ovaries.
5. A stamen, enlarged; inside view.
6. A detached pistil, enlarged; and 7, same, with the ovary divided.
8. The top-shaped torus in ripe fruit; natural size.
9. A fruit, with the pericarp divided, showing the contained seed.
10. Same, with the seed, cotyledons, and the contained plumule, divided.
11. Embryo detached and reversed; the cotyledons opened to show the plumule in its transparent delicate sac.
12. Plumule, with the sac removed.
13. The same, magnified, spread out; the lower leaf cut across.

## ORD. NYMPHÆACEÆ.

Herbæ aquaticæ, foliis plerumque peltatis floribusque polymeris natantibus: dicotyledoneæ, polypetalæ; petalis et staminibus indefinitis, toro hypogyno crasso vel ovario pluriloculari multiovulato imbricatim insertis; ovulis parietibus dissepimentorum insertis; bacca polysperma; embryone intra sacculum proprium incluso, albuminis fovea superficiali basilari applicito; cotyledonibus carnosus plumulam includentibus.

NYMPHÆACEÆ, Salisb. in Ann. Bot. 2. p. 69. (excl. gen.) DC. Prop. Med. ed. 2. & Syst. 2. p. 39. Bartl. Ord. p. 88. Lindl. Introd. Nat. Syst. ed. 2. p. 10. Endl. Gen. p. 898.

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THE WATER-LILY FAMILY is the first of the series which exhibits a truly compound pistil, formed by the union of a whorl of carpels into one syncarpous ovary. It also furnishes instances of the partial cohesion of the floral envelopes with each other, and especially with the surface of the compound ovary. It likewise affords the finest examples of the gradual transition of sepals into petals, and of petals into stamens; as in the White Water-Lily, in which every intermediate gradation may be traced between the naked petals and perfect stamens of the ordinary structure and appearance. Both the petals and stamens are numerous, or indefinite, and imbricated in several series. The pistil consists of several (six to fifteen or more) cells; that is, of as many carpels, verticillate and coalescent in a solid mass around a central axis.

A remarkable characteristic of this family is found in the insertion of the ovules. These are scattered over the whole face of the dissepiments, that is to say, "the whole internal surface of the carpels is equally ovuliferous," instead of the inner angle or suture only, as in all ordinary cases. Indeed, the inner angle of the cells in *Nymphæa* and *Nuphar* is the only part of the surface which is *not ovuliferous*, or scarcely so. The tendency to produce ovules is greatest towards the middle and posterior part of the parieties, and (in *Nuphar*) at or near the dorsal angle itself. This fact, viewed in connection with the circumstance already mentioned under *Cabomba* (p. 93), namely, that one of its ovules is often found attached to the wall of the cell

at some distance from either suture, affords the completest confirmation of Mr. Brown's remark upon this subject.\*

Our analyses clearly demonstrate that the embryo in *Nymphæacæ* and in *Cabombacæ* is just that of *Nelumbium* on a smaller scale: the difference being that the albumen has been absorbed into the latter, which has taken a further development; and that the amniotic sac has disappeared, or become confluent with the coats of the seed, unless, indeed, it may be identified with the diaphanous membrane which surrounds the plumule. The state of our fresh specimens of *Nelumbium*, transmitted to us at midsummer from a great distance, forbade an investigation of this and other points, which a botanist who has the growing plant before him might prosecute with success.

Besides *Nymphæa* and *Nuphar*, the order comprises three exclusively tropical genera, namely, *Barclaya* of Pegu, *Euryale* of Northern India, and the superb *Victoria* of Guiana and Northern Brazil, the most gigantic of water-plants, its orbicular peltate leaves being from six to eight feet, and its fragrant blossoms often fifteen inches, in diameter! †

These plants are destitute of noxious, or any active properties, excepting a moderate astringency. The stalks are also mucilaginous; and the farinaceous seeds are edible, as likewise are the thickened rootstocks of some species, when cooked.

\* "A case of this kind is found in a portion of one of those families in which the whole surface is generally ovuliferous, namely, in *Hydropeltideæ*, which I have always regarded as a mere section of *Nymphæacæ*; and from the nature of these differences in placentation, which are more apparent than real, an argument might even be adduced in favor of that opinion." *R. Br. in Horsf. Pl. Jav. Rar.*, note, p. 108.

† The latest and fullest account of this Titanic Water-Lily is that given by Hooker in the *Botanical Magazine* for January, 1847.

## PLATE 42, 43.

NYMPHÆA, *Tourn.*

Petala et stamina indefinita, ovario (mediante toro) pluri-seriatim inserta, exteriora sepalis 4 liberis æquilonga et conformia. Stigmata linearia, circa glandulam in centro globosam radiata. Semina indefinita arillo inclusa. — Flores sæpius suaveolentes, nunquam flavi.

NYMPHÆA, *TOURN.* Linn. (excl. spec.) Neck. Elem. 1828. Smith, Prodr. Fl. Græc. 1. p. 361. Schkuhr, Handb. t. 142. (excl. spec.)

DC. Syst. 2. p. 49. Endl. Gen. 5020.

LEUCONYMPHÆA, Boerh. Hort. Lugd. p. 364.

CASTALIA, Salisb. in Kön. & Sims, Ann. Bot. 2. p. 71.

**Water-Lily. Lotus** (Egyptian).

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CALYX of 4 oblong SEPALS, green outside and colored within, imbricated in æstivation, free, tardily deciduous. PETALS numerous, distinct, imbricated in several series in æstivation, inserted by means of the thin adnate torus over the whole exterior surface of the ovary, upon which their persistent vestiges remain in fruit; the exterior as large as the sepals and similar in form; the inner series passing by gradual transition into stamens. STAMENS indefinite, inserted on the ovary above the petals: FILAMENTS petaloid, or the innermost linear-filiform: ANTHERS introrsely adnate, the cells opening longitudinally. COMPOUND OVARY many- (12 – 24-) celled, crowned with as many linear STIGMAS radiating around its broadly umbilicate summit, which bears a globular knob in the centre. OVULES very numerous, inserted over the whole face of the dissepiments except at the inner angle of the cells, anatropous, pendulous; the raphe external (the micropyle next the wall of the carpel)?

FRUIT baccate, globular, covered with the scaly vestiges of the sepals, pulpy or gelatinous internally, many-celled, many-seeded. SEEDS pendulous, each inclosed in a mem-

branceous cellular ARILLUS, which is open at the extremity : testa crustaceous, marked with a narrow raphe ; the inner integument membranaceous. ALBUMEN farinaceous, perforated with a central canal leading to the membranaceous closed sac, immersed in a depression at its hilar extremity, which is filled by the globular EMBRYO. RADICLE very minute, next the hilum : COTYLEDONS fleshy, rounded, excavated internally to contain the two-lobed PLUMULE.

HERBS, growing in quiet water, with rounded peltate leaves and solitary showy (white, purple or blue) flowers, raised to the surface on long petioles and peduncles, which spring from a fleshy prostrate lactescent rootstock. Vernation involute. Blossom closing in the afternoon, usually sweet-scented. Fruit ripening under water.

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ETYMOLOGY. *Νυμφαία*, dedicated to the Water-Nymphs.

GEOGRAPHICAL DISTRIBUTION. Natives of the northern temperate and subtropical regions. Our single United States species is one of the finest of these beautiful plants.

NOTE. The arillus in *N. alba* is pretty well figured by Schkuhr (1791).

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PLATE 42, 43. *NYMPHÆA ODORATA*, *Ait.*; — flower-bud, flower, and a small leaf; natural size.

1. Diagram of the æstivation and position of the parts of the flower.
2. An outer petal, natural size.
3. An inner petal, showing the rudiment of an anther at its tip.
- 4, 5. Exterior petaloid stamens, natural size; inside view.
6. An inner stamen, seen from within.
7. Pistil, &c. ; the floral envelopes and all the stamens but one removed.
8. Vertical, and 9, transverse section of the pistil; magnified.
10. An ovule, more magnified.
11. Fruit, covered with the scaly bases of the persistent petals; nat. size.
12. Vertical section of the same, showing the seeds on the partitions.
13. Magnified seed in the arillus; and 14, with the arillus divided.
15. Longitudinal section of a magnified seed, dividing the albumen, and the sac, and cutting away one cotyledon, so as to show the plumule.
16. Transverse section of the base of a seed, cutting through the sac and embryo. (Shows that the cotyledons are parallel with the raphe.)
17. Embryo, magnified; the cotyledons opened, showing the plumule.

PLATE 44.

NUPHAR, *Smith.*

Petala 10–20, glandula-formia, cum staminibus appresso-imbriata, toro hypogyno seu perigyno inserta, sepalis 5–6 liberis et stigmate peltato radiatum 12–20-striato breviora. Semina indefinita, exarillata. — Flores lutei.

NUPHAR, Smith, Prodr. Fl. Græc. 1. p. 361. DC. Syst. 2. p. 59. Deless. Ic. 2. t. 6. Endl. Gen. 5021. Trecul, in Ann. Sci. Nat. 3. ser. 2. p. 286. t. 10–13.

NYMPHÆÆ Sp., Tournef. Linn. Gærtn. Schkuhr, l. c.

NYMPHÆÆ, Boerh. l. c. p. 363. Salisb. in Kön. & Sims, Ann. Bot. 2. p. 71.

NYMPHOSANTHUS, Rich. Anal. Fr. p. 68 & Ann. Mus. 17. p. 230. t. 9.

**Yellow Pond-Lily. Spatterdock.**

CALYX of 5 or 6 roundish and concave coriaceous SEPALS, imbricated in æstivation, green at the base, yellow above and inside, free, persistent. PETALS 10 to 20, small, usually thick and glandular or stamen-like, imbricated, inserted into a thickened (hypogynous or barely perigynous) torus or disk at the base of the ovary. STAMENS indefinite, short, inserted on the torus within the petals in many series, closely imbricated and appressed to the pistil, at length elastically recurved, persistent: FILAMENTS very short, stout, continued into a similar linear glandular-truncate connective: ANTHER adnate to its inner face (introrse); the linear cells parallel, contiguous, opening longitudinally. OVARY columnar, naked, many-striate, 10–25-celled, crowned with a circular and convex 10–25-crenulate and 10–25-rayed peltate sessile STIGMA, umbilicate in the centre. OVULES as in *Nymphæa*, but rather fewer.

FRUIT baccate with a firm rind, naked, ovoid or oblong, terminated by the concave-truncate persistent radiated stigma, pulpy inside, many-celled, many-seeded; the pulpy endocarps capable of being detached entire from the firmer axis

and rind. ARILLUS wanting. SEEDS smooth, and with the ALBUMEN, EMBRYO, &c., of essentially the same conformation as in *Nymphæa*. COTYLEDONS parallel with the raphe, or rarely at right angles to it.

HERBS, growing in quiet or stagnant water; the floating or frequently emersed and erect leaves cordate, sagittate, or reniform, thickish, entire, involute in veneration, fixed at the sinus to the long and stout petioles, which with the one-flowered peduncles spring from a prostrate rhizoma, as in *Nymphæa*. Flowers dull yellow, not showy.

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ETYMOLOGY. A name used by Dioscorides, said to be of Arabic origin.

GEOGRAPHICAL DISTRIBUTION. Natives of the cooler parts of the northern hemisphere: a genus of five or six species, of which there are three in the United States.

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PLATE 44. *NUPHAR ADVENA*, *Ait.* (From spontaneous specimens.)

1. A flower-bud, of the natural size.
2. An expanded flower; natural size.
3. Diagram of the æstivation of the sepals (in two series).
4. Vertical section of an unexpanded flower; natural size.
5. Enlarged petal, outside view; and 6, lateral view of the same.
7. A stamen, enlarged, seen from the inside.
8. Same, as seen from the outside; and 9, seen laterally.
10. Half of a transverse section of an ovary, moderately magnified.
11. An ovule, more magnified.
12. Fruit, of the natural size, with remains of stamens, &c., at the base.
13. Vertical section of a fruit with the receptacle, dividing one of the cells.
14. A pulpy cell or carpel, detached entire from the adjacent side of fig. 13.
15. A seed, enlarged.
16. Vertical section of the hilar end of a seed, magnified, cutting through the fleshy sac, removing one cotyledon, and showing the plumule.
17. The sac removed entire; enlarged.
18. Same, cut through, showing the embryo (edgewise) entire.
19. Embryo, more magnified, the cotyledons opened to show the plumule.

## ORD. SARRACENIACEÆ.

Herbæ paludosæ acaulescentes, foliis coloratis, petiolo tubæformi seu amphoræformi: dicotyledoneæ, hypogynæ, polyapetalæ, polyandræ; æstivatione imbricativo; ovario 3-5-loculari, placentis axi exsertis multiovulatis; capsula polysperma loculicida; embryo parvo in basi albuminis carnososi incluso.

SARRACENIÆ, Pylaie, in Ann. Soc. Lin. Par. 6. p. 388. t. 13. Hook. Fl. Bor.-Am. 1. p. 33.

SARRACENIACEÆ, Dumort. Anal. p. 53. Torr. & Gray, Fl. N. Am. 1. p. 58, 664. Lindl. Veg. Kingd. p. 429.

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THIS GROUP consists of two genera of American Pitcher-plants; namely, *Sarracenia* of the United States and Canada, of which five or six species have long been familiarly known; and *Heliamphora*, *Benth.*, founded on a plant which Mr. Schomburgk gathered on the mountain of Roraima, in British Guiana. The latter differs from the type of the family in bearing several flowers in a raceme on the bracteate scape, in the total absence of the calyculus, of petals, and of the peculiar umbrella-shaped summit of the style which is so remarkable in *Sarracenia*, and also in having the seeds surrounded by a wing.

Unfortunately, this accession does not appear to throw any new light upon the affinities of *Sarracenia*, which are still obscure, notwithstanding that Dr. Planchon\* has recently pointed out some striking points of resemblance between this genus and *Pyrola*, which in his mind leave no doubt of their *immediate* affinity.

The pitcher or open tube of the leaves evidently belongs to the petiole, which is also simply winged or margined along the inner side; while the blade is represented by the hood, or rounded appendage at the apex, which cannot be called a lid, as it never closes the orifice, nor is it so much incurved as at all to cover it, except in two species. This proper lamina is rudimentary in *Heliamphora*, and very small in proportion to the ample orifice, which extends some way down the inner side: and thence a *double* wing-like border extends to the base, appearing just as if the two margins of an

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\* In *London Journal of Botany*, 5. p. 252.

infolded leaf were united by a seam, so as to leave the free edges outside. In *Sarracenia* this wing or margin is simple and entire. The pitchers, especially those of *S. purpurea*, are generally found partly filled with water and dead flies with other small insects. Whether the water is secreted by the leaf itself, or caught from the rain, is still undetermined. The point might readily be ascertained by proper observations, made especially upon *S. psittacina*, the pitchers of which are so protected by the hood that the fluid they contain (if any) can hardly be supposed to have entered by the orifice. That the water in the open pitchers of *S. purpurea* is not secreted by the internal hairs, as Dr. Lindley and Mr. Bentham suppose,\* would appear from the fact, that the younger leaves are empty, and that during the spring and summer it is those of the previous season, from which these hairs (in this species very long and delicate) have mostly disappeared, which alone or principally are found to contain water.

But, however derived, this water serves to drown the flies and other insects, which these leaves are admirably adapted to catch and retain. According to Elliott and others, there is a saccharine exudation at the throat of the Southern species which attracts insects; but this is not noticeable in *S. purpurea*. Immediately below the surface it is very smooth and polished, and still lower it is beset with sharp hairs, in most species long and slender, or else like those of the hood (in *S. Drummondii* extremely short and close), but in all pointing directly downwards so as to allow insects to descend, but effectually to obstruct their return. The inner surface of the hood is likewise lined with stiff and sharp retrorse bristles, which subserve a similar purpose, except in *S. flava*, which is smooth; but in that species this appendage is erect, with its sides turned away from the mouth of the tube, which thus it bears no part in guarding.

An anatomical investigation of the leaves is still a desideratum.

The six described species of *Sarracenia* are all restricted to the Atlantic border of the United States, from Virginia southward; except *S. purpurea*, the range of which extends from Florida to Newfoundland, and northwest to Ohio.

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\* Bentham, in *Linn. Trans.* 18. p. 429.

## PLATE 45, 46.

SARRACENIA, *Tourn.*

Calyx 3-bracteolatus, 5-sepalus. Petala 5. Stylus umbraculifer, persistens. Capsula 5-locularis. — Scapus ebracteatus, uniflorus.

SARRACENA, *TOURN.* Inst. p. 657. t. 476.

SARRACENIA, *Linn.* Gen. 885. *Mill.* Ic. t. 241. *Bart.* Elem. Bot. t. 1. *Nutt.* Gen. 2. p. 10. *Croom*, in *Ann. Lyc.* New York, 4. p. 98. t. 6. *Torr. & Gray*, Fl. 1. p. 58. *Endl.* Gen. 5023.

COILOPHYLLUM, *Morison*, Hist. p. 533.

BUCANAPHYLLUM, *Pluk.* Amalth. t. 376. f. 5, 6.

**Side-saddle Flower. Trumpets.**

**CALYX** calyculate at the base by three small coriaceous bractlets, quincuncially imbricated in æstivation: **SEPALS** 5, ovate, coriaceous, colored (dull purple or yellowish), spreading, persistent. **PETALS** 5, hypogynous, alternate with the sepals, broadly unguiculate, the obovate lamina concave-connivent over the pistil, imbricated in æstivation, deciduous. **STAMENS** indefinite, hypogynous in several series, deciduous: **FILAMENTS** filiform or subulate: **ANTHERS** oval, fixed by the middle, introrse; the chartaceous cells opening longitudinally down the inner face: **POLLEN** simple. **OVARY** globular, five-lobed, five-celled (the cells opposite the sepals): the **STYLE** columnar from its umbilicate summit, expanded at the apex into a very large and petaloid five-lobed and five-rayed umbrella-shaped body which covers the ovary and stamens, the five slender rays terminating in the emarginate lobes (alternate with the petals), and stigmatose at their inflexed apex underneath. **OVULES** very numerous, covering the dilated placenta which projects from the axis into each cell, anatropous.

**CAPSULE** protected below by the persistent calyx and above by the umbrella-shaped persistent style, globular, coriaceous, umbilicate, five-lobed, five-celled, loculicidally dehis-

cent, the five valves cohering by the dissepiments with the axis. SEEDS very numerous, covering the projecting axile placentæ, horizontal, anatropous, with a dilated raphe: testa crustaceous. ALBUMEN fleshy. EMBRYO very small in the axis next the hilum, cylindrical: COTYLEDONS short.

HERBS of singular aspect, growing in bogs and marshes; with fibrous roots from a short perennial rootstock, producing trumpet-shaped or pitcher-shaped coriaceous colored and reticulated leaves, and a naked scape terminated by a large (yellow or purple) nodding flower.

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ETYMOLOGY. Dedicated to *Dr. Sarrazin*, of Quebec, who sent the northern species to Tournefort. The origin of the popular name, *Side-saddle Flower*, is not evident. From the shape of the leaves, the common species is called *Huntsman's Cup*; and the tubular leaves of *S. flava*, &c., are called *Trumpets* in the South.

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PLATE 45. SARRACENIA PURPUREA, *Linn.*; — with rather small leaves; one of them cut across.

1. Flower-bud, showing the calyculate braetlets.
2. Diagram of the æstivation, &c., including an enlarged transverse section of the ovary (the cells alternate with the petals).

PLATE 46. Analyses of the flower and fruit.

1. A sepal; and 2, a petal; inside view, natural size.
3. Outside, and 4, inside view of a stamen, magnified.
5. Pistil, with two stamens left on the receptacle; natural size.
6. Umbrella of the style, seen from above.
7. Same, seen from underneath, showing the stigmas.
8. Vertical section of the whole pistil, enlarged (showing two stigmas).
9. Magnified view of the apex of one of the lobes, showing the stigma.
10. An ovule, magnified.
11. Capsule dehiscing; part of the calyx and umbrella torn away.
12. Capsule (with the persistent style) divided transversely.
13. A seed, magnified.
14. Longitudinal section of the same parallel with the wing-like raphe, showing the embryo in the albumen.
15. Embryo, detached and more magnified.

## ORD. PAPAVERACEÆ.

Herbæ (succo lacteo vel croceo) exstipulatæ: dicotyledonæ, hypogynæ, polyandræ, hermaphroditæ; sepalis petalisque di-trimeris regularibus caducis; ovario uniloculari, placentis 2-20 parietalibus pauci-multiovulatis; ovulis anatropris; embryone in basi albuminis oleoso-carnosi parvo.

PAPAVERACEÆ, Juss. Gen. p. 236. DC. Syst. 2 p. 67. Torr. & Gray, Fl. N. Am. 1. p. 60. Lindl. Veg. Kingd. p. 430.

PAPAVERACEÆ, Subord. 1, Bernh. in Linnæa, 8. p. 401 & 12. p. 651. Endl. Gen. p. 854.

THE POPPY FAMILY is usually known, among the hypogynous polyandrous and polypetalous orders, by its milky or colored, and narcotic or acrid juice; the usually alternate and lobed or divided leaves without stipules; the caducous calyx of only two or three sepals; the early deciduous petals of twice, thrice, or some higher multiple of the same number, imbricated and commonly crumpled in æstivation, and by the one-celled compound ovary, composed of from two to twenty carpels, with as many parietal placentæ, which usually separate from the edges of the valves of the capsule in dehiscence. The anatropous seeds are frequently crested at the raphe; and the embryo is small or minute at the base of the copious fleshy and usually oily albumen. They are principally annuals. One genus, *Dendromecon* of California, alone is shrubby: and a most remarkable anomaly is presented by another Californian genus (*Platystemon*, *Benth.*), which has a cluster or whorl of apocarpous pistils!

The family consists of about 19 genera, none of which is numerous in species except *Papaver* itself. Much the larger part of the order belongs to the South of Europe and the adjacent portion of Asia. Another focus is found in a country of very similar climate, namely in California, to which, and to the regions adjacent, seven or eight of the genera are peculiar. One or two perennial Poppies alone are arctic, and constitute the only representatives of the typical genus in the New World. *Chelidonium*, the *Celandine*, is a common weed around dwellings, but has been introduced from Europe. It is remarkable that, among our numerous weeds, imported with grain, &c., the Corn-Poppies of the Old World have not found a place, except in one or two local instances.

The well-known narcotic properties of the Poppy pervade the order, existing in the milky or colored juice ; which, however, is extremely acrid rather than narcotic in some genera, as in the Celandine. The oily seeds of the Poppy are bland and wholesome : but those of the Prickly Poppy are said to be acrid and noxious.

Most Papaveraceæ have showy flowers, and many are cultivated for ornament ; particularly the Poppy itself, and Eschscholtzia.

The three genera which alone are indigenous within the United States proper, namely, *Argemone*, *Stylophorum*, and *Sanguinaria*, scarcely require a conspectus.

## PLATE 47.

ARGEMONE, *Tourn.*

Sepala 2-3, muricata. Petala 4 vel 6. Stigmata 4-7, subsessilia, discreta. Capsula oblonga, sæpius muricata, apice 4-7-valvis; placentis intervalvularibus filiformibus, intus haud productis, polyspermis. Semina scrobiculata, raphe nuda. — Herba setosa, succo flavo; foliis sessilibus inciso-pinnatifidis, dentibus spinulosis. Alabastra erecta.

ARGEMONE, *Tourn.* Inst. p. 229. t. 121. Linn. Gen. 649. Gærtn. Fr. t. 60. Lam. Ill. t. 452. DC. Syst. 2. p. 85. Endl. Gen. 4821.

• **Prickly Poppy.**

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CALYX of 2 or 3 concave herbaceous SEPALS, nearly valvate in æstivation, prickly outside, horned at the apex, caducous. PETALS twice as many as the sepals, imbricated in two series and more or less crumpled in æstivation, hypogynous, dilated obovate-cuneiform, deciduous. STAMENS indefinite, hypogynous: FILAMENTS filiform: ANTHERS innate, oblong, the cells opening longitudinally by a slightly extrorse line. OVARY oblong, clothed with bristly prickles, strictly one-celled, with 4 to 7 parietal placentæ which do not project into the cell: STIGMAS nearly sessile, as many as the placentæ and placed directly over them, distinct, oval, disciform, radiant. OVULES numerous in several rows on each placenta, ascending, anatropous; the raphe superior.

CAPSULE oblong or ovoid, usually prickly, many-seeded, 4-7-valved at the apex, leaving a replum of as many filiform intervalvular placentæ which remain united by the stigmas. SEEDS horizontal, obovate-spherical, with a salient smooth and naked raphe; the crustaceous testa deeply reticulated-scrobiculate. EMBRYO cylindrical, in the axis of fleshy albumen, and two thirds its length! COTYLEDONS as long as the RADICLE.

HERBS of a glaucous appearance, with annual, biennial, or rarely perennial roots, branching stems beset with prickly bristles and abounding with a yellow juice, and alternate pinnatifid-incised sessile leaves, which are often mottled with white along the midrib; the lobes and teeth spinulose-pointed. Flowers terminal and solitary, short-peduncled or sessile, not drooping in the bud (as in the Poppy and most of the allied genera): petals yellow or white.

ETYMOLOGY and PROPERTIES. Name said to be derived from *ἀργέμα*, a disease of the eye; the acrid juice being a native ophthalmic medicine. The seeds share in the active properties of the plant; and are employed in the West Indies as a substitute for Ipecacuanha, and in South America as a purgative.

GEOGRAPHICAL DISTRIBUTION. The few species are natives of tropical America and, apparently, of the southern border of the United States; but *A. Mexicana* has been from an early period widely diffused over the world.

PLATE 47. ARGEMONE MEXICANA, *Linn.*; — summit of a stem, with a flower-bud, flower, and unripe pod; natural size.

1. A sepal, detached; seen from the inner side.
2. A magnified stamen, outside view; and 3, seen obliquely edgewise.
4. Pistil enlarged; the ovary divided longitudinally.
5. Transverse section of the same.
6. An ovule, more magnified.
7. A capsule, dehiscent; natural size.
8. A seed, enlarged.
9. Longitudinal section of the same; showing the embryo, which is remarkably large for this family.

## PLATE 48.

STYLOPHORUM, *Nutt.*

Sepala 2, pilosa. Petala 4, orbicularia. Stylus columnaris, longus: stigma 3-4-lobum. Capsula ovoidea, setulosa, polysperma, 3-4-valvis, placentis intervalvularibus filiformibus intus hand productis. Semina cristata. — Folia petiolata, 1-2-pinnatifida. Alabastra nutantia. Succus flavus.

STYLOPHORUM, *Nutt. Gen. 2. p. 7. Bernh. in Linnæa, 8. p. 461. Meisn. Gen. p. 7. Endl. Gen. 4820.*

MECONOPSIS, *Sect. STYLOPHORUM, DC. Syst. 2. p. 87. Torr. & Gray, Fl. 1. p. 61.*

**Celandine Poppy.**

CALYX of 2 rounded and very concave herbaceous SEPALS, hairy outside, their margins slightly overlapping in æstivation, caducous. PETALS 4, hypogynous, nearly orbicular, imbricated two and two and slightly crumpled in æstivation, spreading, early deciduous. STAMENS indefinite (20 or more), hypogynous: FILAMENTS filiform: ANTHERS oblong, the cells opening longitudinally by a slightly extrorse line. OVARY ovoid, strictly one-celled, with 3 or 4 parietal placentæ which do not project into the cell: STYLE columnar, slender: STIGMA 3-4-lobed, spreading (the lobes alternate with the placentæ). OVULES numerous, horizontal, in two or three rows on each placenta, anatropous.

CAPSULE ovoid, herbaceo-coriaceous, beset with weak bristles, many-seeded, 3-4-valved to the base, leaving a replum of as many filiform intervalvular placentæ united by the style. SEEDS globular, with a conspicuously crested raphe: testa crustaceous, minutely scrobiculate-reticulated. EMBRYO minute and short at the base of the fleshy albumen.

HERBS with perennial roots, yellow juice, and somewhat hispid or setose stems; the leaves alternate (or the floral opposite), petioled, 1-2-pinnatifid. Flowers showy (yellow

or brick-red), somewhat corymbose or umbellate, on slender naked peduncles; the buds and pods drooping.

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ETYMOLOGY. From *στύλος*, a *style*, and *φέρω*, to *bear*; the conspicuous style being one of the characteristics of the genus.

PROPERTIES. The juice is aerid, much like that of the Celandine.

GEOGRAPHICAL DISTRIBUTION. A genus of two species, one of which belongs to the Northwestern United States; the other to the Himalayan Mountains. — Our species bears very showy yellow flowers, and continues to blossom through the summer.

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PLATE 48. *STYLOPHORUM DIPHYLLUM*, *Nutt.*; — a vernal specimen; natural size. (Botanic Garden, Cambridge; from Ohio, *Dr. Short.*)

1. Diagram of the æstivation and parts of the flower, in a cross section.
2. A sepal, of the natural size; inside view.
3. A petal, natural size.
4. A magnified stamen; outside view.
5. Pistil, magnified.
6. A transverse section of the same.
7. A magnified ovule, after fertilization, showing the incipient crest, which grows from the raphe.
8. A capsule, of the natural size (rather small).
9. A capsule, dehiscient to the base by 4 valves, and seeds.
10. The persistent intervalvular placenta and style of the same.
11. A magnified seed; the crested raphe towards the eye.
12. Longitudinal section of the same through the raphe, and the embryo.
13. Embryo, detached and more magnified.

## PLATE 49.

SANGUINARIA, *Dill.*

Sepala 2. Petala 8–12, oblonga vel spathulata, æstivatione haud corrugata. Stamina 24. Stylus brevis, stigmatibus bisulco. Capsula oblonga, 2-valvis; placentis 2 intervalvularibus polyspermis. Semina cristata. — Scapus uniflorus et folium unicum palmatilobum, vernatione florem involvens, e gemina bivalvi rhizomate crasso enata, primo vere orientes.

SANGUINARIA, Dillen. Hort. Elth. p. 334. t. 252. Linn. Gen. 645. Lam. Ill. t. 449. DC. Syst. 2. p. 88. Bigel. Med. Bot. 1. p. 75. t. 7. Torr. & Gray, Fl. N. Am. 1. p. 62. Endl. Gen. 4818.

**Blood-root.**

CALYX of 2 ovate sepals, slightly imbricated in æstivation, caducous. PETALS 8 to 12, obovate-oblong or spatulate, imbricated in two or three series, hypogynous, spreading, the innermost often narrower, early deciduous. STAMENS about 24, hypogynous, much shorter than the petals: FILAMENTS filiform, short: ANTHERS oblong-linear, innate, the cells opening longitudinally by a marginal and obscurely extrorse line. OVARY oblong, one-celled, with two parietal placentæ: STYLE short, columnar: STIGMA broad, sulcate – two-lobed, the lobes alternate with the placentæ. OVULES very numerous, horizontal in several rows on the two placentæ, anatropous.

CAPSULE oblong, somewhat compressed, herbacco-coriaceous, many-seeded, pointed by the short persistent style, two-valved; the valves separating from the replum formed of the two intervalvular filiform placentæ. SEEDS horizontal, obovoid, with a smooth crustaceous testa, the raphe strongly crested. EMBRYO minute at the base of the fleshy albumen, cordate.

HERB with a large branching tuberous rhizoma, surcharged with orange-red juice, sending up in earliest spring, from

terminal 2-3-valved buds, a long-petioled leaf and a naked one-flowered scape. Leaf roundish, palmately 5-9-ribbed and obtusely 5-9-lobed, reticulated-veiny, wrapped around the flower-bud when it rises from the ground, much enlarged after expansion and becoming reniform. Flower large for the size of the plant, handsome: petals white.

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ETYMOLOGY. Name from *sanguis*, blood, in allusion to the color of the juice, which flows copiously from the rootstock or petioles when wounded.

PROPERTIES. An acrid narcotic, the former quality prevailing; of considerable importance and promise in the materia medica. The active properties appear to be principally due to a peculiar, extremely acrid alkaloid principle, called *sanguinarina*. The juice was used by the aborigines as a paint or dye; and hence, like several other tinctorial plants, it was called *Puccoon*.

GEOGRAPHICAL DISTRIBUTION. Common, in rich woods, throughout the United States and Canada.

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PLATE 49. *SANGUINARIA CANADENSIS*, *Linn.*; — vernal plant, of the natural size.

1. A sepal, enlarged, seen from the inside.
2. A petal, equally enlarged.
3. An enlarged stamen, seen from the inner side.
4. Same, seen obliquely from the outer side.
5. Pistil, enlarged; and 6, same, divided transversely.
7. An ovule, magnified.
8. A pod, of the natural size.
9. Same, the valves cut away; the seeds removed from the placenta above.
10. A seed, enlarged, with its large, crested raphe.
11. Section of the same, showing the embryo at the base of the albumen.
12. Embryo, detached and more magnified.

## ORD. FUMARIACEÆ.

Herbæ teneræ (succo aqueo innocuo), dissectifoliæ, exstipulatæ: dicotyledoneæ, hypogynæ, hermaphroditæ, dimeræ; petalis 4 cruciatis irregularibus; staminibus 6 diadelphis dimorphis; ovario uniloculari, placentis 2 parietalibus; ovulis amphitropis; embryone in basi albuminis subcurvati minimo.

FUMARIACEÆ, DC. Syst. 2. p. 105, & Prodr. 1. p. 125. Meisn. Gen. p. 8.  
Lindl. Veg. Kingd. p. 435.

PAPAVERACEÆ, Subord. FUMARIACEÆ, Bernh. in Linnæa, 8. p. 401, 473.  
Endl. Gen. p. 558.

THE FUMITORY FAMILY accords so nearly with Papaveraceæ in the structure of the fruit and seeds, that these plants were included in that order by Jussieu, and are still regarded by eminent botanists as forming merely a division of it with irregular flowers. Indeed, of the botanists who receive the family as distinct, some admit Hypecoum and its allies to form a component part of it (as does Lindley, notwithstanding his removing the family to another alliance than that which contains the Poppy Family), while others exclude them. According to the latter view, which is manifestly to be adopted when (from considerations of convenience chiefly) the family is kept distinct, Fumariaceæ are to be characterized by the irregular 1-2-spurred or saccate corolla, the four connivent petals of which, or at least the two inner, are more or less coherent; and by the diadelphous stamens, placed three in each set before the exterior petals, with dimorphous anthers; the central one of each set being two-celled, while the lateral are only one-celled and but half the size. The anthers with the stigma remain inclosed in the little cavity formed by the cohesion of the spoon-shaped tips of the two inner petals, which never open. The bitterish or slightly acid and watery (instead of colored or milky) juice is not diagnostic: for it is quite the same in Eschscholtzia and other undoubted Papaveraceæ, which apparently are equally destitute of any narcotic quality.

To account for the nature and position of the four stamens with one-celled anthers, De Candolle suggested that these result from the fission of the two stamens of the inner series which (in the regular symmetry of the binary flower) should stand before the inner petals;—a view which was reproduced

by Lindley (*Introd. to Nat. System*, ed. 1, etc.). On the other hand, M. Gay has recently maintained,\* that these are the four normal stamens of a complete inner verticel, while two of those of the outer verticel (with 2-celled anthers) are wanting, and that the flower is therefore really hexandrous and with the same arrangement as in Cruciferae. The objection to this view is, that it presupposes a truly quaternary, instead of a binary, plan of the flower.

Taking a still different view, I presume that the lateral stamens in this case will be found to arise by the process called "*dédoublément*" by the French botanists (happily translated *deduplication* by Mr. Henfrey);— a mode of increase in the number of parts, particularly of the stamens, which must be allowed to occur in analogous cases, if the observations of Duchatre were accurately made, and which is not at all incompatible with received morphological views; for a single phyton may as readily give rise to a cluster of stamens as to the several leaflets of a digitate leaf.

The two sepals are anterior and posterior and the carpels *lateral* (right and left as respects the axis), just as in Cruciferae; but, by the torsion of the pedicel in flower, the carpels, with the outer petals to which they correspond, appear to be anterior and posterior.

As to sensible qualities, Fumariaceæ are slightly bitter and astringent, or with the tubers, &c., a little acrid; but of no especial importance.

This small order, with the exception of two species indigenous to the Cape of Good Hope, belongs entirely to the temperate zone, and chiefly to the Old World. One species of the genus *Fumaria* (which gives its name to the order, although it is a greatly simplified form, as to the fruit, which is reduced to a one-seeded nutlet) is sparingly naturalized around old gardens and dwellings in the Northern States. The indigenous representatives of the family in North America, scarcely a dozen in number, are restricted to three genera; namely, *Dicentra* and *Adlumia*, with both of the exterior petals gibbous or saccate at the base, and *Corydalis*, in which only one of them is saccate or spurred.

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\* In *Ann. Sci. Nat.* ser. 2. (Oct. 1842.) 2. p. 216.

## PLATE 50.

**DICENTRA, Borkh.**

Corolla æqualiter 2-calcarata vel 2-saccata, sæpius decidua ;  
petalis distinctis. Capsula siliquosa ; seminibus cristatis.

**DICENTRA**, Borkh. in Röm. Arch. 2. p. 46 (err. typogr. *Diclytra*). Bernh.  
in Linnæa, 8. p. 468. Meisn. Gen. p. 10. Endl. Gen. 4836.

**DICLYTRA**, DC. Syst. 2. p. 107, & Prodr. 1. p. 125.

**DIELYTRA**, Hook. Fl. Bor.-Am. 1. p. 35. Torr. & Gray, Fl. 1. p. 66.

**FUMARIÆ** Sp., Linn. Andr. Bot. Rep. t. 395. Michx. Fl. 2. p. 51.

**CORYDALIS** Sp., Neck. Pers. Nutt. Gen. 2. p. 85.

**CUCULLARIA**, Raf. in Mcd. Rep. 2. p. 350, & Desv. Jour. Bot. 2. p. 159.

**PERIZOMANTHUS**, Pursh. Fl. 2. p. 462 (sub *Corydali*), excl. spec.

**Breeches-Flower. Squirrel-corn.**

**CALYX** of 2 very small petaloid or scarious **SEPALS**, resembling bractlets, never inclosing the flower-bud. **COROLLA** cordate, or two-spurred at the base, compressed, hypogynous, of 4 connivent but distinct **PETALS** in two series ; the two exterior larger, alternate with the sepals, similar, saccate or calcarate at the base, appressed, inclosing the inner pair except their midribs and apex, contracted above, and with short and spreading hooded tips : the two interior opposite the sepals, unguiculate, spoon-shaped or excavate-hooded at the apex, where the two lightly but permanently cohere over the anthers and stigma, their prominent midrib dilated at the summit to form a salient crest : all deciduous, or else scarious-persistent around the base of the pod. **STAMENS** 6, in two sets of three each, one set opposite each outer petal and lightly cohering with its insertion and with a linear (or sometimes nearly obsolete) gland that descends into the spur or sac : **FILAMENTS** subulate-filiform, distinct, or the three slightly united, especially about the middle : **ANTHERS** more or less extrorse, fixed by the base, that of the middle stamen two-celled, those of the lateral one-celled ; the cells opening longitudinally. **OVARY** one-celled, with two parietal placentæ

placed opposite the inner sepals: STYLE subulate or filiform: STIGMA crest-like, flattened contrary to the placenta, 2-4-lobed or horned. OVULES numerous, horizontal in two rows on each placenta, between amphitropous and anatropous.

CAPSULE siliquæform, lanceolate or oblong, membranaceous; the two valves separable from the filiform intervalvular placenta, which remain with the persistent style. Seeds several, globular-reniform, with a shining crustaceous testa, conspicuously crested at the hilum. EMBRYO minute, at the narrowed base of the fleshy albumen next the hilum.

HERBS low and acaulescent; the slender rootstocks tuberiferous or granuliferous, sending up slender petioles supporting a ternately-compound leaf with pinnately multifid divisions, and scapes, bearing a simple raceme or else cymulose clusters of handsome (white, purple, or cream-colored) flowers. Pedicels bracteate and bibracteolate, nodding.

ETYMOLOGY. From *δῖς*, *double*, and *κέντρον*, *spur*. A slip or typographical error by Borkhausen (who however gave the derivation correctly) gave rise to much confusion respecting the name, as the synonymy shows.

GEOGRAPHICAL DISTRIBUTION and DIVISION. A genus of a few North American and two Siberian species. (*D. chrysantha*, *Hook. & Arn.*, from California, will probably be found not to belong to the genus.) — Our species form two sections, to be characterized differently from *Bernhardi*, as follows.

- § 1. *CUCULLARIA*, *Raf.* — Flowers simply racemose, vernal (either 2-gibbous or 2-spurred). Gland at the base of the stamens spur-like. Calyx and corolla early deciduous. (*D. Cucullaria* and *D. Canadensis*.)
- § 2. *CAPNORCHIS*, *Borkh. ex Endl.* (*Eucapnos*, *Bernh.*) — Raceme compound; the flowers cymulose-fascicled, produced through the summer. Glands obsolete. Floral envelopes marcescent! (*D. formosa* & *D. eximia*.)

PLATE 50. Fig. 1-5. *DICENTRA CANADENSIS*, *DC.* (under *Diclytra*).

1. Dissected flower, enlarged; with 2, the inner petals, removed.
3. Upper part of one set of stamens, more magnified.
4. Enlarged pistil, the ovary cut across to show the ovulation.
5. A fertilized ovule, magnified; the crest appearing from the raphe above.
6. Ripe pod, with the persistent floral envelopes, of *D. EXIMIA*.
7. Same, with the valves detached from the replum, and seeds fallen.
8. A seed, from the same, and 9, a section through the crest; magnified.
10. The embryo taken from the last, and highly magnified.

## PLATE 51.

**ADLUMIA, Raf.**

Corolla e petalis 4 coalitis, basi 2-saccata, marcescenti-persistens, capsulam siliquosam includens. Seminâ ecristata. — Herba scandens, petiolis cirrhiformibus.

ADLUMIA, Raf. in N. Y. Med. Repos. (hex. 2.) 5. p. 350, & in Desv. Jour.

Bot. 2. p. 169. DC. Syst. 2. p. 111. Bernh. in Linnæa, l. c.

Torr. & Gray, Fl. N. Am. 1. p. 68. Endl. Gen. 4837.

CORYDALIS Sp., Vent. Choix. t. 19.

CALYX of 2 small and scarious SEPALS, deciduous. COROLLA as in *Dicentra*, but the PETALS all firmly coalescent into an ovate-cordate body, which is marcescent-persistent and perfectly incloses the mature pod. STAMENS as in *Dicentra*, except that the FILAMENTS of each set are united nearly to the top into a lanceolate scarious synema. OVARY linear-lanceolate, one-celled, with two parietal placentæ: STYLE subulate: STIGMA flattened and dilated contrary to the placentæ, two-lobed. OVULES 4 to 6 on each placenta, alternately inserted in a single series, horizontal, nearly anatropous; the raphe superior.

CAPSULE siliquæform, lanceolate, tipped with the persistent style and stigma, always covered by the marcescent corolla, inclosed within the inner petals and the staminal sheath, two-valved, the intervalvular filiform placentæ forming a replum. SEEDS 8 to 12, alternately inserted on each placenta in a single series, horizontal, obovoid-reniform, naked (not crested at the raphe or hilum); the black crustaceous testa smooth and shining. ALBUMEN fleshy, reniform-incurved. EMBRYO small, cylindrical, in the hilar curvature of the albumen.

HERB biennial, with elongated branching stems, climbing gracefully by its tendril-like young petioles; the leaves alternate, 3-4-ternately or pinnately decomposed, with a

very short general petiole, but with elongated secondary divisions: leaflets delicate, 3-5-lobed. Flowers in axillary cymulose panicles, drooping on slender pedicels, white, tinged with rose-color.

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ETYMOLOGY. Dedicated to the late *Major Adlum*, an amateur botanist and cultivator.

GEOGRAPHICAL DISTRIBUTION. A genus of a single species, native of damp copses, &c., in the Northern United States, and often cultivated to form light and delicate bowers in shady places.

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PLATE 51. *ADLUMIA CIRRHOSA*, Raf.; — branch with a single leaf and panicle, natural size. (Cambridge Botanic Garden.)

1. An enlarged persistent flower divided vertically, showing the stamens, with the anthers withdrawn from the cavity at the tip of the inner petals, and the included capsule, one of the placenta towards the eye.
2. A flower, at an earlier stage, with the sepals still present, cut across towards the summit, enlarged.
3. Diagram of the flower; the two exterior lines representing the sepals; the next the outer, the others the inner pair of petals, as they would appear in a cross section at their free summits: the inclosed rounded figures represent the anthers, three in each set, and the central figure is a section of the ovary.
4. Anthers of one set, magnified; seen from the outside.
5. Vertical section of the ovary, magnified, showing the ovules.
6. Transverse section of the same, in the same position.
7. The replum, enlarged, with two seeds attached.
8. A seed, magnified.
9. Vertical section of the same, showing the albumen and the embryo.
10. Embryo, detached, and more magnified.

## PLATE 52.

CORYDALIS, *Vent.*, *Bernh.*

Corolla unicalcarata, ringens, decidua. Capsula siliquosa, polysperma, stylo persistente. Semina crista concava sæpe conchiformi strophiolata. — Caulis ramosus e radice subsimplici.

CORYDALIS, *Vent.* ex DC. *Bernh.* in *Linnaea*, 7. p. 604. (non Neck.)

CORYDALIS, Sect. CAPNOIDES, DC. *Syst.* 2. p. 122. excl. *C. Capnoides*.

CORYDALIS, Sect. CAPNITES, *Endl. Gen.* 4839. non DC.

FUMARIÆ Sp., *Linn. Juss. Lam.*

CALYX of 2 very small SEPALs resembling bractlets, deciduous. COROLLA of 4 hypogynous PETALS, deciduous, irregular, ringent at the summit, where the two exterior are alike, the larger (and in the full-grown flower becoming the upper) one alone calcarate or saccate at the base: the two interior opposite the sepals, similar, much smaller than the exterior which inclose them, unguiculate, spoon-shaped, their concave tips cohering over the stigma and anthers, their keel enlarging into a salient dorsal crest at the summit. STAMENS 6, diadelphous, hypogynous, one set inserted opposite each outer petal; the FILAMENTS united nearly to the tip into a dilated membranaceous synema: the middle ANTHER of each set two-celled, the lateral one-celled (as in *Dicentra*, &c.). A hypogynous gland or spur just under the insertion of the corresponding synema projects into the spur or sac of the upper petal. OVARY one-celled, with two parietal placentæ opposite the inner petals: STYLE subulate: STIGMA flattened and two-lobed contrary to the placentæ. OVULES indefinite, horizontal, alternately inserted in a single row upon each placenta, nearly amphitropous; the raphe superior.

CAPSULE siliquæform, one-celled, tipped with the persistent style and stigma, several — many-seeded, two-valved; the valves separating from the replum formed of the persist-

ent filiform intervalvular placentæ. SEEDS globular-reniform, with a smooth and shining crustaceous testa, partly covered by a concave or shell-shaped hilar crest. EMBRYO minute, at the smaller curved extremity of the fleshy albumen, next the hilum: COTYLEDONS as long as the radicle, foliaceous and lanceolate in germination.

HERBS with slender or simple roots (no tuberosus caudex), often biennial or annual; the stem more or less branching, and with ternately or pinnately compound or dissected leaves. Racemes terminal, or becoming opposite the leaves, bracteate, often yellow or purple.

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ETYMOLOGY. An ancient name for the "crested lark," and for some plant of the Fumitory family, which probably took the name from the spur of the flower, somewhat like that of the Larkspur.

GEOGRAPHICAL DISTRIBUTION, &c. Natives of the northern temperate zone, much the greater part Siberian. The two species in the United States, with one on the Pacific coast, belong to the genus as restricted by Bernhardt, whose view it is therefore most convenient to adopt.

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PLATE 52. *CORYDALIS AUREA*, Willd.; — summit of a stem in flower and fruit; natural size. (Botanic Garden, Cambridge; from Vermont, *Oakes*.)

1. A flower (with a bractlet), enlarged.
2. Diagram of the disposition of its parts.
3. A dissected flower, more enlarged; with 4, its pair of inner petals.
5. Pistil, more enlarged, its base cut away, showing a section of the ovary.
6. Vertical section of the lower part, showing the ovules.
7. An ovule, more magnified (the incipient crest forming from the raphe).
8. Enlarged replum of a pod, and seeds; the valves fallen away.
9. A seed, with its crest, more magnified.
10. Vertical section of the same; showing the minute embryo in place.
11. Embryo, detached and more magnified.

## ORD. CRUCIFERÆ.

Herbæ exstipulatæ, alternifoliæ (succo aqueo pungente): dicotyledoneæ, hypogynæ, hermaphroditæ, tetrameræ; sepalis et *petalis* 4 *cruciformibus*; *staminibus tetradynamis*; *siliqua* septo membranaceo inter placentas 2 parietales sæpissime biloculari; ovulis campylotropis vel amphitropis; seminibus exalbuminosis, cotyledonibus radiculæ accumbentibus vel incumbentibus.

CRUCIFORMES, Tourn. Inst. p. 210.

TETRADYNAMÆ, Linn. Gen. p. 329.

SILIKUOSÆ, Linn. Prælect. ed. Giesek. p. 481.

CRUCIFERÆ, Adans. Fam. 2. p. 409. Juss. Gen. p. 237. DC. Syst. 2. p. 139, & Prodr. 1. p. 131. Endl. Gen. p. 861.

BRASSICACEÆ, Lindl. Introd. Nat. Syst. ed. 2. p. 58, & Veg. Kingd. p. 351.

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THE MUSTARD OR CRESS FAMILY, one of the most strictly natural and homogeneous which the vegetable kingdom affords, is at once distinguished by its *regular cruciform flower*, *tetradynamous stamens*, and by that sort of pod termed a *siliqua*, or, when very short, a *silicle*.

The flowers are formed on the quaternary plan. There are always four sepals, of which the two exterior in the bud are situated one anterior and the other posterior, while the two interior, which are often the larger, are lateral, or right and left, as respects the axis of inflorescence. Although the edges of the outer pair cover those of the inner in the bud (except in the few instances where the æstivation is valvate), yet the plan of the flower is not binary, like that of Fumariaceæ (p. 117), but the four sepals constitute a single verticel; for the four petals are alternate with them, instead of being opposed to them, as would necessarily be the case on the former supposition. The laminae of the four petals, spreading opposite each other in pairs, produce the cruciform shape which gives the name to the order. In æstivation, the petals are imbricated with usually one exterior, two half exterior and half interior, and the fourth wholly interior, or else they are regularly convolute; the latter mode being only a slight deviation from the former. Both the calyx and the corolla are deciduous in all the family, or at least in all ordinary cases.

The peculiarity of the stamens gave the name and character to the class, *Tetradynamia*, which in his Artificial System Linnæus framed for the reception of these plants. Of the six stamens, two are shorter and inserted one opposite each lateral sepal; while the four longer, which are commonly inserted a little higher on the receptacle or hypogynous disk, are placed one pair before the posterior, and the other before the anterior sepal. This brings them partly before the four petals respectively; which has not unnaturally been taken to be their normal position by several botanists, as by Kunth,\* and Gay,† who thus view them as forming the complete inner staminal verticil, and consequently suppose that half of the exterior verticil (namely, the two stamens which should stand before the anterior and posterior sepals respectively) has been suppressed. But it is plain, as our diagrams (Plates 53, 54, 63, &c.) show, that these four stamens are not opposite the petals. As already remarked, they stand in pairs before the anterior and posterior sepals, or alternate with the two upper and two lower petals, that is to say, just in the places which should be occupied by single stamens to complete the symmetry of the tetramerous flower. In other words, the anterior and posterior stamens of the simple verticil are doubled, just as the two stamens of *Fumariaceæ* are trebled, by deduplication.

