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THE AMERICAN BOTANIST
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FLORIST:
INCLUDING LESSONS
IN THE
STRUCTURE, LIFE, AND GROWTH OF PLANTS;
TOGETHER WITH
A SIMPLE ANALYTICAL FLORA
DESCRIPTIVE OF THE NATIVE AND CULTIVATED PLANTS
GROWING IN THE ATLANTIC DIVISION
OF THE AMERICAN UNION.

BY
ALPHONSO WOOD, A. M.,
AUTHOR OF THE CLASS-BOOK OF BOTANY, ETC.

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PREFACE.

In preparing the present work, it was our purpose to furnish the student in Botany with a complete manual within the compass of an ordinary duodecimo volume. To this end, we have revised the introductory treatise and recorded the principles of the Science in fewer words, occupying but two-thirds the space so used in the Class-Book. We have thus made room for the introduction of a series of Synoptical Tables—a feature entirely new—exhibiting the principles contained in the several chapters at a single glance, and in their combined relations. In the preparation of these tables we have received important aid from Prof. S. A. Norton, of Mount Auburn Seminary, Cincinnati. They are intended for the blackboard, and we are confident that both teacher and pupil will find them an essential aid both to the understanding and memory.

Our new Flora will be found a phenomenon in brevity. Within the space of 426 duodecimo pages, in fair leaded type, we have recorded and defined nearly 4,500 species—all the known Flowering and Fern-like plants, both native and cultivated (not excepting the Sedges and Grasses), growing in the Atlantic half of the country. This conciseness has been attained, not by the omission of anything necessary to the complete definition and prompt recognition of every species, but simply by avoiding repetitions. In the final definition of the species (see, for example, *R. bulbosus*, the Bulbous Buttercup, p. 20) we give but one, two, three, rarely 4 lines. This cannot, of course, include its full portraiture. It includes only those few features which have not already been given elsewhere, and which here serve to distinguish the *R. bulbosus* from the two preceding species with which it stands grouped in the table. But the full portraiture of *R. bulbosus* (and of every species) nevertheless be found in the Flora. Some of its features are given under its genus, Ranunculus; some under its Order; some under its Cohort; others under its Class, its Province, and its Sub-kingdom.
Moreover, all along the path of its analysis through the tables its characters are announced and recognized; so that if all the statements descriptive of \textit{R. bulbosus} were collected, we should have nearly a half-page of text, and no important character left unnoticed.

Between the cultivated exotics and the wild native or naturalized species constituting our own flora, a distinction is made \textit{in the type}. The names of the latter are expressed in full-face, \textbf{Roman} for the species, and \textit{Italic} for the varieties. The names of the exotics are in \textbf{small capitals}.

The geographical limits of the present flora are the same as those adopted in the Class-Book; viz., all the States of the American Union lying east of the Mississippi River. This will necessarily include so many of the plants of the States bordering on the western shore of the Mississippi, that the book may be regarded as well adapted to those States also.

It gives me great pleasure to acknowledge my obligations to the friends whose names occur below and in many other parts of our work, for their contributions of new and rare plants, and for valuable information concerning them;—first, and especially, to Prof. Thos. C. Porter, of Lafayette College; to E. L. Hankenson, Newark, N.Y.; to John Wolf, Canton, Ill.; to Chas. H. Peck, Albany, N. Y.; to Wm. R. Girard, Esq., Poughkeepsie, N. Y.; to N. Colman, Iowa; to Rev. J. H. Carruth, Kansas; to Dr. W. Matthews, Dakota; to H. Mapes, Michigan, &c., &c.

And as a just tribute to the memory of my \textit{lamented} wife, I would add that whatever is new and peculiar in the plan of the present Flora, that on which its definite conciseness depends, \textit{is due to her alone}. She first indicated the method, and for years assiduously advocated its adoption.

\textit{CuJus nomini ac memorie carissimæ,}
\textit{MOC OPUS, IN MEDIO DOLORE AC DESIDERIO CONFECTION,}
\textbf{DEDICAT CONJUX.}
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TOGETHER WITH A SYLLABUS OF THE MORE PRACTICAL SUBJECTS,
DESIGNED AS EXERCISES ON THE BLACKBOARD,
PRELIMINARY TO THE LESSONS.

N. B.—We give the Syllabus of but a few Chapters, and of fewer entire, in order that the pupil may exercise his own skill in supplying the deficiencies. The teacher should require this. The abbreviation (&c.) indicates a table unfinished.

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      a Unsymmetrical, from the suppression of a part of some set.
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   —β must have 2 (or a double) placenta in each cell.
   —ε and an equal number of ovules in each cell.

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    4. Folded in plaits like a fan ..................................Placate.
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6, Rolled with its axis,—a from one edge into a scroll..........Convolute.
—b from both edges inward...........................Involute.
—c from both edges backward.........................Revolute.

* General;—regarding the whole bud.
1, Edges meeting, Valvate,—with the margins straight...............Valvate.
—without the margins involute..............Induplicate.
—without the margins revolute.............Reduplicate.
2, One edge overlapping, each leaf oblique.................Twisted or Contorted.
3, Both edges overlapping, Imbricate.
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   —half embracing..............Obvolute.
   b Leaves in threes, one of them exterior..............Triquetrous.
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   d Each leaf or petal embracing all those within..............Convolute.
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      2, Outline of a lance, or narrow-ovate................Lanceolate.
      3, Form of the Greek letter Δ..........................Deltoid.
   b The middle veinlets longest, lower and upper equal.
      4, Circular, or nearly so....................Orbicular.
      5, Outline of an elliptic spring.................Elliptical.
      6, Egg-shaped, with equal rounded ends..............Oval.
      7, Narrowly oval, with obtuse ends..............Oblong.
   c The upper veinlets longest.
      8, Inversely ovate, narrower at the base............Obovate.
      9, Inversely lanceolate, narrower at the base.........Oblanceolate.
     10, Obtuse at apex, narrowed to the base..............Spatulate.
     11, Shaped like a wedge, the point at base............Cuneate.
   d Lowest veinlets longest and recurved.
     12, A re-entering angle, or sinus, at base. Heart-shaped.......Cordate.
     13, Base-lobes ear-shaped..........................Auriculate.
     14, Base-lobes arrow-shaped......................... Sagittate.
     15, Base-lobes turned outward........................Iliaate.

* Dissected Forms.
   a Pinnately cut or divided.
CONTENTS.

1. With regular lateral segments. Pinnatifid.
2. With segments recurved or hooked. Runcinate.
5. Segments and sinusae rounded. Sinuate.

b Palmately cut or lobed.
7. Lobes 5 or more. Palmately-lobed.

CHAPTER XXII. Forms of Compound Leaves.

* Pinnately compound.
  a Once compounded, consisting of—
   1. Two leaflets opposite and equal. Binate.
   2. Three leaflets, the odd one petiolate. Pinnately-trifoliate.
   3. Four or more equal leaflets, all in pairs. Equally pinnate.
   4. Five or more equal leaflets, all but one in pairs. Odd-pinnate.
   5. Alternate leaflets smaller. Interruptedly pinnate.

b Twice compounded, consisting of—
   7. Fifteen or more leaflets (3 pinnate leaves). Bipinnate.

c Thrice compounded, having 27 leaflets. Trinervate, &c.

d Irregularly much compounded. Decompounded.

* Palmately compound, consisting of—
   10. Three equal leaflets all alike sessile (Clover). Palmi-trifoliate.
   11. Five or 7 leaflets, all equally sessile. Digitate.

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* Centripetal, or Indefinite.
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     —2, along a thick fleshy rachis. Spadix.
     —3, on an extremely short rachis. Head.
     —4, Spike of imperfect fls. caducous together. Ament.

b Flowers borne on pedicels.
  5. Along the sides of a lengthened rachis. Raceme.
  6. Along a short rachis, the lower pedicels lengthened. Corymb.

c The pedicels themselves branched,—8 loosely. Panicle.
     —9 compactly. Thyrs.

* Centrifugal, or Definite.
  1. Clusters open, loose, of various forms. Cyme.
  2. Clusters compact, terminal. Fascicle.
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  —b in darkness—Consuming C.
  —Exhaling CO₂.
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INTRODUCTION.

CHAPTER I.

AIDS TO THE STUDY OF BOTANY.

1. The proper season for the commencement of the study of Botany in schools, is late in winter, at the opening of the first session after New-Year's. The class will thus be prepared beforehand, by a degree of acquaintance with first principles, for the analysis of the earliest Spring-flowers—the Blood-root, Liverwort, Spring-beauty, Sweet Mayflower, Erigenia, and the Violets. We have arranged the topics of the present treatise with a special view to the convenience of the learner in this respect, beginning with that which is the first requisite in analysis—the Flower.

2. Specimens of leaves, stems, roots, fruit, flowers, etc., in unlimited supply are requisite during the whole course. In the absence of the living, let the dried specimens of the herbarium be consulted. Crayon sketches upon the blackboard, if truthful, are always good for displaying minute or obscure forms. In the city, classes in Botany may employ, at small expense, a collector to supply them daily with fresh specimens from the country. Moreover, the gardens and conservatories will furnish to such, an abundant supply of cultivated species for study and analysis, with almost equal advantage,—since the present work embraces, together with the native flora, all exotics which are in any degree common in cultivation.

3. An Herbarium (Latin, hortus siccus, or h. s.) is a collection of botanic specimens, artificially dried, protected in papers, and systematically arranged. Herbaria are useful in many ways;—(a) for preserving the knowledge of rare, or inaccessible, or lost species; (b) for exchanges, enabling one to possess the flora of other countries; (c) for refreshing one's memory of early scenes and studies; (d) for aiding in more
exact researches at leisure; (e) for the comparison of species with species, genus with genus, etc.

4. **Apparatus.** For collecting botanic specimens, a strong knife for digging and cutting is needed, and a close tin box, fifteen inches in length, of a portable form. Enclosed in such a box, with a little moisture, specimens will remain fresh a week.

5. Specimens for the herbarium should represent the leaves, flowers, and fruit—and, if herbaceous, the root also. Much care is requisite in so drying them as to preserve the natural appearance, form, and color. The true secret of this art consists in extracting the moisture from them before decomposition can take place.

6. **The drying-press,** to be most efficient and convenient, should consist of a dozen quires of unsized paper, at least $11 \times 14$ inches folio; two sheets of wire-gauze (same size) as covers, stiffened by folded edges; and three or four leather straps a yard in length, with buckles. When in use, suspend this press in the wind and sunshine; or, in rainy weather, by the fire. In such circumstances, specimens dry well without once changing. But if boards be used instead of wire-gauze, the papers must be changed and dried daily. Succulent plants may be immersed in boiling water before pressing, to hasten their desiccation.

7. **The lens,** either single, double, or triple, is almost indispensable in analysis. In viewing minute flowers, or parts of flowers, its use cannot be too highly appreciated. Together with the lens, a needle inserted in a handle, a penknife, and tweezers are required for dissection.

8. The compound microscope is undoubtedly a higher aid in scientific investigation than any other instrument of human invention. It is like the bestowment of a new sense, or the opening of a new world. Through this, almost solely, all our knowledge of the cells, the tissues, growth, fertilization, etc., is derived. The skilful use of this noble instrument is itself an art, which it is no part of our plan to explain. For such information the student is referred to the works of Carpenter and Quekett.

9. On the preparation of botanical subjects for examination we remark briefly—The field of view is necessarily small, and only minute portions of objects can be seen at once. The parts are to be brought under inspection successively by the movements of the stage.
10. The tissues of leaves, etc., are best seen by transmitted light. They are to be divided by the razor or scalpel into extremely thin parings or cuttings. Such cuttings may be made by holding the leaf between the two halves of a split cork. They are then made wet and viewed upon glass. The stomata are best seen in the epidermis stripped off; but in the Sorrel-leaf (Oxalis violacea) they appear beautifully distinct upon the entire leaf. (§ 397, Fig. 497.)

11. Woody tissues, etc., may be viewed either as opaque or transparent. Sections and cuttings should be made in all directions, and attached to the glass by water, white of egg, or Canada balsam. To obtain the elementary cells separately for inspection, the fragment of wood may be macerated in a few drops of nitric acid added to a grain of chloride of potassa. Softer structures may be macerated simply in boiling water.

Review of the Chapter.—1. Advantage of beginning the study in early spring. 2. Specimens for illustration. How to obtain them in the city. 3. The herbarium. Uses of it. 4. Apparatus for collecting. 5. Good specimens. Secret of preparing them. 6. The drying-press. 7. The use of lenses. 8. Of the microscope, etc.

CHAPTER II.

DEPARTMENTS OF SCIENCE.

12. Three great departments in nature are universally recognized, commonly called the mineral, vegetable, and animal kingdoms. The first constitutes the Inorganic, the other two the Organic World.

13. A mineral is an inorganic mass of matter—that is, without distinction of parts or organs. A stone, for example, may be broken into any number of fragments, each of which will retain all the essential characteristics of the original body, so that each fragment will still be a stone.

14. A plant is an organized body, endowed with vitality but not with sensation, composed of distinct parts, each of which is essential to the completeness of its being. A Tulip is composed of organs which may be separated and subdivided indefinitely, but no one of the fragments alone will be a complete plant.

15. Animals, like plants, are organized bodies endowed with vitality, and composed of distinct parts, no one of which is complete in itself; but they are elevated above either plants or minerals by their power of perception.

16. Physics is the general name of the science which treats of the mineral or inorganic world.

17. Zoology relates to the animal kingdom.
18. **Botany** is the science of the vegetable kingdom. It includes the knowledge of the forms, organs, structure, growth, and uses of plants, together with their history and classification. Its several departments correspond to the various subjects to which they relate. Thus,

19. *Structural Botany*, or Organography, treats of the special organs of plants as compared with each other, answering to Comparative Anatomy in the science of Zoology. Morphology is a term often used in a similar sense; but it especially relates to the mutual or typical transformations which the organs undergo in the course of development.

20. *Elementary Botany* treats of the elementary tissues—the organic elements out of which the vegetable fabric is constructed.

21. *Physiological Botany* is that department which relates to the vital action of the several organs and tissues, including both the vital and chemical phenomena in the germination, growth, and reproduction of plants. It has, therefore, a direct and practical bearing upon the labors of husbandry in the propagation and culture of plants, both in the garden and in the field.

22. *Systematic Botany* arises from the consideration of plants in relation to each other. It aims to arrange and classify plants into groups and families, according to their mutual affinities and relative rank, so as to constitute of them all one unbroken series or system.

23. *Descriptive Botany*, or Phytology, is the art of expressing the distinctive characters of species and groups of plants with accuracy and precision, in order to their complete recognition. A *Flora* is a descriptive work of this kind, embracing the plants of some particular country or district.

24. Finally, in its extended sense, Botany comprehends also the knowledge of the relations of plants to the other departments of nature—particularly to mankind. The ultimate aim of its researches is the development of the boundless resources of the vegetable kingdom, for our sustenance and protection as well as education; for the healing of our diseases and the alleviation of our wants and woes. This branch of botanical science is called *Applied Botany*, including several departments—as Medical Botany, or Pharmacy; Agricultural Botany, or Chemistry; Pomology, etc.

25. The name of a plant or other natural object is twofold,—the trivial or popular name, by which it is generally known in the country; and the Latin name, by which it is accurately
DEPARTMENTS OF SCIENCE.

designated in science throughout the world. For example, *Strawberry* is the popular name, and *Fragaria vesca* the Latin or scientific name, of the same plant. In elementary treatises, like the present, for the sake of being readily understood, plants are usually called by their popular names. Yet we earnestly recommend the learner to accustom himself early to the use of the more accurate names employed in science.

26. The Latin name of a plant is always double—generic and specific. Thus *Fragaria* is generic, or the name of the *genus* of the plant—*vesca* is specific, or the name of the *species*.

27. **A Species** embraces all such individuals as may have originated from a common stock. Such individuals bear an essential resemblance to each other as well as to their common parent, in all their parts. For example, the White Clover (*Trifolium repens*) is a species embracing thousands of contemporary individuals scattered over our hills and plains, all of common descent, and producing other individuals of their own kind from their seed.

28. To this law of resemblance in plants of one common origin there are some apparent exceptions. Individuals descended from the same parent often bear flowers differing in color, or fruit differing in flavor, or leaves differing in form, etc. Such plants are called **Varieties**. They are never permanent, but exhibit a constant tendency to revert to their original type. Varieties occur chiefly in species maintained by cultivation, as the Apple, Potato, Rose, Dahlia. They also occur more or less in native plants (as Hepatica triloba), often rendering the limits of the species extremely doubtful. They are due to the different circumstances of climate, soil, and culture to which they are subjected, and continue distinct only until left again to multiply spontaneously from seed in their own proper soil, or some other change of circumstances.

29. **A Genus** is an assemblage of species closely related to each other in the structure of their flowers and fruit, and having more points of resemblance than of difference throughout. Thus, the genus Clover (*Trifolium*) includes many species, as the White Clover (*T. repens*), the Red Clover (*T. pratense*), the Buffalo Clover (*T. reflexum*), etc., agreeing in floral structure and gen-
eral aspect so obviously that the most hasty observer would notice their relationship. So in the genus Pinus, no one would hesitate to include the White Pine, the Pitch Pine, the Long-leafed Pine (P. strobus, rigida, and palustris), any more than we would fail to observe their differences.

30. Thus individuals are grouped into species, and species are associated into genera. These groups constitute the bases of all the systems of classification in use, whether by artificial or natural methods.


CHAPTER III.

THE FOUR STAGES OF PLANT LIFE.

31. In its earliest stage of life, the plant is an embryo sleeping in the seed. It then consists of two parts, the radicle or rootlet, and the plumule. Both may be seen in the Pea, Bean, or Acorn. Besides the embryo, the seed contains also its food in some form, provided for its first nourishment.

32. At length the genial warmth and moisture of the Spring awakens the embryo, and it begins to feed and grow. The radicle protrudes the slender rootlet (fig. 2, r), which turns downward, seeking the dark damp earth, avoiding the air and light, and forms the root or descending axis. The plumule, taking the opposite direction (fig. 3, p), ascends, seeking the air and light, and expanding itself to their influence. This constitutes the stem or ascending axis, bearing the leaves. Thus the acorn germinates, and the Oak enters upon the second stage of its existence.

33. At first the ascending axis is merely a bud, that is, a growing point clothed with and protected by little scales, the rudiments of leaves. As the growing point advances and its lower scales gradually expand into leaves, new scales successively appear above. Thus the axis is always terminated by a bud.
34. By the growth of the terminal bud, the axis is simply lengthened in one direction, an undivided stem. But besides this, buds also exist, ready formed, in the axils of the leaves, one in each. These axillary buds, a part or all of them, may grow and develop like the terminal bud, or they may always sleep, as in the simple-stemmed Mullein or Palm. But in growing they become branches, and these branches may, in turn, generate buds and branchlets in the axils of their own leaves in like manner. By the continued repetition of this simple process, the vegetable fabric arises, ever advancing in the direction of the growing points, clothing itself with leaves as it advances, and enlarging the volume of its axis, until it reaches the limit of being assigned by its Creator.

35. Reared by this process alone, the plant consists of such organs only as were designed for its own individual nourishment—roots to absorb its food, stem and branches to transmit it, and leaves to digest it. These are called organs of nutrition. But the divine command which caused the tribes of vegetation in their diversified beauty to spring from the earth, required that each plant should have its "seed within itself" for the perpetuation of its kind. (See. 1; 11.)

36. In the third stage of vegetation, therefore, a change occurs in the development of some of the buds. The growing point ceases to extend itself as hitherto, and still remains a point, expanding its scales in crowded whorls, each successive whorl undergoing a gradual transformation, departing more and more from the original type—the leaf. Thus, instead of a leafy branch, the ordinary product of the bud, a flower is the result.

37. Hence a flower may be considered as a transformed branch,
having the leaves crowded together by the non-development of the axis, moulded into more delicate forms and tinged with more brilliant hues, not only to adorn the face of nature, but to fulfil the important office of reproduction.

38. Lastly comes fruit-bearing, the fourth stage of plant life, for which the flower has prepared the way. The work and bloom of the flower are soon accomplished, its deciduous parts fall, and the remaining energies of the plant are directed to the development of the pistil into the perfect fruit.


CHAPTER IV.

TERM OR PERIOD OF PLANT LIFE.

39. Flowering and fruit-bearing is an exhausting process. If it occur within the first or second year of the life of the plant, it generally proves the fatal event. In all other cases it is either immediately preceded or followed by a state of needful repose. Now if flowering be prevented by nipping the buds, the tender annual may become perennial, as in the florist's Treemignonette.

40. We distinguish plants, as to their term of life, into the annual (1), the biennial (2), and the perennial (2f). An annual (1) herb is a plant whose entire life is limited to a single season. It germinates from the seed in Spring, attains its growth, blossoms, bears fruit, and dies in Autumn; as the Flax, Corn, Morning-glory.

41. A biennial herb (2) is a plant which germinates and vegetates, bearing leaves only the first season, blossoms, bears fruit, and dies the second; as the Beet and Turnip. Wheat, Rye, etc., are annual plants; but when sown in Autumn they have the habit of biennials, in consequence of the prevention of flowering by the sudden cold.
42. **Monocarpic herbs.** The Century-plant (Agave), the Talipot-palm, etc., are so called. They vegetate, bearing leaves only, for many years, accumulating materials and strength for one mighty effort in fructification, which being accomplished, they die. In some species the term of life depends on climate alone. The Castor-bean (Ricinus) is an annual herb in the Northern States, a shrub in the Southern, and a tree of large size in its native India. So Petunia, annual in our gardens, is perennial at home (in Brazil).

43. **Perennial plants** are such as have an indefinite duration of life, usually of many years. They may be either herbaceous or woody. Herbaceous perennials, or *perennial herbs* (24), are plants whose parts are annual above ground and perennial below. In other words, their roots or subterranean stems live from year to year, sending up annually, in Spring, flowering shoots which perish after they have ripened their fruit in Autumn; as the Lily, Dandelion, Hop.

44. **Woody perennials** usually vegetate several years, and attain well-nigh their ordinary stature before flowering; thenceforward they fructify annually, resting or sleeping in winter. They are known as trees (5), shrubs (5), bushes, and undershrubs (5)—distinctions founded on size alone.

45. A **shrub** (5) is a diminutive tree, limited to eighteen or twenty feet in stature, and generally dividing into branches at or near the surface of the ground (Alder, Quince). If the woody plant be limited to a still lower growth, say about the human stature, it is called a bush (Snowball, Andromeda). If still smaller, it is an undershrub (5) (Whortleberry).

46. A **tree** (5) is understood to attain to a height many times greater than the human stature, with a permanent woody stem, whose lower part, the trunk, is unbranched.

47. As to age, some trees live only a few years, rapidly attaining their growth and rapidly decaying, as the Peach; others have a longevity exceeding the age of man; and some species outlive many generations. **Age may be estimated by the number of wood-circles or rings seen in a cross-section of the trunk (§ 408), each ring being (very generally) an annual growth.** Instances of great longevity are on record. See Class Book of Botany, §§ 99, 100. The monarch tree of the world is that Californian Cedar—Sequoia gigantea. One which had fallen measured 26 feet in diameter, and 363 in length! The wood-circles of this specimen are unusually thick, yet count up to 1,330 years. Among those yet standing (A. D. 1866), are many of even greater dimensions, as beautiful in form as they are sublime in height—the growth, probably, of more than 2,000 years.

48. Trees are again distinguished as **deciduous** (5) and **evergreen** (5)—the former losing their foliage in Autumn, and remaining naked until the following Spring; the latter retaining
their leaves and verdure throughout all seasons. The Fir tribe (Coniferae) includes nearly all the evergreens of the North: those of the South are far more numerous in kind—e. g., the Magnolias, the Live-oaks, Holly, Cherry, Palmetto, etc.

CHAPTER I.

THE FLOWER.

49. The flower is the immediate agent in the production of the seed with its embryo, and to this end its whole structure is designed. Moreover, its superior beauty attracts earliest attention, and an intimate knowledge of its organism is the first requisite in analysis and classification.

50. The flower may consist of the following members—the floral envelopes and the essential floral organs. The floral envelopes consist of one or more circles or whorls of leaves surrounding the essential organs. The outer of these whorls is called the calyx; and the other, if there be any, the corolla. The calyx may, therefore, exist without the corolla; but the corolla cannot exist without the calyx.

51. Calyx is a Greek word signifying a cup. It is applied to the external envelope of the flower, consisting of a whorl of leaves with their edges distinct or united, usually green, but sometimes highly colored. The leaves or pieces composing the calyx are called sepals.

52. Corolla is a Latin word signifying a little crown, applied to the interior envelope of the flower. It consists of one or more circles of leaves, either distinct or united by their edges, usually of some other color than green, and of a more delicate texture than the calyx. Its leaves are called petals.
53. Perianth (*ἐπς, around, ἄνθος, flower) is a word in common use to designate the floral envelopes as a whole, without distinction of calyx and corolla. It is used in description, especially when these two envelopes are so similar as not to be readily distinguished, as in the Tulip, Lily, and the Endogens generally; also where only one envelope exists, as in Phytolacca, Elm, etc.

54. The essential floral organs stand within the circles of the perianth, and are so called because they are the immediate instruments in perfecting the seed, and thus accomplishing the final purposes of the flower. These organs are of two kinds, perfectly distinct in position and office—viz., the stamens and the pistils.

55. The stamens are those thread-like organs situated just within the perianth and around the pistils. Their number varies from one to a hundred or more; but the most common number is five. Collectively they are called the androecium.

56. The pistils (called also carpels) occupy the centre of the flower at the absolute terminus of the flowering axis. They are sometimes numerous, often apparently but one, always destined to bear the seed. Collectively they are called the gynoecium.

57. The torus or receptacle is the axis of the flower, situated at the summit of the flower-stalk. It commonly appears a flattened or somewhat convex disk, whose centre corresponds to the apex of the axis. On this disk, as on a platform, stand the floral organs above described, in four concentric circles.
PLAN OF THE FLOWER.

21
cium (pistils) occupies the centre; the andrœcium encircles it; the corolla is next without; and the calyx embraces the whole.


CHAPTER II.

PLAN OF THE FLOWER.

58. Such, in general, is the organization of the flower. It is simple enough in theory; and in most of the plants with which he meets, the student will easily recognize these several organs by name. But, in truth, flowers vary in form and fashion to a degree almost infinite. Each organ is subject to transformations, disguises, and even to entire extinction; so that the real nature of the flower may become an intricate and perplexing study.

59. But we shall soon see that in all these variations there is method. They are never capricious or accidental, however much they may appear so. *Unity in diversity* is characteristic of Nature in all her departments, and eminently so in the flowers; and the first step in the successful study of them is to discover that unity—that *simple idea* of the floral structure in which all its diversities harmonize. Before flowers were created, that idea or *type* was conceived; and to possess it ourselves is a near approach to communion with the Infinite Author of Nature.

60. The typical flower, one that exemplifies the full idea of the floral structure, consists of four different circles of organs, as before described, placed circle within circle on the torus, and all having a common centre. Such a flower must possess these five attributes—viz.: It must be

a, Complete; having the four kinds or sets of organs arranged in as many concentric circles. That it is *perfect*, having both kinds of the essential organs, is necessarily included under its completeness.

b, Regular; having the organs of the same name all similar
and alike; that is, all the petals of one pattern, all the stamens alike in form, size, position, etc.

c, *Symmetrical*; having the same number of organs in each set or circle.

d, *Alternating* in respect to the position of the organs. This implies that the several organs of each set stand not opposite to, but alternating with the organs of the adjacent set;—the petals alternate with the sepals and stamens; the stamens alternate with the petals and pistils.

e, That the organs be *distinct*, all disconnected and free from each other.

61. This is the *Type*. But it is seldom fully realized in the flowers as they actually grow, although the tendency toward it is universal. Deviations occur in every imaginable mode and degree, causing that endless variety in the floral world which we never cease to admire. For example, in our pattern flowers (5, 6, 7,) the pistils seem too few in the Pink and Lily, and the stamens too many in all of them.

62. The flower of the *Flax* (10) combines very nearly all the conditions above specified. It is complete, regular, symmetrical. Its organs are alternate and all separate; and (disregarding the slight cohesion of the pistils at their base) this flower well realizes our type. Admitting two whorls of stamens instead of one, we have a good example of our type in Stone-crop (*Sedum ternatum*), a little fleshy herb of our woods. Its flowers are both 4-parted and 5-parted in the same plant. See also the 12-parted flowers of the common *Houseleek*.

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8, *Flower of Crassula lactea*, regular, symmetrical, organs distinct. 9, Diagram showing its plan. 10, *Flower of the Scarlet Flax*. 11, Diagram of its plan.

63. The flowers of *Crassula* (8), an African genus sometimes cultivated, afford unexceptionable examples, the sepals, petals,
stamens, and pistils each being five in number, regularly alternating and perfectly separate.


CHAPTER III.

STUDY OF ANOMALOUS FLOWERS.

64. Now the true method of studying the flower is by comparing it with this type. So shall we be able, and ever delighted, to learn the nature of each organ in all its disguises of form, and to discern the features of the general plan even under its widest deviations. The more important of them are included under the following heads, which will be considered in order: 1, Variations of the radical number of the flower; 2, Deficiencies; 3, Redundancies; 4, Union of parts; 5, Irregularities of development.

65. The radical number of the flower is that which enumerates the parts composing each whorl. Here nature seems most inclined to the number five, as in Crassula, Flax, Rose, and Strawberry. It varies, however, from one to twelve, and is expressed by word or sign as follows: di-merous, or 2-parted (\(\varphi\)), tri-merous or 3-parted (\(\varphi\)), penta-merous or 5-parted (\(\varphi\)), etc. The flowers of Hippuris (12) are 1-parted, having but one stamen and one pistil. Those of Circeea (13) are 2-parted, having 2 sepals, 2 petals, 2 stamens, etc. Those of Xyris (14) are \(\varphi\), having all the parts in 3s. Xyris is one of the Endogenes.
Trimerous flowers are characteristic of this great group of Plants, while pentamerous flowers commonly distinguish the Exogens.

66. **Deficiencies** often occur, rendering the flower *incomplete*. Such flowers lack some one or more entire sets of organs. When only one of the floral envelopes, the calyx, exists, the flower is said to be *apetalous* or monochlamydeous (χαλάμως, a cloak), as in Elm, Phytolacca. These terms are also loosely applied to such plants as Rhubarb, Anemone, Liverwort, where the pieces of the perianth are all similar, although in two or three whorls. When the perianth is wholly wanting, the flower is said to be aehlamydeous, or *naked*, as in Lizard-tail (15).

![Image 15, Flower of Saururus (Lizard-tail) — aehlamydeous. 16, Flower of Fraxinus (Ash). 17, Flower of Salix (Willow), staminate — 15, pistillate.](image)

67. **Imperfect flowers** are also of frequent occurrence. They are deficient in respect to the essential organs. A *sterile* or staminate flower (denoted thus ♂) has stamens without pistils. A *fertile* or pistillate flower (♀) has pistils without stamens. Such flowers being counterparts of each other, and *both necessary* to the perfection of the seed, must exist either together upon the same plant or upon separate plants of the same species. In the former case the species is *monœcious* (♂), as in Oak; in

![Image 18, Pistillate flower of Balm-of-Gilead. 20, Staminate. 21, Begonia — a, staminate; b, pistillate.](image)
the latter case *dioecious* (♂ ♀), as in Willow. The term *diclinous*, denoting either ♂ or ♀ without distinction, is in common use.

68. A *neutral flower* is a perianth or calyx only, having neither stamens nor pistils. Such are the ray-flowers of many of the Compositae, and of the cymes of Hydrangea, High-cranberry, etc., which in cultivation may all become neutral, as in the Snow-ball.

69. *Unsymmetrical flowers*. The term symmetry, as used in Botany, refers to number only. A flower becomes unsymmetrical by the partial development of any set or circle in respect to the number of its organs. The Mustard family, called the Crucifers, afford good examples.

70. The flowers of Mustard, Cress, etc., are understood to be 4-merous (♀). The sepals are four, petals four, but the stamens are six and the styles but two. The stamens are arranged in two circles, having two of those in the outer circle suppressed or reduced to mere glands. Two of the carpels are also suppressed (429). In the Mint family and the Figworts one or three of the stamens are generally abortive. Here, while the flowers are ♀, the stamens are four in some species and only two in others. The missing stamens, however, often appear in the guise of slender processes—the rudiments of stamens—proving in an interesting manner the natural tendency to symmetry.

71. In the ♀ flowers of Poppy, the sepals are but two; in ♀ Spring-beauty they are but two; in both cases too few for symmetry. In Larkspur (26) the ♀ flowers have but four petals; and in Monk’s-hood (25), also ♀, the petals are apparently but two, strangely deformed bodies. A careful inspection, however, generally reveals the other three, very minute, in their proper places, as displayed in the cut.

72. “*Organs opposite*” is a condition much less frequent than “organs alternate;” but is highly interesting, as being sometimes characteristic of whole families. Thus in the Primrose, Thrift, and Buckthorn families, the stamens always stand opposite to the petals!

73. How happens this? Among the Primworts this question is solved in the flowers of Lysimachia and Samolus, where we

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*Diagrams.*—22. Flower of Samolus, showing the rudimentary stamens alternating with the perfect. 23. Flower of a Labiate plant, showing the place of the deficient stamen. 24. Flower of Asarum—three sepals, twelve stamens, etc. 25. Flower of Saxifrage—two pistils, ten stamens, etc.
find a circle of five teeth (abortive filaments) between the petals and stamens, alternating with both sets, thus restoring the lost symmetry. Hence we infer that in such cases generally a circle of alternating organs has been either partially or wholly suppressed. In the Buckthorn, however, a different explanation has been given.

74. Redundancy. The multiplication of organs is exceedingly common, and usually according to a definite plan. The increase takes place, as a rule, by circles, and consequently by multiples. That is, e.g., the stamens of a 5 flower, if increased, will be so by 3s; of a 7 flower by 5s, etc.—sometimes to the extent of twenty such circles.

75. In the Crow foot family the stamens are almost always multiplied. The carpels are also generally multiplied, yet often, on the contrary, diminished, as in the Peony. In Rosaceae, also, the stamens are generally multiplied, while the carpels exist in all conditions as to number. Thus in Strawberry they are multiplied, in the Apple they are regularly five, in Agrimony reduced to two, and in the Cherry to one. In Magnolia the 5 flowers have three sepals in one circle, six or nine petals in two or three circles, numerous stamens and carpels in many circles of each. In the 7 flowers or Blood-root there are two sepals, eight petals, twenty-four stamens, and two carpels.

76. Choristes. In other cases the organs seem to be increased in number by clusters, rather than by circles, as when in the same circle several stamens stand in the place of one—e.g., in Squirrel-corn, St. Johnswort, Linden. Such cases afford wide scope for conjecture. Perhaps each cluster originates by division, as the compound from the simple leaf; or as a tuft of axillary leaves; or thirdly, by a partial union of organs.


CHAPTER IV.

ANOMALOUS FLOWERS—CONTINUED.

77. Appendicular organs consist of spurs, scales, crown, glands, etc., and often afford excellent distinctive marks. The old term nectary was indiscriminately applied to all such organs, because some of them produced honey.

78. Spurs are singular processes of the flower, tubular and projecting from behind it. In Columbine each petal is thus
spurred; — in Violet, one petal only; in Larkspur, two petals and a sepal, the spur of the latter inclosing that of the former. The curved spur of the Jewel-weed belongs to a sepal (27, 28).

79. Scales are attached to the inner side of the corolla, usually upon the claw of the petals, as in Buttercups, or within the throat of the corolla tube, as in the Borrageworts. Similar appendages, when enlarged and conspicuous, constitute a crown in Catchfly, Corn-cockle, Narcissus. See also the staminal crown or corona of the Silk-grass (Asclepias, fig. 532).

80. Glandular bodies are often found upon the receptacle in the places of missing stamens or carpels, or as abortive organs of some kind. Examples are seen in the Crucifers and Grape. In Grass-Parnassus they are stalked and resemble stamens.

81. The union of organs in some way occurs in almost every flower; and, more perhaps than any other cause, tends to disguise its plan and origin. The separate pieces which stood each as the representative of a leaf, now, by a gradual fusion, lose themselves in the common mass. Nevertheless, marks of this process are always discernible, either in parts yet remaining free, or in the seams where the edges were conjoined. The floral organs may unite by cohesion or adhesion.

82. Cohesion, when the parts of the same whorl are joined
together; as the sepal of the Pink, the petals of Morning-glory, the stamens of Mallows, the carpels of Poppy. *Adhesion*, when the parts of different whorls are conjoined; as the stamens with the corolla in Phlox, with the pistils in Milkweed, Lady's-slipper; or calyx with ovary, in Apple or Wintergreen (Gaultheria). The adjective *free* is used in a sense opposite to adhesion, implying that the organ is inserted on (or grows out of) the receptacle, and otherwise separated from any other kind of organ. The adjective *distinct* is opposed to cohesion, implying that like organs are separate from each other. More of this in another chapter.

29. Flower of Aconitum Napellus displayed; *s, s, s, s, s*, the five sepals, the upper one hooded; *p, p, p, p*, the five petals, of which the two upper are nectaries covered by the hood, and the three lower very minute. 30. Flower of Catalpa, 2-lipped, 5-lobed. 31. Corolla laid open, showing the two perfect stamens and the three rudimentary.

83. **Irregular development.** Our typical flower, it will be remembered, is regular; and observation proves that all flowers are actually alike regular in the early bud. Those inequalities or "one-sided" forms, therefore, which characterize certain flowers, are occasioned by subsequent irregular growth from a regular type. The irregularity of flowers occurs in a thousand ways and modes;—in the unequal size of like organs; in their dissimilar forms and positions; in their unequal cohesions, and in their partial suppressions. So in the Violet (50), Monk's-hood (29), Catalpa (30), the Labiates (69), the Pea tribe (59), etc.

84. The torus, or receptacle, is sometimes strangely modified. In the little Myosurus (32), in some Buttercups, and in the
STUDY OF ANOMALOUS FLOWERS.

Tulip-tree we find a lengthened or spindle-shaped torus—lengthened according to the nature of a branch (§ 35), and all covered with the multiplied pistils. On the contrary, we have in the Rose (35) and Lady's-mantle (38), an excavated torus, within which the carpels are held, while the other organs are borne upon its elevated rim.

85. **The disk** is a portion of the receptacle raised into a rim somewhere in the midst of the whorls. It is found between the ovary and stamens in Paeony and Buckthorn. It bears the stamens in Maple and Mignonette, and crowns the ovary in the Umbelliferae.

86. **Combined deviations** are quite frequent, and sometimes obscure the typical character of the flower to such a degree as to require close observation in tracing it out. The study of such cases is full of both amusement and improvement. For example, the
Poppy has suppression in the calyx, multiplication in the stamens and carpels, and in the latter cohesion also. The \& Sage has cohesion and irregularity in the calyx, every kind of irregularity in the corolla, suppression and irregularity in the stamens, suppression and cohesion in the pistils. The \& Cypripedium is perfectly symmetrical, yet has irregular cohesion in the calyx, great inequality in the petals, cohesion, adhesion, and metamorphosis in the stamens, and cohesion in the carpels.

(In this way let the pupil analyze the deviations in the flower of Geranium, Hollyhock, Moth-mullein, Larkspur, Sweetbrier, Touch-me-not, Petunia, Snapdragon, Violet, Polygala, Squirrel-corn, Orchis, Henbit, Monk's-hood, Calceolaria, etc.)

Review.—77. Mention some appendicular organs. 78. What are spurs in Larkspur, etc.? 79. Scales in Buttercups, etc.? Explain the cuts 26-28.—The crown in Narcissus, etc.—In Aseleplas. 80. Appendages in Grass-Parnassus. 81. Remarks on the union of organs. How detected? 82. Distinguish between cohesion and adhesion.—Between free and distinct. 83. What of flowers in the early bud? Whence irregularity? Certain modes of irregularity mentioned. Examples. 84. Two singular modifications of the torus. Explain cuts 32-35. 85. What is the disk?—figs. 36-38. 86. Trace the combined deviations in Poppy.—In Cypripedium.—In any flower at hand.

CHAPTER V.

THE FLORAL ENVOLPES, OR PERIANTH.

87. In our idea of the typical flower, the perianth consists of two whorls of expanded floral leaves encircling and protecting the more delicate essential organs in their midst. As a rule, the outer circle, calyx, is green and far less conspicuous than the inner circle of highly colored leaves—the corolla. But there are many exceptions to this rule. Strictly speaking, the calyx and corolla are in no way distinguishable except by position. The outer circle is the calyx, whatever be its form or color; and the inner, if there be more than one, is the corolla.

Forms of petals.—39. Buttercup, showing the scale at base. 40. Mignonette, fringed at top. 41. Silene stellata, fringed and anguiculate. 42. Flower of Osmorhiza longistylis, petals inflected. 43. Flower of Mitella diphylla, petals pectinate-pinnatistif. 44. Petal of Cerastium nutans, 2-clft.
88. Both blade and petiole are distinguishable in the floral leaves, especially in the petals. The blade, or expanded part, is here called limb, or lamina; the petiolar part, when narrowed into a stalk, is called the claw. In form, or outline, there is a general resemblance between the limb and the leaf. It is ovate, oval, lanceolate, obcordate, orbicular, etc. In margin it is generally entire. (See § 308.)

89. Some peculiar forms, however, should be noticed, as the bilobate petal of the Chickweed (44), the pinnatifid petal of Miterwort (43), the inflected petal of the Umbelliferae (42), the fan-shaped petal of Pink, the fringed (fimbriate) petal of Cam pion (Silene stellata) (40), the hooded sepal of Napellus (29), the saccate petal of Calceolaria, Cypripedium (71). The limb is, moreover, often distorted into a true nectary, spurred, as already shown (§ 78), or otherwise deformed, as in Napellus, Coptis, etc.

90. We have seen that the floral organs are often in various ways united. Considering their crowded state in the flower, we rather wonder that they do not always coalesce in their growth. The calyx with united sepals was called by the early botanists monosepalous; the corolla with united petals was called monopetalous (μνοςος, one—from the false idea that such an organ consisted of a single piece or leaf!) Opposed to these terms were polypetalous (πωξις, many), petals distinct; and polysepalous, sepals distinct.

91. The monosepalous calyx, or monopetalous corolla, although thus compounded of several pieces, is usually described as a simple organ, wheel-shaped, cup-shaped, tubular, according to the degree of cohesion. The lower part of it, formed by the united claws, whether long or short, is the tube; the upper part, composed of the confluent laminae, is the border, or limb; the opening of the tube above is the throat.

92. The border is either lobed, toothed, crenate, etc., by the distinct ends of the pieces composing it, as in the calyx of Pink, the calyx and corolla of Primula, Phlox, and Bellwort, or it may become, by a complete lateral cohesion, entire, as in the Morning-glory. Here the compound nature of the organ is shown by the seams alone.
93. A terminal cohesion, where summit as well as sides are joined, forming a cap rather than cup, rarely occurs, as in the calyx of the garden Escholtzia and the corolla of the Grape.

94. The modes of adhesion are various and important, furnishing some of the most valuable distinctive characters. An organ is said to be adherent when it is conjoined with some dissimilar organ, as stamen with pistil. All the organs of our typical flower are described as free.

95. The term hypogynous (υπώ, under, γυνή, the pistil) is an adjective in frequent use, denoting that the organs are inserted into the torus under, or at the base of the ovary or pistil. Organs so situated are, of course, in the normal condition and free, there being no adhesions. Observe and explain the sections of Jeffersonia and Violet (49, 50).
96. *Perigynous* (περί, around) is a term applicable to the stamens and petals only, and implies that they are (apparently) inserted on the calyx or corolla *around* the free ovary. In Phlox, the stamens are perigynous on the corolla-tube. In Cherry and Plum, the petals and stamens are perigynous on the calyx-tube. (See 51.)

97. *Epigynous* (ἐπί, upon) denotes that the organs are inserted (apparently) *upon* the ovary, as appears in Apple, Pear, Caraway, Sunflower. (See cuts 42, 51.) The common phrases "calyx superior," "ovary inferior," have the same signification as "calyx epigynous," all implying the apparent insertion of the organs upon or above the ovary. In this condition all the organs, or at least the calyx, are blended with the ovary to its top. Hence the phrases "ovary adherent," or "calyx adherent," have also the same meaning, and are preferable, because in accordance with the fact. (Explain the sections of Golden Currant and Ear-drop—52, 54.)
98. Calyx inferior or free, ovary superior or free, are all phrases of the same import as calyx hypogynous. Between the two conditions, calyx superior and calyx inferior, there are numerous gradations, of which one only is defined, to wit, calyx half-superior, as exemplified in the Mock-orange and Saxifrage (53).


CHAPTER VI.

FORMS OF THE PERIANTH.

99. The innumerable forms of the perianth, whether calyx or corolla, or both, are first to be distinguished as polypetalous or gamopetalous, and secondly, as regular or irregular. The polypetalous-regular forms may be referred to the four types represented in the drawings below, and described as follows.

100. First, Cruciform (crucis, of a cross) or cross-shaped corollas consist of four long-clawed petals, placed at right angles to each other, as in Mustard, Wall-flower (55). 2d, Caryophyl
laceous or pink-like corollas consist of five petals with long, erect claws, and spreading laminae; as in the Pink (56). 3d, Rosaceous or rose-like corollas are composed of five short-clawed open petals; as in the Rose (fig. 57). 4th, Liliaceous flowers, like the Lilies, consist of a six-leaved perianth; each leaf gradually spreading so as to resemble, as a whole, the funnel-form (58).

101. Polypetalous-irregular forms (59, 71) may generally be referred to these two types—the papilionaceous and the orchidaceous. The Papilionaceous (papilio, butterfly) corolla or flower may consist of five dissimilar petals, designated thus: the upper, largest, and exterior petal is the banner (vexillum); the two lateral, half-exterior, are the wings (alæ); the two lower, interior petals, often united at their lower margin, are the keel (carina). The flowers of the Pea, Locust, Clover, and of the great family of the Leguminosæ in general are examples. The Orchidaceous is a form of the perianth peculiar to the Orchis, and to that large and singular tribe in general. It is a 6-parted double perianth, very irregular, characterized chiefly by its lip, which is the upper petal (lower by the twisting of the ovary) enlarged and variously deformed.

102. Gamopetalous-regular perianths (62–67) may include mainly the following forms, although some of them may become irregular. First, Rotate, wheel-shaped, or star-shaped, is a form with tube very short, if any, and a flat, spreading border; as the calyx of Chickweed, corolla of Trientalis, Elder. It is sometimes a little irregular, as in Mullein. 2d, Cup-shaped with pieces cohering into a concave border, as in the calyx of
Mallows, corolla of Kalmia, etc. 3d, Campanulate, or bell-shaped; when the tube widens abruptly at base and gradually in the border, as in the Harebell, Canterbury-bell. 4th, Ureolated, urn-shaped; an oblong or globular corolla with a narrow opening, as the Whortleberry, Heath. 5th, Funnel-form (in-fundibuliform), narrow-tubular below, gradually enlarging to the border, as Morning-glory. 6th, Salver-form (hypocrateriform), the tube ending abruptly in a horizontal border, as in Phlox, Petunia, both of which are slightly irregular. 7th, Tubular, a cylindraceous form spreading little or none at the border; as the calyx of the Pink, corolla of the Honeysuckle. It is often a little curved. Tubular flowers are common in the Compositae, as the Thistle, Sunflower, when they are often associated with the next form, the ligulate.

103. **Gamopetalous-irregular** perianths may be either ligulate or labiate. The *Ligulate* corolla (*ligula*, tongue) is formed as if by splitting a tubular corolla on one side. The notches at the end plainly indicate the number of united petals composing
forms of the perianth.

it, as also do the parallel longitudinal seams. (See figs 68, 69.) The labiate, bilabiate or lip-shaped, resembling the mouth of some animal, is a very common form, resulting from the unequal union of the parts, accompanied with other irregularities. In the labiate corolla three petals unite more or less to form the lower lip, and two to form the upper. In the calyx, when bilabiate, this rule is reversed, according to the law of alternation of organs; two sepals are united in the lower lip and three in the upper, as seen in the Sage and the Labiate Order generally. Labiate flowers are said to be galeate or helmeted when the upper lip is concave, as in Catmint; ringent or gaping when the throat or mouth is wide open (69); personate or masked when the throat is closed as with a palate, like the Snapdragon (70).

104. Certain reduced forms of the perianth should be noticed in this place. The Pappus (παπύρος, grandfather, alluding to his gray hairs) is the hair-like calyx of the florets of the Compositæ, and other kindred Orders. The florets of this Order are collected into heads so compactly that the calyxes have not room for expansion in the ordinary way. The pappus is commonly persistent, and often increases as the fruit matures, forming a feathery sail to waft away the seed through the air, as in the Dandelion and Thistle. It varies greatly in form and size, as seen in the cuts; sometimes consisting of scales, sometimes of hairs, again of feathers or bristles. Sometimes it is mounted on a stipe, which is the beak of the fruit.

105. Again: the calyx, or the limb of the calyx, is reduced to a mere rim, as seen in the Umbelliferae. In the Amentaceous Orders, the whole perianth diminishes to a shallow cup, as in
the Poplar and Willow, or altogether disappears, as in the Birch, Ash, and Lizard-tail (15, 16).

106. Setae, meaning bristles in general, is a term specifically used to denote the reduced perianth of the sedges. In the Bog-rush (Scirpus) there is, outside the stamens, a circle of six setae, representing a 6-leaved perianth (78). In the Cotton-grass (Eriphorum) the setae are multiplied and persistent on the fruit, becoming long and cotton-like.

107. Perigynium is the name given to the urceolate perianth of Carex, investing the ovary but allowing the style to issue at its summit. It is composed of two united sepals, as indicated by the two teeth at the top (79).

108. Glumes and pales represent the floral envelopes, or rather the involucre of the Grasses (436). Their alternating arrangement clearly distinguishes them from a perianth.

109. The duration of the calyx and corolla varies widely, and is marked by certain general terms. It is caducous when it falls off immediately, as the calyx of Poppy, corolla of Grape; deciduous when it falls with the stamens, as in most plants; and persistent, if it remain until the fruit ripens, as the calyx of Apple. If it continue to grow after flowering, it is accrescent; and if it wither without falling off, it is marescent.

CHAPTER VII.
OF THE ESSENTIAL ORGANS.—THE STAMENS.

110. Within the safe inclosure of the floral envelopes stand the essential organs—the stamens and pistils—clearly distinguishable from the perianth by their more slight and delicate forms, and from each other by various marks. In the complete flower the androecium next succeeds the corolla in the order of position, being the third set, counting from the calyx.

111. A perfect stamen consists of two parts—the filament, corresponding with the petiole of the typical leaf; and the anther, answering to the blade. Within the cells of the anther the pollen is produced, a substance essential to the fertility of the flower. Hence the anther alone is the essential part of the stamen.

112. The filament (filum, a thread) is the stalk supporting the anther at or near its top. It is ordinarily slender, yet sustaining itself with the anther in position. Sometimes it is capillary, and pendulous with its weight, as in the Grasses.

113. The anther is regularly an oblong body at the summit of the filament, composed of two hollow parallel lobes joined to each other and to the filament by the connectile. In front of the connectile, looking toward the pistil, there is usually a fur-
row; on its back a ridge, and on the face of each lobe a seam, the usual place of dehiscence or opening, all running parallel with the filament and connectile.

114. The stamen, as thus described, may be considered regular or typical in form, and as well exemplified in that of the Buttercup (fig. 83). But the variations of structure are as remarkable here as in other organs, depending on such circumstances as, 1st, the attachment of filament to anther. This may occur in three ways. The anther is said to be **innate** when it stands centrally erect on the top of the filament; **adnate** when it seems attached to one side of the filament; **versatile** when connected to the top of the filament by a single point in the back. 2d, The modes of **Dehiscence** or opening, are also three—viz., **valvular**, where the seam opens vertically its whole length, which is the usual way; **porous**, where the cells open by a chink or pore, usually at the top, as in Rhododendron and Potato; **opercular**, when by a lid opening upward, as in Sassafras, Berberis (92). 3d, The facing of the anther is also an important character. It is **introrse** when the lines of dehiscence look toward the pistil, as in Violet; **extrorse** when they look outward toward the corolla, as in Iris. 4th, The **connectile** is usually a mere prolongation of the filament, terminating, not at the base, but at the top of the anther. If it fall short, the anther will be **emarginate**. Sometimes it outruns the anther, and tips it with a terminal appendage of some sort, as in Violet, Oleander, and Paris. Again, its base may be dilated into spurs, as in two of the stamens of Violet. 5th, If the connectile be laterally dilated, as we see gradually done in the various species of the Labiate Order, the lobes of the anther will be separated, forming two **dimidiate** (halved) anthers on one filament, as in Sage and Brunella. Such are, of course, 1-celled (96).

![Diagram of stamens and anthers](image)

**Peculiar forms of stamens.**—89, Pyrola rotundifolia; p, dehiscence by pores at top. 90, Vaccinium uliginosum; p, dehiscence. 91, Berberis aquifolium, anthers opening (92) by valves upward. 93, Anther of Violet, introrse, with an appendage at top. 94, Oleander, sagittate, appendaged. 95, Catalpa, lobes of anther separated. 96, Sage, lobes of anther widely separated, on stipels; b, barren lobe without pollen. 97, Malva, anther 1-celled. 98, Ephedra (after Peyer), anther 4-celled.

115. The cells of the anthers are at first commonly four, all parallel, becoming two only at maturity. In some plants the four are retained, as in the anthers of Ephedra (98). In others, as Mallows, all the cells coalesce into one (97).

116. **Appendages** of many kinds distinguish the stamens of different species. In the Ericaceae there are horns, spurs, tails, queues, etc. In Onions and Garlic, the filament is 2 or 3 forked, bearing the anther on one of the tips. Sometimes a pair of appendages appear at base, as if stipulate. It is often conspicuously clothed with hairs, as in Tradescantia. (See 83-94.)

117. **Staminodia**, or sterile filaments with abortive anthers or none, occur singly in many of the Figworts and Labiates, or in entire whorls next within the petals, alternating with them, as in Loose-strife. The curious fringes of the Passion-flower are regarded as composed of staminodia (112).
118. The number of the stamens is said to be definite when not exceeding twenty, as is sometimes definitely expressed by such terms as follow, compounded of the Greek numerals—viz., monandrous, having one stamen to each flower; diandrous, with two stamens; pentandrous, with five stamens. If the number exceeds twenty, it is said to be indefinite (denoted thus, ∞) or polyandrous.

119. The position or insertion of the stamens (§ 55) may be more definitely stated here as hypogynous, on the receptacle below the ovaries; perigynous, on the calyx around the ovary; epipetalous, on the corolla, as in Phlox; epigynous, on the ovary at its summit, and gynandrous (γυναί, pistil, ἀνδρός, stamens) on the pistil, that is, when the stamens are adherent to the style, as
in Orchis. Inequality in length is definitely marked in two cases, as *tetradynameous* (τετραδύναμος, four, δύναμις, power) when the stamens are six, whereof four are longer than the other two, as in all the Crucifers; *didynamous*, where the stamens are four, two of them longer than the other two, as in all the Labiates (104, 106).

120. **Cohesion** is as frequent with stamens as with petals. They are *monadelphous* (μοναδελφός, a brother) when they are all united, as in Mallow, into one set or brotherhood by the filaments; *diadelphous* in two sets, whether equal or unequal, as in Pea, Squirrel-corn; *polyadelphous*, many sets, as in St. Johnswort; and *syngenesious*, when they are united by their anthers, as in the Compositae. Finally, the absence of the stamens altogether, whether by abortion, as in the ♀ flowers of Veratrum, or by suppression, as in Oak, occurs in various modes, rendering the plant *monoeccious* (♂), *dioecious* (♂ ♀), or *polygamous* (♂ ♀ ♀), as already explained (§ 67).

![Pollen grains](image)

121. The pollen is in appearance a small, yellow dust, contained in the cells of the anther. When viewed with the microscope it appears as grains of various forms, usually spheroidal or oval, sometimes triangular or polyhedral, but always of the same form and appearance in the same species. Externally they are curiously, and often elegantly figured with stripes, bands, dots, checks, etc. Each grain of pollen is a membranous cell or sack containing a fluid. Its coat is double—the outer is more thick and firm, exhibiting one or more breaks where the inner
coat, which is very thin and expansible, is uncovered. In the fluid are suspended molecules of inconceivable minuteness, said to possess a tremulous motion. When the membrane is exposed to moisture, it swells and bursts, discharging its contents.

122. In the Orchids and Silkweed tribe, the pollen grains do not separate as into a dust or powder, but all cohere into masses called **pollinia**, accompanied by a viscid fluid.


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**CHAPTER VIII.**

**OF THE ESSENTIAL ORGANS.—THE PISTILS.**

123. **The Gynoecium** occupies the centre of the flower, at the termination of the axis. It consists regularly of a circle of distinct pistils (§ 60), symmetrical in number with the other circles. It is subject to great variation. The pistil may be distinct and simple, as in Columbine, or coherent in various degrees into a compound body, as in St. Johnswort. Also instead of being free and superior, as it regularly should be, it may adhere to the other circles, as already explained (§ 97), and become
in inferior; that is, apparently placed below the flower, as in the Currant (52).

124. The number of the pistils is by no means confined to the radical of the flower. They may be increased by multiples, becoming a spiral on a lengthened receptacle, as in Tulip-tree, or still remaining a circle, as in Poppy. On the other hand, they may be reduced in number often to one, as in Cherry and Pea. Certain terms are employed to denote the number of pistils in the flower, such as monogynous, with one pistil; trigynous, with three; polygynous, with many, etc.

125. The simple pistil may usually be known from the compound, by its one-sided forms—having two sides similar and two dissimilar. If the pistils appear distinct, they are all simple, never being united into more than one set, as the stamens often are. The parts of a simple pistil are three—the ovary (o, 113) at base, the stigma (s) at the summit, and the style (sty) intervening. Like

the filament, the style is not essential; and when it is wanting, the stigma is sessile upon the ovary, as in Anemone (116). In order to understand the relation of these parts, we must needs first study—

126. The morphology of the pistil. As before stated, the pistil consists of a modified leaf called a carpel (καρπος, fruit), or carpellary leaf. This leaf is folded together toward the axis, so that the upper surface becomes the inner, while the
lower becomes the outer surface of the ovary. By this arrangement two sutures or seams will be formed—the dorsal, at the back, by the midvein; the ventral, in front, by the joined margins of the leaf. This view of the pistil is remarkably confirmed and illustrated by the flowers of the Double Cherry (124, 125), where the pistil may be seen in every degree of transition, reverting toward the form of a leaf. This carpellary leaf stands in the place of the pistil, having the edges infolded toward each other, the midvein prolonged and dilated at the apex, as shown in 125.

127. The placentæ are usually prominent lines or ridges extending along the ventral suture within the cell of the ovary, and bearing the ovules. They are developed at each of the two edges of the carpellary leaf, and are consequently closely parallel when those edges are united, forming one double placenta in the cell of each ovary.

128. The simple carpel, with all its parts, is completely exemplified in the Pea-pod. When this is laid open at the ventral suture, the leaf form becomes manifest, with the peas (ovules) arranged in an alternate order along each margin, so as to form but one row when the pod is closed. In the pod of Columbine (127), the ovules form two distinct rows; in the simple Plum carpel, each margin bears a single ovule; and in the one-ovuled Cherry, only one of the margins is fruitful.

129. The stigma is the glandular orifice of the ovary, communicating with it either directly or through the tubiform style. It is usually globular and terminal, often linear and lateral, but subject to great variations in form. It is sometimes double or halved, or 2-lobed, even when belonging to a single carpel or to
a simple style, as in Linden, where these carpels are surmounted by three pairs of stigmas.