This explanation, as applied to *Fumariaceæ*, was in type, as it now stands (on page 118), when, just in the nick of time, I received the *London Journal of Botany*, for January, 1848, containing a beautiful elucidation of the *Structure of Cruciferous Flowers*, by Prof. Moquin-Tandon and my friend P. Barker Webb, in which this view is brought forward and enforced in a much more thorough and convincing manner than I could have hoped to do it. ‡ To the instances cited by them in which one or both of these stamens

\* *Über die Blüthen- und Fruchtbildung der Cruciferen*, in *Abhandl. Königl. Akad. Wissensch. Berl.* 1832.

† In *Ann. Sci. Nat.* Oct. 1842. p. 218.

‡ "De Candolle, himself, has shown in his Memoir on Cruciferæ, that each pair of geminate stamens has really only the value of a single organ, and consequently that the andræcium in Cruciferæ may, like the corolla and calyx, be reduced to the quaternary type."

"This theory of the *dédoublement* of the two longer stamens in this group is confirmed by numerous facts, both normal and anomalous. 1. In many Cruciferæ, and more particularly in the *Clypeola eyelodontea*, *Del.*, the filaments of the solitary stamen are furnished with two teeth, one on each side, whilst those of the double stamens have but one on their outer side; if we join these two stamens together, so that they form but one, a bidentate filament will result entirely similar to those of the solitary stamens.

"2. In other Cruciferæ a longer or shorter portion of the filament remains simple. Thus, in the *Sterigma tomentosum*, *DC.*, the division takes place as far as the middle; in the *Anethonium Billardieri*, *DC.*, in a third part only of the upper portion of the filament. Here the position of the longer stamens, double only in their upper portion, is exactly the same as that of the solitary stamens.

"3. In the *Vella pseudocytisus*, *Linn.*, we find, in the place of the double stamens, a single one: its filament being frequently rather broader, sometimes divided only at its summit, sometimes entirely undivided, but bearing in that case an anther, wholly or partially geminate.

"4. Many Cruciferæ become tetrandrous by pelorization, others are normally so. In either case, the four stamens are then equal.

habitually or frequently remain undivided below, we may add the genus *Streptanthus* (Plate 61, fig. 4). Although these able botanists do not allude to the analogous case of *Fumariaceæ*, yet it is perfectly evident that they would apply the same principle to the explanation of the anomaly in that family. The six anthers are all alike and two-celled.

The gynæcium consists of two united carpels, which stand right and left as respects the axis of inflorescence, or one before each of the lateral sepals. The peculiarity of the silique consists in its being two-celled, while the placentæ are strictly parietal. The explanation of this long since indicated by Brown, and by Lestiboudois, is doubtless the true one; namely, that the false dissepiment is an extension of the parieties of the carpels, or, so to say, of the epicarp of each, stretching inwards beyond their ovuliferous edges, so as to form, sometimes a narrow border, as in *Selenia* (Plate 67), &c, but commonly a perfect partition by their union in the centre. The line of junction is frequently indicated by a median nerve (Plates 53, 55, 57, 64). This partition, however thin, is separable into its two component lamellæ, composed apparently of a single stratum of compressed cells, which are of different forms in different plants. Besides this areolation, the partition is sometimes veiny, or traversed, more or less copiously, by "tubes having the appearance and ramification of the veins of a leaf." These differences were pointed out by Mr. Brown, and turned to account in distinguishing genera.\* We have endeavoured to figure the principal forms of areolation which are presented by the species we have illustrated; but are not prepared to offer any opinion respecting the value of this character.

In several *Cruciferæ*, this partition is altogether wanting, especially in the *Isatidæ*, where the pod is indehiscant and only 1-2-seeded, and in *Cakile* (Plate 74) and its allies, in which the pod is transversely divided and jointed. In the dehiscent genera, the two valves always separate from the fili-form placentæ, which form the frame (*replum*) for the partition, and bear the persistent style or stigma.

The styles, if any, are always consolidated into one. The two stigmas are either combined, or more or less distinct (2-lobed); and the lobes are anterior and posterior, or are placed over the parietal placentæ, and not over the cells; just as happens in most *Papaveraceæ*, and in many other cases of parietal placentation. This, along with the abnormal partition and dehiscence, gave rise to some ingenious hypotheses respecting the structure of the Cruciferous fruit, which need not be here recounted, since their foundations

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\* "5. Finally, certain *Cruciferæ*, instead of returning to the quaternary type, recede from it. Their single stamens undergo a change analogous or very similar to that of the double pair. One of us has observed flowers of *Matthiola incana*, in which the single stamens were cleft throughout their entire length, each portion being provided with half an anther and half a filament. M. Lestiboudois speaks of a *Cheiranthus Cheiri* in which these stamens were completely geminated, not laterally as the longer pair, but from without inwards. M. Seringe met with a flower of the same species (var. *grandiflora*) which had the lower stamens '*dédoubleés exactement comme les supérieures.*'" — Moq.-Tand. & Webb. in l. c. p. 5, and p. 6, 7.

\* *Observ. Pl. Oudney, Denham, & Clapperton*, p. 12. et seq. 1826.

have been entirely swept away by Mr. Brown's masterly exposition of the real nature and composition of the stigma, as well as of the placenta.\* In this family the two half-stigmas of different carpels are combined over the placenta, just as those placenta are themselves formed by the junction of the contiguous edges of two different carpellary leaves, that is, of the two half-placenta of different carpels. As applied to Cruciferæ, this view has just been very satisfactorily reproduced by Moquin-Tandon and Webb, in the article before cited, and entirely *de novo* on their part, as they were unacquainted with Mr. Brown's exposition of this subject until after their article was prepared for the press.

The structure of the flower and fruit in this strictly natural family is so uniform, that it is unnecessary to repeat continually, in our detailed descriptions, the characters which are common to the whole, or to which there are few if any exceptions; such, for instance, as the alternate leaves (to which *Dentaria* offers the only exception); the indefinite racemose inflorescence; the absence of bracts and bractlets (of which the exceptions are noted where they occur); the introrse 2-celled anthers; the æstivation of the calyx and corolla, which as to the former is imbricated with the anterior and posterior sepals outside, as already mentioned, in all our genera; and, as to the latter, the same genus or even the same individual exhibits both the imbricated-convolute and the truly convolute modes.

As at present known, this family comprises at least 1600 species, under about 180 genera. Cruciferous plants are found in every part of the world, but are most abundant by far in the northern temperate zone. There is a larger proportion in the Old World than in the New.

The sensible properties of the order are exemplified by its familiar esculent and officinal representatives, such as the Mustard, Horseradish, Radish, Cabbage, Turnip, Scurvy-Grass, &c. All have more or less of the volatile acrid principle upon which their stimulant, rubefacient, and antiscorbutic qualities, as well as the pungent flavor, depend. Diffused among abundance of saccharine and farinaceous or mucilaginous matter, this acidity serves as a wholesome natural condiment. Some Cruciferæ, like the Rape, are cultivated for the fixed oil that abounds in the embryo of the exalbuminous seeds. Many are prized for the beauty or fragrance of their flowers; as the Wall-flower, Stock, &c.

In a local Flora, it is most convenient to characterize the primary divisions from the fruit, whether dehiscent, indehiscent and nucamentaceous, or lomentaceous. In a general system, some characters taken from the seed and embryo should doubtless have precedence; but it is still uncertain which should take the lead. For the present purpose it will suffice to dispose our comparatively few genera according to the following conspectus.

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\* In *Plantæ Javanicæ Rariores*, part 2. 1840. p. 106-112, note. For an exposition of this view, see Gray's *Botanical Text-Book*, ed. 1. p. 144 (1842), and ed. 2. p. 238 (1845).

## CONSPECTUS OF THE GENERA OF THE UNITED STATES.

Ser. I. SILIQUOSÆ. — Silique 2-valved, jointless. (Cotyledons plane, in N. Amer. species.)

TRIBE I. ARABIDÆÆ. — Cotyledons plane, parallel with the partition, accumbent (o=), one edge lying against the ascending radicle, which occupies the side remote from the placenta. (Embryo straight in Leavenworthia.) Silique elongated or sometimes short, many-seeded.

\* Silique terete or slightly compressed; the valves nerveless or nearly so.

NASTURTIUM. (Plate 53.) Silique short, often a silicle. Seeds numerous, two-ranked in each cell, very small, punctate, on capillary funiculi. Calyx spreading: petals sometimes wanting.

IODANTHUS. (Plate 54.) Silique linear. Seeds one-ranked in each cell, marginless, as broad as the septum. Calyx erect.

\* \* Silique compressed; the valves flat and nerveless. (Seeds 1-ranked.)

CARDAMINE. (Plate 55.) Silique linear or linear-lanceolate. Seeds wingless, on filiform funiculi.

DENTARIA. (Plate 56.) Silique lanceolate. Seeds wingless, on dilated and flattened funiculi.

LEAVENWORTHIA. (Plate 57.) Silique oblong. Seeds winged. Embryo straight!

\* \* \* Silique compressed, or somewhat quadrangular; the valves 1-nerved.

ARABIS. (Plate 58.) Silique linear, elongated; the valves nearly flat, 1-nerved. Seeds 1-ranked in each cell. Petals somewhat unguiculate or sessile, the claw plane.

TURRITIS. (Plate 59.) Silique, &c., as in Arabis. Seeds 2-ranked in each cell.

STREPTANTHUS. (Plates 60, 61.) Silique linear, elongated; the valves flat or flattish, 1-nerved. Seeds 1-ranked in each cell. Claw of the petals canaliculate or involute, commonly twisted.

BARBAREA. (Plate 62.) Silique linear, nearly quadrangular from the carinate-1-nerved valves. Seeds 1-ranked. Flowers yellow.

TRIBE II. SISYMBRIÆÆ. — Cotyledons plane, placed with their edges to the partition, incumbent (o||), the back of one of them lying against the ascending radicle, which occupies the side remote from the placenta, sometimes oblique, so as to become partly accumbent. Silique mostly linear and elongated, many-seeded.

\* Silique not stipitate.

ERYSIMUM. (Plate 63.) Silique linear, quadrangular, the valves acutely carinate-1-nerved. Calyx erect.

SISYMERIUM. (Plate 64.) Silique linear or oblong, terete or 4-6-angular; the valves convex, 1-3-nerved. Calyx equal, usually open.

\* \* Silique long-stipitate, linear. Petals with long claws.

STANLEYA. (Plate 65.) Claws of the petals connivent into a tube; the linear sepals spreading. Silique nearly terete or quadrangular. Flowers yellow or greenish.

WAREA. (Plate 66.) Claws of the (white or rose-purple) petals spreading. Silique compressed, the valves nearly flat, 1-nerved.

SER. II. SILICULOSÆ. — Silicle (rounded, or not much longer than broad) opening by valves. Cotyledons plane, not longitudinally plicate nor spirally convolute.

TRIBE III. ALYSSINÆ. — Silicle with a broad partition (or rarely none) which is parallel with the flat or convex valves. Cotyledons broad, accumbent against the ascending radicle (o=), parallel with the partition.

\* Silicle compressed. Seeds on free funiculi.

SELENIA. (Plate 67.) Silicle oval, flat, subulate with the long style, many-seeded. Seeds orbicular, surrounded by a wing.

DRABA. (Plates 68, 69.) Silicle elliptical, oval, or linear-oblong, compressed, many-seeded. Seeds wingless.

\* \* Silicle globose-inflated. Funiculi partly adnate.

VESICARIA. (Plate 70.) Valves of the several-seeded silicle hemispherical.

TRIBE IV. SUBULARIÆ. — Silicle oval, turgid, with a rather broad partition, the cells several-seeded. Cotyledons bent transversely below the middle and incumbent on the ascending radicle.

SUBULARIA. (Plate 71.) Silicle somewhat flattened contrary to the partition, the convex valves rather boat-shaped. Leaves all radical, subulate.

TRIBE V. SENEBIERÆ. — Silicle compressed contrary to the very narrow partition, didymous; the globular-ventricose valves closed or nearly so, 1-seeded. Cotyledons as in Tribe IV.

SENEBIERA. (Plate 72.) Cells of the silicle rugose-reticulated, separating entire. Flowers minute.

TRIBE VI. LEPIDINÆ. — Silicle compressed contrary to the very narrow partition; the valves strongly boat-shaped or carinate. Cotyledons plane, incumbent (rarely accumbent) on the ascending radicle.

LEPIDIUM. (Plate 73.) Seeds solitary in each cell: funiculi free.

SER. III. LOMENTACÆ. — Silique or silicle transversely 2-several-celled, and articulated.

TRIBE VII. CAKILINÆ. Cotyledons plane, accumbent.

CAKILE. (Plate 74.) Silicle 2-jointed; the joints 1-celled, 1-seeded. Seed suspended in the lower, erect in the upper cell.

## PLATE 53.

NASTURTIUM, *R. Br.*

Siliqua abbreviata vel silicula teretiuscula, valvis turgidis enerviis. Semina in loculis biseriata, numerosissima, parva, immarginata; funiculis capillaribus. Cotyledones planæ accumbentes. — Calyx patens. Petala flava vel alba, interdum abortiva.

NASTURTIUM, *R. Br.* in Ait. Kew. ed. 2. 4. p. 109. DC. Syst. 2. p. 187.

Torr. & Gray, Fl. N. Am. 1. p. 72. Endl. Gen. 4850.

SISYMBRII Sp., Linn. Sehkuhr, Handb. t. 187. excl. spec.

? ARMORACIA, Rupp. Fl. Jen. Koch, Fl. Germ. p. 66.

**Water-Cress.**

CALYX spreading, somewhat colored; the SEPALs imbricated in æstivation, equal at the base. PETALS spreading, obovate or cuneiform, sometimes obsolete. FILAMENTS subulate or filiform, toothless: ANTHERS oval or sagittate. HYPOGYNOUS GLANDS 4 or 6. OVARY ovoid, oblong, or linear, sometimes one-celled from the incompleteness of the partition: STYLE short or none, rarely slender: STIGMA capitate or depressed, obscurely two-lobed. OVULES numerous, irregularly crowded in several rows on each placenta (in two or more ranks in each cell), nearly horizontal.

SILIQUE or SILICLE varying from linear or oblong to elliptical or even globose-ovoid, terete or slightly compressed parallel with the partition, two-valved; the turgid or strongly convex valves destitute of keel or midnerve; the partition nerveless or one-nerved in the middle. SEEDS indefinite and usually very numerous, occupying two rows in each cell, on irregularly crowded capillary free funiculi, more or less pendulous, flattish, rounded, impressed-punctate. RADICLE ascending on the side towards the axis (remote from the placenta); the COTYLEDONS accumbent, plane, parallel with the partition.

HERBS growing in water or wet places, smooth or simply hirsute; with annual, biennial, or perennial roots, and branching stems which are frequently rooting below. Leaves usually lyrate-toothed or pinnatifid, or pinnately parted; the petioles often auriculate-dilated at the base. Flowers small or minute, yellow or white; the racemes prolonged in fruit.

ETYMOLOGY. An old name for several pungent Cruciferous plants, said to be compounded of *nasus* and *tortus*, from their effect upon the nostrils.

GEOGRAPHICAL DISTRIBUTION, &c. A cosmopolite genus, the species of which are of difficult extrication, especially those of the section BRACHYLOBOS, DC., which have for the most part yellow or yellowish flowers. The *Water-Cress* is the type of a peculiar section of the genus (CARDAMINUM, DC.). While many species bear linear siliques, others by gradual transition have oblong, elliptical, ovoid, or even globular silicles, some of which C. A. Meyer therefore refers to *Cochlearia* § *Armoracia*. Indeed, the white-flowered *N. lacustre*, Gray, *ined.*,\* is so exactly an *Armoracia* as to convince me that that group, if it can be detached from *Cochlearia*, will have to be appended to the present genus;—which, taken as a whole, would be more naturally placed among Alyssineæ than in Arabideæ.—The American *N. palustre* (which usually has shorter pods than the European plant) sometimes exhibits 3–4-carpellary and completely 3–4-celled ovaries.

PLATE 53. *NASTURTIUM SESSILIFLORUM*, Nutt.;—a small specimen (from St. Louis, *Engelmann*); natural size. (Excl. fig. 1–5.)

1. Diagram of the flower of *N. PALUSTRE*, the common North American plant so called.
2. An enlarged flower of the same.
3. Stamens and pistil; and 4, inside view of a stamen, more enlarged.
5. Pistil and receptacle, more magnified.
6. Silique of *N. SESSILIFLORUM*, enlarged; one valve and most of the seeds detached.
7. Tissue from the partition, highly magnified.
8. A seed; and 9, section across the accumbent cotyledons and radicle; magnified.

\* The *Nasturtium natans*, *Hook. Fl. Bor.-Am., Torr. & Gr. Fl., &c.* (*N. natans* β. *Americanum*, Gray, in *Ann. Lyc. N. Y.*) Its flowers are much larger than in *N. natans*, DC. (which is the *Cochlearia amphibia*, β. Meyer); the white petals are twice the length of the calyx, and there is no partition to the pod, except a narrow border.

## PLATE 54.

IODANTHUS, *Torr. & Gr.*

Siliqua linearis, teres, valvis convexis fere enerviis. Semina in loculis uniserialia, immarginata. Cotyledones planæ accumbentes. — Calyx erectus, unguibus petalorum brevior.

IODANTHUS, *Torr. & Gray, Fl. N. Am. 1. p. 72 (sub Cheirantho). Gray, Man. Bot. N. U. S. p. 33.*

HESPERIDIS *Sp., Michx. Fl. 2. p. 31. Nutt. Gen. 2. p. 69. DC. l. c.*

**False Rocket.**

CALYX erect, imbricated in æstivation: the lateral SEPALS slightly gibbous at the base, in the bud furnished with a cornute process next the apex. PETALS spreading, spatulate-obovate, tapering into a narrow claw which is longer than the sepals, entire, imbricated-convolute in æstivation. STAMENS strongly tetradynamous: FILAMENTS subulate-filiform, toothless: ANTHERS sagittate. GLANDS 4. OVARY linear-oblong: STYLE short and thick: STIGMA hemispherical. OVULES numerous, alternately inserted and forming only one row in each cell.

SILIQUE linear, terete, rather fleshy, somewhat torulose when dry, tipped with the short style, two-valved; the convex valves not carinate or nerved on the back (or with an obscure midnerve when dry): the partition nerveless, composed of linear-oblong longitudinal areolæ, bounded by nearly straight lines. SEEDS several in each cell, forming a single series, occupying the whole breadth of the partition, oval, pendulous on short and free ascending funiculi which are geniculate-inflexed at the apex, not margined. RADICLE ascending on the side farthest from its placenta; the COTYLEDONS parallel with the partition, plane, accumbent.

HERB with a branching stem from a perennial fibrous root, and oblong-ovate and acuminate leaves, which are sharply and irregularly toothed; the lower lyrate, with small lateral

divisions, the margined petiole auriculate-sagittate at the base. Racemes loose, elongated, somewhat paniced, ebracteate: the rather large and showy flowers violet-purple.

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ETYMOLOGY. From *ιώδης*, *violet-colored*, and *ἄνθος*, *flower*, in allusion to the color of the petals.

GEOGRAPHICAL DISTRIBUTION, &c. A genus of a single species, indigenous to the Western United States, removed, on account of its accumbent cotyledons, from *Hesperis*, with which genus in all other respects it seems substantially to accord.

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PLATE 54. *IODANTHUS HESPERIDOIDES*, *Torr. & Gr.*; — a small specimen (from Ohio, *Sullivant*), the stem shortened.

1. Diagram of the flower.
2. A flower, enlarged.
3. One of the lateral sepals; and 4, a petal, enlarged.
5. Stamens and pistil, enlarged.
6. A silique, of the natural size.
7. The upper end of a silique, enlarged; seen edgewise.
8. Lower part of the same, with a portion of the valves above cut away.
9. Base of an enlarged pod, the valves removed, showing three seeds; the lower one cut in two, so as to display a section of the accumbent cotyledons and radicle.
10. Tissue of the partition, highly magnified.
11. Embryo, detached entire; enlarged.

## PLATE 55.

CARDAMINE, *Tourn.*

Siliqua linearis, compressa; valvis planis enerviis (elastice sæpius disilientibus), placentis dorso non alato-marginatis. Semina in loculis uniserialia, e funiculis filiformibus liberis pendula, immarginata. Cotyledones planæ accumbentes. — Calyx basi æqualis. Petala alba vel purpurea.

CARDAMINE, *Tourn.* Linn. Gen. 812. Schkuhr, Handb. t. 187. DC. Syst. 2. p. 245. C. A. Meyer, in Ledeb. Fl. Alt. 3. p. 32. Endl. Gen. 4859.

**Bitter Cress.**

CALYX erect or rather open; the SEPALS equal at the base. PETALS obovate, with the lamina spreading, or sometimes narrow and erect. FILAMENTS subulate or filiform: ANTHERS cordate or sagittate at the base. GLANDS 4 or 6, variously disposed. OVARY oblong or linear: STYLE usually short: STIGMA capitate or depressed, entire or two-lobed. OVULES pendulous and alternately inserted, forming only one row in each cell.

SILIQUE linear or linear-lanceolate, compressed (the placenta not bordered and projecting), two-valved, for the most part elastically dehiscent from the base upwards; the valves flat, nerveless: partition with, or commonly without, a mid-nerve; the areolæ short and roundish or amorphous, bounded by even lines. SEEDS several or numerous in a single row in each cell, pendulous on filiform free funiculi, orbicular or oblong, compressed, wingless, smooth. RADICLE ascending, remote from the placenta: COTYLEDONS plane, parallel with the partition, accumbent.

HERBS with fibrous or granulate roots, or rarely with tuberous rootstocks, sending up radical scapes, or more commonly simple or branching stems, bearing alternate and simple or pinnately divided leaves, and terminal racemes of

white or rarely purple ebracteate flowers. Petioles of the lowest leaves elongated, usually not dilated at the base.

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ETYMOLOGY. From *Κάρδαμον*, an ancient name for Cress.

GEOGRAPHICAL DISTRIBUTION. A pretty large, cosmopolite genus, most abundant in the cooler temperate zones and on mountains, extending into the arctic and antarctic regions.

NOTE. The genus is not yet well divided into natural sections. The species here figured is one of those which approach *Dentaria*.

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PLATE 55. *CARDAMINE RHOMBOIDEA*, DC.; — a small specimen.

1. A sepal, enlarged, seen from the inner side.
2. A petal, equally enlarged.
3. Stamens and pistil, with the glands of the receptacle; enlarged.
4. Magnified pistil, seen sidewise, showing three of the four crescent-shaped hypogynous glands.
5. Same, with the ovary transversely divided.
6. An ovule, more magnified.
7. A silique, of the natural size.
8. A dehiscent silique, magnified, showing part of the seeds of one cell, the partition, &c.
9. Portion of the tissue of the partition, highly magnified.
10. Magnified seed, divided transversely, through the accumbent cotyledons.

## PLATE 56.

**DENTARIA, Tourn.**

Siliqua lanceolata. Funiculi seminum plani seu alato-dilatati. Cotyledones crassæ. — Caulis e rhizomate carnosio horizontali dentato vel moniliformi simplicissimus, medio paucifolius; foliis verticillatis alternisve, compositis. Cætera fere omnia Cardamines.

DENTARIA, Tourn. Inst. p. 225. t. III. Linn. Gen. 811. Lam. Ill. t. 562. Schkuhr, Handb. t. 183. DC. Syst. 2. p. 271. C. A. Meyer, l. c. Torr. & Gray, Fl. N. Am. 1. p. 86. Endl. Gen. 4861. CARDAMINES Sp., R. Br. in Ait. Kew. ed. 2. 4. p. 101.

**Toothwort. Peppermint.**

CALYX equal at the base, the SEPALS erect. PETALS much larger than the sepals, obovate, spreading, more or less unguiculate. STAMENS and PISTIL as in Cardamine.

SILIQUE lanceolate, compressed, subulate with the style, elastically two-valved from the base; the valves flat, nerveless; placentæ not wing-margined: partition nerveless or nearly so; the areolation nearly quadrate and uniform (as in Cardamine). SEEDS several in each cell forming a single row, round-oval, turgid, smooth, pendulous on broad and flat free funiculi. RADICLE ascending on the side remote from the placenta: COTYLEDONS accumbent, parallel with the partition, very thick and fleshy, sometimes unequal.

HERBS with a horizontal and fleshy toothed or moniliform-tuberous rhizoma, which sends up in spring an erect and simple flowering stem, bearing near the middle two or three (or rarely more) verticillate or alternate 3-7-foliolate leaves on naked petioles, and terminated by a corymbose raceme of handsome white or rose-purple flowers. Radical leaves sometimes wanting.

ETYMOLOGY, &c. Name from *dens*, a tooth; in allusion to the rhizoma, which is beset with tooth-like processes (the rudiments or vestiges of leaf-stalks) in most species: these are very strongly marked in our *D. diphylla*; which is commonly called Pepperroot, from the pungent taste (much like that of Water-cresses) of its coral-like rootstock. The proper English popular name is *Toothwort*.

GEOGRAPHICAL DISTRIBUTION, &c. A genus (scarcely distinct from Cardamine) of about twenty known species, natives of the northern temperate zone. Five species belong to the United States; two of which are widely diffused, while the others are local or rare. — The species chosen for our illustration is the least known of all. Mr. Nuttall described it from unusually luxuriant specimens, which he found “in the western parts of the State of New York and Pennsylvania.” It has since been gathered only at Watertown, New York, by the lamented Dr. Crave (in whose untimely death by drowning, since our drawing was made, Botany has lost a most assiduous devotee): but none of the specimens are so tall and leafy as Nuttall describes, nor do they deserve the name of *D. maxima*.

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PLATE 56. *DENTARIA MAXIMA*, Nutt.; — in fruit, of the natural size.  
(Specimen from Watertown, New York, Dr. Crave.)

1. A flower, of the natural size.
2. Upper part of a silique, from which the valves have fallen, magnified; showing two of the seeds, the lower one transversely divided.
3. Tissue from the partition, highly magnified.
4. The fleshy embryo detached, magnified.
5. A transverse section of the same, showing the unequal accumbent cotyledons. .

## PLATE 57.

LEAVENWORTHIA, *Torr.*

Siliqua oblonga, compresso-plana, valvis enerviis. Semina uniseriata, plana, alata. Embryo recta! — Herbæ pusillæ, foliis omnibus radicalibus lyratis, scapis nudis 1 – 8-floris.

LEAVENWORTHIA, Torr. in *Ann. Lyc. Nat. Hist. New York*, 3. p. 87 t. 5  
Torr. & Gray, *Fl. N. Am.* 1. p. 89. Endl. *Gen.* 4862.

CALYX equal at the base; the SEPALS nearly erect. PETALS spatulate-cuneiform, emarginate or truncate, spreading, much longer than the calyx, tapering gradually into a short claw. STAMENS strongly tetradynamous: FILAMENTS filiform, toothless: ANTHERS linear-oblong. OVARY linear, tipped with a short STYLE, and a capitate STIGMA. OVULES several in each cell, alternately inserted on each placenta, pendulous on free funiculi.

SILIQUE oblong-linear or oblong, compressed, often somewhat torulose, two-valved; the valves nearly flat, minutely veiny, destitute of a midnerve: partition thin, marked with a midnerve, the areolæ oblong-linear, straight and transverse. SEEDS 4 or 5 in each cell, forming a single series, pendulous on slender free funiculi, orbicular, flat, with a broad winged margin, often overlapping each other. EMBRYO small in proportion to the size of the seed, straight! or with the orbicular flat COTYLEDONS slightly inclined accumbently; the RADICLE short and thick, straight, obliquely ascending on the side remote from the placenta.

HERBS of small size, chiefly acaulescent; with biennial or annual roots, lyrate-pinnatifid radical leaves and one-flowered radical peduncles, or 3 – 8-flowered scapes which often bear a single leaf below. Pedicels elongated. Petals yellow.

ETYMOLOGY and GEOGRAPHICAL DISTRIBUTION. Dedicated to *Dr. M. C. Leavenworth*, the discoverer of one species, if, indeed, *L. aurea* is distinct from *L. Michauxii*, the *Cardamine uniflora*, *Michx.* These little plants grow on wet rocks, &c., in Eastern Kentucky, Tennessee, and Alabama : also in Arkansas.

NOTE. The embryo in this genus exhibits a remarkable "arrest of development," of which there is no other example in the family. In the fully ripe seeds, the cotyledons remain straight, in the same line with the radicle, just as in the half-grown embryos of other Cruciferæ, or else (in *L. Michauxii*, *Torr.*) the cotyledons are slightly inclined to one side, so as to manifest barely a disposition to become accumbent.

PLATE 57. *LEAVENWORTHIA AUREA*, *Torr.*; — specimen from Tennessee, *Mr. Buckley*; of the natural size.

1. A flower, enlarged.
2. A sepal, more enlarged ; inside view.
3. A petal, equally magnified.
4. Stamens and pistil, magnified.
5. An enlarged silique, the valves removed, showing the seeds, &c.  
(From an Arkansan specimen, gathered by *Dr. Leavenworth.*)
6. Tissue of the partition, highly magnified.
7. Magnified seed, divided transversely through the cotyledons.
8. Embryo, detached.

## PLATE 58.

ARABIS, *L.*

Siliqua elongata, linearis, compressa, valvis planiusculis uninerviis. Semina in loculis plurima, uniserialia. Cotyledones planæ accumbentes. — Calyx erectus. Petala (alba seu rosea) sessilia vel breviter unguiculata, ungue plano.

ARABIS, Linn. Gen. 818. R. Br. in Ait. Kew. l. c. p. 104. DC. Syst. 2. p. 218. Deless. Ic. 2. t. 24-28. C. A. Meyer, in Ledeb. Fl. Alt. 3. p. 15. Endl. Gen. 4854.

**Rock-Cress.**

CALYX erect: SEPALs equal, or the two lateral saccate at the base. PETALS obovate, spatulate, or oblong, sessile or usually with a short and flat claw. FILAMENTS filiform or subulate, toothless: ANTHERS oblong. GLANDS 4 to 8. OVARy oblong or linear: STYLE usually short or none: STIGMA truncate or capitate. OVULES numerous on both placentæ, pendulous.

SILIQUE linear, elongated, compressed, not stipitate, two-valved; the valves flat or flattish, marked with a prominent midnerve, the sides sometimes minutely veiny: partition destitute of a midnerve; the areolæ oblong or amorphous, and bounded by more or less sinuous or sometimes (in *A. Canadensis*, *lævigata*, &c.) exceedingly contorted lines. SEEDS numerous, pendulous on filiform and mostly free funiculi, forming a single row in each cell, compressed or flat, with or without a winged margin. COTYLEDONS flat, parallel with the partition, accumbent against the ascending RADICLE, which is remote from the placenta.

HERBS, with annual, biennial, or perennial roots, and leafy stems; the radical leaves usually petioled, sometimes lyrate or pinnatifid; the cauline usually sessile and undivided, often sagittate or auriculate at the base. Raceme at

length elongated, ebracteate. Corolla white, rarely rose-color or purplish.

ETYMOLOGY. An old name, said by Linnæus to be derived from the country, *Arabia*.

GEOGRAPHICAL DISTRIBUTION. A genus of over seventy species, widely scattered over the northern temperate zone, and partly subarctic or alpine.

NOTE. The arrangement of the species is not yet well settled. The North American *A. Canadensis* and *A. lævigata*, with the Siberian *A. pendula* (Sect. *CATOLOBUS*, *C. A. Meyer*, or *Lomaspora*, *DC.* excl. sp.), have winged seeds, with their funiculi partly adnate to the partition, the elongated areolæ of which are bounded by exceedingly tortuous lines (just as in Plate 59, fig. 6), the petals small, the style very short or none, and the ovules biseriate in each cell; and certainly ought not to be separated from *Turritis*.

PLATE 58. *ARABIS PATENS*, *Sulliv.*;— of the natural size (the stem shortened); from Ohio, *Sullivant*.

1. A lateral sepal; and 2, a petal; enlarged.
3. Stamens and pistil, enlarged.
4. A ripe silique, of the natural size.
5. Same, cut across, near the base, and magnified.
6. The replum, from the upper part, with the seeds, magnified; two of the seeds transversely divided, showing the accumbent cotyledons.
7. Tissue from the partition, highly magnified.
8. A magnified seed of *A. CANADENSIS*, *Linn.*, transversely divided.

## PLATE 59.

TURRITIS, *Tourn., Dill.*

Semina in loculis biserialia. Cætera omnia Arabidis.

TURRITIS, Tourn. (excl. spec.) Dillen. Nov. Gen. p. 120. l. 6. Gärtn. Fr. t. 143. R. Br. in Ait. Kew. l. c. (excl. spec.) DC. Syst. 2. p. 213. (excl. spec.) C. A. Meyer, in Ledeb. Fl. Alt. 3. p. 13. Hook. Fl. Bor.-Am. 1. p. 40. Torr. & Gray, Fl. N. Am. 1. p. 78. Endl. Gen. 4853.

**Tower-Mustard.**

CALYX loosely erect; the SEPALS equal at the base, or the lateral gibbous. PETALS spatulate, linear-oblong, or obovate, the claw plane. FILAMENTS filiform, toothless: ANTHERS oblong-linear or sagittate. OVARY linear: STYLE very short or none: STIGMA capitate. OVULES very numerous, forming two rows in each cell.

SILIQUE linear, elongated, not stipitate, flattened or compressed-quadrangular, two-valved; the valves one-nerved in the middle, nearly flat or somewhat carinate: partition destitute of a midnerve, formed of oblong-linear and irregular areolæ bounded by exceedingly tortuous lines. SEEDS very numerous on both placentæ, forming two rows in each cell, pendulous on filiform free funiculi, smooth, oval, compressed, marginless, or surrounded by a winged margin. Embryo, &c., as in Arabis.

HERBS, chiefly with biennial or annual roots, and virgate leafy stems; the radical leaves spatulate and often toothed; the cauline sessile or partly clasping by a sagittate or auriculate base, lanceolate or oblong, chiefly entire. Raceme elongated in fruit, ebracteate. Petals white (the calyx yellowish) or purple.

ETYMOLOGY. An early name, from *turris*, a tower, of uncertain application.

GEOGRAPHICAL DISTRIBUTION, &c. This genus, as now received, con-

tains a single European and North Asiatic species (*T. glabra*, *Linn.*), which is also found in the northern parts of this country, to which several, chiefly more boreal, American species have recently been added. It should, perhaps, form only a section of *Arabis*, and comprise *A. Canadensis*, *A. lævigata*, and *A. pendula*.

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PLATE 59. *TURRITIS STRICTA*, *Graham*; — summit of a flowering, and of a fruit-bearing stem; of the natural size; from Watertown, New York.

1. A sepal; and 2, a petal; enlarged.
3. Pistil, magnified; the base cut away; showing the two ranks of ovules in each cell.
4. Silique transversely divided below, magnified, showing the two ranks of seeds in each cell.
5. Replum from the upper end of a silique, with the seeds in place; magnified.
6. Tissue from the partition, highly magnified.
7. Magnified seed, divided transversely.

## PLATE 60, 61.

STREPTANTHUS, *Nutt.*

Siliqua et semina fere Arabidis. Calyx coloratus. Petala (sæpius purpurea) ungue canaliculato plerumque torto.

STREPTANTHUS, Nutt. in Jour. Acad. Philad. 5. p. 134. t. 7. Hook. Bot. Mag. t. 3317, 3516, & Ic. Pl. t. 40, 44. Torr. & Gray, Fl. N. Am. 1. p. 75. Endl. Gen. 4852.

CALYX colored (purple or purplish): the SEPALs erect, the lateral or all four sometimes gibbous or saccate at the base. PETALS conspicuously unguiculate; the claw canaliculate, often twisted; the lamina dilated and obovate, or narrow and linear-oblong or lanceolate. FILAMENTs subulate, those of the longer pair of stamens frequently united into one! ANTHERS linear-sagittate. OVARY linear or oblong: STYLE short or none: STIGMA truncate or two-lobed.

SILIQUe linear, usually much elongated, not stipitate, or scarcely so, compressed; the valves flat or sometimes convex, strongly one-nerved in the middle; the partition destitute of a midnerve (areolation various). SEEDs numerous in a single row in each cell, pendulous on filiform free funiculi, oval, compressed, usually wing-margined and as broad as the partition. COTYLEDONS flat, parallel with the partition, accumbent against the ascending RADICLE which is remote from the placenta.

HERBS, chiefly annual or biennial, with undivided leaves, or the lowest lyrate-pinnatifid, the cauline sessile or clasping, and virgate racemes of usually showy purple (rarely greenish-yellow) flowers. Limb of the petals frequently rose-color, with a deep purple spot in the centre. Pedicels ebracteate, except in *S. bracteatus*, Plate 60!

ETYMOLOGY. Name composed of *στρεπτός*, *twisted*, and *ἄνθος*, *flower*; from the contorted claws of the petals.

GEOGRAPHICAL DISTRIBUTION and DIVISION. A genus of a dozen or more known species, natives of the drier and nearly unwooded portions of temperate North America west of the Mississippi, from Arkansas to California. Two well-marked sections have been recognized, namely, —

- § 1. *EUSTREPTANTHUS*. — Petals with a broad dilated lamina. Calyx loosely erect.
- § 2. *EUCLISIA*, *Nutt.* — Limb of the petals narrow (often linear) and undulate as well as the claw. Calyx erect, often inflated-connivent.

NOTE. The areolation in *S. bracteatus* and *S. obtusifolius* consists of vertical linear or oblong cells bounded by even lines; that of *S. heterophyllus*? (*Pl. Coult.*) is similar, except that the cells are nearly quadrate; *S. glandulosus* exhibits long and very irregular curved cells, bounded by sinuous lines of uniform strength; while, in *S. hyacinthoides*, the lines are of very unequal strength, some of them appearing like veins, and branching so as to form minute amorphous reticulations, as shown in Plate 61, fig. 8.

PLATE 60. *STREPTANTHUS BRACTEATUS*, n. sp. (Texas, *Lindheimer*);  
— a branch, with a cauline leaf, of the natural size.

1. A sepal, inside view; and 2, a petal, enlarged.
3. Stamens and pistil, enlarged.
4. A mature silique of *S. obtusifolius*, *Nutt.* (Arkansas, *Herb. Torr.*); of the natural size.
5. Base of an enlarged silique, transversely divided.
6. Tissue from the partition, highly magnified.
7. A magnified seed, divided transversely.
8. Embryo detached entire, and enlarged.

PLATE 61. *STREPTANTHUS (EUCLISIA) HYACINTHOIDES*, *Hook.*; — from Texas; the flowering summit, of the natural size.

1. A flower, enlarged.
2. A sepal; and 3, a petal, more enlarged.
4. Stamens (one of the larger pairs united), and pistil, enlarged.
5. A silique, of the natural size.
6. Summit of a silique, enlarged, showing a transverse section.
7. Base of a replum, with three seeds, enlarged, two of them cut across.
8. Tissue from the partition, highly magnified (the stronger lines are represented somewhat too continuous and direct).

## PLATE 62.

**BARBAREA, R. Br.**

Siliqua tetragono-anceps, valvis carinatis. Semina plurima, in loculis uniserialia, immarginata. Cotyledones planæ accumbentes. — Flores flavi. Calyx erectus. Folia lyratopinnatifida, petiolis auriculato-amplexicaulibus.

BARBAREA, R. BROWN, in Ait. Kew. ed. 2. 4. p. 109. DC. Syst. 2. p. 205. Deless. Ic. 2. t. 19. C. A. Meyer, in Ledeb. Fl. Alt. 3. p. 9. Torr. & Gray, Fl. N. Am. 1. p. 75. Endl. Gen. 4851.  
ERYSIMI & SISYMBRII Sp., LIND.

**Winter-Cress. Yellow Rocket.**

CALYX almost equal at the base (yellowish); the lateral SEPALS more or less gibbous at the base, often with a cornute appendage near the apex. PETALS unguiculate with a broad and plane claw, the lamina rounded. STAMENS strongly tetradynamous: FILAMENTS subulate, toothless. GLANDS 6, two of them larger and very prominent, one at the base of each pair of long stamens. OVARY linear: STYLE short: STIGMA two-lobed. OVULES pendulous, forming a single series in each cell.

SILIQUE linear, slightly compressed, but quadrangular, the cross section rhombic, two-valved; the valves prominently carinate-one-nerved, the placentæ or edges of the replum also a little salient: partition nerveless; the areolæ oblong and very irregular, bounded by sinuous lines. SEEDS numerous, pendulous on free filiform funiculi, forming a single row in each cell, nearly or quite as broad as the partition, oval, a little compressed, not margined; the testa minutely punctate. COTYLEDONS plane, thickish, parallel with the partition, accumbent against the RADICLE, which ascends on the side remote from the placenta.

HERBS with biennial or perennial roots, erect and branching leafy stems, and lyrate-pinnatifid leaves, mostly auricu-

late-clasping at the base; glabrous throughout. Racemes elongated in fruit, ebracteate. Flowers rather large, yellow.

ETYMOLOGY. The *Herb of Santa Barbara*; an early popular name.

GEOGRAPHICAL DISTRIBUTION, &c. A genus of few species, natives of Europe and the colder parts of North America. *B. vulgaris* is widely naturalized, and *B. præcox* sparingly so, in the United States, but not truly indigenous, except, perhaps, on our northern frontier. Besides the popular names given above, they are sometimes called *Scurvy-Grass*, an appellation which properly belongs to *Cochlearia officinalis*.

PLATE 62. *BARBAREA VULGARIS*, *R. Br.*; — summit of a stem, of the natural size (from the naturalized plant).

1. A sepal; and 2, a petal; enlarged.
3. Stamens and pistil, with the hypogynous glands; enlarged. (The pistil is wrongly turned flatwise, instead of edgewise, to the eye.)
4. A pistil, more magnified.
5. An ovule, much magnified.
6. Silique, enlarged, and transversely divided.
7. Same, dehiscent, showing the seeds.
8. Portion of the replum and partition from the base of the pod, with the seeds, more enlarged.
9. Tissue from the partition, highly magnified.
10. A magnified seed, cut across, showing the thick accumbent cotyledons.
11. Detached embryo, magnified.

## PLATE 63.

ERYSIMUM, *L.*

Siliqua tetragona, valvis uninerviis placentisque acute carinatis. Cotyledones oblongæ, planæ, incumbentes. — Calyx erectus. Petala flava vel aurea. Folia angusta, integra, haud amplexicaulia.

ERYSIMUM, Linn. Gen. 814. (excl. spec.) Gærtn. Fr. t. 143. R. Br. in Ait. Kew. l. c. p. 115. DC. Syst. 2. p. 491. (excl. § 1.) C. A. Meyer, in Ledeb. Fl. Alt. 3. p. 147. Torr. & Gray, Fl. N. Am. 1. p. 97. Endl. Gen. 4908.

**Treacle-Mustard. False Wall-Flower.**

CALYX erect; the SEPALS equal, or the lateral ones gibbous at the base, and sometimes appendiculate or cornute at the apex. PETALS unguiculate, the slender claw erect, the dilated oblong or roundish lamina spreading. GLANDS 4. FILAMENTS subulate or filiform, toothless: ANTHERS linear-oblong or elliptical, often sagittate. OVARY linear, not stipitate: style mostly short and thick: STIGMA capitate or two-lobed. OVULES numerous, forming a single row in each cell.

SILIQUÆ linear, usually long and slender, and exactly four-sided (the cross section square or rhombic), with four sharp and nearly similar angles, two of them the projecting placenta, the others formed by the strong nerve which occupies the middle of each carinate (and rather coriaceous) valve: partition nerveless. SEEDS numerous, pendulous on filiform or setaceous free funiculi, forming a single row in each cell, oblong, turgid or somewhat three-sided, not margined. COTYLEDONS plane, oblong, thickish, parallel with the placenta and incumbent on the ascending RADICLE, which occupies the side remote from the placenta and is sometimes oblique.

HERBS, chiefly biennials, more or less scabrous with closely appressed rigid hairs, which are two-parted (appear-

ing like a single bristle fixed by the middle), or stellately 3-5-parted; the stems virgate, leafy. Cauline leaves linear or lanceolate, entire or merely toothed, sessile or short-petioled, never dilated and auriculate or clasping at the base; the radical sometimes runcinate-pinnatifid. Raceme elongated in fruit, ebracteate. Flowers yellow, often showy.

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ETYMOLOGY. Ἐρύσιμον, an ancient name, thought to come from ἐρύω, to draw blisters, in allusion to the acrid properties.

GEOGRAPHICAL DISTRIBUTION. A pretty large European, and especially North Asiatic genus, of which there are several Western N. American species, but only two or three this side of the Rocky Mountains (excepting *E. cheiranthoides*, which was doubtless introduced from Europe). The species here illustrated alone crosses the Mississippi, Mr. Sullivant having long since detected it in Central Ohio.

NOTE. The areolation appears to vary considerably in different species. In *E. Arkansanum*, the uniform amorphous areolæ are bounded by very tortuous lines, much as in *Turritis*. In this species and its near allies, also, the radicle is often oblique, or the cotyledons, in part, almost accumbent.

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PLATE 63. *ERYSIMUM ARKANSANUM*, Nutt.; — summit of a flowering stem; natural size. (From Ohio, Sullivant.)

1. Diagram of the flower.
2. Diagram of the æstivation of the petals at an earlier period (more deeply convolute).
3. A flower-bud, enlarged.
4. A lateral, and 5, an anterior sepal, enlarged.
6. A petal, equally enlarged.
7. Stamens and pistil, enlarged.
8. A silique, of the natural size.
9. Transverse section of the base of a pod, magnified.
10. Replum, with style and stigma, and three seeds in place, enlarged; two of these cut across to show the cotyledons, which in the lower seed are almost accumbent.
11. Tissue from the partition, highly magnified.

## PLATE 64.

SISYMBRIUM, *L., R. Br.*

Siliqua haud stipitata, hexagono-teretiuseula vel compresso-teretiuseula, valvis convexis, 1-3-nerviis. Cotyledones lineari-oblongæ, planæ, incumbentes. — Calyx laxus. Flores albi, interdum flavi.

SISYMBRIUM, Linn. Gen. 813. Allioni, Fl. Piedm. 1. p. 274. R. Br. in Ait. Kew. 1. c. C. A. Meyer, in Ledeb. Fl. Alt. 3. p. 122.

Torr. & Gray, Fl. N. Am. 1. p. 91. Endl. Gen. 4906.

ERYSIMUM, Tourn. Inst. p. 228. t. 111. non Linn.

**Hedge-Mustard.**

CALYX loosely erect; the SEPALS equal at the base. PETALS obovate or oblong, more or less unguiculate. FILAMENTS filiform or subulate-setaceous, toothless: ANTHERS oblong or oval. GLANDS various. OVARY sessile on the receptacle, oblong or linear: STYLE usually very short or none: STIGMA subcapitate, mostly undivided. OVULES numerous in one or two rows in each cell.

SILIQUE not stipitate, cylindrical or tapering-subulate, linear, or rarely oblong, mostly elongated, obscurely six-sided, the convex valves being marked with three nerves, or rarely somewhat four-sided, the lateral nerves being inconspicuous or obsolete, sometimes more flattened, two-celled; the partitions 1-2-nerved in the middle, or nerveless; the areolæ of various forms (in *S. canescens* nearly as in *Barbarea*, Plate 62, fig. 9, but the lines more descending and scarcely tortuous). SEEDS numerous, pendulous on filiform free funiculi, in one row, or irregularly in two rows in each cell, oblong, not margined, smooth. COTYLEDONS linear-oblong, plane, parallel with the placentæ, incumbent (sometimes obliquely) on the outer side of the ascending RADICLE.

HERBS, either smooth, or with simple or branched pubes-

cence, with simple or 2-3-pinnately dissected leaves, and white or yellow flowers. Racemes elongated in fruit, ebracteate, or rarely with the flowers subtended with leaf-like bracts.

ETYMOLOGY. *Σισύμβριον*, an ancient name for some plants of this family.

GEOGRAPHICAL DISTRIBUTION, &c. A pretty large genus, widely distributed over the world, comprising some heterogeneous forms. *S. officinale*, the *Hedge-Mustard*, an introduced plant with us, represents a section which may perhaps be taken as the type of the genus. Our figure illustrates only the section *IRIO*, *DC.*

PLATE 64. *SISYMBRIUM CANESCENS*, *Nutt.*; — a small plant; natural size. (Texas, *Lindheimer.*)

1. A flower, enlarged.
2. A sepal, and 3, a petal, more enlarged.
4. Stamens and pistil.
5. A ripe silique, enlarged.
6. The same, divided transversely near the base.
7. Portion of the replum, with seeds, more magnified.
8. A magnified seed, divided, showing the incumbent cotyledons.
9. Hairs from the foliage, magnified.

## PLATE 65.

STANLEYA, *Nutt.*

Siliqua longe stipitata, gracilis, tetragono-teretiuscula, valvis carinato-uninerviis. Semina in loculis uniserialia. Cotyledones lineares incumbentes. — Herbæ perennes. Sepala patentia, ligulata. Petala angusta, lutea, unguibus prælongis conniventibus.

STANLEYA, *Nutt. Gen.* 2. p. 21. *DC. Syst.* 2. p. 511. *Torr. & Gray, Fl. N. Am.* 1. p. 97. *Endl. Gen.* 1916.  
 PODOLOBUS, *Raf. in Amer. Month. Mag.* 6. p. 194.

CALYX loosely spreading, colored (yellow): SEPALS equal, or the lateral ones somewhat gibbous at the base, linear-ligulate, elongated, slightly imbricated in æstivation. PETALS scarcely exceeding the calyx, with very long claws, which are connivent, and in *S. pinnatifida* slightly coherent by the pubescence of their margins into a slender quadrangular tube, in *S. integrifolia* the glabrous and distinct claws are dilated at the base; the short and spreading lamina linear or spatulate, entire. STAMENS tetradynamous; the FILAMENTS but little unequal, filiform, elongated and exerted, toothless: ANTHERS linear, spirally revolute when dry. TORUS dilated, bearing 2 to 4 large glands. OVARY oblong-linear or linear, raised from the torus on a stipe (gynophore) much longer than itself, two-celled, somewhat flattened contrary to the cells: STIGMA sessile or nearly so, entire. OVULES numerous, pendulous, forming a single row in each cell.

SILIQUE linear, slender, long-stipitate (the stipe exceeding the pedicel), between terete and quadrangular, the valves carinate with a midnerve: partition nerveless, the areolæ (in *S. pinnatifida*) narrowly linear and elongated, vertical, bounded by even lines. SEEDS pendulous, forming a single row in each cell, on filiform free funiculi, oblong or linear-

oblong, somewhat flattened parallel with the partition, not margined, smooth. COTYLEDONS linear, almost terete, parallel with the placentæ, a little longer than the RADICLE against which they are incumbent (on the side next the placenta).

HERBS with perennial roots, leafy stems, and glaucous smooth foliage; the leaves pinnately divided or entire. Flowers golden-yellow or greenish-yellow, pretty large, in more or less elongated racemes, ebracteate. Flower-buds linear-clavate.

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ETYMOLOGY. Dedicated by Mr. Nuttall to *Lord Stanley*, who was distinguished as an ornithologist and patron of natural history.

PROPERTIES. These plants differ from the rest of the family, and resemble Capparidacæ (to which they approach somewhat in structure) in their nauseous and emetic qualities. (Vide *Nuttall, l. c.*)

GEOGRAPHICAL DISTRIBUTION. The genus was established on *S. pinnatifida* (the *Cleome pinnatifida*, *Pursh*, first gathered on the Upper Missouri by Bradbury), of which Mr. Nuttall gave an admirable description; a second species from the base of the Rocky Mountains was detected by Dr. James, and two others were subsequently found in the same region by Nuttall himself. The genus is restricted to the Rocky Mountains, except as to the original species, which descends the Missouri for a great distance.

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PLATE 65. *STANLEYA PINNATIFIDA*, *Nutt.*;— summit of a young flowering stem, collected on the Missouri by *Mr. Sprague*; of the natural size.

1. A flower, enlarged.
2. An anterior sepal; and 3, a petal, enlarged.
4. Pistil, with the stipe and receptacle, enlarged.
5. A ripe dehiscent silique, enlarged; from an original specimen of *Bradbury*, in *Herb. Lambert*.
6. Tissue from the partition, highly magnified.
7. Seed, magnified. (From specimens gathered by *Mr. Sprague*.)
8. The same, transversely divided.
9. Embryo detached entire, equally magnified.

## PLATE 66.

WAREA, *Nutt.*

Siliqua longe stipitata, gracilis, compressa, valvis planiusculis dorso uninerviis. Semina in loculis uniserialia. Cotyledones oblongæ, planæ, oblique incumbentes, radícula ad apicem sæpe rimali. — Herbæ annuæ. Sepala erectiuscula. Petala patentia, longe unguiculata, lamina dilatata, purpurea seu alba. Racemi umbelliformes.

WAREA, *Nutt.* in *Jour. Acad. Philad.* 7. p. 83. t. 10. Torr. & Gray, *Fl. N. Am.* 1. p. 98. *Endl. Gen.* 4917.

CLEOMES *Sp.*, *Muhl. Cat.* p. 64.

STANLEYÆ *Sp.*, *Nutt.* in *Sill. Jour.* 5. p. 297. *DC. Prodr.* 1. p. 200.

CALYX equal, colored (purplish or greenish-white); the SEPALS linear or spatulate, soon spreading. PETALS unguiculate, the elongated claws exceeding the calyx, loosely spreading, bearing a dilated cuneiform-spatulate or nearly orbicular lamina, often with minutely erose-undulate margins, in æstivation either convolute, or with one petal entirely external. STAMENS rather slightly tetradynamous: FILAMENTS almost capillary, much exerted: ANTHERS linear-oblong, spirally revolute when dry. GLANDS of the dilated torus 4, conspicuous in pairs in front of the shorter stamens. OVARY oblong-linear, two-celled, raised above the torus on a filiform stipe (gynophore) which is usually longer than the ovary: STIGMA sessile, emarginate. OVULES numerous, in a single row in each cell.

SILIQUE narrowly linear, conspicuously stipitate, falcate-curved, compressed parallel with the partition, two-celled; the flattish valves one-nerved in the middle and minutely veiny; the delicate partition nerveless, composed of slender longitudinal areolæ of various outline, many of them bounded by sinuous lines. SEEDS very numerous, pendulous on

filiform free funiculi, forming a single row in each cell, as broad as the partition, oblong, somewhat compressed, not margined. COTYLEDONS narrowly oblong, thickish, plane, sometimes parallel with the placenta and incumbent on the ascending RADICLE, which rests on the middle of one of them, or is exactly dorsal, sometimes oblique and at the upper part parallel with the partition, so as there to be nearly or quite accumbent.

HERBS, entirely glabrous, with annual fibrous roots, and slender upright and branching stems, bearing numerous spatulate-oblong or ovate-oblong entire leaves, which are nearly sessile or partly clasping, and handsome rose-purple or white flowers in abbreviated umbel-like racemes, the rachis of which scarcely elongates in fruit; the slender pods recurved-spreading or pendulous. Bracts none.

ETYMOLOGY. Dedicated by Nuttall to *Mr. N. A. Ware*, who collected one species in Florida.

GEOGRAPHICAL DISTRIBUTION. A genus of two closely allied species of Georgia and Florida, allied to *Stanleya*, and especially to *Thelypodium*, *Endl.* (*Pachypodium*, *Nutt.*), with which, as our figures show, it frequently accords in having the cotyledons oblique, so as to become almost accumbent.

PLATE 66. *WAREA CUNEIFOLIA*, *Nutt.*; — summit of a stem in flower and in young fruit; of the natural size. (*Georgia, Dr. Wray.*)

1. Diagram of a flower; the petals convolute in aestivation.
2. Aestivation of the corolla of a different flower; one petal external.
3. A flower, enlarged.
4. A sepal, inside view; and 5, a petal, enlarged.
6. Stamens, pistil, and receptacle, equally enlarged.
7. A silique, transversely divided above the base, with its stipe, torus, and part of the pedicel; enlarged.
8. Replum, from the base of the silique, enlarged; the two lower seeds cut across, showing the cotyledons accumbent at the section in the lowest, and very oblique in the middle one.
9. Tissue from the edge of the partition, highly magnified.
10. A magnified seed thrice divided, to show the position of the radicle and the cotyledons at various points; namely, the radicle dorsal where it joins the cotyledons, and rimal at the summit.

## PLATE 67.

**SELENIA, Nutt.**

Silicula ovalis, compressissima, vix stipitata, stylo longe subulata; valvis fere planis septo lato (sæpe incompleto) parallelis. Semina plurima, plana, alata, funiculis filiformibus liberis. Cotyledones planæ accumbentes; radícula brevi placentæ remota. — Flores flavi, in racemis folioso-bracteatis; foliis pinnatifidis.

SELENIA, Nutt. in Jour. Acad. Philad. 5. p. 132. t. 6. Torr. & Gray, Fl. N. Am. 1. p. 99. Endl. Gen. 4884.

CALYX nearly equal at the base, colored (yellow); the SEPALS loose or spreading, oblong-linear. PETALS spatulate, spreading, tapering into a claw nearly as long as the calyx. STAMENS shorter than the petals: FILAMENTS filiform, toothless: ANTHERS oblong, emarginate at both ends. GLANDS 10, yellow, of which 8 form an outer series, one before each sepal and petal, and two thicker ones stand one before each of the shorter stamens (opposite the valves of the pod). OVARY oblong, turgid, contracted at the base but scarcely stipitate, two-celled, or only one-celled, the partition being imperfect: STYLE filiform, much longer than the ovary: STIGMA depressed-capitate, entire. OVULES several (6 to 10) on each placenta, horizontal, on long and filiform free funiculi, forming two rows in each cell.

SILICLE broadly oval, much compressed parallel with the very broad partition, slightly margined, abruptly subulate with the long persistent style, contracted into a slightly stipitiform base; the valves membranaceous, flattened, or when young slightly turgid, minutely veiny, nerveless; the broad partition very thin, complete or fenestrate, sometimes reduced to a mere border not wider than the filiform or capillary free funiculi; the areolæ irregular and bounded by

nearly even lines. SEEDS 4 to 8 on each placenta, horizontal, or toward the summit pendulous, forming two rows in each cell, orbicular, flat, surrounded by a firm and rather broad wing, the cavity extended into a kind of pouch or cæcum next the hilum on the lower or placental side, into which the embryo does not extend. COTYLEDONS orbicular, flat, parallel with the partition, accumbent against the RADICLE, which is very short and ascending, or nearly horizontal, on the side remote from the placenta.

HERB annual or biennial, low, smooth, branching from the base, leafy, terminated by racemes of pretty large, yellow flowers; the leaves runcinate-pinnatifid: the filiform pedicels subtended by foliaceous bracts like the leaves.

ETYMOLOGY. From *σελήνη*, *the moon*; a name chosen to express the near relationship of the genus to *Lunaria*.

GEOGRAPHICAL DISTRIBUTION. Only one species is known (unless the form with the partition obsolete should prove distinct), which grows in damp prairies of Arkansas and the adjacent part of Texas.

NOTE. The arcolæ of the partition are said to be linear and transverse by Torrey, in *Ann. Lyc. Nat. Hist. New York*, 3. p. 94, and in the *Flora of North America*, l. c. (which would be like those of *Lunaria rediviva*); but in our specimens, which, however, all belong to the variety with an incomplete partition to the pod, they are seldom more than oblong, and in great part oblique or vertical, as represented at fig. 7. The singular pouch just below the hilum gives to the seed so exactly the appearance of being resupinate, as in *Cremolobus*, that it was thus described in the *Flora of North America*, l. c., and a distinct tribe accordingly established for its reception. But the radicle lies on the other side, as shown in our analyses; and the genus therefore belongs to *Alyssineæ*, next to *Lunaria*.

PLATE 67. *SELENIA AUREA*, Nutt.; — var. with the partition of the pod incomplete, natural size; from Arkansas, *Dr. Leavenworth*.

1. A sepal; and 2, a petal, enlarged.
3. Stamens and pistil, enlarged.
4. Pistil, more magnified (the glands not well represented).
5. Silicle, of the natural size, transversely divided.
6. The replum and seeds, enlarged.
7. Tissue from the imperfect partition, highly magnified.
8. A seed, enlarged.
9. Same, with the integuments cut away to show the embryo in place.
10. An enlarged seed, transversely divided.
11. The embryo detached entire, enlarged.

## PLATE 68, 69.

## DRABA, L.

Silicula oblonga v. ovalis, plano-compressa, polysperma, valvis septo lato parallelis complanatis. Semina compressiuscula immarginata. Cotyledones planæ accumbentes. Filamenta edentula, sæpius complanata.

DRABA, Linn. Gen. 800. (excl. spec.) Schkuhr, Handb. t. 179. R. Br. in Ait. Kew. ed. 2. 4. p. 91. Torr. & Gray, Fl. N. Am. 1. p. 103.

DRABA & EROPHILA, DC. Syst. 2. p. 331, 356. (excl. spec.) C. A. Meyer, in Ledeb. Fl. Alt. 3. p. 69. Endl. Gen. 4880, 4881.

**Whitlow-Grass.**

CALYX equal at the base; the SEPALs erect or a little spreading. PETALS somewhat unguiculate; the lamina dilated, entire, emarginate, or (in Sect. *Erophila*) two-lobed. STAMENS moderately tetradynamous: FILAMENTS mostly flattened and more or less dilated towards the base, not toothed nor with membranaceous appendages: ANTHERS roundish or oval. OVARY two-celled: STYLE short or elongated: STIGMA capitate or depressed, usually entire. OVULES 6 to 30 in each cell in two series.

SILICLE varying from oval to linear-oblong, not stipitate, sometimes twisted, compressed parallel to the broad and mostly 1-2-nerved partition; the valves flat with incurved edges, one-nerved, or sometimes three-nerved, and minutely veiny (areolæ of the partition much as in *Arabis*). SEEDS 6 to 30 in each cell, pendulous in two rows, on slender free funiculi, oval or oblong, more or less compressed, not margined, smooth. COTYLEDONS parallel with the partition, oval, rather thick, accumbent; the RADICLE ascending on the side remote from the placenta.

HERBS low, of various aspect, with entire or toothed leaves, the radical mostly rosulate, the cauline when present sessile. Flowers yellow or white, in ebracteate racemes.

ETYMOLOGY. Name from  $\delta\rho\acute{\alpha}\beta\eta$ , *acrid*; in allusion to the pungent taste.

GEOGRAPHICAL DISTRIBUTION and DIVISION. A genus of 70 or 80 described species, the greater part natives of the colder, and especially of the arctic and alpine, regions of the northern hemisphere. There are 22 South American species, of which three belong to Patagonia and the Falkland Islands, and the rest to the Andes. The species (of which there are very few in the United States) are grouped under several sections, and divided by De Candolle into two genera, namely, —

§ 1. DRABA, DC. — Petals entire or merely emarginate. Silicle elliptical, oblong, or linear.

§ 2. EROPHILA, DC. — Petals 2-cleft. Silicle oval or elliptical.

PLATE 68. DRABA ARABISANS, *Michx.*; — specimen in fruit, of the natural size, from St. Lawrence county, New York.

1. A flower, enlarged.
2. A sepal; and 3, a petal, more enlarged.
4. Stamens and pistil, enlarged.
5. A silicle, enlarged.
6. Portion of the replum, with the seeds, more enlarged.
7. Magnified seed, divided, to show the accumbent cotyledons.

PLATE 69. DRABA (EROPHILA) VERNA, *Linn.*; — of the natural size.

1. A magnified flower.
2. A sepal; and 3, a petal, more magnified.
4. A stamen, equally magnified.
5. A magnified silicle, transversely divided.
6. The replum with the seeds, more magnified.
7. Tissue from the partition, highly magnified.
8. A magnified seed, divided, showing the accumbent cotyledons.

## PLATE 70.

VESICARIA, *Lam.*

Silicula inflata, globosa; valvis hæmisphericis aut valde convexis: septo lato orbiculari. Semina plura, funiculis basi septo adnatis. Cotyledones planæ accumbentes. Filamenta edentula. — Herbæ pilis stellatis plerumque canescentes. Flores flavi.

VESICARIA, Lam. III. t. 559. R. Br. in Ait. Kew. ed. 2. 4. p. 97. Desv. in Jour. Bot. 3. p. 171. DC. Syst. 2. p. 295. Torr. & Gray, Fl. N. Am. 1. p. 101 (excl. § 3). Endl. Gen. 4869.

ALYSSI Sp., Linn. Schkuhr, Handb. t. 181.

CALYX equal at the base; the SEPALS loose, oblong. PETALS obovate or cuneiform-spatulate, entire or barely emarginate, more or less unguiculate, spreading, in æstivation either entirely convolute, or one of them exterior. FILAMENTS filiform or subulate, toothless, commonly more or less thickened at the base: ANTHEERS oblong. GLANDS (in V. Engelm.) two more or less united at the base of each short stamen. OVARY globular or ovoid, usually raised on a very short thick stipe: STYLE filiform, elongated: STIGMA capitate. OVULES numerous, horizontal or pendulous in two rows in each cell; the funiculi adnate more or less to the partition.

SILICLE globose-inflated, sessile on the receptacle, or somewhat stipitate: the valves hemispherical and membranaceous, or strongly convex and nearly coriaceous, nerveless: partition (rarely imperfect) broad, orbicular or broadly obovate; the areolæ (in V. Engelm.) oblong or linear, sinuous, directed towards the axis. SEEDS 4 to 12 in each cell, in two rows, on filiform funiculi which are adnate to the partition for a part of their length, orbicular, compressed, often margined. COTYLEDONS flat, parallel with the septum, accumbent: the RADICLE ascending on the side remote from the placenta.

HERBS low and spreading or tufted; with entire or repand, rarely pinnatifid, narrow leaves, usually canescent or hoary with close stellate pubescence; the showy yellow flowers in ebracteate terminal racemes.

ETYMOLOGY. Name from *vesica*, a bladder; in allusion to the inflated or bladder-like silicles.

GEOGRAPHICAL DISTRIBUTION. A genus of a very few South European species, of one subarctic American, and about a dozen other known species (several of which are yet undescribed) belonging chiefly to the region between the Mississippi and the Rocky Mountains, the greater portion Texan. Only one species (*V. Shortii*, Torr. & Gr.) is found east of the Mississippi.

NOTE. The section *PHYSARIA*, Nutt. in Torr. & Gray, Fl. l. c., founded on *V. didymocarpa*, Hook., now confirmed by a second species (*V. Geyeri*, Hook.), must surely be raised to the rank of a genus, distinguished from *Vesicaria*, and differing from the character of *Alyssineæ*, by the strongly didymous silicle with a narrow partition. (*P. didymocarpa* and *P. Geyeri*.)

PLATE 70. *VESICARIA ENGELMANNII*, n. sp.; — a small specimen of the natural size (the sinuate-toothed radical leaves wanting), from Texas, *Lindheimer*.

1. Apex of a sepal, magnified, to show the stellate pubescence.
2. One of the stellate hairs, more magnified.
3. Diagram of the flower, in a cross section.
4. A flower, enlarged.
5. A sepal (inside view); and 6, a petal, more enlarged.
7. Stamens and pistil, enlarged. (In the living plant the filaments are thicker at the base than is represented.)
8. A stamen (wanting the base of the filament), more enlarged.
9. Enlarged replum, with the style, &c., and one seed.
10. Tissue from the partition, highly magnified.
11. Transverse section of an enlarged silicle, and of the seeds.
12. A magnified seed.
13. Magnified embryo, detached entire.

## PLATE 71.

## SUBULARIA, L.

Silicula globoso-ovalis, mutica, septo elliptico contrarie compressiuscula; valvis ventricosis. Semina plura. Cotyledones incumbentes, lineares, bicures. — Herba parva, foliis omnibus radicalibus elongato-subulatis cellulosis, scapo paucifloro, floribus minimis albis.

SUBULARIA, Linn. Gen. 799. Fl. Dan. t. 35. R. Br. in Ait. Kew. l. c. p. 91. DC. Syst. 2. p. 697. Hook. Fl. Lond. t. 135. C. À. Meyer, in Ledeb. Fl. Alt. 3. p. 218. Torr. & Gray, Fl. N. Am. 1. p. 113. \* Endl. Gen. 4977.

**Awlwort.**

CALYX equal, spreading; the SEPALS oval, caducous. PETALS spatulate or narrowly oblong, entire, spreading, scarcely exceeding the calyx, caducous. STAMENS slightly but distinctly tetradynamous: FILAMENTS subulate, toothless: ANTHERS roundish, somewhat cordate. OVARY globular, two-celled, somewhat compressed contrary to the partition: STYLE none: STIGMA obscurely two-lobed. OVULES numerous, forming two rows in each cell.

\*SILICLE somewhat pyriform-oval, turgid, slightly compressed contrary to the elliptical nerveless partition, raised at the base on a short or obscure stipe, abrupt at the pointless apex, membranaceous; the valves convex-ventricose, 1-3-nerved: areolæ of the partition oblong-linear, sinuous or curved. SEEDS elliptical, somewhat compressed parallel with the partition, not margined, smooth, 4 to 6 in each cell, pendulous on setaceous funiculi which are slightly adnate to the partition at their base. COTYLEDONS linear, thickish, parallel with the placenta, thrice the length of the short ascending RADICLE against which they are incumbent at their upper portion, their base forming half of the radicular (inner) side of the embryo; that is, the cotyledons are

transversely folded upon themselves, instead of being upwardly bent upon the radicle at their very base.

HERB small, aquatic, with a tuft of annual fibrous roots, from which rise clustered terete and elongated-subulate loosely cellular leaves, and naked scapes, bearing a raceme of few and minute white flowers.

ETYMOLOGY. Name formed from *subula*, an awl; in allusion to the shape of the leaves.

GEOGRAPHICAL DISTRIBUTION. A genus of a single species, indigenous to the colder parts of the northern temperate zone, growing on the gravelly margins of lakes and pools, where it is ordinarily covered with water. In the United States this little plant has as yet been detected only in the State of Maine, where it was gathered long ago by Nuttall; and recently by Tuckerman and by Oakes. Probably it is not local, however, but has escaped notice in the North from its size and the place of growth as much as from its rarity.

PLATE 71. *SUBULARIA AQUATICA*, *Linn.*; — in flower and fruit, of the natural size; from fresh specimens gathered in Maine and sent by *Mr. Oakes*.

1. A magnified leaf, cut across at the base, to show the air-cells.
2. A flower, magnified.
3. A sepal; and 4, a petal, more magnified.
5. A magnified stamen, back view; and 6, inside view of the same.
7. Pistil, magnified.
8. A transverse section of the same, showing the ovules, &c.
9. An ovule, much magnified.
10. A silicle, magnified.
11. Same, deliscent, showing the seeds.
12. A detached valve of the same, seen obliquely from the inside.
13. Replum and seeds, with the partition towards the eye; magnified.
14. A seed, more magnified.
15. Same, showing two transverse sections of the embryo at different heights.
16. Magnified embryo, detached cutic.

## PLATE 72.

SENEBIERA, *Poir.*

Silicula didyma, septo angustissimo contrarie compressi-  
 usecula, 2-ocularis; loculis indehiscensibus, reticulato-rugosis  
 vel cristatis, monospermis. Cotyledones incumbentes, line-  
 ares, biveres. — Herbæ multicaules ramosæ, foliis incisissimis vel  
 1-2-pinnatifidis, floribus minimis albidis.

SENEBIERA, Poir. Dict. 7. p. 75. Pers. Syn. 2. p. 185. DC. Syst. 2.  
 p. 521. Deless. Ic. 2. t. 71. Torr. & Gray, Fl. N. Am. 1. p.  
 114. Endl. Gen. 4975.

CORONOPUS, Hall. Helv. 1. p. 217. Gærtn. Fr. t. 242. R. Br. in Ait.  
 Kew. 1. c. p. 76. Nutt. Gen. 2. p. 64. non Tourn.

COCHLEARIE & LEPIDII Sp., Linn. Schkuhr, Handb. t. 181.

NASTURTIOLUM & CARARA, Medik. Gen. 1. p. 33. t. 1, 2.

**Wart-Cress.**

CALYX equal at the base, spreading; the SEPALS oval, cadu-  
 cious. PETALS small, spatulate or linear, or abortive. STA-  
 MENS 6 and tetradynamous, or 4 (the shorter abortive), or 2,  
 one opposite each placenta, that is, occupying the position of  
 the longer pairs: FILAMENTS subulate: ANTHERS didymous.  
 OVARY globular, and compressed contrary to the narrow par-  
 tition: STYLE none: STIGMA entire. OYULE single in each  
 cell, pendulous from near its summit.

SILICLE strongly didymous, compressed contrary to the  
 very narrow partition, the closed valves or cells globular or  
 ovoid, indehiscens, nut-like, rugose-reticulatèd, or crested on  
 the back, one-seeded. SEED suspended, obliquely obovate,  
 somewhat compressed contrary to the partition, smooth.  
 COTYLEDONS linear, thickish, bent transversely below the  
 middle, so that the upper part is incumbent against the as-  
 cending RADICLE.

HERES with annual or biennial roots; the stems branched  
 from the base, diffuse or decumbent, the leaves incisely ser-  
 rate, or 1-2-pinnately parted. Racemes opposite the leaves,  
 often abbreviated, ebracteate; the flowers minute, white.

ETYMOLOGY. Dedicated to *Senecier*, a well-known vegetable physiologist of the last century.

GEOGRAPHICAL DISTRIBUTION. A genus of a few, chiefly tropical species: one, however, is a native of Europe, and is very sparingly introduced into this country; while another, which extends northward to Virginia, has also been widely diffused over the Old World.

PLATE 72. *SENEBIERA PINNATIFIDA*, DC.; — a branch, natural size.

1. A flower, magnified. (Diandrous, the two stamens occupying the place of the longer pairs: the two subulate bodies by the side of each, resembling sterile filaments, from their position are probably abortive petals.)
2. A magnified sepal, separate.
3. A stamen, more magnified, inside view.
4. Silicle, magnified.
5. Vertical section of the same, showing the seeds.
6. Tissue, from the partition, highly magnified.
7. Transverse section of a magnified seed near the lower end, dividing the cotyledons twice.
8. Magnified embryo, detached entire.

## PLATE 73.

LEPIDIUM, *L.*, *R. Br.*

Silicula ovalis v. obcordata, septo angustissimo contrarie complanata; loculis monospermis, valvis navicularibus. Cotyledones planæ, incumbentes, raro accumbentes. — Petala equalia, interdum nulla.

LEPIDIUM, *R. Br.* in Ait. Kew. ed. 2. 4. p. 83. Gærtn. Fr. t. 141. Schkuhr, Handb. t. 180. DC. Syst. 2. p. 527. Deless. Ic. 2. t. 72, 73. C. A. Meyer, in Ledeb. Fl. Alt. 3. p. 182. Torr. & Gray, Fl. N. Am. 1. p. 115.

LEPIDIUM & NASTURTIUM, Medik. Gen. I. p. 80, 84.

LEPIDII, COCHLEARIE, & THLASPEOS Sp., Linn.

LEPIDIUM & CYNOCARDAMUM, Webb & Berthel. Fl. Canar. Endl. Gen. 4888, 4932.

**Pepperwort. Peppergrass.**

CALYX equal at the base; the SEPALS spreading. PETALS equal, entire, spatulate or obovate. STAMENS commonly 6 and slightly tetradynamous, rarely 4, or else only 2 (replacing the longer pairs): FILAMENTS subulate, toothless: ANTHERS didymous or cordate. OVARY sessile on the receptacle, globular, compressed contrary to the narrow partition, two-celled, two-ovuled: STYLE short or slender: STIGMA depressed-capitate, usually entire. OVULE solitary in each cell, pendulous from near the summit.

SILICLE much flattened contrary to the very narrow partition, oval or orbicular and nearly entire or emarginate at the apex, or obcordate, two-celled, two-seeded, two-valved; the valves laterally compressed, navicular-carinate, wingless, or often winged at the apex: areolæ of the partition (in *L. Virginicum* and *L. ruderale*) quadrate or roundish, irregular. SEEDS pendulous from near the summit of the cell, compressed contrary to the partition, wingless, sometimes surrounded by a narrow margin. COTYLEDONS plane, oblong-linear, parallel with the partition and incumbent on the

ascending RADICLE, or rarely (in *Cynocardamum*) broader, contrary to the partition, and accumbent.

HERBS, rarely suffruticose; with branching stems and ebracteate racemes of very small white flowers, which are sometimes apetalous. Leaves entire, toothed, incised, or variously pinnately dissected; the cauline sessile or clasping.

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ETYMOLOGY. From *λεπίδιον*, a little scale, alluding to the small and flat scale-like pod.

GEOGRAPHICAL DISTRIBUTION, &c. A genus widely diffused over the world, especially in the warmer portions of the northern temperate zone. In the Old World the focus of the genus is in the eastern Mediterranean region: in the New, in California. Within the proper United States, we have only *L. Virginicum*, which is, perhaps, indigenous at the South, but at the North apparently naturalized, as it is in widely remote parts of the world; and *L. ruderale*, which is sparingly found on our northern frontier.

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PLATE 73. LEPIDIUM (CYNOCARDAMUM, *Webb & Berthel.*) VIRGINICUM, *Linn.*; — summit of a stem in flower and fruit.

1. A magnified flower (diandrous).
2. A petal, more magnified.
3. A stamen, equally magnified.
4. Pistil, magnified; and 5, section of the same, showing the ovules.
6. Silicle, enlarged, one valve separated.
7. Transverse section of the magnified seed, showing the accumbent cotyledons.
8. Enlarged silicle of LEPIDIUM RUDERALE, *Linn.*; from British America.
9. Same, with one valve separated.
10. Transverse section of the magnified seed, showing the incumbent cotyledons.

## PLATE 74.

CAKILE, *Tourn.*

Silicula lomentacea biarticulata ; articulis crassis unilocularibus monospermis ; semine loculi inferioris suspenso, superioris erecto. Cotyledones planæ (nunc oblique) accumbentes. — Herbæ littorales, carnosæ.

CAKILE, *Tourn. Inst. p. 49. t. 483. Adans. Fam. 2. p. 423. Gærtn. Fr. t. 141. R. Br. l. c. (excl. spec.) DC. Syst. 2. p. 427. Deless. Ic. 2. t. 57. Torr. & Gray, Fl. N. Am. 1. p. 119. Endl. Gen. 4899.*

BUNIADIS *Sp., Linn. etc.*

Sea-Rocket.

CALYX nearly erect ; the SEPALS, especially the lateral, somewhat gibbous at the base. PETALS oblong-spatulate or obovate, unguiculate, entire. STAMENS moderately tetradynamous : FILAMENTS filiform or subulate, toothless. OVARY oblong or linear, constricted below the middle into two superposed uniovulate cells : STIGMA sessile, capitate. OVULES of the two cells turned in opposite directions.

SILICLE thick and fleshy and when dry corky in texture, lomentaceous, two-jointed, the lower joint obovoid or turbinate, truncately two-toothed at the junction with the upper one, which is ovate and quadrangular when dry or ensiform ; the joints one-celled, one-seeded. SEED erect from the base of the upper cell, suspended from the summit of the lower one, oblong or oval, somewhat compressed, marginless, smooth. COTYLEDONS plane, thickish, accumbent ; the RADICLE inferior in the upper seed and more or less oblique (or even incumbent ?), superior in the lower seed.

HERBS growing on the sea-coast, annual, smooth, with much branched fleshy stems, and toothed or pinnatifid fleshy leaves. Racemes terminal or opposite the leaves, ebracteate, or leafy below ; the flowers white or purple.

ETYMOLOGY. An old Arabic name, of uncertain meaning.

GEOGRAPHICAL DISTRIBUTION. A genus of a few maritime plants, belonging to the Atlantic shores of the northern hemisphere. Our northern species is also found along the Great Lakes. There is a second species on our Southern coast.

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PLATE 74. *CAKILE AMERICANA*, Nutt.; — a branch in fruit and flower, of the natural size; from the shore of Massachusetts.

1. A flower, enlarged.
2. A sepal; and 3, a petal, enlarged.
4. Stamens and pistil, enlarged.
5. Magnified pistil with the receptacle, seen edgewise.
6. The same, seen laterally.
7. Vertical section of the last, showing the cells and ovules.
8. Enlarged silicle, in a dry state, the joints separated.
9. Transverse section of the upper joint and seed.
10. Vertical section of a fresh pod, magnified, the two seeds transversely divided, showing the cotyledons.
11. Enlarged seed, from the upper cell, entire.
12. The same, thrice divided, showing that the radicle is rather oblique.

## ORD. CAPPARIDACEÆ.

Herbæ, vel in subtropicis arbores (succo aqueo acridi), foliis alternis, stipulis nullis aut spinescentibus; dicotyledoneæ, poly-apetalæ, hypogynæ, hexa-polyandraræ (nec tetradynamæ); floribus subregularibus; ovario uniloculari monostylo; placentis parietalibus intervalvularibus 2 vel 4-10; ovulis amphitropis seu campylotropis; seminibus exalbuminosis reniformibus vel conduplicatis; cotyledonibus arcuato-incumbentibus seu convolutis.

CAPPARIDES, Juss. Gen. p. 242, & in Ann. Mus. 18. p. 474.

CAPPARIDÆ, Vent. Tab. 3. p. 118. DC. Prodr. 1. p. 237. R. Br. in Denh. & Clapp. Voy. p. 220. Endl. Gen. p. 889.

CAPPARIDACEÆ, Lindl. Introd. Nat. Syst. ed. 2. p. 61, & Veg. Kingd. p. 357.

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THE CAPER FAMILY is nearly related to Cruciferæ on the one hand, and to Resedaceæ on the other. It resembles the former in sensible qualities, as well as in the usually cruciform flowers, and in the structure of the ovary (of which even the spurious partition connecting the parietal placentæ is sometimes met with); and likewise in the dehiscence of the pod in all the capsular genera, in which the two valves separate more or less completely from the intervening filiform placentæ, just as in Fumariaceæ. The stamens, also, are commonly six in the *Cleomeæ*, that is, in all the capsular-fruited Capparidaceæ, but are not tetradynamous. In the *Cappareæ*, or proper Caper Tribe, with baccate fruit, the stamens are often indefinite, and the placentæ sometimes several in number. Several genera of this tribe are apetalous.

The pungency and stimulant qualities of the Caper Family are owing to an acrid principle, much like that of Cruciferæ, which gives the flavor to the well-known condiment, the *capers* of commerce, which are the pickled flower-buds of *Capparis spinosa*. This pungent principle is often so concentrated as to be dangerous; and is accompanied with other active, or even narcotic qualities, which render many species more or less poisonous or medicinal.

Capparidaceæ are chiefly found in the tropics, and the countries bordering on them. The common Caper, however, inhabits the European shore of the Mediterranean, and, in the New World, one or more West Indian spe-

cies of the genus have barely reached the eastern coast of the peninsula of Florida, or the adjacent "Keys," which have a proper West Indian and tropical vegetation. The few species of extra-tropical North America belong to four or five genera of the Tribe Cleomeæ, DC., and are all Southern and Western, with the exception of *Polanisia graveolens*, which extends northward and eastward to the Great Lakes and Lake Champlain. *Gynandropsis pentaphylla* has most probably been introduced by the negroes into the Southern States; so that the genus does not properly deserve a place in this work.

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#### CONSPECTUS OF THE GENERA OF THE UNITED STATES.

- CLEOMELLA.** (Plate 75.) Pod siliculæform, rhomboidal, compressed contrary to the placentæ, 4-6-seeded, stipitate on a very long gynophore and a short torus. Petals nearly sessile, regular, entire. Stamens 6.
- CLEOME.** (Plate 76.) Pod siliquæform, several-many-seeded, long-stipitate or sessile. Stamens 6, rarely 4, distinct and free on a globular or hemispherical torus. Petals entire.
- CRISTATELLA.** (Plate 77.) Pod siliquæform, many-seeded, stipitate on a short gynophore. Torus minute, bearing a tubular gland as long as the ovary, placed between it and the upper sepal. Petals unequal, unguiculate, palmatifid. Stamens 6-14.
- GYNANDROPSIS.** (Plate 78.) Pod siliquæform, many-seeded, stipitate on a prolonged gynophore, to which the filaments of the 6 stamens are adnate as far as the middle. Petals long-unguiculate, undivided.
- POLANISIA.** (Plate 79.) Pod siliquæform, sessile or short-stipitate. Stamens 8-32, unequal, free on a very short torus. Petals entire or cmarginate, unguiculate.

## PLATE 75.

## CLEOMELLA, DC.

Petala fere sessilia, æqualia. Stamina 6, toro brevi columnari imposita. Capsula siliculæformis, longissime stipitata, dilatato-rhomboidæa, obcompressa; valvis navicularibus cassidæformibus. Semina 4-6, conduplicata. — Herba annua, trifoliolata; racemis virgatis foliosis; floribus flavis.

CLEOMELLA, DC. Prodr. 1. p. 237. Torr. in Ann. Lyc. Nat. Hist. New York, 2. p. 157. Hook. Ic. Pl. t. 28. Torr. & Gray, Fl. N. Am. 1. p. 120. Endl. Gen. 4983.

CALYX small, a little spreading; the SEPALS 4, distinct, ovate-lanceolate, membranaceous, erose-serrate, imbricated in early æstivation, deciduous. PETALS 4, imbricated in æstivation, equal or nearly so, spreading, oval or oblong, entire, narrowed at the base but scarcely unguiculate, hypogynous at the base of the torus, deciduous. TORUS short-columnar, rather shorter than the calyx, destitute of any glandular appendage. STAMENS 6, equal, inserted on the summit of the torus, longer than the petals, deciduous: FILAMENTS filiform, free: ANTHERS linear-oblong, fixed by the base, the cells introrsely dehiscent longitudinally. OVARY ovoid, raised from the centre of the truncate torus on a long filiform stipe (gynophore), one-celled, with two parietal placentæ (anterior and posterior): STIGMA nearly sessile, undivided, obtuse. OVULES 2 or 4 upon each placenta, usually a single pair from above the middle of each, nearly horizontal, amphitropous, soon campylotropous.

CAPSULE silicle-like, dilated-rhomboidal, compressed anteriorly and posteriorly, that is, contrary to the deeply navicular or helmet-shaped valves, stipitate on a filiform gynophore (of twice its length or more) which surmounts the oblong columnar torus, strictly one-celled, two-valved; the minutely

reticulated valves separating from the filiform placentæ, which persist as an elliptical replum. SEEDS 2 or 3, usually a single collateral pair, upon each placenta, pendulous on short funiculi, conduplicate-campylotropous; the crustaceous testa minutely rugose. ALBUMEN none. EMBRYO arcuate-conduplicate; the thickened COTYLEDONS incumbent upon the ascending RADICLE on the placental side.

HERB annual, glabrous, with a virgate stem, usually branching above, bearing alternate and exstipulate trifoliolate leaves on short petioles, and terminated by a leafy raceme which is elongated in fruit. Leaflets linear, entire, slightly petiolulate, the upper floral ones, or bracts, simple and sessile, gradually reduced to about the length of the pedicel. Flowers small, yellow.

ETYMOLOGY. The name is a diminutive of *Cleome*.

GEOGRAPHICAL DISTRIBUTION. This very distinct genus was founded on a single species, indigenous to Northern Mexico, Texas, and Western Arkansas.

PLATE 75. *CLEOMELLA MEXICANA*, DC.; — summit of a plant, of the natural size, in fruit and flower; from Texas, *Lindheimer* (*Pl. Lindheim.* No. 10).

1. A flower, magnified.
2. A petal; and 3, a sepal, more magnified.
4. Vertical section of a magnified flower, through the torus, cutting away half the stamens, petals, and sepals.
5. Transverse section of a magnified ovary, showing the ovules.
6. A pod, enlarged, with its stipe, torus, and apex of the receptacle.
7. The replum of the same, with the funiculi of the seeds.
8. A seed, magnified.
9. Vertical section of the same, cutting through the embryo.

## PLATE 76.

CLEOME, *L.*, *DC.*

Petala subæqualia, integerrima. Stamina 6, raro 4, sæpissime inæqualia, declinata, toro brevissimo (nonnunquam glandula appendiculata) imposita; filamentis filiformibus. Capsula siliquæformis.

CLEOME, Linn. (excl. spec.) Schkuhr, Handb. t. 189. DC. Prodr. 1. p. 238. Torr. & Gray, Fl. N. Am. 1. p. 121. Endl. Gen. 4985.

SINAPISTRUM, Mœnch. Meth. p. 250.

ATALANTA, Nutt. Gen. 2 p. 73. non Corr.

PERITOMA, DC. Prodr. 1. p. 237. Nutt. in Jour. Acad. Philad. 7. p. 14.

CALYX four-cleft or four-parted, or the SEPALS nearly distinct, somewhat persistent or deciduous (in *C. serrulata* and *C. integrifolia* usually separating round the base and at length hanging loose on the pedicel of the fruit). PETALS 4, hypogynous, equal or unequal, often turned to one side, entire, unguiculate or nearly sessile, imbricated-convolute in æstivation (as in Cruciferæ), deciduous. TORUS above the petals short, usually globular or hemispherical, inappendiculate, or sometimes bearing a gland or glandular scale between the pistil and the upper sepal. STAMENS 6 (rarely 4), borne on the summit of the torus, free and distinct: FILAMENTS filiform, more or less declined, longer than the petals: ANTHERS fixed by the base, the cells opening introrsely and longitudinally. OVARY stipitate or nearly sessile, one-celled, with two parietal (anterior and posterior) placentæ: STYLE short or none: STIGMA obtuse. OVULES numerous and usually in two series on each placenta, horizontal, amphitropous.

CAPSULE silique-shaped, linear or oblong, more or less terete, often torulose, stipitate by the gynophore, or almost sessile, one-celled, two-valved; the membranaceous valves separating from the replum formed of the persistent and filiform intervalvular placentæ. SEEDS several or numerous on

each placenta, pendulous on short funiculi, campylotropous, reniform or conduplicate-incurved, exalbuminous. EMBRYO conformed to the seed; the COTYLEDONS incumbently incurved upon the ascending RADICLE.

HERBS, rarely suffruticose, with alternate palmately 3-7-foliolate or rarely simple leaves, without stipules; and yellow, purple, or white flowers in terminal leafy racemes; the upper bracts simple.

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ETYMOLOGY. An early name, said to come from κλείω, *to close*.

GEOGRAPHICAL DISTRIBUTION, &c. A somewhat polymorphous genus of numerous species, belonging to the warmer parts of the world. One species is found in Portugal, and two or three extend northward to about the same latitude in North America west of the Mississippi.

NOTE. In *C. integrifolia*, a species scarcely distinct from *C. serrulata* (the type of *Atalanta*, *Nutt.*, or *Peritoma*, *DC.*), of which I have no specimens, the somewhat dilated summit of the torus is produced posteriorly into a lanceolate and flat entire or 3-toothed appendage, which is longer than the calyx! Whether this, taken in connection with the separation of the marcescent calyx from the base, will serve to characterize a section or subgenus, I am unable to pronounce. In the place of this appendage, *C. lutea*, *Hook.*, bears a short gland, like some other species.

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PLATE 76. CLEOME (PERITOMA) INTEGRIFOLIA, *Torr. & Gray*; — summit of flowering and fruiting plant; from Upper Missouri.

1. A flower-bud, enlarged.
2. Diagram of the flower; the posterior side (marked by the appendage of the torus) turned to the right.
3. Calyx laid open and enlarged.
4. Vertical section of a flower, enlarged, passing through the appendage of the torus.
5. This appendage, as seen from the inside, enlarged.
6. Placentæ and seeds, of the natural size.
7. A magnified seed.
8. Section of the same, displaying the embryo.

## PLATE 77.

CRISTATELLA, *Nutt.*

Petala longe unguiculata, flabelliformia, dimorpha; postica eroso-fimbriata anticis palmatopartitis multo majora. Stamina 6-14, declinata, toro plano, postice appendicem vaginæformem ore truncatam exserenti, inserta. Capsula, etc., ut *Cleomes*.

CRISTATELLA, *Nutt.* in *Jour. Acad. Philad.* 7. p. 85. t. 11. Torr. & Gray, *Fl. N. Am.* 1. p. 123.

CYRASIUM, *Endl. Gen.* 4989.

CALYX herbaceous, of 4 lanceolate SEPALS a little united at the base, deciduous. PETALS 4, hypogynous, of two forms, conspicuously unguiculate, dilated-cuneiform or flabelliform; the two posterior lacinate-fimbriate or incised at the dilated summit; the two anterior much smaller, with the lamina palmately parted or dissected into 5 to 9 narrowly linear lobes, which are emarginate or 2-3-cleft at the apex. TORUS between the petals and the stamens obsolete or minute, bearing, on the posterior side of the pistil, a conspicuous and tubular sheath-like appendage as long as the anterior petals, with a truncate or somewhat toothed open orifice at the summit, and which in fruit persists at the base of the stipe. STAMENS 6 to 14, inserted with the petals or nearly so, distinct: FILAMENTS filiform, unequal when more than six, declined: ANTHERS cordate or somewhat sagittate, fixed by the base, apiculate; the cells introrsely deliscent. Ovary oblong-linear or lanceolate, declined with the stamens, more or less stipitate, one-celled with two parietal placenta: STYLE filiform, short: STIGMA obtuse. OVULES very numerous on each placenta.

CAPSULE silique-shaped, linear-lanceolate, nearly terete, stipitate on a short gynophore, one-celled, two-valved; the valves membranaceous, reticulated, separating from the fili-

form persistent placentæ, as in *Cleome*. SEEDS numerous on both placentæ, round-reniform, exalbuminous. EMBRYO conformed to the seed: COTYLEDONS short, incumbently incurved; the RADICLE superior.

HERBS minutely viscid-glandular, with annual roots and slender branching stems, bearing alternate and palmately trifoliolate leaves on short petioles, without stipules, and small flowers (white or yellowish) in leafy racemes. Leaflets linear, entire.

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ETYMOLOGY. The name is a diminutive of *crista*, a crest; in allusion to the fringed petals.

GEOGRAPHICAL DISTRIBUTION, &c. A genus of two species (not yet well discriminated), natives of Northern Texas and the adjacent parts of Arkansas and Louisiana.

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PLATE 77. *CRISTATELLA JAMESII*, Torr. & Gray; — the summit of a flowering and fruiting plant, of the natural size; from Texas, Mr. Wright.

1. Calyx, laid open, enlarged.
2. An upper petal, magnified.
3. A lower petal, magnified.
4. A magnified flower, with part of the calyx and two petals, &c., cut away, displaying the singular appendage of the torus, &c.
5. A pod in dehiscence, showing the replum, &c., enlarged.
6. A seed, magnified.
7. Section of the same, and of the contained embryo.

## .PLATE 78.

GYNANDROPSIS, *DC.*

Petala unguiculata, æstivatione imbricata vel (in *Gymnogonia*) aperta. Stamina 6, filamentis ad medium usque gynophori longissimi adnatis. Cætera omnia *Cleomes*.

GYNANDROPSIS, *DC.* Prodr. 1. p. 237. Wight & Arn. Prodr. Fl. Ind. Or. 1. p. 21. Deless. Ic. 3. t. 1. Torr. & Gray, Fl. N. Am. 1. p. 121. Endl. Gen. 4984.

CLEOMES *Sp.*, Linn. etc.

CLEOMES Sect. GYNANDROPSIS & GYMNAGONIA, *R. Br.* in Denham & Clapp. Narr.

CALYX of 4 somewhat spreading SEPALS, deciduous. PETALS 4, hypogynous, entire or minutely erose-crenulate, obovate or roundish, on slender claws, nearly equal, imbricated in æstivation, or else open from the first. TORUS depressed-hemispherical, the petals inserted around its base, the long gynophore springing from its centre. STAMENS 6; the FILAMENTS monadelphous-adnate to the very long gynophore for half its length or more, then free and distinct, filiform, nearly equal: ANTHERS oblong or linear, fixed near the base, introrse, the cells opening longitudinally. OVARY, &c., as in *Cleome*.

CAPSULE silique-shaped, linear, terete, ascending on a very long stipe (gynophore) which is marked as if by an articulation in the middle at the point from which the filaments have fallen; its structure, and also the SEEDS and EMBRYO, as in *Cleome*.

HERBS, either smooth or glandular, with alternate and palmately 3-7-foliolate leaves, and white or purplish flowers in a leafy raceme.

ETYMOLOGY. So named from the attachment of the stamens to the stalk of the pistil, as if gynandrous.

GEOGRAPHICAL DISTRIBUTION, &c. A genus of several tropical or subtropical species, some of which belong to Equinoctial America (GYNANDROPSIS proper, *R. Br.*) and have the petals imbricated in æstivation; while the others, with the æstivation of the corolla open, as in *Reseda*, which form the section or genus GYMNOGONIA, *R. Br.*, are probably all exclusively natives of the Old World, as Mr. Brown supposes. *G. pentaphylla*, therefore, although spontaneous in the Southern United States, as in the West Indies, was most likely introduced by the negroes, "who use it both as a potherb and in medicine," and therefore should not have been included in this work.

NOTE. Our figure, made from poor dried specimens, erroneously represents the flower-buds as if with closed petals, which is the case with the truly indigenous American species only.

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PLATE 78. GYNANDROPSIS (GYMNOGONIA, *R. Br.*) PENTAPHYLLA, *DC.*;  
— from Georgia; the summit of a stem in fruit and flower, of the natural size.

1. A flower, enlarged.
2. Magnified vertical section through the torus, gynophore, and pistil.
3. A magnified seed.
4. Section of the same, and of the embryo.

## PLATE 79.

**POLANISIA, Raf.**

Petala longe unguiculata, emarginata vel obcordata, conformia. Stamina 8-32, inæqualia; filamentis filiformibus. Torus depressus, postice glandulam truncatam gerens. Gynophorum nullum aut brevissimum. Stylus filiformis. Capsula siliquæformis, turgida. — Folia trifoliolata.

POLANISIA, Raf. in Jour. Phys. 89. (1819.) p. 98. DC. Prodr. 1. p. 242.  
(excl. spec. gerontogæis, ex not. R. Br.) Torr. & Gray, Fl. N. Am. 1. p. 122, 669.

JACKSONIA, Raf. in New York Med. Rep. hex. 5. 2. p. 350.

CLEOMES Sp., Michx., Pursh, etc.

CALYX of 4 herbaceous or purplish spreading SEPALS, imbricated in æstivation, deciduous. PETALS hypogynous, nearly equal, somewhat turned to the upper side, obcordate or obovate and emarginate, on slender or filiform claws, imbricated in æstivation, deciduous. TORUS inconspicuous, convex, produced on the upper side into a thickened gland. STAMENS 9 to 32 (usually 12 to 24): FILAMENTS filiform or capillary, declined (purple), inserted on the depressed torus, the anterior ones usually shorter: ANTHERS oval, fixed by the base; the cells opening introrsely by a longitudinal line. OVARY oblong, glandular-viscid, sessile or nearly so, one-celled, with two parietal placentæ: STYLE filiform: STIGMA depressed-capitate. OVULES very numerous, in two series upon each placenta, horizontal, amphitropous.

CAPSULE silique-shaped, linear-oblong, turgid, nearly terete, sessile or very short-stipitate, two-valved; the reticulated-veiny valves separating from the filiform placentæ; the style deciduous. SEEDS numerous, reniform-conduplicate, exalbuminous. EMBRYO conformed to the seed: COTYLEDONS incumbently incurved upon the ascending RADICLE.

HERBS annual, viscid-glandular with a heavy odor, leafy;

the leaves trifoliate and petioled, or the upper floral simple. Flowers in a terminal leafy raceme.

ETYMOLOGY. Name formed of *πολύς*, *many*, and *ἄνιστος*, *unequal*; from the number and inequality of the stamens.

GEOGRAPHICAL DISTRIBUTION, &c. The genuine species of the genus, founded by Rafinesque on *Cleome dodecandra*, *Michx.*, belong to the warmer parts of North America, of which *P. graveolens* alone is diffused northward to the Great Lakes. — The species chosen for illustration is the *P. trachysperma*, *Torr. & Gray*, l. c. ; but the verrucose-roughened surface of the seeds, from which the name was taken, is not constant, and is sometimes found in *P. graveolens* ; the flowers, also, vary greatly in size. The species, however, is perfectly distinguished from *P. graveolens*, by the long style, the more exerted stamens, and the entire absence of a stipe to the ovary and pod. It would appear to accord very well with *P. uniglandulosa*, except that the flowers are only one fourth the size of those delineated in the original figure of that species by Cavanilles.

PLATE 79. *POLANISIA TRACHYSPERMA*, *Torr. & Gr.* ; — summit of a specimen in flower and fruit, of the natural size, raised in the Cambridge Botanic Garden from Texan seeds, sent by *Lindheimer*.

1. A flower, enlarged.
2. Vertical section of a flower, more enlarged, through the ovary, &c.
3. Transverse section of an ovary, magnified.
4. An ovule, more magnified.
5. A magnified seed (almost smooth).
6. Section of the same, and of the contained embryo.

## ORD. VIOLACEÆ.

Herbæ (v. in tropicis frutices), foliis stipulatis vernatione involutis: dicotyledoneæ, hypogynæ, symmetricæ; sepalis cum petalis et staminibus pl. m. irregularibus 5; æstivatione imbricativa; filamentis brevissimis membranaceo-dilatatis (antheris introrsum adnatis) circa ovarium uniloculare multiovulatum conniventibus; placentis 3 parietalibus; stylo unico; ovulis anatropis; capsula loculicide trivalvi; embryone recto axili albumine carnosio vix breviori, cotyledonibus planis.

VIOLARIÆ, DC. Fl. Fr. 4. p. 801, & Prodr. 1. p. 287. Endl. Gen. p. 903.

VIOLACEÆ, Juss. in Ann. Mus. 18. p. 476. Lindl. Introd. ed. 2. p. 146.

THE VIOLET FAMILY is represented in temperate regions, especially in the northern hemisphere, by the genus *Viola* alone, or in the New World by one or two other herbaceous plants, with similar irregular flowers. But within the tropics there are several genera of shrubs, or even trees, widely different in aspect from Violets, some of which have perfectly regular flowers. In all, the flower is symmetrical and pentamerous throughout, except as to the pistil, which is only tricarpellary, as is shown by the three parietal placentæ and the 3-valved capsule. The consolidated style, the stipules, the vernation of the leaves (which are involute or rolled up from their edges inward, instead of from the apex downward), the anthers introrsely adnate to the inner face of dilated membranous filaments, and the large embryo, as well as the prevalent irregularity of the flowers, distinguish the Violet Family from Droseraceæ, the order which it most resembles in character.

The spurred or saccate and larger petal is said to be the upper one, and to become the lower by the resupination of the flower; but we do not find this to be the case in the Violet. In the Pansy, for instance, it is easy to see that the odd petal is anterior, even while the flower-bud is still sessile or nearly so. The æstivation of the corolla is not convolute, as generally described, but truly imbricative.

An active and emetic or purgative principle pervades the Violet Family, and is chiefly contained in the roots. This principle, called *violine*, nearly resembles *emetine* in its properties; and the roots of several species of *Ionidium* are used in place of those of the true *Ipecacuanha*. Many South

American species are employed medicinally, or as antidotes to the bites of venomous serpents.

Besides the typical genus, we have one or two species of *Ionidium* indigenous to the southwestern borders of the United States, and in the North the single species of *Solea*.

## PLATE 30.

VIOLA, *Tourn.*

Sepala subæqualia, basi producta soluta. Petala inæqualia, anticum basi saccatum seu calcaratum. Stamina coarctata, 2 anticis dorso calcaratis. — Herbæ caulescentes vel acaulescentes, pedunculis solitariis unifloris.