130. The compound pistil consists of the united circle of pistils, just as the monopetalous corolla consists of the united circle of petals. The union occurs in every degree, always commencing at the base of the ovary and proceeding upward. Thus in Columbine, we see the carpels (pistils) quite distinct; in early Saxifrage, cohering just at base; in Pink, as far as the top of the ovaries, with styles distinct; in Spring-beauty, to the top of the styles, with stigmas distinct; and in Rhododendron, the union is complete throughout.

131. To determine the number of carpels in a compound ovary is an important and sometimes difficult matter. It may be known, first, by the number of the styles; or, by the number of the free stigmas (remembering that these organs are liable to be halved—§ 129); or 3d, by the lobes, angles, or seams of the ovary; or 4th, by the cells; or 5th, by the placentae. But in Dodecatheon, etc., all these indications fail, so perfect is the union, and we are left to decide from analogy alone.

132. The student will notice two very diverse modes of cohesion in the carpels of the compound ovary. First and regularly, the carpels may each be closed, as when simple, and joined by their sides and fronts; as in St. Johnswort (129) and Lily (171). In this case, he may prove the following propositions. 1st. The compound ovary will have as many cells as carpels. 2d. The partitions between the cells will be double, and alternate with
the stigmas. 3d. A partition dividing the cell of a single carpel must be a *false* one; as occurs in Flax (136). 4th. The **Placenta**, as well as the ventral suture, will be **axial**.

†133. Again: the carpels may each be open and conjoined by their edges, as are the petals of a gamopetalous corolla. So it is in the ovary of Violet (137) and Rock-rose (139). In this case, 1st. There will be no partition (unless a false one, as in the Crucifers), and but one cell; 2d. The **Placenta** will be **parietal**, i. e., on the wall of the cell (**paries**, a wall).

134. Between the two conditions of **axial** (or central) and **parietal placenta**, we find all degrees of transition, as illustrated in the different species of St. Johnswort and in Poppy, where the inflected margins of the carpels carry the placenta inward, well-nigh to the axis. Moreover, the placenta are not always mere marginal lines, but often wide spaces covering large portions of the walls of the cell, as in Poppy and Water-lily: in other cases, as Datura (168), they become large and fleshy, nearly filling the cell.

138, Samolus Valerandi, section of flower showing the free axial placenta. 134, Ovary of Scrophulariaceae. 135, Ovary of Tulip. 136, Cross-section of ovary of Flax, 5-celled, falsely 10-celled. 137, Ovary of Violet, 1-celled. 138, Ovary of Fuchsia, 4-celled. 139, Ovary of Rock-rose, 1-celled, 5-carpelled. 140, Gentianaceae, 2-valved, 1-celled.

135. A free **axial placenta**, without partitions, occurs in some compound one-celled ovaries, as in the Pink and Primrose orders (133). This anomaly is explained in two ways—first, by the obliteration of the early formed partitions, as is actually seen to occur in the Pinks; secondly, by supposing the placenta to be, at least in some cases, an **axial** rather than a marginal growth; that is, to grow from the point of the axis rather than from the margin of the carpellary leaf, for in Primrose no partitions ever appear.

136. A few peculiar forms of the style and stigma are worthy of note in our narrow limits, as the **lateral** style of Strawberry; the **basilar** style of the Labiate and Borrageworts; the branching style of Emblica, one of the Euphorbiaceae; also the globular
stigma of Mirabilis; the linear stigma of Gyromia; the feathery stigma of Grasses; the filiform stigma of Indian corn; the lateral stigma of Aster; the petaloid stigmas of Iris; the hooded stigma of Violet (141-149).

142. Pistil. 141, Symphytum, basilar style, ovary 4-parted. 142, $^2$ Flower of Emblica (Euphorbiaceae), branching styles. 143, Mirabilis Jalapa, globular stigma. 144, Flower of Luzula, stigmas linear. 145, Feathery stigmas of a Grass. 146, Stigmas of Aster. 147, Rumex. 148, Poppy. 149, Filiform stigma of Zea Mays (Corn).

137. In the Pine, Cedar, and the Coniferae generally, both the style and stigma are wanting; and the ovary is represented only by a flat, open, carpellary scale, bearing the naked ovules at its base.


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CHAPTER IX.

THE OVULES.

138. The ovules are understood to be transformed buds, destined to become seeds in the fruit. Their development from the margins and inner surface of the carpel favors this view; for the ordinary leaves of Bryophyllum and some other plants do habitually produce buds at their margin or on their upper surface; and in the Mignonette, ovules themselves have been seen transformed into leaves.

139. The number of ovules in the ovary varies from one to hundreds. Thus in Buttercups, Compositæ, and Grasses, the
The ovule is solitary; in Umbelliferae it is also solitary in each of the two carpels; in the Pea order they are definite, being but few; in Mullein and Poppy, indefinite (\(\infty\)), too many to be readily counted. As to position, the ovule is erect when it grows upward from the base of the cell, as in Composite; ascending, when it turns upward from the side of the cell; horizontal, when neither turning upward nor downward; pendulous, when turned downward; and suspended, when growing directly downward from the top of the cell, as in Birch (158–161).

140. The ovule at the time of flowering is soft and pulpy, consisting of a nucleus within two coats, supported on a stalk. The stalk is called funiculus; the point of its juncture with the base of the nucleus is the chalaza. The nucleus was first formed; then the tegmen, or inner coat, grew up from the chalaza and covered it; and lastly the outer coat, the testa, invested the whole. Both coats remain open at the top by a small orifice, the foramen.

141. In most cases the ovule, in the course of its growth, changes position—curving over in various degrees upon its lengthening funiculus or upon itself. When no such curvature exists, and it stands straight, as in the Buckwheat order, it is
ORTHOTROPous. It is ANATROPous when completely inverted. In this state a portion of the funiculus adheres to the testa, forming a ridge called raphe, reaching from the chalaza to the hilum. It is CAMPYLOTROPous when curved upon itself. In this state the foramen is brought near to the chalaza, and both are next the placenta, as in the Pinks and Cruciferae; and AMPHITROPous when half inverted, so that its axis becomes parallel with the placenta, as in Mallow. Here the raphe exists, but is short. In campylotropous there is no raphe.

142. The ovule contains no young plant (embryo) yet; but a cavity, the embryosac, is already provided to receive it just within the upper end of the nucleus.

The relations of the ovule to the pollen grain will be more suitably discussed hereafter, under the head of fertilization. We briefly remark here that the immediate contact of the two is brought about, at the time of flowering, by special arrangements; and that, as the undoubted result of their combined action, the embryo soon after originates in the embryo sac.


CHAPTER X.

THE FRUIT.—PERICARP.

143. After having imbibed the pollen which the anthers have discharged, the pistil or its ovary continues its growth and enlargement, and is finally matured in the form of the peculiar fruit of the plant. The fruit is, therefore, properly speaking, the ovary brought to perfection.

144. As to the other organs of the flower, having accomplished their work—the fertilization of the ovary—they soon wither and fall away. Some of them, however, often persist, to protect or become blended with the ripening fruit. Thus the tube of the superior calyx (§ 97) always blends with the ovary in fruit; as in Currant, Cucumber, Apple, etc. In Composite, the persistent limb enlarges into the pappus of the fruit. In Buttercups, the fruit is beaked with the short, persistent style. In Clematis and Geum, it is caudate (tailed) with the long, growing style. In the Potato tribe, Labiatae, and many others, the inferior calyx continues to vegetate like leaves until the fruit ripens. In some cases the fruit, so called, consists of the receptacle and ovaries blended; as in Blackberry and Strawberry. Again—in Mulberry, Fig, and Pineapple, the whole inflorescence is consolidated into the matured fruit.
145. As a rule, the structure of the fruit agrees essentially with that of the ovary. In many cases, however, the fruit undergoes such changes in the course of its growth from the ovary as to disguise its real structure. An early examination, therefore, is always more reliable in its results than a late one. For example, the Oak-acorn is a fruit with but one cell and one seed, although its ovary had three cells and six ovules! This singular change is due to the non-development of five of its ovules, while the sixth grew the more rapidly, obliterated the partitions by pressing them to the wall, and filled the whole space itself. Similar changes characterize the Chestnut, Hazelnut, and that whole Order. The ovary of the Birch is 2-celled, 2-ovuled; but by the suppression of one cell with its ovule, the fruit becomes 1-celled and 1-seeded.

146. The Pericarp. The fruit consists of the pericarp and the seed. The pericarp (περικάρπιον, around) is the envelope of the seeds, consisting of the carpels and whatever other parts they may be combined with. It varies greatly in texture and substance when mature, being then either dry, as the Pea-pod, or succulent, as the Currant. Dry pericarps are membranous, or coriaceous (leathery), or woody. Succulent pericarps may be either wholly so, as the Grape, or partly so, as the Peach and other stone fruit.

147. With very few exceptions the pericarp encloses the seed while maturing. In Mignonette (165), however, it opens, ex-
posing the seed, immediately after flowering. The membranous pericarp of Cohosh (Leontice) falls away early, leaving the seed to ripen naked. In Yew (Taxus) the seed is never enclosed wholly by its fleshy pericarp; but in most of the other Conifers, the close-pressed, carpellary scales cover the seeds. One-seeded fruits, like those of Butter-cups, etc., are liable to be mistaken for naked seeds.

148. Dehiscence. The fleshy pericarp is always indehiscent. Its seeds are liberated only by its decay, or bursting in germination. So also in many cases the dry pericarp, as the acorn. But more commonly the dry fruit, when arrived at maturity, opens in some way, discharging its seeds. Such fruits are dehiscent. Dehiscence is either valvular, porous, or circumscissile; valvular, when the pericarp opens vertically along the sutures, forming regular parts called valves. These valves may separate quite to the base, or only at the top, forming teeth, as in Chickweed. We notice four modes of valvular dehiscence, viz.: 

1, Sutural, when it takes place at the sutures of any 1-celled pericarp, as Columbine, Pea, Violet.

2, Septicidal (septum, partition, cædo, to cut), when it takes place through the dissepiments (which are double, § 132). The carpels thus separated may open severally by sutures (Mallows), or remain indehiscent, as in Vervain.

3, Loculicidal (loculus, a cell, cædo, to cut), when each carpel
FORMS OF THE PERICARP.

opens at its dorsal suture directly into the cell (Evening Primrose, Lily). Here the dissepiments come away attached to the middle of the valves.

4. Septifragal (*septum*, and *frango*, to break), when the valves separate from the dissepiments which remain still united in the axis (Convolvulus.)

149. *Porous* dehiscence is exemplified in the Poppy, where the seeds escape by orifices near the top of the fruit. It is not common. *Circumscissile* (*circumscindo*, to cut around), when the top of the ovary opens or falls off like a lid, as in Jeffersonia, Henbane, Plantain. Some fruits, as the Gerania and Umbellifera, are furnished with a *carpophore*, that is, a slender column from the receptacle—a *fusiform torus*, prolonged through the axis of the fruit, supporting the carpels.


CHAPTER XI.

FORMS OF THE PERICARP.

150. The morphology of the pericarp is exceedingly diversified; but it will suffice the learner at first to acquaint himself with the leading forms only, such as are indicated in the following synopsis and more definitely described afterward.

The following is a synopsis of the principal forms of Pericarps, for the blackboard.
§ 1. Free Fruits (formed by a single Flower).

* Pericarps Indehiscent.
  † With usually but one seed, and
    ‡ Uniform, or 1-coated.
    1. Separated from the seed.  Achenium (Buttercups),
    2. Inflated, often breaking away.  Utricle (Pigweed).
    3. Inseparable from the seed.  Caryopsis (Grasses)
    4. Invested with a cupule (involucre).  Glans (Oak).
  ‡ Double or triple-coated, fleshy or fibrous.
  † With two or more seeds,
    ‡ Immersed in a fleshy or pulpy mass.

* Pericarps dehiscent.
  † 13. Dehiscence circumcissile, seeds ∞.
  † Dehiscence valvular or porous;
    ‡ Simple, or 1-carpeled,
    14. Opening by the ventral suture.  Follicle (Columbine).
    15. Opening by both sutures.  Legume (Pea).
    16. Legume jointed.  Loment (Desmodium).
    ‡ Compound pericarps;
    17. Placentae parietal with two cells.
        Silique short.  Silyque (Mustard).
    18. Placentae parietal only when 1-celled.
        Capsule (Shepherd’s Purse).
    19. Capsule with carpophore and elastic styles.  Regma (Geranium).

  § 2. Confluent Fruits (formed of an Inflorescence).

* 20. With open carpels aggregated into a cone.  Strobile (Pine).
* 21. With closed carpels aggregated into a mass.  Sorosis (Pineapple.)

151. The achenium is a small, dry, indehiscent pericarp, free from the one seed which it contains, and tipped with the remains of the style (Buttercups, Lithospermum).

The double achenium of the Umbellifera, supported on a carpophore, is called cremocarp (177). The 2-carpeled achenium of the Composite, usually crowned with a pappus, is called cypsela (178).

The achenia are often mistaken for seeds. In the Labiateae and Borrageworts they are associated in fours (141). In Geum, Anemone, etc., they are collected in heads. The rich pulp of the Strawberry consists wholly of the overgrown receptacle, which bears the dry achenia on its surface (184).

152. The utricle is a small, thin pericarp, fitting loosely upon its one seed, and often opening transversely to discharge it (Pigweed, Prince’s Feather).
153. Caryopsis, the grain or fruit of the Grasses, is a thin, dry, 1-seeded pericarp, inseparable from the seed.

154. Samara; dry, 1-seeded, indehiscent, furnished with a membranous wing or wings (Ash, Elm, Maple).

155. Glans, or nut; hard, dry, indchisent, commonly 1-seeded by suppression (§ 145), and invested with a persistent involucre called a cupule, either solitary (Acorn, Hazelnut) or several together (Chestnut, Beechnut).

156. Drupe, stone-fruit; a 3-coated, 1-celled, indehiscent pericarp, exemplified in the Cherry and Peach. The outer coat (epidermis) is called the epicarp; the inner is the nucleus or endocarp, hard and stony; the intervening pulp or fleshy coat is the sarcocarp (σάρξ, flesh). These coats are not distinguishable in the ovary.

157. Tryma, a kind of dryish drupe, 2-coated; the epicarp fibro-fleshy (Butternut) or woody (Hickory); the nucleus bony, with its cell often deeply 2-parted (Cocoanut).

158. Eterio, an aggregate fruit consisting of numerous little drupes united to each other (Raspberry) or to the fleshy receptacle (Blackberry).

159. Berry, a succulent, thin-skinned pericarp, holding the seeds loosely imbedded in the pulp (Currant, Grape).

160. Hesperidium, a succulent, many-carpelled fruit; the rind
thick, leathery, separable from the pulpy mass within (Orange, Lemon).

161. **Pepo**, an indehiscent, compound, fleshy fruit, with a hardened rind and parietal placentae (Melon).

162. The **pome** is a fleshy, indehiscent pericarp, formed of the permanent calyx, containing several cartilaginous (Apple) or bony (Haw) cells.

163. The **pyxis** is a many-seeded, dry fruit, opening like a lid by a circumscissile dehiscence (Plantain, Henbane, Jeffersonia).

164. The **follicle** is a single carpel, 1-celled, many-seeded, opening at the ventral suture (Columbine, Larkspur, Silk-grass).

165. The **legume**, or pod, is a single carpel, 1-celled, usually splitting into two valves, but bearing its $1 - \infty$ seeds along the ventral suture only, in one row, as in the Bean and all the Leguminose. It is sometimes curved or coiled like a snail-shell (Medicago). The **lomentum** is a jointed pod, separating across into 1-seeded portions (Desmodium).

166. **Silique**. This is also a pod, linear, 2-carpelled, 2-valved, 2-celled by a false dissepiment extended between the two parietal placentae. To this false dissepiment on both sides of both
edges the seeds are attached (Mustard). The silicle is a short silique, nearly as wide as long (Shepherd’s Purse). The silique and silicle are the peculiar fruit of all the Cruciferæ.

167. Capsule (casket.) This term includes all other forms of dry, dehiscent fruits, compound, opening by as many valves as there are carpels (Iris), or by twice as many (Chickweed), or by pores (Poppy).

168. The Regma is a kind of capsule like that of the Geranium, whose dehiscent carpels separate elastically, but still remain attached to the carpophore.

169. Strobile, or Cone; an aggregate fruit consisting of a conical or oval mass of imbricated scales, each an open carpel (♀ flower), bearing seeds on its inner side at base, i.e., axillary seeds (Pine and the Gymnosperms generally). The Cone (syncarpium, σω, together) of the Magnolia tribe is a mass of confluent, closed pericarps on a lengthened torus (Cucumber Tree).

170. The Fig (syconus) is an aggregate fruit, consisting of numerous seed-like pericarps enclosed within a hollow, fleshy receptacle, where the flowers were attached.

171. Other confluent fruits (Sorosis) consist of the entire inflorescence developed into a mass of united pericarps, as in the Mulberry, Osage-orange, Pineapple.

Review.—150. Name the first division of fruits. Free fruits, how subdivided? Name the five indehiscent, 1-seeded, 1-coated fruits. How do we distinguish them? Name the three indehiscent, 1-seeded, several-coated fruits. Difference between drupe and tryma?—Euteria? Name the four indehiscent, several-seeded fruits. How does pome differ from the others? Are the dehiscent pericarps fleshy or dry? Distinguish the Pyxis. Name three simple fruits which open by valves. Distinguish them. Name four compound, opening fruits. What is the fruit of Mustard, etc.? Find all the figures. The subdivision of confluent fruits, etc., etc.
CHAPTER XII.

THE SEED.

172. The seed is the perfected ovule, having an embryo formed within, which is the rudiment of a new plant similar in all respects to the original. The seed consists of a nucleus or kernel invested with the integuments or coverings. The outer covering is the testa, the inner the tegmen, as in the ovule. The latter is thin and delicate, often indistinguishable from the testa.

173. The testa is either membranous (papery), coriaceous (leathery), crustaceous (horny), bony, woody, or fleshy. Its surface is generally smooth, sometimes beautifully polished, as in Columbine, Indian-shot (Canna), and often highly colored, as in the Bean; or it may be dull and rough. It is sometimes winged, as in Catalpa, and sometimes clothed with long hairs, as in Silk-grass (Asclepias). Such a vesture is called the Coma. Cotton is the coma of the Cotton-seed.

174. The coma must not be confounded with the pappus (§ 104), which is a modification of the calyx, appended to the pericarp, and not to the seed, as in the achenia of the Thistle, Dandelion, and other Compositae. Its intention in the economy of the plant cannot be mistaken; serving like the pappus to secure the dispersion of the seed, while incidentally as it were, in the case of the Cotton-seed, it furnishes clothing and employment to a large portion of the human race.

175. The aril is an occasional appendage, partially or wholly investing the seed. It originates after fertilization, at or near the hilum, where the seed is attached to its stalk (funiculus). Fine examples are seen in the gashed covering of the Nutmeg, called mace, and in the scarlet coat of the seed of Staff-tree. In the seed of Polygala, etc., it is but a small scale, entire or 2-cleft, called caruncle.

176. The position of the seed in the pericarp is, like that of the ovule, erect, ascending, pendulous, etc. (§ 149). Likewise in respect to its inversions, it is orthotropous, anátropous, amphitropous, and campylotropous (§ 141), terms already defined. The anátropous is by far the most common condition.
177. The hilum is the scar or mark left in the testa of the seed by its separation from the funiculus. It is commonly called the eye, as in the Bean. In orthotropous and campylotropous seeds, the hilum corresponds with the chalaza (§ 140). In other conditions it does not; and the raphe (§ 141) extends between the two points, as in the ovules. The foramen of the ovule is closed up in the seed, leaving a slight mark—the micropyle.

178. The seed-kernel may consist of two parts, the embryo and albumen, or of the embryo only. In the former case the seeds are albuminous; in the latter, exalbuminous; a distinction of great importance in systematic botany.

179. The albumen is a starchy or farinaceous substance accompanying the embryo and serving as its first nourishment in germination. Its qualities are wholesome and nutritious, even in poisonous plants. Its quantity, when compared with the embryo, varies in every possible degree; being excessive (Ranunculaceae), or about equal (Violaceae), or scanty (Convolvulaceae), or none at all (Leguminosae). In texture it is mealy in Wheat, mucilaginous in Mallows, oily in Ricinus, horny in Coffee, ruminated in Nutmeg and Pawpaw, ivory-like in the Ivory-palm (Phytelephas), fibrous in Cocoanut, where it is also hollow, enclosing the milk.

180. The embryo is an organized body, the rudiment of the future plant, consisting of root (radicle), stem-bud (plumule),
and leaves (cotyledons). But these parts are sometimes quite undistinguishable until germination, as in the Orchis tribe. The Radicle is the descending part of the embryo, always pointing toward the micropyle, the true vertex of the seed. The Plumule is the germ of the ascending axis, the terminal bud, located between or at the base of the Cotyledons. These are the seed-lobes, the bulky farinaceous part of the embryo, destined to become the first or seminal leaves of the young plant. The nutritive matter deposited in the seed for the early sustenance of the germinating embryo, is found more abundant in the cotyledons in proportion as there is less of it in the albumen—often wholly in the albumen (Wheat), again all absorbed in the bulky cotyledons (Squash).

181. The number of the cotyledons is variable; and upon this circumstance is founded the most important subdivision of the Flowering Plants. The Monocotyledons are plants bearing seeds with one cotyledon; or if two are present, one is minute or abortive. Such plants are also called Endogens, because their stems grow by internal accretions (§ 421). Such are the Grasses, the Palms and Lilies, whose leaves are mostly constructed with parallel veins.

182. The Dicotyledons are plants bearing seeds with two cotyledons. These are also called Exogens, because their stems grow by external accretions; including the Bean tribe, Melon tribe, all our forest trees, etc. These are also distinguished at a
glance by the structure of their leaves, which are net-veined (§ 280). More than two cotyledons are found in the seeds of Pine and Fir; while the Dodder is almost the only known example of an embryo with no cotyledon.

183. The position of the embryo, whether with or without albumen, is singularly varied and interesting to study. It may be straight, as in Cat-tail and Violet, or curved in various degrees (Moonseed and Pink), or coiled (Hop), or rolled (Spice-bush), or bent angularly (Buckwheat), or folded (Cruciferae). In the last case two modes are to be specially noticed. 1, Incumbent, when the cotyledons fold over so as to bring the back of one against the radicle (Shepherd’s Purse); 2, accumbent, when the edges touch the radicle (Arabis).

184. A few plants, as the Onion, Orange, and Coniferæ, occasionally have two or even several embryos in a seed; while all the Cryptogamia or flowerless plants have no embryo at all, nor even seeds, but are reproduced from spores—bodies analogous to the pollen-grains of flowering plants (217).

185. Vitality of the seed. After the embryo has reached its wonted growth in the ripened seed, it becomes suddenly inactive and torpid, yet still alive. In this condition it is, in fact, a living plant, safely packed and sealed up for transportation. This suspended vitality of the seed may endure for years, or even, in some species, for ages. The seeds of Maize and Rye have been known to grow when 30 to 40 years old; Kidney-beans when 100; the Raspberry after 1700 years (Lindley). Seeds of Mountain Potentilla (P. tridentata) were known to us to germinate after a slumber of 60 years. On the other hand, the seeds of some species are short-lived, retaining vitality hardly a year (Coffee, Magnolia).

186. The dispersion of seeds over wide, and often to distant regions, is effected by special agencies, in which the highest Intelligence and Wisdom are clearly seen. Some seeds made buoyant by means of the coma or pappus, already mentioned, are wafted afar by the winds, beyond rivers, lakes, and seas: as the Thistle and Dandelion. Other seeds have wings for the same purpose. Others are provided with hooks or barbs, by which they lay hold of men and animals, and are thus, by unwilling agents, scattered far and wide (Burr-seed, Tick-seed). Again: some seeds, destitute of all such appendages, are thrown to a distance by the sudden coiling of the elastic carpels (Touch-me-not). The Squirting-cucumber becomes distended with water by absorption, and at length, when ripe, bursts an aperture at the base by separating from the stem, and projects the mingled seeds and water with amazing force.

187. Rivers, streams, and ocean currents, are agents for transporting seeds from country to country. Thus the Cocoa, and the Cashew-nut, and the seeds of Mahogany, have
been known to perform long voyages without injury to their vitality. Squirrels laying up their winter stores in the earth; birds migrating from clime to clime and from island to island, in like manner conspire to effect the same important end.


CHAPTER XIII.

GERMINATION.

188. The recommencement of growth in the seed is called germination. It is the awakening of the embryo from its torpor, and the beginning of development in its parts already formed, so as to become a plant like its parent.

Germination of the Beechnut.—218. Cross-section, showing the folded cotyledons. 219. The radicle only. 220. The ascending axis, above c, appears. 221, The cotyledons expand into the primordial leaves. 222, The first true leaves.

189. All the stages of this interesting process may be conveniently observed, at any season, by an experiment. Let a few seeds, as of flax, cotton, wheat, pea, be enveloped in a lock of cotton resting upon water in a bulb-glass, and kept constantly at a proper temperature. Or, in Spring, the garden-soil will give us examples of all kinds everywhere.
190. That the seed may begin to grow, or germinate, it is first
planted; or, at least, placed in contact with warm, moist soil.
Concerning the proper depth of the planted seed, agriculturists
are not agreed; but nature seems to indicate that no covering
is needed beyond what will secure the requisite moisture and
shade. Thus situated, the integuments gradually absorb water,
soften, and expand. The insoluble, starchy matter deposited in
the cotyledons, or in the albumen, or in both, undergoes a cer-
tain chemical change, becoming sweet and soluble, capable of affording nour-
ishment to the embryo now beginning to dilate and develop its parts. First
(in the winged seed of the Maple, scattered everywhere) the radicle is
seen protruding from the micropyle, or the bursting coverings. A section
of this seed would now show the fold-
ed embryo, impatient of confinement
(225).

191. Soon after, the radicle has ex-
tended; and, pale in color, has hidden
itself in the dark damp earth. Now
the cotyledons, unfolding and gradu-
ally freed from the seed-coats, display
themselves at length as a pair of green
leaves. Lastly the plumule appears
in open air, a green bud, already show-
ing a lengthening base, its first inter-
node, and soon a pair of regular leaves, lobed as all Maple-leaves.
The embryo is now an embryo no longer, but a growing plant
descending by its lower axis, ascending and expanding by its
upper.

192. With equal advantage we may watch the germination of
the Beech, represented in the figures above; or of the Oak, as
displayed in figures 1, 2, 3, 4; or the Pea, or Squash, and other
Dicotyledons; and the chief difference observed among them
will be in the disposal of the cotyledons. In general, these arise
with the ascending axis, as in Maple and Bean, and act as the
first pair of leaves. But sometimes when they are very thick, as in Pea, Buckeye, and Oak, they never escape the seed-coats, but remain and perish at the collum (§ 199), neither ascending nor descending.

193. The germination of monocotyledons, as seen in Indian Corn, Wheat, and Tulip, is in this wise. The cotyledon is not disengaged from the seed, but remains stationary with it. The radicle \( r \) protrudes slightly, and one or more rootlets \( s \) break out from it and descend. The plumule \( c \) shoots at first parallel with the cotyledon along the face of the seed, but soon ascends, pushing out leaf from within leaf.

194. The conditions requisite for germination are moisture, air, and warmth. Moisture is necessary for softening the integuments, dissolving the nutritive matter, and facilitating its circulation. This is supplied in the rain and dew. Air, or rather its oxygen, is required for the conversion of the starch into sugar,—a process always depending upon oxidation. The oxygen absorbed unites with a portion of the carbon of the starch, producing heat, evolving carbonic acid, and thus converting the remainder into grape-sugar, soluble and nutritive.

195. Warmth is a requisite condition of all vital action, as
well in the sprouting of a seed as in the hatching of an egg. The proper degree of temperature for our own climate may be stated at 60° to 80°. Extremes of heat and of cold are not, however, fatal to all germination. In one of the Geysers of Iceland, which was hot enough to boil an egg in four minutes, a species of Chara was found in a growing and fruitful state. The hot springs and pools of San Bernardino, California, at the constant heat of 190°, have several species of plants growing within their waters. Many species also arise and flower in the snows of Mt. Hood, along their lower borders. Darkness is favorable to germination, as proved by experiment, but not an indispensable condition. Hence, while the seed should be covered, for the sake of the moisture and shade, the covering should be thin and light, for the sake of a free access to air.

196. The cause of the downward tendency of the root is a theme of much discussion. Some have referred it to the principle of gravitation; others to its supposed aversion to light. But it is a simple and satisfactory explanation that its growth or cell-development takes place most readily on the moist side of its growing-point, and consequently in a downward direction, so long as the soil in contact with its lower surface is more moist than that above. Hence, also, the well-known tendency of roots toward springs and water-courses.

CHAPTER XIV.

THE ROOT, OR DESCENDING AXIS.

197. The Root is the basis of the plant, and the principal organ of nutrition. It originates with the radicle of the seed, the tendency of its growth is downward, and it is generally immersed in the soil. Its office is twofold; viz., to support the plant in its position, and to imbibe from the soil the food necessary to the growth of the plant.

198. The leading propensity of the root is to divide itself; and its only normal appendages are branches, branchlets, fibres, and fibrillae, which are multiplied to an indefinite extent, corresponding with the multiplication of the leaves, twigs, &c., above. This at once insures a firm hold upon the earth, and brings a large absorbing surface in contact with the moist soil.

199. The summit of the root, or that place where the root
meets the stem, is called the *collum*; the remote, opposite extremities, the ends of the fibres, being chiefly active in absorption, are the *spongioles*. Neither of these terms denotes distinct organs, but places only, and are often convenient. The *fibrils*, or *fibrillae*, are those minute hairs (seen only with a lens) which clothe the younger fibres. They arise from the tender epidermis or skin, and perish when that thickens into bark. These are the efficient absorbers of liquid nourishment. They are developed and perish annually with the leaves, whose servants they are. Few of them remain after the fall of the leaf. This fact plainly indicates that the proper time for transplanting trees or shrubs is the late Autumn, Winter, or early Spring, when there are but few tender fibrillae to be injured.

200. Two modes of root-development are definitely distinguished. First, the **Axial mode** is that where the primary, simple radicle, in growing, extends itself downward in a main body more or less branched, continuous with the stem, and forms the permanent root of the plant. Such is the case with the Maple, Mustard, Beet, and most of the Dicotyledonous Plants (§ 183).

201. Secondly, the **Inaxial** development is that where the primary radicle proves abortive, never developing into an axial root; but, growing laterally only, it sends out little shoots from its sides, which grow into long, slender roots, nearly equal in value, none of them continuous with the stem. Of this nature are the roots of all the Grasses, the Lilies, and the Monocotyledons generally, and of the Cryptogamia. Plants raised from layers, cuttings, tubers, and slips are necessarily destitute of the axial root.

202. The **various forms of the root** are naturally and conveniently referred to these two modes of development. The principal axial forms are the ramous, fusiform, napiform, and con-
ical. To all these forms the general name tap-root is applied. The ramous is the woody tap-root of most trees and shrubs, where the main-root branches extensively, and is finally dissolved and lost in multiplied ramifications.

203. Tuberous tap-roots. In herbaceous plants the tap-root often becomes thick and fleshy, with comparatively few branches. This tendency is peculiarly marked in biennials (§ 41), where the root serves as a reservoir of the superabundant food which the plant accumulates during its first year's growth, and keeps in store against the exhausting process of fruit-bearing in its second year. Such is the Fusiform (spindle-shaped) root—thick, succulent, tapering downward, and also for a short space upward. Beet, Radish, and Ginseng are examples. The Conical root tapers all the way from the collum downward (Carrot). The Napiform (turnip-shaped) swells out in its upper part so that its breadth equals or exceeds its length, as in Erigenia (235) and Turnip (239).

204. The forms of inaxial roots are fibrous, fibro-tuberous, tubercular, coralline, nodulous, and moniliform. The fibrous root consists of numerous thread-like divisions, sent off directly from the base of the stem, with no main or tap root. Such are the roots of most Grasses, which multiply their fibres excessively in light sandy soils. Fibro-tuberous roots (or fasciculate) are
so called when some of the fibres are thick and fleshy, as in the Asphodel, Crowfoot, Pœony, Orchis, and Dahlia. When the fibre is enlarged in certain parts only, it is nodulous; and when the enlargements occur at regular intervals, it is moniliform (necklace-like). When it bears little tubers here and there, as in Squirrel-corn (Dicentra Canadensis), it is tubercular.

205. Deposits of starch, or farinaceous matter, in all these cases, constitute the thickening substance of the root, stored up for the future use of the plant.

206 Adventitious roots are such as originate in some part of the ascending axis—stem or branches—whether above or below the ground. They are so called because their origin is indeterminate, both in place and time. Several special forms should be noticed; as the cirrhous roots of certain climbing vines (European Ivy, Poison Ivy, Trumpet-creeper) put forth in great numbers from the stem, serving for its mechanical support and no other known use. Again; the Fulca of certain Monocotyledonous plants originate high up the stem, and descending obliquely enter the ground. The Indian Corn frequently puts forth such roots from its lower joints, and thereby becomes strongly braced. The Screw Pine (Pandanus) of the conservatories puts forth fulca often several feet in length.

207. The Banian Tree (Ficus Indicus) drops "adventitious" roots from its extended branches, which, reaching and entering the ground, grow to supporting columns, like secondary trunks. Thus a single tree becomes at length a grove capable of sheltering an army.

208. Epiphytes (ἐπιφυτής, upon, φυτον, a plant), a class of plants, called also air-plants, have roots which are merely mechanical,
serving to fix such plants firmly upon other plants or trees, while they derive their nourishment wholly from the air. The Long-moss (Tillandsia) and Conopseum are examples.


209. Parasites—Three classes. Very different in nature are the roots of those plants called parasites, which feed upon the juices of other plants or trees. Such roots penetrate the bark of the nurse-plant to the cambium layer beneath, and appropriate the stolen juices to their own growth; as the Dodder and Mistletoe. Other parasites, although standing in the soil, are fixed upon foreign roots, and thence derive either their entire sustenance, as the Beech-drops and other leafless, colorless plants, or a part of their sustenance, as the Cow-wheat (Melampyrum) and Gerardia.

210. Subterranean stems. As there are aerial roots, so there are subterranean stems. These are frequently mistaken for roots, but may be known by their habitually and regularly producing buds. Of this nature are the tubers of the Irish Potato, the root-stock of the Sweet-flag, the bulb of the Tulip. But even the true root may sometimes develop buds—accidentally as it were—in consequence of some injury to the upper axis, or some other unnatural condition.

CHAPTER XV.

THE STEM, OR ASCENDING AXIS.

211. The general idea of the Axis is this: the central substantial portion of the plant, bearing the appendages, viz., roots below, and the leaf-organs above. The Ascending Axis is that which originates with the plumule, tends upward in its growth, and expands itself to the influence of the air and the light.

212. Although the first direction of the stem's growth is vertical in all plants, there are many in which this direction does not continue, but changes into the oblique or horizontal, either just above the surface of the ground, or just beneath it. If the stem continues to arise in the original direction, as it most commonly does, it is said to be erect. If it grow along the ground without rooting, it is said to be procumbent, prostrate, trailing. If it recline upon the ground after having at the base arisen somewhat above it, it is decumbent. If it arise obliquely from a prostrate base, it is said to be ascending; and if it continue buried beneath the soil, it is subterranean. Such stems, although buried like roots, may readily be known by their buds as already explained (§ 210).
213. Stems are either simple or branched. The simple stem is produced by the unfolding of the primary bud (the plumule) in the direction of its point alone. As this bud is developed below into the lengthening stem, it is continually reproduced at its summit, and so is always borne at the termination of the stem. Hence the axis is always terminated by a bud.

214. The Branched Stem, which is by far the most common, is produced by the development of both terminal and axillary buds. The axis produces a bud in the axil of its every leaf; that is, at a point just above the origin of the leaf-stalk. These buds remain inactive in the case of the simple stem, as the Mullein; but more generally are developed into leafy subdivisions of the axis, and the stem thus becomes branched. A Branch is, therefore, a division of the axis produced by the development of an axillary bud. This bud, also, ever renewed, is borne at the termination of the branch; so that axillary buds, each in turn, become terminal.

215. The Arrangement of the Branches upon the stem, depends, therefore, upon the arrangement of the leaves; which will be more particularly noticed hereafter. This arrangement is beautifully regular, according to established laws. In this place we briefly notice three general modes. The Alternate arrangement is where but one branch arises from each joint (node) on different sides of the stem, as in the Elm. The Opposite is where two branches stand on opposite sides of the same node, as in Maple. The Verticillate is where three or more branches, equidistant, encircle the stem at each node, as in the Pine.

216. Certain kinds of branches are noted for their tendency to produce adventitious roots, and thus to become independent plants. Nurserymen avail themselves of this property in propagation, and name such branches cions, suckers, stolons, offsets, slips, layers, cuttings, and runners. The Sucker is a branch issuing from some underground portion of the plant, leaf-bearing above and sending out roots from its own base, becoming finally a separate, independent plant. The Rose and Raspberry are thus multiplied.

217. The Stolon or Layer is a branch issuing from some above-ground portion of the stem, and afterward declining to the
ground, takes root at or near its extremity, sends up new shoots, and becomes a new plant. The Hobble-bush and Black-rasberry do this naturally, and gardeners imitate the process in many plants.

218. The Cion is any healthy twig or branchlet bearing one or more buds, used by the gardeners in the common process of grafting. Slips and cuttings are fragments of ordinary branches or stems, consisting of young wood bearing one or more buds. These strike root when planted in the ground. So the Grape-vine and Hop. The Offset is merely a cion severed from the parent and set in the ground to strike root.

220. The Node, or joint of the stem, marks a definite point of a peculiar organization, where the leaf with its axillary bud arises. The nodes occur at regular intervals, and the spaces between them are termed Internodes. This provides for the symmetrical arrangement of the leaves and branches of the stem. In the root no such provision is made, and the branches have no manner of arrangement. Now the growth of the stem consists
in the development of the internodes. In the bud, the nodes are closely crowded together, with no perceptible internodes; thus bringing the rudimentary leaves in close contact with each other. But in the stem, which is afterward evolved from that bud, we see full-grown leaves separated by considerable spaces. That is, while leaves are developed from the rudiments, internodes are pushed out from the growing point.

251. A Strawberry plant (Fragaria vesca) sending out a runner.

221. There are, however, many species of plants, especially of herbs, in which the axis of the primary bud does not develop into internodes at all, or but partially in various degrees. See the axis of Trillium, Onion, and Bloodroot. Such stems seldom appear above-ground. They are subterranean. This fact makes a wide difference in the forms of stems, and naturally constitutes them into two great divisions—viz., the Leaf-stems and the Scale-stems.

CHAPTER XVI.

FORMS OF THE LEAF-STEMS.

222. The leaf-stems are those forms which, with internodes fully developed, rise into the air crowned with leaves. The principal forms are the caulis, culm, trunk, caudex, and vine. They are either herbaceous or woody. They bear fruit but one season and then perish, at least down to the root, scarcely becoming woody; as seen in Mustard, Radish, and Grasses. But the woody leaf-stems survive the Winter, and become firm and solid in substance in after years; as do all the forest trees.

223. Caulis is a term generally applied to the annual leaf-stems of herbaceous plants. "Halm" is a term used in England with the same signification. Caulescent and acaulescent are con-
venient terms, denoting, the former the presence, and the latter the absence of the caulis or aerial stem.

224. The culm is the stem of the Grasses and the Sedges, generally jointed, often hollow, rarely becoming woody; as in Cane and Bamboo.

225. The trunk is the name of the peculiar stems of arborescent plants. It is the central column or axis which supports their branching tops and withstands the assaults of the wind by means of the great firmness and strength of the woody or ligneous tissue with which it abounds. The trunk is usually seen simple and columnar below, for a certain space, then variously dividing itself into branches. Here it is cylindrical, straight, and erect, as in the Forest Pine; prismatic often, as in the Gum-tree; gnarled and curved, as in the Oak; or inclined far over its base, as in the Sycamore.

226. In dividing itself into branches we observe two general modes, with their numerous variations, strikingly characterizing
the tree forms. In the one, named by Lindley the excurrent, the trunk, from the superior vigor of its terminal bud, takes precedence of the branches, and runs through to the summit, as in the Beech, Birch, Oak, and especially in the Spruce—trees with oval or pyramidal forms. But in the other, the solvent axis, as seen in the Elm and Apple-tree, the trunk suddenly divides into several subequal branches, which thence depart with different degrees of divergency, giving the urn form to the Elm, the rounded form to the Apple-tree, the depressed form to the Sloe-tree (Viburnum) and Dogwood.

227. CAUDEX is a term now applied to the peculiar trunk of the Palms and Tree-ferns, simple, branchless columns, or rarely dividing in advanced age. It is produced by the growth of the terminal bud alone, and its sides are marked by the scars of the fallen leaf stalks of former years, or are yet covered by their persistent bases. The stock or caudex of the cactus tribe is extraordinary in form and substance. It is often jointed, prismatic, branched, always greenish, fleshy, and full of a watery juice. Instead of leaves, its lateral buds develop spines only, the stem itself performing the functions of leaves. These plants abound in the warm regions of tropical America, and afford a cooling, acid beverage to the thirsty traveller when springs dry up under the torrid sun.

228. The vine is either herbaceous or woody. It is a stem too slender and weak to stand erect, but trails along the ground, or any convenient support. Sometimes, by means of special organs for this purpose, called tendrils, it ascends trees and other objects to a great height; as the Grape, Gourd, and other climbing vines.

229. The twining vine having also a length greatly disproportioned to its diameter, supports itself on other plants or objects by entwining itself around them, being destitute of tendrils. Thus the Hop ascends into the air by foreign aid, and it is a curious fact that the direction of its winding is always the same, viz., with the sun, from left to right; nor can any artificial training induce it to reverse its course. This is a general law among twining stems. Every individual plant of the same species revolves in the same direction, although opposite directions may characterize different species. Thus the Morning-Glory revolves always against the sun.

CHAPTER XVII.

FORMS OF SCALE-STEMS.

230. The Scale-stems are those forms which, with internodes partially or not at all developed, and generally clothed with scales for leaves, scarcely emerge from beneath the soil. They are the creeper and rhizoma (developed), the crown, tuber, corm, and bulb (undeveloped). Their forms are singular, often distorted in consequence of their underground growth and the unequal development of the internodes. They commonly belong to perennial herbs, and the principal forms are described as follows; but intermediate connecting forms are very numerous, and often perplexing.

257, Creeper of "Nimble Will," or Witch-grass; a, Bud; b, bases of culms.

231. The creeper is either subaerial or subterranean. In the former case it is prostrate, running and rooting at every joint, and hardly distinguishable otherwise from leaf-stems; as the Twin-flower (Linnæa), the Partridge-berry (Mitchella). In the latter case it is more commonly clothed with scales, often branching extensively, rooting at the nodes, exceedingly tenacious of life, extending horizontally in all directions beneath the soil, annually sending up from its terminal buds erect stems into the air. The Witch-grass (Triticum repens) is an example. Such plants are a sore evil to the garden. They can have no better cultivation than to be torn and cut to pieces by the spade of the angry gardener, since they are thus multiplied as many times as there are fragments.
232. Repent stems of this kind are not, however, without their use. They frequently abound in loose, sandy soil, which they serve to bind and secure against the inroads of the water and even the sea itself. Holland is said to owe its very existence to the repent stems of such plants as the Mat-grass (Arundo arenaria), Carex arenarius, and Fymhus arenarius, which overrun the artificial dykes upon its shores, and by their innumerable roots and creepers apparently bind the loose sand into a firm barrier against the washing of the waves. So the turf, chiefly composed of repent Grass-stems, forms the only security of our own sandy or clayey hills against the washing rains.

233. The rhizome or root-stock differs from the creeper only in being shorter and thicker, having its internodes but partially developed. It is a prostrate, fleshy, rooting stem, either wholly or partially subterranean, often scaly with the bases of undeveloped leaves, or marked with the scars of former leaves, and yearly producing new shoots and roots. Such is the fleshy, horizontal portion of the Blood-root, Sweet-flag, Water-lily, and Bramble (the latter hardly different from the creeper).

234. The growth of the rhizome is instructive, marking its peculiar character. Each joint marks the growth of a year. In Spring, the terminal bud unfolds into leaves and flowers, to perish in Autumn—a new bud to open the following Spring, and a new internode, with its roots, to abide several years. The number of joints indicates, not the age of the plant, but the destined age of each internode. Thus if there are three joints, we infer that they are triennial, perishing after the third season, while the plant still grows on

235. The premorse root-stock, formerly described as a root, is a short, erect rhizome, ending abruptly below, as if bitten square off (praemorsus). This is owing to the death of the earlier and lower internodes in succession, as in the horizontal rhizome. Scabius, Viola pedata, and Benjamin-root (Trillium) are examples.

236. Crown of the root designates a short stem with condensed internodes, remaining upon some perennial roots, at or
beneath the surface-soil, after the leaves and annual stems have perished.

237. **The Tuber** is an annual thickened portion of a subterranean stem or branch, provided with latent buds called eyes, from which new plants ensue the succeeding year. It is the fact of its origin with the ascending axis, and the production of buds, that places the tuber among stems instead of roots. The Potato and Artichoke are examples.

238. The stem of the Potato-plant sends out roots from its base, and branches above, like other plants; but we observe that its branches have two distinct modes of development. Those branches which rise into the air, whether issuing from the aboveground or the underground portion of the stem, expand regularly into leaves, etc.; while those lower branches which continue to grope in the dark, damp ground, cease at length to elongate, swell up at the ends into tubers with developed buds and abundance of nutritious matter in reserve for renewed growth the following year.

239. **The Corm** is an underground, solid, fleshy stem, with condensed internodes, never extending, but remaining of a rounded form covered with thin scales. It is distinguished from roots by its leaf-bud, which is either borne at the summit, as in the Crocus, or at the side, as in the Colchicum and Putty-root (Aplectrum).
FORMS OF SCALE-STEMS.

240. The Bulb partakes largely of the nature of the bud. It consists of a short, dilated axis, bearing an oval mass of thick, fleshy scales, closely packed above, a circle of adventitious roots around its base, and a flowering stem from the terminal, or a lateral bud.

241. How multiplied.—Bulbs are renewed or multiplied annually at the approach of Winter by the development of bulbs from the axils of the scales, which increase at the expense of the old, and ultimately become detached. Bulbs which flower from the terminal bud are necessarily either annual or biennial; those flowering from an axillary bud may be perennial, as the terminal bud may in this case continue to develop new scales indefinitely.

242. Bulbs are said to be tuni
cated when they consist of concentric layers, each entire and enclosing all within it, as in the Onion. But the more common variety is the scaly bulb—consisting of fleshy, concave scales, arranged spirally upon the axis, as in the Lily.

243. The tuber, corm, and bulb are analogous forms approaching by degrees to the character of the bud, which consists of a little axis bearing a covering of scales. In the tuber, the axis is excessively developed, while the scales are reduced to mere linear
points. In the corm, the analogy is far more evident, for the axis is less excessive and the scales more manifest; and lastly, in the bulb the analogy is complete, or overdone, the scales often becoming excessive.

267. Corm of Crocus, with new ones forming above. 268. Vertical section of the same. 269. Section of bulb of Hyacinth, with terminal scape and axillary bulbil. 270. Section of bulb of Oxalis violacea, with axillary scapes.


CHAPTER XVIII.

THE LEAF-BUD.

244. It is but a step from the study of the bulb to that of the leaf-bud. Buds are of two kinds in respect to their contents—the leaf-bud containing the rudiments of a leafy stem or branch, the flower-bud containing the same elements transformed into the nascent organs of a flower for the purpose of reproduction.

245. The leaf-bud consists of a brief, cone-shaped axis with a tender growing point, bearing a protecting covering of imbricated scales and incipient leaves.

246. The leafy nature of the scales is evident from a careful inspection of such buds as those of the Rose, Currant, Tulip-tree,
THE LEAF-BUD.

when they are swollen or bursting in Spring. The student will notice a gradual change from the outer scales to the evident leaves or stipules within, as seen in Fig. 273.

As a further protection against frost and rain, we find the scales sometimes clothed with hairs, sometimes varnished with resin. This is abundant and very aromatic in the buds of the Balm-of-Gilead and other Poplars.

247. In regard to position, buds are either terminal or axillary, a distinction already noticed. Axillary buds are especially noted as being either active or latent. In the former case they are unfolded into branches at once, or in the Spring following their formation. But latent buds suspend their activities from year to year, or perhaps are never quickened into growth. Axillary buds become terminal so soon as their development fairly commences; therefore each branch also has a terminal bud, and, like the main axis, is capable of extending its growth as long as that bud remains unharmed. If it be destroyed by violence or frost, or should it be transformed into a flower-bud, the growth in that direction forever ceases.

248. The suppression of axillary buds tends to simplify the form of the plant. Their total suppression during the first year's growth of the terminal bud is common, as in the annual stem of Mullein and in most perennial stems. When axillary buds remain permanently latent, and only the terminal bud unfolds year after year, a simple, branchless trunk, crowned with a solitary tuft of leaves, is the result, as in the Palmetto of our southern borders.

249. A partial suppression of buds occurs in almost all species, and generally in some definite order. In plants with opposite leaves, sometimes one bud of the pair at each node is developed and the other is suppressed, as in the Pink tribe. When both buds are developed, the branches, appearing in pairs like arms, are said to be brachiate, as in the Labiates. In many trees the terminal buds are arrested by inflorescence each season.
and the growth is continued by axillary buds alone, as in the Catalpa and Horse-chestnut. In all trees, indeed, buds are suppressed more or less, from various causes, disguising at length the intended symmetry of the branches, to the utter confusion of twigs and spray.

250. **Accessory buds**, one or more, are sometimes found just above the true axillary bud, or clustered with it, and only distinguished from it by their smaller size; as in the Cherry and Honeysuckle.

251. **Adventitious** or accidental buds are such as are neither terminal nor axillary. They occasionally appear on any part of the plant in the internodes of the stem or branches, on the root or even the leaves. Such buds generally result from some abnormal condition of the plant, from pruning or other destruction of branches or stem above, while the roots remain in full vigor; thus destroying the equilibrium of vital force between the upper and lower axis. The leaf of the
Walking-fern emits rootlets and buds at its apex; the leaf of Bryophyllum from its margin each—bud here also preceded by a rootlet. Some plants are thus artificially propagated in conservatories from the influence of heat and moisture on a leaf or the fragment of a leaf.

252. **Vernation** or **præfoliation** are terms denoting the mode of arrangement and folding of the leaf organs composing the bud. This arrangement is definitely varied in different orders of plants, furnishing useful distinctions in systematic botany. It may be studied to excellent advantage by making with a keen instrument a cross-section of the bud in its swollen state, just before expansion; or it may be well observed by removing one by one the scales. The Forms of Vernation are entirely analogous to those of Ästivation, and denoted by similar terms.

253. Vernation is considered in two different aspects—first, the manner in which the leaf itself is folded; second, the arrangement of the leaves in respect to each other. This depends much upon the phyllotaxy. (§ 261.)

254. Each leaf alone considered is either **flat** and **open**, as in the mistletoe, or it is **folded** or **rolled**, as follows: viz. **Reclined**, when folded crosswise, with apex bent over forward toward the base, as in the Tulip-tree; **Conduplicate**, when folded perpendicularly, with the lateral halves brought together face to face, as in the Oak; **Plaited**, or **Plicate**, each leaf folded like a fan, as in Birch.

255. **Circinate** implies that each leaf is rolled or coiled downward from the apex, as in Sundew and the Ferns.

256. The **Convolute** leaf is wholly rolled up from one of its
sides, as in the Cherry; while the Involute has both its edges rolled inward, as in Apple, Violet; and Revolute has both margins rolled outward and backward, as in the Dock, Willow, Rosemary.

257. The general vernation is loosely distinguished in descriptive botany as valvate (edges meeting), and imbricate (edges overlapping), terms to be noticed hereafter. The valvate more often occurs in plants with opposite leaves.

258. Imbricate vernation is Equitant (riding astraddle), when conduplicate leaves alternately embrace—the outer one the next inner by its unfolded margins, as in the Privet and Iris (282). It is Obvolute when it is half-equitant; that is, the outer leaf embraces only one of the margins of the inner, as in the Sage (281). Again, it is Triquitrous where the bud is triangular in section and the leaves equitant at each angle, as in the Sedges (280).

259. The principle of budding.—Each leaf-bud may be regarded as a distinct individual, capable of vegetating either in its native position, or when removed to another, as is extensively practised in the important operation of budding.

260. Bulblets. In the Tiger-lily, Cicuta bulbifera, and Aspidium bulbiferum, the axillary buds spontaneously detach themselves, fall to the ground, and become new plants. These remarkable little bodies are called bulblets.
LEAF-ARRANGEMENT.

261. As the position of the leaf upon the stem marks the position of the axillary bud, it follows that the order of the leaf arrangement will be the order of the branches also. The careful investigation of this subject has developed a science of unexpected exactness and beauty, called phyllotaxy (φύλλα, a leaf, τάξις, order).

262. In regard to position, leaves are radical when they grow out of the stem at or beneath the surface of the ground, so as to appear to grow from the roots; cauline, when they grow from the stem; and ramial (ramus, a branch), when from the branches.
Their arrangement on the axis is according to the following general modes:

*Alternate*, one above another on opposite sides, as in the Elm.

*Scattered*, irregularly spiral, as in the Potato vine.

*Rosulate*, clustered regularly, like the petals of a Rose, as in the Plantain and Shepherd's-purse.

*Fasciculate*, tufted, clustered many together in the axil, as seen in the Pine, Larch, Berberry.

*Opposite*, two, against each other, at the same node. Ex., Maple.

*Verticillate*, or whorled, more than two in a circle at each node, as in the Meadow-lily, Trumpet-weed. We may reduce all these modes to two general types,—the *alternate*, including all cases with one leaf at each node; the *opposite*, including cases with two or more leaves at each node.

263. The true character of the alternate type may be learned by an experiment. Take a straight leafy shoot or stem of the Elm or Flax, or any other plant with seemingly scattered leaves, and beginning with the lowest leaf, pass a thread to the next above, thence to the next in the same direction, and so on by all the leaves to the top; the thread will form a regular spiral. The opposite leaved type is also spiral, consisting of two or more parallel spirals—as many as there are leaves at the node. Therefore it is an established law that the course of development in the growing plant is universally spiral. But this, the *formative cycle* as it is called, has several varieties.

264. **The Elm cycle.** In the strictly alternate arrangement (Elm, Linden, Grasses) the spiral thread makes one complete circuit and commences a new one at the third leaf. The third leaf stands over the first, the fourth over the second, and so on, forming two vertical rows of leaves. Here (calling each complete circuit a *cycle*) we observe, first, that this cycle is composed of two leaves; second, that the angular distance between its leaves is $\frac{1}{2}$ a circle ($180^\circ$); third, if we express this cycle mathematically by $\frac{1}{2}$, the numerator (1) will denote the turns or revolutions, the denominator (2) its leaves, and the fraction itself the angular distance between the leaves ($\frac{1}{2}$ of $360^\circ$).

265. **The Alder cycle.** In the Alder, Birch, Sedges, etc.,
the cycle is not complete until the fourth leaf is reached. The fourth leaf stands over the first, the fifth over the second, etc., forming three vertical rows. Here call the cycle \( \frac{1}{3} \); 1 denotes the turns, 3 the leaves, and the fraction itself the angular distance (\( \frac{1}{3} \) of 360°).

266. The Cherry cycle. In the Cherry, Apple, Peach, Oak, Willow, etc., neither the third nor the fourth leaf, but the sixth, stands over the first; and in order to reach it the thread makes two turns around the stem. The sixth leaf is over the first, the seventh over the second, etc., forming five vertical rows. Call this the \( \frac{3}{5} \) cycle; 2 denotes the turns, 5 the leaves in the cycle, and the fraction itself the angular distance (\( \frac{3}{5} \) of 360°).

267. The Osage-orange cycle. In the common hedge plant, Osage-orange, the Holly, Evening Primrose, Flax, etc., we find no leaf exactly over the first until we come to the 9th, and in reaching it the spiral makes three turns. Here the leaves form eight vertical rows. It is a \( \frac{3}{8} \) cycle; 3 the number of turns, 8 the number of leaves, and the fraction the angular distance between the leaves (\( \frac{3}{8} \) of 360°).

268. These several fractions which represent the above cycles form a series as follows: \( \frac{1}{2}, \frac{1}{3}, \frac{2}{5}, \frac{3}{8}, \) in which each term is the
sum of the two preceding. The fifth terms in order will, therefore, be \( \frac{5}{3} \); and this arrangement is actually realized in—

269. The **White Pine cycle.** In the young shoots of the White Pine, in cones of most Pines, in Flea-bane (Erigeron Canadense), etc., the fourteenth leaf stands over the first, the fifteenth over the second, etc. The spiral thread makes five revolutions to complete the cycle, which is, therefore, truly expressed by \( \frac{5}{3} \).

270. The **Houseleek cycle** is next in order, expressed by the fraction \( \frac{\frac{3+5}{8+13}}{21} \), having eight turns and twenty-one leaves. Examples are found in the Scotch Pine, Houseleek, and the cone of Pine figured above (§ 299).

**Review.**—261. What is the etymology of the word phyllotaxy? 262. Explain "Lvs. radical"—Lvs. cauline—Lvs. ramial. What is the alternate arrangement?—Opposite?—Scattered?—Fasciculate?—Verticillate? Reduce to two general types. 263. What experiment reveals the true nature of these types? State the Law of plant-development. 264. Carefully explain the Elm Cycle. Why is its index \( \frac{4}{3} \)? 265. Explain also the Alder Cycle and its index—and the other cycles. 266. Show the relation of these cycles. Explain figs. 299, 300.
MORPHOLOGY OF THE LEAF.

CHAPTER XX.

MORPHOLOGY OF THE LEAF.

271. The leaf constitutes the verdure of plants, and is by far the most conspicuous and beautiful object in the scenery of nature. It is also of the highest importance in the vegetable economy, being the organ of digestion and respiration. It is characterized by a thin and expanded form, presenting the largest possible surface to the action of the air and light, which agents are indispensable to the life and increase of the plant.

The leaf may be regarded as an expansion of the substance of the bark, extended into a broad thin plate by means of a woody framework or skeleton, issuing from the inner part of the stem. The expanded portion is called the lamina or blade of the leaf, and it is either sessile, that is, attached to the stem by its base, or it is petiolate, attached to the stem by a footstalk called the petiole.

272. The regular petiole very often bears at its base a pair of leaf-like appendages, more or less apparent, called stipules. Leaves so appendaged are said to be stipulate; otherwise they are exstipulate.

273. Therefore a complete leaf consists of three distinct parts—the lamina or blade, the petiole, and the stipules. But they are subject to endless transformations. Either of them may exist without the others, or they may all be transformed into other organs, as pitchers, spines, tendrils, and even into the organs of the flower, as will hereafter appear.

274. The Petiole in form is rarely cylindrical, but more generally flattened or channelled on the upper side. When it is flattened in a vertical direction, it is said to be compressed, as in the Aspen or Poplar. In this case the blade is very unstable, and agitated by the least breath of wind. The winged petiole is flattened or expanded into a margin, but laterally instead of vertically, as in the Asters. Sometimes the margins outrun the petioles, and extend down the stem, making that winged, or
alate, also. Such leaves are said to be decurrent (decurro, run down). Ex., Mullein.

275. The amplexicaul petiole is dilated at the base into a margin which surrounds or clasps the stem, as in the Umbellifers. Frequently we find the stem-clasping margins largely developed, constituting a sheath—with free edges in the Grasses, or closed into a tube in the Sedges.