VIOLA, *Tourn.* Inst. p. 419. t. 236. Linn. Gen. 1007. (excl. spec.) Juss. Gen. p. 294. Gærtn. Fr. t. 112. Schkuhr, Handb. t. 269. Ging. in DC. Prodr. 1. p. 291, & in Mem. Soc. Genev. 2. p. 1. Torr. & Gray, Fl. N. Am. 1. p. 136. Endl. Gen. 5040.

**Violet. Pansy.**

CALYX herbaceous, persistent; the SEPALS 5, scarcely unequal, distinct or nearly so, produced below the insertion into a free appendage, imbricated in æstivation, the odd one superior. PETALS 5, hypogynous, alternate with the sepals, unequal, imbricated (and a little twisted, but not convolute) in æstivation, one of the two upper and usually smaller ones exterior, the lower one interior and larger than the others, saccate or spurred at the base, marcescent or deciduous. STAMENS 5, hypogynous on an annular or concave torus, alternate with the petals: proper FILAMENTS very short or obsolete; the connective dilated, membranaceous, and produced above the anther into a wing-like triangular or ovate apical appendage, the five connivent or more or less coherent over the pistil which they inclose; the two anterior produced from the back into spur-shaped appendages which are received into the spur or sac of the anterior petal: ANTHERS adnate to the inner face of the broad connective, two-celled; the cells divergent at the base, opening by a longitudinal introrse line. OVARY sessile, ovoid-three-sided, one-celled with three strictly parietal placentæ: STYLE terminal, clavate or subulate, various in form, persistent: STIGMA various, often

turned to one side. OVULES numerous, horizontal, in two or more series upon each placenta, anatropous.

CAPSULE crustaceous or chartaceous, one-celled, many-seeded, three-valved, loculicidal; the valves bearing the nerviform placentæ on their middle, conduplicate as they dry, so as to project the seeds elastically when they close. SEEDS globular or obovoid, indefinite, with a smooth crustaceous testa, marked with a distinct raphe and an orbicular impressed chalaza, often carunculate at the hilum. ALBUMEN fleshy. EMBRYO straight, in the axis and occupying almost the whole length of the albumen: RADICLE cylindrical, next the hilum: COTYLEDONS oval, flat, parallel with the raphe, foliaceous in germination.

HERBS either caulescent with annual roots or perennial rootstocks, or acaulescent from scaly-toothed rootstocks; the leaves petioled, involute in vernation, alternate; the stipules foliaceous, persistent. Peduncles or scapes axillary and solitary, bibracteolate, incurved at the apex, one-flowered. Many produce apetalous or cryptopetalous and fertile radical flowers during the summer.

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ETYMOLOGY. The ancient Latin name of the Violet, of obscure origin.

GEOGRAPHICAL DISTRIBUTION, &c. A large genus, belonging chiefly to temperate regions, and principally to the northern hemisphere. There are over twenty species indigenous to the United States proper.

PROPERTIES as in the order generally. Some are highly prized for their beauty or their unequalled fragrance.

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PLATE 80. *VIOLA SAGITTATA*, *Ait.*; — of the natural size, in flower.

1. Diagram of the flower in a transverse section.
2. The petals, displayed.
3. Section of a flower through the ovary, enlarged.
4. Stamens in place, but separated, and pistil; enlarged.
5. Inside view of one of the upper stamens.
6. Outside, and 7, inside view of one of the lower (spurred) stamens.
8. Magnified pistil; the ovary transversely divided.
9. An ovule, more magnified.
10. Pod, with the calyx, enlarged; 11, same, dehiscent.
12. A seed, more enlarged; and 13, same, vertically divided.
14. Embryo detached, turned flatwise, and more magnified.

## PLATE 81.

SOLEA, *Ging.*

Sepala æqualia, basi non producta. Petala fere æquilongâ; anticum basi gibboso-saccatum apice bilobum; cætera consimilia. Stamina arcte connata, synemate antice uniglanduloso. — Herba caulescens, foliis alternis, floribus parvulis, pedicellis 2–3 in axillis fasciculatis.

SOLEA, *Gingins* in DC. Prodr. 1. p. 306, & in Mem. Soc. Genev. l. c. t. 2.  
(vix Spreng.) Torr. & Gray, Ft. N. Am. 1. p. 144. Meisn.  
Gen. p. 20.

VIOLÆ Sp., Forst. Nutt etc.

HYBANTHUS Sp., Spreng. Syst. Veg. 1. p. 805, & Gen. 366.

IONIDIÏ Sp., Rœm. & Schult. 5. p. 401. Endl. Gen. 5041.

CALYX of 5 linear and equal SEPALS, spreading, not produced at the base, nearly as long as the corolla, persistent. PETALS hypogynous, nearly equal in length, erect, with their tips barely spreading; imbricated (as in *Viola*) in æstivation, marcescent; the upper and lateral ones alike, narrowly oblong, emarginate; the lower one much larger, saccate at the base, dilated upwards, obcordate or emarginate-two-lobed at the apex. STAMENS 5, perfectly syngenesious; the FILAMENTS proper nearly none; the connectives membranaceous and dilated as in *Viola*, but firmly and permanently united by their edges into a sheath (their tips alone becoming free) which incloses the pistil, and bears a single rounded or two-lobed gland on the anterior side next the base; ANTHERS adnate to the inner face, two-celled; the cells contiguous and parallel, opening introrsely by a longitudinal line. OVARY, &c., as in *Viola*, but with only 3 or 4 ovules on each placenta: STYLE clavate, gibbous and hooked at the apex, the terminal STIGMA turned to the lower side, simple, perforate.

CAPSULE obovoid, obscurely three-lobed, crustaceous, one-celled, three-valved, the valves bearing the 2–4-seeded pla-

centæ in the middle, conduplicate-infolded and closing firmly after dehiscence, so as forcibly to project the seeds. SEEDS large, obovoid-globose, horizontal, conspicuously carunculate at the hilum, anatropous; the crustaceous testa smooth, marked with a distinct raphe and a large orbicular chalaza. ALBUMEN fleshy. EMBRYO straight, in the axis and nearly the length of the albumen: RADICLE next the hilum, very short: COTYLEDONS almost orbicular, subcordate, flat and thin, occupying nearly the whole breadth of the albumen.

HERB pubescent, with a perennial root, and elongated leafy stems; the leaves alternate, oblong, conspicuously acuminate at both ends, entire, short-petioled; the stipules linear-subulate, deciduous. Peduncles axillary, short, recurved, one-flowered, usually two or three from the same axils, ebracteolate, articulated near the middle. Flower small, greenish-white.

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ETYMOLOGY. Dedicated to *W. Sole*, a German botanist.

GEOGRAPHICAL DISTRIBUTION. A genus of a single species, indigenous to the Northern and Middle United States. (The original *Solea* of Sprengel seems to be equivalent to *Ionidium*.)

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PLATE 81. *SOLEA CONCOLOR*, *Ging.*:—summit of a flowering plant of the natural size. (Cambridge Botanic Garden.)

1. Diagram of the flower.
2. A flower, enlarged.
3. Sepals and petals, displayed.
4. Stamens inclosing the pistil, showing the gland, enlarged.
- 5: The two lower stamens of the same, separated, with the gland.
6. The same, inside view, showing the two anthers.
7. Magnified pistil; the ovary transversely divided.
8. An ovule, more magnified.
9. Capsule, of the natural size.
10. The same, deliscent, showing the seeds.
11. The same, with the valves conduplicate-closed, and the seeds discharged.
12. A seed enlarged, side view.
13. A vertical, and 14, a transverse section of the same.
15. Embryo detached, and placed flatwise, enlarged.

## PLATE 82.

IONIDIUM, *Vent.*

Sepala pl. m. inæqualia, basi exappendiculata. Petala valde inæqualia; postica 2 breviora; anticum maximum, unguiculatum, ungue dilatato breviter gibboso vel concavo. Stamina conniventia, anticis singulis dorso glandula instructis. — Herbæ vel suffrutices, foliis alternis aut oppositis, pedunculis axillaribus solitariis.

IONIDIUM, Venten. Hort. Malm. l. 27. DC. Prodr. 1. p. 306. H. B. K. Nov. Gen. 5. p. 373. t. 495–500. St. Hil. Fl. Bras. 2. p. 141. Torr. & Gray, Fl. N. Am. 1. p. 144. Wight, Ill. Ind. Bot. t. 19. Endl. Gen. 5041 (ex parte).

SOLEA, Spreng. Pugill. p. 23, & Syst. Veg. 1. p. 803.

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CALYX imbricated in æstivation, persistent; the SEPALS more or less unequal, herbaceous and usually with membranaceous margins, not produced at the base, nearly distinct. PETALS very unequal; the two posterior shorter than the lateral ones; the anterior longest and largest, labelliform, contracted below the roundish lamina into a claw, which is dilated at the base and barely concave or gibbous; in æstivation imbricated as in *Viola*, marcescent. STAMENS as in *Viola* (connivent, but not connate?), except that the two anterior each bear a gland at the base, instead of a spur. OVARY globular, one-celled, with three parietal placentæ: STYLE clavate, the stigmatic apex recurved. OVULES several on each placenta in two series, horizontal, anatropous.

CAPSULE chartaceous or coriaceous, pointed with the persistent style, one-celled, three-valved, the valves bearing the nerviform few–several-seeded placentæ on the middle. SEEDS and EMBRYO as in *Viola*.

HERBS or suffruticose plants (rarely shrubs), with branching stems, bearing linear or oblong and alternate or opposite often sessile leaves, and axillary and solitary nodding flow-

ers. Stipules often deciduous. Peduncle articulated and bibracteolate.

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ETYMOLOGY. Name from *ζῶν*, a violet, and *εἶδος*, appearance.

GEOGRAPHICAL DISTRIBUTION. Chiefly intertropical both in the New and the Old World. In this country one or two species are found as far north as Texas and Arkansas.

PROPERTIES. The roots of numerous species are used medicinally and highly valued in South America, chiefly as emetics. They are known in commerce under the name of *White Ipecacuanha*; and possess the same properties as the real *Ipecacuanha*, which they are likewise said closely to resemble in the chemical constitution of their active principles. The roots of our own species doubtless possess the same properties, and might be turned to important account.

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PLATE 82. *IONIDIUM LINEARE*, Torr.; — from Texas, Mr. Wright.

1. Diagram of the flower.
2. A flower, with its peduncle, enlarged.
3. A sepal, enlarged.
4. The petals displayed, enlarged.
5. The stamens surrounding the pistil, enlarged.
6. Inside view of an enlarged stamen, showing the anther.
7. The pistil and receptacle, enlarged.
8. A deliscent pod, and seeds, magnified.
9. A seed, more magnified.

## ORD. DROSERACEÆ.

Herbæ sæpius glanduliferæ, vix stipulatæ, vernatione circinata: dicotyledoneæ, hypogynæ, pentameræ, symmetricæ et regulares; staminibus discretis petalis marcescenti-persistentibus numero æqualia (5), nunc dupla v. tripla, antheris extrorsis; ovario uniloculari, placentis 3 seu 5 parietalibus, raro basilaribus; stylis discretis vel in unicum connatis; ovulis indefinitis anatropis; capsula loculicide 3-5-valvi; embryo in basi albuminis carnosissimi brevissimo.

DROSERÆ, Salisb. Parad. Lond. p. 95.

DROSERACEÆ, DC. Theor. Elem. p. 214, & Prodr. 1. p. 317. Lindl. Introd. Nat. Syst. ed. 2. p. 66. Endl. Gen. p. 906.

THE SUNDEW FAMILY is most nearly related to Violaceæ on the one hand and to Cistaceæ on the other; from both of which it is distinguished by its minute embryo, extrorse anthers, the usually distinct or divided styles, the circinate vernation (the inflorescence as well as the leaves being rolled up from the apex towards the base in the bud), and a peculiar habit. The leaves in most plants of the order are beset with stalked glands, which secrete a clear, viscid fluid, and give the plant the appearance of being covered with dew-drops; whence the popular name of Sundew, as well as the scientific name of *Drosera*. Some of the bristly hairs of the common Sundew are irritable to the touch; and this is more strikingly the case in a New Holland species, in which the glandular fringes of the leaves are said to close upon flies and other insects that happen to alight upon them. This peculiarity is carried to its maximum in *Dionæa*, the Venus's Fly-trap, of North Carolina, in which the blade of the leaf closes suddenly, so as to imprison insects which attempt to traverse its upper surface.

The family comprises seven genera, namely, *Drosera*, which is cosmopolite and embraces much the larger part of the species; *Sondera*, a New Holland genus recently established by Dr. Lehmann, which is remarkable for its octamerous flowers; and *Drosophyllum* of the sands of Portugal, *Aldrovanda*, a floating aquatic of the South of Europe, *Roridula* of the Cape of Good Hope, *Byblis* of New Holland, and *Dionæa* of the savannas of Carolina, — each of a single species.

Little is known of their sensible qualities. The Sundews are somewhat acrid or acid and bitter, and have the reputation of being poisonous to sheep. They impart a deep purple stain to paper in the herbarium; and it is thought they may afford a valuable dye.

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*Parnassia*, which has long been dubiously appended to this family, from which it differs by its *introrse* anthers as well as the exalbuminous seeds, should doubtless, for the present, rather be appended to Hypericaceæ, to which Dou, and subsequently Lindley, have referred it. The latter, indeed, has inserted a proviso, that if "the seeds of *Parnassia* were really parietal, as they are described to be, that would be a reason for removing it to some other place,"\* — and he proceeds to maintain that the placentæ in this case and in *Hypericum* are *truly axile!* But how the placentation differs from that of *Cistaceæ* and *Violaceæ*, which are allowed to have truly parietal placentæ, we are not informed.

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\* *Veget. Kingd.* p. 406.

## PLATE 83.

DROSERA, *L.*

Stamina 5, petalis alterna. Styli 3 vel 5, sæpius (in Bor.-Americanis) bipartita. Capsula unilocularis, 3-5-valvis, placentis totidem parietalibus polyspermis. — Herbæ paludosæ, vernatione circinatæ, foliis ciliis glanduliferis rubidis ornatis.

DROSERA, Linn. Gen. 391. Lam. Ill. t. 220. Gærtn. Fr. t. 61. Schkuhr, Handb. t. 87. Hook. Fl. Lond. t. 188, 189. DC. Prodr. 1. p. 317. Wight, Ill. Ind. Bot. t. 20. Torr. & Gray, Fl. N. Am. 1. p. 145. Endl. Gen. 5033. Torr. Fl. New York, 1. p. 81. t. 10.

RORELLA, Rupp. Fl. Jen. 1. p. 102.

ROS-SOLIS, Tourn. Inst. p. 245. t. 127.

**Sundew.**

CALYX herbaceous, of 5 SEPALS more or less united at the base, quincuncially imbricated in æstivation, persistent. PETALS 5, hypogynous, obovate or cuueiform, convolute-imbricated or entirely convolute in æstivation (imbricated, *Endl.*, etc.), marcescent-persistent. STAMENS 5, hypogynous, alternate with the petals: FILAMENTS filiform or subulate, persistent: ANTHERS extrorse, immovable, two-celled; the cells often somewhat separated, opening externally by a longitudinal line: POLLEN-grains united in fours. OVARY globular, one-celled: STYLES 3 or 5, alternate with as many parietal placentæ, simple, penicillate-multifid, or more commonly two-parted, with linear or clavate divisions stigmatose on the inner side. OVULES numerous, in two or more series occupying the whole length of the parietal placentæ, horizontal, anatropous.

CAPSULE partly covered by the persistent calyx, one-celled, loculicidally 3-5-valved; the valves bearing the nerviform many-seeded placentæ on their middle for their whole length. SEEDS scobiform, the loose and cellular testa very much larger than the nucleus, or oblong with the crusta-

ceous and rough or pitted testa conformed to the nucleus. EMBRYO very short or minute next the hilum, immersed in or at the extremity of the fleshy albumen.

HERBS growing in bogs, generally of a reddish tinge, the foliage beset with viscid stalked glands; acaulescent and scapigerous, with the leaves rosulate from fibrous roots or a slender rhizoma, or caulescent (often from a bulb) with alternate leaves and terminal peduncles; the racemiform and unilateral inflorescence and the leaves coiled or rolled up from the apex to the base, in the manner of Ferns. Flowers white, purple, or rose-color, expanding successively only in sunshine and for a single day. Stipules usually obsolete or reduced to bristles. Bracts commonly obsolete or deciduous.

ETYMOLOGY. Name from *δροσερός*, *dewy*; the glands exuding a clear fluid, which, in the morning sun, gives the plant the appearance of being covered with dew-drops.

GEOGRAPHICAL DISTRIBUTION. The Sundews inhabit bogs or wet sands in both temperate zones; but are far more numerous in New Holland. Those of the northern hemisphere are all acaulescent, with naked scapes.

NOTE. The scorpioid inflorescence is not a true raceme, but a reduced unilateral cyme, as in *Sedum*; the pedicels not arising from the axil of the bracts (as is incorrectly delineated in our figure), but laterally, or from the opposite side. Hence the inflorescence sometimes forks, bearing the primary terminal flower in the bifurcation.

PLATE 83. *DROSERA FILIFORMIS*, *Raf.*; — from specimens sent to the Cambridge Botanic Garden from Plymouth, Massachusetts, by *G. Gilbert, Esq.*

1. Diagram of the æstivation, &c.
2. An enlarged flower.
3. Outside, and 4, inside view of a magnified stamen.
5. Pistil, magnified, the ovary divided transversely, and the receptacle and calyx vertically.
6. Dehiscent capsule and seeds; magnified.
7. A valve of the same, the seeds detached from the placenta.
8. A seed, much magnified.
9. Vertical section of the same through the raphe and minute embryo.
10. Embryo detached, and highly magnified.

## PLATE 84, 85.

DIONÆA, *Ellis*.

Petala 5. Stamina sæpius 15. Stylus columnaris: stigmata 5, brevissima, lacerato-multifida. Capsula utriculata, 5-loba, unilocularis; placenta basilari polysperma. — Herba glaberrima acaulescens; foliis radicalibus rosulato-patentibus, petiolo dilatato spathulato; lamina orbiculari utrinque emarginata spinuloso-ciliata, vernatione conduplicata et supra petiolum inflexa, irritabili, tactu cum impetu complicata! Scapus nudus, floribus cymosis albis.

DIONÆA, Ellis, in Nov. Act. Ups. 1. p. 98. t. 8. Linn. Mant. p. 151. Michx. Fl. 1. p. 267. Venten. Hort. Malm. t. 20. DC. Prodr. 1. p. 320. M. A. Curtis, in Bost. Jour. Nat. Hist. Soc. 1. p. 123. Lindl. Ladies' Bot. 2. p. 87. t. 34, 35. Torr. & Gray, Fl. N. Am. 1. p. 147. Endl. Gen. 5037.

## Venus's Fly-trap.

CALYX herbaceous, of 5 oblong-ovate SEPALS, quincuncially imbricated in æstivation, persistent and reflexed in fruit. PETALS 5, hypogynous on the margin of the dilated receptacle, alternate with the sepals, spreading, obovate-cuneiform, emarginate or truncate and somewhat erose at the extremity, veiny, marcescent-persistent. STAMENS (10 to 20?) commonly 15, hypogynous within the petals, shorter than they: FILAMENTS filiform, monadelphous at the very base, persistent: ANTHERS oblong, of two parallel cells without a manifest connective, extrorse, attached to the filament by a point above the base; the cells opening longitudinally and somewhat extrorsely. POLLEN of pretty large grains (about the  $\frac{1}{300}$  of an inch in diameter) composed of four united. OVARY depressed-ovoid, sessile by a broad base, one-celled, five-lobed, the lobes alternate with the petals: STYLE columnar, pretty large, undivided: STIGMAS 5, corresponding with

the lobes of the ovary, short, erect or connivent, fimbriately many-cleft. OVULES indefinite, anatropous, erect, sessile on and uniformly covering the nearly flat basilar placenta which occupies the whole bottom of the cell.

CAPSULE membranaceous, utricular, broadly ovoid, rupturing irregularly, or more or less distinctly five-valved, soon decaying or falling away, all but the disk-like base, which is thickened and persistent, forming a kind of border around the flat and circular basilar placenta. SEEDS indefinite, ob-ovoid, smooth and shining (black), erect, uniformly covering the placenta or whole bottom of the capsule; their base immersed in the fleshy scrobiculæ of the placenta; the crustaceous testa conformed to the nucleus; the raphe salient: inner integument fleshy. EMBRYO minute, occupying the base of the fleshy albumen, conical; the short RADICLE inferior: COTYLEDONS very thick.

HERB acaulescent, very smooth, with fibrous roots, and a rosulate cluster of spreading yellowish-green leaves, which consist of a spatulate-obovate foliaceous portion (the dilated petiole) traversed by a strong midrib, and bearing at its apex an orbicular herbaceo-coriaceous lamina which is emarginate at both ends, fringed with a row of strong spinulose bristles round the margin, traversed by the strong midrib, the two sides conduplicate and the whole incurved on the petiole in veneration; the upper surface dotted with minute reddish glands, and bearing two or three slender bristles on each side of the midrib, in which the sensitiveness of the leaf chiefly resides; but which at length fall away from the old leaves. The lobes or sides of the lamina are infolded at night, in repose, but spread open in the day; when if the midrib, or especially the bristles of the upper surface, be roughly touched, or an insect alights there, the sides suddenly close with considerable force and imprison the intruder, the marginal fringes interlacing, like the fingers of the two hands clasped together, or like the teeth of a steel trap. After contraction the trap remains closed for a short time and then slowly expands, ready to close again if newly irritated. But if it be caused to make repeated efforts at short intervals, its

movements become languid, or the sensibility is altogether exhausted, to be recovered only by a period of repose. The scape, which is produced in April or May, is naked, simple, or forked at the summit, bearing a small and umbel-like cyme of pretty large greenish-white flowers. Bracts opposite, or the lower scattered. Stipules none. (The foliage stains paper with a brown-purple hue, much as does that of *Drosera*.)

ETYMOLOGY. Name from *Διώνη*, the mother of Venus.

GEOGRAPHICAL DISTRIBUTION, &c. This truly wonderful plant abounds in the savannas around Wilmington, North Carolina, and extends northward as far as Newbern, and along the Cape Fear River nearly to Fayetteville. I extract, from an account published several years ago by my friend the Rev. Mr. Curtis, who was long familiar with the plant in its native habitat, the following particulars.

“Elliott says, on the authority of General Pinckney, that it grows along the lower branches of the Santee in South Carolina. Dr. Bachman has received it from Georgetown, South Carolina; and Mr. Audubon informed me, with the plant before us, that he has seen it in Florida, of enormous size [?]. I think it not improbable, therefore, that it inhabits the savannas, more or less abundantly, from the latter place to Newbern. It is found in great abundance for many miles around Wilmington, in every direction. I venture a short notice of this interesting plant, as I am not aware that any popular description of it has been published in this country. The leaf, which is the only curious part, springs from the root, spreading upon the ground, or at a little elevation above it. It is composed of a petiole or stem with broad margins, like the leaf of the orange-tree, two to four inches long, which at the end suddenly expands into a thick and somewhat rigid leaf, the two sides of which are semicircular, about two thirds of an inch across, and fringed around their edges with somewhat rigid ciliæ or long hairs like eyelashes. It is very aptly compared to two upper eyelids joined at their bases. Each side of the leaf is a little concave on the inner side, where are placed three delicate, hairlike organs, in such an order, that an insect can hardly traverse it without interfering with one of them, when the two sides suddenly collapse and inclose the prey with a force surpassing an insect's efforts to escape. The fringe or hairs of the opposite sides of the leaf interlace, like the fingers of the two hands clasped together. The sensitiveness resides only in these hairlike processes on the inside, as the leaf may be touched or pressed in any other part without sensible effects. The little prisoner is not crushed and suddenly destroyed, as is sometimes supposed, for I have often liberated captive flies and spiders, which sped away as fast as fear or joy could hasten them. At other times I have found them enveloped in a fluid of a mucilaginous consistence, which seems to act as a solvent, the insects being more or less consumed in it. This circumstance has suggested

the possibility of their being made subservient to the nourishment of the plant, through an apparatus of absorbent vessels in the leaves. But as I have not examined sufficiently to pronounce on the universality of this result, it will require further observation and experiment on the spot to ascertain its nature and importance. It is not to be supposed, however, that such food is necessary to the existence of the plant, but, like compost, may increase its growth and vigor. But however obscure and uncertain may be the final purpose of such a singular organization, if it were a problem to construct a plant with reference to entrapping insects, I cannot conceive of a form and organization better adapted to secure that end than are found in the *Dionæa muscipula*. I therefore deem it no credulous inference, that its leaves are constructed for that specific object, whether insects subserve the purpose of nourishment to the plant or not.' \*

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PLATES 84, 85. *DIONÆA MUSCIPULA*, *Ellis*; — plant from Wilmington, *Dr. Macree*, of the natural size.

1. Diagram of the flower, æstivation, &c.
2. A sepal; and 3, a petal, enlarged.
4. Stamen, with a portion of adjacent filaments united at the base, magnified; seen from the inner side.
5. Anther of the same, seen from the outside.
6. Pollen-grains (quadruple, as likewise in *Drosera*), more magnified.
7. Vertical section of the pistil and receptacle, magnified.
8. Magnified pistil, entire.
9. An ovule, much magnified.
10. Enlarged ripe pod (split into five valves), with the marcescent calyx and corolla.
11. The persistent base of the pod and scrobiculate placenta, after the seeds have fallen, seen from above, magnified.
12. A seed, magnified; and 13, a vertical section of the same.
14. Magnified embryo; and 15, the same seen obliquely from above.

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\* *Curtis, Cat. Pl. Wilmingt. N. Car.*, in *Bost. Jour. Nat. Hist. Soc.* 1. p. 123 - 125.

## PLATE 86.

PARNASSIA, *Tourn.*

Stamina fertilia 5, petalis alterna; sterilia plerumque glandulæformia in phalanges petalis oppositas connata. Capsula unilocularis, loculicide 3-4-valvis, stigmatibus 3-4, placentas totidem parietales valvasque superantibus, coronata. Semina numerosissima, scobiformia, exalbuminosa. — Herbæ glaberrimæ, foliis rotundatis cordatisve, scapis mono-oligophyllis unifloris.

PARNASSIA, *Tourn. Inst.* p. 246. t. 127. *Linn. Gen.* 334. *Gærtn. Fr. t.* 60. *Schkuhr, Handb.* t. 86. *Venten. Hort. Malin.* t. 39. *DC. Prodr.* 1. p. 320. *Hook. Fl. Bor.-Am.* 1. p. 82. t. 27, 28. *Arn. in Comp. Bot. Mag.* 2. p. 315. *Wight, Ill. Ind. Bot.* t. 21. *Endl. Gen.* 5039.

**Grass of Parnassus.**

CALYX of 5 equal herbaceous SEPALS, united at the base, and by means of a thickish torus adherent barely to the very base of the sessile ovary, quincuncially imbricated in æstivation, persistent, reflexed in fruit. PETALS 5, inserted on the torus alternate with the sepals and just within them, quincuncially imbricated in æstivation, ovate or obovate, veiny, widely spreading, tardily deciduous. STAMINODIA (or sterile stamens of authors) 5, opposite the petals, of which they are probably a deduplication, inserted with them in a series exterior to the true stamens, composed either of a 3-5-lobed and glandless dilated-cuneiform scale, or parted into 3 to 13 glandular-tipped setæ which resemble abortive stamens, persistent, marcescent. STAMENS 5, alternate with the petals, inserted just within them: FILAMENTS subulate, marcescent: ANTHERS cordate-ovate or oblong, introrse (not extrorse as usually described), fixed above the base to the point of the filament, two-celled; the cells opening longitudinally by an introrse line. POLLEN simple. OVARY closely

sessile, usually ovoid, with three or four parietal placentæ more or less projecting into the cell: STIGMAS thick, sessile, as many as the placentæ and placed directly over them! persistent. OVULES very numerous in several series covering each dilated placenta, horizontal, anatropous.

CAPSULE membranaceous, one-celled, loculicidally three-valved from the apex, the placentæ borne on the middle of each valve. Seeds very numerous, scobiform; the loose cellular testa wing-like and much larger than the nucleus. ALBUMEN none. EMBRYO cylindrical, straight: RADICLE next the hilum: COTYLEDONS very short.

HERBS very smooth throughout, with perennial roots, and rounded or reniform-cordate entire leaves, which are punctate with obscure dots; the radical clustered and long-petioled; the one or two (if any) borne on the otherwise naked and slender one-flowered scapes sessile or clasping, alternate. Flowers large; petals white or yellowish, often with greenish veins.

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ETYMOLOGY. From Mount Parnassus, on which a plant called *Grass of Parnassus* was said by Dioscorides to grow.

PROPERTIES. Rather bitter and astringent, but of little importance.

GEOGRAPHICAL DISTRIBUTION. Natives of the temperate and frigid regions of the northern hemisphere, or on high mountains. A small genus.

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PLATE 86. PARNASSIA CAROLINIANA, Michx.; — of the natural size.

1. Diagram of the flower.
2. A separate petal, displaying the venation.
3. Vertical section through the ovary, enlarged.
4. One of the staminodia, enlarged.
5. An enlarged stamen, inside, and 6, outside view.
7. The pistil, magnified, with the ovary transversely divided.
8. An ovule, much magnified.
9. Capsule, dehiscent, with the persistent calyx, &c.
10. A seed, magnified.
11. The same, divided, showing the embryo.

## ORD. CISTACEÆ.

Suffrutices v. herbæ, integrifoliæ: dicotyledoneæ, hypogynæ, anisomeræ, regulares, oligo-polyandræ; sepalis 3 interioribus seu propriis æstivatione convolutis; petalis ephemericis æstivatione eodem calycis contrarie convolutis; antheris introrsis; ovario uniloculari vel semi-3-10-loculari monostylo, placentis parietalibus; ovulis orthotropis; capsula loculicida poly-oligosperma; embryo excentrico intra albumen varie curvato seu convoluto.

CISTI, Juss. Gen. p. 294. DC. Fl. Fr. 4. p. 811.

CISTOIDEÆ, Venten. Tabl. 3. p. 219.

CISTINEÆ, DC. Prodr. 1. p. 263. Endl. Gen. p. 903.

CISTACEÆ, Lindl. Introd. Nat. Syst. ed. 2. p. 91. Spach, in Ann. Sci. Nat. ser. 2. 6. p. 357. Torr. & Gray, Fl. N. Am. 1. p. 150.

THE ROCK-ROSE FAMILY consists of low shrubby plants or herbs, often with viscid branches, with entire leaves, which are either opposite or alternate, even upon the same plant, with or without stipules, and with flowers which expand in the sunshine for a single day only, and then (except in *Lechea*) cast their delicate petals. It is distinguished from all the other hypogynous orders with parietal placentation by its orthotropous ovules (except in *Fumana*) and anisomerous, usually polyandrous flowers. The calyx, which is wholly persistent, should probably be regarded as trimerous rather than pentamerous; for the two smaller sepals, so called, are entirely exterior in the bud, like a pair of bractlets, and not involved in the convolute æstivation of the three inner, or proper sepals. When the petals are only three, they alternate with these last; but when five, they exhibit no manifestly regular order as respects the calyx. They are convolute in æstivation, but turned in the contrary direction from the sepals; and in the proper Rock-roses the petals are more or less crumpled, as in the Poppy. The stamens are either indefinite, or, when few, very inconstant in number; and the filaments are never united or collected in clusters as in *Hypericaceæ*. The styles, if any, are perfectly consolidated into one. The placenta, three, five, or rarely ten in number, are either strictly parietal or borne on partial dissepiments which project into the cell; and the dehiscence of the

capsule being loculicidal, these are borne on the middle of the valves, as in the two preceding families. The elongated embryo is more or less excentric, and either slightly curved (as in *Lechea*), or circinate, conduplicate or variously convolute in the midst of the farinaceous (rarely corneous) albumen; the slender radicle pointing to the extremity of the seed remote from the hilum.

Cistaceæ possess no marked sensible qualities and furnish no useful products except a balsamic gum-resin, such as the officinal *Ladanum*, yielded by *Cistus Creticus* and its allies, which exudes from the leaves and branches of many species so as to render them glutinous. They are all slightly astringent.

The principal home of this family is in the western part of the Old World, and especially around the Mediterranean.

There are five or six species of *Helianthemum* in the New World, chiefly in the warmer portion of the United States (one of them in California), besides *Lechea* and *Hudsonia*, which are peculiar to this country.

## PLATE 87.

**HELIANTHEMUM, *Tourn.***

Petala 5, ephemera, æstivatione pl. m. corrugata. Stamina indefinita. Capsula unilocularis, 3-valvis, pleio-oligosperma. Semina orthotropa. Embryo circinatus, circumflexus, vel uncinatus. — Herbæ vel suffruticuli.

HELIANTHEMUM, *Tourn.* Inst. p. 248. t. 128. Gærtn. Fr. 1. t. 76. Michx. Fl. 1. p. 308. Dunal, in DC. Prodr. 1. p. 266. (excl. plur.) Spach, in Ann. Sci. Nat. ser. 2. 6. p. 360 (cum Crocanthemo). Endl. Gen. 5029. (excl. spec.)

CISTI Sp., Linn. etc.

Subgen. HETEROMERIS. — Flores majusculi 5-petali et polyandri, cum parvulis apetalis sæpiusve cryptopetalis 3–10-andris plerumque in eadem stirpe mixti. — Herbæ perennes, foliis alternis vel suboppositis exstipulatis.

HETEROMERIS, Spach, in Ann. Sci. Nat. l. c. & in Comp. Bot. Mag. 2. p. 290. HELIANTHEMI Sect. LECHEOIDES, Dunal, in DC. l. c. p. 269.

**Rock-rose. Frost-weed.**

CALYX herbaceous, persistent: SEPALS 5, of which the two exterior are much smaller or minute and rather to be regarded as bractlets; the three proper sepals equal, convolute in æstivation. PETALS 5, hypogynous, unsymmetrically placed as respects the sepals, more or less crumpled and convolute in the contrary direction from the sepals in æstivation, spreading, rounded or dilated-cuneiform, equal, expanding in sunshine for a single day, then caducous. STAMENS indefinite, hypogynous, all fertile, caducous: FILAMENTS filiform, distinct: ANTHERS introrse or innate; the cells opening longitudinally. OVARY ovoid, one-celled with three parietal placentæ, or incompletely three-celled by their projection: STYLE articulated with the summit of the ovary, or very short or wanting: STIGMA capitate, three-lobed or three-crested. OVULES orthotropous, nodding or recurved on as-

ending filiform funiculi, numerous or few. — In the section *Heteromeris*, there are produced, in the course of the season, clusters of smaller flowers, with petals which do not exceed the calyx and seldom or never expand, or else are apetalous or tripetalous, 3 – 10-androus, and few-ovuled.

CAPSULE chartaceous or cartilaginous, one-celled or half three-celled, three-valved, loculicidal, the valves bearing the narrow placentæ upon their middle, few – many-seeded. SEEDS usually on slender funiculi, orthotropous, with a crustaceous testa. EMBRYO excentric, circumflexed or curved nearly into a ring in the midst of the farinaceous albumen: the slender RADICLE pointing to the apical micropyle: COTYLEDONS flattish, oval, oblong, or linear.

HERBS or suffruticose plants, usually low and branching; with alternate or partly opposite entire leaves, and yellow, or sometimes white or rose-colored flowers. Stipules none in American species.

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ETYMOLOGY. Name formed of ἥλιος, *the sun*, and ἄνθεμον, *flower*; the blossoms opening only in direct sunshine.

GEOGRAPHICAL DISTRIBUTION. A genus of numerous species in the warmer parts of Europe and especially in the Mediterranean region, and with a few in similar parts of North America, nearly all of which belong to *Heteromeris*, *Spach*. One species only extends northward to Canada.

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PLATE 87. HELIANTHEMUM (HETEROMERIS) CANADENSE, *Michx.*; — a flowering stem, early in the season, of the natural size.

1. Diagram of the æstivation and plan of the flower.
2. A magnified stamen, seen from the outside; and 3, from the inside.
4. Pistil and receptacle, magnified.
5. Same, vertically divided, showing the numerous ovules on long funiculi.
6. Transverse section, showing the slightly introflexed placentæ.
7. A magnified pistil of one of the smaller and later flowers.
8. Vertical section of the same, showing a solitary ovule on each placentæ.
9. A capsule (and calyx) from a secondary flower, enlarged.
10. A many-seeded capsule (and calyx) of a primary, petaliferous flower, enlarged to the same degree as the last.
11. A seed, magnified.
12. Vertical section of the same, showing the circumflexed-uncinate embryo in the albumen.

## PLATE 88, 89.

## LECHEA, L.

Petala 3, parva, in alabastro plana, marcescentia. Stamina 3-12. Ovarium incomplete 3-loculare: placentæ 3 late lamelliformes semiseptis adnatæ, extus 2-ovuliferæ. Stigmata plumoso-fimbriata. Capsula 3-valvis: valvæ a semi-septis placentisve solutæ. Embryo rectiusculus, fere axilis. — Herbæ exstipulatæ, parvifloræ, floribus sordide purpureis.

LECHEA, Linn. Gen. 142. Gärtn. Fr. t. 129. DC. Prodr. 1. p. 285.  
Torr. & Gray, Fl. N. Am. 1. p. 152. Endl. Gen. 5030.

LECHEA & LECHIDIUM, Spach, in Comp. Bot. Mag. 2. p. 282, & Ann. Sci. Nat. l. c.

**Pinweed.**

CALYX herbaceous, persistent, of 5 SEPALS; the two exterior in the bud minute and rather to be regarded as bractlets; the three proper sepals convolute in æstivation, ovate, concave. PETALS 3, hypogynous, alternate with the three proper sepals, and not longer than they, obovate or oblong, convolute but not crumpled in æstivation, marcescent-persistent. STAMENS hypogynous, 3-12, when only three placed opposite the petals, shorter than they: FILAMENTS filiform: ANTHERS oval, introrse, the cells opening longitudinally. OVARY globular, raised on a very short stipe, incompletely three-celled, the 3 imperfect partitions each bearing a large oval and valve-shaped placenta: STYLE very short or obsolete: STIGMAS 3, fimbriate-plumose. OVULES 2 on each placenta, borne on the base of the posterior face one on each side of the partition, erect, orthotropous, on very short funiculi.

CAPSULE cartilaginous, triangular-ovoid or globular, inclosed in the connivent calyx or nearly so, 3-6-seeded, loculicidally three-valved; the valves separating from the broad and crustaceous placentæ, which appear like an inner set of valves curved in the opposite direction, and inclosing the

two or by abortion the single erect SEEDS between them and the proper valves. EMBRYO straight or 'accumbently arcuate in the axis or nearly so of the corneous albumen: RADICLE cylindrical, superior: COTYLEDONS elliptical or obovate, flat.

HERBS, branching and often suffrutescent at the base, with entire and mostly sessile puncticulate leaves; the lower usually opposite or verticillate, the upper alternate, gradually reduced to bracts. Flowers very small and numerous, cymulose-clustered, or racemiform on the branches (but not axillary), pedicellate. Petals and stigmas dull purple.

ETYMOLOGY. Dedicated to *Leche*, a Swedish botanist, Professor at Abo.

GEOGRAPHICAL DISTRIBUTION. An Eastern North American genus of three or four species, growing chiefly in sandy or sterile soil, from Canada to Texas, principally along and near the coast.

DIVISION. There are two pretty well-marked sections, which are viewed as genera by Spach, namely:—

- § 1. *LECHEA*, *Spach*. — Placentæ membranaceo-crustaceous, fragile, separating from the evanescent partitions and revolute around the seeds.
- § 2. *LECHIDIUM*, *Spach*. — Placentæ cartilaginous, scarcely recurved, firmly adherent to the persistent partitions which separate from the valves at dehiscence. Pedicels slender, deflexed. (*L. Drummondii*.)

PLATE 88. *LECHEA THYMIFOLIA*, *Pursh*; — flowering stem, with some of the sterile shoots at the base; from the coast of Massachusetts.

- 1. Diagram of the flower and æstivation. 2. Open flower, magnified.
- 3. A stamen; and 4, pistil and receptacle, more magnified.
- 5. Double section of the ovary, displaying the ovules and placentæ.
- 6. Capsule, with the calyx opened, enlarged.
- 7. Magnified cross-section of the valves, placentæ, and seeds.
- 8. Magnified seed; and 9, vertical section of the same.
- 10. The embryo from the last, showing the cotyledons.

PLATE 89. *LECHEA (LECHIDIUM) DRUMMONDII*, *Torr. & Gr.* (Texas.)

- 1. Flower-bud, enlarged; and 2, diagram in a transverse section.
- 3. Expanded flower, magnified.
- 4. An inner sepal; 5, a petal; and 6, a stamen, more magnified.
- 7. Pistil and receptacle, equally magnified.
- 8. Transverse section of a ripe capsule and seeds, showing the septifragal valves, and the persistent partitions fixed to the placentæ.
- 9. A magnified seed.

## PLATE 90.

HUDSONIA, *L.*

Petala 5, calyce majora, ephemera. Stamina 9–30. Ovarium uniloculare, placentis 3 nerviformibus 2-ovulatis; stylo filiformi stigmatate minuto desinente. Capsula calyce tubuloso-connivente inclusa, 3-valvis, 2–6-sperma. Embryo uncinato-circinatus, gracilis. — Fruticuli ericoidei, canescentes, dense cæspitosi, foliis parvis imbricatis persistentibus, floribus luteis.

HUDSONIA, Linn. Mant. p. 11. Willd. Hort. Ber. t. 15. Gærtn. f. Fr. 3. p. 152. t. 310. Nutt. Gen. 2. p. 4. DC. Prodr. 1. p. 284. Spach, in Ann. Sci. Nat. ser. 2. 6. p. 372. Torr. & Gray, Fl. N. Am. 1. p. 154. Endl. Gen. 5031. Torr. Fl. New York, 1. p. 80. t. 9.

CALYX of 5 SEPALS; the two exterior minute and resembling bractlets; the three others ovate, equal, convolute in æstivation, colored (yellowish) inside, united at the base, persistent, at length connivent in a tube and inclosing the capsule. PETALS 5, hypogynous, convolute in æstivation, obovate or cuneiform, much larger than the sepals, thin and delicate, caducous. STAMENS 9 to 30, hypogynous, deciduous: FILAMENTS filiform: ANTHERS roundish, innate or slightly introrse, the cells opening laterally by a longitudinal line. OVARY sessile on the convex torus, ovoid, strictly one-celled, with three nerviform parietal placentæ: STYLE long and filiform, straight, persistent: STIGMA truncate, minutely three-lobed. OVULES two from the lower part of each placenta, orthotropous, ascending, on slender funiculi.

CAPSULE oblong, somewhat triangular, inclosed in the connivent calyx, one-celled, three-valved; the chartaceous valves bearing the narrow placentæ upon their middle. SEEDS one or two on each placenta, ascending from near the base, ovate; the testa nearly smooth, crustaceous. EM-

BRYO linear, slender, homotropous; the RADICLE about the length of the thin farinaceous albumen, superior, excentric; the linear COTYLEDONS incumbently uncinately-circinate.

SHRUBS dwarf and cæspitose, Heath-like, much branched, hoary-tomentose; the very small leaves closely imbricated on the stems and branches, alternate, subulate or linear-oblong, sessile, appressed or somewhat spreading, persistent. Flowers sessile or peduncled, terminating the crowded short branchlets, expanding in sunshine for a single day only, yellow.

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ETYMOLOGY. Dedicated to *Hudson*, the author of the *Flora Anglica*, an English botanist contemporary with Linnæus.

GEOGRAPHICAL DISTRIBUTION, &c. A genus of three Eastern North American species, growing in sandy soil chiefly along the coast; one of them (*H. tomentosa*) nearly confined to the sea-shore, and to the shores of the Great Lakes, extending northward to Slave Lake.

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PLATE 90. HUDSONIA TOMENTOSA, *Nutt.*;— branch in flower, of the natural size, from the coast of Massachusetts. (Ipswich, *Oakes.*)

1. A leaf, magnified.
2. Diagram of the flower and æstivation. (The placentæ alternate with the sepals; but are wrongly placed opposite them.)
3. Branchlet and flower, enlarged.
4. A stamen, magnified.
5. Same, with the anther transversely divided.
6. Pistil, with the receptacle, magnified.
7. Same, with the ovary divided vertically, showing the ovules.
8. An ovule, more magnified.
9. Dehiscent capsule and persistent calyx, enlarged.
10. A seed, more magnified.
11. Vertical section of the same, showing the embryo in the albumen.

## ORD. HYPERICACEÆ.

Frutices vel herbæ (succo acrido resinoso), exstipulatæ, foliis oppositis integerrimis punctatis: dicotyledoneæ, hypogynæ, 5 - 4-petalæ, regulares, poly-oligandræ; staminibus sæpissime 3 - 5-adelphis; petalis æstivatione convolutis rariusve imbricatis; ovario 2 - 5-carpellari uniloculari placentis pl. m. parietalibus, aut placentis inter se ad axim coalitis 2 - 5-loculari, stylis totidem pl. m. discretis; ovulis anatropis; capsula plerumque septicida et polysperma; seminibus exalbuminosis; cotyledonibus brevibus.

HYPERICA, Juss. Gen. p. 254.

HYPERICINEÆ, DC. Fl. Fr. Chois. Prodr. Mon. Hyper. & in DC. Prodr. 1. p. 541. Endl. Gen. p. 1031.

HYPERICACEÆ, Lindl. Introd. Nat. Syst. ed. 2. p. 77. Spach, Suit. Buff. 5. p. 335, & in Ann. Sci. Nat. ser. 2. 5. p. 157, 349.

THE ST. JOHN'S-WORT FAMILY is doubtless most nearly related to the tropical order called Guttiferae or Clusiaceae; but in an extra-tropical Flora it is most conveniently introduced between the Cistaceae and the small family of Elatinaceae.

Among our hypogynous polypetalous orders it is readily distinguished by the opposite and entire leaves, which are punctate (as also the sepals, petals, &c.) with pellucid dots and usually with dark-colored ones intermixed, and destitute of stipules; by the regular pentamerous (or in *Ascyrum* alone tetramerous) calyx and corolla; the prevailing polyandrous and 3 - 5-adelphous stamens; the separate or separable styles; the septiceidal capsule; and the indefinite and exalbuminous (oblong or cylindrical and straight or somewhat curved) anatropous seeds. The embryo is conformed to the cavity of the rather thick and fleshy inner integument of the seed, which sometimes has been mistaken for a thin albumen; it is oblong or cylindrical, with the obtuse radicle usually much longer than the thick or flattish cotyledons. The foliaceous or herbaceous calyx is persistent, and imbricated in æstivation. The petals are either deciduous or marcescent, and usually oblique and convolute in æstivation, but in *Elodea* they are equal-sided and quinque-angulately imbricated. The inflorescence is always cymose.

The pellucid dots of the leaves are glandular vesicles, filled with an ethereal oil, of which the coloring matter of the dark glands is probably a sort of resin or balsam. To this secretion, and to the free resinous juice, which especially abounds in tropical plants of the family, the acrid and balsamic qualities which pervade the order are owing. The yellow juice of some Equatorial American trees or shrubs of the order is strongly cathartic, and furnishes a product (*Gummi Gutta*) analogous to *gamboge*, which is a product of some Ceylonese trees of the allied family of *Guttiferæ*.

Hypericaceæ are widely diffused over the world, but are most abundant in the warmer temperate climes. Far the greater part belong to *Hypericum*, as received by Linnæus, Endlicher, and most botanists. Besides the typical genus, we have in the United States *Ascyrum*, characterized by its quaternary calyx and corolla; and *Elodea*, with equal-sided petals, and conspicuous hypogynous glands interposed between the three stamen-clusters.

## PLATE 91.

ASCYRUM, *L.*

Sepala 4, decussata; exteriora multo majora. Petala 4, æstivatione convoluta. Glandulæ inter stamina indefinita nullæ. Capsula unilocularis. — Flores flavi.

ASCYRUM, Linn. Gen. 903. Nutt. Gen. 2. p. 15. Chois. in DC. l. c. p. 55.

Torr. & Gray, Fl. N. Am. 1. p. 156, 671. Endl. Gen. 5463.

ASCYRUM (& ISOPHYLLUM ?), Spach, in Ann. Sci. Nat. l. c. p. 367.

**St. Peter's-wort.**

CALYX foliaceous; the 4 SEPALS imbricated two exterior and two interior in æstivation; the exterior usually rounded or cordate and much larger than the inner pair, spreading in flower, enlarging in fruit and valvate-connivent over the capsule, persistent. PETALS 4, hypogynous on the short receptacle, cruciate, widely spreading, obovate or linear-oblong, convolute in æstivation, somewhat oblique, deciduous. STAMENS indefinite, 9 to 100, hypogynous: FILAMENTS distinct or obscurely united at the very base, scarcely clustered, capillary, marcescent: ANTHERS round-oval, didymous, introrse, fixed by the middle, somewhat apiculate by the glandular point of the interposed connective; the cells opening longitudinally. OVARY ovoid, one-celled, 2-4-lobed, with two to four somewhat introflexed parietal placentæ: STYLES 2 to 4, united below or distinct, short or slender, persistent, stigmatose at the apex down the inner side. OVULES very numerous, horizontal, in several rows on the inner face of each placenta, anatropous.

CAPSULE ovoid, often somewhat compressed parallel to the larger sepals, one-celled, septicidally 2-4-valved, the sutures dividing the lamelliform parietal placentæ. SEEDS very numerous and small, horizontal on the inner face of each placenta, oval or oblong, straight; the crustaceous testa minutely reticulated; the inner integument thickish. AL-

BUMEN none. EMBRYO cylindrical: COTYLEDONS very short, at the extremity opposite the hilum.

SUFFRUTICOSE, with the branches or young stems ancipital, very leafy, and terminated with single large flowers or three together. Leaves all opposite, sessile, often partly clasping, oval, oblong, or obovate, entire, usually opaque and coriaceous, punctate with translucent and beneath with blackish dots. Pedicels bibracteolate. Petals yellow.

ETYMOLOGY. An old name of the St. John's-wort, composed of a privative, and *σκιπος*, *asperity*, from the smoothness of these plants.

GEOGRAPHICAL DISTRIBUTION, &c. A genus of several species, natives of the Atlantic and chiefly Southern United States, and of the West Indies. Two species extend northward in the warm Pine barrens near the coast, as far as New Jersey and Long Island. — Besides the genuine species, which have the outer pair of sepals ovate or cordate, many times larger than the narrow or minute and somewhat colored inner pair, and entirely inclosing them as well as the pod in fruit, there is a single species in Florida (*A. microsepalum*, *Torr. & Gr.*; the genus *Isophyllum*, *Spach*) with the small and narrow sepals not more unequal than in *Hypericum*, from which it differs only in the quaternary number of parts, and to which, rather than to *Ascyrum*, it should most probably be appended. Thus restricted, the present genus is well marked in habit and character.

PLATE 91. *ASCYRUM STANS*, *Michx.*; — a flowering branch (from New Jersey, *Kniefskern*), of the natural size.

1. Diagram of the flower, æstivation, &c.
2. Flower, the petals removed or fallen.
3. Outside; and 4, inside view of an anther, &c., magnified.
5. A tricarpellary pistil and the receptacle, magnified.
6. Transverse section of the same, showing the placentæ and ovules.
7. An ovule, more magnified.
8. Capsule in the fructiferous calyx, the anterior sepal turned down.
9. Capsule removed from the calyx, of the natural size.
10. A magnified seed.
11. Vertical section of the same and of the contained embryo.

## PLATE 92, 93.

**HYPERICUM, Tourn., L.**

Sepala 5. Petala 5, inæquilatera, æstivatione convoluta. Glandulæ inter stamina indefinita rariusve pauca nullæ. Capsula 1 – 5-locularis. — Flores flavi.

HYPERICUM, Lam. Ill t. 643. Gærtn. Fr. t. 62. Torr. & Gray, Fl. N. Am. 1. p. 157. Endl. Gen. 5464.

HYPERICUM, ASCYRUM, & ANDROSÆMUM, Tourn. Inst. &c.

HYPERICUM & SAROTHTA, Linn. Gen. 383, 902. excl. spec.

**St. John's-wort.**

CALYX herbaceous or foliaceous, persistent; the SEPALS 5, equal or somewhat unequal, imbricated in æstivation, two of them exterior (and often rather larger), and two interior, distinct, or united at the base. PETALS 5, hypogynous, alternate with the sepals, convolute in æstivation, usually oblique or unequal-sided, naked, deciduous or marcescent. STAMENS indefinite, very numerous, or sometimes few, hypogynous, commonly 3 – 5-adelphous at the base or more or less distinctly collected in as many clusters: FILAMENTS capillary, marcescent: ANTHERS globular, didymous, introrse; the cells opening longitudinally. HYPOGYNOUS GLANDS none. OVARY of 3 or 5 united carpels (which are opposite the sepals when of equal number), one-celled, with three or five strictly parietal or introflexed placentæ, or 3 – 5-celled by the junction and cohesion of the placentæ in the axis: STYLES 3 or 5, filiform, distinct, or united below, sometimes united to the apex, but separable in fruit, persistent: STIGMAS usually capitate. OVULES indefinite, in two or several series on each placenta, horizontal, anatropous.

CAPSULE like the ovary one-celled with projecting or strictly parietal placentæ, or 3 – 5-celled by the junction of the placentæ in the axis, septicidally 3 – 5-valved; the placentæ adhering to the inflexed edges of the valves, or often

separating from them. SEEDS very numerous, anatropous, oblong or cylindrical, straight or sometimes incurved; the testa usually conformed to the nucleus and crustaceous, or bearing a wing-like raphe; the inner integument thickish and fleshy. ALBUMEN none. EMBRYO oblong or cylindrical; the COTYLEDONS short, at the extremity opposite the hilum.

HERBS or SHRUBS; with opposite and entire leaves, punctate with pellucid and usually also with dark-colored dots; and commonly showy yellow flowers, which are terminal and solitary or in cymes.

ETYMOLOGY. 'Υπέρικον, an ancient name, of uncertain derivation.

GEOGRAPHICAL DISTRIBUTION, &c. This large and polymorphous genus is widely distributed over the world, but far most copiously in the eastern part of the warmer temperate regions of the northern hemisphere, both in the New and in the Old World. It is doubtless to be divided hereafter, but not to be dismembered to the extent proposed by Spach.

PROPERTIES. The herbage is acrid, especially in the herbaceous species, as in the *Common St. John's-wort*, which has been variously used in popular medicine. Many species are also balsamic.

PLATE 92. *HYPERICUM GRAVEOLENS*, *Buckley*; — summit of a flowering plant, cultivated in the Cambridge Botanic Garden, from the mountains of North Carolina; of the natural size.

1. Diagram of the flower, æstivation, &c.
2. One of the three sets of stamens (united at the base), enlarged.
3. Inside, and 4, outside view of a more magnified stamen.
5. Pistil, magnified; and 6, transverse section of the ovary.
7. An ovule, more magnified.
8. Enlarged capsule, divided transversely, with the calyx.
9. Magnified seed; and 10, vertical section of the same and of the embryo.

PLATE 93. *HYPERICUM (BRATHYS) SAROTHTRA*, *Michx.*; — natural size.

1. Diagram of the flower. (Stamens 8, in three sets.)
2. Enlarged flower; and 3, the two stamens of the third set, magnified.
4. Pistil, magnified.
5. Enlarged capsule, transversely divided, showing the truly parietal seeds.
6. A magnified seed; and 7, section of the same and of the embryo.
8. Capsule (5-celled) of *HYPERICUM (ROSCYNA) SPACHII* *Pyramidatum*, *Ait.*; — in dehiscence, divided transversely and enlarged.
9. A magnified seed; and 10, the same and the embryo vertically divided.

## PLATE 94.

ELODEA, *Adans.*

Sepala 5. Petala 5, æquilatera, inappendiculata, æstivatione imbricata, decidua. Glandulæ squamiformes 3, phalangibus staminum sæpissime 3-andris alternæ. Capsula 3-ocularis. — Flores rubelli.

ELODEA, *Adans. Fam.* 2. p. 443. *Pursh, Fl.* 2. p. 479. *Nutt. Gen.* 2. p. 17. *Spach, in Ann. Sci. Nat.* l. c. *Torr. & Gray, Fl. N. Am.* 1. p. 167. *Endl. Gen.* 5465. (excl. § b. c.)

HYPERICI Sp., *Linn., Michx.*

HYPERICI Sect. ELODEA, *Chois. Prodr. Mon. Hyp.* p. 43, & in *DC.* l. c.

TRIADENIUM, *Raf. in Med. Repos. hex.* 6. 2. p. 350.

MARTIA, *Spreng. Syst.* 3. p. 333.

## Marsh St. John's-wort.

CALYX persistent, of 5 nearly equal nervose-striate SEPALS, erect, chartaceo-herbaceous, quincuncially imbricated in æstivation, persistent. PETALS 5, hypogynous, ovate or spatulate, equal-sided, not appendiculate, imbricated in æstivation (two exterior and two interior), spreading in anthesis, otherwise erect, deciduous. STAMENS 9 (rarely 12 or 15), triadelphous, not longer than the calyx, hypogynous; the phalanges placed opposite the dissepiments, one before each exterior petal, and the third between the third and fifth petals: FILAMENTS united for one third or half their length, then linear-filiform, persistent: ANTHERS globular, didymous, introrse, apiculate with the glandular apex of the connective, the cells opening longitudinally. HYPOGYNOUS GLANDS 3, conspicuous, interposed between the phalanges of the stamens, ovate, fleshy and nectariferous (orange-colored). OVARY ovoid-oblong, three-celled by the junction of the thick placentæ in the axis: STYLES 3, subulate, stigmatose down the inner side. OVULES numerous, in three or more series on each placenta, horizontal, anatropous.

CAPSULE oblong, chartaceous, three-celled, many-seeded,

septicidally three-valved. SEEDS very numerous, horizontal, oblong; the crustaceous testa minutely striate and scrobiculate; the inner integument fleshy. ALBUMEN none. EMBRYO conformed to the seed, cylindrical: COTYLEDONS at the apex remote from the hilum, much shorter than the RADICLE.

HERBS very smooth and pale green, with perennial roots, terete and branching stems, and decussately opposite oval or oblong entire leaves, which are sessile by a broad and somewhat clasping base, or else narrowed into a short petiole, punctate with translucent and larger dark-colored dots. Flowers small, cymulose; the contracted cymes axillary and terminal, much shorter than the leaves: petals flesh-colored, or somewhat orange-colored in fading. Capsules much larger than the calyx, the pericarp filled with resiniferous lines.

ETYMOLOGY. Name from *ελώδης*, *growing in marshes*, from the station these plants inhabit.

GEOGRAPHICAL DISTRIBUTION, &c. A well-marked genus of two species, natives of Eastern North America from Canada to Florida and Texas.

PLATE 91. *ELODEA VIRGINICA*, *Nutt.*; — summit of a flowering plant, of the natural size. (Cambridge, Massachusetts.)

1. Diagram of the flower, æstivation, &c.
2. Open flower, enlarged.
3. One of the three phalanges of the stamens, magnified; inside view.
4. Anther, &c., more magnified, outside view; and 5, inside view.
6. Pistil and receptacle, magnified.
7. An ovule, highly magnified.
8. A capsule, with the persistent calyx and filaments at the base, enlarged.
9. A magnified seed.
10. Vertical section of the same and of the contained embryo.

## ORD. ELATINACEÆ.

Herbæ paludosæ annuæ, foliis oppositis seu verticillatis, stipulis interpetiolaribus, floribus axillaribus: dicotyledoneæ, hypogyneæ, regulares, symmetricæ, 2 – 5-meræ; nempe, sepalis, petalis, staminibus, stylis loculisque ovarii 2, 3, 4, v. 5, aut staminibus numero duplis; æstivatione imbricativa; ovulis anatropis; placentis in columnam centradem connatis; capsula septifrage vel septicida 2–5-valvi polysperma; seminibus exalbuminosis; cotyledonibus brevibus.

ELATINÆ, Camb. in Mem. Mus. 18. p. 225, & in St. Hil. Fl. Bras. 2. p. 160. Arn. in Edinb. Jour. Nat. Sci. 1. p. 430. Fisch. & Meyer, in Linnæa, 10. p. 69. Endl. Gen. p. 1036. Fenzl, in Regensb. Denkschr. 3. p. 179.

ELATINACEÆ, Lindl. Introd. Nat. Syst. ed. 2. p. 88, & Veg. Kingd. p. 480.

THE WATER-WORT FAMILY consists of about twenty known species of annual herbs, usually of small size, growing in water or wet and muddy places. Much the greater number are natives of the Old World, in the northern hemisphere; the Elatines chiefly in the temperate, and the Bergias in the tropical regions. Of the three known American representatives, two fall within the limits of the present work; while the third is Brazilian. They are bland plants, destitute of any marked sensible qualities, as far as is known; although the popular name of *Water Pepper* in Europe, and the Tamul name meaning *Water-fire*, which, according to Dr. Wight, is applied to an Indian species, would seem to indicate no small degree of acridity.

Until their separation as a distinct family by Cambessedes, these plants had been appended to Caryophyllaceæ, on account of a general resemblance to Chickweeds; from which their exalbuminous and anatropous seeds (much more than their capitate stigmas) abundantly distinguish them. Bartling joined them to Lythraceæ, which some of them resemble in aspect, but from which they differ widely in their stipulate leaves, discrete styles or stigmas, and especially in the hypogynous insertion of the petals and stamens. Lindley refers the family to his Rutal alliance, chiefly on considerations derived from one or two plants which are doubtless with justice excluded from the order. But the nearest affinity of Elatinaceæ is evidently on one hand with Hypericaceæ; from which they are principally distinguished by their

stipules, the absence of pellucid dots in the leaves, and by the perfect symmetry of the distinct stamens; and on the other with Crassulaceæ, through *Diamorpha*, as has already been suggested by the acute Fenzl.

The two Linnæan genera rested on the number of stamens and styles; *Elatine* being octandrous and tetragynous, and *Bergia*, decandrous and pentagynous. But it afterwards appeared that the parts of the flower were occasionally ternary, and the stamens sometimes of the same number as the petals only, namely 3, 4, or 5: and in 1817, Nuttall introduced a third genus, *Crypta*, with a dimerous and diandrous, or rarely trimerous and triandrous flower, and few seeds. This genus, as well as *Bergia*, Fischer and Meyer soon afterwards referred to *Elatine*. In 1829, Cambessedes founded on a Brazilian plant a fourth genus, *Merimea*; which he distinguished from *Bergia* by its smooth (instead of ribbed) seeds, and strictly septicial dehiscence, the dissepiments coming away attached to the valves; while in *Bergia* he supposed them to remain adherent to the axis as in *Elatine*; — leaving the pentamerous instead of 3-4-merous flowers to distinguish *Bergia* from *Elatine*. The next year, Mr. Arnott, or at least in 1834, in conjunction with Dr. Wight, also referred all the plants of the family (except apparently *Lancretia* of Delile) to *Elatine*; at the same time erroneously characterizing the dehiscence as loculicidal. Endlicher retained the genera *Elatine*, *Bergia*, and *Merimea* as left by Cambessedes, distinguishing *Bergia* by the valves of the capsule being introflexed but separating from the persistent dissepiments; and appending *Lancretia* to *Hypericinea*. In 1840, Hooker (in *Icones Plantarum*) figured a Texan pentamerous species, with just the habit of the Indian *Bergias*, under the name of *Merimea* (or *Bergia*?) *Texana*; which, not having ascertained its dehiscence, he referred to *Merimea* chiefly because of its being a native of the New World. The dehiscence of this species having been ascertained to be septifragal, as in *Elatine* proper, it was referred to that genus in the Supplement to the *Flora of North America*, Vol. I. More recently, Fenzl has successfully reduced the whole to the two Linnæan genera; *Elatine* comprising all those with septifragal dehiscence, and *Bergia* (including *Lancretia* and *Merimea*) those with septicial dehiscence; giving to the former, however, the original Linnæan species of *Bergia*. But Seubert has since observed that this species is septicial, and has restored it to *Bergia*; wrongly taking with it, however, our *E. Texana*, the dehiscence of which, he says, is not clearly described, although, in the work referred to, it is explicitly said to be *septifragal*.

As this last plant is now the only pentamerous *Elatine*, and presents just the aspect of *Bergia*, I have allowed it to form a distinct section. It should be remarked that the specimens gathered by Lindheimer are decandrous!

Finally, as it appears that our *Crypta* differs from its allies by the evanescent partitions of the delicate pod (if we mistake not), and the basilar placentæ, as well as by the few seeds and prevailingly dimerous flowers, I have separated it from the gerontogeous species, as a subgenus merely; proposing, however, its entire reëstablishment, in case of its corroboration through the New Zealand *E. gratioloides* of Cunningham, — a trimerous species of similar habit, which is described as having a unilocular capsule.

## PLATE 95, 96.

ELATINE, *L.*

Capsula septifraga; dissepimentis columnæ adnatis persistentibus, aut raro evanidis.

ELATINE, Linn. Gen. 502. Gærth. Fr. t. 102. Juss. Gen. p. 300.

Schkuhr, Handb. t. 109. Camb. in Mem. Mus. l. c. Fenzl, l. c.

Seubert, in Nov. Act. Acad. Nat. Cur. 21. p. 38. t. 2-5.

ALSINASTRUM, Vaill. Bot. Par. p. 5. t. 1. f. 6.

Subgen. *CRYPTA*. — Flores dimeri, rarius trimeri. Dissepimentum evanescens. Placentæ basilares, oligospermæ. — Folia opposita, integerrima.

*CRYPTA*, Nutt. in Jour. Acad. Philad. 1. p. 117. t. 6.

Subgen. *BERGELLA*. — Flores pentameri (5-10-andri). Dissepimenta persistentia. Placentæ centrales. — Folia opposita, serrulata.

**Water-wort.**

CALYX herbaceous, of 2 to 5 SEPALS, which are distinct or united barely at the base, imbricated in æstivation, persistent. PETALS as many as the sepals and alternate with them, hypogynous, imbricated in æstivation, persistent or marcescent. STAMENS hypogynous, as many as the petals and alternate with them, or more commonly of twice their number and both alternate with and opposite them: FILAMENTS subulate, persistent: ANTHERS globular or cordate, introrse; the cells opening longitudinally. OVARY globular, sessile, usually 3-4-celled, rarely (in *Bergella*) five-celled, the cells alternate with the petals; or in *Crypta* mostly two-celled, the cells opposite the petals (anterior and posterior): the placentæ in the axis, central, or in *Crypta* basilar: STYLES as many as the cells, short or almost wanting, persistent: STIGMAS dilated. OVULES anatropous, indefinite, covering the thick placentæ, in *Crypta* rather few and all ascending.

CAPSULE globular, membranaceous or chartaceous, 3-4-celled, or in *Bergella* five-celled, septifragally dehiscent by as many valves opposed to the sepals, their margins separating from the persistent dissepiments, which remain attached to the central axis, interposed between the projecting many-seeded placentæ; or in *Crypta* the membranous capsule bursts irregularly? and the delicate dissepiments disappear after or before the capsule opens, leaving a basilar placenta bearing 6 to 12 erect seeds. SEEDS anatropous, oblong or cylindrical, straight or incurved; the crustaceous testa longitudinally ribbed and transversely rugose or reticulated: inner integument thin. ALBUMEN none. EMBRYO conformed to the seed: COTYLEDONS semiterete, obtuse, shorter than the cylindraceous RADICLE which points to the hilum.

HERBS, usually small aquatic annuals, with opposite, or in § *Potamopithys* verticillate, sessile or short-petioled and entire or toothed leaves, with interposed stipules, and small (solitary or rarely cymulose-fascicled) axillary flowers. Stipules distinct or more or less united in pairs, entire or toothed.

ETYMOLOGY. Ἐλατίμη, an ancient name, from Ἐλάτρη, a fir-tree, in allusion to the appearance of the verticillate-leaved species.

PLATE 95. ELATINE (*CRYPTA*) AMERICANA, *Arn.* New Haven, Connecticut.

1. Flowering branch, magnified.
2. Diagram of a dimerous flower. (Carpels, &c., anterior and posterior.)
3. A flower, more magnified.
4. A magnified stamen, outside, and 5, an inside view.
6. Pistil, magnified; and 7, vertical section, showing the basilar placentæ.
8. An ovule, more magnified.
9. A seed, magnified; and 10, a vertical section of it through the embryo.

PLATE 96. E. (*BERGELLA*) TEXANA, *Torr. & Gr.*;—Texas, *Lindheimer.*

1. Diagram of the flower, æstivation, &c.
2. Two flowers, with the axis, base of the leaves, and stipules, magnified.
3. A sepal; 4, a petal; and 5, a stamen, more magnified.
6. Ovary, magnified; and 7, vertical section through the placentæ.
8. Dehiscent capsule, with the persistent sepals and petals, enlarged.
9. Transverse section, showing the septifragal dehiscence, &c.
10. A magnified seed.
11. Vertical section of the same, through the contained embryo.

## ORD. PORTULACACEÆ.

Herbæ (v. frutescentes) succulentæ, insipidæ, exstipulatæ, foliis integerrimis: dicotyledoneæ, anisomeræ, regulares, hypogynæ vel perigynæ; calyce sæpius dipetalo, corolla 3-6-petala seu nulla; æstivatione imbricativo; staminibus petalis numero æqualibus et antepositis aut indefinitis; ovulis amphitropis e placenta centrali; embryone peripherico annulari vel hippocrepiformi albumen farinaceum cingente.

PORTULACEÆ, Juss. Gen. p. 313. (excl. gen.) DC. Prodr. 3. p. 351.  
Fenzl, in Ann. Wien. Mus. & in Endl. Gen. p. 946 (ex parte).  
Lindl. Veg. Kingd. p. 500.

PORTULACACEÆ, Lindl. Introd. Nat. Syst. ed. 2. p. 123. Torr. & Gray,  
Fl. N. Am. 1. p. 195.

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THE PURSLANE FAMILY consists of succulent plants, with a watery or mucilaginous juice, entirely destitute of any active or harmful properties, usually bearing ephemeral, and often showy flowers. The order is most allied to the Mesembryanthemaceæ on one hand, and to Caryophyllaceæ on the other. Its limits are by no means well settled; but the genuine Portulacæaceous plants are recognized by a calyx of two sepals, while the corolla is composed of three to six, usually 5 petals, which have the stamens opposite them or attached to their base, except when the latter are more numerous or indefinite; and by the commonly one-celled capsule with a free central placenta from the base, with reniform or lenticular seeds having the slender embryo coiled around the outside of farinaceous albumen, as in Caryophyllaceæ, &c. *Sesuvium* and its allies, however, have a regular 5-parted calyx and are apetalous.

Portulacaceæ are chiefly indigenous to the tropical and warmer temperate regions, and grow in sunny and parched situations, as do other succulents. This is not the case, however, with *Claytonia* and *Montia*, which are scarcely fleshy, and inhabit rich and damp woods or wet places, and extend north even to the arctic zone.

Several plants of the order besides the well-known Purslane are employed as potherbs. The tuberous root of a *Claytonia* is eaten in Siberia; and the farinaceous roots of *Lewisia* furnish the Indians of Oregon with an important article of food.

## CONSPECTUS OF THE UNITED STATES GENERA.

\* Sepals 2. Petals usually 5. (True Portulacacæ.)

CLAYTONIA. (Plate 97.) Calyx persistent. Stamens 5, adherent to the base of the hypogynous petals (which are not ephemeral). Capsule 3-valved, 3-6-seeded.

TALINUM. (Plate 98.) Calyx deciduous. Petals 5, hypogynous, ephemeral. Stamens 10-30. Capsule 3-valved, many-seeded.

PORTULACA. (Plate 99.) Calyx 2-cleft, the tube coherent with the ovary. Petals 4-6, perigynous, ephemeral. Stamens 8-20. Capsule circumscissile at the middle, the upper portion deciduous with the limb of the calyx, one-celled, many-seeded.

\* \* Sepals 5. Corolla wanting.

SESUVIUM. (Plate 100.) Calyx 5-parted, free. Stamens 5-20, inserted in the throat of the calyx. Capsule circumscissile, 3-5-celled, many-seeded. Styles distinct.

## PLATE 97.

## CLAYTONIA, L.

Calyx 2-sepalus, liber, persistens. Petala 5, hypogyna, haud ephemera. Stamina 5, unguibus petalorum inserta. Stylus apice trifidus. Capsula unilocularis, 3-valvis, basi 3-6-sperma. — Herbæ sæpius diphyllæ, inflorescentia racemiformi, floribus albis vel roseis.

CLAYTONIA, Linn. Gen. 2:7. Lam. Ill. t. 144. Gærtn. Fr. t. 129. Pursh, Fl. 1. p. 175. t. 3. DC. Pl. Gras. t. 131, & Prodr. 3. p. 360. Hook. Fl. Bor.-Am. 1. p. 224. t. 71-74. Torr. & Gray, Fl. N. Am. 1. p. 198. Endl. Gen. 5180.

LIMNIA, Linn. in Act. Ups. 1746. p. 130. t. 5.

**Spring Beauty.**

CALYX herbaceous, of two ovate sepals, imbricated in æstivation (both margins of one exterior), persistent. PETALS 5, hypogynous, equal, quincuncially imbricated in æstivation, distinct, or somewhat united by the short claws or contracted base, spreading, expanding for more than one day, at length gelatinous-colliquescent. STAMENS 5, equal, one before each petal; the filiform or subulate FILAMENT inserted on its base: ANTHERS oval or oblong, fixed by the middle, introrse; the cells opening longitudinally. OVARY ovoid, one-celled: STYLE slender, three-cleft; the slender divisions stigmatose down the inner side. OVULES 3 to 6, on short free funiculi which rise from the base of the cell, campylotropous.

CAPSULE ovoid, membranaceous, one-celled, three-valved (loculicidally) 3-6-seeded from the base. SEEDS erect, lenticular, with a shining crustaceous testa, not strophiolate at the hilum. EMBRYO incompletely annular or curved into the form of a horseshoe around the outside of the farinaceous albumen: RADICLE inferior, much longer than the semiterete COTYLEDONS.

HERBS, usually of humble size, very smooth, slightly succulent, either annual with fibrous roots, or perennial from a caudex or globular tuber; the leaves plane and entire; the radical ones long-petioled; the cauline rarely alternate, or in several pairs, usually a single pair, either distinct or connate. Inflorescence racemiform and usually secund (but the bracts, if any, not subtending the pedicels), or rarely manifestly cymulose: the petals rose-color or white.

ETYMOLOGY. Dedicated to *John Clayton*, of Virginia, one of the earliest botanists of this country, and who furnished to Gronovius the materials of the *Flora Virginica*.

GEOGRAPHICAL DISTRIBUTION, &c. A North American and Siberian genus of about twenty known species, of which two, belonging to CLAYTONIA proper, are natives of the United States and Canada, and are among the prettiest of our vernal flowers. The greater number, and especially the annual species, are indigenous to Oregon and North California.

PLATE 97. CLAYTONIA VIRGINICA, *Linn.*; — plant of the natural size.  
(Botanic Garden, Cambridge; from New York.)

1. Diagram of the flower, æstivation, &c.
2. A petal with the stamen attached, enlarged.
3. Outside, and 4, inside view of a stamen, more magnified.
5. Pistil, enlarged.
6. The ovary, vertically divided, showing the insertion of the ovules.
7. An ovule, more magnified.
8. Dehiscent capsule, with the seeds, and the persistent calyx, enlarged.
9. A seed, more magnified.
10. Vertical section of the same, showing the embryo curved almost round the albumen.

## PLATE 98.

TALINUM, *Adans.*

Calyx 2-sepalus, liber, deciduus. Petala 5, hypogyna, ephemera. Stamina 10–30, hypogyna. Stylus apice trilobus. Capsula unilocularis, 3-valvis, polysperma. — Flores sæpius cymosi.

TALINUM, *Adans. Fam. 2. p. 145. excl. spec. Gärtn. Fr. t. 219. Sims. Bot. Mag. t. 1357. Haworth, Syn. Succ. p. 123. DC. Prodr. 3. p. 356. Fenzl, in Ann. Wein. Mus. 2. p. 296. Torr. & Gray, Fl. N. Am. 1. p. 196. Endl. Gen. 5178.*

PHEMERANTHUS, *Raf. Specch. 1. p. 86.*

CALYX herbaceous, of two ovate sepals, imbricated in æstivation, deciduous. PETALS 5, hypogynous, quincuncially imbricated in æstivation, expanding in sunshine for a single day, deciduous soon after. STAMENS 10 to 30, hypogynous, or slightly adnate to the base of the petals: FILAMENTS filiform: ANTHERS introrse, fixed by the middle; the cells opening longitudinally. OVARY globular, slightly three-grooved, one-celled, or three-celled below, the thin dissepiments soon disappearing: STYLE columnar or filiform, three-lobed, the whole inner surface of the lobes stigmatose. OVULES indefinite, on slender funiculi, inserted all over the central and usually stipitate placenta, amphitropous or campylotropous.

CAPSULE chartaceous, smooth, globular, one-celled, loculicidally three-valved (the valves in *T. teretifolium* usually separating or separable from a capillary replum), many-seeded. SEEDS covering the free central placenta, lenticular or reniform, strophiolate at the hilum; the crustaceous testa smooth and shining. EMBRYO incompletely annular around the outside of the farinaceous albumen.

HERBS or suffruticose fleshy plants, very smooth, with alternate or somewhat opposite entire leaves, and cymose fugacious flowers, expanding in the morning sunshine.

ETYMOLOGY obscure : probably an unmeaning name.

GEOGRAPHICAL DISTRIBUTION. A tropical and subtropical genus ; with the exception of *T. teretifolium*, which extends northward to Pennsylvania, and a nearly allied species in Arkansas.

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PLATE 98. *TALINUM* (*PHEMERANTHUS*, *Raf.*) *TERETIFOLIUM*, *Pursh* ; — plant of the natural size, cultivated in the Cambridge Botanic Garden, from Westchester, Pennsylvania, *Darlington*.

1. Diagram of the æstivation, &c., with a transverse section of the ovary near the base, showing the incomplete dissepiments.
2. Vertical section of the ovary and receptacle, &c., magnified.
3. Pistil and receptacle entire, equally magnified.
4. A stamen, magnified, inside view.
5. Same, seen from the outside.
6. An ovule, more magnified.
7. A capsule, enlarged ; the valves just separating.
8. The same, more dehiscent, showing the seeds packed on the placenta.
9. A magnified seed.
10. The same, vertically divided, showing the coiled embryo.

## PLATE 99.

PORTULACA, *Tourn.*

Calyx tubo cum ovario inferne comato, limbo 2-partito circumscisse deciduo. Petala 4-6, cum staminibus 8-20 summo calycis tubo inserta, fugacissima. Stylus 3-8-partitus. Capsula unilocularis, polysperma, circumscisse delhiscentis.

PORTULACA, *Tourn.* Inst. p. 236. t. 118. *Adans.* Fam. 2. p. 242. *Juss.* Gen. p. 312. *Gærtn.* Fr. t. 128. *DC.* Pl. Gras. t. 123, & Prodr. 3. p. 353. *Endl.* Gen. 5174.

**Purslane.**

CALYX two-cleft or two-parted; the tube coherent with the lower part of the ovary; the divisions herbaceous, imbricated in æstivation, circumscissile round their base and deciduous. PETALS 4 to 6, distinct, or a little united at the base, inserted on the summit of the tube of the calyx just where it becomes free from the ovary, equal or unequal, imbricated in æstivation, expanding only once, then colliquescent. STAMENS 8 or numerous, inserted at the base of the petals: FILAMENTS subulate or filiform: ANTHERS introse, didymous, the oval cells opening longitudinally. OVARY ovoid, one-celled, with a free basilar placenta: STYLES 3 to 8, united at the base, stigmatose down the inner side. OVULES indefinite, erect on capillary and free or branching funiculi from the basilar placenta, amphitropous.

CAPSULE (PYXIS) membranaceous, one-celled, ovoid or globular, circumscissile near the middle at the point where the calyx ceases to be adherent, the upper part falling off as a lid. SEEDS numerous, campylotropous, reniform-annular; the crustaceous and shining testa often granulated. EMBRYO completely or incompletely annular around the outside of the farinaceous albumen: RADICLE inferior: COTYLEDONS semiterete, incumbent.

HERBS low and succulent; with alternate or irregularly opposite entire leaves, which are either terete or plane, and often furnished with tufts of bristles in their axils; the uppermost usually involucrate around the solitary or clustered (sessile or pedicellate) flowers. Petals yellow, purple, or rose-color, delicate, expanding in direct sunshine during the forenoon, soon closing, and before evening colliquescent.

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ETYMOLOGY, GEOGRAPHICAL DISTRIBUTION, &c. The old Latin name, of uncertain meaning, for the *Common Purslane*, which has been used from all antiquity as a potherb, and in salads. All are natives of the tropics and of the southern border of the northern temperate zone; but the common Purslane has from early times been naturalized around gardens almost everywhere. Several showy species have recently become common in cultivation. *P. pilosa* is indigenous on our Southern frontiers; and *P. oleracea* itself is said to be truly wild in Arkansas and Texas.

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PLATE 99. *PORTULACA OLERACEA*, *Linn.*; — a branch in flower, of the natural size.

1. Diagram of the flower, æstivation, &c.
2. Magnified stamen, outside view.
3. Inside view of the same.
4. Vertical section through the ovary and adherent calyx, &c., magnified.
5. An ovule, more magnified.
6. A capsule (pyxis), enlarged.
7. Same, with the lid detached, showing the seeds.
8. A seed, more magnified.
9. Vertical section of the same through the embryo.

## PLATE 100.

SESUVIUM, *L.*

Calyx 5-partitus, liber, persistens. Petala nulla. Stamina perigyna, 10 – 15 vel indefinita, rarius 5 sinibus calycis inserta. Styli 3 – 5. Capsula 3 – 5-ocularis, polysperma, circumscisse dehiscens. — Herbæ prostratæ littorales, foliis oppositis succulentis.

SESUVIUM, Linn. Gen. 624. Jacq. Stirp. Amer. t. 95. Lam. Ill. t. 434.  
DC. Pl. Gras. t. 9, & Prodr. 3. p. 453. Wight & Arn. Prodr.  
Fl. Ind. Or. I. p. 361. Endl. Gen. 5170.

CALYX deeply five-cleft or five-parted, free, persistent; the SEPALs quincuncially imbricated in æstivation, herbaceous, colored (purplish) inside, sometimes mucronate or cornute below the tip. PETALS wanting. STAMENS inserted on the short tube of the calyx, rarely 5 and alternate with the sepals, oftener 10 to 15, or indefinite: FILAMENTS filiform: ANTHERS globular, didymous, introrse, the cells opening longitudinally. OVARY free from the calyx, 3 – 5-celled, with the placentæ in the axis: STYLES 3 to 5, distinct, stigmatose for the whole length of the inner side. OVULES numerous in each cell, ascending on filiform funiculi arising from the axile placenta.

CAPSULE (PYXIS) ellipsoid or oblong, membranaceous, 3 – 5-celled, many-seeded, circumscissile as in *Portulaca* at or below the middle, the upper part falling off as a lid. SEEDS reniform or globular, campylotropous, smooth. EMBRYO curved around the outside of the farinaceous albumen, annular or nearly so.

HERBS prostrate, succulent and maritime; with opposite and entire fleshy leaves, and terminal or axillary and sessile or short-peduncled flowers.

ETYMOLOGY. An unexplained name.

GEOGRAPHICAL DISTRIBUTION, &c. A genus evidently allied to *Portulaca*, notwithstanding the 5-sepalous calyx, &c., composed of a few species of strictly maritime plants, which are principally tropical; but two or more species inhabit the coast of the Southern States, and even extend northward, it is said, as far as New Jersey. The species figured is remarkable for having the minimum number of stamens.

PLATE 100. *SESUVIUM PENTANDRUM*, *Ell.*; — New Orleans, *Drummond*.

1. Diagram of the flower.
2. Calyx, with the stamens, detached and laid open; magnified.
3. A magnified stamen, inside view.
4. Pistil, magnified.
5. Vertical section through the ovary and calyx, &c.
6. Capsule (pyxis) magnified, the persistent calyx spread open, the lid raised up, showing the seeds.
7. A seed, more magnified.
8. Section of the same, showing the embryo curved around the albumen.







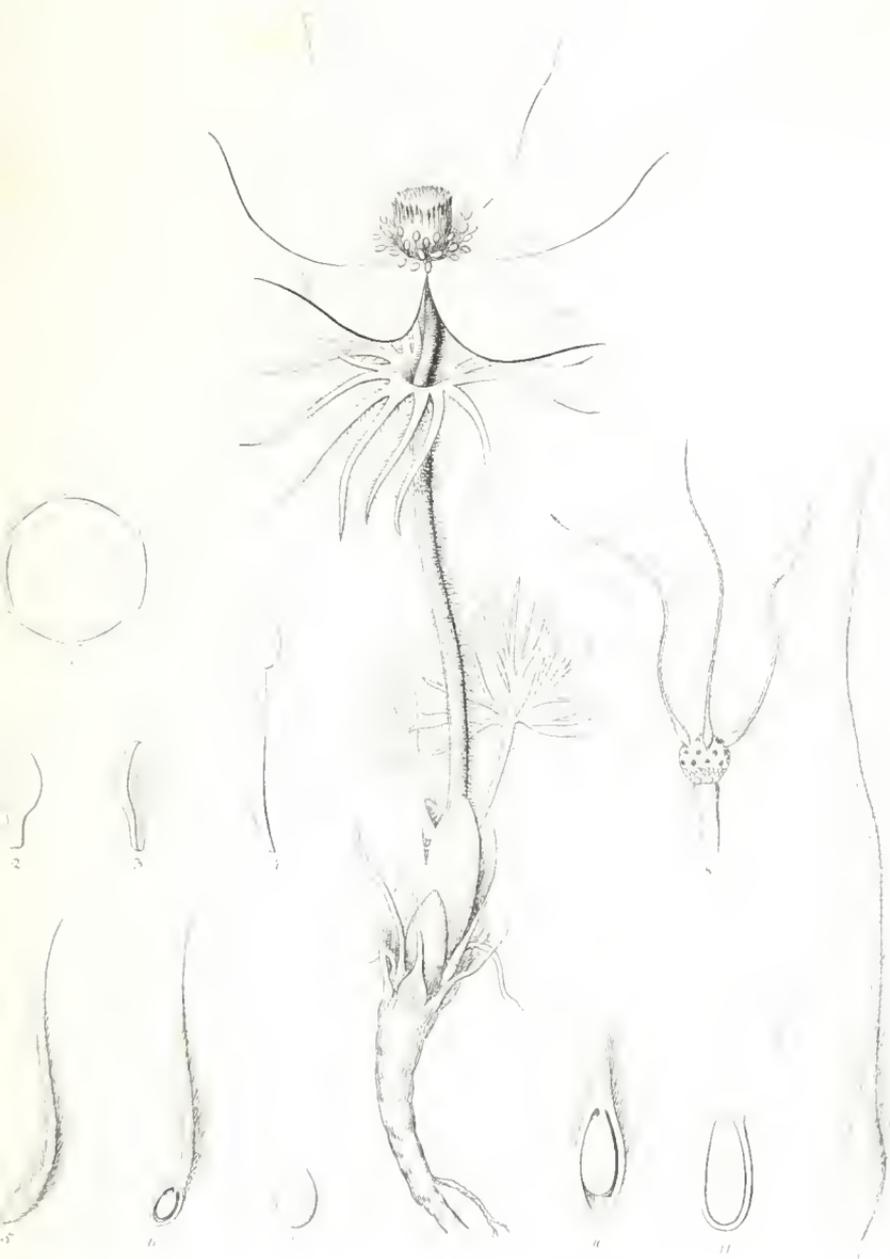




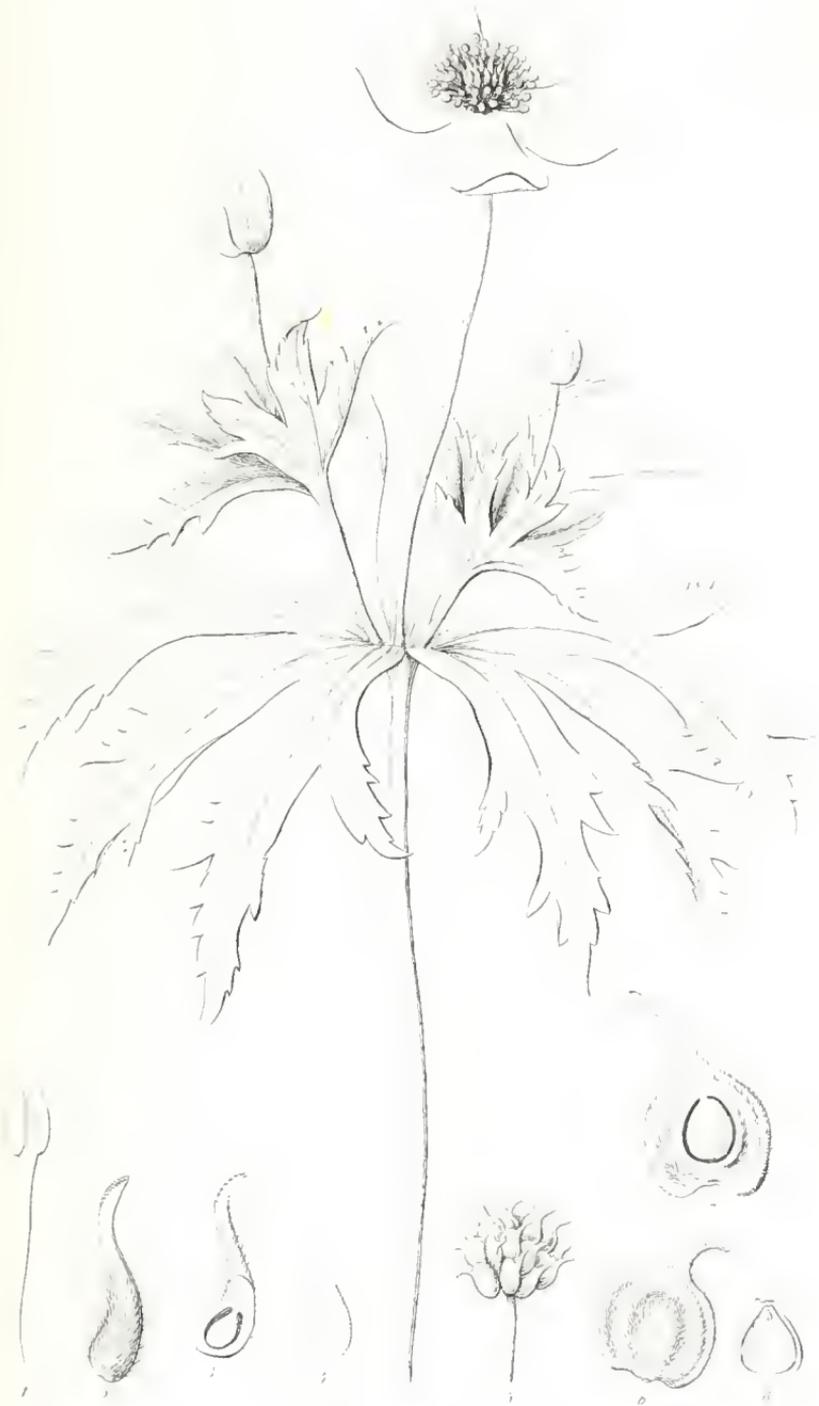


CLEMATIS









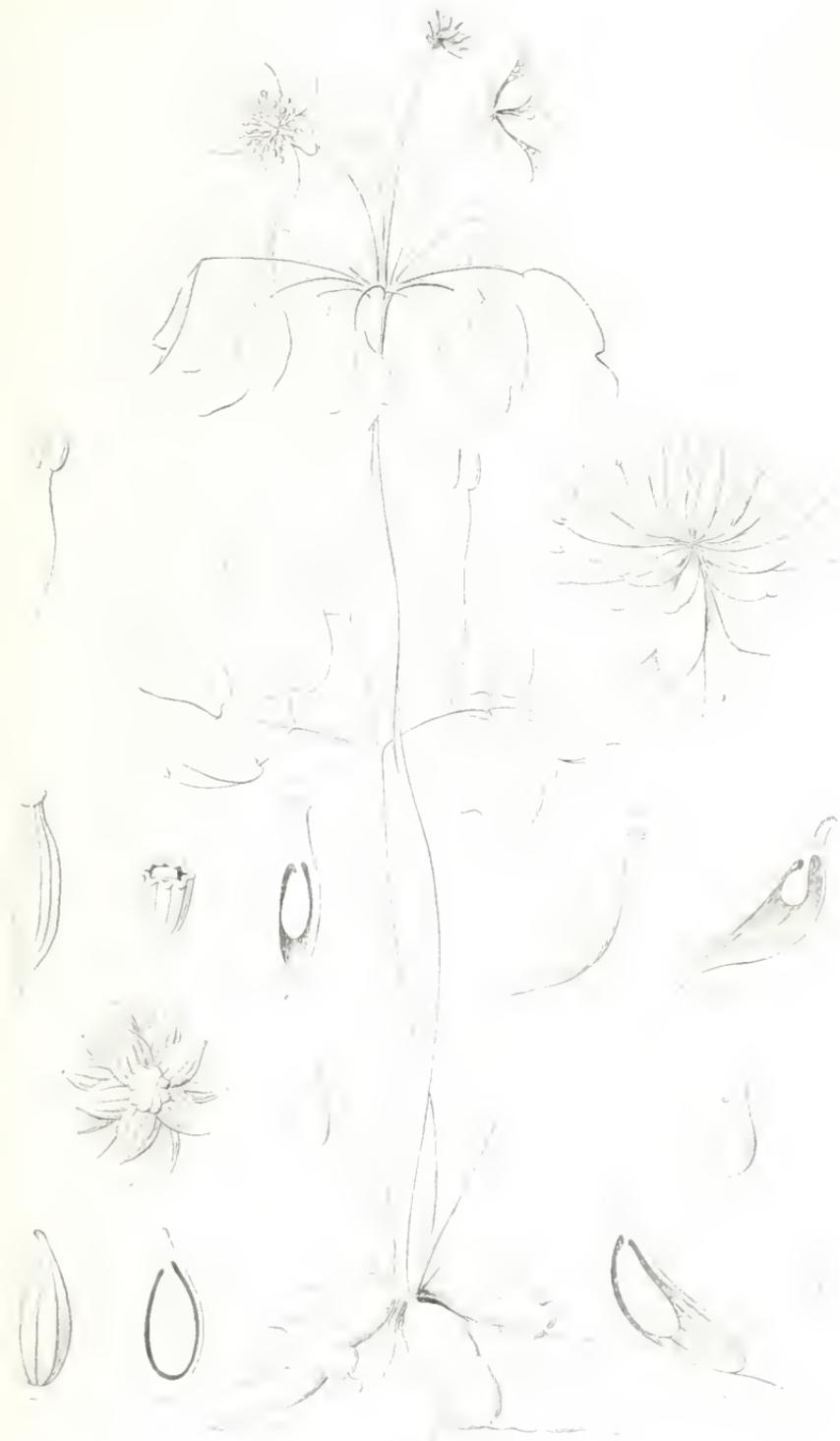
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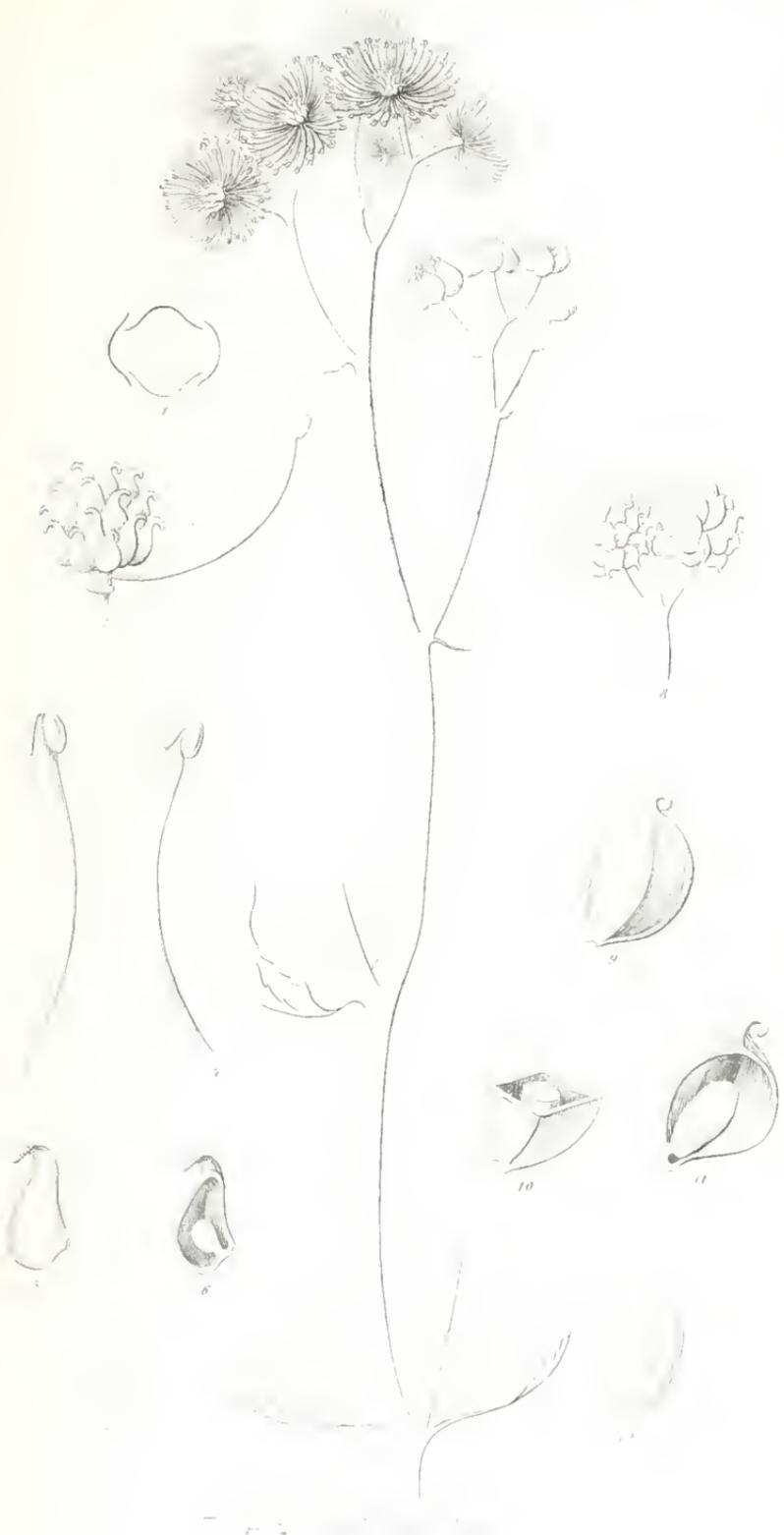


HEPATI L.