276. The petiole is simple in the simple leaf, but compound or branched in the compound leaf, with as many branches (petiolules) as there are divisions of the lamina. A leaf is simple when its blade consists of a single piece, however cut, cleft, or divided; and compound when it consists of several distinct blades, supported by as many branches of a compound petiole.

277. Stipules are certain leaf-like expansions, always in pairs, situated one on each side of the petiole near the base. They do not occur in every plant, but are pretty uniformly present in each species of the same natural order. In substance and color they usually resemble the leaf; sometimes they are colored like the stem, often they are membranous and colorless. In the Palmetto its substance is a coarse net-work resembling canvas.

278. Stipules are often adnate, or adherent to the petiole, as in the Rose; more generally they are free, as in the Pea and Pansy. In these cases and others they act the part of leaves; again they are very small and inconspicuous.

279. An Ochrea is a membranous sheath enclosing the stem from the node upward, as in the Knot-grass family (Polygonaceae). It is formed of the two stipules cohering by their two margins. In case the two stipules cohere by their outer margin
only, a double stipule is formed opposite to the leaf, as in the Buttonwood. If they cohere by their inner margin, the double stipule appears in the leaf axil, as in the Pond-weed (Potamogeton). The Ligule of the Grasses is generally regarded as a double axillary stipule. The leaflets of compound leaves are sometimes furnished with little stipules, called stipels.

280. Inter-petiolar stipules occur in a few opposite-leaved tribes, as the Galium tribe. Here we find them as mere bristles in Diodia, while in Galium they look like the leaves, forming whorls. Such whorls, if complete, will be apparently 6-leaved, consisting of two true leaves and four stipules. But the adjacent stipules are often united, and the whorl becomes 4-leaved.

281. Stipules are often fugacious, existing as scales in the bud, and falling when the leaves expand, or soon after, as in the Magnolia and Tulip-tree.

282. Nature of veins. The blade of the leaf consists of, (1) the frame-work, and (2) the tissue commonly called the parenchyma. The frame-work is made up of the branching vessels of the footstalk, which are woody tubes pervading the parenchyma, and conveying nourishment to every part. Collectively, these vessels are called veins, from the analogy of their functions. Venation is a term denoting the manner in which the veins are divided and distributed. The several organs of venation, differing from each other only in size and position, may be termed the midvein, veins, veinlets, and veinulets. (The old terms, midrib and nerves, being anatomically absurd, are here discarded.)
283. The *Midvein* is the principal axis of the venation, or prolongation of the petiole, running directly through the lamina, from base to apex, as seen in the leaf of the Oak or Birch. If there be several similar divisions of the petiole, radiating from the base of the leaf, they are appropriately termed *Veins*; and the leaf is said to be three-veined, five-veined, as in Maple. The primary branches sent off from the midvein or the veins we may term the *Veinlets*, and the secondary branches, or those sent off from the veinlets, are the *Veinulets*. These also branch and subdivide until they become too small to be seen.

284. Botanists distinguish three modes of venation, which are in general characteristic of *three Grand Divisions* of the Vegetable Kingdom—viz.:

*Reticulate* or *Net-veined*, as in the *Dicotyledons* (called also *Exogens*). This kind of venation is characterized by the frequent reunion or inoseulation of its numerously branching veins, so as to form a kind of irregular net-work.

*Parallel-veined*, as in the *Monocotyledons* (called also *Endogens*). The veins, whether straight or curved, run parallel, or
side by side, to the apex of the leaf or to the margin, and are connected by simple transverse veinlets hardly seen.

*Fork-veined*, as in the Ferns (and other Cryptogams where veins are present at all). Here the veins divide and subdivide in a forked manner, and do not reunite.

285. Of the Reticulate venation the student should carefully note three leading forms: viz., The *Feather-veined* (pinni-veined) leaf is that in which the venation consists of a midvein giving off at intervals lateral veinlets and branching veinules, as in the leaf of Beech, Chestnut. In the *Radiate-veined* (palmi-veined) leaf the venation consists of several veins of nearly equal size radiating from the base toward the circumference, each with its own system of veinlets. Ex., Maple, Crowfoot. Lastly, the *Tripli-veined* seems to be a form intermediate between the two former, where the lowest pair of veinlets are conspicuously stronger than the others, and extend with the midvein toward the summit (see fig. 319).

286. In parallel-veined venation the veins are either *straight*, as in the linear leaf of the Grasses; *curved*, as in the oval leaf of the Orchis; or *transverse*, as in the Canna, Calla, etc.


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**CHAPTER XXI.**

**MORPHOLOGY OF THE LEAF—CONTINUED.**

287. That infinite variety of beautiful and graceful forms for which the leaf is distinguished, becomes intelligible to the student only when viewed in connection with its venation. Since it is through the veins alone that nutriment is conveyed for the
development and extension of the parenchyma, it follows that there will be the greatest extension of outline where the veins are largest and most numerous. Consequently the form of the leaf will depend upon the direction of the veins and the vigor of their action in developing the intervening tissue. In accordance with this theory, leaf-forms will be classed in respect to their venation.

288. ** Feather-veined leaves.** Of these, the following forms depend upon the length of the veinlets in relation to each other and to the midvein. *When the lower veinlets are longer than the others, the form of the blade will be (1) ovate, with the outline of an egg, the broad end at the base; (2) lanceolate, or lance-shaped, narrower than ovate, tapering gradually upward; (3) deltoid, or triangular-shaped, like the Greek letter Δ.*

289. If the middle veinlets exceed the others in length, the leaf will be (4) orbicular, roundish, or quite circular; (5) elliptical, with the outline of an ellipse, nearly twice longer than broad; (6) oval, broadly elliptical; (7) oblong, narrowly elliptical.

290. *When the veinlets are more largely developed in the upper region of the leaf, its form becomes (8) obovate, inversely ovate, the narrow end at base; (9) oblanceolate, that is, lanceolate with*
the narrow end at base; (10) **spatulate**, like a spatula, with a narrow base and a broader, rounded apex; (11) **cuneate or cuneiform**, shaped like a wedge with the point backward.

291. **Again:** if the lowest pair of veinlets are lengthened and more or less recurved, the leaf will be variously modified in respect to its base, becoming (12) **cordate**, or heart-shaped, an ovate outline with a sinus or re-entering angle at base; (13) **auriculate**, with ear-shaped lobes at base; (14) **sagittate**, arrow-shaped, with the lobes pointed, and directed backward; (15) **hastate**, halbert-shaped, the lobes directed outward.

292. **Pinnatifid forms.** The following pinnate-veined forms, approaching the compound leaf, depend less upon the proportion of the veinlets than upon the relative development of the inter-
vening tissue. The prefix *pinnated* is obviously used in contrast with *palmated* among palmate-veined forms.

293. *Pinnatifid* (pinna, feather, *findo*, to cleave), feather-cleft, the tissue somewhat sharply cleft between the veinlets about half-way to the midvein, forming oblong segments. When the segments of a pinnatifid leaf are pointed and curved backward, it becomes *runcinate*, i.e., re-uncinate. When the terminal segment of a pinnatifid leaf is orbicular in figure and larger than any other, presenting the form of the ancient lyre, the form is termed *lyrate*.

294. *Pinnately parted* implies that the incisions are deeper than pinnatifid, nearly reaching the midvein. In either case the leaf is said to be *sinuate* when the incisions (sinuses) as well as the segments are rounded and flowing in outline. Such segments are *lobes*, and the leaves *lobate* or lobed, a very generic term.

295. *Palmate forms*. The palmate venation presents us with a set of forms which are, in general, broader in proportion than the pinnate, having the breadth about equal to the length. Such a leaf may be rarely *broadly ovate*, or *broadly cordate*, terms which require no further explanation. Or it may be *Reniform*, kidney-shaped, having a flowing outline broader than long, concave at base; or *Peltate*, shield-form, the petiole not inserted at the margin, but in the midst of the lower surface of the blade. This singular form evidently results from the blend-
ing of the base lobes of a deeply cordate leaf, as seen in hydrocotyle. It may be orbicular, oval, etc.

296. The following result from deficiency of tissue, causing deep divisions between the veins. Leaves thus dissected are said to be *palmately-lobed* when either the segments or the si-

nuses are somewhat rounded and continuous. The number of lobes is denoted by such terms as *bilobate*, *trilobate*, *five-lobed*, etc. Leaves are *palmately cleft* and *palmately parted*, according
to the depth of the incisions as above described. But the most peculiar modification is the *Pedate*, like a bird’s foot, having the lowest pair of veins enlarged, recurved, and bearing each several of the segments (348).

297. **The forms of the parallel-veined leaves** are remarkable for their even, flowing outlines, diversified solely by the direction and curvature of the veins. When the veins are straight, the most common form is the *Linear*, long and narrow, with parallel margins, like the leaves of the Grasses—a form which may also occur in the pinnate-veined leaf, when the veinlets are all equally shortened. The *ensiform*, or sword-shaped, is also linear, but has its edges vertical, that is, directed upward and downward.

298. If the veins curve, we may have the *lanceolate*, *elliptical*, or even *orbicular* forms; and if the lower curve downward, the *cordate*, *sagittate*, etc. Palmate forms there also are, splendidly developed in the Palmetto and other Palms, whose large leaves are appropriately called *flabelliform* (fan-shaped).

299. The leaves of the Pine and the Fir tribe (Coniferae) generally are parallel-veined also, and remarkable for their contracted forms, in which there is no distinction of petiole or blade. Such are the *Acerose* (needle-shaped) leaves of the Pine, the *Subulate* (awl-shaped) and scale-form leaves of the Cedars, etc.

CHAPTER XXII.

THE COMPOUND LEAF, ETC.

300. If we conceive of a simple leaf becoming a compound one, on the principle of "deficiency of tissue between the veins," it will be evident that the same forms of venation are represented by the branching petioles of the latter as by the veins of the former. The number and arrangement of the parts will therefore in like manner correspond with the mode of venation.

301. The divisions of a compound leaf are called leaflets; and the same distinction of outline, margin, etc., occur in them as in simple leaves. The petiolules of the leaflets may or may not be articulated to the main petiole, or rachis, as it is called.

302. Pinnately compound. From the pinnate-veined arrangement we may have the pinnate leaf, where the petiole (midvein) bears a row of leaflets on each side, either sessile or petiolulate, generally equal in number and opposite. It is unequally pinnate (357) when the rachis bears an odd terminal leaflet, and equally pinnate (356) when there is no terminal
leaflet, and *interruptedly pinnate* when the leaflets are alternately large and small (358).

303. The number of leaflets in the pinnate leaf varies from thirty pairs and upward (as in some Acacias), down to three, when the leaf is said to be *ternate* or *trifoliate*; or two, becoming *binate*; or finally even to one leaflet in the Lemon. Such a leaf is theoretically compound, on account of the leaflet (blade) being articulated to the petiole.

![Diagram of leaf structures](image)

304. A *bipinnate leaf* (twice pinnate) is formed when the rachis bears *pinnae* or secondary pinnate leaves, instead of leaflets (361), and *tripinnate* (thrice pinnate) when pinnae take the places of the leaflets of a bipinnate leaf (360). When the division is still more complicated, the leaf is *decompound*. Different degrees of division often exist in different parts of the same leaf, illustrating the gradual transition of leaves from simple to compound in all stages. The leaves of the Honey-locust and Coffee-tree (Gymnocladus) often afford curious and instructive examples (362).

305. A *biteminate leaf* is formed when the leaflets of a ternate leaf give place themselves to ternate leaves (359), and *triternate* when the leaflets of a biteminate leaf again give place to ternate leaves.

306. **Palmately compound.** The palmate venation l
also its peculiar forms of compound leaves, as ternate, quinate, septinate, etc., according to the number of leaflets which arise together from the summit of the petiole. Ternate leaves of this venation are to be carefully distinguished from those of the pinnate plan. The palmately ternate leaf consists of three leaflets, which are either all sessile or stalked alike; the pinnately ternate has the terminal leaflet raised above the other two on the prolonged rachis (354, 355).

307. Apex. In regard to the termination of a leaf or leaflet at its apex, it may be acuminate, ending with a long, tapering point; cuspidate, abruptly contracted to a sharp, slender point; mucronate, tipped with a spiny point; acute, simply ending with an angle; obtuse, rounded at the point. Or the leaf may end without a point, being truncate, as if cut square off; retuse, with a rounded end slightly depressed where the point should be; emarginate, having a small notch at the end; obcordate, inversely heart-shaped, having a deep indentation at the end.

308. Margin. The following terms are used to define the
margin of the leaf or leaflet, with no reference to the general form. If the leaf be even-edged, having the tissue completely filled out, the appropriate term is, *entire*. Sometimes a vein runs along such a margin as if a *hem*.

309. But when the marginal tissue is deficient, the leaf becomes *dentate*, having sharp teeth pointing outward from the centre; *serrate*, with sharp teeth pointing forward, like the teeth of a saw; *crenate*, with rounded or blunt teeth. The terms *denticulate*, *serrulate*, *crenulate*, denote finer indentations of the several kinds; *doubly dentate*, etc., denote that the teeth are themselves toothed.

310. The *undulate*, or wavy edge, is somewhat different from the *repand*, which bends like the margin of an umbrella. If the veins project, and are tipped with spines, the leaf becomes *spinous*. Irregularly divided margins are said to be *erose* or jagged, *laciniate* or torn, *incised* or cut. Often, instead of a deficiency, there is a superabundance of marginal tissue, denoted by the term *crispate* or *crisped*.

311. **Insertion.** Several important terms descriptive of the various modes of leaf-insertion must here be noticed. A sessile leaf is said to be *amplexicaul* when its base lobes adhere to and
clasp the stem. Should these lobes extend quite around the stem and become blended together, on the other side a *perfoliate* leaf will be formed (*per*, through, *folium*, leaf), the stem seeming to pass through the leaves. When the bases of two opposite sessile leaves are so united as to form one piece of the two, they are said to be *connate*.

312. **Surface.** The following terms are applicable to any other organs as well as leaves. In the quality of surface the leaf may be *glabrous* (smooth), destitute of all hairs, bristles, etc., or *scabrous* (rough), with minute, hard points, hardly visible. A dense coat of hairs will render the leaf *pubescent* when the hairs are soft and short; *villous* when they are rather long and weak; *sericeous*, or silky, when close and satin-like: such a coat may also be *lanuginous*, woolly; *tomentous*, matted like felt; or *floccose*, in soft, fleecy tufts.

313. Thinly scattered hairs render the surface *hirsute* when they are long; *pilous* when short and soft; *hispid* when short and stiff. The surface will be *setous* when beset with bristly hairs called *setae*; and *spinous* when beset with spines, as in the
Thistle and Horse-nettle. Leaves may also be armed with *stinging* hairs which are sharp and tubular, containing a poisonous fluid, as in Nettles and Jatropha stimulans (503).

314. A *pruinous* surface is covered with a bluish-white waxy powder, called *bloom*, as in the Cabbage; and a punctate leaf is dotted with colored points or pellucid glands.

315. In *texture* leaves may be *membranous*, or *coriaceous* (leathery), or *succulent* (fleshy), or *scariosus* (dry), *rugous* (wrinkled), etc., which terms need only to be mentioned.

316. **Double terms.** The modifications of leaves are almost endless. Many other terms are defined in the glossary, yet it will often be found necessary in the exact description of a plant to combine two or more of the terms defined in order to express some intermediate figure or quality; thus *ovate-lanceolate*, signifying a form between ovate and lanceolate, etc.

317. The Latin preposition *sub* (under) prefixed to a descriptive term denotes the quality which the term expresses, in a lower degree, as *subsessile*, nearly sessile, *subserrate*, somewhat serrate.


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**CHAPTER XXIII.**

**TRANSFORMATIONS OF THE LEAF.**

318. Hitherto we have considered the leaf as foliage merely—constituted the fit organ of aeration by its large expansion of surface. This is indeed the chief, but not the only aspect in which it is to be viewed. The leaf is a typical form; that is, a type, or an *idea* of the Divine Architect, whence is derived the form of every other appendage of the plant. To trace out this idea in all the disguises under which it lurks, is one of the first aims of the botanist. Several of these forms of disguise have already been noticed—for example:

319. **The scales** which clothe the various forms of scale-
stems are leaves, or more usually petioles, reduced and distorted, perhaps by the straitened circumstances of their underground growth. The scales of corms and rhizomes are mostly mere membranes, while those of the bulb are fleshy, serving as repositories of food for the future use of the plant. That these scales are leaves is evident—1st, from their position at the nodes of the stem; 2d, from their occasional development into true leaves. Of the same nature are the brown scales of Winter buds.

320. **The cotyledons** of seeds or seed-lobes are readily recognized as leaves, especially when they arise above-ground in germination, and form the first pair upon the young plant; as in the Beechnut and Squash seed. Their deformity is due to the starchy deposits with which they are crammed for the nourishment of the embryo when germinating, and also to the way in which they are packed in the seed.

321. **Phyllodia** are certain leaf-forms, consisting of petioles excessively compressed, or expanded vertically into margins while the true lamina is partly or entirely suppressed. Fine examples are seen in our greenhouse Acacias from Australia. Their vertical or edgewise position readily distinguishes them from true leaves.

322. **Ascidia**, or pitchers, are surprising forms of leaves, ex-
pressly contrived, as if by art, for holding water. The pitchers of Sarracenia, whose several species are common in bogs North and South, are evidently formed by the blending of the involute margins of the broadly winged petioles, so as to form a complete vase. The broad expansion which appears at the top may be regarded as the lamina. These pitchers contain water, in which insects are drowned, being prevented from escaping by the deflexed hairs at the mouth. Other pitcher-bearing plants are equally curious; as Darlingtonia of California, Nepenthes and Dischidia of the East Indies. In Dionæa of North Carolina, the leaves are transformed to spiny, snapping fly-traps!

323. Many weak-stemmed water-plants are furnished with Air-bladders, or little sacks filled with air to buoy them up near to the surface. Such are the bladders of the common Bladderwort, formed from the leaf-lobes. In the Horned-bladderwort, the floats are made of the six upper inflated petioles lying upon the surface of the water like a wheel-shaped raft, and sustaining the flower upon its own elevated stalk.

324. The Tendril is a thread-like, coiling appendage, furnished to certain weak-stemmed plants as their means of support in place. Its first growth is straight, and it remains so until it reaches some object, when it immediately coils itself about it, and thus acquires a firm though elastic hold. This beautiful appendage is finely exemplified in the Cucurbitaceæ and Grape, above cited; also in many species of the Pea tribe (Leguminosæ), where it is appended to the leaves. It is not a new organ, but some old one transformed and adapted to a new purpose. In Gloriosa superba, the midvein of the leaf is prolonged beyond the blade into a coiling tendril. In the Pea, Vetch, etc., the
tendrils represent the attenuated leaf-blades themselves. Again, the entire leaf sometimes becomes a tendril in Lathyrus, while the stipules act as leaves.

325. The petiole of the leaf of Clematis, otherwise unchanged, coils like a tendril for the support of the vine. In the Greenbrier, the stipules are changed to tendrils, which thus arise in pairs from the base of the petioles. So probably in the Gourd.

326. But the tendrils of the Grapevine are of a different nature. From their position opposite the leaves, and the tubercles occasionally seen upon them, representing flower-buds, they are inferred to be abortive, or transformed flower-stalks.

327. Many plants are armed, as if for self-defence, with hard, sharp-pointed, woody processes, called spines or thorns. Those which are properly called spines originate from leaves. In Berberis the spines are evidently transformed leaves, as the same plant exhibits leaves in every stage of the metamorphosis. In Goat's-thorn (Astragalus tragacanthus) of S. Europe, the petioles change to spines after the leaflets fall off. In the Locust (Robinia), there is a pair of spines at the base of the petiole, in place of stipules.

328. Thorns originate from axillary buds, and are abortive branches. This is evident from their position in the Hawthorn and Osage-orange. The Apple and Pear tree in their wild state produce thorns, but by cultivation become thornless; that is, the axillary buds, through better tillage, develop branches instead of thorns. The terrible
branching thorns of the Honey-locust originate just above the axil, from accessory buds. Prickles differ from either spines or thorns, growing from the epidermal upon stems or leaves, at no determinate point, and consisting of hardened cellular tissues, as in the Rose, Bramble.

329. By a more gentle transformation, leaves pass into Bracts, which are those smaller, reduced leaf-forms situated near and among the flowers. So gradual is the transition from leaves to bracts—in the Peony, e. g.—that no absolute limits can be assigned. Equally gradual is the transition from bracts to sepals of the flower—affording a beautiful illustration of the doctrine of metamorphosis (§ 330, etc.) Bracts will be further considered under the head of Inflorescence.


CHAPTER XXIV.
METAMORPHOSIS OF THE FLOWER.

330. It has already been announced (§ 37) that a flower is a metamorphosed, that is, a transformed branch. No new principle or element was devised to meet this new necessity in the life of the plant, viz., the perpetuation of its kind; but the leaf, that same protean form which we have already detected in shapes so numerous and diverse, the leaf, is yet once more in nature's hand moulded into a series of forms of superior elegance, touched with colors more brilliant, and adapted to a higher sphere as the organs of reproduction.

331. Proofs of this doctrine appear on every hand, both in the natural and in the artificial development of plants. We mention a few instances. The thoughtful student will observe many more.

332. In most flowers, as in the Poppy, very little evidence of the metamorphosis appears, simply because it has been so complete. Its sepals, petals, stamens, and pistils—how unlike!
Can these be of one and the same element? Look again. Here is a double flower, a Poppy of the gardens, artificially developed; its slender white stamens have indeed expanded into broad red petals!

333. The argument begins with the sepals. In the Rose and Paeony, and in most flowers, the sepals have all the characteristics of leaves—color, form, venation, etc. The transition from leaves to bracts and from bracts to sepals is so gradual as to place their identity beyond doubt. Again, in Calicanthus, the sepals pass by insensible gradations into petals; and in the Lilies these two organs are almost identical. Hence, if the sepals are leaves, the petals are leaves also. In respect to the nature of the stamens, the Water-lily is particularly instructive. Here we see a perfect gradation of forms from stamens to petals, and thence to sepals, where, half-way between the two former, we find a narrow petal tipped with the semblance of an anther (410). Finally, cases of close resemblance between stamen and pistil, so unlike in the Poppy, are not wanting. For example, the Tulip-tree.

334. Teratology. Cases in artificial development where organs of one kind are converted into those of another kind by cultivation, afford undeniable evidence of the doctrine in question—the homology of all the floral organs with each other and with the stem. Such cases are frequent in the garden, and, however much admired, they are monstrous, because unnatural. In all double flowers, as Rose, Paeony, Camellia, the stamens have been reconverted into petals, either wholly or partially, some yet remaining in every conceivable stage of the transition. In the double Butter-cup (416) the pistils as well as stamens revert to petals, and in the garden Cherry, Flowering Almond, a pair of green leaves occupy the place of the pistils. By still further changes all parts of the flower manifest their foliage affinities, and the entire flower-bud, after having given clear indications of its floral character, is at last developed into a leafy branch (417). Further evidence of this view will appear in the—
335. *Estivation of the flower-bud.* This term (from *æstivus*, of Summer) refers to the arrangement of the floral envelopes while yet in the bud. It is an important subject, since in general the same mode of *æstivation* regularly characterizes whole tribes or orders. It is to the flower-bud what *vernation* (*vernus*, Spring) is to the leaf-bud. The various modes of *æstivation* are best observed in sections of the bud made by cutting it through horizontally when just ready to open. From such sections our diagrams are copied.

336. Separately considered, we find each organ here folded in ways similar to those of the leaf-bud; that is, the sepal or the petal may be *convolute, involute, revolute*, etc., terms already defined. Collectively considered, the *æstivation* of the flower occurs in four general modes with their variations—the valvate, the contorted, imbricate, and plicate.

337. In *valvate æstivation* the pieces meet by their margins without any overlapping; as in the sepals of the Mallow, petals of Hydrangea, valves of a capsule. The following va-
ricies of the valvate occur: Induplicate, where each piece is involute—i.e., has its two margins bent or rolled inward, as in Clematis; or reduplicate, when each piece is revolute—having its margins bent or rolled outward, as in the sepals of Althea rosea (419, 420).

338. Contorted aestivation is where each piece overlaps its neighbor, all in the same direction, appearing as if twisted together, as in Phlox, Flax, Oleander (421).

339. Imbricated aestivation (imbrex, a tile) is a term restricted to those modes in which one or more of the petals or sepals is wholly outside, overlapping two others by both its margins. This kind of aestivation naturally results from the spiral arrangements so common in phyllotaxy, while the valvate and contorted seem identified with the opposite or whorled arrangement. The principal varieties are the following: The Quincuncial, consisting of five leaves, two of which are wholly without, two wholly within, and one partly both, or one margin out, the other in, as in the Rose family (422). This accompanies the two-fifths cycle in phyllotaxy, and corresponds precisely with it, each quincunx being in fact a cycle with its internodes suppressed. (See fig. 300, and § 266.) The Triquetrous, consisting of three leaves in each set, one of which is outside, one inside, and the third partly both, as in Tulip, Erythronium, agreeing with the two-thirds, or Alder Cycle (§ 265). The Convolute, when each leaf wholly involves all that are within it, as
do the petals of Magnolia; and lastly, the Vexillary, when one piece larger than the rest is folded over them, as in Pea (425).

340. **Plicate** or folded aestivation occurs in tubular or monopetalous flowers, and has many varieties, of which the most remarkable is the *supervolute*, where the projecting folds all turn obliquely in the same direction, as in the Morning-glory, Thorn-apple (Datura).

![Diagrams of flowers (as seen by cross-sections).](image)

It will be seen by the cuts that different modes of aestivation may occur in the different whorls of the same flower.


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**CHAPTER XXV.**

**INFLORESCENCE.**

341. Inflorescence is a term denoting the arrangement of the flowers and their position upon the plant.

All the buds of a plant are supposed to be *originally* of one and the same nature, looking to the production of vegetative organs only. But at a certain period, a portion of the buds of the living plant, by an unerring instinct little understood, are converted from their ordinary intention into *flower-buds*, as stated and illustrated in the foregoing Chapter. The flower-bud is incapable of extension. While the leaf-bud may unfold leaf after leaf, and node after node, to an indefinite extent, the flower-bud blooms, dies, and arrests forever the extension of the axis which bore it.

342. In position and arrangement, flower-buds cannot differ from leaf-buds, and both are settled by the same unerring law
which determines the arrangement of the leaves. Accordingly, the flower-bud is always found either terminal or axillary. In either case, a single bud may develop either a compound inflorescence, consisting of several flowers with their stalks and bracts, or a solitary inflorescence, consisting of a single flower.

343. The Peduncle is the flower-stalk. It bears no leaves, or at least only such as are reduced in size and changed in form, called bracts. If the peduncle is wanting, the flower is said to be sessile. The simple peduncle bears a single flower; but if the peduncle be divided into branches, it bears several flowers, and the final divisions, bearing each a single flower, are called pedicels. The main stem or axis of a compound peduncle is called the rachis.

344. The Scape is a flower-stalk which springs from a subterranean stem, in such plants as are called stemless or acaulescent; as the Primrose, Tulip, Bloodroot. Like the peduncle, it is leafless or with bracts only, and may be either simple or branched. The flower-stalk, whether peduncle, scape, or pedicel, always terminates in the torus (§ 57).

345. Bracts. The branches of the inflorescence arise from the axils of reduced leaves, called bracts. Those leaves, still smaller, growing upon the pedicels, are called bractlets. Bracts are usually simple in outline and smaller than the leaf, often gradually diminishing to mere points, as in Aster, or even totally
suppressed, as in the Cruciferae. Often they are colored, sometimes brilliantly, as in Painted-cup. Sometimes they are scale-like, and again they are evanescent membranes.

346. The Spathe is a large bract formed in some of the Monocotyledons, enveloping the inflorescence, and often colored, as in Arum, Calla; or membranous, as in Onion and Daffodil.

347. Bracts also constitute an Involucre when they are collected into a whorl or spiral group. In the Phlox, Dodecatheon, and generally, the involucre is green, but sometimes colored and petaloid, as in Dogwood and Euphorbia. Situated at the base of a compound umbel, it is called a general involucre; at the base of a partial umbel it is a partial involucre or involucel, both of which are seen in the Umbelliferae.

348. In the Compositae, where the flowers are crowded upon a common torus, forming what is called a compound flower, an involucre composed of many imbricated scales (bracts) surrounds them as a calyx surrounds a simple flower. The chaff also upon the torus are bracts to which each floret is axillary (434).

349. In the Grasses, the bracts subsist under the general name of chaff. At the base of each spikelet (436) of flowers we find two bracts—the Glumes. At the base of each separate flower in the spikelet are also two bractlets—the Pales—enveloping as a calyx the three stamens and two styles (c).

350. The cup of the Acorn is another example of involucre,
composed of many scale-like bractlets. So, also, perhaps the burr of the Chestnut, etc.

351. The forms of inflorescence are exceedingly various, but may all be referred to two classes, as already indicated—the axillary, in which all the flowers arise from axillary buds; the terminal, in which all the flower-buds are terminal.

352. Axillary inflorescence is called indefinite, because the axis, being terminated by a leaf-bud, continues to grow indefinitely, developing bracts with their axillary flowers as it grows. It is also called centripetal, because in the order of time the blossoming commences with the circumference (or base) of the inflorescence, and proceeds toward the central or terminal bud, as in Hawthorn or Mustard.

353. Terminal inflorescence, on the other hand, is definite, implying that the growth of the axis as well as of each branch is definitely arrested and cut short by a flower. It is also centrifugal, because the blossoming commences with the central flower and proceeds in order to the circumference, as in the Sweet-William, Elder, Hydrangea.

354. Both kinds of inflorescence are occasionally combined in the same plant, where the general system may be distinguished from the partial clusters which compose it. Thus in the Composite, while the florets of each head open centripetally, the general inflorescence is centrifugal, that is, the terminal head is developed before the lateral ones. But in the Labiate the partial clusters (verticillasters) open centrifugally, while the general inflorescence is indefinite, proceeding from the base upward.


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CHAPTER XXVI.

SPECIAL FORMS OF INFLORESCENCE.

355. Of centripetal or axillary inflorescence the principal varieties are the spike, spadix, catkin, raceme, corymb, umbel, panicle, thyrse, head. The spike is a long rachis with
sessile flowers either scattered, clustered, or crowded upon it, as Plantain, Mullein, Vervain. The so-called spikes of the

Grasses, as Wheat, Timothy, are in fact compound spikes, bearing little spikes or spikelets in place of single flowers (440).
356. The spadix is a thick, fleshy rachis, with flowers closely sessile or imbedded on it, and usually with a spathe, as in Calla (432), or without it, as in Golden-club (436).

357. The catkin or ament is a slender, pendent spike with scaly bracts subtending the naked, sessile flowers, all caducous (falling) together, as in Birch, Beech, Oak, Willow.

358. The raceme is a rachis bearing its flowers on distinct, simple pedicels. It may be erect, as in Hyacinth, Pyrola; or pendulous, as in Currant, Blackberry. The corymb differs from the raceme in having the lower pedicels lengthened so as to elevate all the flowers to about the same level. The corymb often becomes compound by the branching of its lower pedicels, as in Yarrow.

359. An umbel consists of several pedicels of about equal length radiating from the same point—the top of the common peduncle, as Milk-weed, Ginseng, Onion. When the pedicels of an umbel become themselves umbels, as in Caraway and most of the Umbelliferae, a compound umbel is produced. Such secondary umbels are called umbellets, and the primary pedicels, rays.

360. The panicle is a compound inflorescence formed by the irregular branching of the pedicels of the raceme as in Oats,
Spear-grass, Catalpa. A *thyrse* is a sort of compact, oblong, or pyramidal panicle, as in Lilac, Grape.

361. A *head* or capitulum is a sort of reduced umbel, having the flowers all sessile upon the top of the peduncle, as in the Button-snake-root, Button-bush, Clover. But the more common examples of the capitulum are seen in the Compositae, where the summit of the peduncle, that is, the receptacle, is dilated, bearing the sessile flowers above, and scale-like bracts around, as an involucre.

362. The *capitulum* of the Compositae is often called a compound flower from its resemblance, the involucre answering to a calyx, the rays to the corolla. The flowers are called florets—those of the outer circle, *florets of the ray*, generally differing in form from those of the central portions, the *florets of the disk*.

363. **Of terminal inflorescence** the following varieties are described: cyme, fascicle (verticillaster), and glomerule.

364. *Cyme* is a general term denoting any inflorescence with centrifugal evolutions, but is properly applied to that level-topped or fastigiate form which resembles the corymb, as in the
Elder. If it is loosely spreading, not fastigiate, it is called a cymous panicle, as in the Chickweed, Spergula, etc. If it be rounded, as in the Snowball, it is a globous cyme.

365. A scorpion cyme, as seen in the Sundew, Sedum, and Borage family, is a kind of coiled raceme, unrolling as it blossoms. It is understood to be a half-developed cyme, as illustrated in the cut (454). The fascicle is a modification of the cyme, with crowded and nearly sessile flowers, as in Sweet-William (Dianthus).

366. Glomerule, an axillary tufted cluster, with a centrifugal evolution, frequent in the Labiatæ, etc. When such occur in the axils of opposite leaves and meet around the stem, each pair constitutes a verticillaster or verticil, as in Catmint, Hoarhound.

367. The above diagrams show the mutual relations of the several forms of centripetal Inflorescence—how they are graduated from the spike (457) to the head (464). Thus the spike (457) + the pedicels = raceme (458); the raceme with the lower pedicels length-
ened = corymb (450); the corymb — the rachis = umbel (460); the umbel — pedicels = head (464), etc.

(For the phenomena of Flowering, Coloring, the Floral Calendar, the Floral Clock, see the Class Book of Botany, pp. 75-77.)


** Hitherto we have treated of the organisms of the Phanogamia, or Flowering Plants, the higher of the two Subkingdoms of the vegetable world. The other Subkingdom, called the Cryptogamia, or Flowerless Plants, includes the lower tribes of vegetation, such as the Ferns, Mosses, Lichens, etc., never adorned with flowers, and producing spores instead of seeds. For the Morphology of these tribes, see the Class Book of Botany, pp. 124-129. Or study carefully the descriptions at the head of the several Cryptogamic Orders in the present volume.
At the head of this chapter we place a sketch representing a thin cutting from the rhizome of Bloodroot, as seen under the microscope, magnified 100 diameters. It is all made up of cells, of various forms and colors, some green and red translucent, and others purely transparent. The microscope reveals a similar structure in all plants. In the pith of Elder, pulp of Snowberry, and especially in the pulp of Orange, we can discern the cells with the naked eye. Therefore—

369. The cell is the elementary organism which by its repetitions makes up the mass of all vegetation. It is defined as a closed sac composed of membrane containing a fluid.

370. The primary form of the cell is spheroidal. In some cases it retains this form during its existence, but generally, in
growing, it takes new and various forms, which, on account of the two causes that control them, may be classed as inherent and casual. The inherent forms of the cell, or those depending on its own laws of growth, may be referred to three general types—(1) spheroidal, like Pollen grains, the red Snow-plant, the cells of leaf-tissue, etc., varying to oblong, or lobed, or stellate; (2) cylindrical, or tube-form, as most wood-cells are; (3) tabular or flattened, as the cells of the epidermis.

371. The casual forms result from external pressure—as of cells crowding against cells, in stems or pith. In this way spheroidal cells may become cubical, 8-sided, 12-sided, etc., tubiform cells, prismatic, and tabular cells 4-angled, hexagonal, etc.

372. In magnitude the plant-cell varies from $\frac{1}{100}$ to $\frac{1}{1000}$ of an inch in diameter. The cells of Elder pith measure about $\frac{1}{100}$ inch; cells of parenchyma (leaf-tissue) about $\frac{1}{1000}$; consequently, 64,000,000 of them would occupy only one cubic inch. The cells of cork are computed to be $\frac{1}{10000}$ inch in diameter—1000 millions to a cubic inch. But the length of some cells is more considerable. Wood-cells measure $\frac{1}{10}$ inch; bark-cells, as Flax, Hemp, nearly $\frac{1}{2}$ inch; the cells of some plant hairs, an inch or more.

373. The wall of the new cell consists of two layers; the outer one a firm, colorless membrane, made of cellulose, the inner a plastic, gelatinous layer applied to the outer, and chiefly concerned in cell-life and multiplication. This is called the primordial utricle. It is best seen when treated with a weak solution of nitric acid, iodine, or alcohol. It thus becomes colored, contracts, and lies loose in the cell (472).

374. The cell-wall is easily permeated by fluids flowing in and out. It must, therefore, be regarded as porous; although it appears perfectly entire even under the highest magnifier.

375. A secondary layer is subsequently added to the outer layer, between it and the primordial utricle, as if to strengthen it. This new layer is seldom entire, but perforated and cleft in a great variety of patterns, leaving certain points or parts of the cell-wall still bare and discernible by their transparency. Hence the following varieties:

376. Wood-cells, which are finally filled up by the repetitions
of the secondary layers, leaving only minute points of the original cell-wall bare and transparent. A remarkable variety of the wood-cell is seen in the Pine and Coniferae in general, where the points are large, transparent, and surrounded by two or three rings. These we call *Pitted cells.*

377. *Spiral cells,* where the secondary layer consists of spiral fibres or bands. There may be a single fibre, or several (2 to 20) united into a band. It is usually elastic, and may be drawn out and uncoiled. These beautiful cells may be well seen in a shoot of Elder, in the petiole of Rhubarb, Geranium, Strawberry. In the two latter, if gently pulled asunder, the coiled fibres appear to the naked eye.

378. *Annular cells,* when there are numerous rings within, instead of a spiral coil, as in the stems of Balsam and some Cryptogamia. *Scalariform cells,* when the rings seem conjoined by bars crossing between them, giving an appearance compared to a ladder (*scala*), as in the Vine and Ferns. *Porous cells,* with the secondary layers full of perforations; *reticulated cells,* as if a net-work; and many other forms.

379. *Cellulose,* the material of which the outer cell-walls and other secondary layers are made, is proved by chemical analysis to consist of three simple elements, carbon, hydrogen, oxygen, in the proportions of $C_{24}H_{20}O_{20}$—carbon and the exact elements of water. In the material of the primordial utricle nitrogen is added. Out of these four simple elements ($C\ H\ O\ N$), with slight additions of lime, silex, and a few other earthy mat-
ters, the Great Creator is able to produce all the countless varieties of plants which clothe and beautify the earth.

380. Contents of the cell. Some cells contain air only. Others are filled with solid matter; but the greater part contain both fluids and solids. There is the cytoblast, a globular atom, earnest of new cells; and protoplasm, the nourishing semi-fluid, both of the same material as the primordial utricle, and with it, and the fluid cell-sap, ever flowing, acting, combining, and producing either new cells or products like the following:

381. Chlorophyll, the green coloring matter of leaves, consists of green corpuscles floating in the colorless sap or attached to the colorless wall. In the Indigo plant these corpuscles are blue, and constitute that poisonous drug. But the coloring matter which gives to fruits and flowers their bright and varying tints of yellow, red, and blue, is generally dissolved in the cell-sap, which is otherwise colorless.

382. Starch also originates here, in the form of little striated granules of the same composition as cellulose (C_{24}H_{40}O_{20}). Some twenty such granules appear in the same cell, either loosely or
compactly filling it. Starch is nutritive matter, sealed up for preservation and future use.

333. Gum, sugar, salts, acids, alkalies, poisons, medicines, whatever is peculiar in the properties of each vegetable substance, may also be held in solution in the cell-sap, and invisible, unless forming Raphides, little bundles of crystals, needle-shaped, or, of some other form, seen in the cells of Rhubarb, Cactus, Hyacinth.

384. The growth of the plant, then, consists of the development of new cells. This is accomplished within the pre-existing cells, and by the agency of their contents. The primordial utricle divides itself into two or more utricles, by new walls growing from its sides until they meet. These then acquire the cellulose layer outside, the cytoblast in side, at the expense of the old cell, which shortly gives place to its new progeny. Thus cells multiply, and by millions on millions build up the fabric of the plant.


CHAPTER II.

THE TISSUES.

385. One-celled plants. The cell, as heretofore described, is endowed with a life within itself. It can imbibe fluids, nourish itself, and reproduce others like itself. It may, therefore, and actually does in some cases, exist alone as a plant! Many species of the Confervoids and Diatomes are plants consisting
of a single cell—the simplest possible form of vegetation (see fig. 519).

386. With a few such exceptions, vegetation consists of a combination of cells united in a definite manner and form. Such combinations are called tissues, which we may describe under four general names or types:

I. **CELLULAR TISSUE (PARENCHYMA)**:

II. **FIBROUS TISSUE (PLEURENCHYMA)**:

III. **VASCULAR TISSUE (TRACHEENCHYMA)**:

IV. **LATICIFEROUS TISSUE (CIENCHYMA)**.

387. **Parenchyma**, composed of spheroidal cells, is the most common form of tissue, no plant being without it, and many, especially of the lower orders, being entirely composed of it. Numerous varieties occur according to the forms of the cells and their closeness of contact, intermediate between the following:

1. when there are copious intercellular spaces, the cells slightly touching, and being (a) rounded, or (b) lobed, or (c) stellate;

2. when the cells are crowded, leaving no intercellular space, and being (d) prismatic, or (e) polyhedral, or (f) irregular.

388. Examples of these tissues are found (a) in the pulp of fruits, in newly-formed pith, and in all young growths; (b) in the lower stratum of leaf-tissue; (c) in the pith of rushes and other aquatic plants; (d) in the herbaceous stems of Monocotyledons; (e) everywhere, but well observed in full-formed pith; (f) abundant in all the soft, fleshy parts of plants.

389. **Pleurenchyma** is composed of elongated cells cohering by their sides in such a way that end overreaches end, forming a continuous fibre. Two varieties are noticed—(a) wood-fibre, with cells of moderate length, remarkable for its firmness, the main constituent of the stems and trunks of the higher plants; (b) liber, with very long attenuated cells, the substance of the inner layers of bark, remarkable for its tenacity, especially in Flax, Hemp, Linden:
The pitted cells (§ 376) constitute a singular variety of wood-fibre, common in Pines, Firs, etc. That mysterious double ring which encircles each pit, is projected, the inner by the pit itself, which is an aperture in the secondary layer, the outer by a lens-shaped intercellular cavity opposite, outside (474).

Trachenchyma is a tissue of vessels or tubes rather than cells. The vessels are extended lengthwise, and composed each of a row of cells joined end to end, and fused into one by the absorption of the contiguous walls. This tissue varies according to the character of the constituent cells, which are (a) spiral, or (b) annular, or (c) scalariform, or (d) reticulated.

Such cells, with their tapering ends, form vessels with oblique joints. When porous cells, with their truncated ends unite, they form right-jointed vessels resembling strings of beads, called dotted or vascular ducts. These are usually quite large, and characteristic of the woody layers of all Exogenous plants. The different varieties of trachenchyma are assigned to different regions and offices—(a) to the earliest formed part of the wood, the petioles and veins of leaves, petals of flowers, etc.; (b) to similar parts, but later formed, most abundant in Ferns and Equisetaceae; (c) in the woody bundles of the Endogens, and in the succulent parts of plants in general; (d) most abundant in Ferns, Club-mosses.

Cienchyma is a system of milk-vessels—vessels secreting the latex or peculiar juice of the plant, white, yellow, red, turbid, containing opium, gamboge, caoutchouc, resin, etc. It occurs in the petioles and veins; in the parenchyma of roots, in the Liber especially; sometimes simple, generally branched and netted in a complicated manner, as well seen in the Poppy, Celandine, Bloodroot, Gum-elastic tree, etc.

These vessels are probably mere open spaces between the cells at first, subsequently acquiring a lining membrane which never exhibits pores or spiral markings. But there are also true Intercellular passages filled with air, and admitting its free circulation in all directions through the parenchyma. These are necessarily very irregular, and they communicate with the external air through the stomata (§ 397).
395. Thus the cell appears to be the type of every form of tissue, the material of which the vegetable fabric is built, and the laboratory where the work is performed.


CHAPTER III.

THE EPIDERMAL SYSTEM

Includes the external covering of all herbaceous growths—viz., the epidermis, stomata, hairs, glands, cuticle, etc., organs which in older stems give place to bark.

396. The epidermis (skin) consists of a layer of united, empty cells, mostly tabular, forming a superficial membrane. It invests all plants higher than Mosses, and all parts save the extremities, the stigma, and rootlets. Its office is to check evaporation. That delicate membrane which may be easily stripped off from the leaf of the Houseleek or the garden Iris is the epi-
dermis. It is transparent, colorless, and under the microscope reveals its cellular structure.

397. Stomata. The epidermis does not entirely exclude the tissues beneath it from the external air, but is cleft here and there by little chinks called stomata (mouths). Each stoma is guarded by a pair of reniform cells, of such mechanism (not well understood) as to open in a moist atmosphere and close in a dry.

398. The stomata are always placed over and communicate with the intercellular passages. They are found only on the green surfaces of parts exposed to the air, most abundant on the under surface of the leaves. Their numbers are immense. On the leaf of garden Rhubarb 5,000 were counted in the space of a square inch; in the garden Iris, 12,000; in the Pink, 36,000; in Hydrangea, 160,000.

399. The surface of the epidermis at length becomes itself coated with a delicate, transparent pellicle, not cellular, called the cuticle. It varies in consistency, being thicker and stronger in evergreen and succulent plants. It seems to be merely the outer cell-wall of the epidermis thickened and separated from the newly-formed wall beneath it.

400. The hairs which clothe the epidermis are mere expansions of its tissue. They may each consist of a single elongated cell, or of a row of cells. They may also be simple, or branched, or stellate, or otherwise diversified.

401. Glands are cellular structures serving to elaborate and contain the peculiar secretions of the plant, such as aromatic oils, resins, honey, poisons, etc. A gland may be merely an expanded cell at the summit of a hair, or at its base, and hence
called a glandular hair (Labiatae). Or it may be a peculiar cell under the epidermis, giving to the organ a punctate appearance (leaf of Lemon). Other glands are compound, and either external (Sundew) or internal reservoirs of secretion (rind of Orange).

402. Stings are stiff-pointed, 1-celled hairs expanded at base into a gland containing poisonous secretion. An elastic ring of epidermal cells presses upon the gland so as to inject the poison into the wound made by its broken point (Nettle).

403. Prickles are hardened hairs connected with the epidermis alone, thus differing from spines, which have a deeper origin. Examples in the Rose.


CHAPTER IV.

THE LIGNEOUS SYSTEM

Includes the firm structures of roots, stems, and their appendages, summarily called the wood.

404. There are four general modes of growth and structure,
whereby the vegetable kingdom is distinguished into as many great classes, viz.:

- The outside-growers (Exogens),
- The inside-growers (Endogens),
- The point-growers (Acrogens),
- The mass-growers (Thallo gens).

405. The exogenous structure. A cross-section of the stem or branch of any dicotyledonous plant (Mustard, Maple) exhibits zones of different structures, which are distinguished as pith, medullary sheath, wood, and bark.

406. The Pith occupies the central part of the stem. It consists of parenchyma, is chiefly abundant in herbaceous plants and all young stems. When new, it is filled with fluids for the nourishment of the buds until they can make food for themselves. As the plant advances in age, the pith loses its vitality, is filled with air only, is often torn into cavities, or disappears.
PHYSIOLOGICAL BOTANY.

407. The Medullary sheath immediately surrounds the pith. It is a thin, delicate tissue, consisting of spiral vessels. It communicates with every bud, and sends off detachments of its vessels to the petioles and veins of every leaf. Its tubes secrete oxygen from carbonic acid or water, and convey it to the leaves.

408. The wood consists of pleurerenchyma and ducts (§ 392), arranged more or less distinctly in concentric zones or layers. The first, or inner layer, together with the medullary sheath and pith, is the product of the first year. One new layer is formed each successive year, during the life of the plant.

409. There are doubtless some exceptions to this rule. In tropical countries, where there is no distinction of seasons, there may be several zones deposited annually; or, on the other hand, several or all the annual layers may be so blended by the uniform mixture of the ducts with the wood-tissue as to be undistinguishable. The layers of the beet-root are certainly not annual. They seem to correspond with the number of leaf-cycles (§ 263).

410. The Alburnum and Duramen—the sap-wood and heart-wood—are well-known distinctions in the wood. The former, named from albus, white, is usually of a light color and softer structure. It is the living part of the wood, through whose vessels mainly the sap ascends. The interior layers of the alburnum gradually harden by the deposition of solid matter in their vessels, and the thickening of the cell-walls, until fluids can no longer pass through them. Thus the duramen (durus, hard) is formed of a firm and durable texture—the only part valued as timber. Its varying colors in Cherry, Walnut, Rosewood, are well known. It is of no account in vegetation, and may be considered as dead. Hence it often decays, leaving the trunk hollow, and the tree at the same time as flourishing as ever.
411. The bark succeeds and replaces the epidermis, covering and protecting the wood. It is readily distinguished into three parts, viz.:

The inner, white bark (liber);
The middle, green bark (cellular);
The outer, brown bark (cortical).

The substance of all these is parenchyma; and arranged, like the wood, in layers.

412. The liber, or white bark, contains scattered bundles of pleurenchyma and cienchyma with its cellular tissue. Its wood-cells are very long (§ 389), called bast-cells, and are strengthened with secondary deposits until quite filled up. Hence the strength and toughness of flax and hemp. The strong material of "Russian matting" is from the liber of the Linden-tree, and the "lace" of the South Seas, from the Lace-bark tree. The liber of other trees is not remarkable for strength.

413. The cellular, or green bark, succeeds to the liber. Its tissue resembles that of the leaf—being filled with sap and chlorophyl. It grows laterally, to accommodate itself to the enlarging circumference of the tree, but does not increase in thickness after the first few years.

414. The cortical, or brown bark. Its color is not always brown, being rarely white (Canoe Birch), or straw-color (Yellow Birch), or greenish (Striped Maple), or grayish (Beech, Magnolia). Its substance is always cellular tissue, but differing widely in consistency in different species. Its new layers come from within, formed from the green bark, while its older are sooner or later cast off.

415. The cortical layers sometimes accumulate to a considerable thickness (Maple, Hickory, Oak), but are finally rent and furrowed by the expanding wood. In the Cork Oak (Quercus suber) they attain an excessive growth, furnishing that useful substance, cork. In Birch (Betula papyracea) these layers resemble paper, long abiding by their elasticity the expansion of the trunk.

416. The medullary rays (medulla, pith) are those fine
lines which appear in a cross-section, passing like radii from the pith to the bark, intersecting the wood and dividing it into wedge-shaped bundles or sectors. They consist of firm plates of parenchyma (muriform tissue, the cell resembling brick-work) belonging to the same system with the pith.

417. The medullary rays are no less frequent in the outer layer of wood than in the inner. Hence, their number must increase yearly, and a new one commence with each successive layer, extending with those already formed through the subsequent layers to the bark, as shown in the diagram (500). In a radial section (511, 512) the medullary rays are more conspicuous as shining plates of a satin-like texture, called the silver-grain, quite showy in Oak, Maple. A tangential section shows their ends in the form of thin ellipses. They serve as bonds to combine into one firm body the successive wood-layers, and as channels of communication to and from the bark and heart-wood. They also generate, at their outer extremities, the adventitious buds.

418. The cambium layer. Between the liber and the wood there is formed in the Spring, at the time of the opening of the buds, a mucilaginous, half-organized layer of matter. Its presence loosens the bark, and renders it easily peeled from the wood. The cambium is a sap solution of the starchy deposits of the preceding year, now being rapidly organized into cells.

419. This is the generative layer, whence spring all the growths of the ligneous system. From this, during each growing season, two layers are developed, one of liber and one of wood, both at first a cellular mass, but the cells with wonderful precision transforming, some into the slender bast-cells of the liber, some into the dotted ducts and fusiform cells of the wood, some into the muriform tissue of the medullary rays. Through these latter the quickening influence of the cambium pervades both wood and bark.

420. Unlimited growth is therefore a characteristic of the exogenous stem; for the yearly increments are added to the outside of the wood, and the bark is capable of expansion by lateral growth to any extent.


CHAPTER V.

THE LIGNEOUS SYSTEM—CONTINUED.

421. The endogenous structure. In the cross-section of a monocotyledonous stem (Corn, Palm) there is no visible distinction of bark, wood, pith, or of annual layers of any kind. It is composed of tissues quite similar to those of the exogenous stem, but very differently arranged.

422. The body of the monocotyledonous stem consists of parenchyma, within which tissue numerous threadlike bundles of woody matter are imbedded. Each bundle consists of one or more dotted ducts accompanied by spiral vessels, pleurencyma, and often cienchyma, variously arranged in different species.

423. The formation of these bundles is dependent upon the leaves, from which they may severally be traced downward, first tending toward the interior of the stem. Further on they recurve outward again, and finally terminate near the surface, there interlacing and combining with their fellows, and forming an excessively hard but inseparable rind (false bark). From this entanglement of the fibres the cleavage of endogenous stems is difficult or impossible. In jointed stems (culms) this entanglement occurs only at the nodes (Cane, Grasses).

424. The growth of monocotyledonous stems thus takes place by the addition of the new wood bundles to the interior, and hence such plants are called Inside-growers or Endogens.
The caulex of Endogens often takes peculiar forms. The rind is capable of only a limited expansion. This limit is soonest attained at the base of the stem, long before the upper parts cease to enlarge. Consequently such trunks are often seen of equal or greater diameter at the summit than at the base: so the Palmetto, Corn, Bamboo.

425. The acrogenous structure is found in Mosses, Ferns, and the other higher tribes of the Cryptogamia. The stems advance, beneath or above the ground, full-formed, growing only at the end, hence called *Acrogena*.

A cross-section of a Fern stem shows a body of parenchyma strengthened by an outer zone of fibro-vascular bundles, the whole invested with a sort of bark. The bundles are precisely similar to those found in the petioles, showing that the stem is the aggregate of the unaltered leaf bases (514).

436. *Thallogens* are the lowest in the scale of rank, having no true axis and no other tissue than parenchyma, which grows in threads or in mass in all directions. The apparent stems (the stipes), if there be any, support the fructification only. Such are Sea-weeds, Lichens, Mushrooms, Puff-balls, Frog spittle, and Mildew.

437. The structure of roots presents few deviations from that of the stems to which they severally belong, being exogenous in *Exogenous*, endogenous in Endogens, etc. In the former class the central pith disappears, its place being occupied mainly by vascular ducts; and the liber, if any, has no bast-cells.

438. The fibrille and pileorhiza should, however, be mentioned as peculiar in the structure of the root. The former are produced by millions, clothing the delicate epidermis of the young rootlets as with a cottony down, especially in light soils. They usually consist of a single cell of the epidermis extended, as seen in figure 515. They are the true absorbents, the mouths of the growing plant.

439. The microscope shows that the extreme, advancing point of the delicate growing fibres is not thrust naked against the opposing soil, but is covered with a cap called pileorhiza (*pileus*, a cap, *rhiza*, root), which consists of older, hardened cells, behind which are formed the new cells. In the Duckmeat, the pileorhiza is lengthened into a sheath.

440. The manner of growth in the root is not like that of stems, by the extension of parts already formed, but simply by the addition of new matter at the advancing point. This accounts for the wonderful facility with which it penetrates the soil and finds its way uninjured into the hardest earth.

431. Structure of Leaves. The leaf may be regarded as an expansion of the two outer integuments of the bark, or of the green bark and the epidermis, expanded into a broad, thin surface by a woody framework proceeding from the medullary sheath and the liber. The framework of veins is therefore fibro
vascular, abounding in spiral vessels, and strengthened with liber.

432. The parenchyma exists in two strata, more or less distinct. In all those leaves which are ordinarily horizontal in position, one surface being upward and the other downward, these two layers are dissimilar; but in leaves with a vertical lamina (Iris), and in Phyllodia (§ 321), the two layers are similar.

433. Our cut (518) displays a superficial layer of the empty tabular cells (a) of the epidermis. Next beneath, in the surface on which the sun shines, are one or two layers of oblong cells (b) placed perpendicularly to that surface, and more compact than the cells beneath them (c), which are pervaded by intercellular passages and by the veins.

434. The stomata as a rule belong to the shaded side of the leaf, avoiding the sun’s direct rays. On the sunny side there are few, comparatively, or none. In the submerged leaves of water-plants, the epidermal layer is hardly distinguishable, and is wholly destitute of stomata. In such leaves as float upon water (Water Lilies) stomata are found in the upper surface alone.

435. Within all the vesicles of the parenchyma are seen adhering to the walls the green globules of chlorophyll, which give color to the leaf—dark green above, where it is more compact; paler beneath, where the cells are more loose and separate.
Vessels of *cienchyma* pervade the under-layer of parenchyma, returning the elaborated juices through the petiole into the cambium layer.


CHAPTER VI.

VEGETATION, OR THE PHYSIOLOGY OF PLANT LIFE.

436. We have now briefly surveyed the mechanism of the plant—both its outward forms and internal structure. We next inquire into the uses of all this wonderful apparatus; what the specific office which each part performs in the economy of the plant; and how all parts co-operate in the work of living and growing.

437. What is life? This inquiry meets us at the beginning—a problem never solved. The spontaneous action of the plant, the self-determined shapes which it assumes, we at once refer to this principle—its vitality; but of the nature of this principle itself, we can only say—Is it not a direct emanation from the Supreme Will, the Fountain of all life?

438. Vegetation is doubtless the lowest form of life. It springs directly from inorganic or mineral matter, and is the first step in the organization of mineral matter. Its material is, therefore, mineral matter rendered organic through the vital force. The subordination of the vegetable to the animal kingdom is thus manifest in its being fed and nourished on inorganic matter. It is interposed between these two incompatible extremes, and is ordained to transform the innutritious mineral into the proper and indispensable food of the animal kingdom.

439. The process of vegetation consists of imbibing the crude matters of the earth and air, transforming into sap, assimilating
to plant-juice (latex), and organizing into its own structure according to its own plan. The vital phenomena on which these transformations depend are called absorption, circulation, exhalation, assimilation, secretion, all of which processes take place in the individual cell. Cell-life, therefore, is an epitome of the life of the whole plant. The cell is never a spontaneous production; it is the offspring of a pre-existing cell. So with the plant; it is always the offspring of a pre-existing embryo or cell. Nothing but a cell can produce or nourish a cell.

440. Two kinds of organic matter make up the cell. The first, protoplasm, or protein \((C_{40}H_{31}O_{12}N_5)\), the material of the primordial utricle (§ 373), etc., containing nitrogen; 2d, cellulose \((C_{12}H_{10}O_{10})\), the material of the outer wall or crust, etc., containing no nitrogen. The former more nearly resembles animal matter, and is the seat of the vital force and chemical action.

441. Through the invisible pores of its walls the cell imbibes the fluid in which its food is dissolved, viz., sugar or dextrine, ammonia or some other nitrogenous substance. Such a fluid may be the flowing sap of the plant, or any similar artificial mixture in which the cell is bathed, as (in the case of the Yeast-plant) a syrup with mucilage.

442. The sugar is thus brought into contact with the protoplasm in the cell, through whose action it is decomposed, and its elements transformed into cellulose and water. Thus each atom of (grape) sugar or dextrine becomes

\[
\text{One atom of cellulose, } C_{12}H_{10}O_{10} \\
\text{and two atoms of water, } H_2O_2
\]

\[
C_{12}H_{12}O_{12} = \text{grape sugar.}
\]

The water is exhaled with the rest; the cellulose is retained to incrust a new cell as soon as the primordial utricle shall next divide itself to form one. Or it may be deposited as starch granules for future use.

443. In the cells of green plants the globules of chlorophyll
act an important part. Their formation depends upon the decom position of carbonic acid \((\text{CO}_2)\), the retention of the carbon, and the exhalation of the oxygen under the stimulus of the light. If the formation of cellulose continue beyond the present need for cell formation, the excess is deposited in the form of starch granules enclosed within the globules of chlorophyl, one in each.

444. When the starch granules are redissolved, they go to incrust the next new cell, or to form a secondary layer in the old cell; or in Autumn they go out into the general circulation, and are at length stored up in the buds, the cambium, the roots, ready for early use the following Spring.

445. The increase of the protoplasm from the decomposition of the ammonia or other nitrogenous compounds present, is a more intricate process, but no less evident; and when in excess, this also is deposited in minute globules of gluten, mucus, legumine, chiefly in seeds (Wheat, Beans, Rice), in aid of germination.

446. The starch and gluten deposits of the Wheat-kernel are about sixty-eight and seventeen per cent. The former is found in the interior cells, the latter in the exterior, adjoining the pericarp or bran. In "flouring," some of the gluten adheres to the bran, and some constitutes the coarser meal, all of which is separated by the "bolt." Extra flour must, therefore, necessarily be deficient in gluten, the only element of the Wheat which adapts it to the formation of muscle—a great error.


CHAPTER VII.

FERTILIZATION.

447. Such being the vital energy of the cell, it is easy to admit the possibility of either its solitary existence as a plant (Protococcus, etc.), or of its associated existence, as in the living tissue of most plants. Now all plants, without exception, do actually commence existence in the state of a simple cell. But while in the lower plants (Cryptogamia) this simple cell, the plant rudiment, is at once discharged, free and independent, to float or grow, in the Phenogamia it is yet a while protected and nourished by other cells—the cells of the ovule.

448. This primitive cell-plant, after acquiring the requisite means, swells and divides itself into two or more new cells.
these new cells cohere into a tissue assuming a definite form, as in the higher plants, the process is called *growth*; but if they separate, each one still abiding separate, it is *reproduction*.

449. **The embryonic vesicle** is the expressive name of the embryonic cell of the Flowering Plants. It has its birth in that large cell of the nucleus of the ovule (§ 142) called the embryo sac, and is in some way developed from the cytoblast (§ 380). In appearance it may be like other new cells; but in the impulse or instinct with which it is endowed, it is immeasurably different. It looks not to the mere continuation of an old series, but is the projector and pioneer of a new. But before it can enter upon its course of development so different from the destination of common cells, it must somehow be quickened and energized with an impulse in this new direction. In other words, it must be fertilized—a process dependent on the pollen-grains (§ 121).

450. The annexed cuts indicates all that is certainly known of this recondite process. The pollen-grain falls upon the stigma, imbibes the saccharine moisture there, and its inner coat of protoplasm expands and protrudes through the aperture (one or more) of the outer cutaneous coat, in the form of an attenuated tube. This, like a radicle, sinks into the soft tissues of the stigma and style, reaches the ovary, enters the micropyle of the ovule, makes its way to the nucleus, and penetrates to the embryo sac. Here its growth ceases, and its contents pass by absorption into the sac.

451. This is the view of Mohl, Henfrey, and of botanists generally. But Schleiden maintains that the end of the pollen-tube actually penetrates the sac, and itself becomes the embryonic cell. The pollen-grain is in this view the primitive cell, and is itself quickened into development by the contents of the embryo sac (§ 222).

452. However this may be, the embryonic globule, thus some-
how endowed with a new instinct, immediately becomes a new centre of growth. First it expands to a proper cell, attached to the wall of the sac near the micropyle. It then, by division and subdivision, multiplies itself, and begins to take form according to the species, showing cotyledon, plumule, etc., until fully developed into the embryo (523).

453. In the case of the Conifers (Pines, Cedars, Firs), where no styles or stigmas exist, the pollen falls directly into the micropyle of the naked ovule, and its tubes settle into the tissue of the nucleus.

454. Germination. The ovule matures with the completion of the embryo, and passes into the fixed state of the seed in which the embryo sleeps. A store of nutritive matter, starch, gluten, etc., is thoughtfully provided in the seed for the use of the young plant in germination, until its root has gained fast hold of the soil.

455. The changes which occur in the seed at the recommencement of growth, are simply such as are requisite to reduce its dry insoluble deposits to a solution which shall contain the proper materials for cell-formation or growth. Gluten and other nitrogenous matters, oil, starch, etc., are to be changed to diastase, the same as yeast; and dextrine, the same as gum and grape sugar.

456. To this end water and oxygen are absorbed; the gluten begins decomposition, forming yeast; fermentation ensues; heat is produced by the slow combustion of the carbon with oxygen, forming and evolving carbonic acid, by which process some of the oil and starch is destroyed, while another portion gains water and turns to sugar;—all this within the cells of the seed.
457. Ripening of Fruits. After the fruit has attained its full growth the process of ripening commences, during which the pulp becomes gradually sweetened and softened, chiefly by the change of the starch into more or less of soluble sugar. Thus ripening is to the pericarp what germination is to the seed. In its earliest stage the pericarp consists of structure similar to that of green leaves, composed of cellular, vascular, and woody tissues, and epidermis with stomata. Its distended growth afterward results from the accumulation of the flowing sap, which here finds an axis incapable of extension. Thus arrested in its progress it gorges the pistill and adjacent parts, is condensed by exhalation, assimilated by their green tissues, which still perform the office of leaves. Cell-formation goes on rapidly within, and the excess of cellulose is deposited in the cells as starch. Oxygen is usually absorbed in excess, acidifying the juices.

458. In the same way we account for the production of honey in the flower. Copious deposits of starch are provided in the receptacle and disk (§ 85). At the opening of the flower, this is changed to sugar, to aid in the rapid development of those delicate organs which have no chlorophyll wherewith to assimilate their own food. The excess of sugar flows over in the form of honey. The wise economy of the honey is seen in fertilization. For, attracted by it, the insect enters the flower, rudely brushes the pollen from the now open anthers, and inevitably lodges some of its thousand grains upon the stigma!

459. Experiment has proved that in all these cases of the formation of sugar from starch oxygen is absorbed and carbonic acid evolved—a process which we might expect, since starch \((C_{12}H_{10}O_{16})\) contains proportionally more carbon than sugar \((C_{12}H_{12}O_{12})\) contains. It is probable that these two phenomena in vegetation are always co-existent.


**CHAPTER VIII.**

**ABSORPTION.**

460. Office of the root. The absorption of liquids, containing in solution the food of the plant, is the peculiar and indispensable office of the root.

Take a small growing plant from the earth and immerse it by its roots, which should be nearly or quite entire, in a cup containing a definite quantity of water. Place near it another cup with a like quantity of water to indicate the amount of evaporation. The difference of the diminution in the two cups will be the amount of absorption. A plant
of Spearmint has thus been found to absorb more than twice its own weight per day. Every one is familiar with the rapid disappearance of water from the roots of potted plants, as Hydrangea, Oleander.

461. An impervious epidermis destitute of stomata everywhere clothes the roots, excepting its *fibrillae* and the tender extremities of the rootlets. No part, therefore, is capable of absorption except the latter. But these, by their multiplied numbers, present to the soil an adequate absorbing surface. Hence, in transplanting a tree, almost the only danger to its life arises from the difficulty of preserving a sufficient number of these rootlets.

462. The force with which plants absorb fluids by their roots is surprisingly great. If the stem of a Grapevine be cut off when the sap is ascending, and a bladder be tied to the end of the standing part, it will in a few days become distended with sap even to bursting. Dr. Hales contrived to fix a mercurial gauge to a vine thus severed, and found the upward pressure of the sap equal to twenty-six inches of mercury, or thirteen pounds to the square inch.

463. But what causes this absorption of fluids in a direction contrary to gravitation? In explanation of this phenomenon reference has been made to two well-known principles in physics—viz., to capillary attraction by the tubular vessels, and to *endosmose* by the closed cells, which are far more numerous.

464. The effects of capillary attraction are seen in experiments like the following. Insert the end of several open thermometer tubes in a colored liquid. It will be seen rising in the tubes above its level to various heights—highest in the smallest calibre. Or suspend a napkin in such fashion that its lowest corner shall dip into a cup of water. In a few hours the water will have ascended into the napkin.

465. *Endosmose* is thus illustrated: Throw dried prunes, currants, or raisins into water. After a while they will have become swollen and distended with fluid. Now place them in strong syrup—they will again shrink. The *flowing in*, as in the first case, is called *endosmose*; the *flowing out*, as in the second case, is called *exosmose*. (See Class Book of Botany, § 781-783.) Another explanation of absorption is given in § 471.

466. **Other means of absorption.** The office of absorption is not performed by the root alone. Every green part, but especially the leaf, is capable of absorbing gases and watery vapor.

Every one knows how greatly plants, when parched and withered by drought, are revived by a shower which sprinkles their leaves without reaching their roots. Air-plants, or epiphytes (§ 208), such as the Long-moss and Epidendrum, must rely on this source chiefly for the supply of their food; and when the dissevered stems of such plants are the Houseleek grow without roots, suspended by a thread in air, it is evident that all their nourishment comes through their leaves.

467. The use of absorption in the vegetable economy is not merely the introduction of so much water into the plant, but to
obtain for its growth the elements of its food held in solution, whether gaseous or earthy. In attaining this object, the roots seem to be endowed with a certain power of selection or choice, which we cannot explain. Thus, if wheat be grown in the same soil with the pea, the former will select the *silica* along with the water which it absorbs, in preference to the *lime*; the pea selects the *lime* in preference to the *silica*. Buckwheat will take chiefly *magnesia*; cabbage and beans, *potash*. This fact shows the importance of the *rotation of crops* in agriculture.

468. The fluids which are thus taken into the system by absorption cannot remain inactive and stagnant. As their inward flow is regular and constant in its season, so must be their upward and outward flow, in a course more or less direct, toward the parts where they find an outlet or a permanent fixture.

469. In those Cryptogams which are composed of cellular tissue alone, the circulation of the sap consists only of a uniform diffusion from cell to cell throughout the mass, as through a sponge. In the higher plants, the different tissues perform appropriate offices in the circulation; some conducting upward, some downward, some conveying the crude sap, some latex, and some air.

470. Spiral vessels and others of the trachenchyma are generally filled with air, and take no part in the circulation of fluids, except in the Spring, when the whole system is gorged with sap. The intercellular passages, also, generally circulate air alone.

471. From the roots the newly absorbed fluid flows upward through the stems and branches, toward the buds, leaves, and flowers, being probably drawn thither into them by the exhala-
tion and consequent exhaustion there going on. That tissue of
the stem and branches through which the ascending sap loves
chiefly to travel, is the pleurechyma—those long cells of the
wood fibre, whether arranged in broad layers, as in the Exogens,
or scattered in slender bundles, as in the Endogens. And when
the stem grows old the sap ceases to traverse the inner layers,
the duramen, where its passage becomes obstructed by thickened
cell walls; and frequents only the outer newer layers, the albur-
num, next adjoining the liber.

472. The Crude Sap. The fluid which thus flows upward
seeking the leaves, consists largely of water, is colorless, and is
called the Crude Sap. It contains in solution minute quantities
of gases and mineral salts, imbibed by the roots, together with
dextrine and sugar (no starch), which it dissolved out of the cells
on its way. This is the fluid which flows so abundantly from
incisions made in trees in early Spring.

473. The overflow of the sap depends upon the excess of absorption over exhalation.
After the decay of the leaves in Autumn, and the consequent cessation of exhalation, the
rootlets, being deep in the ground, below the influence of frost, continue their action for
a time, and an accumulation of sap in the system, even in the air-vessels and spaces, takes
place. Also in early Spring, before the leaves are developed, this action recommences;
and the plant becomes gorged with sap, which will burst forth from incisions, as in the
Sugar Maple, or sometimes spontaneously, as in the Grape. As soon as the buds expand
into leaves and flowers, the overflow ceases.

474. The True Sap. Throughout its whole course to the
leaves, the sap gains in density by solution. There arrived, it
loses by exhalation a large part of its water, gains additional
carbon, and undergoes other important chemical changes (here-
after to be noticed), and becomes the True Sap, dense and rich,
both in nutritive matter for the immediate growth, and in special
products for the future nourishment of the plant.

475. Returning, the true sap distributes its treasures in due
and exact proportion as needed to every organ. Its course lies
in the tissues of the bark, cellular and woody, first distributed
over the under surface of the leaves, thence by the leaf-stalks
into the liber, and so pervading all, down to the extremities of
the roots.

476. On its passage it makes deposits of food, first in the cells,
of the pith at the base of every incipient bud; then in the cam-
bium region a copious store; next in the medullary rays a due
portion, some carried outward for the supply of the cortical layer, and some inward for solidifying the wood; and lastly, the residue, often the richest legacy of all, falls to the root, and fills every branch and fibre, however vast its extent. This last deposit is that which is first met and dissolved by the rising tide of fluid in the following Spring.

477. **Growth progresses downward.** Since the flowing of the true elaborated sap is downward, it scarce admits of a doubt that the progress of the growth is also downward, from the leaves to the roots. And on no other supposition can we account for such facts as the following.

478. Girdle an exogenous tree by removing an entire ring of its bark. It will flourish still during one growing season, and form a new layer of wood and bark everywhere above the wound, as before, but not at all below. The next season the tree will die. Why? Because the true sap returning cannot descend to nourish the roots. But in a few cases trees are said to have survived this process. In such cases the medullary rays may have completed the broken currents. On arriving at the ring, the descending sap flows inwardly by the medullary rays, making a detour, and appears again in the bark below the interruption. (See Class Book, p. 153, for a further illustration of this subject.)


**CHAPTER X.**

**Transpiration and Respiration.**

479. **Transpiration** relates to that important office performed by the leaves and other green organs, whereby pure water is separated from the crude sap and given off into the air. It takes place chiefly through the stomata, and is greatest by day, and in a warm, dry atmosphere.

480. Upon the activity of transpiration depends also the amount of absorption. It not only makes room for the fluids from below to enter, but by disturbing their equilibrium it creates an upward tendency, as the flame of a lamp draws the fluid up the wick. All the mineral and organic constituents of the sap are of course left behind, in the plant.
481. The quantity of pure water transpired by plants is immense. A forest makes a damp atmosphere for miles around. Dr. Hales, in a series of instructive experiments in transpiration, ascertained that a Sunflower three and a half feet high, with a surface of 5,616 square inches, transpired from 20 to 30 oz. in twelve hours; a Cabbage 15 to 25 oz. in the same time—equal to the transpiration of a dozen laboring men.

482. Respiration in plants refers to their relations to the atmosphere. So in animals. These relations are in either case vitally important, as may be shown by placing a small, healthy potted plant (sc. Geranium, Mimosa) under the receiver of an air-pump, and thoroughly exhausting the air. At once every vital process ceases—no absorption, no assimilation, no irritability, but speedily decay ensues. A vacuum would be no more fatal to a sparrow. Air is quite as necessary to the one as to the other.

483. Respiration in plants, or aeration (as sometimes called), consists of all those operations by which the sap is brought into contact with the air or subjected to its influence. It occurs in the intercellular passages, in the spiral vessels everywhere, but especially in the leaves and all other organs which have chlorophyl and stomata. Its vital importance is manifested in the vast extent of the respiratory apparatus, consisting of millions of leaves and billions of breathing pores (stomata) and tracheæ (vessels)!

484. The facts connected with respiration, which seem to have been well established by the experiments of Saussure, Garreau, Moué, Draper, etc., are these: 1. Carbonic acid (CO₂) is absorbed by the leaves and all green tissues, under the direct solar light.

2. Oxygen (O) is absorbed by the leaves and all green tissues in the absence of direct solar light, and by the roots, flowers, fruits, and germinating seeds at all times.

3. The oxygen thus absorbed unites with some of the free (or nascent) carbon already in the tissues, and forms carbonic acid.

4. By a process of assimilation (§ 439), carbonic acid within the green tissues, from whatever source derived, is decomposed under the direct sunshine, and its carbon is retained; but,

5. Its oxygen is set free and exhaled.

6. Carbonic acid is exhaled by the leaves and all the green
tissues in the absence of the sunshine, and by all other parts (root, flowers, fruit, and germinating seeds) at all times.

485. Hence it appears that there are two phases of aerial action constantly performed and seemingly opposed to each other. One dependent wholly upon the clear sunshine, in which, by the leaves, etc., C O₂ is absorbed, decomposed, and O returned to the atmosphere; the other, in which O is absorbed, and C O₂ exhaled, by the leaves in the absence of sunshine, and by all other parts (roots, flowers, etc.) at all times. Both are equally and vitally important.

486. The former process becomes visible to the eye by the rapid development of chlorophyll accompanying it—the latter by its gradual loss. Hence, during a protracted season of cloudy weather, vegetation grows sensibly paler; but a few hours of sunshine restores the green to its wonted depth and richness. Hence, also, plants growing in darkness or shade, as potatoes in the cellar, are very pale, and manifest their affinity for light by stretching themselves with famishing eagerness toward the slender sunbeam which gains admittance. Analysis shows structures thus grown to be deficient in carbon.

487. We may easily repeat the experiments of Saussure and Priestley. Place a quantity of freshly gathered leafy stems under a bell-glass inverted and full of rain-water, and thus expose them to the sunshine. Soon bubbles of pure oxygen gas arise and slowly collect above. Now repeat the experiment with boiled or distilled water, and no oxygen will appear. Rain-water contains CO₂ in solution; boiled water does not. The O must therefore have come from the CO₂ as would appear.

488. If we enclose, air-tight, in a glass globe the end of a leafy branch, without severing it from the tree, it will be found by careful analysis, after a day of sunshine, that the proportion of O has increased at the expense of CO₂ within the globe; and vice versa by night or in the shade.

489. The results of both transpiration and respiration, as concerns the plant, tend to concentrate the diluted sap by the elimination of the water, which served merely for its conveyance, and to assimilate it into food capable of being organized into cells and their various contents. And it is proper in this place also to notice the effects of this vast machinery upon the constitution of the atmosphere and its relation to the animal kingdom.

490. Carbonic acid gas is dissolved in the atmosphere and somewhat uniformly diffused throughout its whole extent, in the proportion of about 4 parts in 10,000, or 27 3/10. This gas flows, and is ever flowing into the air from decaying animal and vegetable substances, from combustion, and from the breath of all living animals. The quantity thus added to the atmosphere annually is estimated at 100 billions lbs., or nearly one-tenth of the whole amount of carbon, and yet it does not accumulate. Now if we were able to compute in pounds the annual growth of the
entire plant world, and the proportion of solid carbon which enters into that amount, we should doubtless find that the grand total of the demand equals this grand total supply.

491. And further: not only are the necessities of the plant met by this wonderful circulation, but the necessities of animal existence also. Carbonic acid is poisonous; and should it be left to accumulate unchecked, it would gradually corrupt the air, and within a few centuries extinguish all animal life. Thus are the two kingdoms of the organic world mutually, through the inorganic, dependent upon each other. The plant furnishes the oxygen which the animal consumes, the animal the carbonic acid which the plant consumes, while each would perish in an atmosphere of its own production. "Great and marvellous are thy works, O Lord of Hosts! in wisdom hast thou made them all."

PART THIRD.

SYSTEMATIC BOTANY.

CHAPTER I.

GENERAL PRINCIPLES OF CLASSIFICATION.

492. Systematic Botany relates to the arrangement of Plants into Groups and Families according to their characters, for the purpose of facilitating the study of their names, affinities, habits, history, properties, and uses. In this department the principles of Organic and Physiological Botany are applied and brought into practical use.

493. But there is another and higher import in the study of Systematic Botany. It shows us Plants as related to each other and constituting one magnificent system. It reveals the Almighty Creator at once employed in the minutest details and upon the boundless whole; equally attentive to the perfection of the individual in itself, and to the completeness of the Grand System of which it forms a necessary part.

494. The necessity for such an arrangement of the Species will appear when we consider their immense numbers. They meet us in ever-varying forms at every step, clothing the hills, mountains, valleys, and plains. They spring up in hedges and by the wayside. They border the streams and lakes, and sprinkle over their surface. They stand assembled in forests, and cover with verdure even the depths of the Ocean. Not less than 100,000 kinds are already distinguished, and the catalogue is still increasing.

495. Into this vast kingdom of Nature the student is introduced, and proposes to acquaint himself with each and every object. How shall he begin? Evidently he must begin with the individual—a single individual plant. But (thanks to Him who created both the plant and the mind—the object and the subject), we are not left to continue the study in a method so endless and so hopeless. As if in special regard to the measure of the human intellect and the means of its culture, the Great Author of Nature has grouped these myriads of individuals into
496. **Species** (§ 27). When He called plants into existence in their own specific forms, He endowed each with the power of *perpetuating its own kind and no other*; so that they have descended to us distinguished by the same characters and properties as at the beginning. When, therefore, the student has formed acquaintance with any one individual plant, he is also acquainted with *all other individuals belonging to the same species*.

497. For example: a single plant of *White Clover* is a true representative of all the millions of its kind that grow on our hills and meadows. Likewise, a single description of the *White Pine* will answer in all essential points for every individual tree of that noble species in all its places and times. Thus all the individual plants of the globe are grouped into species by *descent and resemblance*.

498. **Genera** (§ 29). Although the species are separated from each other by clear and definite distinctions, still they are found to exhibit, also, constant affinities whereby they stand associated into larger groups called *genera*. Thus the White Clover and the Red Clover (*Trifolium repens* and *T. pratense*) are universally recognized as different species, but of the same kind or genus; and a proper *generic* description of one plant of the genus *Trifolium* will convey intelligence to a certain extent concerning every other plant belonging to its 150 species.

499. **Orders**. But natural affinities do not end here. The genera are yet too numerous for the ready and systematic study of the naturalist. He, therefore, would generalize still further, and reduce the genera to still fewer and broader groups. On comparing the genera with each other, he finds that they also possess in common certain important characters which are of a more *general* nature than those which distinguish them from each other. By these general characters the genera are associated into Orders.

500. For example: comparing such genera as the Mustard, Radish, Cabbage, Cress, Wallflower, etc., it is seen that, while they differ sufficiently in their generic characters, yet they all have certain marked resemblances in their didynamous stamens, siliquous fruit, whereby they are obviously associated into the same Order—the Cruciferae. So, also, the Pines, the Spruces, the Cedars, the Larches, and the Cypress, while as genera they are obviously distinct, yet all bear cones of some form, with naked seeds; hence they are naturally grouped into one Order—the Coniferae.

501. **Classes**. In like manner the Orders, by traits of resemblance still more general, are associated into a few groups, each of great extent, called Classes.

502. **Intermediate Groups**, formed on the same principles, are recognized as Subgenera, Suborders or Tribes, and Subclasses or Cohorte, which will be particularly noticed in another place. Of the same nature, also, are Varieties, which are groups subordinate to species, already described in § 28.

503. **Systems**. Two independent and widely different methods of classifying the genera have been generally approved—the Artificial Method of Linnaeus, and the Natural System of Jussieu. The former is founded solely on characters relating to the organs
of fructification, leaving all other natural affinities out of view. It is simply an arrangement devised by Linnaeus for convenience in the analysis of plants—as words in a dictionary, for convenience of reference, are arranged *alphabetically*, without regard to their nature. It is now generally superseded by—

504. The Natural System. This system of classification, on the contrary, takes for its basis all those natural affinities and resemblances of plants whereby Nature herself has distinguished them into groups and families. It seizes upon every character wherein plants agree or disagree, and forms her associations only upon the principle of natural affinity. Hence, each member of any natural group resembles the other members; and a fair description of one will serve, to a certain extent, for all the rest.

505. The species and genera are formed on this principle of classification, as above stated, and are truly natural associations. Individuals altogether similar—cast, as it were, in the same mould—constitute a species. Species agreeing in nearly all respects, and differing but in few, constitute a genus. Thence the genera, associated by their remaining affinities into groups of few or many, by this same method are organized into Natural Orders and other departments of the System.


**CHAPTER II.**

**THE NATURAL SYSTEM.**

506. There is indeed but one truly Natural System. Yet so long as any portion of that System remains imperfectly understood, so far authors may be expected to hold different views, and to attempt by different methods to express that true System. But the discrepancies observed in the several “Natural Systems” proposed by different writers, are slight compared with the num-
ber and importance of the principles now common to them all, and universally admitted.

Let us begin with the **VEGETABLE KINGDOM** as a whole.

**507. Sub-kingdoms.** It is first divided or separated into two Sub-kingdoms, viz., the Phænogamia, or Flowering Plants, and the Cryptogamia, or Flowerless Plants. These divisions were first propounded by John Ray, of England, in 1682. They lie at the foundation of the System of Linnaeus as well as that of Jussieu, and have been adopted by every subsequent author. It is a division founded in Nature—that is, marked by Nature herself; for,

<table>
<thead>
<tr>
<th>The Phænogamia (φαίνω, to appear, γάμος, nuptials)</th>
<th>The Cryptogamia (κρύωτω, to conceal, γάμος)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a, Consist of a regular axis of growth with leafy appendages;</td>
<td>a, Are generally destitute of a regular axis and of true leaves;</td>
</tr>
<tr>
<td>b, They possess a woody and spiro-vascular structure;</td>
<td>b, They possess mostly only a cellular structure;</td>
</tr>
<tr>
<td>c, They develop stamens and pistils constituting flowers;</td>
<td>c, They do not develop true flowers;</td>
</tr>
<tr>
<td>d, They produce seeds containing an embryo.</td>
<td>d, They produce spores having no embryo.</td>
</tr>
</tbody>
</table>

508. The above diagnosis does not mark the absolute limits between the two Sub-kingdoms; for the higher Cryptogams, as the Ferns and Mosses, give indications of approach to the Phenogams, both in form and structure, while the lower Phenogams can scarcely be said to produce flowers. And universally, so gradual is the transition from group to group, that it is difficult or impossible to employ characters so definite as to circumscribe completely any one group, while at the same time they exclude every member of the surrounding allied groups.

**509. Provinces.** The Flowering Plants are next resolved into two great Provinces, indubitably marked by Nature’s own hand, and employed in every natural method. The following is their diagnosis. They were also first propounded by John Ray, under the names of Dicotyledons and Monocotyledons.

<table>
<thead>
<tr>
<th>Exogens (ἐξω, outside, γεννάω, to generate or grow)</th>
<th>Endogens (ἐνδον, within, γεννάω, to grow, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a, Growing by layers external to the wood, internal to the bark;</td>
<td>a, Growing by scattered, internal wood-bundles;</td>
</tr>
<tr>
<td>b, Leaves net-veniled;</td>
<td>b, Leaves parallel-veniled;</td>
</tr>
<tr>
<td>c, Flowers very rarely 3-parted;</td>
<td>c, Flowers very generally 3-parted;</td>
</tr>
<tr>
<td>d, Seeds with two or more cotyledons;</td>
<td>d, Seeds with one cotyledon; and</td>
</tr>
<tr>
<td>e, The radicle producing an axial root.</td>
<td>e, The radicle never producing an axial root.</td>
</tr>
</tbody>
</table>

510. Classes. The Provinces are next broken into Classes, groups of the third rank in extent. Two are constituted of the Exogens, viz.:
Angiosperms (αὐγγείος, a vessel, σπέρμα, seed), (Oak, Rose)—

1. Flowers more generally perfect;
2. Pistils complete, enclosing the ovules;
3. Embryo enclosed in a pericarp;
4. Embryo mostly with several whorled cotyledons.

Gymnosperms (γυμνός, naked, σπέρμα), (Pine, Yew)—

1. Flowers imperfect;
2. Pistils scale-like, with no stigma;
3. Seeds naked, not in a pericarp;
4. Embryo mostly with several whorled cotyledons.

511. Two Classes also constitute the Endogens, viz.:

The Petaliferae (πέταλον, a petal, φέρω, to bear)—

Plants of the endogenous structure, having continuous stems and petaloid flowers; that is, flowers invested with a whorled perianth or none (Lily, Orchis, Rush).

Glumiferae (gluma, husk, fero, to bear)—

Plants of the endogenous structure, having jointed culms and glumaceous flowers; that is, invested with an imbricated perianth of green glumes (Grasses, Grains, Sedges).

512. Cohorts. The Classes are each of great extent, both as to the number and the diversity of their families, and obviously require a further subdivision. To effect this on strictly natural principles, botanists have labored hitherto in vain. The truth is, the members of these several classes are united by affinities so equable as to render a further subdivision impossible except by distinctions more or less arbitrary. So adjacent territories, where rivers or other natural boundaries are wanting, must be separated by artificial lines.

513. The Angiosperms were subdivided by Endlicher into three cohorts, and nearly all modern botanists have adopted his plan under various names.

1. Dialypetalae (διαλέω, to dissolve). Exogenous plants, having both calyx and corolla, the latter composed of distinct petals (polypetalous), sometimes slightly cohering by the base of the stamens, rarely abortive.
2. Gamopetalae (γαμός, union). Exogenous plants, having both calyx and corolla, the latter composed of petals more or less united (monopetalous).
3. Apetalae (α, privative). Exogenous plants with flowers having a calyx only, or neither calyx nor corolla (achlamydeous).

514. The class Petaliferae may be conveniently separated into two cohorts as follows:

1. Spadixflora. Endogenous plants with flowers having no perianth, or a scaly one, and borne on a thickened spadix, which is often enveloped in a spathe.
2. Floriidea. Endogenous plants with the flowers usually perfect and complete, the perianth double, 3-parted, the outer often, and sometimes both, green.

515. The class Glumiferae is equivalent to the cohort Graminoidea, including the Sedges, Grains, and Grasses—a truly natural assemblage.

516. The Sub-kingdom Cryptogamia is resolved into groups which are analogous to those of the Phænogamia. First,
it is naturally divided into two Provinces, founded upon their mode of vegetation. The Acrogens include those tribes which make some approach toward the Phænogams, while the Thallogens include the lowest tribes of the vegetable kingdom. They are thus distinguished—

**Acrogens** (ἄξρον, the summit or point, γέννάω)—
Flowerless Plants having a regular stem or axle, which grows by the extension of the apex only, generally with leaves, and composed of cellular tissue and scalariform ducts (Ferns, Mosses, Club-mosses, Horsetails, etc.)

**Thallogens** (θάλλασσα, green expansion, γέννάω)—
Flowerless Plants producing in vegetation a thallus—an indefinite expansion or mass, with no distinction of stem, leaf, or root, composed of cellular tissue only (Lichens, Fungi, etc.)

517. **Classes** of the Flowerless Plants. For the sake of analogy and an advantageous comparison with the Phænogams, we may also regard these two provinces of the Cryptogams in the light of Classes founded upon their different modes of fruit-bearing. Thus the Acrogens constitute the class—

**Angiospore** (αγγιόσης, σπόρα), or Angiospores:
Acrogenous plants, producing their spores in sporangia (vessels) which burst when the spores are mature.

And the Thallogens constitute the class—

**Gymnospore** (γυμνάς, σπόρα), or Gymnospores:
Thallogensous plants reproduced by spores, which are produced in parent cells, either forming a part of the vegetating thallus, or growing upon the surface of some definite region of the thallus.

518. The class **Angiospores** is divided into three cohorts (or Alliances according to Lindley):

**Lycopodales.** Acrogens with vascular tissue, spores of two kinds, and spore-cases axillary or radical, one—many-celled. Plants with well-developed leaves. (Lycopodiaceae, Marsileaceae.)

**Filicales.** Acrogens with vascular tissue, spores of but one kind, spore-cases borne on the margin, back, or summit of the frond, one-celled, usually girded by an elastic ring. Plants leafy or sheathed. (Equisetaceae, Filices.)

**Muscales.** Acrogenous plants mostly cellular, with two kinds of floral organs (antheridia and archegonia), and spore-cases (thecae) either hooded or immersed in the substance of the frond. (Mosses, Hepaticce, etc.)

519. The class **Gymnospores** also consists of three cohorts:

**Lichenales.** Thallogens growing in air, crustaceous, without mycelium, including spores plunged in the thallus as well as in shields. (Lichens.)

**Algales.** Thallogens living in water or very damp places, cartilaginous, brightly colored, without mycelium, nourished through their whole surface. (Alge, or Seaweeds.)

**Fungales.** Thallogens fructifying in the air, never green, nourished by their own mycelium, which is immersed in, and feeds upon decaying substances. (Fungi.)
520. The following is a condensed tabular view of the Natural System as above constituted.

THE VEGETABLE KINGDOM.

The Sub-kingdom Phalenogamia, or Flowering Plants.

Province 1st.—Exogens, or Dicotyledons.

Class I.—Angiosperms.

Cohort A.—Dialypetalæ, or Polypetalous Exogens (Roseworts).

Cohort B.—Gamopetalæ, or Monopetalous Exogens (Phloxworts)

Cohort C.—Apetalæ, or Apetalous Exogens (Pokeworts).

Class II.—Gymnosperms.

Cohort D.—Conoïdeæ, or Cone-bearing Plants (Pines).

Province 2d.—Endogens, or Monocotyledons.

Class III.—Petalifereæ, or Aglumaceæ.

Cohort E.—Spadiceæ (the Aroids, etc.)

Cohort F.—Florideæ (Lilyworts, etc.)

Class IV.—Glumifereæ, glumaceous Endogens.

Cohort G.—Graminoideæ (Grasses, etc.)

The Sub-kingdom Cryptogamia, or Flowerless Plants.

Province 3d.—Aerogens, the Point-growers.

Class V.—Angiospores.

Cohort II.—Lycopodales, or Lycopods.

Cohort J.—Filicales, or Ferns.

Cohort K.—Muscules, or Mosses.

Province 4th.—Thallogens, the Mass-growers.

Class VI.—Gymnospores.

Cohort L.—Lichenales, the Lichens.

Cohort M.—Algales, the Seaweeds.

Cohort N.—Fungales, or Fungi.

Fig. 524, A Moss (Bartramia). 525, Chara; 526, a portion magnified. 527, Lichens (Cladonia). 528, 9, Seaweeds; 8, Vaucheria s, a spore just discharged; 9, Fucus; a, air-vessel; b, fruit; z, section of one of the fruit-clots; c, a spore with paraphyses.
521. Orders or Families succeed to the Cohorts. The Natural Order is perhaps the most important of all the associations. On the accuracy and distinctness of the characters of these groups botanists have bestowed the highest degree of attention, and the student's progress will largely depend upon his acquaintance with them.

522. Orders are formed by associating together those genera which have the most intimate relations to each other, or to some one genus previously assumed as the type. As species form genera, so genera form Orders. In regard to extent, they differ widely; some consisting of a single genus, as Platanaceæ, while others comprehend hundreds of genera, as Compositæ. For convenience in analysis, the larger Orders are broken up into Sub-orders or Tribes.

523. The Natural System, then, with all its divisions, groups, and subordinations, may be exhibited at one view, as follows:

The Vegetable Kingdom consists of
Two Sub-Kingdoms,
Four Provinces,
Six Classes,
Thirteen Cohorts, with Alliances,
300 Orders, with Sub-orders and Tribes,
20,000 Genera, with Sub-genera,
100,000 Species, with Varieties, and
Finally, of Individuals.

CHAPTER III.

BOTANICAL ANALYSIS

Is the application of the rules and principles of botany to the study of the natural plant, in order to determine its place in the system, its names, history, uses—all that is on record concerning it.

524. In the flowering months the learner will constantly meet with new forms of bloom; and if he is duly interested in the
science, he will not fail to seize and analyze each new flower while the short hour of its beauty may last. Thus in a few seasons, or even in one, he may become well acquainted with the *flora* of the vicinity where he dwells.

525. Suppose, now, the pupil to be in possession of an unknown plant in flower and fruit. The first requisite is, its Natural Order, and the first step in *analysis* is an examination of the several organs, one by one, until the general structure is well understood. This done, the *experienced* botanist, who has in memory the characters of all the Orders, might determine at once to which of them the plant in question belongs. But the *beginner* must be content with a longer course of inquiry and comparison,—a course which might be indefinitely long and vague without the use of—

526. **Analytical Tables.** These are designed to shorten and define to exactness the processes of analysis. Those which appear in the present work are peculiar in form, and more copious and complete than the tables of any other similar work. These tables, with proper use in connection with the specimen, will very rarely fail to conduct the inquirer almost immediately to the right Order, Genus, and Species.

We subjoin a few examples of the analysis of particular species by the aid of these tables. If the exercise be conducted in the class-room, the successive steps in the process (indicated by the numbers 1, 2, 3, &c., below) may be assigned, in order, to each pupil in the class.

**Analysis of a Polypetalous Herb.**

527. **To determine the Cohort.** A good specimen of a little yellow-flowered herbaceous plant, common in the grassy fields of cool regions, is supposed to be now in the hands of each pupil of the class. (1.) The first pupil, reading (if necessary) the characteristic of each sub-kingdom, pronounces the plant one of the Phænogamia, and refers the next pupil to the Provinces, 1 or 2.

(2.) The next reads the characters of those Provinces, and comparing the specimen (which has *net-veined leaves* and *5-merous flowers*), concludes that it is an Exogen. Refer next to the Classes, 1 or 2.

(3.) "Stigmas present. Seeds enclosed in vessels."

"Stigmas none. Seeds naked. (Pines, Spruces, &c.)" Our plant has stigmas, &c., and, moreover, is not a Pine, Spruce, &c. It is, therefore, an Angiosperm. Refer next to Cohorts 1, 2, or 3.

(4.) "Corolla with the petals distinct." This characterizes our plant, and it is pronounced one of the Polypetalae. Refer them to A.
528. **To determine the Order**, the (5th) pupil reads the first *alternative*, or triplet, noted by a star (*), and comparing his plant, finds it to correspond with the first line, for it is an "herb with alternate leaves." Pass now to (12).

(6) "Flowers regular or nearly so. Fruit never a legume."

"Flowers irregular," &c. The flower is regular. Pass to (14).

Again, a (7th) pupil reads, "Stamens 3—10 times as many as the petals." "Stamens few and definite." The stamens are many. Pass to (15).

(8) The next pupil reads, compares, and determines that the stamens are "perigynous on the base of the calyx," and announces the letter (d) as the reference to the next alternative. (9) Next, the pupil reads and compares his specimen with the triplet (d), and concludes that the sepals are 5, and imbricated in the bud. Consequently, it is announced that the plant in hand belongs to the Order ROSACEA.

529. **To determine the Genus.** After a careful comparison of their specimen with the diagnosis of the Roseworts (Order 44), in order to verify the analysis thus far, the learner or the class will then consult the table of the Genera. (10) A pupil reads the couplet marked A, and determines that the "Ovary is superior, fruit not enclosed," &c. Pass to (a).

11. "Carpels ∞. Calyx persistent, with 5 bractlets added," characterizes our plant. Pass to (f'), which is Tribe V. Pass on to (g). (12) The next pupil determines that the "style is deciduous." Pass to (k). (13) "Torus spongy or dry," is true of our specimens. Pass to (l). (14) "Bractlets 5" reads the next, and announces the plant to be a Potentilla. Now all turn to Genus 13, and together verify this result by reading and comparing the stated character of the genus.

530. **To determine the Species.** (15) As our plant has "stamens ∞ and flowers yellow" it must be a *true* Potentilla. Pass to (d). (16) "Leaves palmately 3-foliate" suits our plant. It is, therefore, either species No. 3, 4, or 5. Lastly (17), after a due comparison of their plant with each of these three species, it is determined that it is P. Norvegica.

**ANALYSIS OF AN ENDOGEN.**

531. A grass-like, blue-flowered herb is now supposed to have been discovered and distributed to the Class for analysis. Having (1) determined that it is an Endogen (for it has "parallel-veined leaves and 3-parted flowers"), they would now (2) determine its Class, whether the 3d or the 4th. They read,

"Flowers without glumes, and colored," &c.

"Flowers with green alternate glumes, and no perianth." The first line is adopted, and Petalifera is its Class. Pass next to (t) Cohorts 5th or 6th, and read,

(3) "Cohort 5. Flowers on a spadix, apetalons or incomplete."

"Cohort 6. Flowers complete, with a double perianth"—which answers to the specimens in hand, and it is seen to belong to the Florideae. Pass to F.

(4) The next pupil having read and compared the first couplet under "F, Cohort 6, Florideae," chooses the second line. Pass to No. 2. (5) "Perianth tube adherent to the ovary" is adopted. Pass to (4). (6) "Flowers perfect." The second line of this couplet is true of our plant. Next pass to (b). The (7) pupil reads "Anthers 3 or 6," which is true of the plant. Pass to (c). (8) "Perianth glabrous outside" is true. Next read (d). (9) "Anthers 3, opening lengthwise, outward," is also true, and our plant is thus traced to the order IRIDACEA.

532. To determine the Genus and Species under the Irids, Order 146, is the next and the last step. Having carefully compared their specimens with the characters ascribed to the Irids, the pupils next apply to the Table of the Genera. (10) "Flowers regular and equilateral," in the first dilemma, is chosen. Read the (*) couplet next. (11) "Sepals similar to the petals in form, size, and position" is true. Next to (a). (12) "Stamens monadelphous. Flowers small, blue. Plants grass-like," describes the plant truly, and it must be a Sisyrinchium. They turn to Genus 7, and verify by reading its characters. Lastly, the brief diagnoses of the two species are compared, and the plant is found to be S. Bermudiana.
CHAPTER IV.

RULES IN NOMENCLATURE.

533. **The Names of the Orders** are Latin adjectives, feminine, plural (to agree with *plantae*, plants, understood), usually derived from the name of the most prominent, or leading genus, by changing or prolonging the termination into *aceae*, as *Rosaceae*, the Rose tribe, *Papaveraceae*, the Poppy tribe, from Rosa and Papaver. Earlier names, however, derived from some leading character in the Order, and with various terminations, are still retained. Thus, *Composite*, with compound flowers; *Labiate*, with labiate flowers.

534. **Generic Names** are Latin substantives, arbitrarily formed, often from some medicinal virtue, either supposed or real, or from some obvious character of the genus; sometimes from the native country of the plants, or from the name of some distinguished botanist, or patron of botany, to whom the genus is thus said to be dedicated. Also the ancient classic names, either Latin or Greek, are often retained. Examples of all these modes of construction will be hereafter seen.

535. **Specific Names** are usually Latin adjectives, singular, and agreeing in gender with the name of the genus to which they belong. They are mostly founded upon some distinctive character of the species; as, *Viola blanda*, Sweet-scented Violet; *V. cucullata*, Hood-leaved Violet. Frequently the species is named after some other genus, which, in some respect, it resembles; as *Viola delphinifolia*, Larkspur Violet.

536. **Commemorative Specific Names.** *Species*, like genera, are also sometimes named in commemoration of distinguished persons. The rules given by Lindley, for the construction of such names, are: 1st. If the person is the discoverer, the specific name is a substantive in the genitive case, singular number; as, *Viola Selkirkii*, Selkirk's Violet; *Lobelia Kalmii*, Kalm's Lobelia. 2d. If the name is merely conferred in honor of the person to whom it is dedicated, it is an adjective ending in *nus, na, or num* (according to the gender of the generic
name); as, Tulipa Gesneriana, Gesnerian Tulip, or Gesner's Tulip; Erica Linneana, Linnaeus' Heath.

537. **Rules for the use of Capitals.** The names of the order, the sub-order or tribe, and of the genus, should always commence with a capital letter. The name of the species should never commence with a capital except in the following cases: (1), when it is derived from the name of a person or of a country, as Phlox Drummondii, Aquilegia Canadensis; (2), when it is a substantive, as Delphinium Consolida.

538. **Synonyms.** Very frequently, the same species has been described by different (or even by the same) authors, under different names. In such cases it becomes a question, often of difficult solution, which name is to be adopted. Obviously, the prior name, that is, the original one, if it can be ascertained, is entitled to the most respect; and it is a rule with botanists to adopt this name, unless it has been previously occupied, or be strongly objectionable on some other account. All other names are synonyms.

539. **Authorities.** In the flora which accompanies this work, immediately after the Genus we insert the abbreviated name of the author by whom it was originally published, with a comma between, thus: *Trifolium*, Tourn. After a species the authority is inserted *without a comma*, as *T. repens* L.,—that is to say, *Trifolium repens* (of) Linnaeus. In changing the generic relations of a species (as subsequent writers often deem necessary), it is a custom for the author of the change to annex his own name, or a blank, instead of the original authority. The custom is often unjust, and always liable to abuse. It offers a bribe for innovations in the Genera, and recent works abound in changes which otherwise could scarcely be accounted for. When such changes become necessary, the just and proper rule (actually adopted in Conchology) is the following. Let the original specific name and authority both be retained, the latter in parenthesis, thus, Lychnis Githago (Linn.)—originally Agrostemma Githago Linn. This method is often but not always used in the present work.

Authorities for our species of exotic cultivated plants, for want of space, have all been here omitted.
INDEX AND GLOSSARY.

A (α, privative), prefixed to a Greek word, signifies without; as *aphyllous*, without leaves.

**Abbreviations**, page 3, Part IV.

**Abortion**, non-development of a part.

**Absorption**, 460.

**Aculeous**, apparently stemless, 223.

**Accessory**, something superadded.

**Accrescent**, growing after flowering, 109.

**Accumbent**, lying against a thing, 183.

**Acrosome or acrosome**, needle-shaped, 299.

**Achnium**, plural, *achenta*, 151.

**Acramydeo**, without floral envelopes.

**Acellular**, finely needle-shaped.

**Aclinal**, without cotyledons.

**Acogynous**, summit-growers, 435.

**Aculeate**, armed with prickles.

**Acuminated**, drawn out into a point, 307.

**Acute**, ending in a sharp angle, 307.

**Adherent**, growing to, 82, 94.

**Adnate**, growing fast to, 114.

**Adventitious**, growing out of the usual or normal position, as roots, 296.

**Aeration**, same as Respiration, 483.

**Aestivation**, 333.

**Affinity**, resemblance in essential organs.

**Age of trees**, 47.

**Aggregate**, assembled close together.

**Agglomeraeous**, without glummes, the same as Petaliferous, 514.

**Air-bladders**, 323.

**Air-plants**, 228.

**Alata**, wing; *Alae*, wings, 101.

**Alate**, winged, 274.


**Albunum**, sap-wood, 410.

**Algy**, seaweeds, 519.

**Alternate**, 215, 263.

**Alviate**, with pits like the honey-comb.

**Ament**, a deciduous spike, 357.

**Amorphous**, without definite form.

**Amphitropical**, 141.

**Amplexicaul**, stem-clasping, 275, 311.

**Analyseis**, Botanical, 523.

**Anastomosis**, reunion of vessels or veins.

**Andropous**, 141.

**Androphilous**, two-edged.

**Androgynous**, stamens and pistils on the same peduncle.

**Angiospermae**, angiosperms, 510.

**Angiosporae**, 517.

**Animal**, 15.

**Annual**, yearly (or plants), 40.

**Annular cells**, 373.

**Ant [bract]**.

**Anterior**, parts of a flower adjacent to the **Anthelmintic**, expelling or killing worms.

**Anther**, 111, 113.

**Anthesis**, the opening of the flower; flower-

*Antheridia*, the staminate organs of *Mosses*.

*Anpetale*, 513. *Anpetalous*, without petals.

**Aphyllous**, without leaves.

**Apophyse**, a swelling, *e.g.*, under the thecae of some *Mosses*.

**Apparatus**, 4.

**Appendicular organs**, 77.

**Appressed**, closely applied but not adhering to; the same as adpressed.

**Apterous**, without wings.

**Aquatic**, living in water.

**Arbica**, resembling cobwebs.

**Arborious**, tree-like.

**Arcegonium**, the pistillate organs of *Mosses*.

**Areca**, arched or curved like a bow.

**Areolate**, having the surface divided into little spaces or areas.

**Arti**, an extra seed-covering, 173.

**Articulate**, with an arista or awn (Barley).

**Armed**, bearing prickles, spines, etc.

**Articulated**, jointed, as the culm of Wheat.

**Ascending**, arising obliquely; assurgent.

**Ascidia**, leaves holding water, 322.

**Assimilation**, 439.

**Alternate**, becoming slender or thin.

**Auriculate**, ear-bearing, 201.

**Axial**, the beard of Barley and the like.

**Axial root**, 200.

**Axil** (arm-plt), the angle between the petiole and the branch, on the upper side.

**Axillary**, growing out of the axils.

**Axis**, ascending, 211, 212; erect, procumbent, prostrato, trailing, decumbent, 212; excurrent, solvent, 226; descending, 197.

**Baccate**, berry-like; covered with pulp.

**Banner**, same as *Vexillum*, 101.

**Banyan tree**, 207.

**Bark**, 411.

**Basilar**, basal, attached to the base, 136.

**Basticells**, wood-cells of bark, 412.

**Beaked**, ending in an extended tip.

**Bearded**, with tufts of long, weak hairs.

**Berry**, 159.

**Bilis**, twice (in compound words).

**Bicolor**, two-colored.

**Bicuspitate**, with two points or cusps.

**Bidentate**, with two teeth.

**Bifacial**, of two faces, 41.

**Bifid**, cleft into two parts.

**Bifoliate**, with two leaflets.

**Bifurcate**, twice forked, or merely forked.

**Bifoliate**, divided, two-lobed.

**Bipinnatifid**, twice pinnatifid. *Fig. 342.*

**Bipinnatifid**, twice ternate, 305.

**Bivalved**, two-valved.

**Blade**. (See *Lamina*, 271.)
INDEX AND GLOSSARY.

Blanched (plants), whitened for the want of light, § 466 (See Etiolated.)
Bloom, a fine white powder on some plants.
Border, 91, 92.
Botany defined, 18.
Botany, Elementary, 30, 368, etc.
Botany, Physiological, 21, 436.
Botany, Systematic, 22, 153.
Bracteate, with opposite, spreading branch-

Coccus, accessory, 29.
Chaff, 29.
Chalaza, 29.
Cernuous, nodding (less inclined than pen-
dulous).
Chaff, chaffy, 349. (See Paleaccons.)
Chalaza, 140.
Channelled, hollowed out like a gutter.
Characeous, with the texture of paper.
Chlorophyli, 381, 435.

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Botany, Physiological, 21, 436.
Botany, Systematic, 22, 153.
Bracteate, with opposite, spreading branch-

Coccus, accessory, 29.
Chaff, 29.
Chalaza, 29.
Cernuous, nodding (less inclined than pen-
dulous).
Chaff, chaffy, 349. (See Paleaccons.)
Chalaza, 140.
Channelled, hollowed out like a gutter.
Characeous, with the texture of paper.
Chlorophyll, 381, 435.

Blanched (plants), whitened for the want of light, § 466 (See Etiolated.)
Bloom, a fine white powder on some plants.
Border, 91, 92.
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Chalaza, 140.
Channelled, hollowed out like a gutter.
Characeous, with the texture of paper.
Chlorophyll, 381, 435.
INDEX AND GLOSSARY.

{gamma}, a little cup (see, acorn), 155.
Cytridate, with a sharp, stiff point, 307.
Cvitetect, 397.
Cytridge, blue, or any color except yellow.
Cyathiform, cup-shaped.
Cycle (in Phylotaxy), 263, 264. [cell, 260.
Cycles, same as Rotation, currents in the
Cyone, cymous, 363.
Cymliform, boat-shaped.
Cyprosa, 151.
Cytoelastic, 380.
Deea (in Greek composition), t.n.
Decidual, falling at the end of the season.
Dekinate, bent downward.
Decomposed, much compounded or divided,
Decumbent 212. (Fig. 249.)
Decurrent, 274. [at right angles.
Decussate (leaves), opposite, and the pairs
Dignifie, 113.
Deflected, bent downward.
Defoliation, the casting off of leaves.
Dehiscence, 113, 148.
Deltiissécent (axis), same as Solvent, 226.
Deltoid, form of the Greek letter Δ, 283.
Dendroid, tree-like in form.
Dendron (in Greek compounds), a tree.
Dentate, 309. Denticulate, 309.
Denuded, become naked.
Depapillate, less developed than usual.
Dependent, hanging down.
Depressed, flattened from above; low.
Dextrin, 455.
Dextrorse (twining), turning to the right.
Did (in Greek numerals), two.
Diadelphous, 135.
Diaphragm, a brief statement of the distinctive character of a plant or group.
Diapetalous, Polypetalous, 513.
Diphysianous, transparent or translucent.
Diplovis, with two stems, 118.
Diastase, 455.
Diastrophic, forked or two-forked.
Dichromatic, 67.
Dicytoidens, Dicotyledonous, 182, 234.
Didymous, double.
Didynamous, 119.
Digitate, with several distinct leaflets pinnately arranged (as in the leaf of the
Horse-chestnut).
Diffuse, much divided and spreading.
Dimidiate, (anther), halved, 114.
Dioecious (flowers), 67.
Diplovis, having two wings.
Disk, 55, 362. Discoid, no rays. (Fig. 446.)
Dissected, cut into deep lobes.
Dissection, same as partition, 132.
Disstichous, arranged in two rows.
Distinct, separate, not united, 82.
Divaricate, wide-spread, straggling.
Divergent, spreading with a less angle.
Dorsal, on or relating to the back.
Double terms, 301.
Downy, clothed with short, weak hairs.
Drupel, 156. Drupaceous. (See Tryma.)
Dryme, [in composition], without; as,
Excrinate, without bracts.
Fech natate, prickly with rigid hairs.
Effete, sterile, exhausted.
Elaters, spiral, elastic threads accompanying certain spores.
Elliptic, Elliptical (leaf), 259.
Elongated, lengthened, extended.
Emerginate, 377.
Embryo, 31, 180. Embryo sac, 142.
Embryonic residue, 449.
Endocarp, 156. [See Chlorophyli.
Endochrome, the coloring matter of plants.
Endogenous structure, 421.
Endosperm, 503, 180, 424.
Endopeluria, same as Tegmen, 172.
Endospermous, 465.
Enseiform, sword-shaped, 297.
Entire, even-edged, 308.
Ephemeral, enduring for one day.
Epik (in Greek composition), upon; as
Epicarp, 156.
Epilermis, 396.
Epicygous, upon the ovary, 97, 119.
Epicalyx, on the petals, 119.
Epiphytes, plants on other plants, 203.
Episperma, the skin of the seed.
Equilateral (astraddle), 258.
Eroded, eroded, as if gnawed, 310.
Ester, 153.
Eutolaled, colorless for want of light
Exalbminous, without albumen, 173.
Excurrence, 226.
Exocarp, Exocarp, 182, 509.
Exogenous structure, 405.
Excrescence, flowing out, 465.
Exserted, projecting out of, or beyond.
Exstipulate, without stipules, 272.
Extra (in composition), beyond; as,
Extra-axillary, same as supra-axillary.
Extra-flower (of wheat), 446.
Extrorse, turned outward, 114.
Falcate, scythe-shaped, curved.
Familiar, flour-like in texture.
Fibrinous, mealy on the surface.
Fascicle, a bundle, 365.
Fasciculate (leaves), 262.
Feathered, 265.
Ferruginous, of the color of iron-rust.
Fertile (flower), seed-producing, 67.
Fertilization, etc., 447.
Fibrillum, fibrils, 199, 428.
Filament, the stalk of a stamen, 111, 112.
Filiform, slender like a thread.
Flimbulate, fringed, having the edge bordered with slender processes.
Foliar, hollow, as the leaf of Onion.
Flabelliform, fan-shaped, 298. [supply.
Flagelliform, whip-shaped; long, taper, and
Flavescence, yellowish, turning yellow.
Flexuous, zig-zag or wavy.
Floccous, with hairs in soft fezzy tufts.
Flora, (a) the spontaneous vegetation of a country; (b) a written description of the
same, 53.
Floral, relating to flowers.
Floral envelopes, 50, 57. [362.
Floret, the flowers of a compound flower.
Flower, 40, etc.; origin of, 57.
Flower-bud, 344, 353, etc.
Foliate, leaf-like in texture or form
Foliolation, the act of leafing.
Follicle, 164.
Foramen, same as Micropyle, 140.
Free, not adherent nor adnate, 81, 94.

Fringed. (See Fimbriate.)

Fron, an organ which is both stem and leaf, as in Buckwheat, Fern.

Fruiting, bursting into leaf.

Fructification, flower and fruit as a whole.

Fruit, 38, 143; ripening of, 457.

Fruitecent, shrubby, becoming shrubby.

Fulva, Fulvous, Furcate.

Fuliginous.

Fulcrum.

Frutescent, having 6 stamens.

Frond.

Gynoecium.

Gymnospermous.

Gluten, Glumiferous, Glumes, Glossology, Glomerate, Globous.

Glaucous.

Glans.

Glomerate, Globous, Glabrous.

Gland.

Glabrous, Genus.

Galea.

Gamopetalous.

Herb.

Gyrous.

Genera, Gymnospermous, Gymnogamus.

Habit, the general aspect of a plant.

Habitat, the natural locality or place of growth of a wild plant.

Hair, 400. Hairy, hjraste.

Vallert-shaped, hastate.

Hale, one-half apparently deficient.

Jastate, with the base-lobes abruptly spreading, as in a halbert, 291.

Heart-shaped, 291. Heart-wood, 410.

Herbaceous, green and cellular in texture.

Herbaceous, 81, 94.

Herb. 400. Herbaceous, 40, 41.

Herbarium, 3.

Herbaceous, with stalks and pistils, Hermaphrodite (flower), with both stamens and pistils.

Heterocarpous, heads of two sorts in the same plant, some $\alpha$ and some $\beta$.

Heterogamous, two sorts of flowers in the same head, some $\alpha$ and some $\beta$.

Heca (Greek numeral), six; as in, Hexagonal, 6-sided or 6-angled.

Hexameric, 6-parted.

Hexandrous, having 6 stamens.

Hilum, the eye or scar of the seed, 177.

Hirsute, hairy, with rather long hairs, 313.

Hypid, bristly with stiff hairs, 313.

Hairy, frost-colored, grayish-white.

Homogamous, head with all the flowers alike, to the stamens and pistils.

Honey, Honey-bee, 458.

Hood. (See Calyptra, 518.)

Hooded. (See Cucullate.)

Horn., of the texture of horn.

Hortus siccus, the herbarium, 3.

Hamiform, spreading on the ground.

Hyathiform, transversely, or nearly so.

Hybrid, a cross-breed between two species.

Hyperborean, inhabiting northern regions.

Hypo (in Greek compounds), under; as, Hypocotyliferous, salver-form, 102.

Hypogean, growing under ground.

Hypogynous, 95, 119.

Imbricate, imbricated, 257, 339.

Immarginate, having no rim or border.

Immersed. (See Submersed.)

Inaxial root, 201.

Incised, divided deeply as if cut, 310.

Included, enclosed within, or shorter than the stamens in the corolla.

Incrassate, thickened.

Incumbent (sc. embryo), 183.

Indehiscent, not opening, 148.

Indefinite, 118.

Indigenous, native of a country.

Induplicate, 337.

Indusium, the shield of the fruit-dot (sorus) of a Fern.

Infior, lower in position.

Inflorescence, 341, etc.

Infundibuliform, funnel-shaped, 102.

Infundibulum, 102.

Incised, inserted, insertion, to refer to the point of junction or apparent origin.

Involucel, 496.

Involucrate, 320.

Involucrum, the involucre, 347.

Involucre, rolled inward, 256.

Involuted, 256.


Jointed, having joints, separable pieces.

Jugum, a pair; as bif jugous, with two pairs of leaflets; trif jugous, three pairs.

Keel. Keeled. (See Carinate.)

Kidney-shaped. (See Reniform, 295.)


Labellum, the add of an Orchid, 101.

Labiate, lip-shaped, 103.

Lacerate, torn irregularly by deep incisions
INDEX AND GLOSSARY.