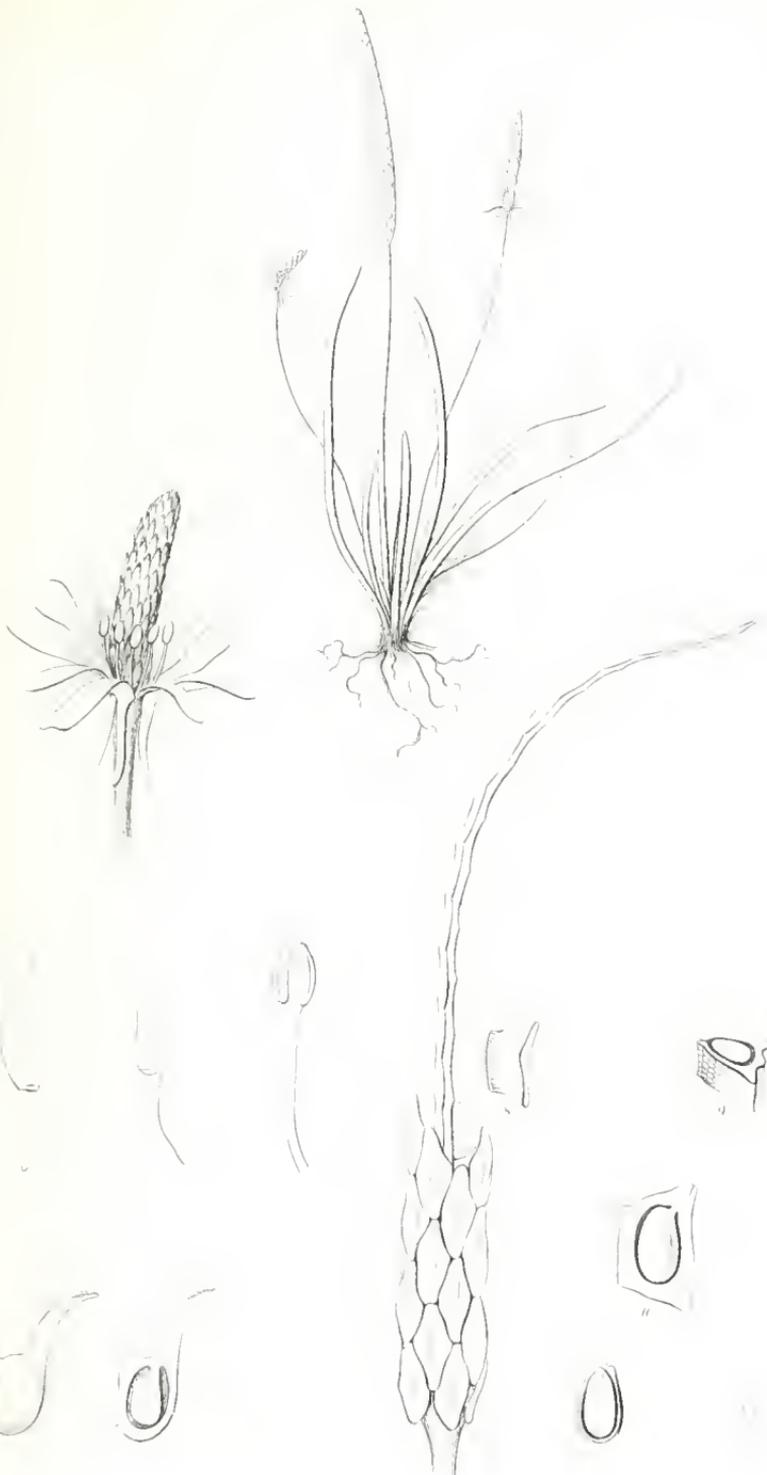




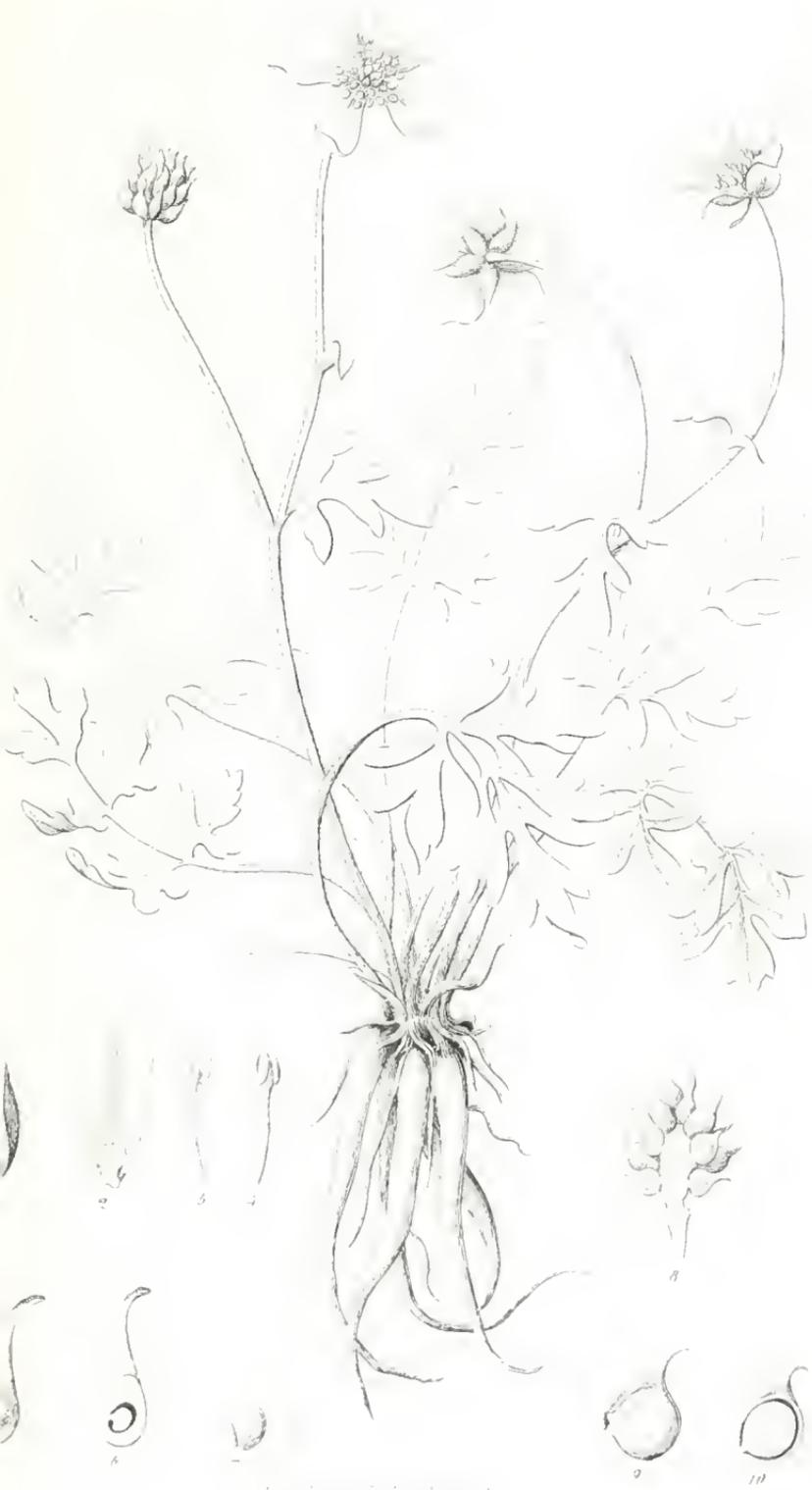










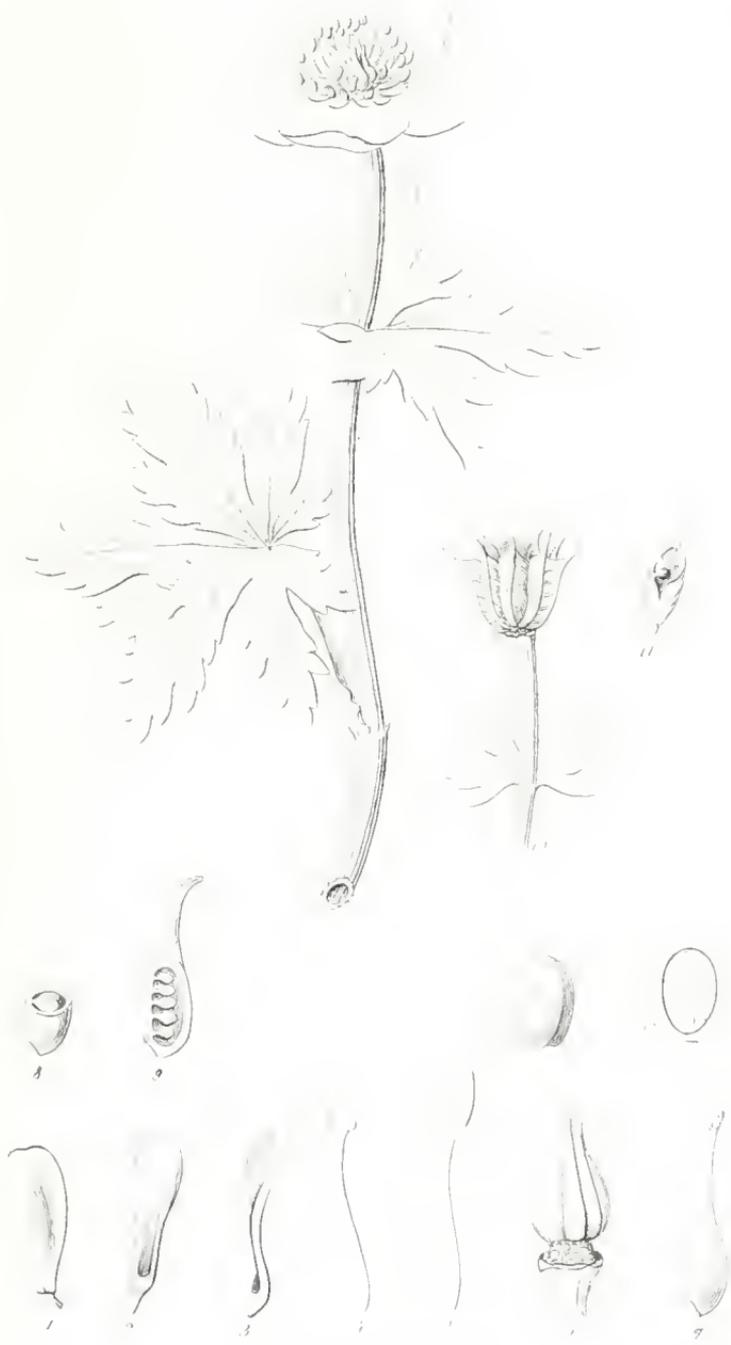






PLANT





TR. LINN.







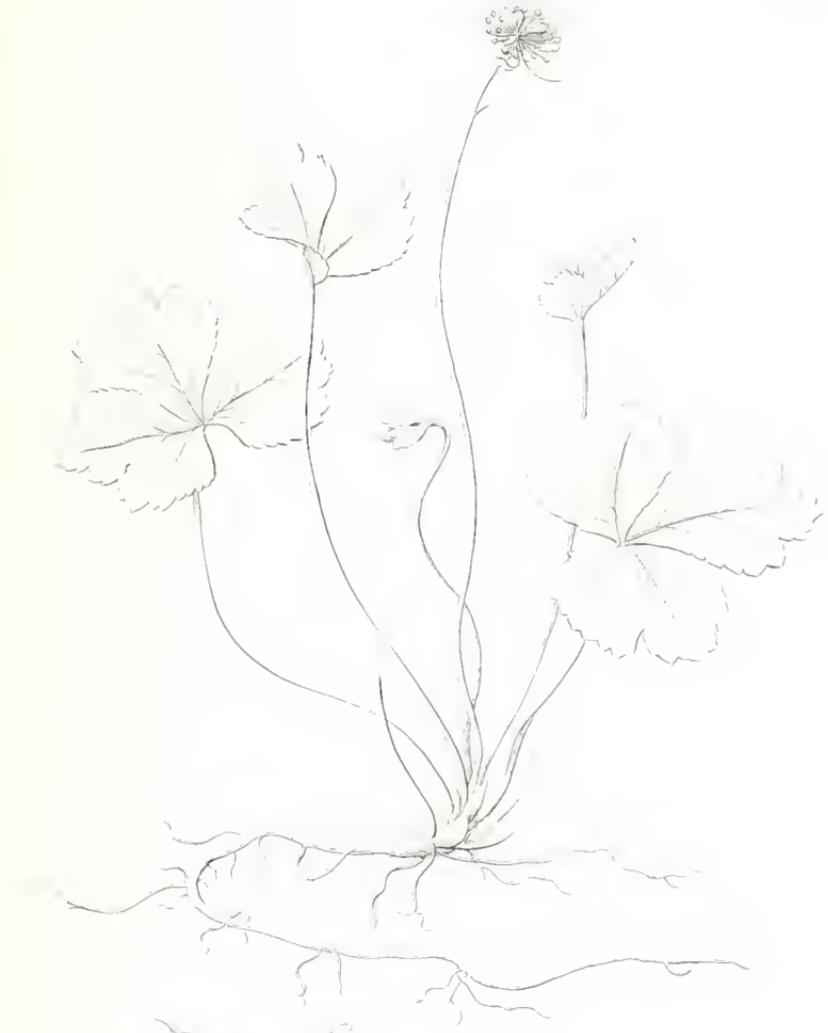


PLATE I



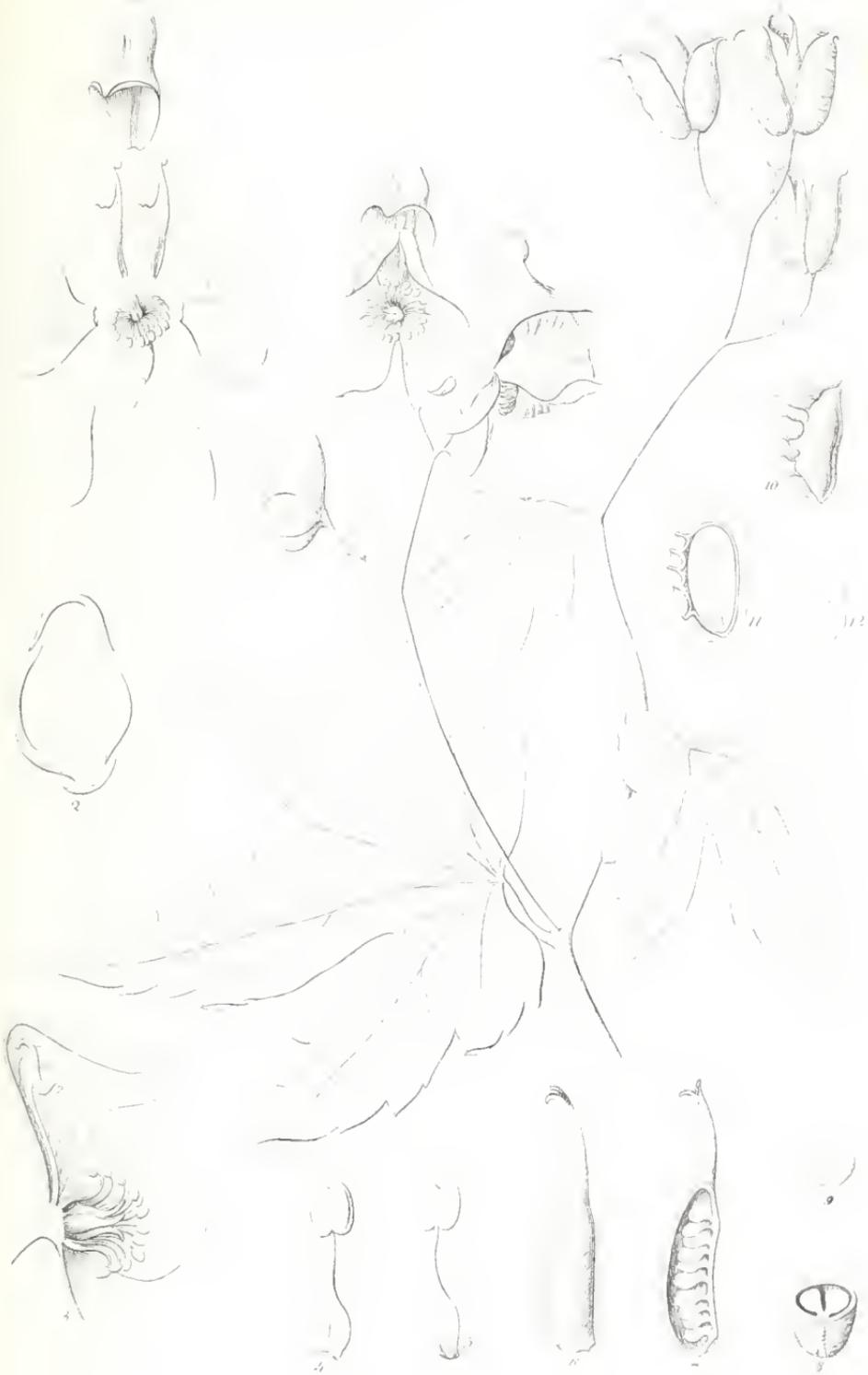


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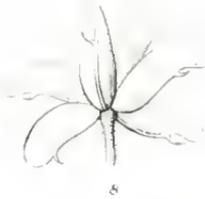
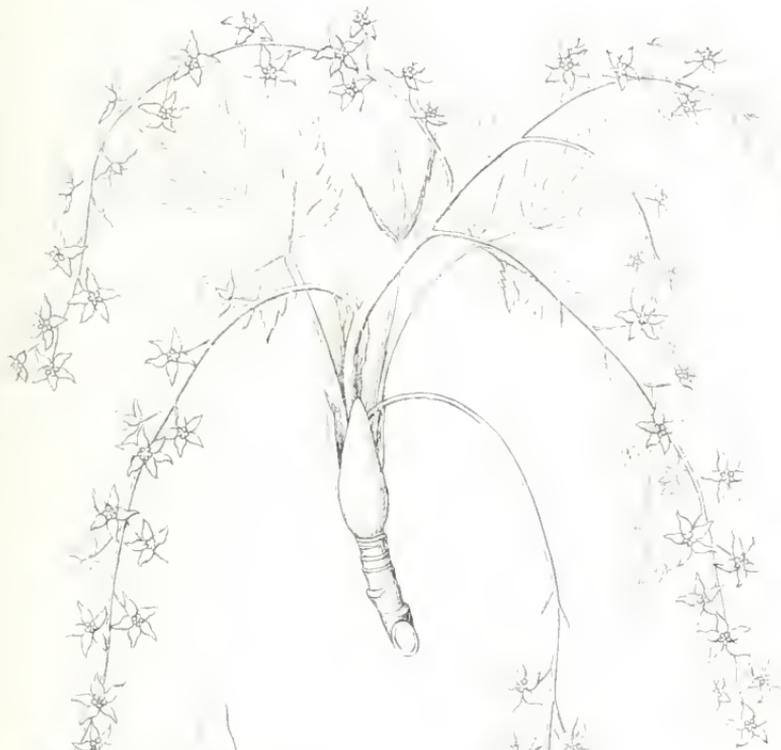




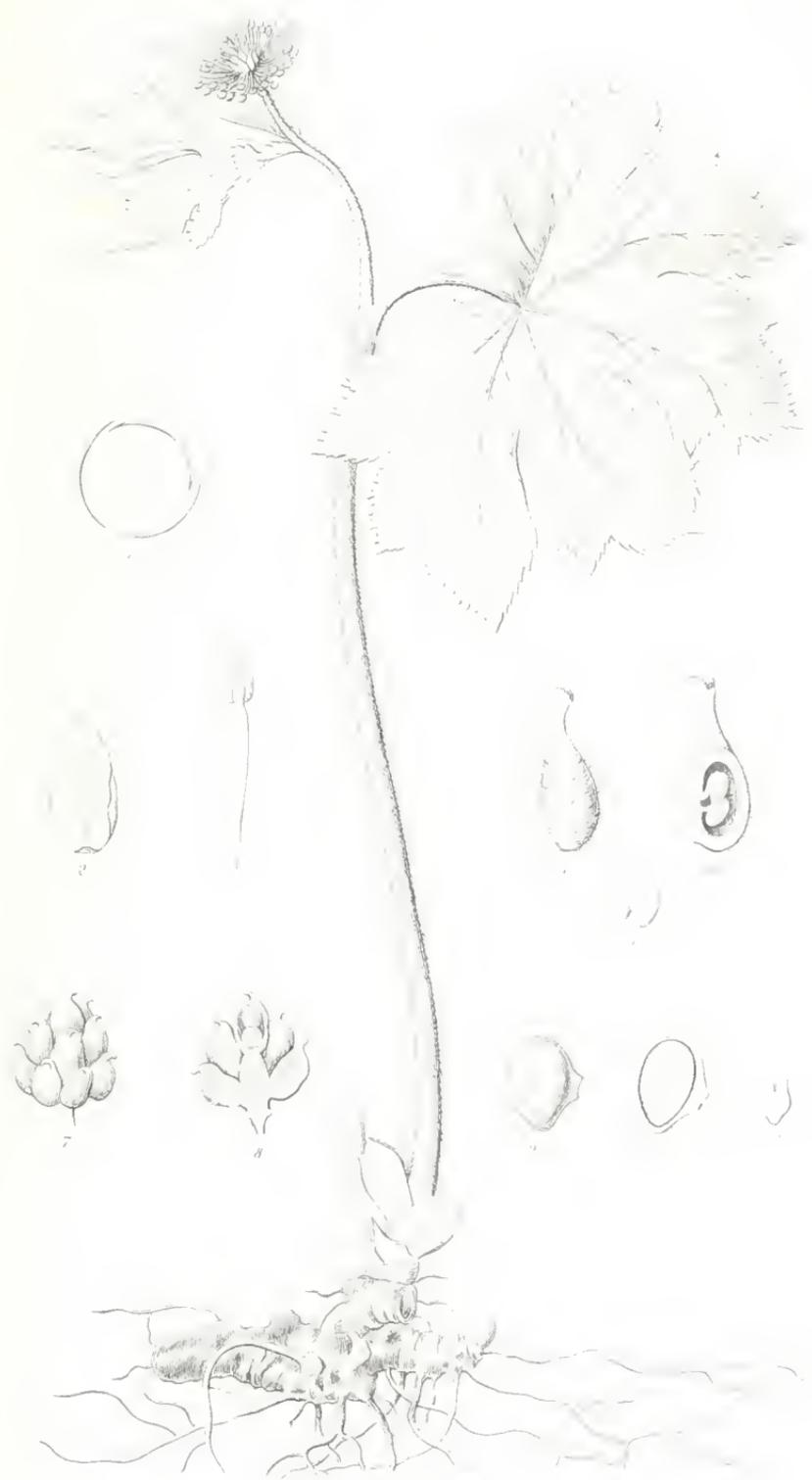


CENTROPAGON



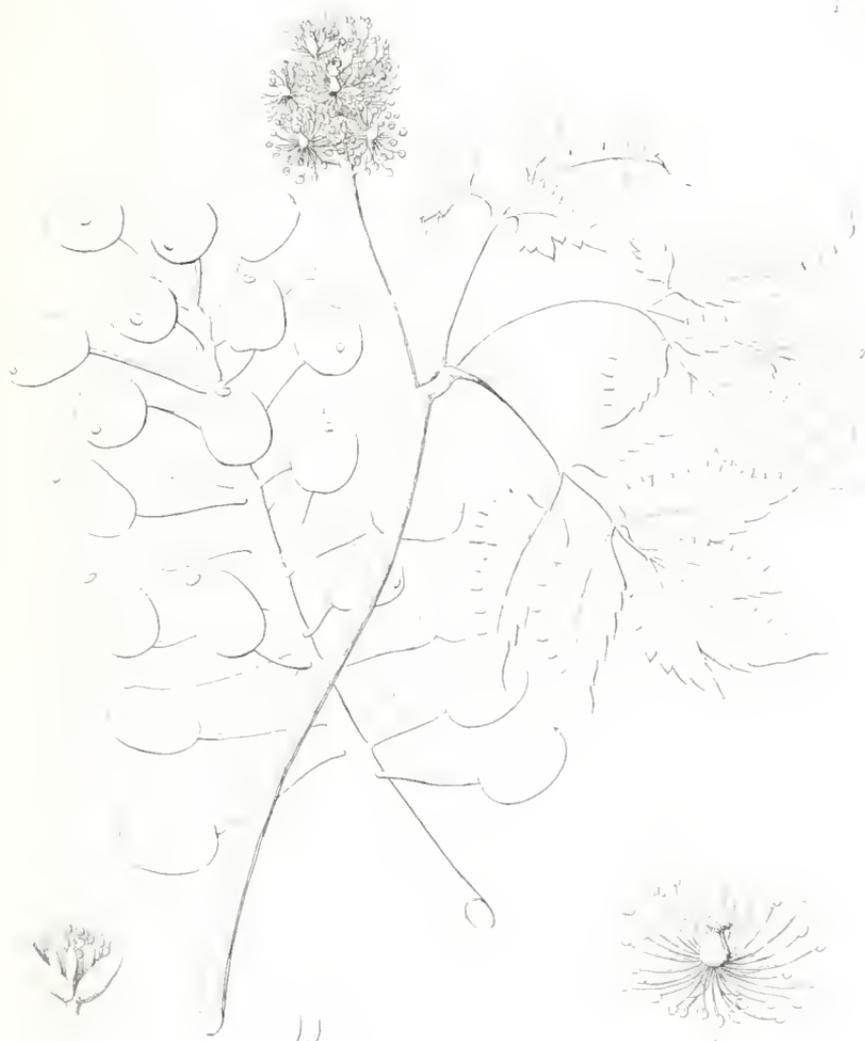




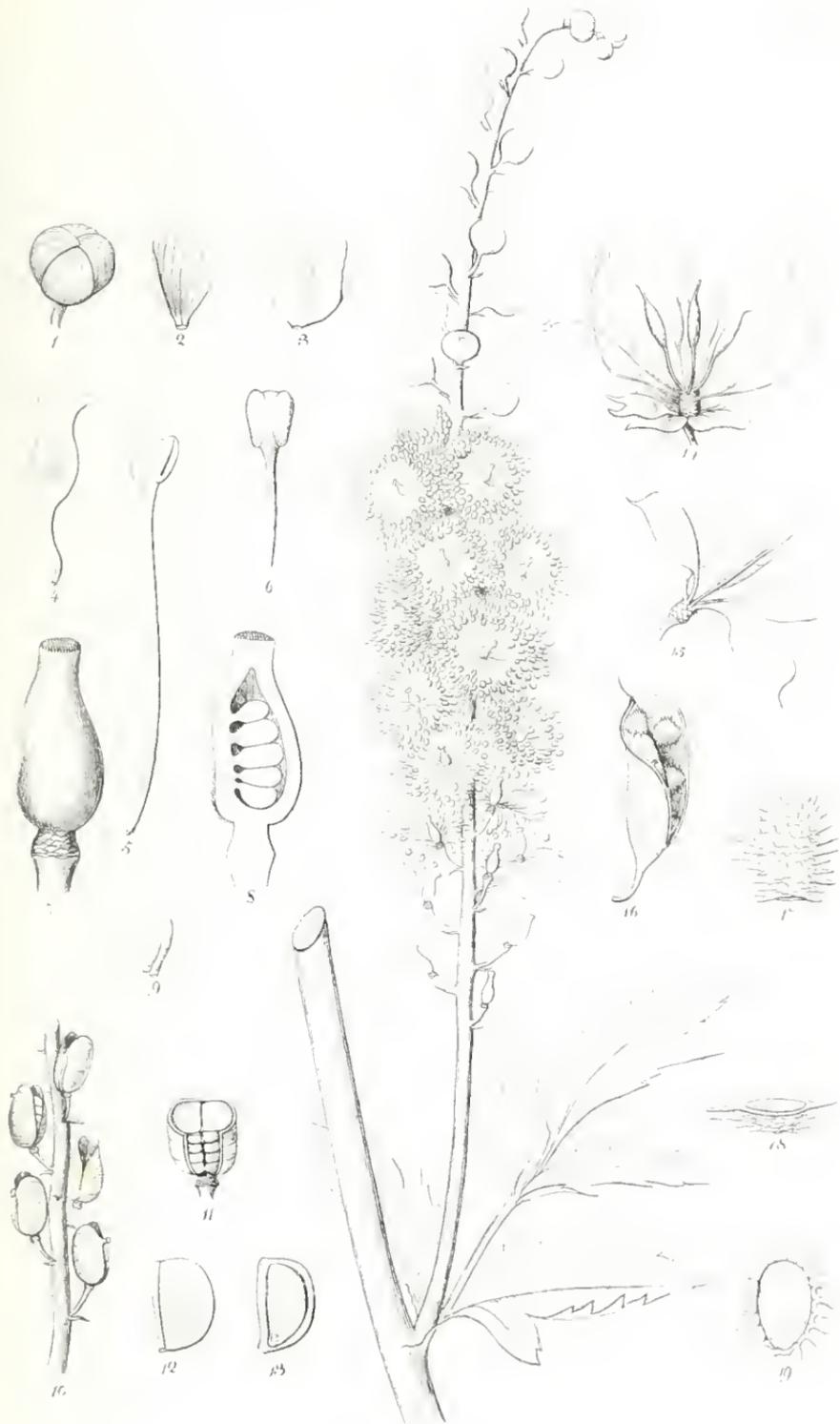


HYDRA.









PHOTODUPLICATION



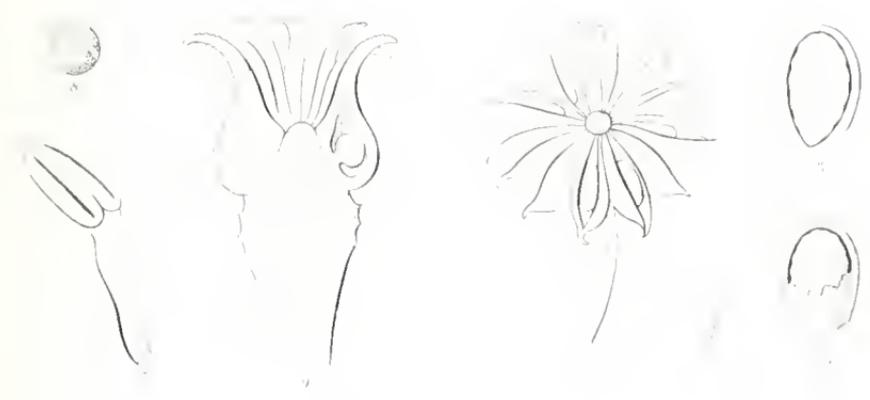








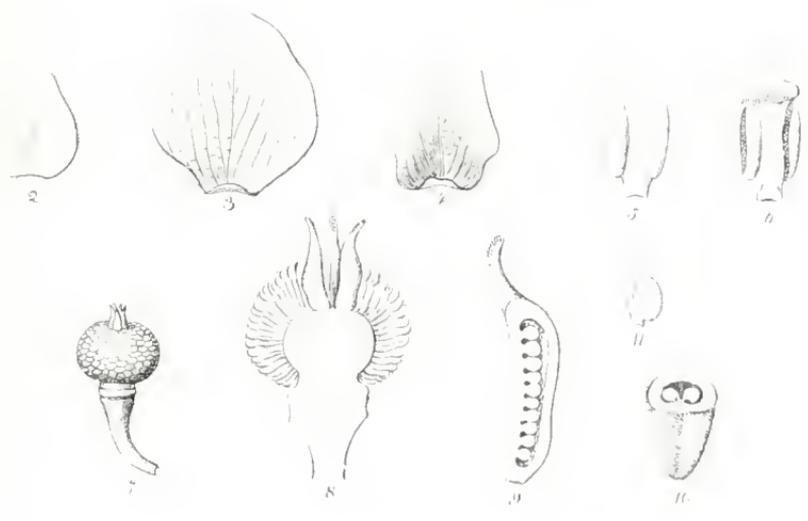
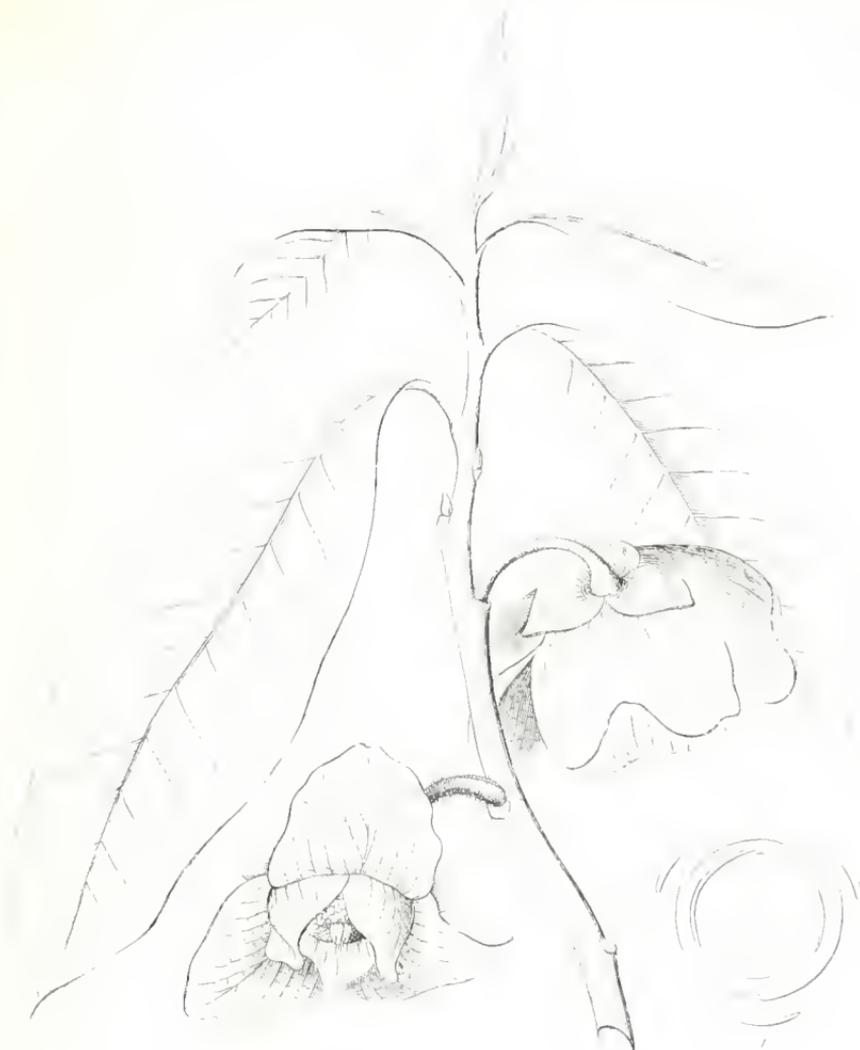




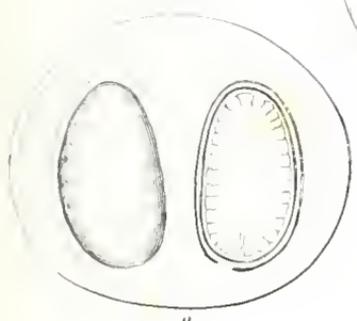


PLATE 100









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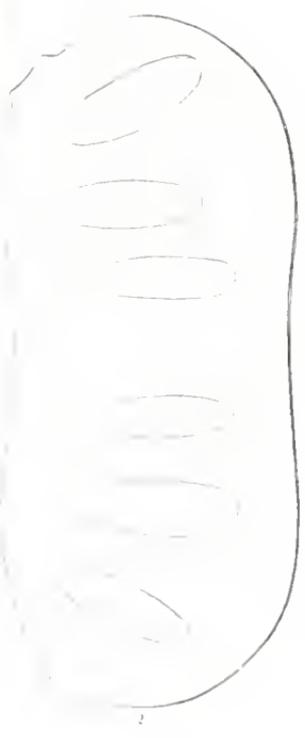
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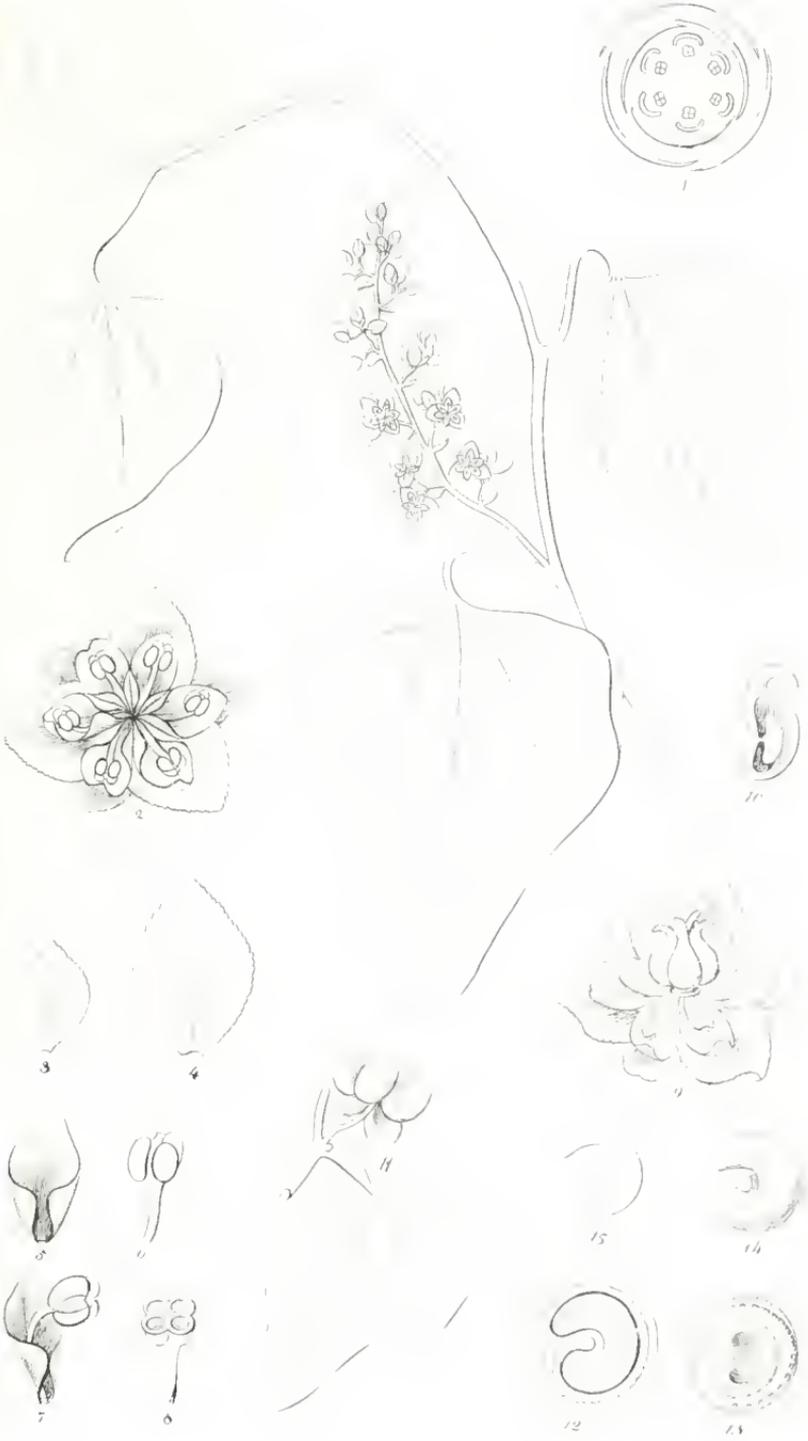
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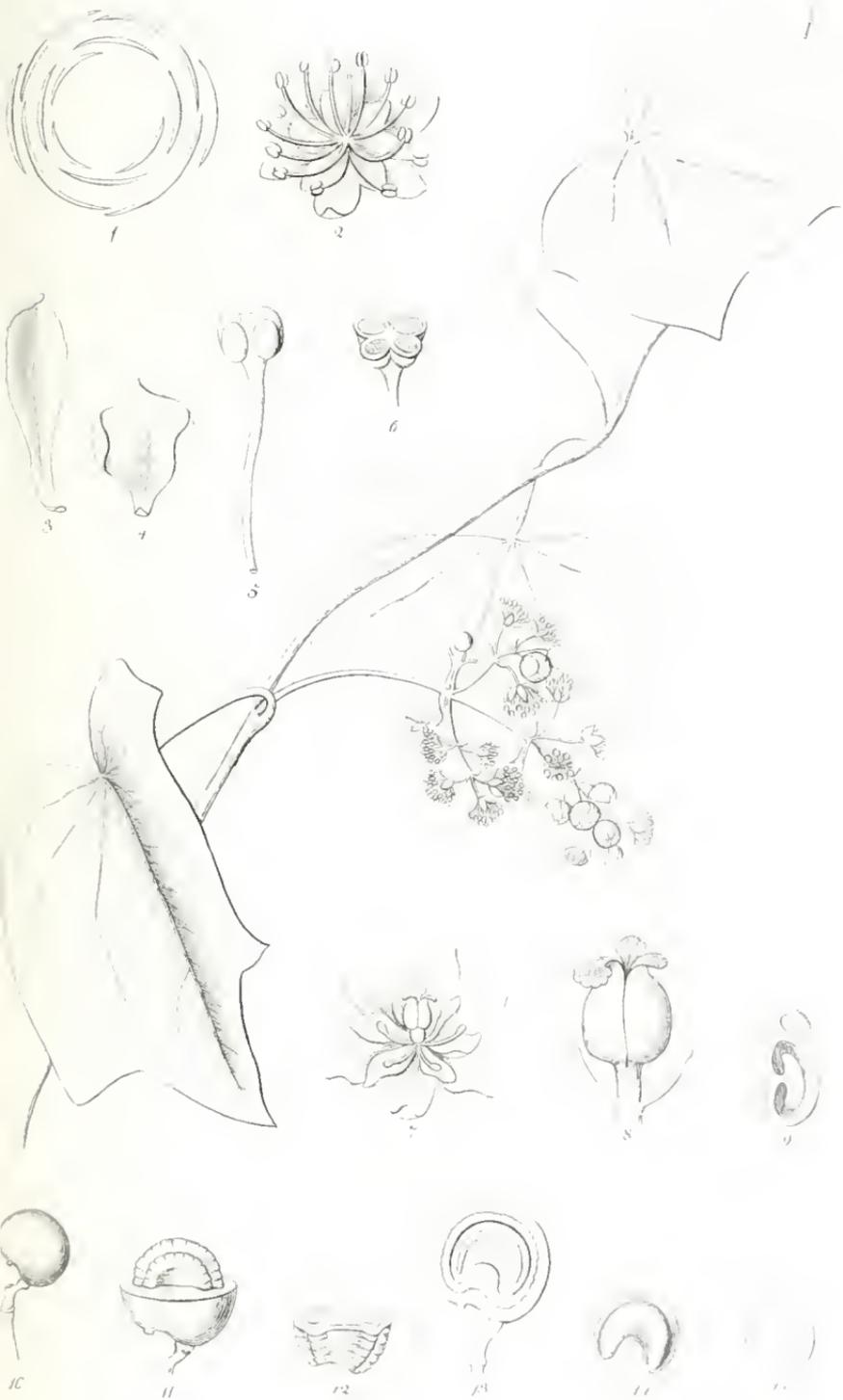


CHILANIPA





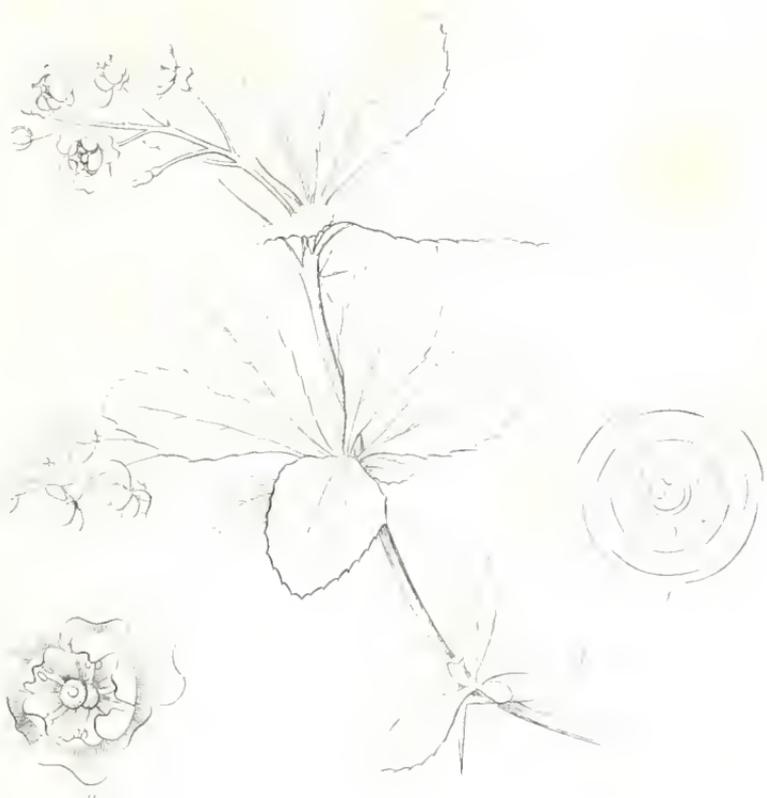




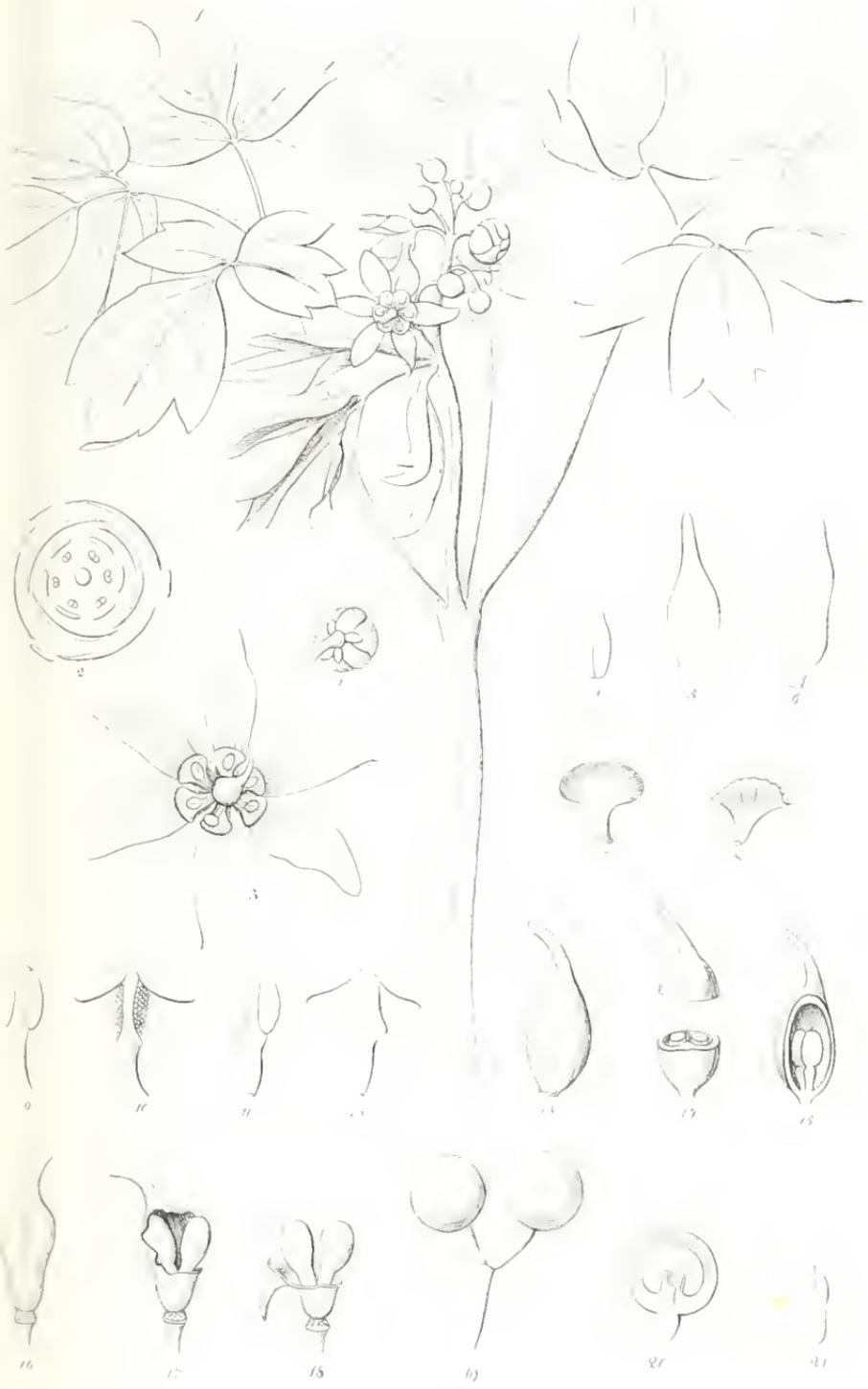








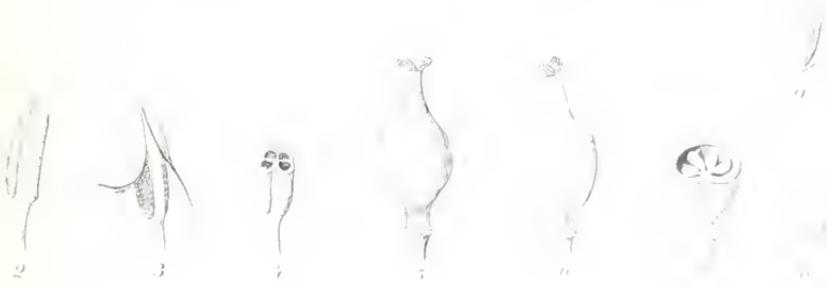
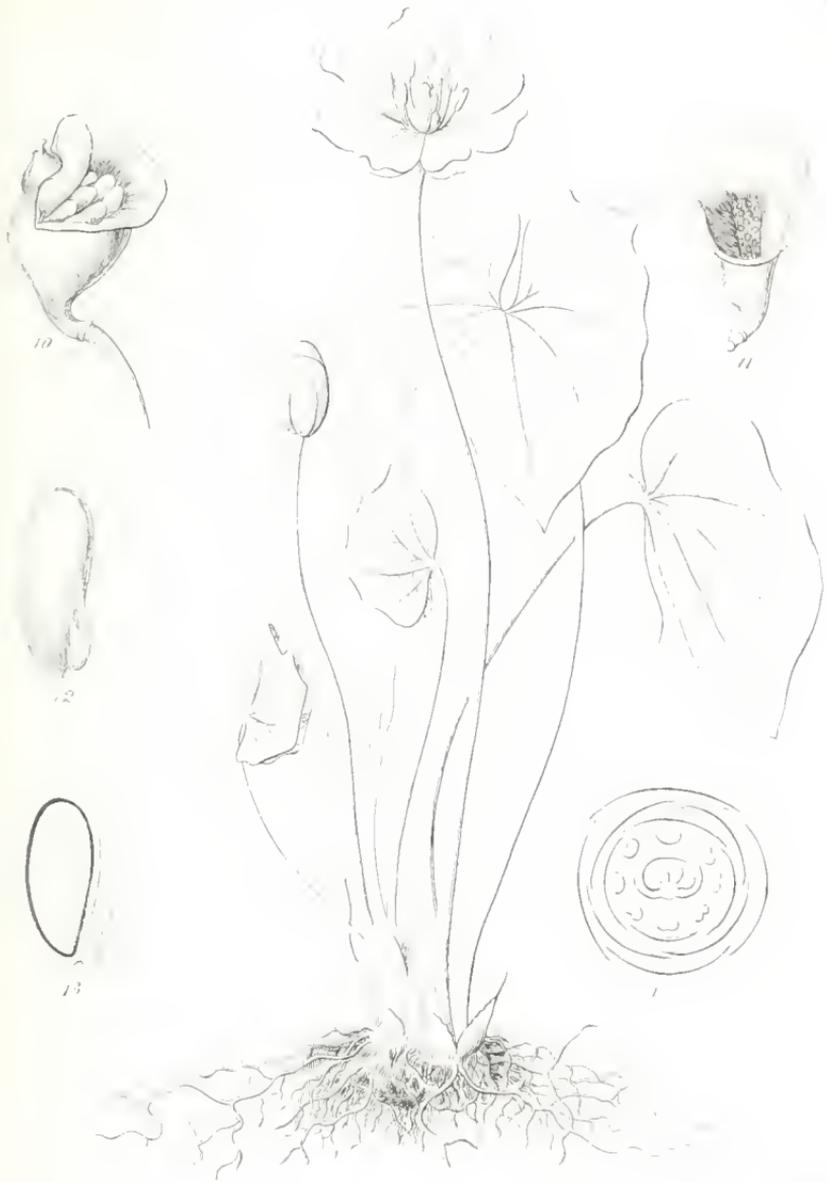








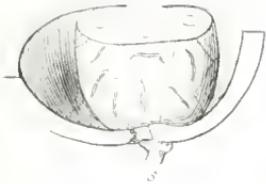
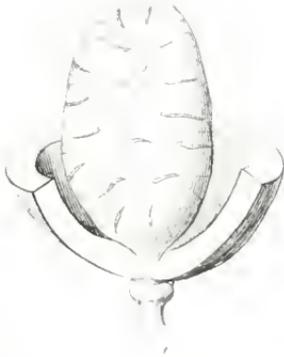