Laciniate, slashed, with deep incisions.
Lacteal, containing lac, or milk.
Lacteous, with large depressions or pits.
Lacustrine, growing in lakes.
Lamina, the blade of a leaf, 271.
Lanceolate, lance-shaped. (Fig. 317.)
Lanuginous, woolly, 312.
Latex, the turbid or milky juice of plants.
Laticiferous tissue. (See Chelsey, 386.)
Latin names of plants, 25, 26.
Layer. (See Stolon, 217.)
Leaf, 271, etc.; structure of, 431, etc.
Leaf-bud, 244, etc.
Leaflet, the pieces of a compound leaf, 301.
Leaf-stems, 222.
Legume, 155.
Lens, 7.
Lenticulate, shaped like a double convex lens, the inner bark, 412.
Lichens, 519.
Lignaceous system, 404.
Ligulate, strap-shaped, 103.
Ligule, the stipules of Grasses, 279.
Lilaceous, 100.
Limbs, the border, 91.
Linear, long and narrow, 297.
Lixirid, clouded with bluish, brown, and gray.
Lobate, lobed, 291.
Loculicidal, opening into the cell, 148.
Loculata, a spikelet of the Grasses.
Loment, a jointed legume, 165.
Lorate, thong-shaped.
Lax, a crescent-shaped.
Lyrate, pinnatifid, with the upper lobes much larger than the lower, 293.
Macro, in Greek compounds, long.
Maculate, spotted or blotched.
Malus (flowers), same as Staminate.
Marcus, withering, but persistent, 109.
Marginal, belonging to the border.
Marginate, having the border different.
Medulla, pith. Medullary rays, 416.
Medullary sheath, 407.
Membranaceous, membranous, thin and pellucid.
Merocarp, one of the carpels of a cremocarp or umbelifer. (Fig. 177.)
Micropyle, 177; same as Foramen.
Microscopic, 8.
Midrib, the central vein of a leaf, 282.
Midrib (in this work), 283.
Mineral, 13.
Mitriform, formed like a conical cap.
Mono (in Greek compounds), one only; as, Monadelphous, 120.
Monandrous, 1-stamened, 118.
Moniliform (roots), 201.
Monocarpic herbs, 42.
Monochlamydeous (flowers), 66.
Monocotyledons, 130, 284.
Monocotyledous, 67.
Monogynous, with one style, 124.
Monopetalous. (See Gamopetalous, 513.)
Monopetalous, 90, 91.
Monophyllous, 1-leaved.
Monopetalous, 90, 91.
Monocious flowers, 314.
Morphology, 19; of the leaf, 271.
Mucro, a sharp, small, abrupt point.
Mucronate, 307.
Multifid (in composition), many.
Multifid, cut halfway into many segments.
Muriate, bearing short, hard points.
Muriiform, like a wall of mason-work.
Musceology, a treatise on Mosses.
Muricous, pointless, not pointed.
Mycelium, the thallus of the Fungi, usually concealed, 519.
Naked seeds, 147. (Fig. 166.)
Napiform (root), 203.
Natal, swimming; under water.
Naturalized, growing spontaneously but not native.
Natural Orders, 439.
Natural System, 504, 506, etc.
Nectar, honey. Nectary, 77.
Nepenthes, 322. (Fig. 381.)
Nerve, the veins (282) are sometimes so netted or net-veined. (See Reticulate, 284.)
Neutral flower, 63.
Nitroflora, 63.
Nodding, nutant, the summit bent over, as Node, a joint of the stem, 220.
Nodulous, knotted, large-jointed.
Nodiolus (root), 214.
Nomenclature, 25, 533, &c.
Normal, according to rule, regular.
Nuciform, nut-like.
Nucleus, kernel (see ovule), 140, 172.
Nut. (See Glans, 155.)
Ob (in composition), denotes inversion; as, Obcompressed, flattened back and front.
Oblique, unequal-sided, as the leaves of Elm.
Obrevolute (in revolute), 258.
Ochrea, sheathing stipules, 279.
Ochroleucous, cream-color, pale yellow.
Octo (in Greek composition), eight.
Oclandrous, having 8 stamens.
Oclaygnous, having 8 styles.
Olfet, a short lateral shoot, 218.
Oleaginous, 439.
Oleagos (in Greek composition), few; as, Oligandria, with few stamens.
Oliveaceous, olive-green, brownish-green.
Opaque, dull, not shining.
Opercular, with a lid, 114.
Opposite, two at a node, 215, 282.
Orchard, Orcharic, circular, 289.
Orchideous, 101.
Organography, 19.
Organic world, 12.
Orthotropous (ovule), erect, 141.
Ossaceous, bony, as the Peach-stone.
Oval, 283. Ovalate, 283.
Ovate, 125.
Ovoid, egg-shaped, as in fruits.
Ovule, the young seed, 138.
Palea or Pales, 108, 349.
Palaceous, chiefly, having pales.
Panandrous, simple-shaped.
Panicle, 360. Paniculate, panicked.
Papilionaceous, 101.
Papilionaceous, 101.
Pappus, the calyx of Composites, 104.
Parallel-veined, 284.
Parraphyses, jointed threads around the antheridia of mosses.
Papigales, 289.
Paraphyses, 289.
Parénychyma, 337.
Parietal, on the wall (paries), 133.
Past, deeply divided into parts.
Fear-shaped, obvoid, larger above.
INDEX AND GLOSSARY.

Pectinate, combed, finely pinnatifid.
Pedate, shaped like a bird's foot, 296.
Pedicel, Peduncle, 548.
Pellate, shield-form, 293.
Pendent, Pendulous, hanging, drooping.
Tenellate, with a tuft of hairs, as if a camel's-hair pencil.
Pente (in Greek composition), five; as, Pentamerous, 5-parted.
Pentandra, with 5 stamens, 118.
Lyo, a fruit like a melon, 161.
Perennat, living several years, 43.
Perfect flower, (x) with both stamen and pistil.
Perfoliate, through the leaf, 311.
Peri (in Greek composition), around; as, Perianth, 53, 87; forms of, 90.
Pericarp, 146; forms of, 150.
Perigynium, 107.
Perigynous, 96, 119.
Perispem, same as Albumen, 179.
Persistent, remaining long in place, 109.
Personate, 103.
Petals, 53; forms of, 89.
Petaloid, 511.
Petaloid, resembling petals.
Petiol, 274. Petiolar, 271.
Petiolar, 276.
Pecnologiam, 507.
Phylloid, (plural Phyllidia), 321.
Phyllotaxy, leaf-arrangement, 351.
Physic, 16.
Physiology, 436.
Phytology (Greek, phylos, a plant), 23.
Pleura, a cap of a rootlet, 425.
Pilae, cap of some Fungals.
Pilus, with erect, thin hairs, 313.
Pinnate, 393. Pinnatifid, 293.
Pistil, 56, 123.
Pitches (leaves). (See Ascidia, 322.)
Pith, 406. Pitted cells, 376, 390.
Pitted, with depressions or excavations.
Placent, 127; free axis, 193.
Plant defined, 14.
Plan of the Flower, 53.
Pleuréphytm, 391.
Plicate, plaited lengthwise as a fan, 254, 340.
Plumous, feathery.
Plumule, a little plume, 51, 190.
Pollen, masses of pollen, 132.
Poly (in Greek compounds), many; as, Polydactylous, 120.
Polygamous, with some imperfect flowers.
Polypetalal. (See Dialypetalal, 513.)
Polypetalalous, Polysepalous, 90.
Pome, a fruit like an apple, 162.
Posterior, next the axis.
Potato, manner of its growth, 283.
Precocious, flowering before the leaves.
Prefoliation, vernation, 232.
Precipice, 548.
Premorse, ending abruptly, 235.
Press for drying plants, 6.
Prickles, 493.
Primrose, same as Tesea, 173.
Primordial utricule, 373.
Prismatic, prism-shaped, having several parallel, longitudinal angles.
Procrement (stem), 212. (Fig. 248.)
Produced, extended more than usual.
Proklorous, reproducing; as cymes from the midst of a cyme, flowers from the midst of a flower.
Protein, 440. Protoplasm, 380.
Proveness, 509.
Prickly, powdered, as if frosted. 314.
Pruriens, causing an itching sensation.
Pseude (in Greek composition), spurious.
Pubescent, downy with short, soft hairs.
Puberulent, minutely downy.
Pumilous (pumillus), dwarfed in size.
Punctate, seeming as if perforate, or marked with minute dots.
Pungent, plicoful, sharp-pointed.
Putamen, the bony nuclei of a drupe.
Pyramidal, form of a cone or pyramid.
Pyrifhorm, of the form of a pear.
Pyxid, a pericarp with a lid, 163.
Quadri (in composition), four; as, Quadrifoflreate, four-leaved.
Quadrangular, four-sided.
Quadrijugate, with four pairs of leaflets.
Quadrilateral, four-sided.
Quinque (in composition), five.
Quinate, growing in fives, 306.
Quintuple, 393. (Fig. 300.)
Quintuple, five-fold.
Race (Latin, stirps), a permanent variety, as Red-cabbage.
Raceme, 355.
Rachis, axis of the inflorescence, 301, 343.
Radiate, diverging from a common centre.
Radial (in the Composites), the outer row of florets ligulate. (Fig. 388.)
Radiant, outer flowers enlarged (and often central, Fig. 271); or (in the Composites), all the florets ligulate.
Radial, from the root, 362.
Radical (of the flower), 63.
Radicle, rootlet (of the embryo), 31, 180.
Rapax, of a branch, 362.
Raphé (of the ovule or seed), 141.
Rapidae, 383.
Rays, 339, 362.
Receptacle, 57. (See Toms.)
Receded, bent (not rolled) backward.
Reflccted, curved backward excessively.
Refracted, bent back suddenly as if broken.
Regma, fruit as of Geranium, 168.
Regular, like parts similar, 60, b.
Reniform, kidney-shaped, 295.
Repand (margin), 310.
Repens, creeping (sc. stems, 223).
Respiration, 452.
Resupinate, reversed, upside down.
Reliculate, netted, 284.
Retróbre, backward, downward.
Retuse (apex), 307. (Fig. 267, c.)
Revolute, rolled backward, 236.
Rhizons, Rizome, 230, 233.
Rhombic, Rhomboidal, in the figure of a rhomb, or approaching it.
Ribs, the chief veins of a leaf, ridges.
Ringlet (corolla), 103.
Root, 197. Root-stock, 293.
Rosaceous (corolla), 100.
Rostrate, beaked, with a beak.
Rosulate (leaves), arranged around the base of the stem, as the petals of a Rose, 263.
Rotate, wheel-shaped, 102.
Rotation, circulation of fluids in the cell.
Rodiment, the beginning of a thing.
Rugous, wrinkled, 515.
INDEX AND GLOSSARY.

Ruminated (albumen), full of chinks, as if composed of numerous folds.
Runcinate, hooked backward. 293.
Runner, 219.
Sagittate, arrow-shaped, 291.
Sakura-shaped. (See Hypocrateriform, 102.)
Samara, 154.
Sap, the crude, 472; the true, 474.
Sarcocarp (of the drupe), 156.
Scabrous, rough, 312.
Scaliform (cells), ladder-shaped, 373.
Scales, 319. Scale-stems, 70, 230.
Scandent, climbing.
Scape, 344. Scariens, 315.
Scattered, sometimes used for alternate.
Scoporous (in florescence), 305.
Scrobiculate, pitted, with little depressions.
Sea-green, light bluish green, glauceseent.
Secund, all on one side, or turned one way.
Sedum, same as Tegmen, 172.
Seed, 172. Seed-coverings, 173.
Seed. vitality of, 185; dispersion of, 186.
Semi, (in composition), half; as, Semicordate, half of corollate.
Seminiferous, half-round, 312.
Semen, half-round, 312.
Semiagulate, and Semiterete.
Sepals, 51. Sepaloid, sepal-like.
Septum, a partition between two spaces.
Septicidal (dehiscence), 145.
Sepi/fragal (dehiscence), 143.
Sericeous, silky, 312.
Serrifomus, occurring late in the season.
Serrate, Serrulate, 369.
Sessile, sitting, not stalked, 125, 271.
Sclere, 166. Setaconas, bristle-form.
Selous, Seligmaners, bearing bristles, 313.
Sheath, Sheathing, as the leaves of the Grasses, 274.
Shrub, 45.
Siltage, Silicide, 166.
Silicous, bearing siliques (as the Cruciferae).
Silier-grain (of wood), 417.
Simple, of one piece, not compound.
Siphonaceous, the inflow right from to left.
Solitary, growing alone, or singly.
Solvent axes, 226.
Sori, patches of fruit in ferns.
Soroes, 171.
Spatial, 513. Spadix, 356.
Spate, Spatiaceous, 316.
Spatumate (leaf), 290.
Species, 27, 456. Specific name, 28.
Specimens (of plants) 2, 5.
Spike, Spicate, 355.
Spikel, a little spike, as in a Grass.
Spina, a woody thorn, 327.
Spindle-shaped (roset), 203. (Fig. 291.)
Spinal arrangement (of leaves), 263.
Spinal cells, or vessels, 377.
Spongiate, Spongiolte, 199.
Spores, 164.
Spur, a projecting, slender appendage, 78.
Sporomere, spreading widely, as the involucral scales of some Composites.
Stages of plant life, 31.
Staminodia, 117.
Starch, 382.
Stem, or Ascending Axis, 211.
Sterile, not bearing seeds, 67.
Stigma, Stigmatic, 125, 129.
Stings, 402.
Siphon, the stalk of the ovary or ovaries; also, the stem of a Mushroom.
Siphile, Stipulate, 273.
Siphuline, Stipulate, 373, 277.
Stolon, 217. Stoloniferous, producing stolomata, 397, etc.
Strap-shaped, flat, narrow, and straight.
Strict, erect and very straight.
Strong, with sharp, close, rigid hairs.
Strobile, fruit, 169.
Strigilulate, having an appendage (stro- phiote or caruncle) about the hilum.
Style, 135. Styloid, style-like.
Sub (in composition), 317.
Succulent, corky in texture.
Sub-kingdoms, 307.
Subulate, awl-shaped, 299.
Suculent, very juicy and cellular, 315.
Sucker, 216.
Suffrutescent, woody at the base only.
Sulcate, furrowed.
Superior, 97, 98.
Superior calyx, calyx adherent to ovary.
Superior corolla, calyx free from ovary.
Supérvolé, 310.
Supra-axillary, situated above the axis.
Supradecompost, much very divided.
Suspended (ovule), 139. (Fig. 158.)
Suspensor (of the embryo). (Fig. 52.)
Succulent, situated at the top of the plant.
Sulphurous compound, very much divided.
Symmetrical (of the flower), 60, 69.
Syn. (in Greek compounds), together, union.
Synantherum, 169.
Synenous, 123.
Synonym, 538.
Systematic Botany, 492, etc.

Taper-pointed. (See Acuminat, 307.)
Tap-root, 233.
Tawny, fulvous, dull yellowish brown.
Taxonomy, the science of classification.
Telegynous, the inner seed-coat, 140, 173.
Tenuil, 228, 234.
Tecology, 334.
Terete, cylindrical, or nearly so.
Term of plant life, 39, etc.
Terinal, situated at the end or apex.
Terminology. See Nomenclature, 533.
Ternate (leaves), in threes, 303.
Tesselated, checkered, as a pavement.
Testa, the outer seed-coat, 140, 173, 178.
Thera (in Greek composition), four.
Therapy, 119.
Tigridyal, with four corners.
Tetrallygnous, with four pistils.
Thalligen, 424, 516.
Thallus, the cellular vegetative system of the Thallogens.
Theca, Thece, sporangia or spore-cases.
Thorn, 327.
Thread, orifice of a monopetalous corolla.
Thryse, 312.
Tomentous, with short, dense, wooly hairs.
Top-shaped, inversely conical.
Torus, same as Receptacle, 57, 54.
Trachichyma, 381, 391.
Tree, 46. Transpiration, 479.
Tris (in Greek compounds), three, as.
Triadphylous, the stamens in three sets.
Triandrous, having three stamens.
INDEX AND GLOSSARY.

Trigynous, having three styles, 124.
Tricoccous (fruit), with three 1-seeded carpels.
Tricolored (tricolor), with three colors.
Triennial, lasting three years.
Trifold, split half-way into three parts.
Trifoliate, with three leaflets, 303.
Trilobate, having three lobes, 296.
Trimerous, 3-parted, 65.
Tripartite, separable into three parts.
Tripli-reinforced, 285. (Fig. 319.)
Triquetrous, three angled, 359, 332.
Triplinate, thric e pinnate, 304.
Trifurcate, thric e ternate, 335.
True sap, 474.
Truncate, 307. (Fig. 367, d.)
Trunk (of a tree), 225.
Tryma, fruit, as the hickory-nut, 157.
Tube, 91. Tubular corolla, 102.
Tuber, 237. Tubercular, 204.
Tuberculat e, covered with warts (tubercles).
Tumid, swollen or inflated.
Tunicate, coated, as the bulb, 212.
Turon, young shoot, as of asparagus
Typical Flower, 60. (Figs. 8-11.)

Umbral, 229. Umbellet, a partial umbel.
Umbellate, bearing umbels.
Umblicate, with a sharp depression at end.
Unarmed, with no stings, thorns, etc.
Undershrub, a low shrub, 45.
Undulate, wavy, 310.
Unequally pinnate, 392.
Inquivalerate (petal), having a claw, 38.
Uni (in compounds), one, 48.
Unifoliolate, with one leaf or leaflet.
Uniform, of one form.
Unilateral, 1-sided.
Unilocular, 1-celled.
Univalved, with but one valve.
Uniseriate, urn-shaped, 102.
Utricle (fruit), 153.

Vaginate, sheathing; the flattened petiole involving the stem.

Valsate, 257, 337.
Valves, Valvular, 114, 148.
Varieties, 28.
Vascular tissue, 326.
Vauled, arched.
Vegetation, or Physiology of Plant Life, 426.
Veins, 252. Veinlets, Veinlets, 283.
Venation (of the leaf), 282.
Venetous, swelling out on one side.
Vernal, appearing in the Spring-time
Vernation (of the leaf-bud), 252.
Ventral, belonging to the front side, i.e.,
the side toward the axis.
Verrucose, covered with warts (verruca).
Vesicular, appearing in the evening.
Vexillary (entivation). (Fig. 425.)
Vexillum, banner, 101. (Figs. 59, 60.)
Villos, with long, weak hairs, 312.
Vimineous, with long flexible shoots, osier-like.
Virgate, twiggy, long, slender.
Vine, 228.
Viscid, Viscous, sticky or glutinous.
Vitality of seeds, 183.
Vitta, Vitile, the minute oil-tubes in the
fruit-coat of the Umbiliferae. (Figs. 17, 18.)
Volea, membrane enclosing the young Fun-

Wedge-shaped, tapering to the base. Woody
Whorl, a circle of similar organs.
Witch-grass, 231.
Wood, 408. Wood-cells, 376.
Yeast-plant, 411. (Fig. 520.)

Zoology, 17.
Zoospora. (Fig. 217.)

ADDENDA.

Fastigate, 353; level-topped, as in the in-
florescence of the corymb.
Faveolate, honey-combed, alveolate.
Fragaceous, soon falling or perishing.
Inflected, bent inward, inflected.

Scion, or cion, 218.
Stipitate, on a stipe, which see.
Torulous, swollen at intervals.
Turbinate, shaped like a top (turb). Uncinate, shaped like a hook (uncus).
The American Botanist and Florist.

Part Fourth,

Descriptive Botany;

Being

A Simple Analytical Flora,

Including the Native and Cultivated Plants Growing in the Atlantic Division of the United States.

By

Alphonso Wood, A. M.,

Author of the Class-Book of Botany, etc.

A. S. Barnes & Company,
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H. B. Nims & Company, Troy, N. Y.

1877.
ABBREVIATIONS AND SIGNS.

§ BOTANICAL TERMS OFTEN RECURRING IN DESCRIPTIONS.

ach. achenia.  
æst. aestivation.  
alter. alternate.  
amplex. amplexicaul.  
anth. anther.  
axill. axillary.  
caps. capsule.  
cor. corolla.  
cypr. cyprosula.  
decid. deciduous.  
diam. diameter.  
ellip. elliptical.  
emarg. emarginate.  
epig. epigynous.  
f. or ft. fect.  
fil. filaments.  
fl. flower; fls. flowers.  
fr. fruit.  
gl. glume; gls. glumes.  
hd. head; hds. heads.  
hyp. hypogynous.  
imbr. imbricate.  
inf. inferior.  
inv. involucr.  
irreg. irregular.  
leg. legume.  
l. leaf; lvs. leaves.  
lfts. leaflets.  
lom. lomentum.  
opp. opposite.  
ora. ovary.  
pap. pappus.  
ped. peduncle.  
pet. petals.  
perig. perigynous.  
perig. perigynium.  
phs. phalae.  
pt. pinne.  
pnl. pinnule.  
recep. receptacle.  
reg. regular.  
rhiz. rhizoma.  
rt. root.  
sc. scale, scales.  
sds. seeds.  
sep. segment.  
sep. sepals.  
sl. stem.  
sts. or slms. stamens.  
stig. stigmas.  
sty. styles.  
var. variety.

§ TIMES OF FLOWERING, AND LOCALITIES.

1. Names of the Months and Seasons are abbreviated in the usual manner, as, Jan. January; Apr. April; Spr. Spring; Aut. Autumn; Sum. Summer; &c.

2. The names of States and Territories of the U. S. are abbreviated precisely as in other works, thus:—Ala. Alabama; Ark. Arkansas; Conn. Connecticut, &c.


5. E. East, Eastward, indicates the States of the Atlantic seaboard from Maine to Virginia inclusive; N-E. or N. Eng. denotes the New England States.

6. M. is used to denote the Middle States; viz., N. Y., Penn., N. J., and Del.

7. N. North, Northward, Indicates generally the territory north of 42° N. latitude.

8. N-W. Northwest, indicates Wis., Minn., and parts of Ill. and Mich.

9. S. South, Southward, is used to indicate the Southern States in general,—all lying south of Virginia and Kentucky.

10. S-W. Southwest, viz., Miss., La., Ark., and perhaps Tennessee and Texas.

11. W. West, denotes the States lying due north of Tennessee and Arkansas.
### Abbreviations and Signs

#### § Signs.

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<thead>
<tr>
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<th>Description</th>
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<td>an</td>
<td>An annual Herb.</td>
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<td>bi</td>
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<td>pr</td>
<td>A perennial Herb.</td>
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<td>ud</td>
<td>An undershrub, deciduous.</td>
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<td>ud</td>
<td>An undershrub, evergreen.</td>
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<td>sh</td>
<td>A Shrub, deciduous.</td>
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<td>A Shrub, evergreen.</td>
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<td>A Tree, deciduous.</td>
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<td>A Tree, evergreen.</td>
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<td>wo</td>
<td>An herbaceous Vine, or ( \frac{1}{2} ).</td>
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<tr>
<td>wo</td>
<td>A perennial Vine, ( \frac{1}{2} ).</td>
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<tr>
<td>wo</td>
<td>A Woody Vine, deciduous.</td>
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<td>wo</td>
<td>A Woody Vine, evergreen.</td>
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<td>Trailing Herb, ( \frac{1}{2} ) or ( \frac{1}{2} ).</td>
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<td>an</td>
<td>An aquatic Plant.</td>
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<td>fr</td>
<td>Flowers perfect.</td>
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<td>Flowers staminate.</td>
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<td>Monecious.</td>
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<td>poly</td>
<td>Polygamous.</td>
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<tr>
<td>want</td>
<td>Wanting, or none.</td>
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<td>num</td>
<td>Numerous, or indefinite.</td>
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#### § Authors' Names Cited in this Work.

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<td>Humboldt, Bonpland &amp; Jacquin.</td>
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## ABBREVIATIONS AND SIGNS.

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ANALYSIS OF THE NATURAL ORDERS,

Founded on the most obvious or artificial characters: designed as a key for the ready determination of any plant, native, or naturalized, or cultivated, growing within the limits of this Flora.

PROVINCES, CLASSES, AND COHORTS.

Sub-kingdom I. The Flowering Plants. (See, next, Provinces 1, 2)....PHÆNOGAMIA.
Sub-kingdom II. The Flowerless Plants. (See the Provinces 3, 4)....CRYPTOGAMIA.

Province 1. Leaves net-veined. Flowers never completely 3-parted (mostly and /). Embryo with 2 or more cotyledons.
Wood (if any) in annual circles. (See Classes 1, 2)....................EXOGENS.
Province 2. Leaves parallel-veined (rarely netted). Flowers 3-parted. Bark, wood, and pith commingled. Embryo with but one cotyledon. (See Classes 3, 4)..................................ENDOGENS.
Province 3. Stem and leaves distinguishable. (H)..........................ACROGENS.
Province 4. Stem and leaves indistinguishable. (K).....................THALLOGENS.

Class 1. Stigmas present. Seeds enclosed in vessels. (*)............ANGIOSPERMS.
Class 2. Stigmas 0. Seeds naked (Pines, Firs, Cedars, &c.) (**)..GYMNOSPERMS.
Class 3. Flowers without glumes. Perianth colored or green. (t)....PETALIFERÆ.
Class 4. Flowers with green alternate glumes. No perianth. (tt)....GLUMIFERÆ.

* Cohort 1. Corolla with the petals distinct. (A)...............POLYPETALÆ.
* Cohort 2. Corolla with the petals united. (B)..............GAMOPETALÆ.
* Cohort 3. Corolla none. Calyx often none. (C)...............APETALÆ.
** Cohort 4. The cone-bearing plants (same as Class 2). (D)......CONIOIDS.
† Cohort 5. Fls. on a spadix, apetalous or incomplete. (E)....SPADICIFLORÆ.
† Cohort 6. Flowers complete, with a true perianth. (F).......FLORIDEÆ.
‡ Cohort 7. The Grasses, Grains, &c. (same as Class 4). (G)....GRAMINOIDÆ.

‡ Cohort 8. The cone-bearing plants (same as Class 2). (D)......CONIOIDS.

A. Cohort 1. POLYPETALOUS EXOGENS.

* Herbs with the leaves alternate or all radical. (12)
* Herbs with the leaves opposite on the stem. (9)
* Shrubs, trees, or undershrubs. (2)
  2 Flowers regular or nearly so. (3)
  2 Flowers irregular (or the fruit a legume) (§ 165). (r)
  3 Polyandrous,—stamens 3—10 times as many as the petals. (4)
  3 Oligandrous,—stamens 1—2 times as many as the petals or fewer. (6)
ANALYSIS OF THE NATURAL ORDERS.

4 Leaves opposite..(c)  
4 Leaves alternate..(5)  
5 Stamens on the torm or the hypogynous corolla..(f)  
5 Stamens and petals on the calyx tube..(e)  
6 Ovaries simple, distinct, or one only. Vines or erect shrubs..(w)  
6 Ovary compound, and wholly adherent to the calyx..(x)  
6 Ovary compound and free from the calyx or nearly so..(7)  
7 Stamens opposite to the petals and of the same number..(y)  
7 Stamens alternate with the petals or of a different number..(8)  
8 Leaves opposite on the stems.(z)  
8 Leaves alternate, and compound..(yy)  
8 Leaves alternate and simple..(zz)  

9 Polyandrous—stamens 3—10 times as many as the petals..(m)  
9 Oligandrous,—stamens 1—2 times as many as the petals or fewer..(10)  
10 Pistils separate and distinct, few or solitary, simple..(n)  
10 Pistils united into a compound ovary free from the calyx..(11)  
10 Pistils united into a compound ovary adherent to the calyx..(o)  
11 Stamens opposite to the petals and of the same number..(p)  
11 Stamens alternate with the petals or of a greater number..(q)  

12 Flowers regular or nearly so. Fruit never a legume..(14)  
12 Flowers irregular (rarely regular and the fruit a legume)..(13)  
13 Stamens numerous, 3 or more times as many as the petals..(k)  
13 Stamens few and definite, 4—12..(l)  
13 Stamens or anthers 3—10 times as many as the petals..(15)  
14 Stamens few and definite. Ovary free from the calyx..(17)  
14 Stamens few and definite. Ovary adherent to the calyx..(j)  

15 Stamens hypogynous—inserted on the torm..(16)  
15 Stamens perigynous—inserted on the corolla at the base..(c)  
15 Stamens perigynous—inerted on the calyx at the base..(d)  
16 Pistils few or many, distinct (at least as to the styles)..(a)  
16 Pistils (and styles if any) completely united..(b)  
17 Pistils one, indefinite and distinct, simple..(e)  
17 Pistils definitely—* 2 united, the short styles combined into one..(f)  
17 Pistils definitely—* 2, 3 or 4 united, styles or stigmas, 2, 3, 4 or 6..(g)  
17 Pistils definitely—* 5, distinct or united, with 5 distinct styles..(h)  
17 Pistils definitely—* 5, united and the styles also combined into one..(i)  

a Petals 5 or more, deciduous. Leaves never peltate..................RANUNCULACE.E.  

a Petals 3 or numerous. Water plants with peltate leaves..  

b Sepals 4—6, equal. Petals 0, imbricated in the bud..  

b Sepals 5, equal. Petals 5, imbricate. Leaves tubular..............SARRACENIACE.E.  

b Sepals 6, unequal. Petals 6, convolute. Flowers of 2 sorts........CISTACE.E.  

b Sepals 2, with—* 2 Petals imbricated in the bud...............PORTULACCACE.E.  

b Sepals 2, with—* 4 or 8 petals usually crumpled in bud.............PAPAVERACE.E.  

c Filaments united into a tube. Anthers 1-celled..................MALVACE.E.  

c Filaments persistent, capping the lid of the pyxis..................PORTULACCACE.E.  

d Sepals 9—5, valvate in the bud. Pod long, 2-carpelled............TILIACE.E.  

d Sepals 3—5..* 2 Petals imbricate in bud. Fruits simple............ROSACE.E.  

d Sepals 3—5..* 4 or 8 petals convolute in bud. Fruit compound........LOASACE.E.  

c Stamens opposite to the petals and of the same number. Pistil 1 only..BERBERIDACE.E.  

c Stamens alternate with the petals or more numerous..................RANUNCULACE.E.  

c Stamens 6, tetradynamous. Pod 2-celled. Flowers cruciform.............CUCURBITACE.E.  

c Stamens 4—32, not tetradynamous. Pod 1-celled..................CAPRARIDACE.E.  

c Sepals 5, unequal. Flowers perfect, numerous, minute..............CISTACE.E.  

c Sepals 5, equal. Flowers monocious. Herbs woolly or scurfy.........ORDER 113
ANALYSIS OF THE NATURAL ORDERS.

7

Secals 5, or 3, equal, and the stamens twice as many....Geraniaceae. 30

Secals 5, and the stamens (anthers) of the same number...(*)

Sterile filaments numerous, in several whorls. Climbing...Passifloraceae. 57

Sterile filaments numerous, in 5 clusters. Herb erect...Saxifragaceae. 45

Sterile filaments 0...(*)

* Flowers white, racemcd. Climbing..........................Order 106

* Flowers yellow. Plants erect..................................Turneraceae. 56

* Flowers cyanic. Herbs stemless...............................Drosierac.e. 17

Stamens 5, alternate with the 5 petals. Styles 5 or 3. Seeds oo...Linaceae. 20

Stamens 5, opposite to the 5 petals. Styles 5, but the seed 1........Order 83

Stamens twice as many as the petals...(*)

Leaves peltate.............................................Nymphaeaceae. 7

Stamens 6-24, distinct..............................Crassulaceae. 46

Stamens 10, united at base.........................Geraniaceae. 33

Ovary 1-celled. Leaves all radical, spincescent, irritable................Drosieraceae. 17

Ovary 3-5-celled. Leaves mostly radical, not dotted............................Order 73

Ovary 3-5-celled. Leaves caulescent, pinnate, dotted....................Rutaceae. 31

Style 1, but the carpels as many as the petals (2-6)........Onagraceae. 51

Styles 3-5, ovary 3-5-celled, 3-5-seeded, wholly adherent..........Araliaceae. 61

Styles 3-8, ovary 1-celled, half-adherent. Sepals 2.........Portulacaceae. 20

Styles 2, carpels 2, fewer than the (5) petals.—* Seeds several...Saxifragaceae. 45

—* Seeds 2....................................Umbelliferae. 63

Ovaries many, or few, rarely 1, always simple..................Ranunculaceae. 1

Ovary compound, 3-carpelled, open before ripe..................Resedaceae. 13

Secals 4 or 5 produced into 1 slender spur behind, petals 2 or 5...Geraniaceae. 30

Secals 2 (or vanished), petals 4 (2 pairs) with 1 or 2 blunt spurs...Punicaceae. 10

Secals 5, very unequal; petals 3. Stamens 6 or 8. No spur........Polygalaceae. 42

Secals and petals each of the same number, viz...(*)

U 4, the flowers slightly irregular. Stamens 6-32. No spur...Capparidaceae. 12

U 4, the flowers moderately irregular. Stamens 8. A vine...Sapindaceae. 37

U 5, with 5 stamens, and generally a blunt spur................Violaceae. 11

U 5, with 10 or more stamens. No spur. Fruit a legume........Leguminoseae. 43

Pistils many, entirely distinct, simple.............................Ranunculaceae. 1

Pistils 3-5, united more or less completely......................Hypericaceae. 16

Pistils 5-10, united, with sessile stigmas and many petals........Ficoideae. 61


Pistils 3 or more, distinct. Flowers all symmetrical...Crassulaceae. 46

Pistils 2, consolidated with the 5 stamens. Juice milky........Order 100

O Carpels as many as the seals...(*)

O Carpels fewer in number than the sepalos...(*)

Anthers opening at the top. Flowers 4-parted...Melastomaceae. 52

Anthers opening laterally. Styles united into 1........Onagraceae. 54

Anthers opening laterally. Styles or stigmas distinct...Haloragaceae. 48

Each carpel oo-seeded. Styles 2..........................Saxifragaceae. 45

Each carpel 1-seeded. Styles 2 or 3.........................Araliaceae. 64

Each carpel 1-seeded. Style 1 (double)..................Cornaceae. 65

Style 3-cleft at the summit. Flowers 5-parted........Ponti:ulaceae. 20

Style and stigma 1, undivided. Flowers 7-parted..............Order 81

Leaves pinnate, with interpetiolar stipules........Zygophyllaceae. 29

Leaves simple, toothed or lobed. Flowers cruciform. Stamens 6...Cruciferae. 11

Leaves simple, toothed or lobed. Flowers 5-merous. Stamens 10...Geraniaceae. 30

Leaves simple, entire...(*)

Petals and stamens on the throat of the calyx................Lythraceae. 5

Petals on the torus...(*
ANALYSIS OF THE NATURAL ORDERS.

* Flowers irregular, unsymmetrical.......................... **POLYGALACEAE** 41
* Flowers regular, 2-(or 3-)parted throughout.................. **ELATINACEAE** 18
* Flowers regular, 5-parted. Leaves pinate................ **HYPERICACEAE** 16
* Flowers regular, 5-parted. Leaves dotted................ **CARTHOPHYLLACEAE** 19

**r** Pistil a simple carpel, becoming a legume. Stamens 10—100....... **LEGUMINOSAE** 43
**r** Pistil compound, viz. (rr)
  **rr** 3-carpelled. Flowers perfect. Leaves digitate................ **SAPINDACEAE** 37
  **rr** 3 carpelled. Flowers monoecious. Cultivated................ **BEGINIACEAE** 59
  **rr** 5-carpelled.—* Stipules present. Cultivated................ **GERANIACEAE** 30
    —* Stipules none. Native........................................**ORDER** 73

**s** Stamens on the receptacle, in several sets. Leaves dotted........ **HYPERICACEAE** 16
**s** Stamens on the receptacle, in 1 set. Lvs. fleshy. (S. Fla.) Clusia. **GUTTIFERAE** (21)

Stamens on the calyx...(ss)
  **ss** Sepals, petals, and ovaries indefinite...................... **CALYCANTHACEAE** 3
  **ss** Sepals, &c., definite. Leaves dotted, entire.............. **MYRTACEAE** 51
  **ss** Sepals, &c., definite. Leaves dottedless, entire........ **LYTHRACEAE** 53
  **ss** Sepals, &c., definite. Leaves dottedless, substipplete... **SAXIFRAGACEAE** 45

**t** Filaments united into 1 set (monadelphous). Petals convolute.(uu)
**t** Filaments united into 1 or several sets. Petals imbricate.(uu)
**t** Filaments distinct...(tt)
  **tt** Petals 6, valvate, lurid. Erect shrubs........................ **ANONACEAE** 4
  **tt** Petals 3—9, imbricate. Trees or shrubs........................ **MAGNOLIACEAE** 2
  **tt** Petals 4—8, imbricate. Climbing or trailing................ **MENISPERMACEAE** 5
  **tt** Petals 4, imbricated. Shrubs, S........................ **CAPARIDACEAE** 12
  **u** Anthers 1-celled. Sepals valvate in the bud................ **MALVACEAE** 23
  **u** Anthers 2-celled. Sepals valvate. Handsome tree............ **STERCULIACEAE** 21
  **u** Anthers 2-celled. Sepals imbricate. A large tree in S. Fla. **CAMELLIACEAE** (22)
    **uu** Leaves pinate with pellucid dots, jointed to stalk... **AURANTIACEAE** 32
    **uu** Leaves opaque. (*
  *
  * Sepals valvate. Flowers small.............................. **TILIACEAE** 25
  * Sepals imbricate. Flowers large............................ **CAMELIACEAE** 26
  **v** Style 1, with many stigmas. Green fleshy shrubs........ **CACTACEAE** 60
  **v** Styles several or 1, each with 1 stigma. Woody trees or shrubs... **ROSACEAE** 44
  **v** Style 1, with 1 stigma. Stam. in 5 sets, long, red, very showy. **MYRTACEAE** 51
  **w** Trailing vines, with crimson lvs. Ovaries oo, in a little spike... **MAGNOLIACEAE** 2
  **w** Climbing vines, with white-greenish fls. Ova. 2—6, capitate... **MENISPERMACEAE** 5
  **w** Erect shrubs, with yellow flowers, 6-parted. Pistil only........ **BERBERIDACEAE** 6
  **w** Erect shrubs (S. Fla.) with yellow fls. Pistils 5, 2-ovuled, 1-seeded... **SAXIFRAGACEAE** (62)
  **w** Trees, with greenish fls.,—* and pinnate lvs. Pist. 3—5, 1-ovuled... **SIMARUBACEAE** 34
  —* and simple leaves. Follicles 3—5.... **STERCULIACEAE** 21
  **x** Flowers 4-parted. Stamens 8. (Fls. red or roseate, drooping). **ONAGRACEAE** 54
  **x** Flowers 4-parted. Sta. 8. Fls. light yellow. Coasts, S. Fla. **RHIZOPORACEAE** (49)
  **x** Flowers 4-parted. Stamens 4. Flowers whitish, in cymes...... **CORNACEAE** 65
  **x** Flowers 5-parted. (xx)
    **xx** Ovary 5-carpelled, 5-styled, 5-seeded................ **ARALIACEAE** 61
    **xx** Ovary 5-carpelled, 1-styled, 1-seeded. S. Fla. .......... **COMBRETACEAE** 50
    **xx** Ovary 2—4-carpelled, oo-seeded........................ **SAXIFRAGACEAE** 45
    **y** Leaves opposite. Stem climbing with tendrils or radicles... **VITACEAE** 41
    **y** Lvs. alternate. St. erect, or climbing without tendrils... **RHAMNACEAE** 40

  **z** Leaves simple. Stamens 5. Carpels 3—5, style 1, short........ **CELASTRACEAE** 33
  **z** Leaves simple. Sta. 10. Carpels and sty. 3. S. Fla. **BYRONIINA. MALPIGHIACEAE** (39)
  **z** Leaves pinnate, or palmately lobed. Carpels and styles 2 or 3..... **SAPINDACEAE** 31
  **z** Leaves pinnate. (*

  * Stamens 10. Small tree with blue flowers. S. Fla........ **ZYGOPHYLLACEAE** 29
  * Stamens 2. Carpels 1 or 2. Style 1...........................**ORDER** 101
ANALYSIS OF THE NATURAL ORDERS.

* Stamens 3. Carpel and style 1........................................BURSERACE.E. 35

* Stamens 10, united into a tube or cup. Flowers in panicles........MELIACE.E. 27

*y Filaments 6—10, distinct. Flowers small, white, in racemes........BURSERACE.E. 35

*y Filaments 6—10, distinct. Fls. small, white or hoary, paniculate..SAPINDACE.E. 37

*y Filaments 5, distinct..(*)

* Leaves pellucid-punctate ..................................................RUTACE.E. 31

* Leaves opaque. Ovary 1-celled, 1-seeded..............................ANACARDIACE.E. 36

zz Petals 4, yellow, strap-shaped, appearing in late Autumn........HAMAMELIS.E. 47

zz Petals 4—7, cyanic (rarely yellow), rounded or short..(t)

† Style 0, the stigmas 1, 4, or 5, sessile. Drupe 4-6-seeded........ORDER 71

† Styles (or stigmas) 3, but the drupe only 1-seeded..............ANACARDIACE.E. 36

† Styles 3, capsule many-seeded. Lvs. minute and scale-form...TAMARISCINE.E. 24 bis

† Style 1,..(*)

‡ Capsule 3-seeded. Seeds with a scarlet aril.........................CELATRACE.E. 33

‡ Caps. 2-celled. Clusters fragrant. Lvs. evergreen. Cult........PITTOSPORACE.E.

‡ Capsule with few or many seeds. Native shrubs..................ORDER 73

B. Cohort 2. GAMOPETALOUS EXOGENS.

§ Stamens (6—∞) more numerous than the lobes of the corolla...(9)

§ Stamens (2—12) fewer than the corolla lobes or of the same number...(2)

2 Ovary inferior,—adherent to the tube of the calyx...(3)

2 Ovary superior,—free from the tube of the calyx...(4)

3 Stamens cohering by their anthers...(c)

3 Stamens entirely distinct..(d)

4 Flowers regular and the stamens symmetrical..(5)

4 Flowers regular and the stamens reduced to 2 or 4..(n)

5 Stamens alternate with the corolla lobes (rarely connate).....(6)

6 Shrubs, trees, with the carpels or stigmas 3—6...(f)

6 Herbs 1-10-carpelled, or shrubs 2-carpelled...(7)

7 Ovary 1, deeply 4-parted or 4-partible, forming 4 achenia...(g)

7 Ovary 2, distinct (often covered by the stamens)..(h)

7 Ovary 1 compound,—* one-celled...(k)

—* two-six-celled...(m)

9 Flowers irregular (rarely regular and the fruit a legume)....(a)

9 Flowers regular and the fruit never a legume (§ 165)...(b)

a Flowers 1- or 2-sided, with 1 or 2 blunt spurs. Stamens 6, in 2 sets...ORDER 10

a Flowers 1-sided, no spur..(*)

* Leaves compound. Fruit a legume......................................ORDER 43

* Leaves simple. Fruit 2-celled, 2-seeded..............................ORDER 42

* Leaves simple. Fruit 5-celled........................................ERICACE.E. 73

b Corolla lobes convolute in bud. Stamens ∞, united into 1 tube...ORDER 23

b Corolla lobes imbricate in bud. Stamens ∞, in 1 or several sets...ORDER 26

b Corolla lobes imbricate or valvate..(u)

u Stamens 10—24. Styles 5—12........................................ORDER 46

u Stamens 5—10. Style 1. Capsule 5-celled..........................ERICACE.E. 73

u Stamens 8—∞. Style 1. Nut 1—5-seeded..........................STYRACACE.E. 76

u Stamens 8. Styles 4. Berry 8-seeded...............................EBENACE.E. 77

u Stamens 8. Style 1. Drupe 1-seeded.................................OAKACE.E. 80 (p. 417)
ANALYSIS OF THE NATURAL ORDERS.

c Flowers in a compact head surrounded by an involucre.................COMPOSITAE. 70
c Flowers separate, irregular, perfect. Plants erect or trailing..........LOBELIACEAE. 71
c Flowers separate, regular, imperfect. Weak vines..............................Order 58
d Leaves alternate. Flowers 5-parted, regular, separate.................CAMPAULACEAE. 72
d Leaves alternate. Fls. irregular, 5-parted. S. Fla. Scirocera. GOODENIACE. (74)
d Leaves opposite, with stipules between, or verticillate....................RUBIACEAE. 61
d Leaves opposite. Stipules none.(c)
v Stamens 5–4. Ovaries 2–5-celled........................................CAPRIFOLIACEAE. 66
v Stamens 2–3. Ovaries 1-celled..............................................VALERIANACEAE. 68
v Stamens 4. Flowers capitulate..............................................DIPSACEAE. 69
c Herbs. Ovary with 5 styles and but 1 seed............................PLUMBAGINACEAE. 83
e Herbs. Ovary with 1 style and many seeds...............PRIMULACEAE. 81
e Trees or shrubs. Appendages between the stamens.........................SAPOTACEAE. 78
c Trees or shrubs. No appendages between the stamens. S. Fla. MYRTINACEAE. (79)

f Leaves opposite. Style 1. Drupe 4-seeded. Herbs, shrubs..............VERBENACEAE. 90
f Leaves alternate...(w)
w Drupe 4–6-seeded. Shrubs, trees........................................AQUIFOLIACEAE. 74
w Drupe 1-seeded. Thorny. S. Fla..............................Ximenia. OLACEAE. (80)
w Capsule 2–5-celled, -oo-seeded........................................ERICACEAE. 73

g Herbs, with alternate leaves, generally rough-hairy..................BORRAGINACEAE. 92
h Stigmas connate. Flower bud convolute.................................APOCYNACEAE. 99
h Stigmas connate. Flower bud valvate.................................ASCLEPIADACEAE. 100
h Stigmas distinct. Flowers minute, yellow...........................CONVOLVULACEAE. 95

k Ovule solitary. Corolla limb entire.......................................ORDER 103
k Ovules several. Leaves cleft and lobed.................................HYDROPHYLLACEAE. 96
k Ovules several. Leaves or leaflets entire...(x)
x Flowers not epicate.........................................................GENTIANACEAE. 97
x Flowers spicate...............................................................PLANTAGINACEAE. 82

m Leaves all radical. Flowers spliced.................................POLEMONIACEAE. 94
m Leaves opposite. Ovary 2-celled..........................................Loganiaceae. 98
m Leaves opposite...(y)
m Leaves opposite. Ovary 3-celled. Not twining..............POLEMONIACEAE. 94

y Ovary 3-celled. Not twining..............................................
y Ovary 2–4-celled. Twining..............................................CONVOLVULACEAE. 95
y Ovary 2–4-celled, 4-seeded. Erect.................................BORRAGINACEAE. 92
y Ovary 2-celled, oo-seeded.–z Styles 2..............................HYDROPHYLLACEAE. 93
-z Style 1..........................................................SOLANACEAE. 96

n Stamens 4. Ova. 4-(rarely 1- or 2-)celled, with as many sds.....VERBENACEAE.90
n Stamens 2. Ovary 2-celled, forming 1 or 2 seeds..........................OLACEAE. 101
o Ovary deeply 4-parted, forming 4 (or fewer) achenia...(p)
o Ovary entire, 4-ovuled, 4- or fewer-seeded. Leaves opposite........VERBENACEAE. 90
o Ovary entire, oo-ovuled, oo- or several-seeded...(x)
p Leaves opposite. Stems square. Stamens 2–4...........................LABIATACEAE. 91
p Leaves alternate. Stems round. Stamens 5..............................BORRAGINACEAE. 92

s Trees or climbing shrubs. Seeds winged.................................BIGNONIACEAE. 86

s Trees. Seeds not winged..........SCROPHULARIACEAE. 92
s Trees. Seeds not winged..........SCROPHULARIACEAE. 88
Herbs.—68 Leafless parasites. Native. Ovary 1-celled..................OROBANCHACEAE. 55
—68 Leafy at base or in the water. Flowers spurred.................LENTIBULACEAE. 54
—68 Leafy. Flowers large, spurred. Ovary 1-celled.......................SCROPHULARIACEAE. 87
—68 Leafy. Spurless. Fruit 4- or 5-celled.............................BIGNONIACEAE. 86
—68 Leafy. Fruit 2-celled..(t)

f Seeds on hooks or cups. Corolla mostly convolute..................ACANTHACEAE. 89
f Seeds without hooks. Corolla imbricated in the bud........SCROPHULARIACEAE. 88
f Seeds without hooks. Corolla mostly plicate..........................SOLANACEAE. 96
C. COHORT 3. APETALOUS EXOGENS.

1 Plants herbaceous, the flowers not in aments (except Humulus, 115)...(2) —
2 Plants woody, shrubs or trees...(8)

2 Flowers with a regular calyx (or a calyx-like involucræ) (3) —
3 Flowers achlamydeous, neither calyx nor corolla. (k)
4 Calyx tube adherent to the ovary, limb lobed, toothed, or entire... (f)
5 Calyx free from the ovary, sometimes enclosing it... (4) —
6 Ovaries several, entirely distinct, each 1-styled, 1-ovuled... (g) —
7 Ovary 1 only, simple or compound...(5)
8 Style or stigma 1 only...(6)
9 Styles or stigmas 2—12...(7)
10 Ovary 1-ovuled, bearing but 1 seed...(c)
11 Ovary many-ovuled, bearing many seeds...(d)
12 Ovary 1-3-ovuled, 1-3-seeded...(e)
13 Ovary 4-oo-ovuled, 4-oo-seeded...(h)
14 Flowers not in aments, with the leaves opposite...(n)
15 Flowers not in aments, with the leaves alternate...(10)
16 Flowers imperfect, the sterile only in aments...(v)
17 Flowers imperfect, both the fertile and sterile in aments...(x)
18 Stamens 1—12, as many or twice as many as the stigmas...(a)
19 Stamens 2—10, not symmetrical, with the 1 or 2 stigmas...(b)
20 Style or stigma 1. Fruit 1-seeded...(11)
21 Styles or stigmas 2...(s)
22 Styles or stigmas 3—9...(t)
23 Calyx free from the ovary...(y)
24 Calyx adherent to the ovary...(r)

a Stigmas and cells of the ovary 1—4. Stamens 1—8. Orders 45, or 54
b Stigmas and cells of the ovary 6. Stamens 6 or 12...ARISTOLOCHIACEÆ. 102
b Styles 2. Ovary many-seeded. Stamens 8—10. Order 45
b Style 1. Ovary 1 or 2-seeded. Stamens 5...SANTALACEÆ. 110

C. ANALYSIS OF THE NATURAL ORDERS.

1 Fruit 3—(rarely 6)-seeded, with 3 (often cleft) styles...EUPHORBIACEÆ. 113
e Fruit 1-seeded. Stipules sheathing the stems...POLYGONACEÆ. 104
f Fruit 1-celled, mostly 1-seeded. Stipules none...(f)
f Calyx with scarious bractlets outside...AMARANTACEÆ. 107
e Calyx naked (double in 1 genus). Lvs. alternate...CHENOPODIACEÆ. 106
f Calyx naked. Leaves opposite...Order 19
g Stamens hypogynous—on the torus...Order 1

g Stamens perigynous—on the calyx...Order 44
h Leaves opposite. Fruit circumscissile, a pyxis...Order 61
h Leaves opposite. Fruit 4-5-valved, a capsule...Order 19
h Leaves alternate. (t)
   i Fruit 5-horned, 5-celled, a capsule...Order 46
   i Fruit a fleshy 4-10-seeded berry...PHYTOLACCACEÆ. 105
f Fruit circumscissile, a utricle...AMARANTACEÆ. 107
k Flowers on a spadix with a spathe. Monocotyledons...Order 130
k Flowers in a long naked spike. Stamens 6 or 7...SAURURACEÆ. 115
k Flowers solitary, axillary, minute. Aquatic plants...(m)
ANALYSIS OF THE NATURAL ORDERS.

m Stamen 1, styles 2. Leaves opposite.................CALLITRICHACEE. 116
m Stamen 2, styles 2. Leaves alternate, dissected...PODOSTEMACEE. 117
m Sta. 12-24, style 1. Lvs. verticillate, dissected...CERATOPHYLLACEE. 118
n Fruit a double samara (2-winged).....................ORDER 37
n Fruit a single samara (1-winged), or a drupe. Stamens 2.........ORDER 101
n Fruit not winged,—o 3-seeded. Stamens 4..............EUPHORBIACEE. 113
—o 1-seeded. Stamens 4 or 8. .........ELEAGNACEE. 112
—o 1-seeded. Stamens 3. Parasites. LORANTHACEE. 109
p Anthers opening by valves. Calyx colored..............LAURACEE. 108
p Anthers opening by slits.—q Calyx colored. Stam. 8. ThyMELACEE. 111
—q Calyx greenish; racemed...........ORDER 37
—q Cal. green; spiked. S. Fla. COMBRETACEE. (50)
r Ovary and seed only 1, in the juicy drupe. Trees............ORDER 65
r Ovaries 2-4, seed 1. Fruit a drupe or nut. Shrubs...SANTALACEE. 110
s Stamens numerous........................................ORDER 47
s Stamens as many as the calyx lobes....................§ 1. URTICACEE. 114
† Leaves pinnate. Pistils 5, scarcely united..............ORDER 31
† Leaves simple, linear, evergreen. Shrubs heath-like..EMPETRACEE. 119
† Leaves simple, expanded. Fls. 3-parted. Fruit dry. EUPHORBIACEE. 113
† Leaves simple, expanded. Fls. 4-5-parted. Fruit fleshy. ORDER 40
v Nut drupaceous, naked. Leaves pinnate.................JUGLANDACEE. 121
v Nut or nuts in a cup or involucre. Leaves simple.....CUPULIFEREE. 122
x Fruit fleshy, aggregated (sorosie). Juice (or sap) milky. § 2. URTICACEE. 114
x Fruit dry. Plants with a watery juice or sap. (y)
y Aments globular, racemed. Nutlets 2-celled, woolly......ORDER 65
y Aments globular, solitary. Nutlets 1-celled, 1-seeded....PLATANACEE. 120
y Aments cylindrical or oblong. (z)
z Ovary 2-celled, 2-ovuled, 1-seeded. Fruit often winged..BETULACEE. 123
z Ovary 1-celled, 1-seeded. Fruit often fleshy.........MYRICEE. 124
z Ovary many-ovuled, many-seeded. Seeds comous........SALICACEE. 125

D. Cohort 4. THE CONOIDS.

* Leaves pinnate. Stem simple, palm-like. Sterile flowers in cones....CYCADACEE. 126
* Leaves simple. Stem branching. Fertile flowers in cones..........CONIFEREE. 127
* Leaves simple. Stem branching. Fertile flowers solitary.........TAXACEE. 128

E. Cohort 5. THE SPADICEOUS ENDOGENS.

† Trees or shrubs with palmi-cleft leaves all from one terminal bud,†...PALMACEE. 129
and a branching "spadix" from a spathe......................†
† Herbs with simple, rarely ternate leaves. Spadix simple. ..(2)
‡ Plants frond-like, minute, floating loose on the water...........LEMNACEE. 131
‡ Plants with stem and leaves, rooting and fixed. ..(3)
3 Spadix evident, in a spathe or on a scape ..................ARACEE. 130
3 Spadix obscure or spike-like. Stems leafy. ..(4)
4 Flowers with no perianth, densely spicate or capitated.....TYPHACEE. 132
4 Flowers with a perianth or not. Plants submersed......NAIADACEE 132
ANALYSIS OF THE NATURAL ORDERS.

F. Cohort 6. FLORIDEÆ, or FLOWERING ENDOGENS.

1. Flowers (not on a spadix) in a small, dense, involucrate head. (a)
2. Flowers (not on a spadix) solitary, racemose, spike, &c. (2)
3. Perianth tube adherent to the ovary wholly or partly. (4)
4. Perianth free from the ovary. (3)
5. Petals and sepals differently colored (except in Medeola, 147). (a)
6. Petals and sepals similarly colored. (5)
7. Flowers imperfect (? or $ or $). (a)
8. Flowers perfect. (b)
9. Leaves net-veined, broad. (k)
10. Leaves parallel-veined. (6)
11. Styles and often the stigmas also united into one. (m)
12. Styles and stigmas united in 3. (n)
13. Styles and stigmas distinct. (o)
14. Low aquatic herbs. HYDROCHARIDACEÆ. 135
15. Climbing shrubby vines. DIOSCORIACEÆ. 143
16. Anthers 1 or 2, on the pistil (gynandrous). ORCHIDACEÆ. 137
17. Anthers 1 or 5, free from the pistil. Leaves ample. SCITAMINEÆ. 134
18. Anthers 3 or 6. (c)
19. Perianth woolly or mealy outside. Ovary half free. IIÆMADORACEÆ. 114
20. Perianth glabrous outside. (d)
21. Anthers 3, opening crosswise, inward. BURMANNIACEÆ. 135
22. Anthers 3, opening lengthwise, outward. IRIDACEÆ. 142
23. Anthers 6, opening inward. AMARYLLIDACEÆ. 134
24. Pistils 3—6, distinct, forming achenia in fruit. ALISMACEÆ. 134
25. Pistils 3 only, more or less united. (g)
26. Leaves verticillate, in 1 or 2 whorls. Stigmas 3. TRILLIACEÆ. 146
27. Leaves alternate. (h)
28. Stigmas 3. Plants with dry leaves, often epiphytes. BROMELIACEÆ. 140
29. Stigmas united into 1. COMMELYNACEÆ. 151
30. Flowers perfect, 4-parted. ROXBURGHIAEÆ. 145
31. Flowers dioecious, 6-parted. SMILACEÆ. 144
32. Flowers colored, regular. Stamens 6 (4 in one species). LILIACEÆ. 147
33. Flowers colored, irregular or else triandrous. PONTEDEMERIAEÆ. 149
34. Flowers greenish, glume-like or scarious. JUNCACEÆ. 150
35. Leaves rush-like. Ovary of 3 1-seeded carpels. MELANTHACEÆ. 148
36. Leaves linear, lanceolate, &c. Ovary 6—O—seeded. (l)
37. Petals yellow, small but showy. Plant acaulescent. XYRIDACEÆ. 152
38. Petals white, minute, fringed. Plant acaulescent. ERIOCAULONACEÆ. 154

G. Cohort 7. GRAMINOIDEÆ, or GRASS-LIKE ENDOGENS.

1. Flowers with 6 bracts in 2 whorls (sepals and petals). Culms solid ORDER 159.
2. Flower with a single bract (glume). Culm solid, sheaths entire. CYPERACEÆ. 151.

H. Province, ACROGENS.

1. Plants with well-developed foliage. (g)
2. Leaves few, mostly ample and from subterranean rhizomes. (a)
ANALYSIS OF THE NATURAL ORDERS.

a Fruit borne on the leaves which are often more or less contracted...Filices. 153
b Fruit borne at the base of the radical, entire or lobed leaves...Marsileaceae. 156

攫 Leaves numerous, small, mostly spirally imbricated on the stem...Fili
攫 Fruit axillary, sessile, opening by a slit...Lycoptidaceae. 157
攫 Fruit mostly terminal and usually stalked, opening by a lid...Musci.*

攫 Leaves numerous, small, imbricated on the stem in 2 rows.
攫 Plants with the leaves and stem confounded, thallus-like......Hepaticae.*
攫 Plants with verticillate branches instead of leaves...Equisetaceae. 158
攫 Fruit in terminal spikes, and of one kind only...Characeae.*
攫 Fruit lateral, scattered on the branches, and of two kinds....Characeae.*

K. Province, Thallogens

Plants aquatic, with a colored thallus. Fruit immersed in the frond...Algae.*
Plants on dry rocks, logs, or bark of trees, thalloid or granular...Lichens.*
Plants growing on decaying organisms. Thallus cotton-like, the fruit very different, all without chlorophyll or starch...Fungi.*

* These Orders, the lower Cryptogams, are omitted in this work.
PART FOURTH.

DESCRIPTIVE BOTANY, OR PHYTOLOGY,

COMPRISING A TABULAR FLORA OF

THE UNITED STATES AND CANADA

(WITHIN THE LIMITS STATED IN THE PREFACE).

Sub-Kingdom, PHÆNOGAMIA, the Flowering Plants, having stamens and pistils, producing seeds with an embryo. (For sub-kingdom Cryptogamia, see page 360.)

Province, EXOGENÆ, the Dicotyledonous Plants. Stems composed of bark, wood, and pith, exogenous (§ 405) in growth. Leaves mostly net-veined. Flowers 5-parted or 4-parted, rarely in 3s. Embryo with 2 or more opposite cotyledons. (Province Endogenæ, p. 316.)

Class I, ANGIOSPERMAE. Pistils complete, with stigma and ovary, the latter enclosing the ovules, and in fruit enclosing the seeds. Cotyledons only 2. (Class II, Gymnospermae, p. 311.)

Cohort 1, DIALYPETALÆ, the Polypetalous Exogens. Flowers having a double perianth, both calyx and corolla, the latter composed of distinct petals. (Cohort 2, p. 144.)

Order I. RANUNCULACEÆ. Crowfoots.

Herbs (or woody climbers) with a colorless, acrid juice. Leaves mostly divided, exstipulate, with half-clasping petioles. Sepals 3–15, green or petaloid. Petals 3–15, distinct, sometimes irregular or none. Stamens hypogynous, indefinite. Ovaries many or few, distinct, 1—∞-ovuled. Fruit either
Order 1.—Ranunculaceae.

Dry achenia, or follicles, or baccate, 1—∞-seeded. Seeds anatropous, embryo straight in horny albumen.—Abounding in cool regions.
Illustrated in figs. 33, 39, 83, 84, 109, 127, 132, 159, 155, 156, 212, 234, etc.

Tribes and Genera.

Sepals valvate in the bud. Achenia tailed. (Tribe I.)
Sepals imbricated in the bud.—a Ovaries 1-seeded, acheniately. (2)
—a Ovaries 2—∞-seeded (3)

2 Corolla 0, or undistinguishable from the colored calyx. (Tribe II., b)
2 Corolla and calyx distinct either in color or form. (Tribe III., c)
3 Sepals as permanent as the stamens. Fruit follicular. (Tribe IV., d)
3 Sepals caducous sooner than the stamens. (Tribe V., g)
3 Sepals persistent with the follicular fruit. (Tribe VI.)

I. Clematidæ.—Petals 0, or stamen-like. Leaves all opposite.
II. Anemonæ. b Sepals deciduous with the stamens. Stem-leaves opposite.
b Sepals deciduous with the stamens. Leaves all radical.
b Sepals caducous.—Leaves ternately compound.
—Leaves palmate, simple. Flowers g.

III. Ranunculæ. c Sepals not appressed. Petals red or yellow, no scale.
c Sepals not appressed. Petals xanthic, a scale at base.
c Sepals appressed. Plant small. Leaves radical.

IV. Helleboreæ.—d Perianth regular. (c)
d Petals 0. Sepals white.
d Petals 0. Sepals 0—9. yellow.
d Petals slender, tubular at apex. Roots yellow.
d Petals minute, tubular at base. I-lipped.
d Petals small, tubular, 2-lipped. Sepals persistent.
d Petals larger than the colored sepals, 3-lobed.
d Petals larger than the colored sepals, spur-like, equal.
—d Perianth irregular. (f)
f Upper sepal spurred, containing two spurred petals.
f Upper sepal hooded, covering two deformed petals.

V. Cimicifugæ. g Flowers numerous, in long, spicate racemes.
g Flowers many, in short racemes. Fruit baccate.
g Flower 1 only. Plant 2-leaved. Berry compound.

VI. Pæoniæ.—Petals plane, large, showy. Disk sheathing the follicles.

1. Clematis, L. Virgin’s bower. Calyx of 4 (4—9 in the exotics) colored sepals, in aestivation valvate-induplicate. Petals 0, or if present, more like sterile filaments. Stamens shorter than the sepals, the outer or all sometimes sterile. Ovaries ∞ in a head. Achenia caudate with the lengthened plumous or pubescent styles 2. b Somewhat woody, climbing by the clasping petioles. Leaves opposite. Fig. 359.

Sub genera and species.

§ Atragine. Outer stamens petal-like. Lvs. verticillate. Fls. solitary. Vine...No. 1
§ Clematis proper. Petals none. Leaves opposite...(*)
* Erect herbs. Lvs. simple. Fls. solitary, large, terminal, nodding. May...Nos. 9—11
* Climbing.—a Fls. panicled, white, often diclinous, sepals thin.................Nos. 2—4
—a Fls. solitary, nodding.—b bell-shaped, pale bluish purple...Nos. 5, 6
—b ovoid, dark purple.................Nos. 7, 8
Exotic.—* Flowers in clusters, white. Leaves pinnate.................Nos. 12, 13
* Flowers single, large.—g Leaves simple. Sepals 4.................Nos. 14, 15
—g Leaves compound. Sepals 4, open...Nos. 16, 17
—g Leaves compound. Sepals 6—9, open...Nos. 18, 19
1 C. verticillaris DC. Lvs. in whorls of 4, each ternate, and 2 large purple fls. at each node. Highland woods, Me. to Ga., W. to Rky. Mts. 15f. May, June. Rare.
3 C. Catesbyana Ph. Pubescent; lvs. biminate, lfts. ovate, mostly 3-lobed, lobes entire; ach. short-plumed; sep. small, linear-oblong. Coast, S. Car. to Fla. 12f. July
4 C. holosericca Ph. Silky-pubescent; lvs. ternate, lfts. lance-oblong, entire; fls. in small corymbs clusters; sep. linear; ach. long-plumed. Carolina. Dioecious.
5 C. crispa L. Lvs. ternate, pinnate, or decompound, lfts. varying from ovate to lanceolate, and linear, acute, thin, smooth; ach. tails short, pubescent. Va. to Ga. and La. Lfts. 3-15. Fls. elegant, 15' long. (C. Walteri Ph., C. cylindrica Sims, &c.)
6 C. reticulata Walt. Lvs. ternate or pinnate, lfts. 3-7, obtuse at each end, at length rigid and prominently veined, often lobed; tails silky. Fla. Sep. 12-15' long.
8 C. Pitcheri T. & G. Leaves pinnate, leaflets coriaceous. roughened with the Lct- ted veins; sepals lance-ovate; ach. tails short, glabrous. Ill., Iowa, to Ark.
9 C. ochroleuca Ait. Lvs. silky-pubescent beneath, ovate, entire; sep. silky, yellowish within; ach. plumes long, straw-color. 24 Woods, L. I. to Ga. Rare. 1f.
10 C. ovata Ph. Leaves glabrous, glaucous beneath, broad-ovate; flower on a short peduncle, purple; sepals ovate, pointed. 2 N. Car. to Fla. 1-2f. Leaves entire.
11 C. Baldwinii T. & G. Lvs. oblong to lance-linear, the lower 3-lobed or cleft; flower on a long peduncle, purplish. 2 Fl. 1-2f. Plumous tails 2' long.
12 C. erecta Ait. Stem 3f, weak, inclining; lfts. lance-ovate. 2 Europe. August.
13 C. Flammula. Stem 12-20f; leaflets oval to oblong-linear, often lobed, acute, smooth; clusters terminal, fragrant. From France. August, September.
14 C. integrifolia. Upright; lvs. lance., entire, smooth; fls. nodding, blue. Eur. 2f.
16 C. Vitexilla. Lfts. 3-15, ovate or oval, entire; sep. obovate, purpl., 15'. Eur. Sum.
17 C. grayi. Lfts. 3-5, lanceolate, acute; sep. oblanceolate, yl., 9'. Thibet.
18 C. Florinda. Lvs. ternate and bitern.; sep. ovate, pointed, wh. or purplish. Japan.
19 C. sieboldii. Fls. 4' broad, creamy-white and purple, double. Splendid.
19 C. cerulea. Lvs. ternate, hairy; fls. very large; sep. lance-ovate, blue, &c. Japan.
20 C. azurea-grandiflora. Flowers 5-7' broad, azure, or lilac-blue. July.

2. ANEMONE, L. WIND-FLOWER. Involucre remote from the flower, of 3 divided leaves, calyx regular, of 3-15 colored sepals. Corolla 0. Ovaries 0, free, collected into a roundish or oblong head. Achenia with a short, rarely a lengthened beak. Seeds suspended. 24 Lvs. radial. Stem leaves 2 or 3, opposite, forming the involucre. Figs. 116, 176.

§ Pulsatilla. Carps many (50-75), with long plumous tails. One large flower...No. 1

§ Anemonántha. Carps hairy, but neither tailed nor grooved...Carpel hairy, but neither tailed nor grooved...Carpel hairy, but neither tailed nor grooved...Carpel hairy, but neither tailed nor grooved...Carpel hairy, but neither tailed nor grooved...Carpel hairy, but neither tailed nor grooved...

1 A. patens L. b. Nuttaliana. Pasque-flowe. Clothed with long silky hairs; lvs. many-cleft, with linear segments, developed after the large spreading pale-purple flower. Dry hills, Ill., Wisc. to Dak. (Matthews). 1'-1f. Sepals 5 or 6, 1'. April.
2 A. nemorosa L. Smooth, 1-flowered; leaves of the invol. 3, petiolate, 2-5-pařed, segm. cleft and lobed. Copes, com., 6-9'. Fl. white, purple outside April, May.
3 A. Pennsylvânica L. Hairy, 1-3-flowered; leaves of the invol. sessile, large, veiny, 3-parted, acuminate-lobed and toothed. Prairies, Can. to Penn., W. to the Miss. 12-20'. Flowers pure white. June—August.

4 A. Caroliniana Walt. Lvs. 3-parted into cuneate-linear, twice trifid segm.; in volucre similarly cleft half-way; sepals obtuse, 15-20; carpels in an oblong head. Car. to Ill., and Nebr. 6-10'. Flower white-purple, pretty, fragrant. April, May.

5 A. heterophylla Nutt. Lvs. of roundish-oval, crenate segments, invol. linear-cleft to the base; sepals acute, 5-13; carpels in a cylindrical head. Ga. to Lan. and Ark. 8-16'. Flower white-green, scentless. March, April.—Varies toward No. 4.

6 A. parviflora Mx. Leaves of involucres 2, 3-cleft, segments cuneiform, 3-cleft, crenate-lobed; sepals 5 or 6; carpels in a globular head. L. Sup., and N. 3-12'. White.


10 A. thalictroides L. Rue Anémone. Glabrous, slender; invol. of 2 sessile bi-ternate (apparently of 6-petioled tertiary) lvs., lfts. 3-lobed; fls. unbelled; sep. 5-10. Woods, Can. to Ga., W. to Iowa. 6-10'. Root tuberous. Fls. white-purp., 1'. Apr., May.

11 A. corônaria. Lvs. multiâlida, segm. linear; sep. 6, roundish, close. Levant. May.

12 A. horténsis. Lvs. 3-parted, with cuneate cut-dentate lobes; invol. sessile; sep. 10-12, oblong. Italy. Varieties are double, semidouble, red, white, blue, &c. May.

13 A. Jâpônîca. Lvs. of the involucres and involucelles broadly 3-5-lobed; fls. many, 18' broad, white and red; sepals in 2 rows, roundish, widely spreading. Autumn.

3. HEPÁTICA, Dill. LIVERLEAF. LIVERWORT. Invol. of 3 entire, ovate, obtuse bracts, resembling a calyx, situated a little below the flower. Calyx of 5-9 petaloid sepals, disposed in 2 or 3 rows. Cor. 0. Achenia awnless. 24 Lvs. all radical, cordate, 3-lobed, thick, evergreen. Flowers single, on hairy scapes, appearing in early Spring before the new leaves Figs. 332, 431. Cultivated as a border flower.


2 H. acûlîloâa DC. Acute-leaved L. Lvs. with 3 acute lobes, bracts of the invol. acute. Borders of woods, Vt. to Wis. 4-5'. Flowers violet-blue to rose-purple.

4. THALÌCTRUM, Tourn. MEADOW RUE. Calyx colored, of 4-5 concave, caducous sepals. Petals 0. Filam. dilated upward, longer than the sepals. Ov. 4-15. Ach. stiped or sessile, ribbed or inflated, short-beaked. 24 Lvs. ternately compounded, with stalked leaflets. Lfts. 3-7-lobed. Flowers paniculate, often diclinous, of no beauty.

* Flowers dioecious, in loose panicles. Styles slender. Achenia sessile or nearly so, ovoid, conspicuously angled and grooved. Nos. 1-3
* Filis. perfect, few in the corymbed clusters. Sty. short. Ach. long-stipitate. Nos. 4

1 T. diòiuem L. Slender, glaucous, glabrous (1-2f); leaves all petiolate (with the general petiole); fls. in slender panicles, purplish or greenish; fl. capillary, drooping, achenia about 8. Hilly woods; common. Leaflets thin, 5-7-lobed. April, May.

2 T. cornüât L. Stoutler, tall (3-4f), smoothish; stem leaves sessile (no common petiole); lfts. thickish, veiny, with acutish lobes; anthers on white erect filaments achenia about 12, substipitate. Meadows. Leaflets 3-lobed. July, August.


1 A. VERNÁLIS. Fls. cup-shaped, yellow, of 10–12 oblong petals. 2f. Eur. 6–10'. May.

7. RANUNCULUS, L. CROWFOOT. BUTTERCUPS. Sepals 5, ovate. Pet. 5–10, roundish, shining, each with a honey-scale (Fig. 39) or pore at the base inside. Ach. flattened, pointed, crowded in a head. 24 Leaves alternate. Flowers generally yellow. Figs. 39, 83, 84, 109, 118, 159, 212, 234, 415, 416.

§ BATRACHIUM. Petals white, with a yellow, naked honey-pore on the claw. Seeds (achenia) transversely wrinkled. Leaves multiform, in water. .................No. 1

§ RANUNCULUS. Petals (yellow) with a honey-scale on the claw of each...(*)
   * Achenia rough with points or prickles. Leaves palmate-parted. 3f. Nos. 18, 19
   * Achenia smooth, =x numerous, in an oblong head. Wet places. .................Nos. 7–9
   —x many, in a rounded head...(a)
   a Leaves many-cleft, in thread-like segments, under water. .................No. 2
   a Leaves all undivided, entire or toothed. In wet places. .................Nos. 3–6
   a Lvs., at least the lowest ones, undivided, merely lobed or crenate...Nos. 10–12
   a Leaves all deeply divided, the lower—y pinnately with stalked lfts...Nos. 13–15
   —y palmately with sessile lfts...Nos. 16, 17
   Exotic, cultivated. .................Nos. 20, 21

γ. heterophýllus DC. Upper leaves floating, 3–5-lobed. Near Boston (Bigelow, now lost). In Idaho (Walker). Submersed leaves as in β.

2 R. multitíferus Ph. Yellow Water-C. Floating or creeping; some of the leaves emersed, reniform, 3–5-parted, and cleft. Sepals reflexed; carpels with a straight beak, heads globose. Ponds and muddy shores, 1–2–3f. Petals 5–8. May, June.

3 R. Flámmula L. Spearwort. Stem erect from an ascending base; lvs. all lance-shaped, on sheathing petioles; ach. roundish, twice longer than its beak. Can. to Can., W. to Oreg. 8–16'. Lvs. 8–6'. Fls. showy. Sum. (R. alisabesfolius Geyer.)

4 R. repánt L. Stem creeping, geniculate, rooting, filiform; nodes 1-flowered; lvs. linear or oblong; pet. 5–10, bright. N. Eng. to Oreg. Delicate. Fls. 4'. Lvs. 1'. Jl.

5 R. pusíllus Poir. Erect; lvs. all petiolate, lower ovate, upper lance-linear; pet. 1–2–3f. short; stem. 8–10; carp. scarcely pointed. N. Y. to Ga., and La. 6–12'. May

6 R. oblongífolius Ell. Erect, diffuse; lvs. lance-ovate and lanceolate, all stalked pet. 5, stem. 30; carp. pointless. Ill. to Tex. June 2f. (R. Texensis Eng.)
7 R. Cymbalària Ph. St. filiform, creeping, rooting; lvs. reniform-cordate, crenate-dentate above; scapes 1-5-flowered (2-6); petals 5—8, oval; carpels striate, beak short, uncinate. Brackish shores, N. J. to Dak. (Matthews). June.

8 R. scelerátus Ph. Erect, smooth-root lvs. 3-lobed, lower stem lvs. 3-parted and cut-crenate; fls. small; carp. point’s. Wet. Can. to Ga. 1f. Head 3”. Jn.—Aug.

9 R. Pennsylvánicus L. Very rude; leaves ternate, lfts. subpetiolate, deeply 3-lobed and cut; sep. reflexed, long, or than the 5 pet.; carp. beaked. Wet. 2f. Jn.—Aug.


13 R. fasciículáris Muhl. Early C. Erect; root a fascicle of fleshy fibres; root leaves appearing pinnate; peduncles terete; carpels scarcely margined, beak slender. Rocky hills. 5—10’. Hairy silky. Flowers 1’ broad. April, May.

14 R. repéns L. Root fibrous; later stems creeping, long; root leaves ternate, with stalked leaflets; pedicels furrowed; carpels broadly margined and stout-beaked. Moist shades. 1—2f. Flowers showy. Hairy or smooth. Very variable.

15 R. bulbósus L. Hairy; stem erect, bulbous at the base; root leaves ternate, segments petiolate, incised; ped. furrowed; sepals reflexed. Fields, N. Eng., to Pa. 1f. May, Jn. The cup-shaped flower, golden-yellow, is larger and handsomer than No. 17.

16 R. palmáta Ell. Erect; leaves 3-5-cleft, with the sinuses at the base closed, segments all sessile, cut-dentate, or lobed; carpels margined and straight-beaked. Pine woods, Car. to Fla. 1f—18’. Pubescent. Flowers small (7’). April, May.


18 R. muricáts L. Glabrous; carpels aculate, strongly margined, ending in a stout recurved beak. Va. to La., also in Cal. 1f. Leaves lobed and toothed.


20 R. Asiáticus. Garden Ranunculus. Erect; leaves ternate or biurnate, segments incised or lobed; head of carpels cylindric. Levant. 1f. Flowers variegated endlessly, of every form and hue. Not hardy.

21 R. Aconítipfólius. Branching and many-flowered; leaves palmately 3-7-parted and cut-toothed, the upper sessile, with lance-linear lobes; calyx appressed; petals pure white. From Europe. A fine old border flower, deep green, the flowers often double.

8. MYOSÚRUS, Dill. Mouse-Tail. Sep. 5, produced downward at base below their insertion. Petals 5, with slender, tubular claws. Stamen 5—20. Achenia spicate on the spindle-shaped torus. 1 Leaves linear, entire, radical. Scapes 1-flowered. Fig. 132.

M. minimus L. Low grounds, Ill. to La., W. to Oreg. 1 A curious little plant, remarkable for its tall torus, covered with numerous blunt carpels. Pet. yellow. Apr.

9. ISOPÝRUM, L. FALSE Rue Anemone. Sep. 4, petaloid, deciduous. Pet. 5, small, tubular, sometimes 0. Follicles 3 or more, subsessile, pointed with the style, with 2 or more seeds. Delicate herbs. Leaves ternately compound, lfts. 2—3-lobed. Flowers pedunculate, white. Fig. 33.
ORDER 1.—RANUNCULACEÆ.

1. bi•terná•tum T. & G. Glabrous, erect; stems clustered; pet. 0; follicles 3–6, strongly veined, 2-seeded. 2f Damp shades, O. to Ark. 4–10'. May. Very pretty.

10. CALTHA, L. Cowslip. MARSH MARIGOLD. Sepals 5–9, petaloid. Petals 0. Follicles 5–10, oblong, pointless, spreading, ∞-seeded. 2f Very glabrous, aquatic.

C. palú•stris L. Stem hollow, thick; leaves thickish, large, orbicular or reniform, crenate or entire; flowers yellow. Wet meadows. 1f. Flowers 18" broad. May.

11. COPTIS, Salisb. GOLD-THREAD. Sepals 5–7, oblong, concave, colored, deciduous. Petals 5–7, clavate, tubular at apex. Follicles 5–10, stipitate, rostrate, divergent, 4–6-seeded. 2f Low, smooth, with radical leaves and flowers on a scape.

C. trí•folià Salisb. Leaves 3-foliate, leaflets sessile; scapes 1-flowered; pet. small and stamen-like; rhizome thread-like, of a golden yellow. Penn. to Can. 3–4'. Flowers white, the small yellow petals inconspicuous. Root bitter, tonic.


1 T. laxus Salisb. Sepals 5, rounded, spreading; petals shorter than the stamens, orange-colored. Swamps, Can. to Penn. and Del. Rare. 1f. Flowers 18" broad; sepals yellow, greenish outside. Pods about 10. June.

2 T. europ•sus. Sepals 15, incurved, concave; petals 5–10, as long as the stamens. From Europe. 2f. Yellow. June, July. Hardy, and very ornamental.

3 T. asiá•ricus. Sepals 10, partly open; petals 10, longer than the stamens. From Asia. 2f, with ample foliage and orange-red flowers, varying to yellow. June, July.

13. HELÉ•borus, L. HELLEBORE. Sepals 5, mostly greenish, persistent. Petals 8–10, very short, tubular, 2-lipped. Stigmas 3–10, orbicular. Follicles ∞-seeded. 2f Leaves coriaceous, palmately or pedately divided. Flowers large, nodding. Fig. 494.

1 H. virídís L. Glabrous; rt. lvs. pedate, cauline palmate, sessile; fls. often in pairs; sepals round-ovate, acute, pale yellowish-green, spreading 1'. From Eur. 1f. 3 Apr.

2 H. nig•er. Christmas Rose. Root lvs. pedate; scape naked, bracted, 1- or 2-flowered; fls. 2' broad, white, pink, and finally green. In England, flowers about Christmas. 1f. Leaves thick, evergreen, and shining. March, April.


Z. apí•folià L'Her.—River banks, N. Y. to Ga. Lvs. clustered at top of the short, thick stem; leaflets 5, sessile, incised; racemes compound. Fls. 3" broad. Apr.

5. NIGELLA, L. FENNEL-FLOWER. Sep. 5, petaloid. Pet. 5, 3-cleft. Pistils 5, becoming as many follicles which are distinct or united. 1 Lvs. 1-2-pinnately divided into linear-subulate segments. Fig. 343.


2 N. satí•va. Nutmeg-flower. Hairy; flowers not involucre; carpels distinct. Egypt.

* Flowers scarlet, red, and orange-colored. Spurs of the petals straight....Nos. 1—3
* Flowers blue and white. Spurs straight in No. 4,....incurred in.... Nos. 5—7

1 **A. Canadensis** L. Very smooth, 1—2f; lfts. 3—9, round-wedge-form; fls. nodding, yellow within; stamens and styles yellow, exserted. Rocky woods, and cultivated.

2 **A. Skinneri**. Like No. 1, but with larger fls., the spurs and sep. greenish. Mexico.

3 **A. formosa**. Sepals and spurs much longer than the petals; sta. Included. Kamt.

4 **A. cerasulea**. Like No. 3, but the fls. all larger, blue and white, 2f long. R. Mts.

5 **A. Vulgaris.** Common C. Spurs little longer than the limb; stam. scarcely exserted.

Europe,—Varies to purple, and white; also with double flowers,—spur within spur.

6 **A. Sibirica.** Stem smooth, nearly naked, few-flw'd., 1f; spur some longer than the white-tipped limb; sepals very obtuse, violet. Very fine and choice like the next.

7 **A. glandulosa.** Glandular-hairy above; stems bracted, 1—2-flw'd., 1f; spurs half as long as the snow-white limb; sepals sky-blue, acute, 1f long. From Siberia.


§ Consólda. Petals united into one piece. Style and follicle 1. ①........Nos. 4, 5
§ Delphinástrum. Pet. 4, distinct. Pistils and follicles 2—5, mostly 3. ② (a)
   a Species indigenous, Penn., South and West, often cultivated.....Nos. 1—3
   a Species exotic, cultivated, natives of Siberia and California.....Nos. 6—9

1 **D. tricórne** Mx. Low (6—12'); leaf-lobes linear; raceme few-flw'd., loose; spur ascending, straight; pods recurved. Uplands. Fls. 6—12, blue, white. April, May.

2 **D. azúreum** Mx. Erect (1—2f); leaf-lobes all narrow-linear; raceme strict; spur ascending; pods erect. Wis. to Ark. Flowers CC, azure, or light blue. May, June.


5 **D. Alácsis.** **Rocket L.** Subsimple; leaves finely cut; flowers many, in crowded rac- emes; pod pubescent. Alps. 1—2f. Flowers pink, rose, white, often double.

6 **D. Eláutum.** **Bee L.** Pubescent, tall (6—8f); leaf-segments 5, cuneate, cut-tri- fidi; rac. long; spur curved downward; petals hairy, resembling a bee inside the flower. Blue.

7 **D. grandíflórem.** Lvs. 5—7-parted, segm. 3-cleft, linear, distant; petals shorter than the calyx. Stem 2f. Flowers large, dark or purplish blue, often double.

8 **D. chillánthum.** Leaf-lobes 3 or 5, oblong, acuminate; pods pubescent; sep. shorter than the calyx; spur decurved. Siberia. 2f. Dark blue.—Var. Formádo is very beautiful, blooming from July to Nov., the large flowers light blue, white at centre.

9 **D. Cardinalé.** Glabrous; lvs. 3-parted, segm. cleft into long acute lobes; fls. scarlet, large; spur longer than the sepal. California. 1—2f. Splendid, but not hardy.

18. **ACONITUM**, Tourt. **WOLFBANE.** Monk's-hood. Sep. 5, irregular, colored, upper one (helmet) vaulted. Petals 2 (the 3 lower minute or 0), spurred at apex, on long claws, concealed beneath the helmet. Sty. and pods 3—5. 2f Lvs. palmate. Fls. racemod or panicked. Poisonous. Fig. 29.

2. A. reclinatum Gray. Trailling (3–7f); leaf-divisions wedge-shaped, cut or lobed; helmet elongated-conical, with a straight beak; flowers white. Mountains, Va.

3. A. Napellus. Common Monk's-hood, or Aconite. Smooth and rigidly erect, 3f; lvs. 5-parted, and cut into broad-linear segm. channelled above; fls. densely racemed, dark blue (or white in B. Album), the hood broader than high. From Europe. Summer.

4. A. Antirrh. Erect (1–2f); lvs. multifid with narrowly linear segm.; fls. panicled, large (as in the others), purple with yellow; hood rather high-crowned. Europe.

5. A. Japonicum. Smoothish, velvety, 3–5f; fls. deep blue, in panicled spikes; hood or helmet very high-crowned and inflated, with a thickened inflamed spur. Japan.

6. A. Variegatum. Erect (3–4f), very smooth; leaves with rhomb-ovate divisions; fls. loosely panicled, blue, edged with white; helmet crown high, curved forward. Jn. +


§ Macrotis. Pistil 1, with a broad stigma and seeds in two rows. No. 1

§ Cimicifuga. Pistils 3–8, with a minute stigma, seeds in one row. Nos. 2, 3


3. C. Cordifolia Ph. Leaves biternate, thick; racemes panicled, slender; ovaries 2 or 3; pods oblong, sessile. Mountains, N. Car. 3–4f. Sept.


A. spicata L. β. rubra Mx. Raceme hemispherical; petals acute; pedicels slender; berries red, ovoid-oblong. Woods, Can. to Penn., and W. 14–2f. Lvs. ample. Raceme as broad as long. May. These plants are often described as species.

y. alba Mx. Raceme oblong; petals truncate; berries white, on thick stalks. Can. to Ga. Common. White berries sometimes occur with slender pedicels, and vice versa. Foliage exactly as in β. Var. a is European.

21. Hydrastis, L. Turmeric-root. Sepals 3, petaloid, caducous. Pet. 0. Ovaries 12 or more, becoming a baccate fruit, resembling a raspberry; acines 1- or 2-seeded. Roots yellow, a tangled mass, sending up a single radical leaf and a stem which is 2-leaved and 1-flowered. Fig. 101.


§ Stems shrubby, perennial. Ovaries and pods 5. China. Nos. 1, 2

§ Stems herbaceous, annual.—x Leaflets entire or cut-lobed. Ovaries 2 or 3. Nos. 3, 4

—x Leaflets many-cleft. Ovaries 5. Nos. 5, 6

1 P. Moutan. Tree Paeony. Ovaries distinct, half enveloped in the disk. 3–12f, widely branching. Flowers large, double, purple varying to white. June.
2 P. papaveracea. Ovaries closely united into a globose capsule. 3f. Fls. white, with a purple centre, 8—10' broad, single or double, varying to rose. May, June.


4 P. albiflora. Chinese P. Lfts. lance-elliptic, entire; carpels 2 or 3, recurved, smooth; calyx bracteate. Tartary. Fls. smaller, white, rose, carmine, &c.


6 P. tenifolia. Fennel P. Segments many linear lobes, very smooth; carpels downy, spreading. Siberia. 2—3f. Fls. red, concave, open the first of May.

ORDER II. MAGNOLIACEÆ. Magnoliads.

Trees or shrubs, often aromatic, with alternate, undivided leaves, and regular, polygonous, hypogynous, trimerous, imbricated flowers. Sepals and petals in several circles, often similar. Anthers adnate. Ovaries imbricated or verticillate on the enlarged torus, 1 or 2-ovuled. Fruit dry or baccate, distinct or coherent into a cone-like head (sorosis) Embryo minute, at the base of fleshy albumen. Illust. figs. 274, 278, 331.

WINTERÆ. Stipules 0. Fls. 5. Carpels arranged in a circle. ............ ills. Illlicium. 1

MAGNOLIEÆ. Stipules caducous. Fls. 5. Carpels imbricated. 5-rows. (a)

a. Anthers introrse. Leaves folded lengthwise in bud. ............... Magnolia. 2

a. Anthers extrorsa. Leaves folded crosswise in the bud. ........... Liriodendron. 3

8. SCHIZANDRÆ. Stip. 0. Fls. 5 5. Carpels in many rows, baccate. .... Schizandra. 4

1. Illlicium, L. Star Anise. (Lat. illicio, to attract; alluding to its fragrance.) Sep. 3—6, colored. Pet. 6—30. Carpels capsular, dry, arranged circularly, each with 1 smooth, shining seed. 5 The smooth lvs., when bruised, exhale the odor of Anise. In wet grounds. May.

1 I. floridanum Ellis. Lvs. acuminate; petals 21—30, purple. Fls. to La. 4—8f.


2. Magnolia, L. (Named for Prof. Magnol, a French botanist of the 17th century.) Sep. 3. Pet. 6—9. Anth. longer than the filaments, introrse. Ov. imbricated, 1-celled, 2-ovuled, becoming in fruit a fleshy, cone-like sorosis. Seeds berry-like, suspended from the opening follicles by a slender funiculus. 5 and 5, with large fragrant flowers. Lvs. conduplicate in bud, with membranous deciduous stipules. Fig. 331.

* Leaves cordate or auriculate at the base. Trees............................. Nos. 5, 6, 7

* Leaves acute at the base,—rusty or glaucous beneath, coriaceous............. Nos. 1, 2

—green (not shining) both sides, thin........................ Nos. 3, 4

Exotic species, cultivated........ Nos. 8—10

1 M. grandiflora L. Big Laurel. Trees; lvs. evergreen, rusty-downy beneath; pet. obovate, white. Swampy woods, S. States. 80f. Fls. 9' broad, lvs. 7 X 4'. May.

2 M. glauca L. White Bay. Shrub or small tree; lvs. obtuse, glaucous-white beneath; pet. ovate-roundish, erect. Coast, Ms. to La. 5—20f. Fls. 2', cup-shaped, strongly fragrant, with white concave petals. Lvs. nearly evergreen. South. May—July.

3 M. acuminata L. Cucumber Tree. Lvs. oval, acuminate, scattered; lvs. small (3—4' broad), petals obovate. S. States, rare in N. Y. 70f. The cones of fruit bear some resemblance to a small cucumber. May.
4 **M. umbrélla** Lam. _Umbrella Tree._ Lvs. cuneate-lanceolate, whorled at the ends of the branches (like an umbrella); sep. reflexed; pet. lanceolate, acute. S. States, rare in N. Y. and O. 25f. Lvs. and fls. very large. White. May.

5 **M. cordáta** Mx. Lvs. broadly ovate, subcordate, pubescent beneath; petals 6–9, oblong, yellow, with reddish lines. Ga. Car. 40f. Lvs. downy beneath.

6 **M. Fráseri** Walt. Lvs. obovate-spatulate, auricled at the narrow base; pet. 6, pure white. Va. Ky. to Fl. 30f. Fls. 6'. Lvs. 1f A slender tree.

7 **M. macrophyilla** Mx. Lvs. obovate-spatulate, cordate; pet. 6, rhomb-ovate, white, with a purple base inside. S. States. 20–30f. A small tree, with immense lvs. (2–3f) and fls. (petals 8' long). June.

8 **M. conspícua.** Yulan. Sep. 0 or very small; pet. 6–9, erect, of a creamy white, appearing before the leaves in early Spring. Lvs. acuminate. 15f.

9 **M. purpu'rea.** Sep. 3; pet. 6, erect, lilac-purple outside, preceding the obovate lvs., which are pointed at both ends. China. 10–15f.

3. **LIRIOUENDRON, L. Tulip Tree. Whitewood.** (Ἀετρίον, a Lily, δένδρον, a tree.) Sep. 3. Pet. 6, in 2 rows, erect. Anth. opening outward. Carpels 1 or 2-seeded, imbricated into a cone, indehiscent, separating from each other at maturity. L Large, with showy, bell-shaped, upright flowers. Lvs. 4-lobed, retuse-truncate at apex, induplicate in bud, with large, caducous stipules. Figs. 274, 278.

**L. tulpífera** L.—A noble tree, beautiful in foliage and flowers; trunk 5–8f diameter; 100f or more high; lvs. very smooth; fls. greenish-yellow, orange within, abounding in honey. May, June.


**S. cocéínea** Mx. Lvs. ovate or oval, pointed; fls. on slender peduncles, small, red; stam. 5, in the upper fls. chiefly. Berries and torus red. Vine 12f. South.

Order III. CALYCANTHACEÆ. CALYCANThs.

**Shrubs** with opposite, simple, exstipulate leaves, and axillary, solitary, often aromatic flowers. **Sepals and petals oo-rowed,** imbricated on a tubular torus, the outer bract-like. **Filaments oo,** inserted on the top of the torus, short. **Anthers adnate, extrorse. Carpels oo, 1-seeded,** distinct, included in the green fleshy torus. **Seed erect,** without albumen.

**CALYCANThUS, L. Sweet-scented Shrub.** (Κάλυξ, calyx, ανθος, flower.) Sep. and pet. oblong, undistinguishable, the inner gradually shorter: Stam. apiculate, the outer longer, inner sterile. Fruit, the enlarged green torus loosely enclosing few or many achenia. L Fls. lurid purple, with the fragrance of strawberries.

1 **C. floridus** L. Lvs. oval or elliptical, acute or acuminate, scabrous, downy beneath; fls. on very short axillary branches; sep. and pet. about 20, near 1' in length. S. States: common in gardens. Lvs. 2–5'. Shrubs 4–8f. Apr. May.
2. **C. laevigatus** Willd. Lvs. thin, oval, obtuse or merely acute, nearly glabrous both sides; fls. smaller, sometimes inodorous. Pa., & S. to Fla. Mar. Apr.

3. **C. glaucus** Willd. Lvs. ovate, acuminate, large (4—7'), glaucous beneath; sep. and pet. lance-obl., 1' in length. Mt. woods, Ga. to N. Car. 6—8'. May, June.

**Order IV. ANONACEÆ. Anonads.**

Trees or shrubs with naked buds, entire, alternate lvs. destitute of stipules. Flowers usually green or brown, axillary, hypogynous, valvate in aestivation. Sepals 3. Petals 6, in two circles, sometimes coherent Stamens ∞, with an enlarged connectile, short filament, on a large torus. Ovaries several or ∞, separate or coherent, fleshy or not, in fruit. Embryo minute in the end of the ruminated albumen. Illust. fig. 314.

**ASÍMINA,** Adans. Papaw. Sep. 3. Pet. 6, the outer row larger than the inner. Stam. densely packed in a spherical mass. Pistils several, distinct, ripening but few, which become large, oblong, pulpy fruits, with many flat seeds. Shrubs or small trees, with brownish, axillary, solitary, flowers.

* Flowers appearing before the leaves. Petals purple................. Nos. 1, 2
* Flowers appearing with the leaves. Outer petals yellowish........ Nos. 3, 4

1. **A. triloba** Dunal. Lvs. ovate-oblong, acuminate; pet. dark purple, the outer orbicular, 3 or 4 times as long as the sepals; fruit ovoid-oblong. N. Y., S. and W. 15—50'. Lvs. 10', smooth. Fls. 1', Mar. Apr. Fr. 3', eatable in Oct.

2. **A. parviflora** Dunal. Lvs. ovate-oval; pet. oval, green-purple, twice longer than sep. Woods, coastward, Car. to Fla. 2—3'. Lvs. 5'. Fls. 6'. Fr. 1', roundish.


4. **A. pygmæa** Dunal. Lvs. coriaceous, evergreen, narrowly oblong or oblanceolate, smooth; pet. obov.-obl., yellowish and brownish. Ga. Fla. 6—12'. Carp. 1'. May.

**Order V. MENISPERMACEÆ. Menispermads.**

Shrubs twining or climbing, with alternate, palmate-veined, exstipulate leaves. Flowers dicous, rarely ♀ or ♂ ♀ ♂, hypogynous, 3-6-gynous. Sepals and petals similar, in 3 or more circles, imbricated in the bud. Stamens equal in number to the petals, and opposite to them, or 3 or 4 times as many. Fruit a 1-seeded drupe, with a large or long curved embryo in scanty albumen. Illust. 347.

♀ Stamens 12—20. Sep. 4—8, nut moon-shaped. Lvs. peltate............. **Menispermum.** 1
♂ Stamens 6. Sep. 6, nut moon-shaped. Lvs. sinuate, 3-lobed........... **Coccus.** 2
♀ Stamens 6. Sep. 6, nut ♀♂-shaped. Lvs. deeply 5-lobed........... **Calyccocarpum.** 3

1. **MENISPÉRMUM,** L. Moon-seed. (Μνήμη, the moon, οὐρα, seed; from the crescent form of the seed.) Fls. ♀ ♂. Sep. 4—8. Pet. 4—8, minute, retuse. ♀ Anth. 12—20, 4-celled. ♀ Ovaries and styles 2—4. ♀ Drupes 1—3-seeded. Seeds lunate and compressed. Fls. white, in axillary clusters. Fig. 347
Order 6.—Berberidaceæ.  

**M. Canadense** L. St. climbing; lvs. 5-7-angled or lobed, peltate, the petiole inserted near the base; rac. compound; petals 6-7, small. ♀ Thickets: common. 8-12f. Drupes black, resembling grapes, ripe in Sept. Fls. in July.

2. **Cocculus**, DC. (Diminutive, from Lat. coccum, a berry.) Fls. ♀♂. Sep., pet., and stam. 6. Anth. 4-celled. ♀ Ov. 3 to 6. Drupe globular-compressed, nut curved as in Menispermum. ♀ Fls. in axillary panicles, small, greenish.

**C. Carolițauanu** DC.—S. Ill. to Fla. 10-15f. Lvs. ovate or cordate, entire or lobed. Drupes red, 1-3 together, as large as a pea. June, July.


**C. Lyon** Nutt.—Ga. to Ky. Vine 30-30f. Lvs. 6-8′ diam., lobes acuminate; drupe 1′, oval, greenish. Fls. small, 2″ diameter. June.

**Order VI. Berberidaceæ. Berberids.**

*Herbs or shrubs* with alternate leaves and with perfect, hypogynous, regular flowers. *Sepals and petals* imbricated in bud, each in one or several rows. *Stamens* as many as the petals, and opposite to them, rarely more. *Anthers* opening mostly by valves, hinged at top. *Pistil 1.* *Style* short or none. *Fruit* a berry or capsule. *Seeds* several, albuminous. Illust. 49, 91, 92, 159, 364, 403, 426.

§ Shrubs, with bristy-serrate leaves, yellow flowers and acid berries…….Berberis. 1

§ Herbs.—§ Anthers opening by 2 valves hinged at the top…(a)

a Stamens 6. Fruit 2, drupe-like, soon-naked seeds…….Caulophyllum. 2

a Stamens 6. Berry 1-4-seeded. Petals white, larger than sep….Diphylleia. 3

a Stamens 8. Pod opening by a lid. Petals 8……………Jeffersonia. 4

—^ Anthers opening by slits. Stamens 9-18……………Podophyllum. 5

1. **Berberis**, L. Berberry. (Name from the Arabic.) Calyx of 6 obovate, spreading, colored sepals, with the 3 outer ones smaller. Corolla of 6 suborbicular petals, with 2 glands at the base of each. Fil. 6, flattened. Anth. opening by uplifted valves. Style 0. Berry oblong, 1-celled. Seeds 2 or 3. ♀ with yellow wood and yellow fls. Figs. 91, 92, 403.

1 **B. Vulgaris** L. Spines (reduced lvs.) 3-forked; lvs. simple, serratures terminated by soft bristles; raceme pendulous, many-flowered; pet. entire; berries oblong. N. States. 6—9f. Rac. 12-flowered. Berries red, very tart. May, June.

2 **B. Canadensis** Ph. Lvs. repandly-toothed, teeth with short, soft bristles; rac. few (6-8)-flowered; pet. notched; berries oval. Mts. Va. to Ga. 2—3f. May—June.

3 **B. Aquifolium** Ph. Lvs. pinnate; lfts. 7—11, coriaceous, polished, evergreen, spinulous-toothed; clusters erect, crowded. Oregon. 3—5f. Berries globular. April.

2. **Caulophyllum**, Mx. Cohosh. (Kαυλοδός, stem, φυλλον, leaf; the stem appearing as the stalk of the compound leaf.) Cal. of 6 green.

- **Note:** The text describes various plant species, their characteristics, and their classification within the Berberidaceae family. It provides detailed information on the structure, floral characteristics, and notable features of each species, including their common names, physical descriptions, and geographic distributions. The text also highlights the distinctive features of each genus, such as the number of sepals, petals, and stamens, as well as the type of fruit and seed. The classification is based on the angiosperm system, focusing on the characteristics of the flower parts and the development of the fruit. The text concludes with examples of specific genera and species, including Berberis and Caulophyllum, with detailed descriptions of their physical traits and ecological habits.
sepal, 3-bracted at base. Cor. of 6 short, gland-like thickened petals, opposite the sepals. Stam. 6. Ov. 2-ovuled, becoming a thin pericarp, which soon breaks away after flowering, and the 2 round drupe-like seeds ripen naked. 2f Glabrous and glaucous, arising from a knotted rhizome. Lvs. 2 only, 2 and 3-ternate.


3. DIPHYLLLEIA, Mx. *UMBRELLA-LEAF.* (δις, twice, φύλλα, leaf) Calyx of 5 sepals, caducous. Cor. of 6 oval petals larger than the sepals. Stam. 6. Ov. eccentric. Stigma sessile. Berry few-seeded, seeds attached laterally below the middle. 2f Glabrous, arising from a thick, horizontal root-stock. Lvs. simple, peltate, 1 or 2 only.


J. diphylla Bart.—N. Y., W. and S. 1½. Fl. handsome, white. April. A singular plant, called Rheumatism Root. The pod has a persistent lid.

5. PODOPHYLLUM, L. MAY APPLE. (Ποδός, πόδι, foot, φύλλον, leaf) Sep. 3, concave, caducous. Pet. 6—9, obovate, concave. Anth. 9—18, linear. Berry large, ovoid, 1-celled, crowned with the solitary stigma. 2f Barren stems with 1 centrally peltate leaf, flowering stems with 2 equal, opposite broad cordate-peltate leaves, and a large white flower between.


Order VII. NYMPHÆACEÆ. NYMPHIADS.

Herbs perennial, aquatic (in deep water), with rhizomes submersed, scapes one-flowered (rarely a leafy stem), and leaves peltate or deep-cordate. Flowers regular, showy, hypogynous (rarely epigynous), with imbricated petals and sepals. Carpels 3—∞, distinct or united. Ovules parietal, never on the ventral suture. Seeds with the embryo enclosed in a sac at the end of copious albumen, or (in Nelumbium) exalbuminous.

Illustr. 202, 407-414, 505, &c.

§ CABOMBE. Sepals 3. Petals 3. Carpels distinct, few-ovuled. Flowers small. (a)

a Stam. 6. Carpels 3. Submersed leaves dissected................................................. *Cabomba.* 1
b Stam. 6—18. Carpels 6—∞. Leaves all peltate........................................................... *Brasenia.* 2

§ NELUMBONE. Sep. 4 or 5. Pet. and stam. ∞. Carp. Immersed in the torus, dis-
tinet, exalbuminous. Fls. very large............................................................... *Nelumbium.* 3
1. **BRASENIA**, Schreb. Water Target. Sep. 3 or 4, colored within, persistent. Stam. 12-24. Pet. 3 or 4. Carp. 6-18, oblong, 2 (or by abortion 1)-seeded. The stems and under surface of the leaves are covered with a viscid jelly. Lvs. all floating, entire, elliptical.


3. **NELUMBUM**, Juss. (Nelumbo is the name of the species in Ceylon.) Pet. and stam. hypogynous, in many rows. Carp. separ- rate, becoming 1-seeded nuts, imbedded in as many cavities on the large, obconic, fleshy torus. Seed with large cotyledons, very short radicle and no albumen. Rhizome horizontal. Lvs. peltate, emersed. Scape 1-flow- ered. There are only 2 species, N. speciosum of E. India, and

4. **NUPHAR**, Smith. Yellow Pond-Lily. (Neufar is the Arabic name.) Sep. 5 or 6, concave. Pet. small, linear, inserted with the stamens on the torus. Stig. discoid, with prominent rays. Caps. -seeded. Lvs. sagittate-cordate at the base, entire at the margin, on stout stalks.

1 **N. aévena** Ait. Lvs. floating or erect, oval; lobes rounded, petioles half terete; stig. 12-24-rayed; sep. 6, unequal. Slow streams and muddy pools. Lvs. thick and large. Fils. deep yellow (save the 3 outer sep.), 2' diam., globular. June, July.

2 **N. Kalmiánna** Ait. Lvs. floating and submersed, the latter membranous, reniform-cordate; stig. 8-14-rayed, crenate; sepals 5, equal. Plant small and delicate. Floating leaves oval, 1-3' long, the lobes nearly meeting. Flowers about 1' diam. Sum.

3 **N. sagittitófílla** Ph. Leaves oblong, sagittate-cordate, obtuse; sep. 6; pet. 0; anth. suboassile. Slow waters, N. Car. to Ga. Lvs. 10-15'. Fils. 2', globular. June, July.


1 **N. cérôlea** Lvs. crenate, lobes partly united, becoming peltate; pet. sky-blue. **Egypt**.
Order VIII. SARRACENIACEÆ. Water Pitchers.

Herbs, aquatic, in bogs, with fibrous roots, perennial, and with the leaves all radical, urn-shaped, or trumpet-shaped, and large flowers on scapes. *Floral envelopes* 4—10, imbricated, the outer greenish, sepaloid. *Stamens* ∞, hypogynous. *Carpels* united into a several-celled capsule. A curious family, remarkable for its leaves, which are of that class called *ascidia* (§ 323), holding water. Figs. 392, 393, 394.

1. SARRACÉNIA, Tourn. Pitcher Plant. (In honor of Dr. Sarrazin, of Quebec.) Sep. 5, colored, persistent, subtended by 3 bractlets. Pet. 5, incurved, deciduous. Stig. 5, united into a large petal, persistent membrane, covering the ovary and stamens. Caps. 5-celled, 5-valved. Seeds very numerous. 2. Lvs. all radical, urn-shaped or trumpet-shaped, with a wing on the front side and a hood (the lamina) at top. Fl. large, nodding.

§ Lamina inflected over the throat of the tube..............................Nos. 1, 2
§ Lamina erect or nearly so, the throat open. (*)
* Leaf-tube pitcher-shaped, with a broad wing.............................No. 3
* Leaf-tube trumpet-shaped, with a narrow wing.............................No. 4

1 S. psittacina Mx. Lvs. short, reclined, with a broad semi-ovate wing; fls. deep purple. Bogs, Fl. Ga. La. 1f. Tube nearly closed. The leaf resembles a parrot in form, hence the specific name. March.

2 S. variolâris Mx. Lvs. elongated, suberect, mottled with white on the back; fls. yellow. Bogs, S. Car. to Fla. Lvs. 12—18, scape shorter.

3 S. purpûrea L. Side-saddle Flower. Lvs. short, recumbent, inflated most near the middle; lamina broad-cordate. Bogs: common. Scapes 14—20, each bearing large handsome deep-purple flower, in June.
γ. *alata*. Fls. large, yellow. Lvs. slender, erect, wing but 6'/ broad. La. 1—2f.

4 S. Gronëvîi Wood. Trumpet-leaf. Lvs. tall, erect, tube gradually enlarged to the open throat, wing narrowly linear, lamina roundish, contracted at base. Swampy pine-woods, S. States. 2—3f. Fls. very large, 4—5'/ broad.
ORDER IX. PAPAVERACEÆ. Poppy-worts.

Herbs with alternate, exstipulate leaves, and generally a milky or colored juice. Flowers solitary, on long peduncles, never blue, hypogynous, regular, \( \checkmark \) or \( \vdash \). Sepals 2, rarely 3, caducous, and petals 4, rarely 6, all imbricated. Stamens indefinite, but some multiple of 4. Anthers 2-celled, innate. Ovaries compound. Style short or 0. Stigmas 2, or if more, stellate upon the flat apex of ovary. Fruit either pod-shaped, with 2 parietal placentæ, or capsular, with several. Seeds \( \infty \), minute. Embryo minute, at the base of oily albumen. Illust. 148, 344, 404, 405, 406, 463, 493.

\[
\begin{array}{l}
\mathbf{1. SANGUINARIA}, L. Blood-root. (Latin sanguis, blood; all its parts abound in a red juice.) Sep. 2, caducous. Pet. 8—12, in 2 or 3 rows, the outer longer. Stam. about 24. Stig. sessile, 1 or 2-lobed. Capsule silique-form, oblong, 1-celled, 2-valved, acute at each end, many-seeded. 2. A low, acaulescent plant, with a white flower, and a glaucous, palmate-veined leaf. Fig. 463.

\mathbf{2. CHELIDONIUM}, L. Celandine. (\( \chi \varepsilon \lambda \delta \omega \nu \), the swallow, being supposed to flower with the arrival of that bird, and to perish with its departure.) Sep. 2. Pet. 4, roundish, contracted at base. Stam. 24—32, shorter than the petals. Stig. small, sessile, bifid. Capsule silique-form, linear, 2-valved, 1-celled. Seeds crested. 2. Fragile, pale green, with saffron-yellow juice. Figs. 344, 493.

\mathbf{3. GLAUCIUM}, Tourn. Horn Poppy. (\( \Gamma \lambda \alpha \nu \kappa \omega \nu \), glaucous, the hue of the foliage.) Sep. 2. Pet. 4. Style none. Stig. 2-lobed. Pod 2-celled, linear, very long, rough. 1 or 2 sea-green herbs, with clasping leaves, yellow juice, and solitary, yellow flowers.

\mathbf{G. LUTEUM} Scop. Sparingly naturalized near the coast, from the Potomac southward. 2. Lvs. 5-7-lobed. Fls. 2', of short duration. Pods 6—9'. June—Aug.

Herbs with a yellow juice, pinnately-divided leaves, and stems 2-leaved, bearing an umbel.

**M. diphylla** DC. Lvs. sinutately 5-7-lobed, the cauline but 2, opposite; fls. few, large (2'), yellow; pod briefly, oval. Woods, W. States. 12—19'. Pet. orbicular; style surpassing the stamens; pod 3'. May.

5. **ARGEMÖNE**, L. **Prickly Poppy.** (Ἀργέμονη, a disease of the eye, which this plant was supposed to cure.) Sep. 2 or 3, caducous, smaller than the 4 or 6 roundish petals. Stig. sessile, capitate, 4 or 6-rayed. Capsule ovoid, prickly, opening at the top by valves. 

Herbs with yellow juice, spinous-pinnatifid leaves, and showy flowers.

**A. Mexicana** L. Calyx prickly; caps. prickly, 6-valved; fls. axillary and terminal, 2—3' diam., yellow, varying to white. Waste grounds, South.


1 **P. somniferum** L. **Opium Poppy.** Glabrous and glaucous; lvs. clasping, cut-dentate; caps. globons. with large white or purplish flowers, often double. 14—3fl. Extensively cultivated for opium. June, July. §.

2 **P. dòbìum L.** St. hispid with spreading hairs; lvs. pinnately-parted; segm. incised; sep. hairy; caps. club-shaped. Fields. 2fl. Slender. Fls. light red or scarlet. June, July. §.

3 **P. Rileas** L. St. many-flowered, hairy; lvs. incisely pinnatifid; caps. globons. Fls. very large, deep scarlet, more or less double. June, July.

4 **P. orientale** L. St. 1-flowered, rough; lvs. scabrous, pinnate, serrate; caps. smooth. 2fl. Levant. 3fl. Fls. very large, scarlet, too brilliant to be looked upon in the sun. June.

7. **ESCHSCHÖLZIA**, Cham. (Named for Eschscholtz, a German botanist well known for his researches in California.) Sep. 2, cohering, caducous. Pet. 4. Stam. 0, adhering to the claws of the petals. Stig. sessile. Caps. pod-shaped, cylindric, 10-striate, many-seeded. Lvs. finely pinnatifid, glaucous. The juice, which is colorless, exhales the odor of hydrochloric acid.

1 **E. dougläsi** Hook. St. branching, leafy; torus obconic; cal. ovoid, with a very short, abrupt acumination; pet. bright yellow, with an orange spot at base. Cal. Oreg. Foliate smooth, abundant, and rich. Fls. 2'—3' broad.

2 **E. californica** Hook. St. branching, leafy; torus funnel-form, with a much-dilated limb; cal. conic. with a long acumination; flowers orange-yellow. Cal.


1 **B. cordàta** Lvs. roundish, cordate, many-lobed, velvety; flowers white or yellowish, numerous in the ample pyramidal panicle, in Summer. From China. Hardy.

2 **B. frútécens** Lvs. oblong, large, sinutate-lobed, splendid; fls. in Spr. wh. W. Ind.
**ORDER 10.—FUMARIACEÆ.**

**ORDER X. FUMARIACEÆ. FUMEWORTS.**


1. **DICÉNTRA**, Borkh. **EAR-DROP.** Sep. 2, very small, sometimes disappearing. The 2 outer petals alike, saccate at base, with spreading tips; the 2 inner alike, spoon-shaped, crested, meeting face to face over the stam. and pistil. Fil. flat, in 2 sets, united at top. Stig. 2-crested. Pod many-seeded. 2 Lvs. ternately divided or cleft. Fls. racemed, nodding. Delicate and beautiful plants. Figs. 61, 252–4.

1. **Dicentra** DC. *White Ear-drop.* Root bulb-like; spurs of the fls. divergent, acute, straight; flower nearly as broad as long. Woods, Can. to Ky. 6–10'. Lvs. all radical of numerous oblong linear segm. The bulb consists of reddish, scale-like tubers. Apr. May.

2. **ADLUMIA**, Raf. **MOUNTAIN FRINGE.** Sepals 2, minute. Petals 4, united into a cellular, monopetalous corolla, persistent, bi-gibbous at base, 4lobed at apex. Stam. united in 2 equal sets. Pod 2-valved, many-seeded. 2. **c.** Delicate, with tripinnate leaves, and ample pendulous cymes.


1. **Corydalis** Ph. Glansons, erect; fls. red, yellow at the tip; pods erect; lobes of the leaflets obtuse, bracts minute. 2. Rocky woods, Can. to N. Car. 1–4. Raceme terminal. Flowers horizontal, spur short, blunt. May, June.
2 C. aërea Willd. Low, diffuse, finally ascending; leaf-lobes acute; rac. opposite the lvs. and terminal; fls. secund, bright yellow, spur deflected; pods pendulous, torulous; seeds turgid, polished. ① Rocky shades. 8—10'. Cor. 6'. Bracts lance-ovate. Apr.—July.

β. macrantha. Fls. 10', spur nearly as long as limb; bracts and leaf-lobes linear. Dakota; sent by Dr. W. Matthews.

γ. flávula. Fls. 3—4', pale yellow, spur very short, petals pointed. Common.

3 C. montàna Engelm. Ascending; rac. terminal; leaf-lobes obtuse, bracts lanceolate; cor. yellow, spur ascending, nearly as long as limb, lower petal at length pendent; pods erect; seeds lenticular. La. Tex.!

4 FUMÁRIA, L. FUMITORY. (Lat. fumus, smoke; from its disagreeable odor.) Sep. 2, caducous. Pet. 4, unequal, 1 of them spurred at the base. Nut ovoid or globous, 1-seeded, and indehiscent. Lvs. cauline, finely dissected.

F. officíniális L. Diffusely branched, erect; lvs. bipinnate; rac. loose; fls. minute, purple at the tip; calyx serrated; ped. erect, twice longer than bract; nut round-ovate. ② Waste grounds, §. 1f. July, Aug.

Order XI. CRUCIFERÆ. Crucifers.

Herbs with a pungent, watery juice, and alternate, exstipulate leaves, with flowers cruciform, tetradynamous, generally in racemes, and bractless. Sepals 4, deciduous. Petals 4, hypogynous, with long claws and spreading limbs. Stamens 6, the 2 outer opposite ones shorter than the 4 interior. Ovary 2-carpelled, 2-celled by a false partition, with parietal placenta. Fruit a siliqua, or silicule, usually 2-celled. Stigmas 2, sessile. Seeds 2-rowed in each cell, but often so intercalated as to form but 1 row. Embryo with the 2 cotyledons variously folded on the radicle. Albumen 0. Illust. 55, 104, 192, 193, 239, 336, 429, 506.

1 2 3 A large and important Order, difficult of analysis. The Genera cannot be well distinguished by their flowers, so nearly alike are they in all. Their characters are taken from the fruit and seeds. Hence it is indispensable that specimens for analysis should be in fruit as well as in flower. DeCandolle arranged the Genera into Tribes according to the folding of the cotyledons upon the radicle. This occurs in three different modes, as follows:

Cotyledons incumbent, when they are so vent or folded as to apply the back of one of them to the radicle, as in the seed of Capsella, fig. 1.

Cotyledons accumbent when they are so turned as to apply their edges to the radicle, as seen in the seed of Arabis Canadensis, fig. 2.

Cotyledons conduplicate, when they are not only incumbent, as in the first case, but also folded on and partly embracing the radicle, as in Mustard, fig. 3.
ORDER 11.—CRUCIFERÆ.