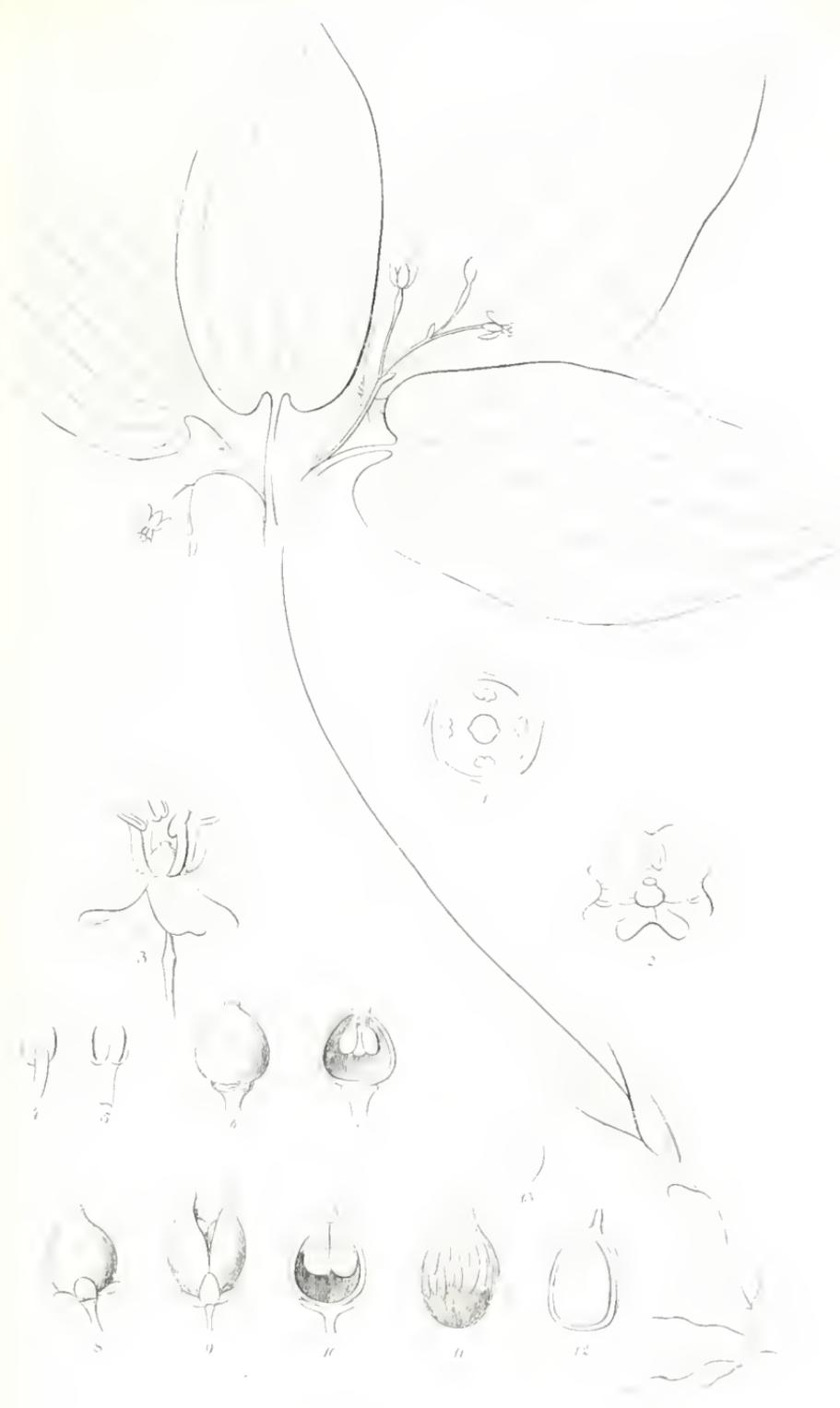




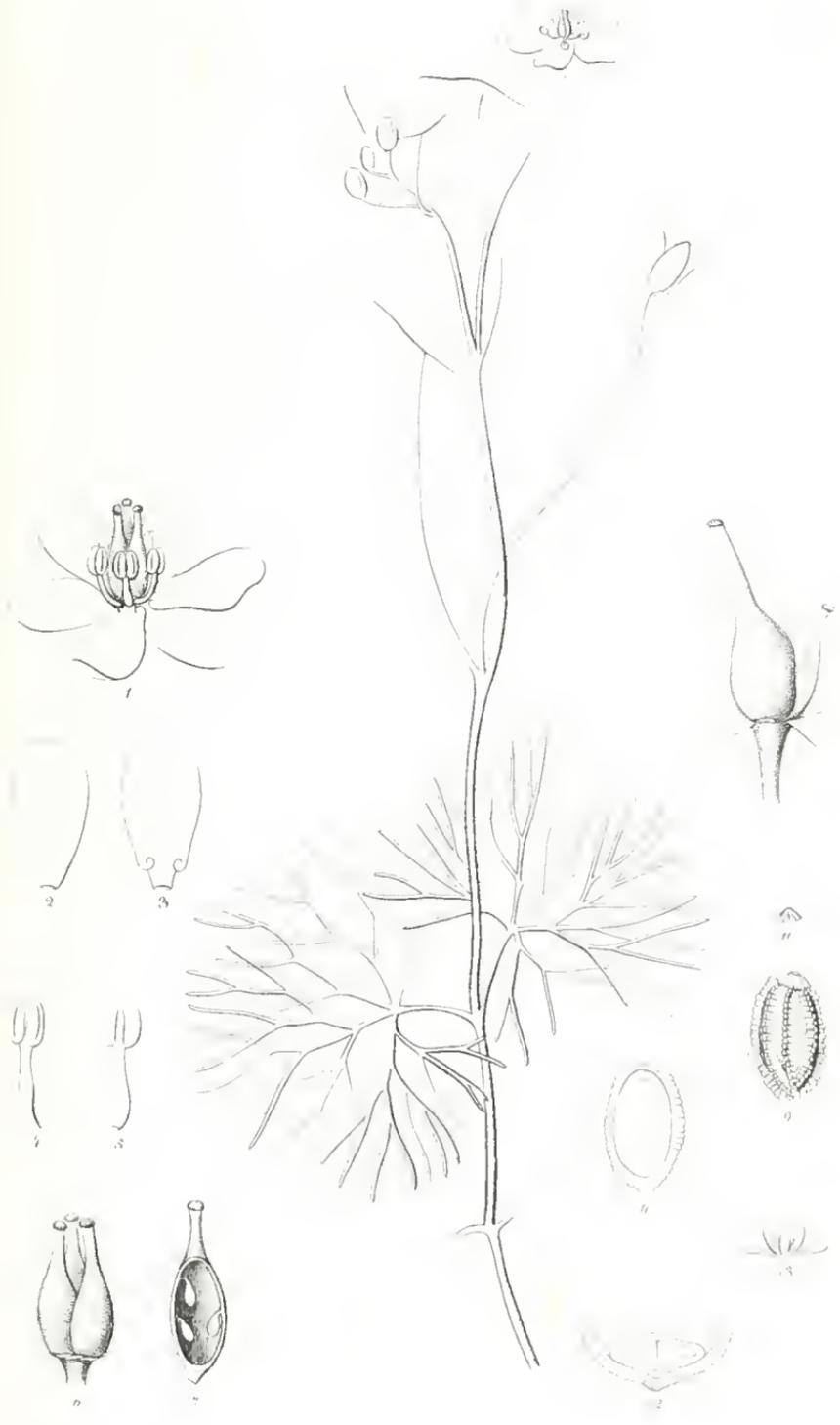




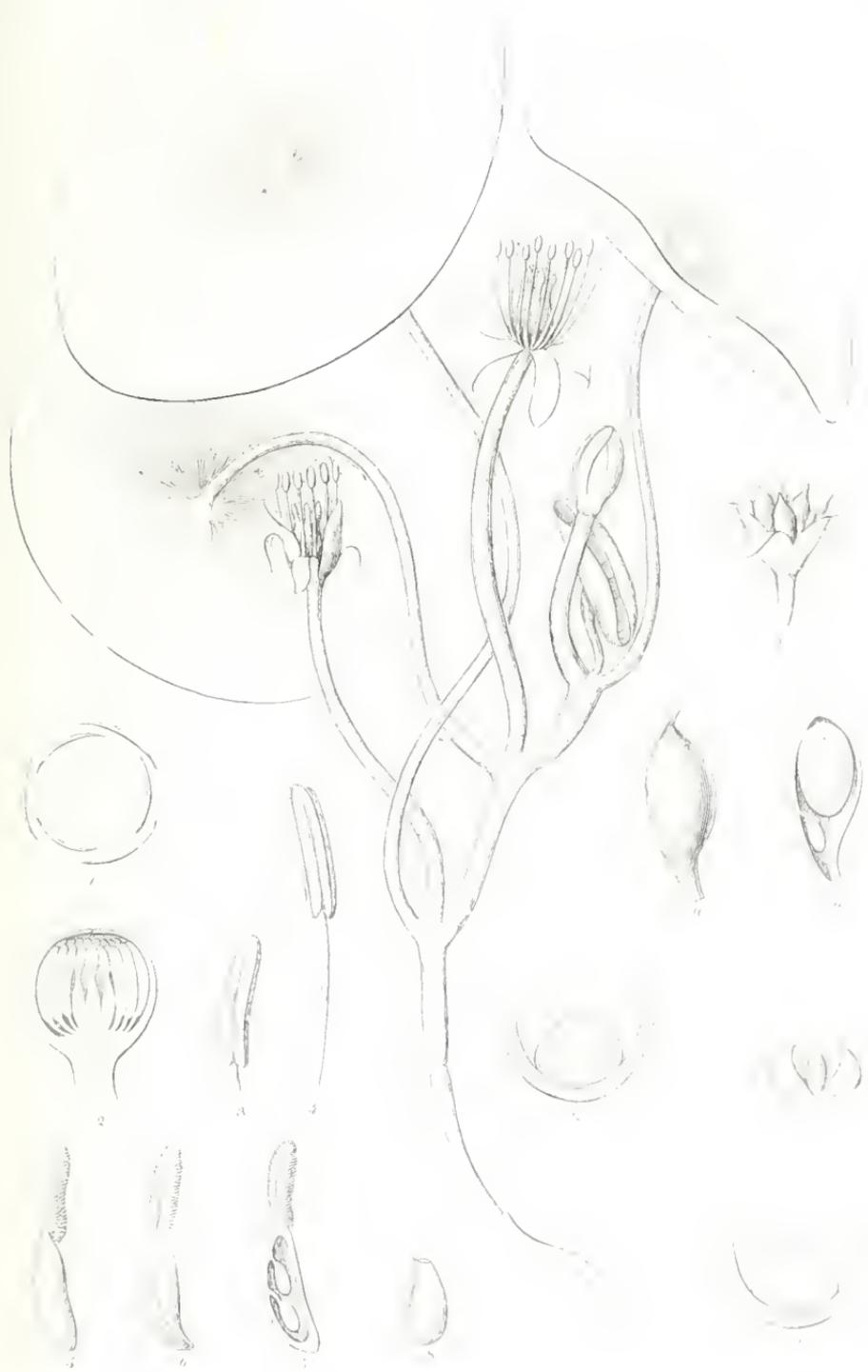




















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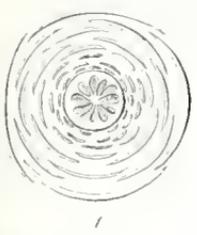
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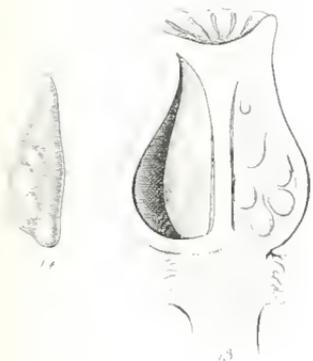
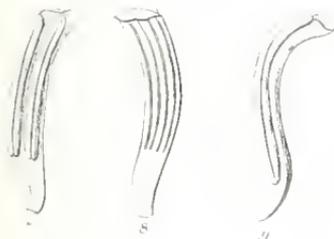
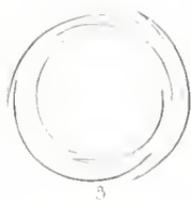
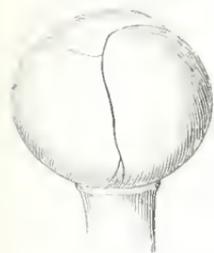
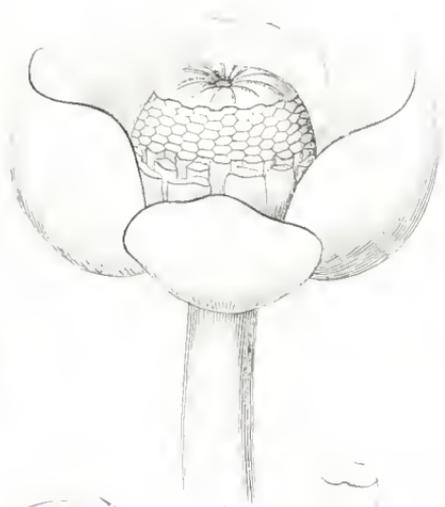


Water lily flower and bud

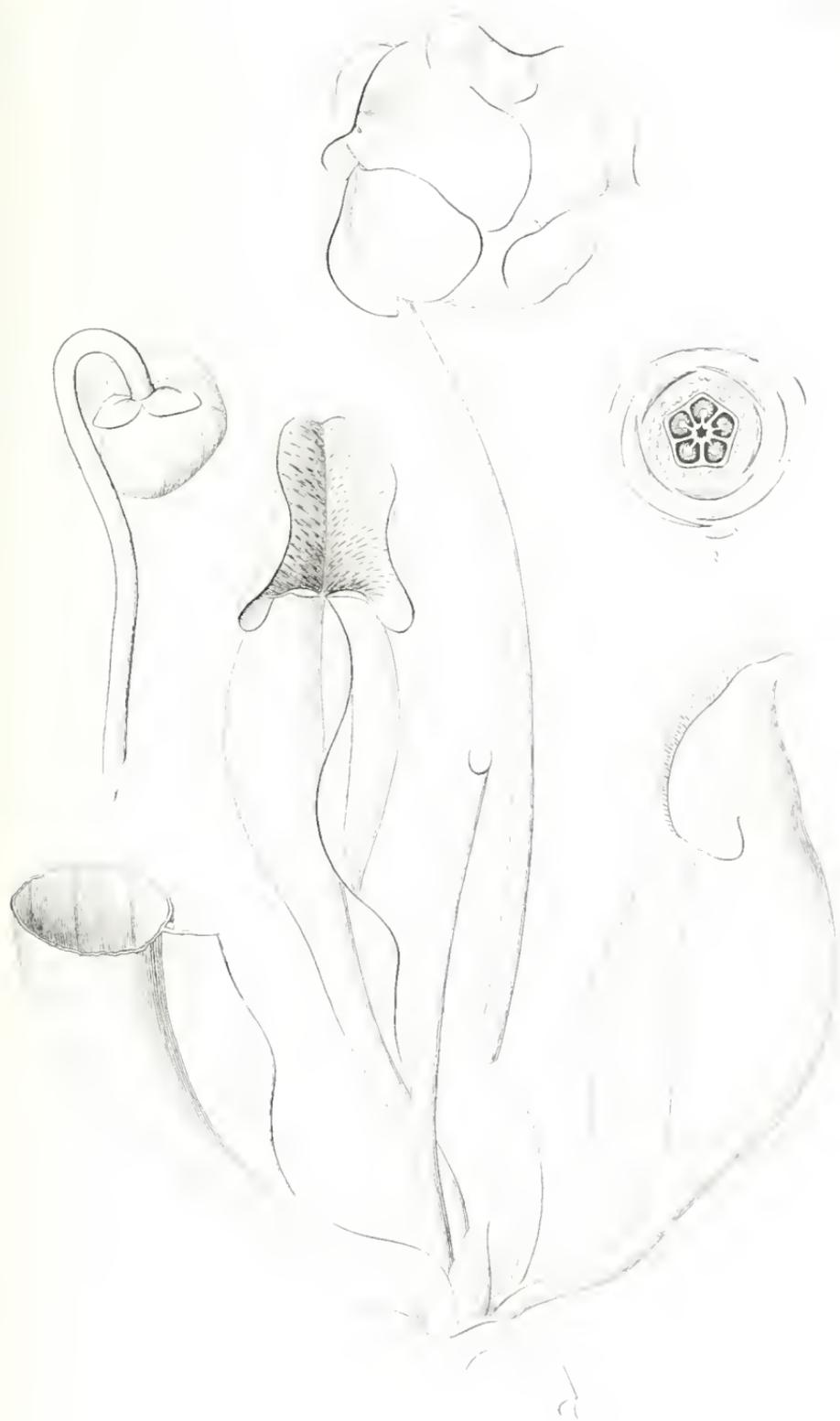




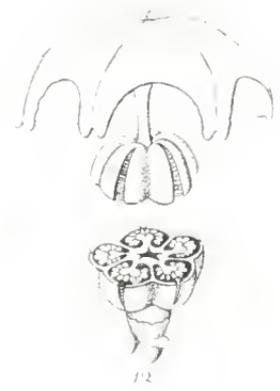
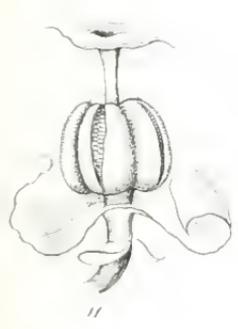
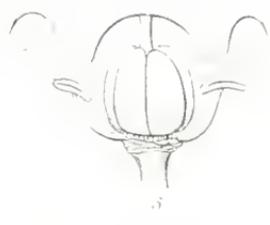












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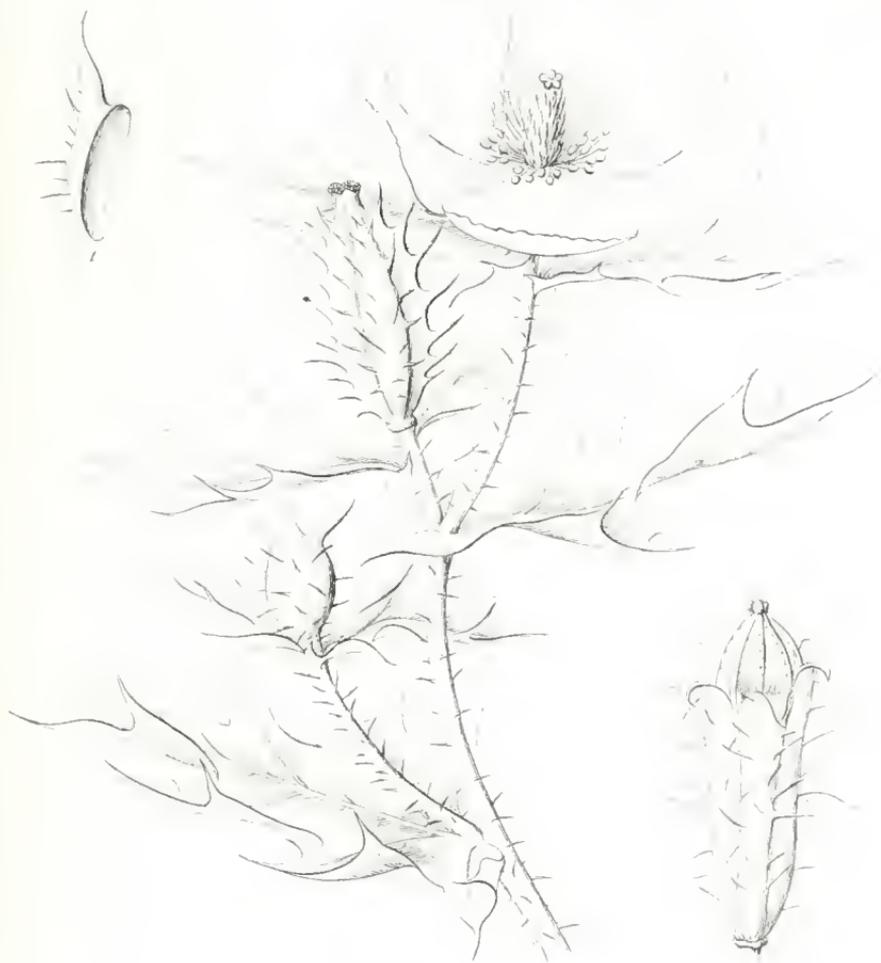
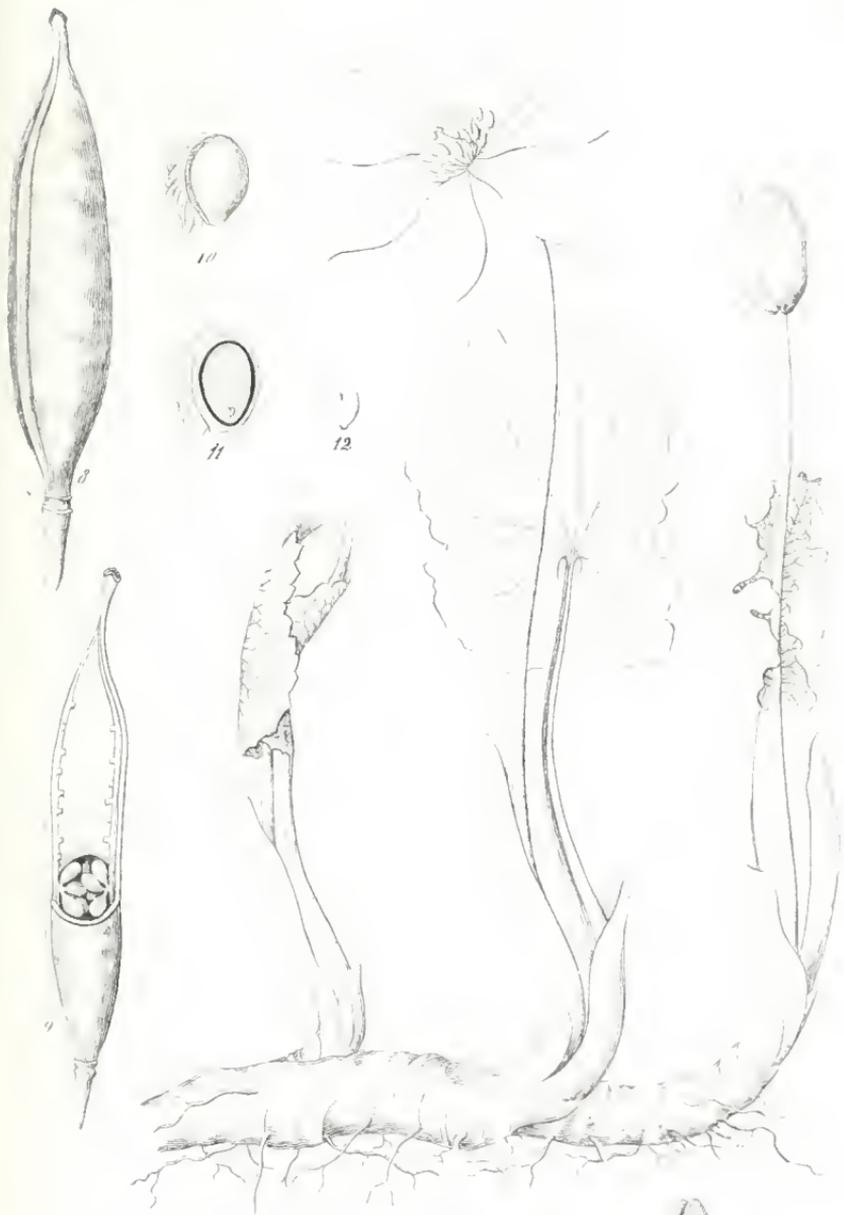


PLATE 10

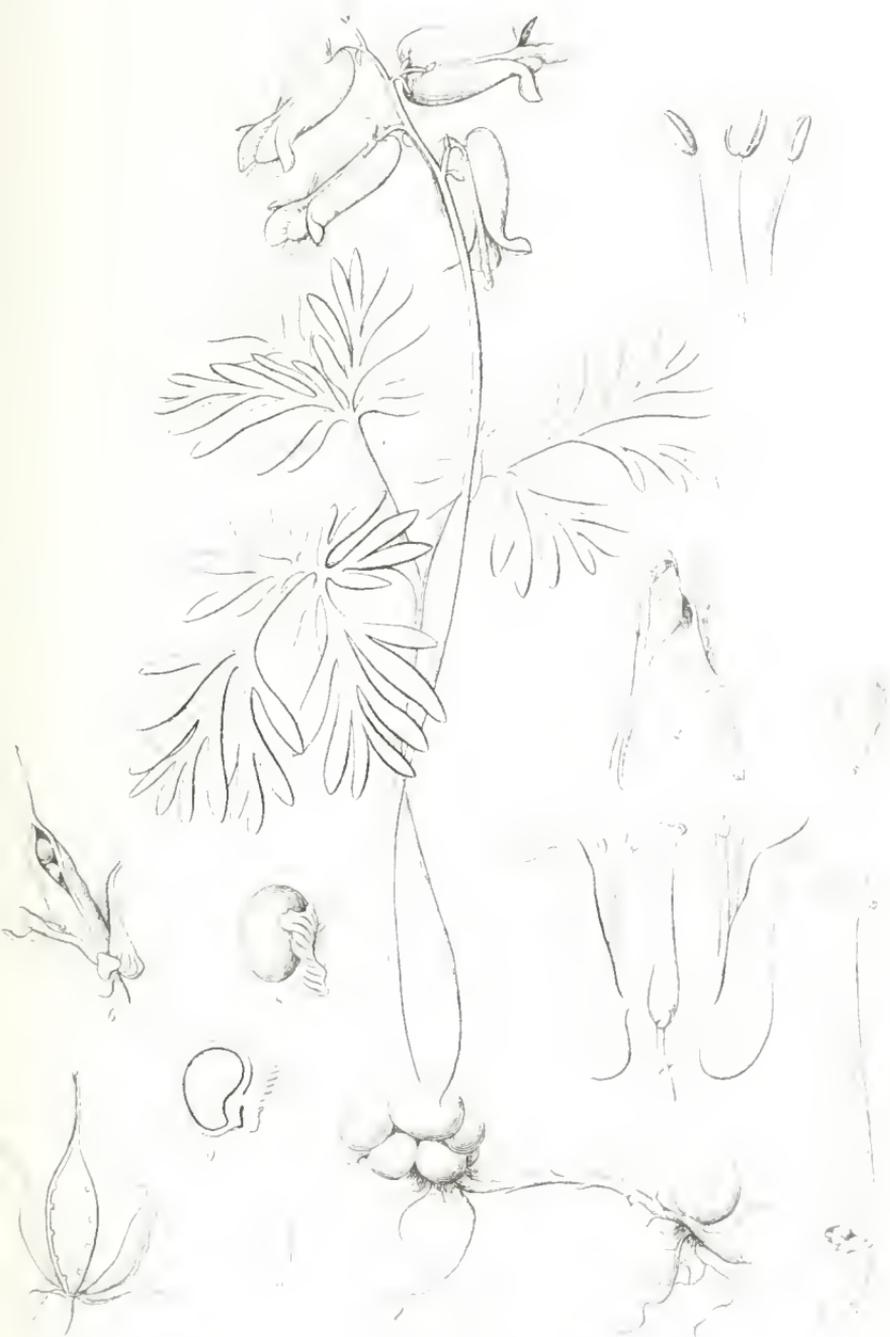






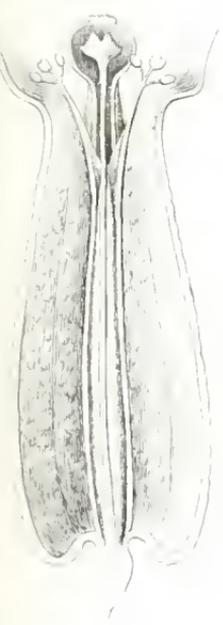






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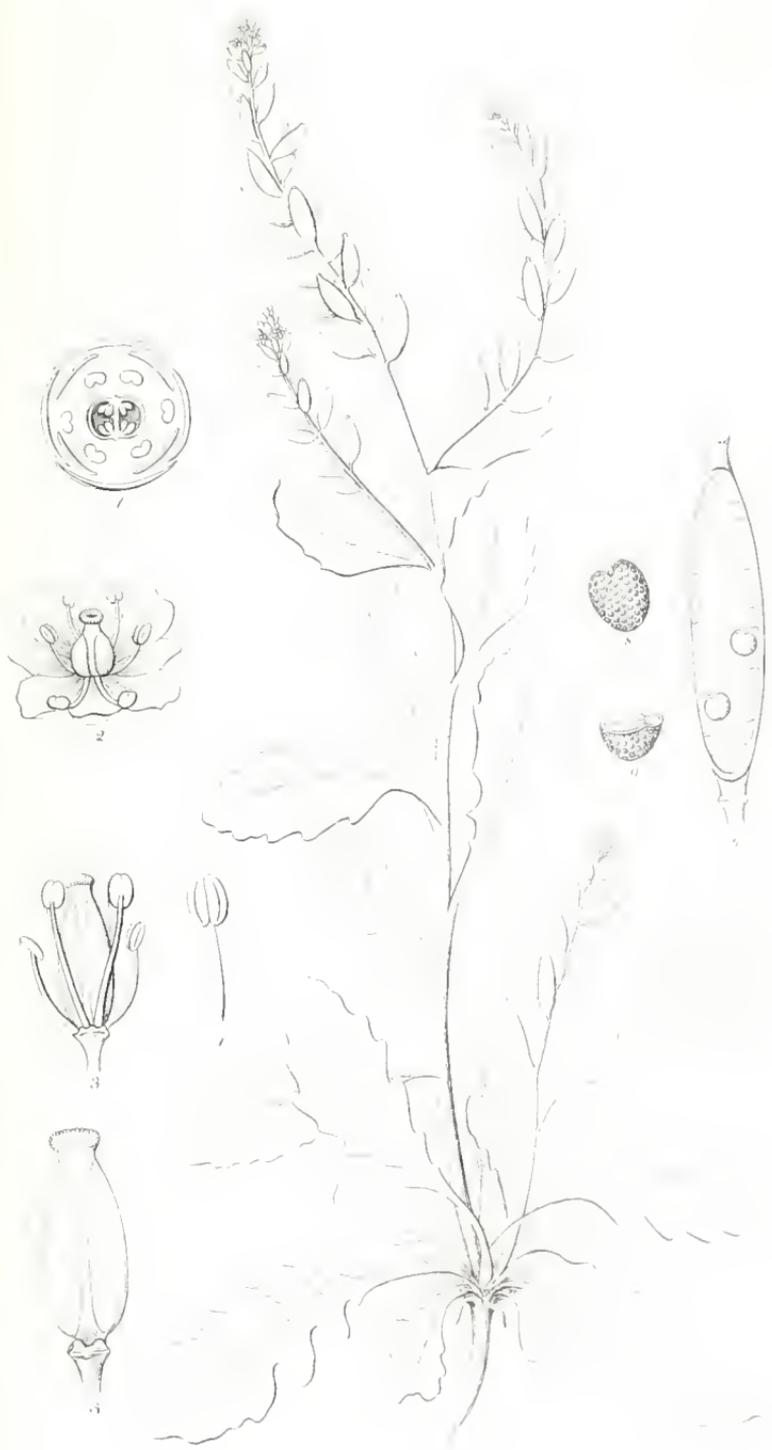






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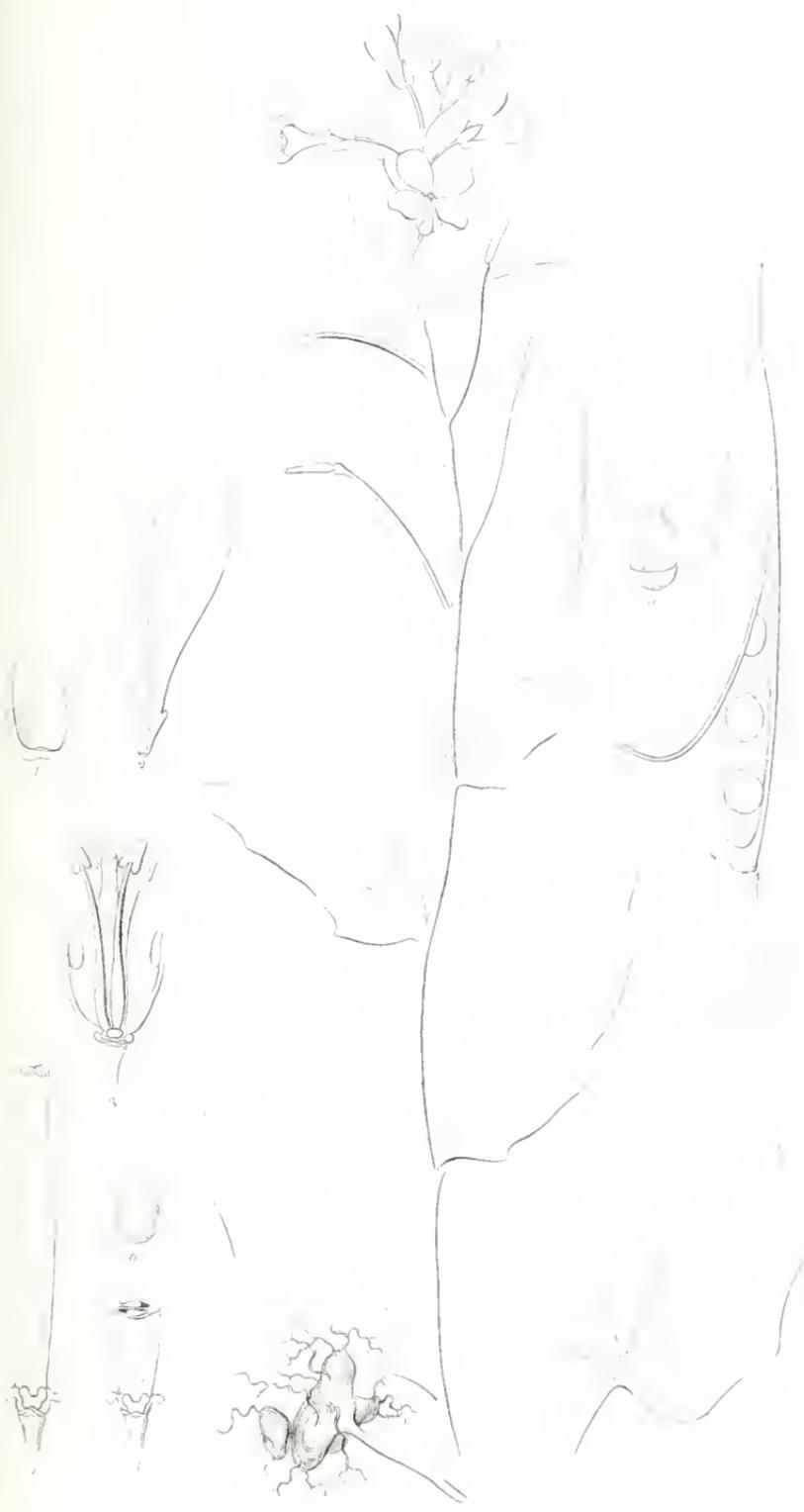








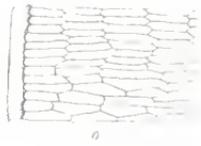
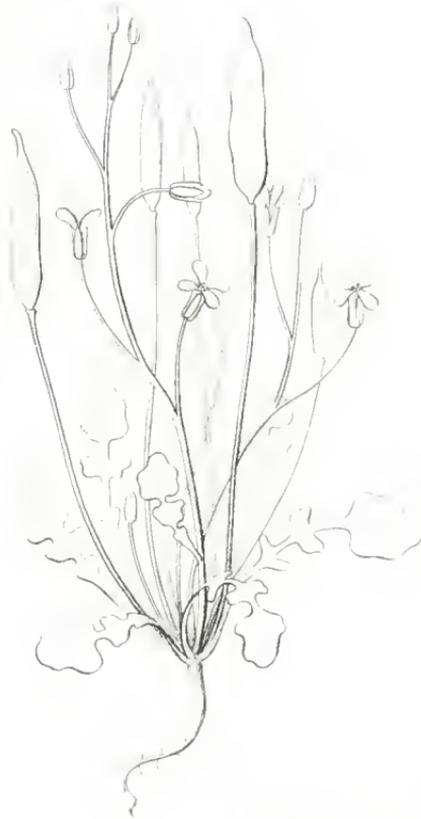




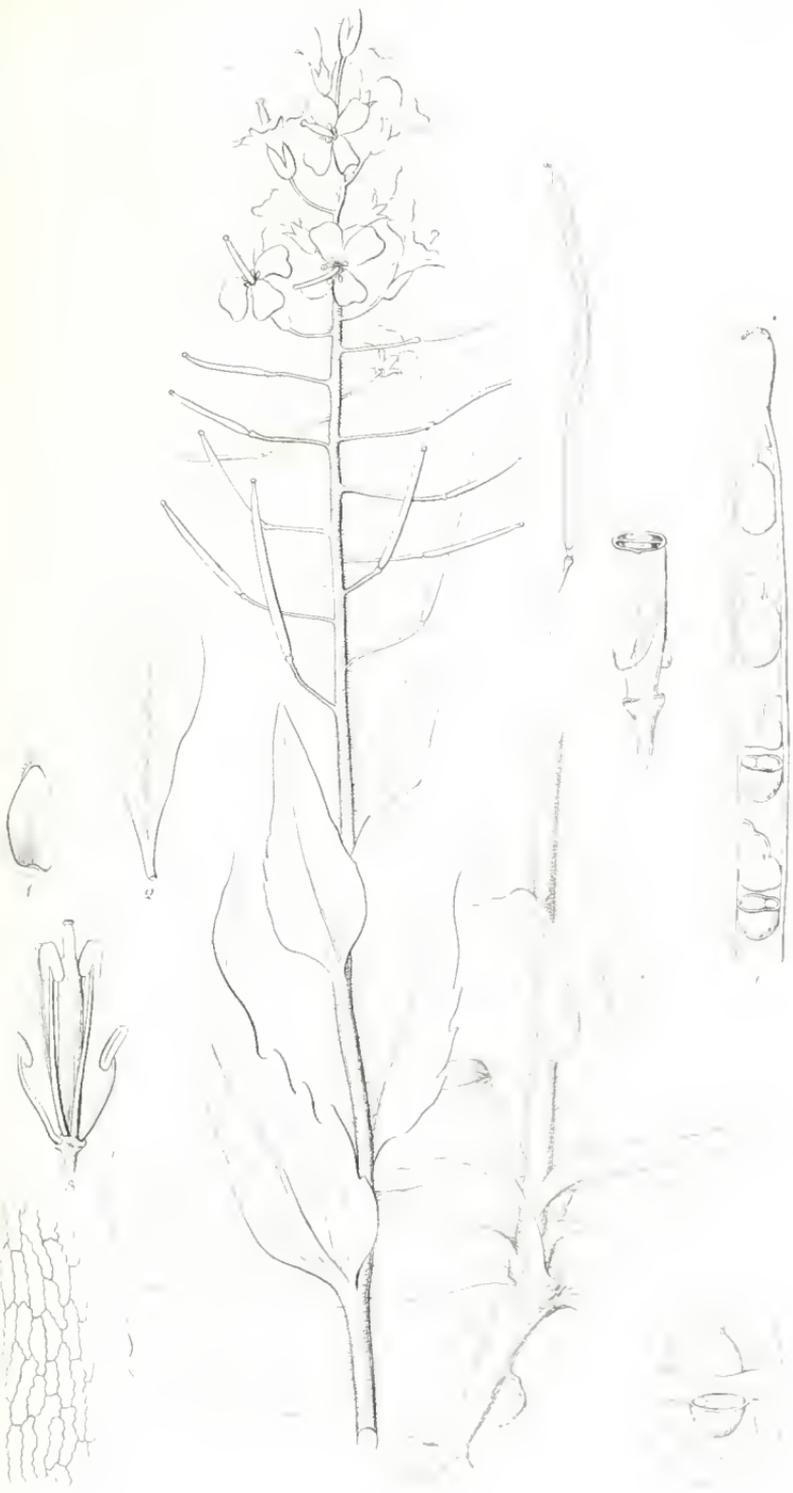














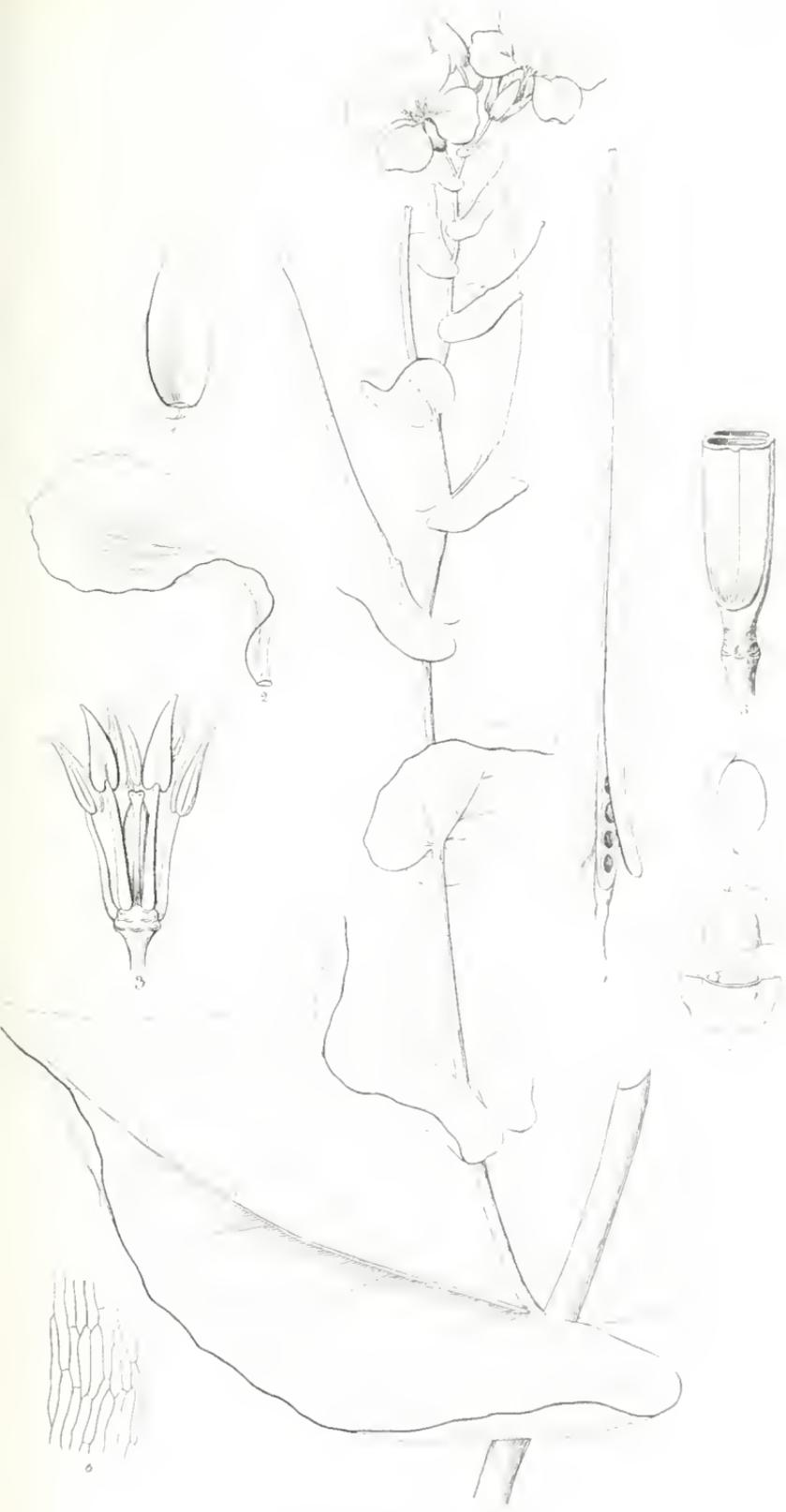


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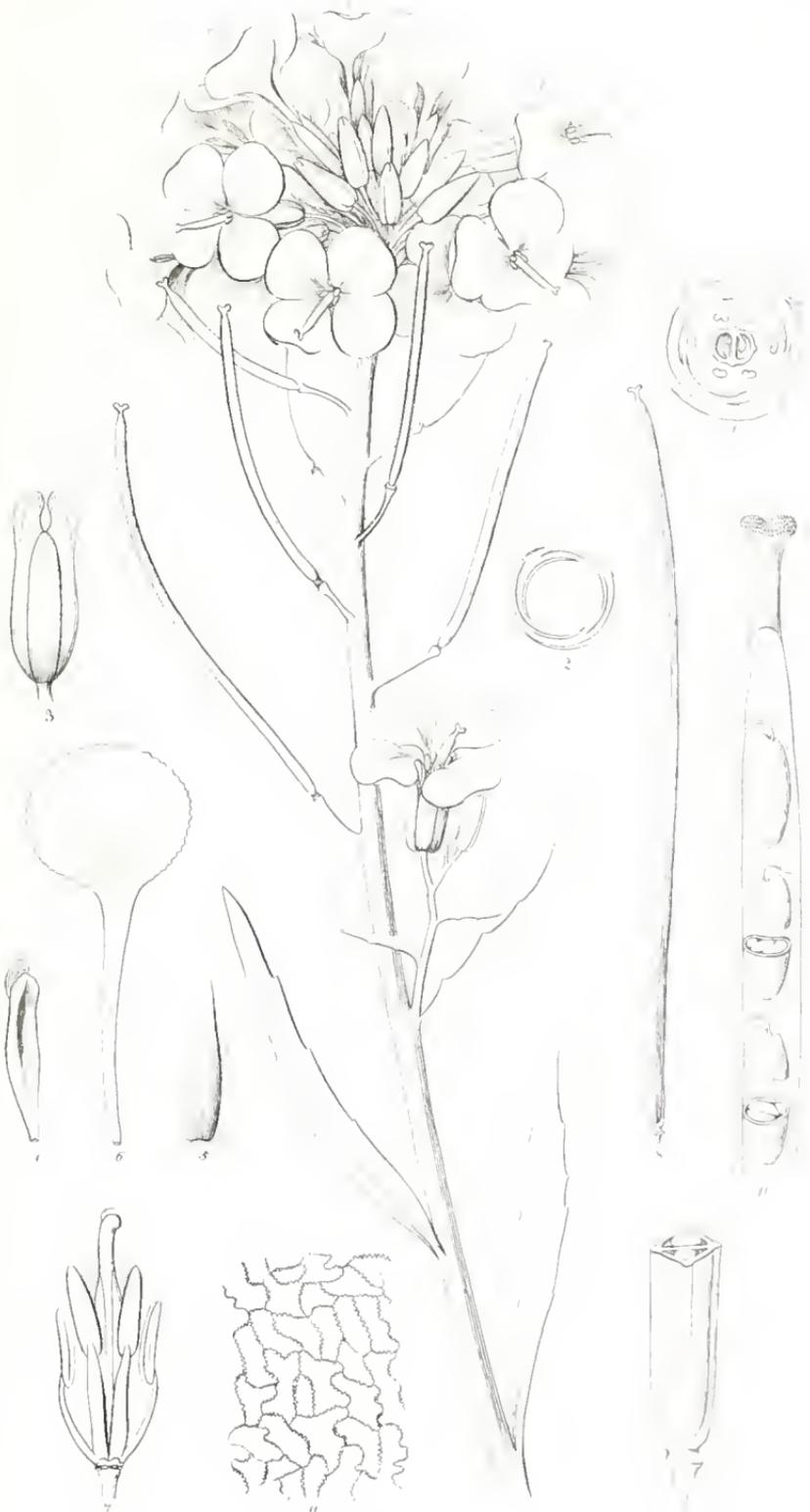




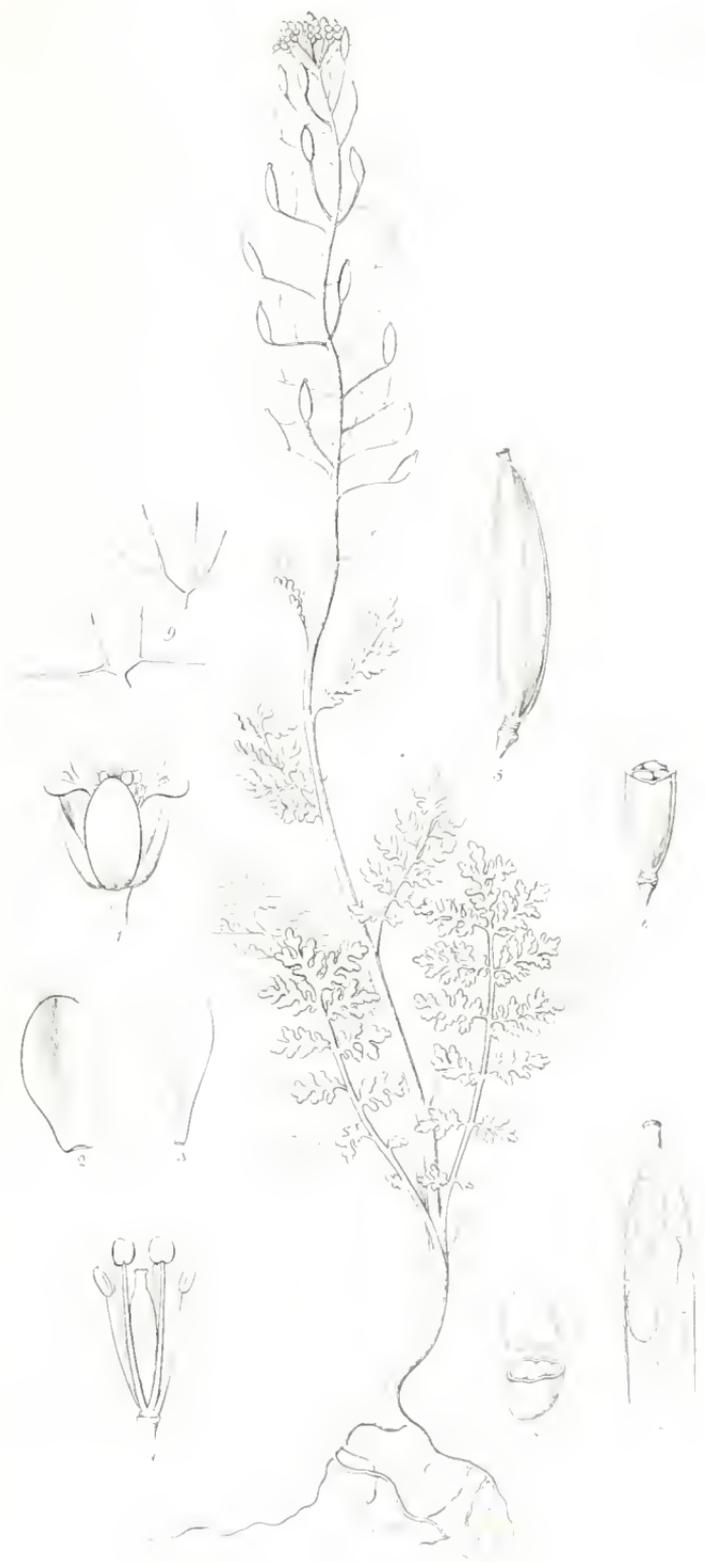










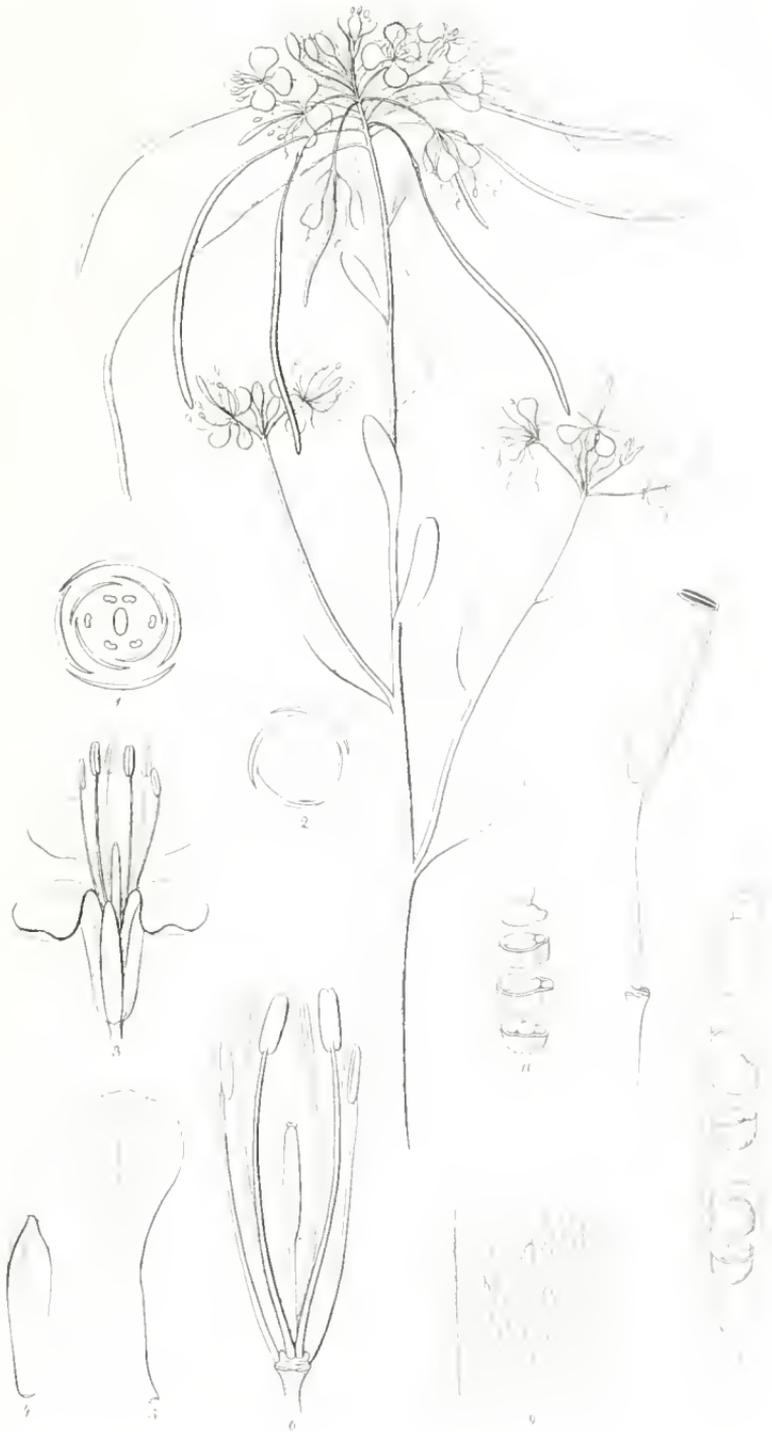




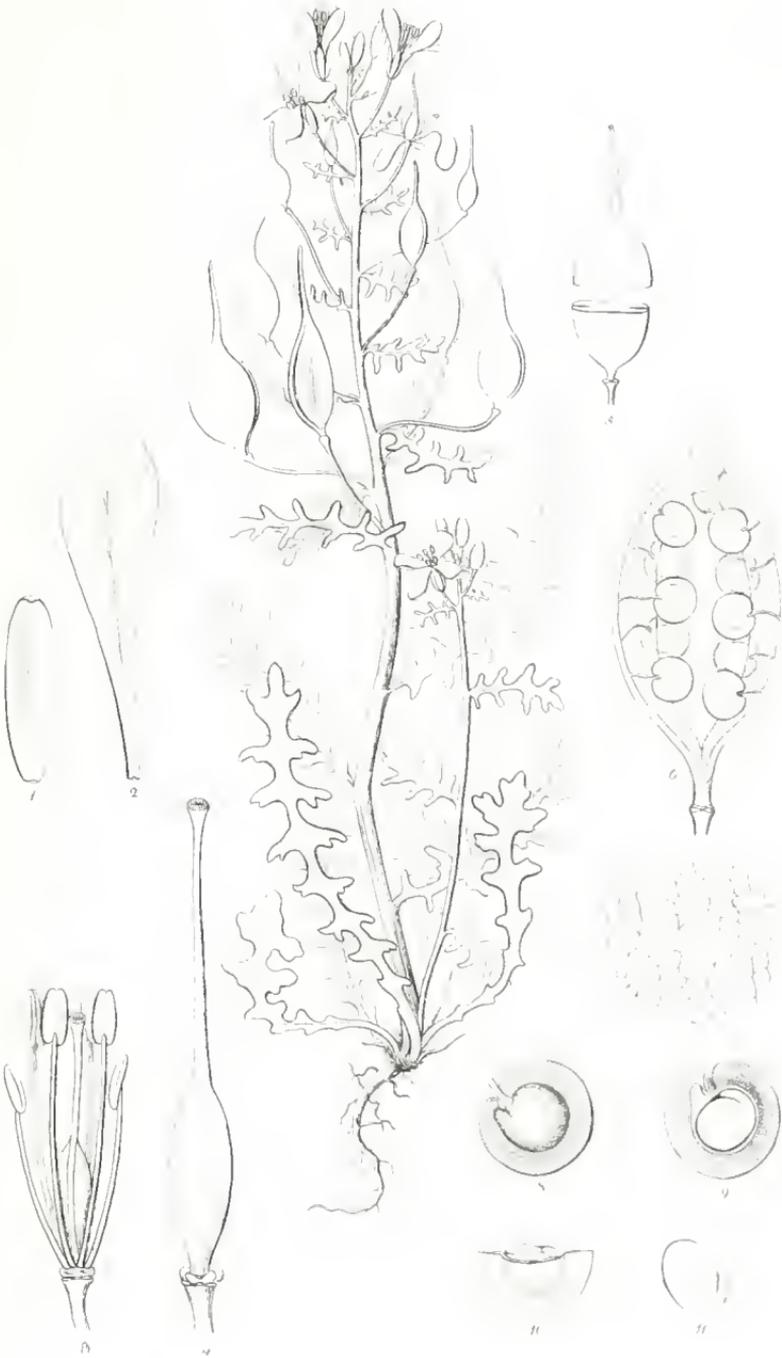


M.H.