In the following table we endeavor to combine with the systematic arrangement of DeCandolle a more practical artificial method:

* Crucifers native, or cultivated for food. (§)
* Crucifers exotic, cultivated for ornament or art. (§ §)
§ Fruit a long pod, siliqua (§ 160), opening by 2 valves. (a)
§ Fruit a short pod, siliqua (§ 160), opening by 2 valves. (c)
§ Fruit a jointed pod, loment, partitioned across.........................Nos. 23, 25
a Flowers cyanic.—b Seeds arranged in a double row in each cell...........Nos. 1, 2
—b Seeds in 1 row.—c Pods sessile on the torus.......................Nos. 3, 4, 5
—c Pods on a slender stipe.................No. 12
a Flowers yellow.—d Seeds flat, wing-margined..............................No. 6
—d Seeds ovate or oblong.............................................Nos. 9, 10, 11
—d Seeds globose.....................................................No. 15
e Flowers bright yellow. Siliqua turgid, or slightly flattened...........Nos. 1, 20, 21
—f Siliqua turgid with a broadband partition.........................Nos. 19, 22
—f Siliqua flattened parallel with a broadband partition..............Nos. 16, 18
—f Siliqua flattened contrary to the narrow partition.................Nos. 24, 26
§ § Fruit a siliqua or long pod, opening by 2 valves......................Nos. 7, 8, 13, 14
§ § Fruit a siliqua—g with 1 seed only, and indehiscent.................No. 27
—g with 2 or more seeds.—h Petals all equal............................Nos. 16, 17
—h Petals unequal.....................................................No. 23

TRIBE I. ARABIDEÆ.—Pods mostly elongated. Seed oval or orbicular, more or less flattened. Cotyledons succulent (= c).
1 Seeds small, turgid, in a turgid, oblong or oval pod...........................*NASTURTIUM.*
2 Seeds flattened, in a long, linear pod. Plants very erect.....................*TURRITIS.*
3 Siliqua linear, seeds in 1 row, not bordered. Purple......................*IODANTHUS.*
4 Siliqua linear, each valve with 1 central vein, not opening elastically......*ARABIS.*
5 Siliqua linear or lanceolate, valves veiny, opening elastically...........*CARDAMINE.*
6 Siliqua oblong, flattened, seeds wing-margined. Leaves radical...........*LEASENORTHIA.*
7 Siliqua long, oo-seeded. Stigmas distinct, 2-horned..........................*MATTIOLIA.*
8 Siliqua long, oo-seeded. Stigmas capitately. Leaves entire. Flowers yellow.*CHEIRANTHUS.*
9 Siliqua 4-angled, 2-edged, rigid. Leaves lunate-pinnatifid.................*BARBERA.*

10 Calyx erect. Pods 4-sided, valves strongly 1-veined. Leaves lanceolate........*ENZYMUM.*
11 Calyx half spreading. Pods subterete. Leaves dissected or incised..........*SIYMERMUM.*
12 Very smooth herbs, with the white flowers in corymba. South..............*WAREA.*
13 Stigma of 2 converging lobes. Petals entire, oblique. Leaves lanceolate.......*HESPERSIS.*
14 Stigma lobes connate. Petals pinnatifid, involute in aestivation............*SCHIZOFALON*

TRIBE III. BRASSICEÆ.—Pods elongated. Seeds globular, (c).
15 Pod terete or 4-sided.................................................*BRASSICA.*

16 Siliqua mostly orbicular, flattened. Cells 1-4-seeded.....................*ALYSSUM.*
17 Siliqua very large, orbicular-oval, very flat, stipitate. Cultivated........*LUNARIA.*
18 Siliqua oblong or elliptical. Seeds oo, not margined. Pet. entire or 2-cleft......*DRABA.*
19 Siliqua globular or ellipsoid. Seeds few. Flowers white..................*ARMORACIA.*
20 Siliqua globular, inflated, thin, veinless. Flowers yellow................*VESICARIA.*

TRIBE V. CAMELINEÆ.—Pods mostly short. Septum broad. Cotyledons oo.
21 Siliqua obvoid, with ventricose valves, many seeds. Flowers yellow.........*CAMELINA.*
22 Siliqua oval, teguliform, few-seeded. Leaves linear, radical. Flowers white........*SUBLARIA.*

TRIBE VI. THLASPIÆ.—Pods short, septum narrow. Cotyledons succulent. (23).*IRESIS.*

TRIBE VII. LEPIDINEÆ.—Pods short, septum narrow. Cotyledons succulent.
24 Siliqua triangular, many-seeded. Flowers white................................*CAPSella.*
25 Siliqua oval-ornibullar, 2-seeded. Flowers white, often incomplete.........*LEPIDIUM.*
26 Siliqua didymous, each half 1-seeded. Flowers minute..................*SNEEBIERA.*

TRIBE VIII. ISATIDEÆ.—Siliqua short, 1-celled, 1-seeded, indehiscent. (27) Cult.....*ISATIS.*

TRIBE IX. CAKALINEÆ.—Pod 2-jointed. Cotyls. oo. (23) Fleshy sea-side herbs....*CALKIN.*

TRIBE X. RAPHANEÆ.—Pod moniliform. Cotyledons oo. (29) Leaves lunate.......*RAPHANUS.*
1. NASTURTIIUM, R. Br. Water-cress. (Lat. nasus tortus, nose tortured; alluding to the pungent qualities.) Sep. spreading. Siliques suberete, turgid, generally curved upward, often shortened to a silicle, valves veinless. Seeds small, ∞, turgid, generally arranged in a double row in each cell (∞∞).  " with pinnate or pinnatifid leaves.

1. * Petals white. Siliques rather long (10–12") ........................................... No. 1
2. * Petals yellow, minute. Siliques shortened (4–8") , but longer than the pedicels. (a)
3. * Petals yellow. Siliques or silicles (1–6") , shorter than the pedicels. (b)
   a) Leaves pinnate or pinnatifid. Diffusely branched .................. Nos. 2, 3
   b) Leaves not longer than the calyx, obscure ......................... Nos. 6, 7

1 N. officinale R. Br. English W. Lvs. pinnate, lfts. ovate, subcordate, repand; petals white, longer than the calyx. 2 Spgs. &c. May, June. §

2 N. tanaecifolium Hook. Upper leaf-segm. confluent, lower distinct, oblong, or roundish, sinuate-toothed, teeth obtuse; pods 4–5", ped. 4 as long. § South. β. obtusum. Lfts. mostly distinct, obtuse, oval. Pods shorter (3–5"). Miss. R.

3 N. Walteri Wood. Segments of the leaves all distinct, narrow, with a few linear, acute lobes or teeth; pods linear (5") , ped. 2–3". 2 South. 3–5". March, April.

4 N. limosum N. Lvs. lanceolate, toothed, the lower lyrata; pods elliptic-oblong, 3–4", ped. much shorter. 2 Riv. La. 10–15'. Fls. minute. Too near the next.


6 N. palustre DC. Marsh Cress. Glabrous; lvs. pinnately lobed, amplexicaul, lobes confluent, dentate; rt. fusiform; pet. as long as the sepals; silicle spreading, turgid, twice longer than wide. 2 Wet places. 1–2f. Pod 3". June–Aug.

7 N. hispidum DC. Villous; lvs. runcinate-pinnatifid, lobes obtusely dentate; siliques tmid, ovoid, or globular, the pedicels longer, ascending; pet. scarcely as long as the calyx. 2 Streams, 1–3f. Pod 1". Ped. 2–3". June–Aug.

8 N. sylvéstes R. Br. Wood Cress. Lvs. pinnately divided, segm. serrate or incised; pods linear, style very short. 2 Meads. Ms. to Pa. Rare. June, July. §

9 N. sinuátum Nutt. Lvs. pinnatifid, segm. lance-oblong, nearly entire; pods oblong, acute, with a slender style. 2 Riv. St. Louis to Oreg. June.

2. TURRITIS, Dill. Tower Mustard. (Lat. turris, a tower; from the strict form of the plants.) Sep. erect, converging. Seeds flattened, minute, in 2 rows in each cell of the long, narrowly-linear 2-edged silique; valves plane, 1-veined. Embryo ∞∞. Glabrous and strictly erect, stem-leaves sagittate-clasping. (Runs into Arabis.)


2 T. stricta Graham. Fls. rose-white, erect; silique long (3") , erect, finally ascending or spreading; stem lvs. linear-lanceolate. 2 Rocks, N. Y. (rare) to Oreg. 1–2f. May.

β. brachycárpae. Fls. and siliques spreading, the latter shorter (1"). Westward.


1. hesperióides Torr & Gr. Penn. to Ill. and Ark. 2–3f. Lvs. serrate or the lower pinnatifid-lyrate. Pods 15–20", spreading. May, June. (Arabis, Gr.)
4. **ÁRABIS, L.** Rock-cress. Sepals mostly erect; silique linear, compressed; valves plane, each with 1 or 3 longitudinal veins, seeds in a single row in each cell, mostly margined, cotyledons accumbent or oblique. Flowers white. Figs. 336, 506.

* Leaves (all or at least the radical) pinnatifid. Stems clustered................Nos. 1, 2, 3
* Leaves all undivided, toothed or entire, often clasping. (a) (Exotic. No. 10.)
  a Siliques short (6—12") and straight. Sds. not winged. Stems clustered....Nos. 4, 5
  a Siliques longer (1—2"), straight or curved. Sds. not winged. St. simple...Nos. 6, 7
  a Siliques ...ong 3", curved, pendent. Seeds winged..............................Nos. 8, 9

1 A. **Ludoviciána** Meyer. All the leaves pinnatifid or pinnate, smoothish; stems branched at base; siliques ascending; seeds bordered. 1 South. 6—10'. March.

2 A. **lyráta** L. Upper leaves smooth, linear, entire; radical leaves lyrately pinnatifid, often pilous; st. branched at base; pedicels spreading; siliques erect, seeds not bordered, obliquely —<. 2 Hills, Can. to Va. 6—12'. Pods 11—2'. Pet. 3" long. Apr., May.

3 A. **petriáca** Lam. Upper leaves linear, entire, minute, radical pinnatifid, very small; stems clustered; pods ascending (1—14'); seeds bordered, —<. 2 Rocks (Greenwich), Ct., Vt., O., Mich. 6—12'. Flowers white or roseate. June.

4 A. **Thallána** L. St. clustered, erect; Ivs. pilous, oblong, nearly entire; pet. twice longer than calyx; pods erect, squarish (9''); seeds obliquely —<. 3 Fields, Vt. to Ill. and Car. (Wayne Co., N. Y. Hankenson.) 4—12'. Fls. small. May. (Sisymbrium, Gay.)§

5 A. **dentáta** T. & G. Stems clustered, diffuse; Ivs. oblong, sharply toothed; petals hardly longer than the calyx; pods spreading. 1 N. Y. to Mo. 1f. Fls. small. May.

6 A. **pátens** Sull. Erect, pubescent; cauline leaves coarsely toothed; siliques spreading and curved upward, beaked with a distinct style. 2 O. to Tenn. 1—2f. May.

7 A. **hirsútá** Scop. Erect, hirsute; radical leaves oblong-ovate, cauline lanceolate, sagittate-clasping, entire or toothed; siliques straight, erect; style none. 2 Can. to Va., and W. 1—2f. June.

8 A. **levigátá** DC. Tall, glaucous, smooth; stem leaves linear-lanceolate and linear, sagittate-clasping, the upper entire: siliques very long, linear, at length spreading and pendulous. 2 Can. to Tenn., and W. 2f. Pod 3'. May.

β. **minor** (Porter). Plant smaller, 10—15', with the Ivs. sessile—not clasping. Penn.

9 A. **Canádénis** L. **Sickle-pod.** Tall, pubescent; stem leaves lanceolate, pointed both ways, sessile; silique subulate, veined, pendulous. 2 Rocky hills. 2—3f. Petals small, but twice longer than sepals. Pods 3'. May, June.

10 A. **Alpína**. Erect, 8—12', hoary with stellate hairs; Ivs. oblong, with slender teeth, clasping; fls. showy, pure wh., in many little long-stalked corymbs. Alps. Mar.—May.

5. **CARDAMÍNE, L.** Bitter Cress. Calyx a little spreading. Silique linear or lanceolate, with flat, veinless valves narrower than the dissectum, and often opening elastically from the base. Stigma entire. Seeds not margined, —>. Flowers white or purple.

§ **Dentária.** Pod lance-linear. Rhizome thickish, knotted. Stem with 2 or 3 palmated leaves near the middle. Flowers large, corymbed...(*)
* Leaves of the stem subopposite or subverticillate.................................Nos. 1, 2, 3
* Leaves of the stem alternate..........................................................Nos. 4, 5

§ **Cardamíne.** Pod linear. Root tuberous or fibrous. Leaves alternate...(+)
† Leaves pinnate, with many leaflets ....................................................Nos. 6, 7
† Leaves simple or partly ternate... (a)
  a Siliques pointed with a slender style. In low, wet grounds...........Nos. 8, 9
  a Siliques tipped with the sessile stigma. In high mountains............Nos. 10, 11

1 **C. díplýlla.** Stem 2-leaved; leaflets subovate; rhizome continuous, toothed. 2 Damp woods, Can. to Car. 1f. Leaves 3-parted, nearly opposite. Root-stock pungent, aromatic. May.
2 C. laciniatà. Caulline lvs. 3, 3-parted, the divisions lanceolate or linear-oblong obtuse, lobed, toothed or entire; rhizome moniliform. 2t Woods. 1f. Apr. May.

3 C. multifida. Caulline lvs. mostly 3, and verticillate, rarely 2, multifid with numerus linear lobes; rhizome tuberous. 2t Woods, N. Car. to Ala. Rare. 9'.

4 C. máxima. Stem about 3-leaved (2 to 7); ifs. 3, ovate, toothed or cleft; rhizome moniliform, the tubers toothed. 2t N. Y. and Penn. Rare. 1—2f. May.


6 C. hirsuta L. Stem (hirsute in Europe) glabrous, erect; leaves pinnately 5-11-foliolate, terminal leaflet largest; flowers (white) small, siilique erect, linear or filiform; stigma minute, sessile. 3 O. Pet. Variable. Stem 3—12', slender or thick. Leaflets obtuse. Pod 1'. March—June.

β. sylatica. Slender and delicate; leaflets 1 or 2-toothed; pods filiform, incurved. Grows in dry places. 6'. (C. Virginica Mx.)

7 C. pratensis L. Cuckoo Flower. Stem ascending, simple; leaves pinnately 7-15-foliolate; leaflets petiolate, subentire, lower ones suborbicular, upper linear-lanceolate; style distinct. 2t Swamps, N. Y. to Arc. Am. 10—16'. Flowers large. Apr. May.

8 C. rhomboida DC. Stems simple, erect or ascending, tuberiferous at base; siliques linear-lanceolate; rt. lvs. roundish, entire, st. lvs. rhomboidal. 2t May. 8—14'.

β. purpurea. Slender, erect, few-leaved and purple-flowered. N. Y., O., Wisc.

9 C. rotundifolia Mx. Stems decumbent, branching, finally stoloniferous; leaves all petiolate; pod linear-subulate; rt. fibrous. 2t Cool springs, Pa. to Car. 1—2f. May, Jn.

10 C. bellidifolia L. Leaves smooth, orbicular-ovate, nearly entire, petiolate; caulline entire or 3-lobed; siliques erect. 2t White Mts. &c. 14—3'. July.

11 C. spatulata Mx. Lvs. hirsute, the radical spatulate, petiolate; caulline sessile, siliques spreading. 3 Ots. of Car. and Ga. Trailing. 6—9'. April.


7. MATTHIOILA, R. Br. Stock. (In honor of P. A. Matthioli, physician to Ferdinand of Austria, and botanic author.) Calyx closed, 2 of the sepalis gibbous at base. Siliques terete; stigmas connivant, thickened or cornute at the back. Herbaceous or shrubby, oriental plants, clothed with a hoary, stellate pubescence.


8. CHEIRÁNTHUS, L. Wall-flower. (Xetp, the hand, ávSOG, flower.) Calyx closed, 2 of the sepalis gibbous at base. Silique terete or compressed. Stigma 2-lobed or capitate. Seeds flat, in a single series, often margined. (==). Garden perennials, mostly European. Leaves undivided. Fig. 55.

C. Cinin. St. somewhat shrubby and decumbent at base; lvs. lanceolate, hirsute pet. obovate, long-clawed, yellow; stig. capitate. 2t S. Eur. 2f. June.
1 **B. vulgáris** R. Br. Upper lvs. toothed or pinnatifid at base; siliques obtusely 4-angled, pointed with the style. @ Brooksides: common. 1–2f. Racemes dense, showy-pamelled. Pod 9". May, June.
2 **B. précox** R. Br. Scourby-grass. Upper lvs. pinnatifid, with the lobes all linear oblong; siliques 2-edged. 2 $§ South. Pod 2–3'. May, June.

1 **E. cheiranthoides** L. Pubescence minute, appressed, branched; lvs. lanceolate, denticate, or entire; fls. small; siliques short (8–10'), on slender pedicels; stig. small, nearly sessile. (1) Wet grounds. 1–2f. Rac. long. July.
2 **E. Arkansánum** N. Yellow Phlox. Simple, scabrous; lvs. linear-lanceolate, remotely dentate; rac. corymbed at top; pod long (3'), erect; stig. capitate. @ Bluffs, O. to Ark. 2–3f. Flowers large, orange-yellow. June, July.

1 **S. officinálé** Scop. Hedge Mustard. Leaves runcinate; racemes slender, virgate; siliques subulate, erect, closely appressed to the rachis. (1) A common weed, with branches at right angles. 1–3f. June—Sept. §
2 **S. Sóphia** L. Flixweed. Lvs. bipinnatifid, lobes linear-oblong, acute; sep. longer than pet.; pod linear, erect, longer than the spreading pedicel. (1) N. Y. Can. §
3 **S. canéscens** Nutt. Tansey Mustard. Lvs. bipinnatifid, canescent, lobes oblong, subdenticate, obtuse; pet. about equalling the calyx; pod oblong-linear, 3–6", ascending, shorter (or never longer) than the spreading pedicel. (1) U. S. 1–2f. Mar.—June.


13. **HÉSPERIS**, L. Rocket. (Έσπερα, evening, when the flower is most fragrant.) Calyx closed, shorter than the claws of the petals. Pet. bent obliquely, linear or obovate. Silique subterete. Seeds not margined. Stig. forked, with the apices converging (―○). Flowers white or purple.
**H. matronális** L. Simple, erect; lvs. lance-ovate, denticate; pet. obovate; pod torulous, elongated (3'), erect. (2) Shores of L. Erie (Hankenson) and Huron. §


15. **BRÁSSICA** (and Sinapis) L. **CABBAGE, MUSTARD, &c.** (The ancient names.) Siliques long, terete, or 4-sided, pointed with a stout style or an ensiform 1-seeded beak. Valves 1-3-veined. Seeds in 1 row, globular, (c. Root lvs. pinnatifid. Rac. elongated. Fls. yellow. Figs. 239, 192, 429.

§ Sinapis. Sep. spreading. Pet. ovate. Pod with an acute beak. . . . . . . Nos. 1, 2, 3
§ Brássica. Sep. erect. Pet. obovate. Pod squarish, with a blunt style... Nos. 4, 5, 6
1 B. nigra L. **Black Mustard.** Smooth; pod 1', smooth, somewhat 4-angled, appressed to the rachis, and beaked with a slender, 4-sided style. (1 3-6f. §
2 B. arvenísis (L) **Field Mustard.** St. and lvs. hairy; pod 1', smooth, many-angled, torulous, spreading, thrice the slender ascipital style. 1 § June, July.
3 B. alba (L) **White Mustard.** Lvs. smoothish; siliques hispid, torulous. shorter than the beak seed; seeds large, pale yellow. 1 Eur. 3-5f. Pod 4-seeded.
4 B. campéstris (L) **Cale.** Lvs. somewhat fleshy and glaucous, the lower lyrate-dentate, subulate, upper coriaceous, acuminate. 1 Fields. 2f. July. §
5 B. Rapa. (L) **Radical lvs.** Lyrate, rough, not glaucous, cauline ones incised, upper entire, smooth.
6. **DEPRÉSSA.** Common Turnip. Root depressed, globous or napiform, contracted below into a slender radicle. 2 Long cultivated for its root. §
6 B. olerácea L. **Cabbage.** Lvs. very smooth and glaucous, fleshy, repand-toothed or lobed. 2 Europe, on rocky shores, forming no head.
6. **BULLÁTA.** Savoy Cabbage. Lvs. curled, subcapitate, finally expanding. §
γ. Botrytis-caulíflóra. **Cauliflower.** Stem low; heads thick, compact, termi- nal; flowers abortive, on short, fleshy peduncles. §
δ. Botrytis asparagoídes. **Broccoli.** Stem taller; heads subramous; branches fleshy at the summit, consisting of clusters of abortive flower-buds. §
ε. **CAPITÁTA.** Head Cabbage. Stem short; leaves concave, packed in a dense head before flowering; raceme paniculate. §

16. **ALÝSSUM, L. Madwort.** (Gr. α, privative, λυοσα, rage; supposed by the ancients to allay anger.) Calyx equal at base. Pet. entire; some of the stamens with teeth. Silicbe orbicular or oval, with valves flat, or convex in the centre. Seeds 1—4 in each cell (= c). Showy European herbs, half shrubby at base.

1 A. marítimum Lam. **Sweet A.** Lvs. lance-linear, acute, entire, some hoary; pods ovate, smooth, 2-seeded; fls. white, small, sweet. 2f. 1f. Escaped from gardens. §
2 A. calyceínum L. **Calyx persistent;** lvs. linear-spatulate, canescent; pods orbicular, lens-shaped, with a thin border, 4-seeded; fls. yellowish. 1f. Fields: rare. Mass. N. Y. (Wayne Co., Hankenson). §
3 A. saxátilis. **Rock A.** Lvs. lanceolate, entire, downy; pods round-obovate, 2-seeded; flowers yellow, corymbed, abundant and brilliant. 2f. Candia. 9f. April.

17. **LUNÁRIA, L. Honesty.** (Lat. luna, the moon; from the broad, round siliques.) Sep. somewhat bisaccate at base. Pet. nearly entire. Stam. without teeth. Silice pedicellate, elliptical, or lanceolate, with flat
Order 11.—Cruciferae.

valves; funiculus adhering to the dissepiment (== ρ). European. Leaves cordate. Flowers lilac.

1 L. *rédiviá L.* Perennial Satin-flower. Lvs. ovate, petiolate, mucronately serrate; silicles lanceolate, narrowed at each end. 2 2-3f. June.

2 L. *bién尼斯 DC.* Honesty. Lvs. with obtuse teeth; silicles oval, obtuse at both ends.

18. DRABA, L. Whitlow Grass. (Δράβη, acrid, biting; from the taste of the plant.) Calyx equal at base. Pet. equal. Fil. without teeth. Silicule oval or oblong, entire, the valves flat or slightly convex, veined. Seeds not margined, 2-rowed in each cell (== ρ). Flowers white, rarely yellow. Plants small.

§ *Eróphila.* Petals 2-parted.................................................No. 1

§ *Drába* proper. Petals entire or only emarginate. (a)
   a Style distinct, long or short. Pods twisted when ripe. Perenn..Nos. 2, 3, 4
   a Style none. Pods straight, plane. Plants annual or bienn. (b)
   b Pedicels as long as or longer than the pods.................Nos. 5, 6
   b Pedicels shorter than the pods..................................Nos. 7, 8

1 D. (Eróphila) *véna* L. Whitlow Grass. Scape naked; lvs. oblong, acute, sub-serrate, hairy; pet. bifid; stig. sessile; silicule oval, flat, shorter than the pedicel. 1 A little Spring flower in rocky places. Can. to Va. 1-3'.

2 D. *ramosissima* Desv. Minutely pubescent, diffuse; lvs. linear-lanceolate, with remote and slender teeth; rac. panicled; silicule lanceolate, about the length of the pedicel, the style half as long. 2 Va. Ky. 5-8'. May.

3 D. *arábisans* Mx. Slightly pubescent; root leaves in tufts, wedge-lanceolate, toothed; stems leafy, erect, its lvs. oblong; silicule glabrous, lance-oblong (6'), spreading; style very short. 2 Lake shores, Vt. N. Y. Mich. 6-10'. White. May.

4 D. *incána* L. Hoary pubescent; root leaves in tufts, wedge-lanceolate, slightly toothed; st. nearly naked, branches and ped. very erect; silicule oblong (5'), twisted, sty. very short. 2 or 3 Mts. N.Vt. and N. 6-8'. Lvs. 6'. Fls. very small, white. June.

5 D. *nemorális* Ehrh. Pubescent, branched; lvs. oval, the cauline lanceolate, toothed; pet. emarginate; silicules half the length of the spreading pedicels. 2 Mich. Mo. 8-10'. Flowers small, white or yellowish. May.

6 D. *brachycárpa* N. Minutely pubescent; lvs. ovate, the cauline oblong; rac. 2-flowered; pet. obvate, entire; silicule as long as the ped. 6-seeded. 1 Mo. and South. 3-4'. Pod 2'. April.

7 D. *cuneifóllia* N. Hirsute, pubescent, branching and leafy below, naked above; lvs. cuneate-oblong, sessile, denticate; rac. elongated in fruit; silicules twice longer (4') than the pedicels. 1 Ky. to La. 3-8'. March.

8 D. *Carolíniána* Walt. Hirsip, branching and leafy below, naked above; lvs. entire, obvate and oval; rac. short; silicules oblong-linear, longer than the pedicels (5'). 1 R. I. to Ga. and W. 1-3'. Much like No. 7. April—June.

β. *micrántha*. Silicules minutely hispid; pet. often wanting. (D. micrántha N.) W.


1 A. *rustícána* Rupp. Radical lvs. oblong, crenate; cauline long, lanceolate, incised; silicule roundish, ellipsoid, much longer than the style. § Eur.
2 A. Americàna Arn. Aquatic; immersed lvs. doubly pinnatifid with capillary segments, emersed, oblong, pinnatifid, serrate or entire; silicle ovoid, little longer than the style. Lakes and rivers, Can. to Ky. July, Aug.

20. VESICÁRIA, Lam. BLADDER-POD. (Lat. vesica, a bladder or blister; from the inflated silicles.) Pet. entire. Silicle globous or ovoid; inflated valves nerveless, hemispherical or convex. Seeds several in each cell, sometimes margined (= o). Flowers yellow. (See Addenda.)

V. Shórtli T. & G. Lvs. elliptical, sessile, entire; style twice as long as the globous silicle; seeds 2-4, not margined. Ky. rare.


22. SUBULÁRIA, L. AWLWORT. (Named in reference to the linear subulate leaves.) Silicle oval, valves turdug, cells many-seeded. Stigma sessile; cotyledons linear, curved and incumbently folded on themselves. Aquatic acaulescent herbs.

S. aquática L.—Shores of ponds, Me. N. H. Lvs. all radical, entire, subulate, 1'. Scape 2-3', with a few minute white flowers. July.

23. IBERIS, L. CANDY-TUFT. (Most of the species are natives of Iberia, now Spain.) The 2 outside petals larger than the 2 inner. Silicles compressed, truncate, emarginate, the cells 1-seeded. Handsome herbs from the Old World, pretty in cultivation. Flowers white or purple.


24. CAPSÉLLA, Vent. (Lat. capsà, a chest or box; alluding to the fruit.) Calyx equal at base; silicles triangular-cuneiform, obcordate, compressed laterally; valves carinate, not winged on the back; septum sublinear; style short; seeds ∞, oblong, small, [| o]. Fls. white. A common weed. Fig. 193.


25. LEPIDIUM, R. Br. PEPPER GRASS. (Lépitos, a scale; from the resemblance of the silicle.) Sepals ovate; petals ovate, entire; silicles oval-orbicular, emarginate; septum very narrow, contrary to the greater
diameter; valves carinate, dehiscent; cells 1-seeded. Cotyledons |o, often —o. Flowers small, white, often incomplete.

* Stamens only 2. Petals often wanting. Leaves not clasping ...... Nos. 1, 2
* Stamens 6. Silices evidently winged ......................... Nos. 3, 4

1 L. Virginicum L. Tongue-grass. Lvs. linear-lanceolate, the lower incisely serrate; pet. 4; silices orbicular, emarginate; cotyledons = o. ① Dry places. f.
2 L. ruderale L. Cauline lvs. incised, those of the branches entire; pet. none; pods broad-oval, notched, wingless. ① Dry fields. Rare. 10—15°. Always apetalous. §

26. SENEBIÈRA, Poir. CARPET CRESS. SWINE CRESS. (In honor of Senebier, a distinguished vegetable physiologist.) Silice didymous, with the partition very narrow; valves ventricose, separating but indehiscent, and each 1-seeded, cotyledons incumbently folded on themselves. ① or ② Prostrate and diffuse, with minute white flowers.

1 S. didyma Pers. Lvs. pinnate, with pinnatifid segments; silices rugously reticulated, notched at the apex. Waste places coastward, Atlantic and Pacific.
2 S. Coronòpus DC. Lvs. pinnate, with the segm. entire, toothed, or pinnatifid; silices-tuberced, not notched at apex. R. Isl. (Robbins) to Car. Rare.

27. ISÁTIS, L. WOAD. (Ἰατίς, to make equal; supposed to remove roughness from the skin.) Silice elliptical, flat, 1-celled (dissemination obliterated), 1-seeded, with boat-shaped valves, which are scarcely dehiscent (|o). None North American.

L. tintòria L. Silices cuneate, acuminate at base, somewhat spatulate at the end, very obtuse, three times as long as broad. ① Eng. 4f. Yellow. May—July. Cultivated for the dye which is yielded by its leaves.

28. CAKÌLE, Tourn. SEA ROCKET. (Named from the Arabic.) Silice 2-jointed, the upper part ovate or ensiform; seed in the upper cell erect, in the lower pendulous, sometimes abortive. ① Maritime, fleshy herbs. Flowers purple.


29. RÁPHANUS, L. RADISH. (Ραξ, quickly, φαίνω, to appear; from its rapid growth.) Calyx erect. Pet. obovate, unguiculate. Siliques terete, torulous, not opening by valves, transversely 2-jointed, joints with 1 or several cells. Seeds large, subglobose, in a single series (|o).

2 R. sativus. Garden Radish. Lower lvs. lyrate, petiolate; siliques 2-3-seeded, acuminate, scarcely longer than the style. ① China. 2—4f. Root napiform or fusiform, red, black, or white. Flowers pink-white.
Order XII. CAPPARIDACEÆ. CAPPARIDS.

Herbs, shrubs, or even trees, destitute of true stipules. Leaves alternate, petiolate. Flowers cruciform, hypogynous. Sepals 4. Petals 4, unguiculate. Stamens 6–12, or some multiple of 4, never tetradynamous, on a disk or separated from the corolla by an internode of the torus. Ovaries often stipitate, of 2 united carpels. Style united. Fruit either pod-shaped and dehiscent, or fleshy and indehiscent. Seeds many, reniform. Albumen 0. Embryo curved. Cotyledon foliaceous.

§ Tribe CAPPARÆ. Shrubs (or trees) with baccate or drupaceous fruit. S. Fls...CAPPARIS.
§ Tribe CLEOMEÆ. Herbs (or shrubs) with capsular 1-celled pods. (a)
  a Stamens 6, separated from the petals by an internode...................GYNANDROPSIS. 1
  b Stamens 6, not separated from the petals.................................CLEOME. 2
  c Stamens 8–32, free. Torus not developed to an internode..............POLANISIA. 3

1. GYNANDROPSIS, DC. (Gynandria, a Linnaean class, όψις, appearance.) Sep. distinct, spreading. Stam. 6, separated from the 4 petals by a slender internode of the torus. Pod linear-oblong, raised on a long stipe which rises from the top of the torus. (1) Lvs. digitate. Fls. racemated.

G. pentaphylla DC. Middle lvs. petiolate, 5-foliate, floral and lower ones 3-foliate, leaflets obovate, entire, or denticulate. Waste grounds, Va. to Ga. 2–3f. White. §

2. CLEOME, L. SPIDER FLOWER. Sep. sometimes united at base. Pet. 4. Torus not developed between the petals and the stamens, which are 6–4. Pod stipitate more or less. Herbs or shrubs. Lvs. simple or digitate. Flowers racemated or solitary. (See Addenda.)

1 C. pungens L. Stem simple, prickly; lfts. 5–9, elliptic-lanceolate, acute; flowers racemated; petals on filiform claws, half as long as the stamens. (2) Gardens and fields. 3–4f. Flowers purple, curious. May–Aug. §

2 C. speciosissima. Stem branched below; lfts. 5–7, lanceolate, acuminate; petals as long as their claws, rose-purple. Mexico. 3–4f. June–Sept.


Order XIII. RESEDACEÆ. MIGNONETTES.

Herbs, with alternate, entire, or pinnate leaves. Stipules minute, gland-like. Flowers in racemes or spikes, small and often fragrant, 4–7-merous, unsymmetrical and open in bud. Petals unequal, entire or cleft. Stamens 8–20, inserted on the hypogynous, one-sided glandular disk. Ovaries ses-
sile, 3-lobed, 1-celled, many-seeded. *Fruit* a capsule, 1-celled, opening between the stigmas before maturity. Illust. 40, 165.

**RESEDA, L.** (Lat. *resedo*, to calm: the plants are said to relieve pain.) Sep. 4—7. Pet. of an equal number, often cleft. Torus large, fleshy, one-sided, bearing the 8—∞ stamens.

1 R. *luteola* L. *Dyer’s Weed*. Lvs. lanceolate, with a tooth on each side at base; sepals 4, united below; petals (greenish-yellow) 3-5-cleft. (1) Roadsides, N. Y. 2f. Flowers numerous, in a tall raceme. § Eur.

2 R. *odorata* L. *Mignonette*. Lvs. cuneiform, entire or 3-lobed; sepals shorter than the 7-13-cleft petals. Egypt. 1f. Fragrant.

**ORDER XIV. VIOLACEÆ. VIOLETS.**


- Sepals not auricled at base. Filaments united into a tube. ................. **SOLEA.**
- Sepals more or less auriculate at base. Filaments scarcely cohering. .... **VIOLA.**

1. **SÖLEA**, Gingins. **Green Violet.** (Dedicated to W. Sole, an English writer on plants.) Sep. nearly equal, not auriculate. Pet. unequal, the lowest 2-lobed and gibbous at base, the rest emarginate. Stam. united into a tube, sheathing the ovary and bearing a gland above the middle. Sds. 6—8, very large. 2f. An erect, leafy plant, with inconspicuous axillary fls.

**S. concolor** Gingins. **Green Violet.**—Woods, W. N-Y. (Hankensons) to Car. and Mo. 1—2f. Lvs. large, lanceolate, acuminate. Fls. greenish. Pod 1’. May, June.

2. **VIOLA, L. Violet. Pansey.** (From the Latin.) Sep. 5, unequal, auriculate at base. Pet. 5, irregular, the broadest spurred at base, the 2 lateral equal, opposite. Stam. approximate, anthers connate, 2 of them with appendages at the back. Caps. 1-celled, 3-valved, seeds attached to the middle of the valves. 2f. Low, herbaceous plants. Ped. angular, solitary, 1-flowered, recurved at the summit so as to bear the flowers in a resupinate position. Joints of the rhizome often bearing apetalous flowers. Figs. 50, 137, &c.

§ Acaulescent.—a Petals yellow ........................................... No. 1
- a Petals white .............................................................. Nos. 2, 3, 4
- a Petals blue,—b beardless ........................................... Nos. 5, 6, 7
- b bearded.—c Lvs. divided ............................................ Nos. 8, 98, 99
- c Lvs. undivided .9, 10, 11, and the Exot. 19
§ Caulescent. — *Petals yellow. Stems leafy at the top only. Nos. 12, 13, 14
—*Petals not quite yellow. — *Stipules entire. Nos. 15
—*Stipules fringe-toothed. Nos. 10, 17, 18
—*Stip. lyrate-pinnatifid, very large. Nos. 20—22

1 V. rotundifolia Mx. Fig. 50. Lvs. smooth, orbicular-ovate, coriace, with the sinuses closed; petiole pubescent; sep. obtuse. Woods, N. E. to Tenn. Mar.—May.

2 V. lanceolata L. Lvs. smooth, lanceolate, tapering at base into the long petiole, obtuse, subacinate. Wet meadows. Lvs. 3—5'. Rt. stock creeping. Fls. white. May.


5 V. palustris L. Lvs. reniform-cordate; stip. broadly ovate; sep. ovate, obtuse, spur very short; caps. oblong-triangular. White Mts. 3'. Pale blue. June.

6 V. Selkirkii Goldie. Lvs. orbicular-cordate, crenately serrate, the sinuses deep and nearly closed; spur nearly as long as the petals, thick, very obtuse. Hills, N. Y. to Can. and Mich. 2'. Pale blue, with a large blunt spur. May.

7 V. pedata L. Rt. premorse; lvs. pedately 5—9-parted, segments linear-lanceolate, entire; stip. large, obtusely truncate, scarcely beaked; spur short, obtuse. Hilly woods, 4—7'. Smooth and beautiful. Flowers large, violet-blue. April, May.

8 V. color. Upper petals violet, the lower pale blue and yellow. Mass. to Ga.


9 V. cennula Ait. Lvs. reniform-cordate, cucullate at base, acute, crenate; stip. linear; inferior and lateral petals bearded. Common everywhere. 3—12'. Known by its broad hooded leaves and blue flowers. Varies much. April, May.

9 V. palmata. Lvs. cordate, hastate-lobed, middle lobe largest. Fls. large. South, &c.

9 V. septemloba. Lvs. concave at base, deeply 5—7 lobed, mid. lobe lance. South.

10 V. villosa Walt. Lvs. roundish-ovate, cordate, obtuse, flat, pubescent, sinuous narrow or closed; pet. bearded; stip. beaked. Woods, Pa. to Ga.; com. 2—3'. Apr.

11 V. sagittata Ait. Lvs. oblong-lanceolate, sagittate-cordate, subacut, often incised at base, serrate-crenate; pedicel longer than the leaves; pet. densely bearded. Dry hills. 3—5'. Lvs. varying to triangular-hastate. April—June.

9 V. ovata. Lvs. ovate, incised and decurrent at base. N. J., southward.

12 V. hastata Mx. Smooth; st. simple, erect, leafy above; lvs. deltoid-lanceolate or hastate, acute, dentate; stip. ovate, minute, ciliate-dentate; lower pet. dilated, obscurely 3-lobed; spur very short. Fla. to Tenn. 6—10'. April, May.

13 V. tripartita Ell. Hairy. St. simple, erect, leafy above; lvs. deeply 3-parted, lobes lanceolate, dentate; stip. lanceolate. Upper Ga. 1'. Yellow.

14 V. pubescens Ait. Villous-pubescent; st. erect, naked below; lvs. broad-cordate, toothed; stip. ovate, large, subdeterminate. Dry woods. 5—20'. May, June.

9 V. eriocarpa. Tall, pubescent; pods woolly. Westward.

9 V. scabriflora. Some scabrous; sts. decumbent, branched at base. Ct. to Ky.

15 V. Canadensis L. Smooth; lvs. cordate, acuminate, serrate; ped. shorter than the leaves; stip. short, entire. Woods. 8—12'. Leafy all the way. Flowers large, subregular, white or light blue. Summer.

16 V. striata Ait. Smooth, nearly erect; lvs. roundish-ovate, cordate, crenate-serrate; stip. large, ciliate-dentate, oblong-lanceolate; spur one-fourth as long as the corolla. Wet grounds. 6—13'. St. semi-terete. Flowers cream-white.

17 V. Muhlenbergii Torr. St. weak, assurgent; lvs. reniform-cordate, upper ones rather acuminated; stip. lanceolate, somewhat fringed; spur half as long as the corolla, obtuse. Swamps. 6—8'. Pale purple. May.

18 V. rostrata L. Smooth; st. terete, diffuse, erect; lvs. cordate, roundish, serrate, upper ones scute; stip. lanceolate, deeply fringed; petals bearded; spur longer than the corolla. Moist woods. Can. to Kv. 6—8'. Pale blue. May.—Often beardless.
Order XV. CISTACEÆ. Rock Roses.

Herbs or low shrubs with simple, entire, opposite (at least the lower) leaves, with flowers perfect, regular, hypogynous, in one-sided racemes, very fugacious. Sepals 5, unequal, persistent. Petals 5 (sometimes 3 or wanting), convolute in bud. Capsules 1-celled, 3-5-valved, with as many parietal placenta. Seeds albuminous. Embryo curved or spiral.

1. **LECHÈA**, L. Pinweed. Sep. 5, the 2 outer minute. Pet. 3, lanceolate, small. Stig. 3, scarcely distinct. Caps. 3-celled, 3-valved, placenta nearly as broad as the valves, roundish, each 1-2-seeded. Often shrubby at base, with numerous very small brownish purple flowers.

2. **HELIANTHEMUM**, L. Rock Rose. Sep. 5, the 2 outer smaller. Pet. 5, or rarely 3, convolute contrary to the sepals, sometimes 0. Stam. 5. Stig. 3, scarcely distinct. Capsules triangular, 3-valved, opening at top. Sds. angular. Fls. yellow, often of 2 kinds, the later ones being apetalous.


3 **H. Carolinianum** Mx. Villous, simple, erect; fls. all large, petaliferous and sub-terminal; sepals acuminated; lvs. oblong-oval, edges denticulate, not revolute. Dry woods, South. 8—12. Apr., May.

4 **H. arenicola** Chapm. Hoary-tomentous; lvs. lance-oblong, obtuse, small (9°); fls. few or solitary, pedicellate (7°), terminal. Fla. in sand. 3—6'. Apr. (H. Cana dense, & obtusum Wood. Ed. 5th.)

3. **Hudsònia, L.** (In honor of William Hudson, author of Flora Anglica.) Sep. 3, united at base, subtended by 2 minute ones outside pet. 5; sta. 9—30; style filiform, straight; cap. 1-celled, 3-valved, mar. y-seeded with very numerous branches, minute leaves, and small, bright yellow flowers. May.

1 **H. tomentòsa** Nutt. Hoary tomentous; lvs. ovate, appressed-imbricate, acute; fls. subsessile; sep. obtuse. Coasts, Me. to N. J. and Wisc. In tufts, 7—10'.

2 **H. ericoides** L. Hoary-pubescent; lvs. subulate, a little spreading; pedicels exserted, as long as the calyx; sep. acutish. Shores, Vt. N. H. to Va. Delicate, 6'.

3 **H. montàna** Nutt. Minutely pubescent; lvs. filiform-subulate; pedicels longer than the flowers; sep. acuminated, the outer ones longer, subulate. Mts. Car. 5'.

**Order XVI. Hypericaceae. St. John's worts.**

*Herbs or shrubs* with opposite, entire, dotted, exstipulate leaves, with flowers perfect, regular, hypogynous, 4 or 5-merous, cymous and mostly yellow; *sepals* unequal, persistent; *petals* mostly oblique or convolute in the bud; *stamens* few or many, polyadelpheous; *anthers* versatile; *ovary* compound, with styles united or separate, becoming in fruit a 1-celled capsule with parietal placenta, or 3 to 5-celled when the disseminations reach the centre. *Seeds* exalbaminous, minute. (Illust. 128, 129, 275.)

§ Sepals 4. Petals 4, oblique, contorted in evagination, yellow..........................**Ascyrum.** 1
§ Sepals 5. Petals 5,—a oblique, contorted in evagination, yellow..........................**Hypericum.** 2

1. **Ascyrum, L.** St. Peter's Wort. Sep. 4, the two outer usually very large and foliaceous; pet. 4, oblique, convolute; fil. slightly united at base into several parcels; styles 2—4, mostly distinct; cap. 1-celled. 5

Lvs. punctate with black dots. Fls. pale yellow, 1 or 3 terminating each branch.

The outer pair of *sepals*—a very large, ovate. Styles 1 or 2..........................Nos. 1, 2

—a still larger, orbicular. Styles 3..........................Nos. 3, 4

—a small, like the two inner. Styles 3, long, distinct.....No. 5

1 **A. Crux-Andreae** L. Branches many, suberect, ancipital above; lvs. linear-oblong, obtuse; outer sep. twice longer than the pedicel; 2 bracteoles a little below the flower. Sandy woods, N. J. to Ga. and La. 1—2f. Lvs. 6—12'. Jn.—Sep.

β. **angustifolia,** Lvs. smaller (3—6'), crowded; bracteoles close to the fl. Car. Ga.

2 **A. pumilum** Mx. Low, trailing at base; lvs. oval and obovate, obtuse, sessile; outer sepals shorter than the slender pedicel, inner sepal 0; bracteoles 0. Ga. Fla.

2 **A. stans** Mx. St. erect, ancipital; lvs. oblong, sessile and half-clasping, obtuse; caps. ovate, acute. Swamps, N. J. to Fla. and La. 1 to 3f. Lvs. 10—15'. Jn.—Aug.

4 **A. amplexicaule** Mx. St. erect, terete below; lvs. broadly ovate, cordate, clasping; caps. oblong; bracteoles 0. Ga. and Fla. 1 to 2f. Lvs. 8—12'. Apr.—Sep.

5 **A. microsepalum** Torr. and Gr. Lvs. oblong-linear, crowded; sep. much shorter than the obovate, unequal petals. Bushy, 1—2f. Lvs. 3—6'.

§ Stamens 23—100, more or less united into sets (polyadelphous)...(a)
§ Stamens 5—15, not at all united. Annuals. Flowers small. (g)
  a Carpels (and styles) 5 or more. Capsule 5-celled
  b Shrubby. Petals not dotted. Lvs. lanceolate or ob lanceolate
  c Herbaceous. Petals sprinkled with black dots.

H. pyramidatum Ait. Herbaceous; lvs. sessile, oblong-ovate, acute; sty. 5; placenta retroflexed. 2' O. Pa. to Can. 3—6'. Flowers very large (2').

H. Kalmianum L. Shrubby; lvs. linear-lanceolate, very numerous, obtuse; caps. 5-celled, tipped with the 5 styles. Niagara, &c. 1'. Flowers 9".

H. Buckleyi Curtis. Low. diffuse, shrubby; lvs. obovate, very obtuse; fls. solitary, peduncled; caps. 3-celled, styles united. Mts. N. Car. to Ga. 8—12".

H. prolificum L. Branches ancipital, smooth; lvs. oblong-lanceolate, obtuse; cymes compound, leafy; sepals unequal, leafy, ovate, cupulidate. M. W. 2—4'.

H. densusfiorum. Branches, lvs. and fls. crowded, and smaller. Lvs. 1'. Fls. 6". South.

H. galloides Lam. Branches erect, terete; lvs. linear-lanceolate; cymes axillary and terminal, paniculate; sep. subequal, linear-lanceolate. S. Car. to Fla. 2—3'.

H. rosmarinifolium Lam. Erect, sparingly branched; lvs. linear, shorter than the internodes, narrowed to a petiole. South. Handsome. 2'.

H. fasciculatum Lam. Shrub much branched, bushy; lvs. linear, 1', very narrow, longer than the internodes, sessile; cymes leafy. Pine-barrens, South. 1—2'.

H. abbreviatum. Lvs. very short (2—3"), tufted in the axils. Car. to Ga.

H. perforatum L. Stem 2-edged, branched; lvs. with pellucid dots; sep. lanceolate, half as long as the petals. 2' Dry pastures. 1—2'. Lvs. 6—10". Flowers 1'.

H. corymbosum Muhl. Stems terete, corymbously branched; lvs. oblong-ovate or oval, obtuse, marked with black (as well as pellucid) dots; sep. ovate, acute (very small), 1' as long as the petals. 2' Can. to Pa. and Ark. 2'. Lvs. 1—2'. Flowers 9".

H. maculatum Walt. Stem terete, corymbously branched; lvs. oblong, thickly sprinkled with black dots; sep. lanceolate. 2' S. Car. to Fla. 2—4'. Lvs. 1'. Fls. 10".

H. aureum Bartram. Branches spreading, ancipital; lvs. thick, lance-ovate, obtuse, sessile; flower (large) solitary, sessile. Ga. to Ark. 2—4'. Stamens 56X! 1'

H. ambiguum Ell. Branches ancipital; lvs. lance-linear, thin, acute; fls. solitary and in 3's in the axils of the upper leaves. Ga. 1—2'. Flowers 9".

H. myrtifolium L. St. terete; lvs. thick, ovate, or oblong, cordate-clasping; fls. in a leafy compound fastigiate cyme, the dichotomous sessile. Ga. Fla. 1—2'.

3
14 H. cistifolium Lam. St. 2-winged, subsimple; lvs. linear-oblong, obtuse, sessile; flowers in a leafless, compound cyme. Ga. to Fla. and La. (No. 6, s.)

15 H. nudiflorum Mx. St. and branches 4-angled and winged; lvs. ovate-lanceolate or oblong, obtuse, sessile; cyme leafless, peduncled; sep. linear; capsule almost 3-celled. 2 Wet. Penn. to La. and Ga. 1–2f. Leaves 2½, thin.

16 H. sphaerocarpum Mx. St. obscurely 4-sided; lvs. linear-oblong, obtuse, with a minute callous tip; sep. ovate, mucronate; caps. globular. 2f Rivers, W. 1f. FIs. 7½.

17 H. adpressum Bart. St. 2-winged above; lvs. linear-oblong, half erect; cymes few-leaved; petals obvolute. 2f R. I. to Ark.

18 H. dolabriflorum Vent. St. scarcely 2-edged above; lvs. lanceolate, spreading; fls. in a leafy, fastigate cyme; pet. very oblique (dolabriform). 2f Ky. Tenc.

19 H. angulösum Mx.* Herb smooth; st. acutely 4-cornered; lvs. oblong-lanceolate, acute; cymes leafless; style distinct, thrice longer than the ov. 2f N. J. to Fla.

20 H. ellipticum Hook. Herb smooth; st. quadrangular, simple; lvs. elliptical, obtuse, somewhat clasping, pellucid-punctate; cyme pedunculate; sep. unequal; style united to near the summit, as long as the ovary. 2f Can. to Pa. 1f. Flowers 6½.

21 H. gravéolens Buckley. Stem terete, smooth; leaves oblong-ovate, clasping; sepals and petals narrow; styles 3. 2½ High Mts., N. Car. Strong-scented.

22 H. pilòsum Walt. Rough-downy; stem simple, terete, virgate; lvs. ovate-lanceolate, appressed, clasping, acute; styles distinct. (1) Pine-barrons, South. 1–2½.

23 H. mâtulum L. Stem square, branched; lvs. ovate, 5-veined, clasping, obtuse; cymes leafy; pet. shorter (1½") than sep.; sta. 6–12. (1) Damp sandy soils. 3–9½. Com. β. gymnánthemum, Strict, simple or branched, cy. only bracted. Del., Penn. (Porter).

24 H. Canadéne L. Stem quadrangular, branched; lvs. linear, attenuated to the base, with pellucid and also with black dots, rather obtuse; petals shorter than the lanceolate, acute sepals; stamens 5–10. (1) Wet sandy soils. Capsule red. 6–1½.

25 H. Sarôthra Mx. Stem and branches filiform, erect, and parallel; lvs. very minute, subulate; flowers sessile; stam. 5–10. (1) Sandy soils. 4–1½. FIs. minute.


1 E. Virginíca Nutt. Stem erect, somewhat compressed, subsimple; leaves oblong, amplexical; stamens united below the middle, with 3 in each set. Swamps. 1½f.

2 E. pettolàta Ph. Leaves oblong, narrowed at base into a petiole; flowers mostly in 3’s, axillary, nearly sessile; filaments united above the middle; caps. oblong, much longer than the sepals. Swamps, S. States, N. to N. J. Flowers smaller (½").

ORDER XVII. DROSÉRACEÆ. SUNDEWS.

Herbs growing in bogs, often covered with glandular hairs, with leaves alternate or all radical, mostly cirtinate (rolled from top to base) in vernation. Flowers regular, hypogynous, 5-merous, the Sepals, Petals, and Stamen persistent (withering). Ovaries compound, 1-celled, with the Styles and Stigmas variously parted, cleft, or united. Seeds ∞ in the capsule, albuminous. Embryo minute.

* Stamens 5. Styles distinct. Seeds on the valves of the capsule. .............. DROSÉRA. 1
* Stamens 10–15. Styles united. Seeds all at the base of the cell. ............. DIONÉA. 1
1. **DROSERA**, L. SUNDEW. (Δρόσος, dew; from the dew-like secretion.) Sep. 5, united at base, persistent. Pet. 5. Stam. 5. Sty. 3–5, each 2-parted, the halves entire or many-cleft. Caps. 3–5-valved, 1-celled, many-seeded. 2 or 2' Small marsh herbs. Lvs. covered with reddish, glandular hairs, secreting a viscid fluid. Flowers in a raceme on a slender scape which is at first coiled, uncoiling as the flowers open.

* Scapes 4–6 times as long as the spreading leaves.................................Nos. 1–3
* Scapes 1–2 times as long as the ascending leaves .................................Nos. 4–6

1 **D. rotundifolia** L. Lvs. orbicular, abruptly contracted into the hairy petiole; fls. white. 2 A curious little plant, in bogs and muddy shores. Scapes 6–9', 6–9-flowered. Leaves 1–2', glistening as with dew-drops. Jn—Aug.

2 **D. capillaris** Poir. Lvs. ovobovate, cuneiform at base, the petioles naked; flowers purple; scape erect. 2 Marshes, S. Car. to Fla. Scapes 2–12', 6–12-flowered. May.

3 **D. brevifolia** Poir. Lvs. cuneiform-spatulate, forming a small, dense tuft (1' diam.); petioles very short, hairy; flowers few, rose-colored. 2 N. Car. to Fla. 2–5'.

4 **D. longifolia** L. Lvs. spatulate-oblong or obovate, ascending, alternate, tapering at base into a long, smooth petiole; scape declined at base; pet. wh. 2' 4–7'. Lvs. 2–3'.

5 **D. linearis** Goldie. Lvs. linear, obtuse; petioles elongated, naked, erect; scapes few-flowered, about the length of the leaves (3'); calyx glabrous, much shorter than the ovary capsule; seeds oval, smooth. 2 Borders of lakes, North. White.

6 **D. filiformis** Raf. Lvs. filiform, very long, erect; scape nearly simple, longer than the leaves, many-flowered; petals obovate, serously denticulate, longer than the glandular calyx; style 2-parted to the base. 2 Wet sand. 1f. Purple.


**D. muscipula** Ell.—A very curious plant. Sandy bogs in Car. Lvs. rosulate, lamina roundish, spinulose on the margins and upper surface, instantly closing upon insects and other objects which light upon it. Scape 6–12', with an umbel of 8–10 white flowers. April, May. ±

**Order XVIII. ELATINACEÆ. WATER PEPPERS.**

Flowers small, annual, with opposite leaves and membranous stipules. Flowers minute, axillary. Sepals 2–5, distinct or slightly coherent at base, persistent. Petals hypogynous, as many as the sepals. Stamens twice as many as the petals, anthers introrse. Ovaries 2–6-celled. Stigmas 2–6, capitate; placenta in the axis. Fruit capsular. Seeds numerous, exalbuminous.

**ELATINE**, L. MUD PURSLANE. Fls. 2–, 3–, or 4-parted, symmetrical, all the parts distinct except the united ovaries. Stig. sessile. ≡ Very small plants growing in mud, with minute, axillary, sessile flowers.

1 **E. Americana** Arn. Stems creeping, diffuse, in patches; branches ascending 1–2'; leaves wedge-obovate, 2', obtuse; flowers 2-parted, rarely 3-parted; seeds 6–8.

ORDER XIX. CARYOPHYLLACEÆ. Pinkworts.

Herbs with swollen joints, opposite, entire leaves, and regular $\mathbf{\sqrt[3]{3}}$ (rarely $\mathbf{\sqrt[3]{3}}$) flowers. Sepals persistent. Petals often unguiculate, or bifid, or 0. Stamens distinct, twice as many as the sepals, or fewer. Torus often some developed, separating the whorls. Styles 2—5, ovary 1. Fruit a 1–5-seeded, 1–$\infty$-seeded pod, opening by teeth or valves. Embryó curved around the albumen. Figs. 6, 41, 44, 45, 50, 131, 276, 390, 456.

§ Stigmas present, dry (0 in No. 17). Calyx open. Petals sessile, minute, or 0. Tribe III... (b)
§ Stipes 0.—α Calyx a tube including the long claws of the petals. Pod $\infty$-seeded. Tribe I... (c)
—α Calyx open. Petals sessile (rarely 0 in No. 10). Pod 3–$\infty$-seeded. Tribe II... (e)
—α Calyx open, white. Petals 0. Styles 3. Pod 3-seeded. Tribe IV... Mollichugo. 15

I. SILENEÆ.—α Calyx with scale-like bractlets at base. Styles 2... Diánthus. 1
—α Calyx bracteate.—d Styles 2... Saponaria, 2, or Gyppsofla, 21
—d Styles 3. Pod 5-toothed when open... Silene. 3
—d Styles 3. Pod 10-toothed or 5-valved... Lycium. 4

II. ALSINEÆ.—α Petals roseo-dentate at the end. Styles 3... Holostenum. 5
—α Petals 2-parted (sometimes wanting in No. 7)... (f)
 f Styles 5. Capsule opening at the top by 10 teeth... Crasium. 6
 f Styles 3. Capsule opening to the base by half-valves... Stellaria. 7
—α Petals entire (often wanting in No. 10)... (g)
 g Styles 3, or 5, opposite to the sepals. (No. 7 or)... Arenaria. 8
 g Styles 4, opposite to the 4 sepals. Stamens 4... Menchia. 9
 g Styles 4 or 5, and alternate with the sepals... Sagina. 10

III. ILLECEBREÆ.—α Styles or stigmas 3–5. Pod several-seeded. Pet. colored... (k)
 k Leaves opposite.—l Flowers axillary, solitary... Spergularia. 11
—l Flowers in terminal clusters... Stipulicida. 12
 k Leaves whorled.—m Styles 5, pod 5-valved... Spergula. 13
—m Styles 3, pod 3-valved... Polycarpion. 14
—n Styles or stigmas 2 or 1. Utricle-seeded... (n)
 n Sepals distinct or nearly so, greenish... Paronychia. 15
 n Sepals united into a tube below, white above... Spynnchymia. 16
 n Sepals united into an urn below, green above... Sclectania. 17

1. DIÁNTHUS, L. PINK. Calyx tube cylindrical, striated, with 2 or more pairs of imbricated scales or bracteoles at base. Pet. 5, with long claws, limb irregularly notched. Stam. 10, styles 2, recurved. Capsule cylindrical, 1-seeded, 4-valved at top. Beautiful Oriental plants, everywhere cultivated. Figs. 6, 131, 276.

§ Bracts long-pointed, equaling the calyx tube (dry, obtuse, No. 2).... Nos. 1–4
§ Bracts much shorter than the calyx tube... Nos. 5–7


2 D. pilóler L. Slender, strict, smooth; 1vs. linear, erect, 1—2'; bracts dry, ovate, covering the calyx and pod; pet. small, pink; fl. mostly but 1. Penn. (Porter). § Eur.


4 D. Chinêsis. Leaves lance-linear; flowers solitary; bracteoles spreading, linear. 2 China. 1f. Evergreen, not glaucous. Flowers large, variegated.

5 D. Caryóphyllus. Carnation P. Glanous; leaves linear; flowers solitary; bracteoles very short, ovate; petals very broad, crenate. 2£ England. 2±3£. Fragrant.


7 D. Supérbus. Leaves linear-subulate, green; cymes fastigate; bracts ovate, mucronate; petals pinnatifid-fringed. 2£ Europe. White-roseate. July, August.

§ Calyx tube oblong, neither angled nor veined (Saponària).............. No. 1
§ Calyx tube ovoid, 5-angled, at length 5-winged, very smooth. (Vaccària).... No. 2
1 S. officinàlis L. Bouncing Bet. Lvs. lanceolate; pet. crowned. 2* 2f. White. §
2 S. Vaccària L. Lvs. lance-ovate; fls. cymous, pale red. 1If. Waste grounds. §


1 G. ELEGANS. Lvs. lance., thick; pan. loose, forked; pet. notched, wh. or pink. 1f. ①
2 G. MURÀLIS. Low, diffuse, with linear 1Vs. and a profusion of pinkish small fls. ① 6°.
3 G. PANICULÀTA. Tall; lvs. lance-lin.; fls. minute, numerous, white, in flliform pan. ②
4 G. STÈVENI. Lvs. lance-lin., keeled; fls. white, in corymbs, fine for bouquets. ② 2f.