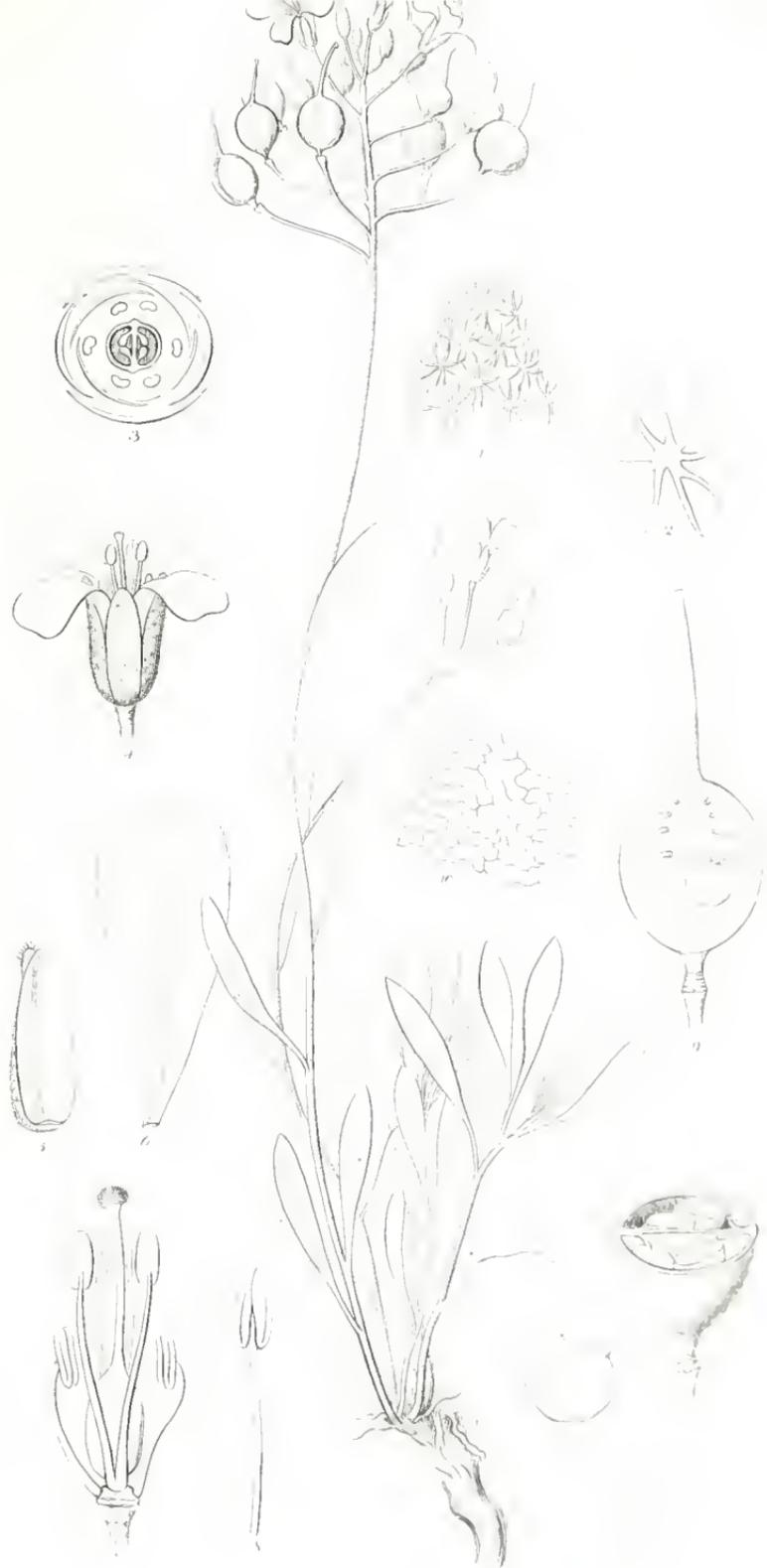




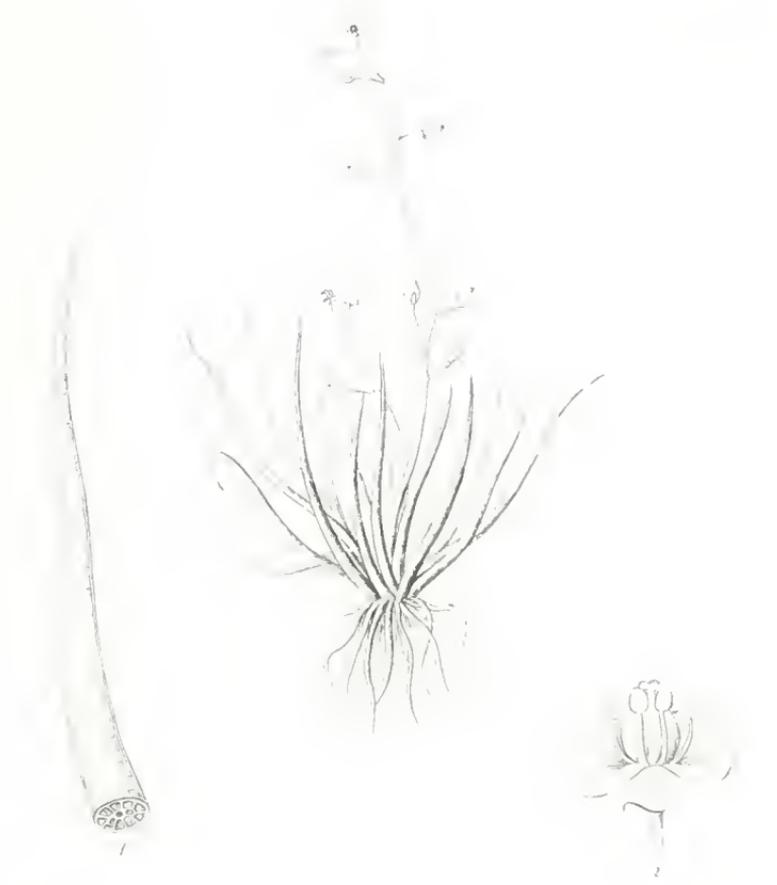




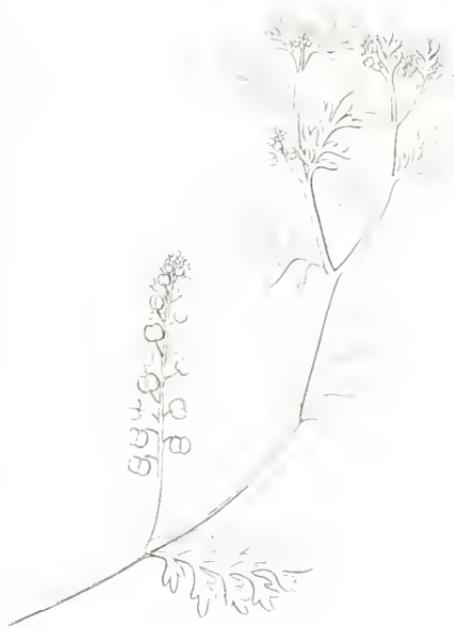




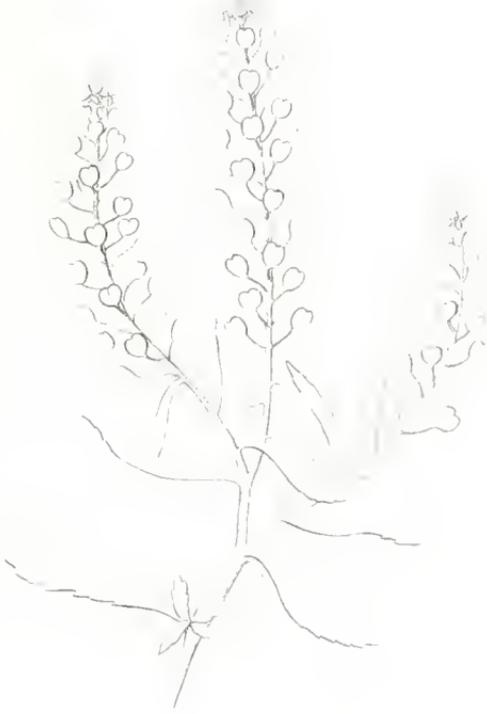




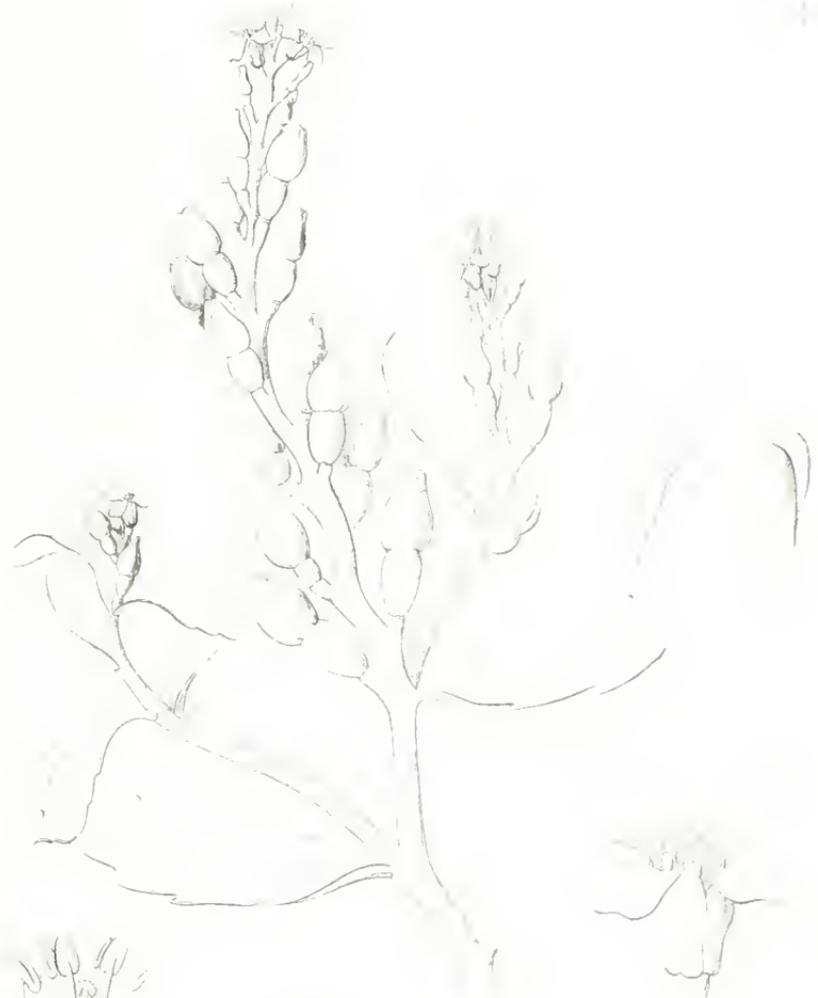








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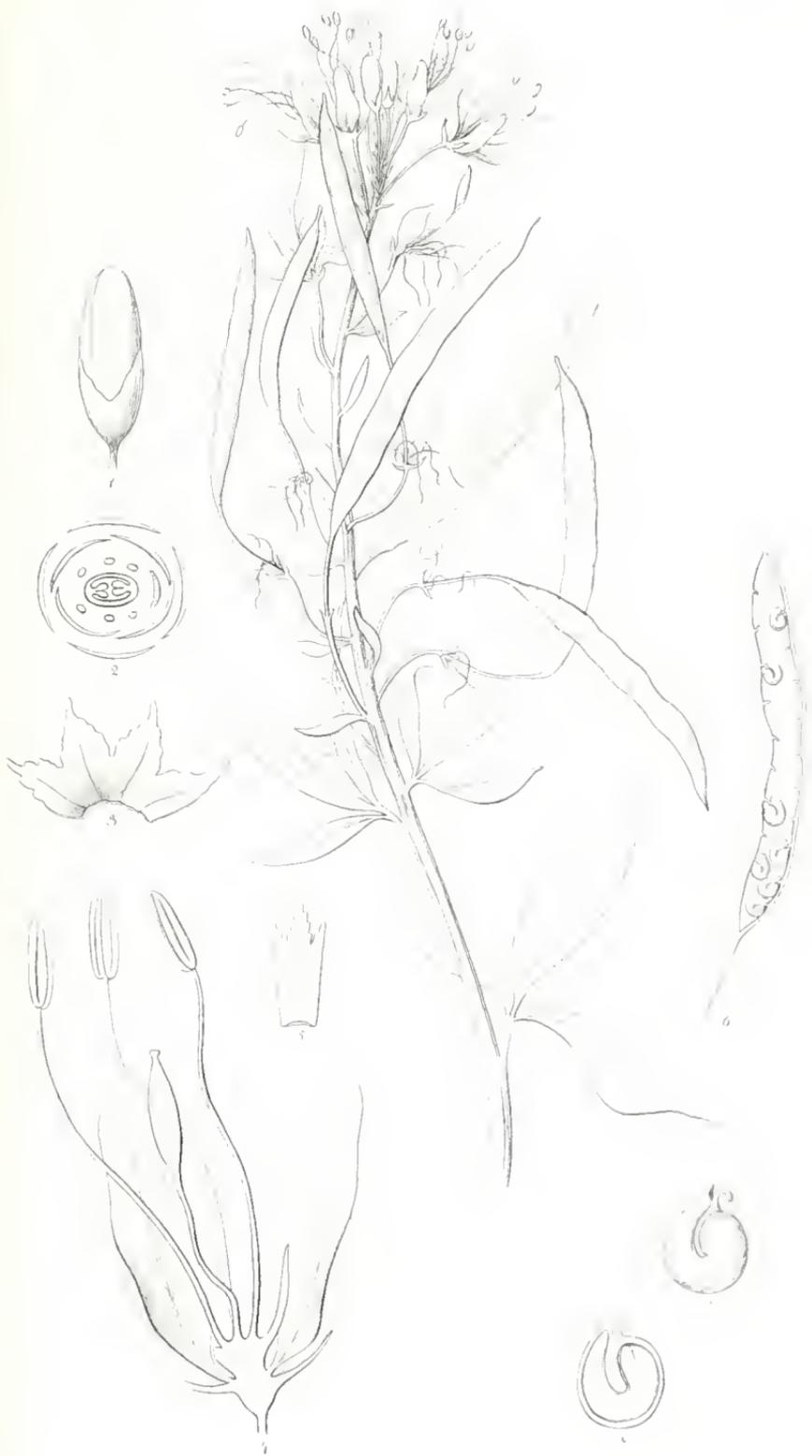


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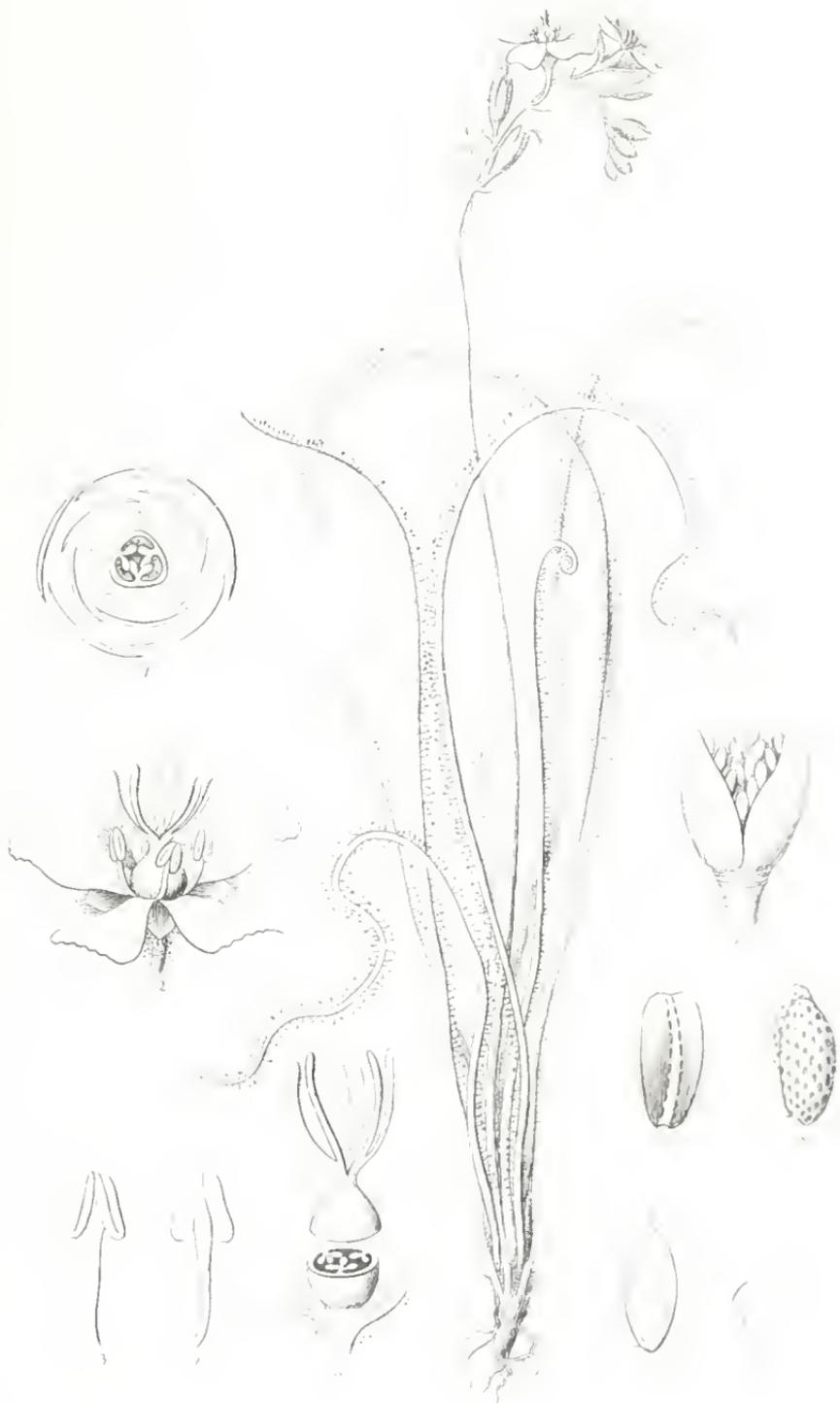




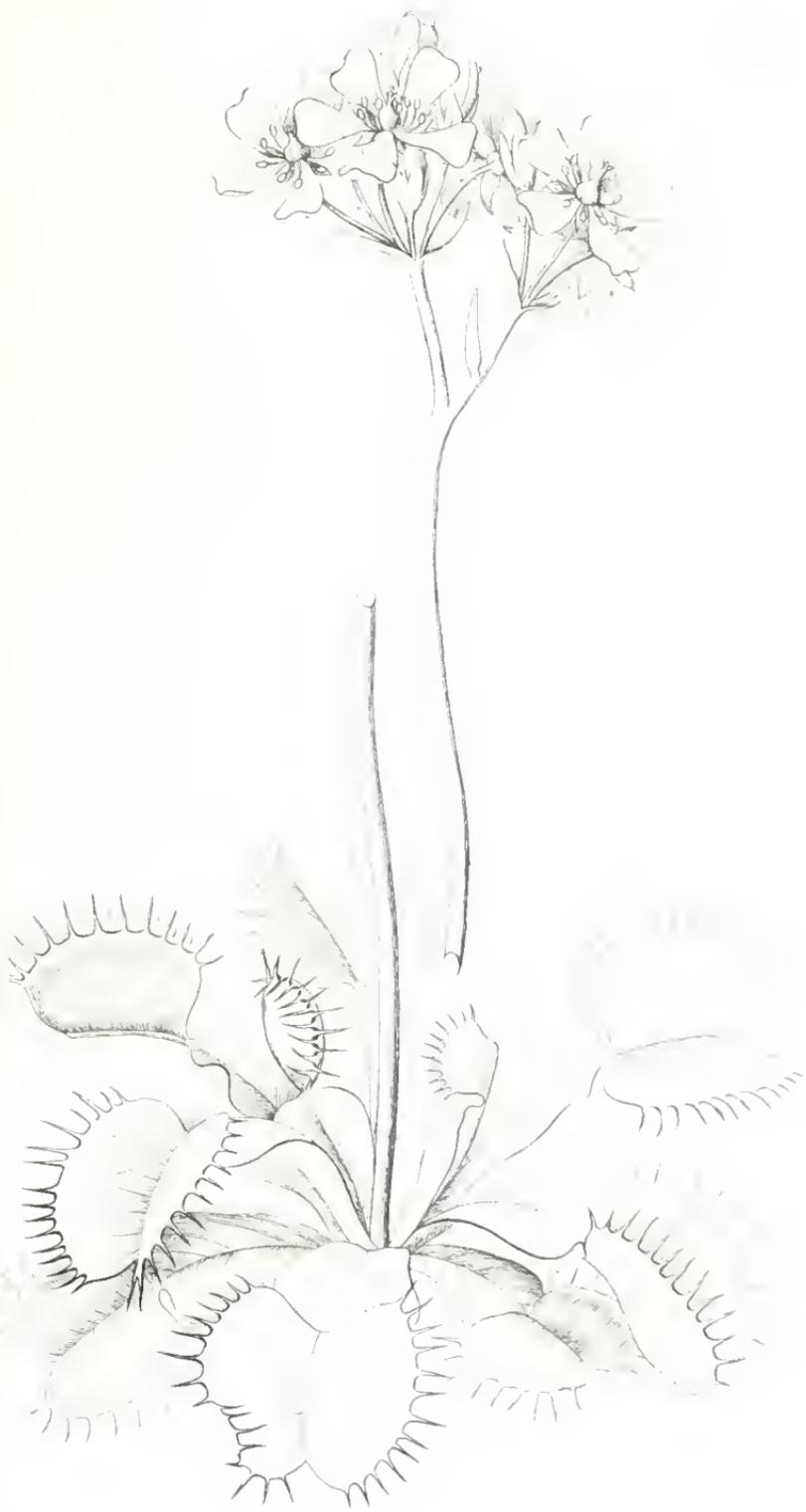




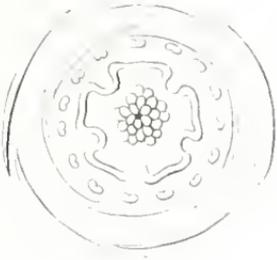




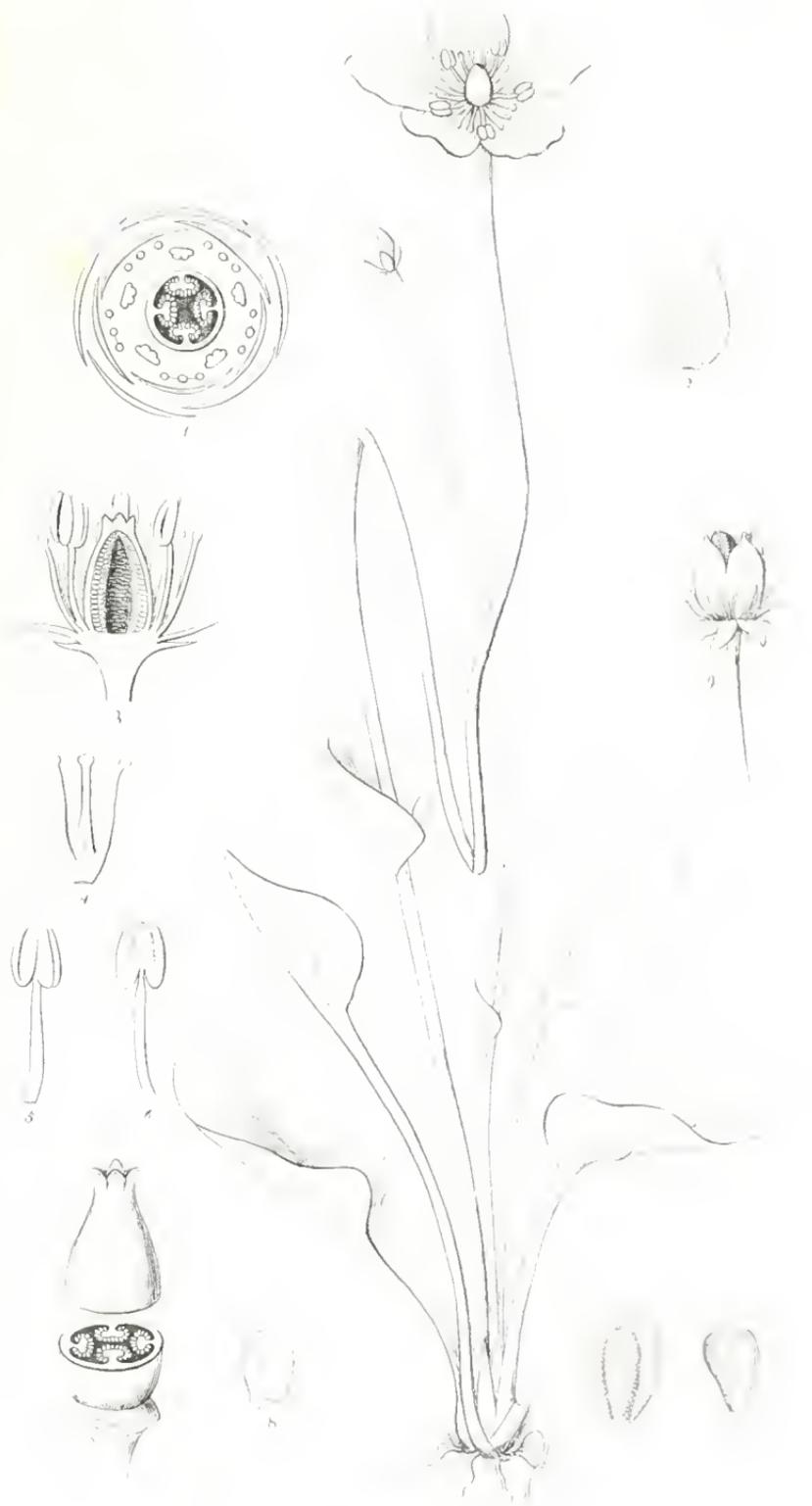




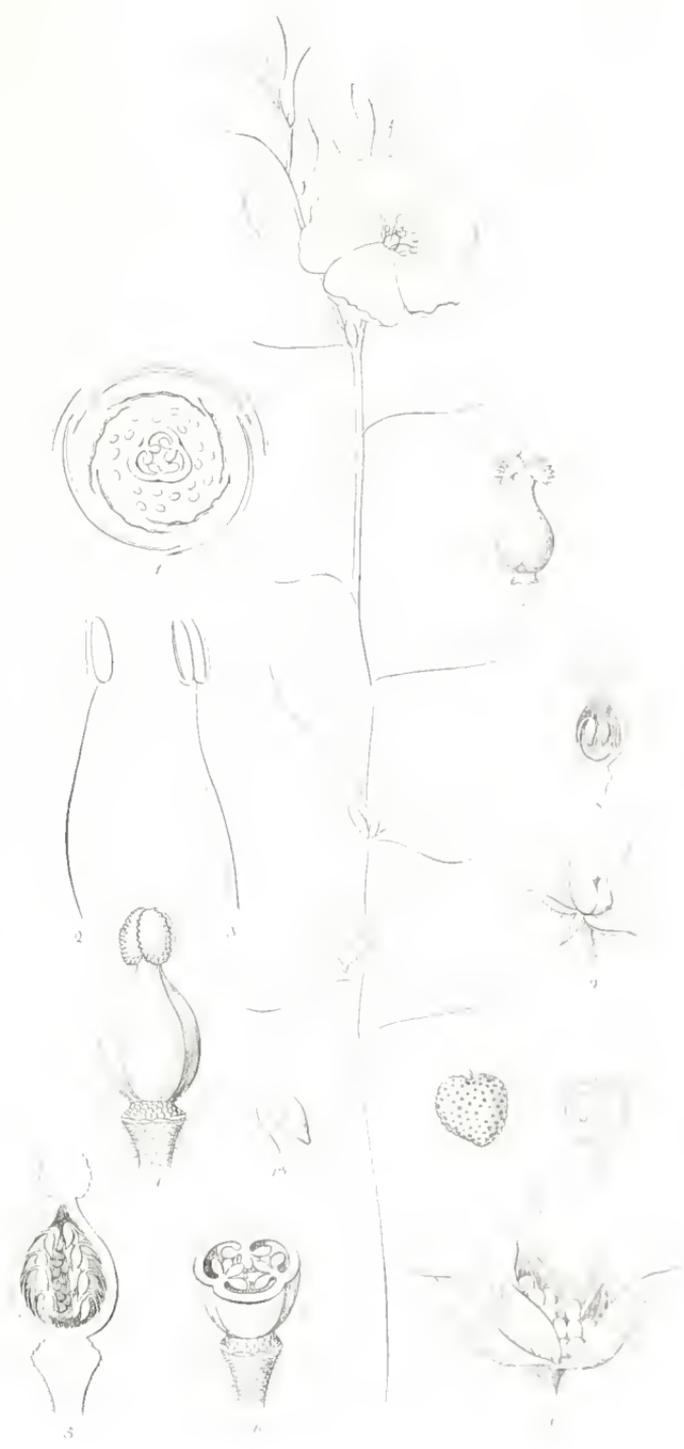












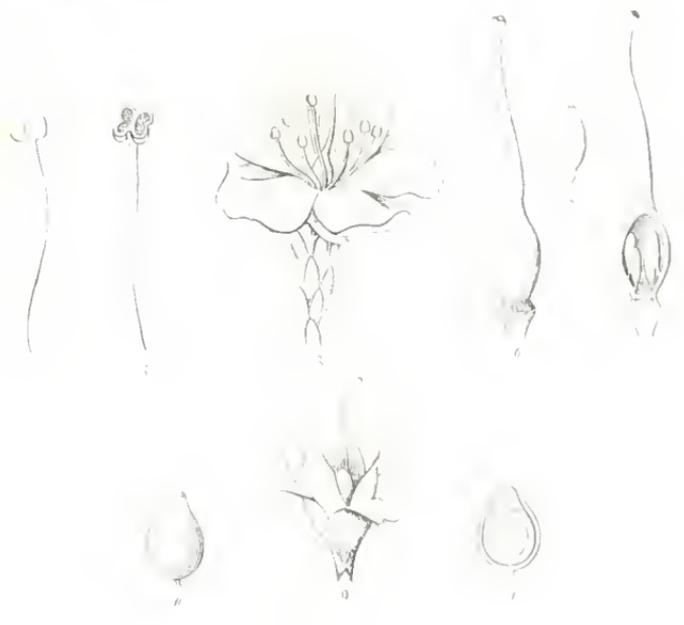
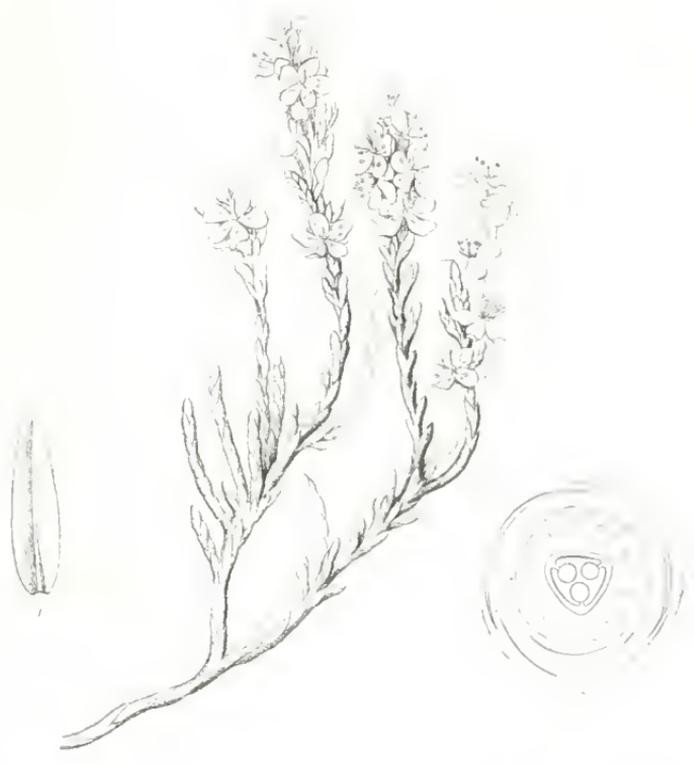




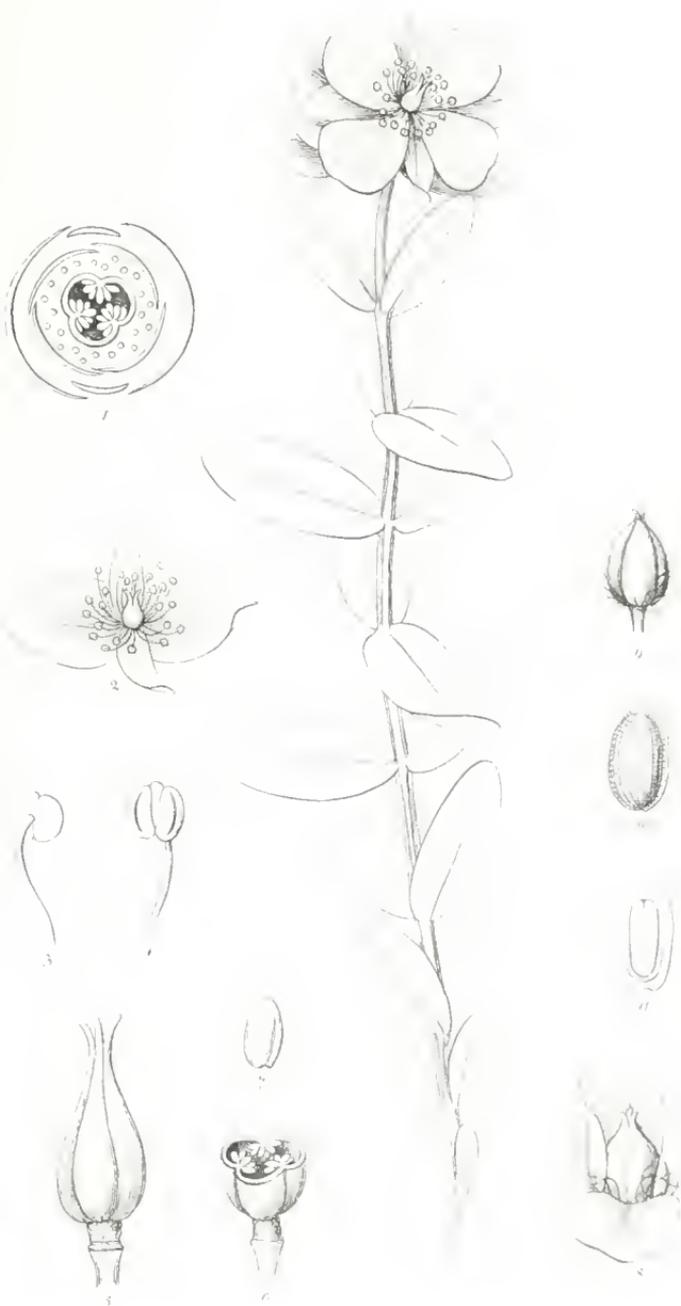




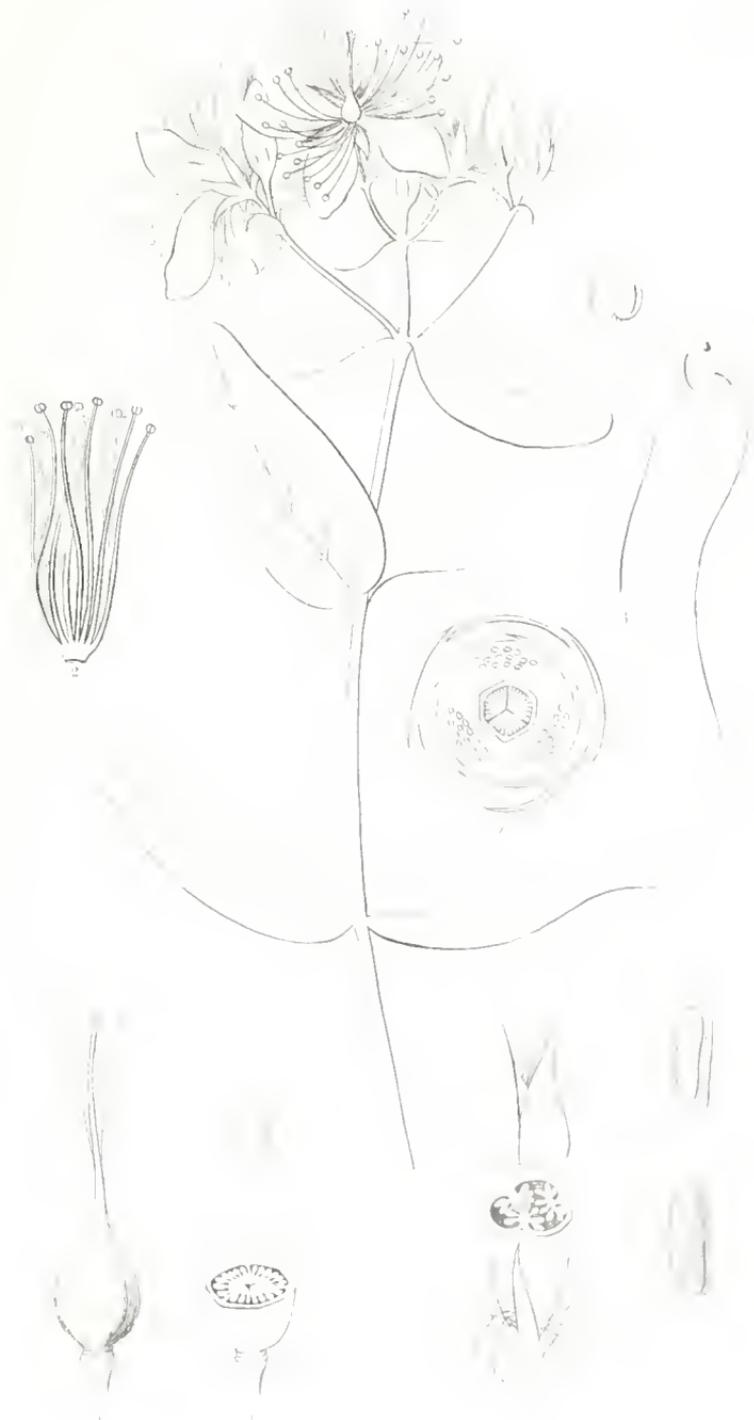




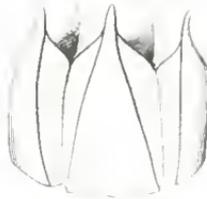
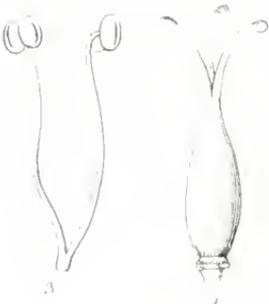




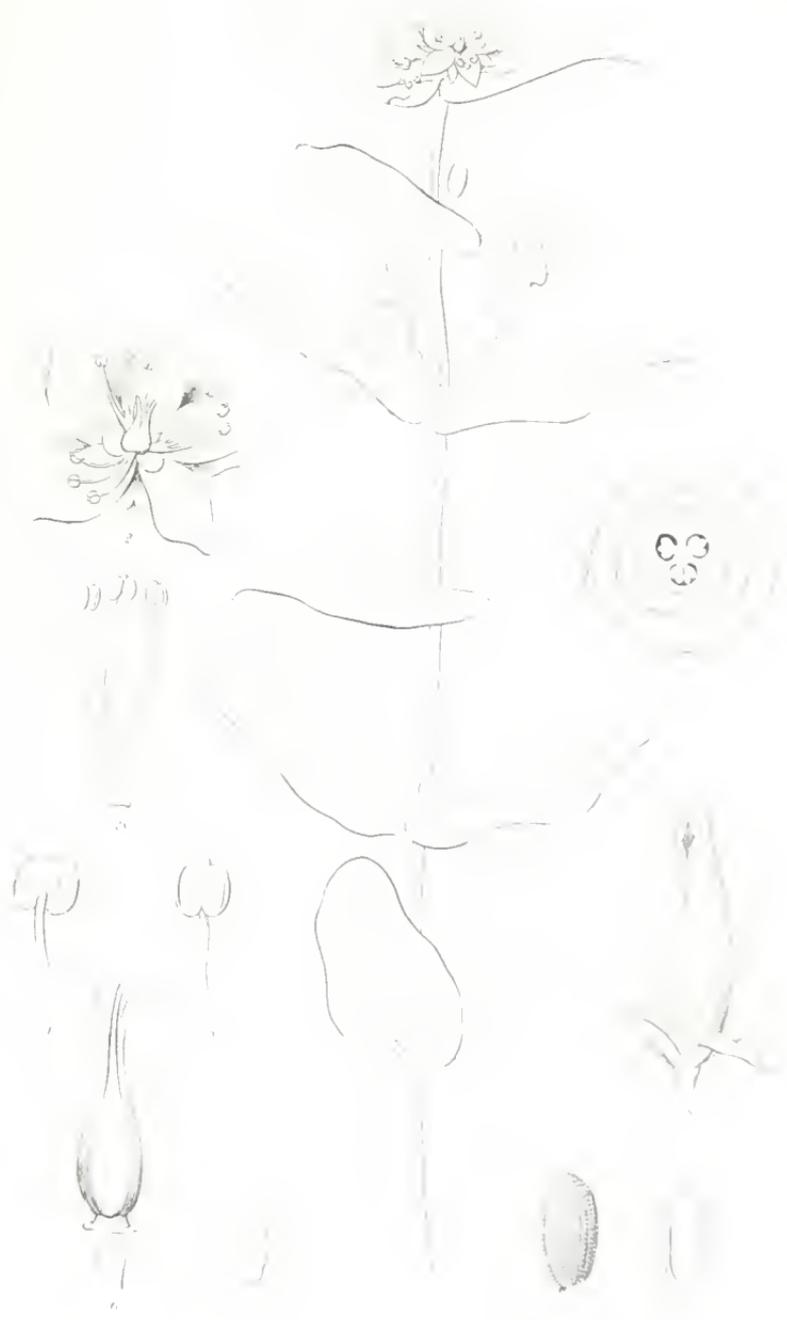




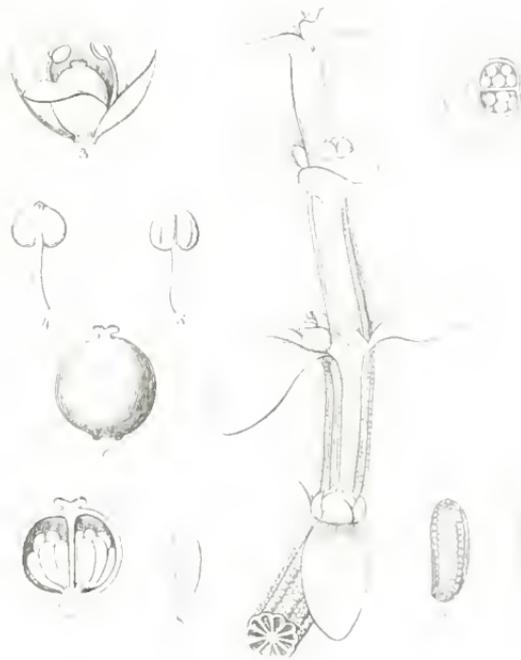












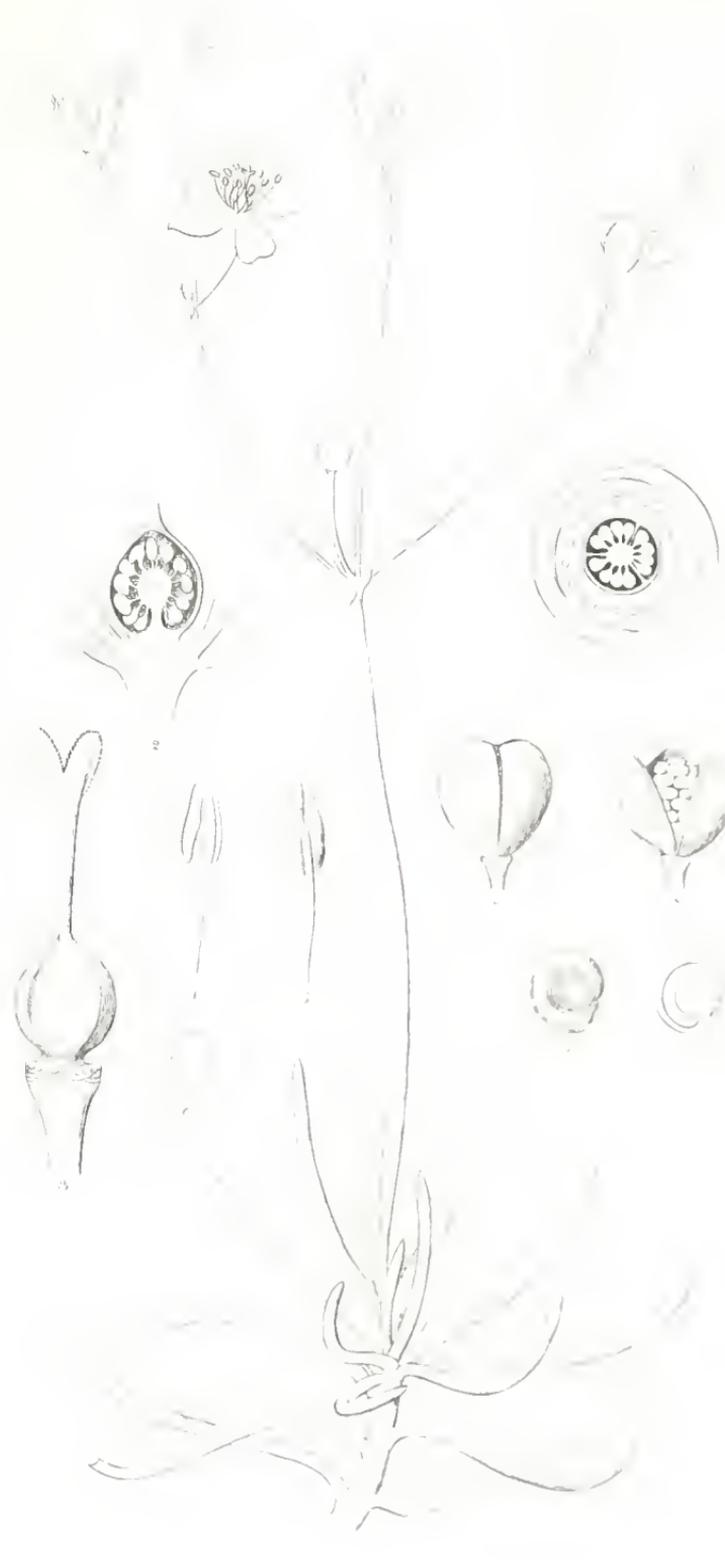




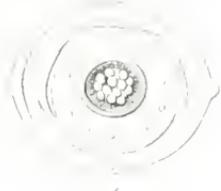




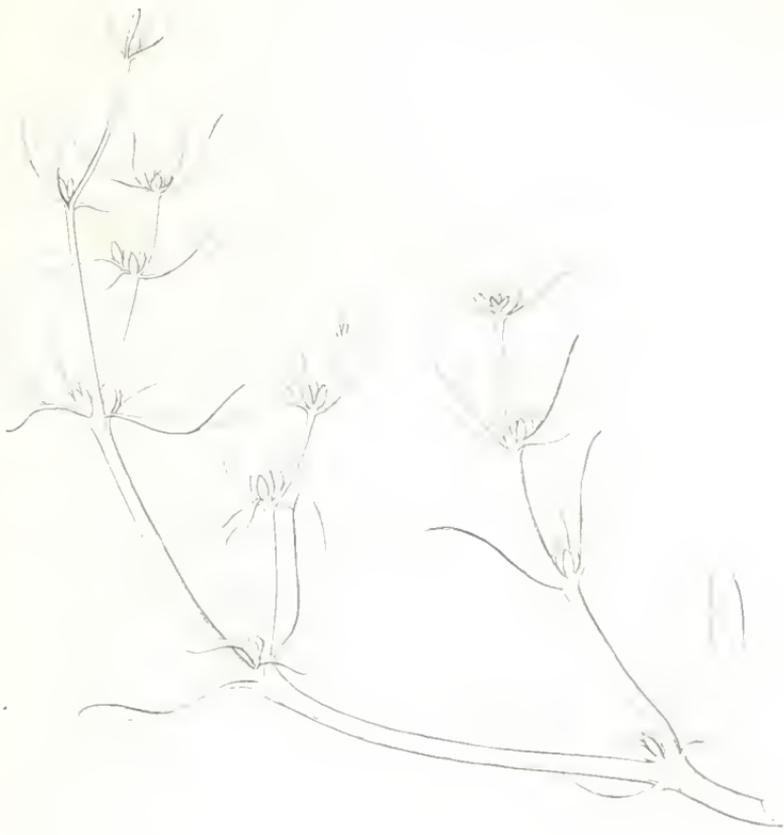
























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