3. SILÈNE, L. CAMPION. CATCH-FLY. (Silènus was a drunken god of the Greeks, covered with slaver as these plants are with a viscid secretion.) Calyx tubular, swelling, without scales at the base, 5-toothed; pet. 5, unguiculate, often crowned with scales at the mouth, 2 or many-cleft, or entire; sta. 10; styles 3; capsule 3-celled, opening at top by 6 teeth, many-seeded. Figs. 41, 56, 330.

§ Acaulescent, low, tufted. Petals crowned. Perennial......................... No. 1
§ Canescent.—Petals fring-crest, white or rose-color, crownless. Perennial. Nos. 2—4
—Petals bifid or entire.—Calyx inflated, velv. Perennial............ Nos. 5, 6
—Calyx close on the pod. (*)
* Flowers spicate, alternate. Upper leaves linear, lower spat. Annual... Nos. 7, 8
* Fls. not spicate.—Petals pale, closed in sunshine. Upper lvs. linear... Nos. 9, 10
—Petals red, purple, &c.,—bifid............. Nos. 11, 13
—entire............. Nos. 14—15

1 S. acaèulis L. Moss Campion. Low, moos-like; lvs. linear (6'); ped. solitary, short, 1-fl.; calyx bell-shaped; pet. obcordate, crowned. 2f White Mts. 1—3'. Purp. JI.

2 S. stellàlá Alt. Erect, pubescent; lvs. in whorls of 4's, oval-lanceolate, acuminate; cal. loose and inflated; pet. fimbriate. 2 Can. to Car. and W. 2—3f. White. July.


4 S. Baldwìnii Nutt. Weak, hairy; lvs. obovate-spatulate; calyx not inflated; pet. cuneiform, diuvocarly fimbriate. 2f Ga. Fla. 1f. Fls. 2', roseate. April.

5 S. nìvea DC. Minutely puberulent, erect, subsimple; lvs. oblong-lanceolate, acuminate; fls. few, solitary, leafy; cal. inflated; pet. 2-cleft, with a small bifid crown; caps. shorter than its stipe. 2f Penn. to Ill. Rare. 2f. Fls. few, white. July.


7 S. quinquèvulnàla L. Villous; spike somewhat one-sided; cal. very villous; pet. roundish, entire, crowned. ① S. Car. 1f. Pet. crimson, with a pale border. §

8 S. noctàrna L. Lvs. pubescent; fls. small, appressed to the stem in a dense 1-sided spike; cal. cylindrical, smoothish; pet. narrow, 2-parted. ① Ct. to Pa. Rare. 2f. JI. §

9 S. Antirrhìna L. Snap-dragon Catch-fly. Sticky in spots; lvs. lanceolate, acute; fls. few, on slender branches; cal. ovoid; pet. emarginate. ① Waste pl. 1Iff. Fls. r. β. linària. Very scinder; lvs. all linear; cal. globular. Ga. and Fla.

10 S. nàctifióra L. Viscid-pubescent; lower lvs. spatulate; cal. cylindrical, teeth subulate, very long; petals 2-parted. ① Cult. grounds. Flowers large, white. §

12 S. rotundifólia Nutt. Decumbent, branching; lvs. thin, roundish-oval; fls. solitary, very large; calyx cylindric-campanulate; petals bifid and toothed, deep scarlet, crowned. 2f Rocks, W. States. Rare. June—August.

13 S. regá Sims. Splendid Catch-fly. Scabrous, somewhat viscid; st. rigid, erect; lvs. ovate-lanceolate; calyx paniculate; pet. oblanceolate, entire, close at the end; sta. and stig. exserted. 2f. O. to Ill. and S. 3—4f. Bright scarlet. June, July.

14 S. Pennsylvánica Mr. Wild Pink. St. clustered, low; ascending; lvs. spatulate or cuneate, of the stem lanceolate; calyx few-flowered; pet. slightly emarginate, suberecten. 2f Dry soils, N. Eng., S. and W. 6—10f. Fls. pink-red. June. July.

15 S. Arméria L. Garden Catch-fly. Very smooth, glaucous; st. branching, glutinous below each node; lvs. ovate-lanceolate; flowers in flat cymes; pet. obcordate, crowned; cal. clavate, 10-striate. ① 12—18f. July, September. † §

4. LYCHNIS, L. (Ἄυξνος, a lamp; from fancied resemblance or use.) Cal. tube bracteate, 10-veined, limb 5-lobed. Pet. 5, entire or cleft, often crowned. Stam. 10. Styles 5. Caps. more or less 5-celled at base, opening by 5 or 10 teeth. Handsome exotic, cultivated or §.

§ AGRóstémma. Calyx limb of 5 leafy, deciduous lobes exceeding the petals...........No. 1

§ LYCHNIS proper. Calyx limb of 5 persistent lobes shorter than the petals...①

a Fls. dioecious. Petals 2-lobed, white or purplish. Escaped from culture...........No. 2

a Fls. all perfect.—b Petals 2-lobed or entire........................................Nos. 3, 4

—b Petals 4-parted or laciniate........................................Nos. 5, 6

1 L. Githago Lam. Corn Cockle. St. forked; lvs. linear, hairy; fls. few, large, dull purple; seeds large, blackish. 1 Fields. 2—3f. A handsome weed. July. §

2 L. dlúrna L. Stem forked and panicked; fls. ①; pet. half-2-cleft; pod ovoid or subglobose. ① Rare in cultivated grounds. 2f. June—August. § Eur.

3 L. coronária DC. Mullein Pink. Rose Campion. Villous; stem dichotomous; ped. long, 1-flowered; petals broad, entire. 2f Italy. 2f. Purple, &c.

4 L. Chálcédónica L. Scarlet Lychnis or Sweet William. Smoothish; fls. fasciculate; calyx cylindric-clavate, ribbed; petals 2-lobed. 2f Russia. 2f. Scarlet.

5 L. Floscútuli L. Ragged Robin. Fls. fascicled; cal. campanulate, 10-ribbed; pet. in 4 deep, linear segments. 2f Europe. 1—2f. Flowers pink.

6 L. coronáta L. Chinese Lychnis. Fls. terminal and axillary, 1—3; calyx rounded, clavate, ribbed; petals laciniate. 2f 1—2f. Flowers large, red, &c.


H. umbellátum L. Lvs. smooth and glaucous, oblong, sessile; ped. long, terminal, viscid, pedicels reflexed after flowering. ① Fields: rare. ⑥. § Eur.

6. CERÁSTIUM, L. Mouse-ear Chickweed. (Κεράς, a horn; from the resemblance of the capsule.) Sep. 5, ovate, acute. Pet. 5, 2-cleft or lobed. Stam. 10, rarely fewer. Styles 5, opposite to the sepals. Capsule cylindrical or ovoid, elongated, opening at top by 10 teeth, ∞-seeded. Flowers cymous, white. Fig. 44.

§ Petals about as long as the sepals...........................................Nos. 1, 2

§ Petals much longer than the sepals...........................................Nos. 3, 4, 5
ORDER 19.—CARYOPHYLLACEÆ.

1 C. vulgātum L. Hairy, cespitose; lvs. obovate or ovate, obtuse, attenuated at base; fls. in subcapitate clusters; sep. acute, longer than the pedicels; stam. often 5. ① Fields and waste grounds. 6—12'. June—Aug. §

2 C. viscēsium L. Hairy, viscid, spreading; lvs. oblong-lanceolate, rather acute; fls. in loose cymes; sep. obtuse, scarious on the margin and apex, shorter than the pedicels. ② Fields and waste grounds. 5—9'. Plant greener. June—Aug.

3 C. arvēnēse L. Pubescent; lvs. linear-lanceolate, acute; cyme on a long, terminal, peduncle, 4-flowered; petals more than twice longer than the calyx; capsule scarcely exceeding the sepals. ② Rocky hills. 4—10'. May—Aug.

4 C. oblōngifōlium Torr. Villous, viscid above; lvs. oblong-lanceolate; flowers numerous, in a spreading cyme; pet. twice as long as the sepals; capsule about twice as long as the calyx. ② Rocky places. Rare. 6—10'. Fls. large. April—June.

5 C. nūtās Raf. Viscid-pubescent, erect; lvs. lanceolate; fls. many, diffusely cymose, on long, filiform, nodding pedicels; pet. nearly twice as long as the calyx; capsule a little curved, nearly thrice as long. ① Low grounds. 8—12'. May.

7. STELLARIA, L. STAR CHICKWEED. (Lat. stella, a star; from the stellate or star-like flowers.) Sep. 5, connected at base. Pet. 5, 2-parted, rarely 0. Stam. 10, rarely fewer. Styles 3, sometimes 4. Caps. ovoid, 1-celled, valves as many as styles, 2-parted at top. Sds. many. Small herbs in moist, shady places. Fls. in forked cymes or axillary, small, wh. Fig. 456.

§ Stems hairy mostly in lines, leafy to the top. Leaves broad………Nos. 1, 2, 3
§ Stems all glabrous,—a leafy to the top. Petals sometimes wanting……Nos. 4, 5, 6
—α leafless above, with scarious bracts………Nos. 7, 8, 9

1 S. mēdiā Smith. Lvs. ovate; st. procumbent, with an alternate, lateral, hairy line; pet. shorter than the sep.; stam. 3 to 5 or 10. ① A common weed. April—Nov.

2 S. prostrātā Baldw. Lvs. ovate, the lower on long petioles; sts. procumbent, pubescent; fls. on long pedicels; pet. longer than sepals; stam. 7. ① Ga. Fla. Mar. Ap.

3 S. pūbera Michx. Stem ascending, pubescent in 1 lateral or 2 opposite lines; lvs. oblong, acute, sessile; pet. longer than the white-edged sep. ② Pa. S. and W. Apr.Jun.

4 S. unifōrā Walt. Smooth, erect from a prostrate base; lvs. linear-subulate, remote; ped. long, 1-flwd.; pet. obcordate, twice longer than cal. ② Swamps, S. 10—12'. May.

5 S. boreālis Bw. Smooth, weak; lvs. veinless, lance-oblong; ped. at length axillary, 1-flwd.; pet. 2-parted (often 0), as long as calyx. ② Wet shades, N. Eng. to Wis. 6—15'.

6 S. crassifiōlā Ehrh. Sts. weak; lvs. linear-oblong, thickish; pet. longer than the cal., or 0; sds. roughened. Wet rocky places, Ky. and N. (Sagina fonthaliles Sh. & Pet.)

7 S. uliginōsa Murr. Decumbent; lvs. lance-oval and oblong, velv. cymes lateral, sessile, leafless; sep. 3-veined, as long as the bifid pet. ② Springs, Md. to N. II., and W.

8 S. lōngipes Goldie. Smooth and shining; lvs. linear-lanceolate, broadest at base; ped. erect, filiform, cymose; sep. with membranous margins, shorter than the petals. ② Me. to Mich. and N. June.

9 S. longifōlā Muhl. Lvs. linear; cyme terminal, naked, at length lateral, the pedicels spreading; petals longer than the calyx. ② Common. July.

8. ARENĀRIA, L. SANDWORT. (Lat. arena, sand, in which most species grow.) Sep. 5, spreading. Pet. 5, entire, or notched, rarely 0. Stam. 10, rarely fewer. Styles 3, rarely more or fewer, opposite to as many sepals. Capsule 1-celled, co-seeded, opening by valves or half-valves. Slender herbs, mostly tufted, with white flowers. (The following sections have sometimes been regarded as genera.)

§ ARENĀRIA. Caps. splitting into 6 half-valves. Lvs. acute. Seeds naked………Nos. 1, 2
§ MOSERINIA. Caps. as above. Lvs. and sep. obtuse. Sds. strophiolate………No. 3
§ Honkenya. Caps. splitting into 3 (–5) valves. Disk large, 10-lobed............No. 11
§ Aliscea. Capsule splitting into 3 entire valves. Disk inconspicuous.(a)
   a Sepals 3 or 5-veined, acute, or acuminate.........................No. 4, 5, 4
   b Sepals veinless, obtuse. – 9 Leaves rigid, subulate, imbricated............No. 7

1 A. serpyllifolia L. St. dichotomous, spreading; lvs. ovate, acute, subulate; pet. shorter than the acute sep.; pod ovate. ① Sandy pl. 2–5'. Lvs. 2–3'/2. Jn.–Aug. §
2 A. diffusa Ell. St. long, diffuse; lvs. lance-ovate, acute at both ends; ped. 1-flwd.; pet. oval, much shorter than the calyx, or 0. ② Moist woods, S. 2–5f. Apr. June.
3 A. lateriflora L. Upright, slightly pubescent; lvs. oval, obtuse; ped. lateral, 2 to 3-flwd.; seeds (strophiolate) appended at the hilum. ② Damp shades, N. 6–10'. Jn.
5 A. Pitcheri T. & G. Erect, fastigiately branched, almost glabrous; lvs. linear, obtuse, flat; pet. entire, twice as long as the 5-veined sepals. ① Tenn. and W. 3–6'.
6 A. strícta Mx. Glabrous, diffuse; st. branched from the base; lvs. subulate-linear, rigid, so fascicled in the axils as to appear whorled; cymes few-flowered, with spreading branches. ② Sterile grounds. 8–10'. May, June.
7 A. squarrosa Mx. Caespitous; stem few-flowered; lower leaves squarrosely-imbricate, crowded, upper ones few, all subulate, channelled, smooth; petals obovate, 3 times longer than the sepals. ② Barrens, L. I. to Ga. 6–10'. April–Aug.
9 A. breviflólia N. Erect (not tufted), few-leaved; stems many, filiform; lvs. minute, few, remote, ovate-subulate; sepals obtlong. ① Rocks, Ga. 2–4'. May.
10 A. glábra Mx. Caespitose, glabrous; sts. filiform; lvs. linear setaceous, spreading; sep. oval, veinless, half as long as the petals. ② Mts. S. 4–6'. Fls. 6'/2. July.
11 A. peplóides L. Sts. creeping, with upright branches, tufted; lvs. ovate, fleshy, half-clasping; fls. small, the veinless sepals exceeding the petals. ② Coast. 1f. May.

9. MÓENCHIA, Ehrh. (Dedicated to Móench, a German botanist.) Sep. 4, as long as the 4 entire petals and opposite to the 4 styles. Stam. 4. Caps. ovoid, not exceeding the calyx, opening by 8 teeth, ∞-seeded. ① Low, smooth, glaucous. Flowers white.

M. quaternélla Ehrh.—Dry places, Md. Stems simple, 2–3', with 1 or 2 flowers. Leaves lance-linear, acute. Apr. May. § Eur. (Sagina erecta L.)

10. SAGINA, L. PEARLWORT. (Lat. sagina, food or nourishment; badly applied to these minute plants.) Sep. 4 or 5. Pet. 4 or 5, entire, often 0. Stam. as many or twice as many as the sepals. Styles 4 or 5, alternate with the sepals, but the valves of the pod are opposite. Diminutive herbs with linear leaves and small white flowers.

* Petals 0, or 4, and much shorter than the 4 sepals. Stam. 4.............Nos. 1, 2
* Petals 5, equalling or much exceeding the 5 sepals. Stam. 10...............Nos. 3, 4

1 S. procumbens L. Procumbent, glabrous; pet. about half as long as the roundish, obtuse sepals, sometimes 0; lvs. linear-filiform. ② Damp, N. 3–4'. June.
2 S. apétala L. Erect, puberulent; pet. very minute, or none; sep. oblong, acute; lvs. linear-subulate. ① Sandy, N. Y., N. J. and W. Stems filiform, 2–4'. May, Jn.
3 S. subulátà Wimmer. Smooth or puberulent, tufted; lvs. filiform-linear, mucronate, shorter than the erect ped.; pet. 5, as long as the ovate, obtuse sep., rarely 0. ② Sandy, S. 2–6'. Lvs. 6'/2. March, April. (S. Elliottii Fenzl.)
4 S. nodósa Fenzl. Tufted, ascending, glabrous; lvs. subulate, the upper very short and fascicled; pet. much longer than the sepals. ② Sandy shores, N.

1 S. rubra Presl. Decumbent, divaricately branched, slender; stip. triangular-acuminate; lvs. linear; sep. lanceolate, with scarious margins; pet. as long, pink-red; seeds rough, marginless. 2 Sandy, near the coast. 3—6'. May—October.

2 S. marina. Plant thick and fleshy; caps. a third longer than the calyx, with the seeds nearly smooth and mostly margined. Otherwise like No. 1, and perhaps not distinct. 2 Salt marshes. May—October. (Arenaria, L.)

12. STIPULÍCIDA, Michx. (Lat. stipula, eedo; the stipules being much cleft.) Sep. with scarious margins. Pet. 5, as long as the sepals, entire. Stig. 3, subsessile. Caps. subglobose, 3-valved, few-seeded. 1 A slender, tufted, dichotomously branched herb, almost leafless, with the small flowers in terminal cymes.

S. setacea Mx.—Dry sand, Ga. Fla. Stems almost setaceous, 6—10'. Joints distant, with a fringe of leaves and stipules \( \frac{1}{2}' \). Root leaves roundish, 1'. Fls. reddish. May—July.

13. SPÉRGULA, L. SPURRY. (Lat. spergo, to scatter; from the dispersion of the seeds.) Sep. 5. Pet. 5, entire. Stamens 5 or 10. Styles 5. Caps. ovate, 5-valved, seeds \( \infty \). Embryo coiled into a ring. 1 Herbs with fls. in loose cymes. Leaves verticillate. Stipules scarious.

S. arvensis L. Lvs. filiform; ped. reflexed in fruit; ads. reniform, angular, rough. Cultivated grounds. 1—2fl. Lvs. 1—2', many in a whorl. May—August. §

14. POLYCÁRPON, L. ALL-SEED. (Polóνs, much, καρπός, fruit; the pods are many.) Sepals 5, carinate. Pet. 5, emarginate. Stam. 3—5. Style short, 3-cleft. Caps. 3-valved. 1 Low, diffuse, with whorled lvs.

P. tetraphyllum L. Lvs. spatulate or oval, tapering to a petiole, some of them in whorls of 4; stam. 3. Around Charleston, S. Car. 3—6'. Lvs. 3—5'. Fls. minute. §

15. PARONÝCHIA, Tourn. NAILWORT. (Parôδ, with, ὀνυξ, the nail; i. e., the whitlow; supposed cure for.) Sep. 5, linear-oblong, con- vent, mucronate or awned near the apex. Pet. or sterile filaments very narrow and scale-like, or none. Stam. 2, 3, or 5. Stig. 2, with the styles more or less united into 1. Utricle 1-seeded. Low herbs dichotomously branched, with scarious, silvery stipps., and at least the lower lvs. opposite.

§ PARONÝCHIA. Sepals evidently awned at apex. Lvs. linear and subulate....Nos. 1, 2
§ ANÝCHIA (Mx. partly). Sep. merely mucronate at apex. Lvs. lanciolute to oval.(*)
* Stems procumbent, diffuse on the ground. Stamens 5 ......... Nos. 3, 4
* Stems erect, with diffusely ascending branches. Stamens 2 or 3 ....... Nos. 5, 6

1 P. dichótoma Nutt. Glabrous, densely branched; lvs. acerose, mucronate; bracts like the leaves; cymes fastigate, with no central flower; sepals 3-valved, cuspidate. 2 Rocks, Va. to Car. and Ark. 6—12'. Lvs. 1'. July—November.

2 P. argyrócoma Nutt. Pubescent, tufted, decumbent; lvs. linear, acute; cymes glomerate, terminal; fls. enveloped in dry, silvery bracts; sep. hairy, 1-valved, setaceously cuspidate. 2 Mls. N. H. Va. to Ga. 4—10'. Lvs. 6—10'. July.

3 P. herniarioides Nutt. Scabrous, diffusely branched; lvs. oval or oblong, mucronate; the ramal alternate. Fls. sessile in the axils of the leaves; sep. 3-valved, merely mucronate. 2 Sand, S. Small, flat. Lvs. 1—3'. July—October.
4 P. Baldwinii Chapm. Diffusely branched, procumbent; leaves linear-lanceolate, very acute, all opposite; flowers longer than the sepalaceous stipules, mostly terminal, stalked; stam. 5. Dry fields, Fl. Ga. 6–10'. Lvs. few. July—Oct.

5 P. Canadensis. Stem erect, slender, pubescent, many times forked, with slender or capillary branches; lvs. lanceolate, the ramial alternate; style none; utricle equaling the sepals. (1) Woody hills.

b. pumila. Dwarf (2–4'), tufted; fls. closely sessile; style as long as ovary, forked at apex. Dry hills, Md. (Mr. Shriver.)

16. Siphonochla, Torr. and Gr. (Σίφων, a tube; that is, Anychia with a tubular calyx.) Sep. linear, petaloid above, coherent into a tube below, unarmed. Pet. 5 setae alternate with the stamens on the throat of the calyx. Style filiform, minutely bifid; utricle included. (1) Diffuse and widely spreading. Fls. in glomerate, terminal cymes, white. Jn.—Oct.

§ Calyx tube bristly with hooked hairs. Stems prostrate, diffuse..............Nos. 1, 2
§ Calyx smooth or merely pubescent. Stems erect..............................Nos. 3, 4

1 S. Americana T. & G. Sta. pubescent in lines; lvs. lanceolate; sep. rounded, incurved at apex; fls. solitary and clustered. (1) S. Car. to Fla. 1–2'. Lvs. small.

2 S. diffusa Chapm. Pubescent; lvs. lanceolate, obtuse; sep. linear, mucronate; fls. in dense cymes. 1 Pine-barrens, Fla. 1f.

3 S. erecta Chapm. Sta. smooth, rigidly erect, subsimple; lvs. linear; sep. lanceolate, tube smooth, furrowed. 24 Sands, Fla. 6–12'.

4 S. Rugelli Chapm. Erect, dichotomous, pubescent; lvs. oblanceolate; sep. conspicuously mucronate, the tube hairy. (1) E. Fla. 1f. (Paronychia, Shutt.)

17. Scleranthus, L. Knawel. (Σκληρός, hard, κρύσταλλος; the calyx hardens in fruit.) Sep. 5, united below into a tube contracted at the orifice. Pet. 0. Sta. 10, rarely 5 or 2. Styles 2, distinct. Utricle very smooth, enclosed in the hardened calyx tube. (1) A prostrate, diffuse little weed, extipulate.

S. annuus L. Dry fields and road-sides, N. and M. 3–6'. Lvs. linear, acute, short, partially united at their bases. Fls. very small, green, in axillary fascicles. July.


M. verticillata L. Lvs. cuneiform, acute; st. prostrate, branched; pedicels 1-flowered, subumbellate; sta. mostly but 3. (1) Dry fields. 6–10'. White.

ORDER XX. PORTULACACEAE. PURSLANES.

Herbs succulent or fleshy, with entire leaves, no stipules, and regular flowers. Sepals 2, united at base. Petals 5, more or less imbricated. Stamens variable in number, but opposite the petals when as many. Ovaries free, 1-celled. Styles several, stigmatous along the inner surface. Fruit a pyxis, dehiscing by a lid, or a capsule, loculicidal, with as many valves as stigmas. Seeds with a coiled embryo. Figs. 122, 123.
ORDER 23.—MALVACEÆ.


2 P. grandiflòra. Upright; lvs. linear, acute; fls. large, rose-purple. ① S. Am. 8'.

3 P. gilléshii. Upright; lvs. short, terete, blunt; fls. large, deep purple. ① S. Am.


T. tereftòlum L. Stem short, thick, with crowded linear lvs. at the ends of the short branches, with long (6") terminal, naked peduncles, bearing a cyme of purple, ephemeral flowers. ④ Rocks, Penn. to Ga. June—Aug.

3. CLAYTONIA, L. Spring Beauty. (In memory of John Clayton, one of the earliest botanists of Virginia.) Sep. 2, ovate or roundish. Pet. 5, emargined or obtuse. Stam. 5, inserted on the claws of the petals. Stig. 3-cleft. Caps. 3-valved, 2—5-seeded.—Small, fleshy, early flowering plants, arising from a small tuber. (Stem with 2 opposite leaves.)

1 C. Carolìnìa Mx. Lvs. ovate-lanceolate; sep. and pet. obtuse. ④ Moist woods. Stem 3', bearing 2 (rarely 3 or 4) leaves; root leaves few; fls. white, with purple lines.

2 C. Virgìnìca L. Lvs. linear or lance-linear; sepals rather acute; petals obovate, mostly emarginate or retuse; ped. slender, nodding. ④ In low, moist grounds, more common than the first, the 2 opposite leaves 3—5' long. Flowers roseate.

4. CALANDRÍNIA, H. B. K. (Calandrini was an Italian botanist.) Sep. 2. Pet. 3—5. Stam. 4—15, mostly hypogynous. Style short, stig. 3. Caps. 3-valved.—Herbs of Chili and California, smooth, with alternate leaves and purple flowers.

1 C. grandiflòra. Leaves rhomboid; raceme terminal. ④ Chili. ① Fls. near 2'.

2 C. speciòsa. Leaves linear-spatulate; flowers axillary. ① Cal. 6'. Fls. 1' broad.

Order XXIII. MALVACEÆ. Mallow.

Herbs or shrubs with alternate, stipulate leaves and regular flowers, with 5 sepals united at base, valvate in the bud, often subtended by an involucre; 5 petals hypogynous, convolute in the bud, with the stamens ∞ monadelphous, hypogynous, and 1-celled reniform anthers. Pistils several, distinct, or united, and stigmas various. Fruit a several-celled capsule, or a collection of 1-seeded indehiscent carpels. Seeds with little or no albumen, and a curved embryo.

$ Calyx naked, i. e., having no involucre. (b)

$ Calyx involucrellate.—Carpels (and styles) more than 5. (a)

—Carpels 3 to 5 only,—1-seeded. (c)

—3—∞-seeded. (d)
1. **ALTHÆA, L.** Marsh Mallow. ("Αλθω, to cure; the mucilaginous root is highly esteemed in medicine.) Calyx surrounded at base by a 6-9-cleft involucre. Styles ‡, with linear stigmas. Carpels ‡, 1-seeded, indehiscent, arranged circularly, and at maturity separating from the axis.  

1 A. officinalis L. Lvs. soft-downy on both sides, corotate-ovate, dentate, somewhat 3-lobed; ped. much shorter than the leaves, axillary, many-flowered. 2f Salt marshes, North. 3f. Flowers large, pale purple. Sept. § Eur.  

2 A. ròsea Cav. Hollyhock. St. erect, hairy; lvs. corotate, 5-7-angled, rugous; fls. axillary, sessile. 2 Gardens, often sowing itself. 6f. Flowers of all colors. §  

2. **MALVA, L.** Mallow. (Μάλαξί, soft; on account of the soft mucilaginous properties.) Calyx 5-cleft, the involucre 3-leaved. Pet. obcordate or truncate. Styles ‡, with linear stigmas. Carpels ‡, 1-celled, 1-seeded, indehiscent, arranged circularly, and at maturity separating from the axis.  

* Leaves triangular-hastate, crenate, scabrous. Carpels acute..........................No. 1  
* Leaves orbicular, with 5—7 angular lobes. Carpels obtuse..............................Nos. 2—4  
* Leaves palmately 5-7-parted...............................................................Nos. 5—7  

1 M. triangulàta Lav. Rough-hairy; lvs. triang.-hastate, crenate; the lower cor- date; panicle many-flowered; carp. 10—15, slightly beaked, at length 2-valved. 2f Dry prairies, W. and S. 2—3f. Petals 1', purple. July, Aug. (Callirrhœa triang. Gr.)  

2 M. rotundifòlia L. Low Mallow. St. prostrate; lvs. obtusely 5-lobed; cor. pale, twice as long as the calyx. 2f Waste grounds. 1f. June, July. § Eur.  

3 M. sylvéstris L. High Mallow. St. erect; lvs. 5—7-lobed, lobes rather acute; pet. purple, 3 times longer than sepals. 2f Waysides. 3f. June, July. § Eur.  

4 M. crispa L. St. erect; lvs. angular-lobed, dentate, crisped, smooth; fls. axillary, sessile, white. 1 Gardens and waste grounds. 5f. June—Aug. § Syria.  

5 M. moschàta L. Musk Mallow. Erect; radical lvs. reniform, incised, cannine 5- parted, the segments linear-cuneiform, incisely lobed; peduncles shorter than the leaves. 2f Gardens and waysides. 2f. Flowers large, roseate. July. § Eur.  

6 M. Al'icea L. Erect; rt. lvs. angular; st. lvs. 5-lobed, the lobes merely incised; stem and calyx velvety. 2f Escaped from gardens: rare. 3f. Fls. purple. July. † § Eur.  

7 M. Papàver Cav. Poppy Mallow. Lvs. 3—5-parted, segm. oblong or linear, entire or toothed; fls. on very long peduncles; bracteoles 1—3, subulate. 2f Open woods, South. 12—18'. Flowers bright red. May, June. (Callirrhœa Pavaver Gr.)  

3. **LAVATÈRA, L.** (Named in honor of the two Lavaters, physicians of Zurich.) Calyx subtended by an involucre of 3 united bracteoles. Stigmas ‡, filiform. Carpels ‡, 1-celled, 1-seeded, indehiscent, arranged circularly as in Malva.  

L. trimes correspondence. Annual; lvs. roundish-cordate, the upper angular; fls. large, red, solitary. Europe. 2f. The flowers vary to white. July, Aug.
4. **MODIOLA**, Mönch. (Lat. modiolus, a certain measure; from the fancied resemblance of the fruit to a basket.) Calyx 5-cleft, with an involucel of 3 bractlets at base. Stigmas 15–20, capitate. Carpels same number, 2-seeded, transversely 2-celled, 2-valved. ①② Prostrate, with cleft leaves and small flowers.


5. **MALVASTRUM**, Gray. (Name altered from *Malva.*) Involutel of 1–3 leaves, or 0. Styles 5–20. Stigmas capitate. Carp. 5–∞, often beaked or awned, each 1-seeded.

1 **M. angustum** Gr. Branched, erect, hairy; lvs. lanceolate, with bristle-form stip.; invol. bristleform; carp. 5, dehiscent. ① S. Car. Ga. 1f. Fls. yellow. (Sida, Ph.)

2 **M. tricuspidatum** Gr. Shrubby; rough-hirsute; lvs. ov.-oblong; stip. lanceolate; invol. 3-leaved; carp. 10–12, 3-awned at apex. ① S. Fla. 1f. Yellow.

6. **NAPřEA**, Clayt. (Napřėa, a wooded valley between mountains, where Clayton discovered the plant.) Involutel none. Calyx 5-toothed; fls. dioecious. Styles 6–8, with filiform stigmas. Carpels as many, 1-seeded, indehiscent, beakless, circularly arranged. ① Tall, with large, palmately divided leaves and small white flowers in leafy panicles.


7. **SIDA**, L. Involutel 0. Fls. perfect. Calyx 5-cleft. Styles 5 or more, with the stigmas capitulate or truncate. Carp. 5–∞, 1-seeded, finally separable. Herbs or shrubs, mostly tomentous.

* Leaves palmately parted. Flowers rose-white. Carpels beaked...........Nos. 1, 2
* Leaves undivided. Flowers red or yellow.—① Carpels 5 or 7.............Nos. 3, 4
   —① Carpels 10–12............Nos. 5–8


2 **S. alcœoides** Mx. Strigous-pubescent; lvs. palmately 5-7-parted, the segments laciniate; fls. corymbed, terminal; carp. 10, acute. ② In barren oaklands, Tenn. Ky. 1–2f. Fls. nearly as large as in the Musk Mallow. (Callirrhoe alcœoides Gr.)

3 **S. spinosa** L. St. rigid; lvs. ovate-lanceolate, serrate, with a spinous tubercle at the base of the petiole; stip. setaceous, shorter than the petioles or axillary peduncles; carp. 5, birostrate. ② Sandy, M. and W. 8–16". Yellow. July. §

4 **S. ciliäris** Cav. St. prostrate; lvs. elliptical, obtuse; stip. setaceous, and calyx ciliate; carp. 7, tipped with 2 spines; fls. red. ② S. Fla.

5 **S. stipulātā**, Cav. Smoothish; leaves rhombic-lanceolate, dentate; stip. subulate, longer than the petioles, persistent; carpels 10–12, pointed with 2 short spines. ② Sandy soils, S. 18'. Pet. 5'/, yellow. July. (S. hispida C-B.)

6 **S. Elliottii** Torr. & Gr. Lvs. linear-oblong, obtuse at base; ped. 1-flowered, a little longer than the petioles; caps. truncate. ② Sandy soils, S. 3f. Yellow.

7 **S. rhombifiolia** L. Leaves rhombic-oblong, serrate, cuneate and entire at base; ped. much longer than the petioles; caps. 2-beaked. ① S. Car. to Fla. 2f. Yellow.

8. **ABUTILON**, Dill. **INDIAN MALLOW.** Calyx 5-cleft, without an involucel, often angular. Styles 5 to 20, with capitate stigs. Carpels as many, arranged circularly, each 1-celled, 3 to 6-seeded, and opening by 2 valves.
§ HERBACEOUS. Lvs. ovate, crenate, acuminate, velvety. Fls. erect...... Nos. 1, 2
§ SHRUB. Leaves 3-5-acuminate-lobed. Fls. pendulous..............No. 3
1 A. Avicénna Gart. Tomentous; lvs. roundish, cordate; ped. shorter than the long petiole; carp. about 15, inflated, 2-beaked, 3-seeded. (1) Waste places. 3f. Yel. Jl. §
2 A. Hulseannum Torr. Pilous-hispid; lvs. roundish; ped. 3-5-flowered; carpels about 12; fls. near 2' broad, light purple. Fls. Lvs. small, whitish beneath.
4 A. vexillárum. Shrub with long, slender, drooping branches; leaves lance-ovate, cordate, crenate-serrate; flowers droop on filiform stalks, cylindrical; calyx scarlet, corolla golden yellow, column exserted. Greenhouse. Flowers all Winter.


10. PAVÓNIA, L. (Latin pavo, peacock; suggested by the colors.) Involute of 5 or more bracteoles. Calyx 5-cleft. Carpels 5, half as many as the branches of the style, 1-seeded. Stig. capitate. Fruit dry. §
P. Lécóntii T. & G. Shubby; lvs. sagittate-oblong, obtuse, hoary-tomentous beneath; bractlets 5; carpels blunt, rugous. 5f. Ga. (Mr. Jones), rare. Fls. 18f diam, rose-white, with a deep purple centre. (P. Jonesi C-B.)

11. KOSTÉLÊTZYKA, Presl. (In honor of Kosteletszy, a German botanist.) Calyx, involucre, styles, &c., as in Hibiscus. Fruit a 5-celled, de-pressed capsule, with a single seed in each cell.

K. Virginica Presl. Lvs. acuminate, cordate, ovate, dentate, upper and lower ones undivided, middle 3-lobed; ped. axillary, and in terminal racemes; fls. nodding; pistils declinate. 2' Marshes, L. I. to Ga. 3f. Fls. 24', rose-red. Aug.

12. HIBÍSCUS, L. Calyx 5-cleft, subtended by an involucre of many bractlets. Column long with the stamens lateral and the 5 stigmas capitate. Fruit a 5-celled capsule, loculicidal, the valves bearing the partitions in the middle. Seeds 3 or many in each cell. 2' Flowers large and showy. Plants often cultivated.

§ Hibíscus proper. Calyx equally 5-cleft or toothed, persistent... (a)
§ Abelmoschus. Calyx tube in flowering split down to the base on one side...... Nos. 12, 13
a Shrubs and trees. Leaves undivided, ovate, &c. Stip. persistent...... Nos. 9—11
a Herbs.—5 Calyx, &c., tomentous. Lvs. undivided, angularly lobed...... Nos. 1, 2, 3—5 Calyx, &c., hispid. Leaves palmately divided.............. Nos. 4, 5—5 Calyx, &c., glabrous.—c Leaves strongly 3-5-lobed.............. Nos. 6, 7—c Leaves ovate, undivided.............. Nos. 8
1 H. Moseheútos L. Simple, erect, hoary-tomentous; lvs. ovate, obtusely dentate, some 3-lobed; ped. long, often cohering with the petiole; pod and seeds smooth; sepals abruptly pointed. Brackish marshes. 4—6f. Fls. 6' diam., roseate. Aug.
β. floréscens. Fls. larger (pet. 4' long), of a light sulphur-yellow, with a purple centre. Marshes, Indiana to Fla. (H. incanus Wendl.)
5 **H. Triönum** L. *Flower-of-an-Hour.* Hispid; leaves 3-parted, middle segments long, all sinuate-lobed; bractlets' entire; calyx inflated, membranous; flowers yellowish, dark-brown centre, ephemeral, numerous. Fields and gardens. § Italy.

6 **H. militaris** Cav. Glabrous; leaves hastately 3-lobed, lobes acuminate, serrate; corolla tubular-campanulate; capsules smooth, ovoid-acuminate; seeds hairy. 2 Penn., S. and W. 4f. Petals flesh-color, purple at base, 't. July, August.

7 **H. coccineus** Walt. Very smooth; lvs. palmate, 5-parted, lobes lanceolate, acuminate; corolla expanding; caps. ovoid. 2 South. 6f. Flowers 6', scarlet, July, Aug.

8 **H. Carolinianus** Muhl. Smooth; lvs. cordate, ovate, acuminate; ped. free from petiole; pet. downy inside, purple, 't; pod globular. 2 Wilmington Isl., Ga. (Elliott).

9 **H. Syriacus** L. *Althaea. Tree Hibiscus.* Lvs. ovate, cuneiform at base, 3-lobed, dentate; ped. scarcely longer than petiole. Fls. wh.-purp. or roseate. 8—15f. § Syria.

10 **H. Floridânus** Shutt. Hispid; lvs. ovate-cordate, obtuse, small; lvs. pendulous on long peduncles, scarlet or crimson; stamens exerted. S. Fla. 4—5f. Fls. 1'.

11 **H. Rosa-Sinensis. Chinese H.** Shrub with very smooth ovate pointed lvs. coarsely dentate at end; lvs. very large, dark red, varying to buff, yellow, striped, and double.

12 **H. esculentus. Okra.** Lvs. cordate, 5-lobed, obtuse, dentate; petiole longer than the fl.; involucel about 5-leaved, caducous. 15f. Cult. for its large, mucilaginous pods.

13 **H. Mánítor.** Lvs. divided into 5—7 linear, pointed, few-toothed lobes; bractlets of the involucel 5—7, persistent. 2 China. 4f. Fls. sulph.-yellow, purp. centre. Jl. +

13. **GOSSYPIUM, L. Cotton Plant.** Calyx obtusely 5-toothed, surrounded by an involucel of 3 cordate leaves, deeply and incisely toothed. Stamens very numerous, lateral. Stigmas 3, rarely 5, clavate. Seeds ∞, involved in cotton. Flowers yellow. Fig. 201.

1 **G. herbarècum.** Leaves 3-5-lobed, with a single gland below, lobes mucronate; seeds brownish, cotton white. 15f. Cultivated South. Yellow.

2 **G. barradéense. Sea Island C.** Leaves with 5 glands on the mid-vein below; seeds black, cotton white, long and silky. 2 Coasts, South. Planted in Autumn.

**Order XXIV. STERCULIACEÆ. Silk Cottons.**

Large trees or shrubs with simple or compound leaves, with flowers similar to those of the Mallow, except that the anthers are 2-celled and turned outward. *Fruit* capsular, of 3, rarely 5 carpels.

* Involucel 0. Petals 0. Carpels 3. Stamens 10—20, all fertile, monadelphous. *Sterculia.*

1. **STERCULIA, L.** Calyx 5-lobed, sub-coriaceous. Stam. monadelphous, united into a short, sessile cup. Anth. adnate, 10, 15, or 20. Carp. 5, distinct, foliolar, 1-celled, 1—∞-seeded.—Trees with axillary panicles or racemes. (See Addenda.)


**Order XXIV. ös. TAMARISCINEÆ. Tamarisks.**


ORDER XXV. TILIAE. LINDENBLOOMS.

Trees or shrubs (rarely herbs) with simple, stipulate, alternate, dentate leaves, with flowers axillary, hypogynous, usually perfect and polyadelpous; with the sepals 4 or 5, deciduous, valvate in bud, the petals 4 or 5, imbricated. Stamens ∞, with 2-celled, versatile anthers. Ovary of 2—10 united carpels, and a compound style. Fruit dry or succulent, many-celled, or 1-celled by abortion. Embryo in the axis of fleshy albumen.

1. CORCHORUS, L. Sep. and pet. 4 or 5. Stam. ∞, rarely as few as the petals. Style very short, deciduous, stig. 2 to 5. Caps. roundish or siliquose, 2-5-celled, many-seeded. § Flowers yellow.

C. siliquősus L. Lvs. ovate-lanceolate, acuminate, equally serrate, 4 times longer than the petioles; caps. siliquose, linear, 2-valved. La. to Fla. Flowers 4-merous.

2. TÍLIA, L. LINDEN OR LIME TREE. Calyx of 5, united sepals, colored. Cor. of 5, oblong, obtuse petals, crenate at apex. Stam. ∞, somewhat polyadelpous, each set (in the N. American species) with a petaloid scale (staminodium) attached at base. Ov. superior, 5-celled, 2-ovuled. Caps. globose, by abortion 1-celled, 1-2-seeded. § Lvs. coriaceous. Fls. cymous, cream-white, with the peduncle adnate to the vein of a large leaf-like bract.

§ Staminodia 5, petaloid, opposite the petals. Leaves mucronate-serrate....Nos. 1, 2
§ Staminodia none. Stamens scarcely cohering.................................No. 3
1 T. Americánæa L. Bass-wood. Lvs. broad coriaceous, unequal at base, acuminate, coriaceous, smooth, and green on both sides; pet. truncate or obtuse at apex; sty. as long as the petals. Woods, N. and M. States. 70f. June. Timber valuable.

β. Walleri. Lvs. pubescent (but green) beneath. A large tree. Va. to Fla.

2 T. heterophýlla Vent. White Bass-wood. Lvs. obliquely subordinate, scarcely acuminate, white and velvety beneath, shining, and dark green above; pet. obtuse, crenulate; sty. hairy at base, longer than the petals. River banks, W. 40f.

β. alba. Lvs. whitish and minutely tomentous beneath, serratures fine and long-mucronate. Ky. and South along the mountains. 80f.

3 T. Européa L. Lime Tree. Lvs. suborbicular, obliquely coriaceous, abruptly acuminate, serrulate, twice as long as the petioles, glabrous except a woolly tuft in the axis of the veins beneath. Parks. 40f. † Eur.

ORDER XXVI. CAMELLIACEÆ. CAMELLIAS OR TEAWORTS.

Trees or shrubs with alternate, simple, feather-veined, exstipulate leaves. Flowers regular, polyandrous, hypogynous, cyanic, with sepals and petals imbricated, the former often unequal in size. Stamens more or less coherent at base into one, three, or five sets. Anthers 2-celled. Seeds few, with little or no albumen. Cotyledons large.

§ Calyx of many imbricated sepals. Stamens monadelphous..............................CAMELLIA. 1
§ Calyx simple.—Stamens united at the base into one set..............................STUARTIA. 2
—Stamens in 5 sets, adhering to the base of the petals..............................GORDONIA. 3
1. CAMÉLLIA, L. **TEA ROSE.** Tea. Sepals many, imbricated, the inner ones larger. Fil. ∞, shorter than the corolla, united at base, some of the interior free. Styles united. Stigmas 3—5, acute. 5 5

1 C. **JAPONICA** L. **Japan Rose.** Leaves ovate, acuminate, acutely serrate, glabrous and shining; flowers terminal, solitary; petals obovate; stamens 50 (mostly transformed to petals); stigmas 5-cleft. Tree in Japan, here a beautiful greenhouse shrub.

2 C. (Thea) **BOHEA.** Shrubs 4; lvs. elliptic-oblong, acute, some rugous, twice as long as broad; flowers axillary, white. Cultivated throughout China and Japan—rarely here.

3 C. (Thea) **VIRIDIS.** Shrubs 4; lvs. lance-oblong, thrice longer than broad, flat, acute; fls. white, 1' broad. China. The leaf of these shrubs, variously cured, is the Bohea, Black, Green, or Imperial Tea.

2. **STUARTIA,** Catesby. Sepals 5 (or 6), ovate or lanceolate. Petals 5 (or 6), obovate, crenulate. Stamens monadelphous at base. Capsules 5-celled, 5- or 10-seeded, seeds ascending. 5 Leaves large, deciduous; flowers showy, fragrant, axillary, nearly sessile.

§ **STUARTIA proper.** Styles united. Capsule globose. Seeds lenticular. 5

§ **MALACODENDRON.** Styles distinct. Capsule ovoid. Seeds margined. 5

1 S. **Virginica** Cav. Leaves oval, acuminate, thin, serrulate, downy beneath; sepals roundish; pet. white; fil. purple, anth. blue. Va. to Fls. and La. 6—12f. Apr., May.

2 S. **pentágyra** L'Her. Leaves ovate, acuminate; sep. lanceolate: one pet. smaller than the others, all cream-white; capsules 5-angled. Ky. to Ga. 10—15f. June, JI

3. **GORDONIA,** Ellis. **LOBLOLLY BAY.** Sepals 5, roundish, strongly imbricated. Pet. 5. Sta. 5-adelphous, one set adhering to each petal at base. Styles united into one. Caps. woody, 5-celled. Seeds 2 or more in each cell, pendulous. 5 With large, white, axillary, pedunculate flowers.

§ **GORDONIA proper.** Stam. inserted on a 5-lobed cup, as short as the style. 5

§ **FRANKLINIA.** Stam. inserted on the pet. at base, longer than the style. 5

1 G. **Lasianthus** L. Leaves coriaceous, perennial, glabrous, shining on both sides, lance-oblong; peduncles half as long as the lvs.; fls. 3f. S. 70f. July, August.

2 G. **pubéscens** L'Her. Leaves thin, serrate, deciduous, oblong-cuneiform, shining above, canescent beneath; fls. on short peduncles; sep. and pet. silky. S. 30f. May +

Order XXVII. **MELIACEÆ.**

**Trees or shrubs** with exstipulate, often pinnate leaves. **Flowers** 4—5-merous. **Stamens** 6—10, coherent into a tube, with sessile anthers. **Disk** hypogynous, sometimes cup-like; **style** 1. **Ovary** compound, several-celled, cells 1—2—6-ovuled. **Fruit** fleshy or dry, often 1-celled by abortion. **Seeds** winged or wingless.

§ **MELIA.** Cells of the ovary 2-ovuled. Seeds wingless, few (in a fleshy drupe). . . . . . . . . . . . . . . . 1

§ **SWIETENIA.** Cells of ovary many-ovuled. Seeds winged, many in the capsule. . . . 2

1. **MELIA,** L. **PRIDE OF INDIA.** (Melía, honey; the name was first applied to the Manna Ash.) Sep. small, 5, united. Pet. spreading. Sta. tube 10-cleft at summit, with 10 anthers in the throat. Ovary 5-celled, 10-ovuled. Style deciduous. Drupe with a 5-celled, bony nut, cells 1-seeded. 5 With bipinnate lvs. and panicles of delicate flowers.

**M. AZÉDARACH** L. Lvs. deciduous, glabrous, lfts. obliquely lance-ovate, acuminate, serrate. S. States. 30—40f. Fol. light; fls. lilac; drupes as large as cherries. + W. Ind
2. SWIETENIA MARÍGONI, L. MAHOGANY TREE. A large and beautiful ornamental tree growing in South Florida, Mexico, and the Isthmus. 80—100 ft. The reddish-brown ornamental wood is well known. Lvs. smooth, abruptly pinnate, with 6—10 lance-ovate lfts. Fls. small, yellowish, in panicles, 5-parted. Pod size of a goose-egg, 10-seeded.

ORDER XXVIII. LINACEÆ. FLAXWORTS.

Herbs with entire, simple leaves, and no stipules; with flowers regular, symmetrical, and perfect, 5-(rarely 3 or 4)-parted. Calyx strongly imbricated in the bud, corolla contorted. Stamens definite, hypogynous, alternate with the petals. Styles distinct, with capitate stigmas, and each cell of the capsule more or less divided by a false dissection into two 1-seeded compartments. Seeds with little or no albumen, attached to axile placentae. *Figs. 10, 11, 130, 136, 460.

LINUM, L. FLAX. Sepals, petals, stamens, and styles 5, the latter rarely 3. Caps. 6—10-celled. Seeds 10, suspended, mucilaginous. Herbs with a bark of strong fibres, and simple, sessile leaves.

Flowers yellow, small (2—7" broad). Species 1, native. Jane—August...*(a)
* Sepals entire, 1-veined, as long as the depressed or globous capsule...Nos. 1—4
* Sepals glandular-fringed, longer than the globular-ovoid capsule...Nos. 5, 6
* Flowers blue, large (1" broad). In fields and gardens....................Nos. 7, 8
* Flowers large, showy, red or yellow. Garden exotics....................Nos. 9, 10

1. *Virginianum* L. Sts. teretish, erect, corymbs above, branches short, spreading, terete; lvs. oblong to lanceolate, mostly scattered; fls. 4—5" broad; caps. depressed, styles distinct. Woods and hills. 2f. Prof. Porter distinguishes No. 2 from this.


3. *simplex* Wood. Stem single, terete, corymbs at top, branches subterete; leaves linear-subulate, erect, scattered; caps. globular; sty. distinct; fls. 3", few. S-W. 18.

4. *dif fusum* Wood. Stems very slender, ascending, with long, filiform, diffuse, angular branches; lvs. velv. lance., spreading, 9—12"; fls. 2" broad; pod depressed. W.

5. *sulcatum* Riddell. St. and branches sulcate, strict, erect; lvs. lin., erect; sep. 3-veined, acuminate; sty. united below. Conn. to Ill., and S. 1—1f. (L. rigidum C-B.)

6. *rigidum* Ph. Stems low and branches rigidly erect, angular-sulcate; lvs. linear-subulate, erect; sepals lance-linear, twice longer than the pod. Iowa, Min., and W.

7. *usitatissimum* L. Common Flax. 1 Leaf lance-linear; panicle corymbs; flowers axillary; petals crenate. 2f. The strong bark yields *linen*. § Europe.


10. *Trígnym* L. Leaves elliptical; flowers yellow; styles 3. E. India. 1f.

ORDER XXIX. ZYGOPHYLLACEÆ. BEAN CAPERS.

Herbs, shrubs, or trees, with leaves opposite, mostly pinnate (not dotted) and stipulate. Flowers 4- or 5-merous, corolla imbricate or convolute in bud. Stamens twice as many as the petals, hypogynous, distinct, each often with a scale. Ovary compound; style and stigma 1 fruit and seeds as in Linacea.
Herbs. Disk annular, 10-lobed. Fruit of 5-12 dehiscent carpels...................TRIBULUS. 1
Trees. Disk inconspicuous. Fruit of 2-5 dehiscent, 1-seeded carpels..................GUAIACUM. 2

1. TRIBULUS, L. Sep. and pet. 5, imbricated. Stam. 10, the 5 alternate with the petals placed inside of hypogynous glands. Ov. sessile, cells 1-5-seeded, separating into nutlets.—Loosely branched, prostrate herbs, with abruptly pinnate leaves. Flowers solitary (yellow).

1 T. (Kallstroemia) maximus L. Lfts. 3 or 4 pairs, oblong or oval, oblique, the terminal pair largest; nutlets 10, tubercled, 1-seeded. Ga. Fla. 1-2f.

2 T. cistoides L. Lfts. 5-8 pairs, linear-lanceolate, subequal; ped. elongated, with one large flower; nutlets 5, spiny, 2-5-seeded. Fla. 2f.

2. GUAIACUM, Plm. LIGNUM-VITÆ. Sep. and pet. 4 or 5, deciduous, imbricated. Stam. 8-10. Ovary stipitate, 2-5-celled, cells many-ovuled, in fruit 1-seeded. 5 Wood hard and resinous. Lvs. abruptly pinnate. Ped. in pairs, between the stipules, 1-flowered.

G. sanctum L. Branches jointed; lfts. 3 or 4 pairs, oblong, oblique, entire, mucronate; ped. short; pet. obtuse, blue. S. Fla. 20f. Bark white.

Order XXX. GERANIACEÆ. Gerania.

Herbs or shrubs with perfect, hypogynous, symmetrical and regular, or irregular, 3-5-merous flowers. Stamens as many or twice as many as the sepals, often some of them abortive or rudimentary. Carpels as many as the sepals, 1-few-seeded, mostly separating from the persistent axis at maturity.—A large and rather incongruous order, as now constituted (by Bentham and Hooker), including the following tribes, heretofore regarded as orders. Figs. 27, 28, 172, 243, 265, 270, 315; 350, 497.

☞ Flowers regular.—α Styles 5. Carpels several-seeded. TRIBE I.

—α Style 1-5 Sepals valvate. Fruit beakless. TRIBE II.

—β Sepals imbricate. Fruit beaked. TRIBE III.

$ Flowers irregular.—c Petals perigynous. Stamens 7 or 8. TRIBE IV.

—c Petals hypogynous. Stamens 5. short. TRIBE V.
I. OXALIDEÆ. Symmetrical. Stamens 10. Petals convolute. Pod 5-celled........OXALIS. 1
II. LIMNANTHIEÆ.—Symmetrical. Stamens (10 in LIMNANTHES, No. 3) 6 in.........FLORKEA. 2
III. GERANIEÆ.—Stamens 10-14, 5 often sterile. Glands between the petals. Fruit % POLYGA. (c)
   e Stamens 10. all antheriferous. Tail of carpels beardless.......................GERANIUM. 3
e Stamens 5 antheriferous. Tail of the carpels bearded............................ERODIUM. 4
IV. PELARGONIEÆ.—Sepals spurred behind. Glands 0. Stamens declined./(f)
   f Spur adnate to the pedicel. Fruit rostrate.—a regna............................PELARGONIUM. 5
   f Spur free. Fruit not beaked. Carpels 1-seeded, separating....................TROP.ROLUM. 6
V. BALSAMINEÆ.—Sepals spurred behind. Pod opening elastically..............IMPATIENS. 7

1. OXALIS, L. Wood Sorrel. ("Oξυς, acid: the herbage is sour.) Sep. 5, distinct or united at base. Pet. contorted, much longer than the calyx. Sty. 5, capitate. Caps. oblong or subglobose. Carp. 5, 1 to several-seeded. Mostly 2t, with palmately trifoliate leaves and inversely heart-shaped leaflets. Figs. 265, 270, 497. (See Addenda.)

1 O. Acetosella L. Acaulescent; scape longer than the leaves, 1-flowered; leaflets broad-oblanceolate with rounded lobes; styles as long as the inner stamens; root decumbent, scaly. 2t Woods, Can. and N. States. 6'. Flowers white-purple. June.
2. **O. violacea** L. Bulbous at base, scapose; scape umbelliferous; flowers nodding; tips of the calyx fleshy; styles shorter than the outer stamens. 4 An elegant species in rocky woods. 5–8'. Flowers violet-purple. May.

3. **O. stricta** L. Caulose; st. branching; ped. umbelliferous, longer than the petals; style as long as the inner stamens; flowers yellow. 1 Fields. 3–9'. Common.

4. **O. flava** L. Scapes 6', 1-flowered; leaflets 6–10, linear; petals yellow, 1' long. S. Afr.

5. **O. rosea** L. Stem erect, 8'; lfts. 3, obcordate; ped. roseate, 1', toothed; fls. many. Chili.

6. **O. venecicolor** St. 3'; lfts. 3, linear, emarginate; ped. crimson-striped outside. S. Afr.


**F. proserpinacoides** Lindl.—By streams and lakes, Vt. to Penn., and W. 6–10'. Prostrate; lvs. alternate; lf. segm. 3–5; ped. white, shorter than the sepals; ach. 1–3.


**L. douglasii**. Stems low, diffuse, with numerous axillary flowers 1' broad; petals wedge-oblong, yellow, edged with white, notched at the end. California.

4. **GERÁNIUM**, L. **CRANE'S BILL**. Sep. and pet. 5, regular. Stam. 10, all perfect, the 5 alternate ones longer, and each with a gland at its base. Fruit at length separating from the axis into 5 achenia, and up-lifted on the smooth curving styles.—Herbs. Ped. 1–3-flowered. Fig. 172.

* Petals entire, twice as long as the awned sepals, purplish………………Nos. 1, 2
* Petals emarg. or 2-lobed, not longer than the sep., roseate. May—Aug…Nos. 3–6

European perennials, cultivated, hardy, ornamental……………………No. 7

1. **G. maculátum** L. Stem erect, angular, dichotomous, retrorsely-pubescent; leaves palmately 3-5-lobed, lobes cuneiform and entire at base, incisedly serrate above, radical ones on long petioles. 4 Woods. 2f. Flowers 1', purple. April—June.

2. **G. Robertiánum** L. Herb Robert. Stems weak, reddish, diffuse, hairy; leaves pinnately 2-parted to the base, the segments pinnatifid, and the pinnus incisedly toothed; capsule ramos, seeds smooth. 2 Rocky places, Can. to Va. 1–2f. Jn.—Aug.

3. **G. Caroliníanum** L. Erect, at length diffuse, hairy; leaves 5–7-parted; segm. 3-lobed, lobes entire or incised; ped. short, clustered at the ends of branchlets; sepals awned; fruit hairy; seeds obscurely reticulated. 3 Hills, dry or rocky. 4–2f.

4. **G. disséctum** L. Diffuse, pubescent; lvs. 5- or 7-parted, segm. linear, many-cleft; seeds strongly reticulated. 1 Fields: rare. 6–12'. Fruit some hairy. § Europe.

5. **G. pusíllum** L. Procumbent, puberulent; lvs. round-reniform, 7-parted, segments 3-cleft; sepals awnless; seeds smooth. 3 Waste grounds, N. Y., Mass. 1f. § Eur.

6. **G. columbínínum** L. Slender, decumbent, with long, filiform flower-stalks; sep. awned, enlarged after flowering; fr. glab.; lvs. and sd. as in No. 4. Penn. (Porter). §

7. **G. Sanguíneum**. Erect, diffuse; leaf-lobes 3-cleft, linear; ped. 1-flowered; flowers red, large. 8. **Lancastriense** is prostrate, with smaller (1') purple flowers, very elegant.


**K. cicutárium** Sm. Diffuse, hairy; leaves pinnately divided, segments sessile, pinna-tifid, incised, acute; ped. several-flowered; petals equal, red. 1 Lake shores, N. Y.: rare. In California it is one of the chief forage plants. May, June. § Europe.

6. **PELARGONIUM**, L'Her. **STORK'S BILL**. **GERANIUM**. Sepals 5,
the upper one ending in a nectariferous tube extending down the pedicel. Petals 5, irregular, longer than the sepals. Filaments 10, 3 or 5 of them sterile. 5 or herbs. A large and ornamental genus, chiefly S. African, everywhere cultivated. Lower leaves (in plants raised from the seed) opposite, upper alternate. Figs. 243, 350.

§ Filaments 10, the alternate ones bearing anthers. Upper petals larger...........Nos. 1, 2
§ Filaments 10, of which 7 bear anthers, and 3 are sterile...(a)
  a The 2 upper petals smaller, all scarlet, 1-colored. Shrubby.............Nos. 3-5
  a Petals nearly equal in size, mostly variegated...(b)
  b Stemless. Root tuberous. Leaves lanceolate. Flowers brown...........Nos. 6, 7
  b Stems shrubby.—c Lvs. cordate, palmate, lobed. Flowers small...........Nos. 8, 9
  —c Lvs. peltate or cordate, 5-lobed, smooth...........No. 10
  a Two upper petals longer and broader. Stems shrubby...(d)
  d Flowers white, the 2 upper petals striped with red...........Nos. 11, 12
  d Flowers purple.—e Leaves undivided...........Nos. 13, 14
  —e Leaves divided below the middle...........Nos. 15-17

1 P. tricolor. Lvs. lanceolate, cut-dentate; 3 lower pet. white, 2 upper purp.-blk. 18'. 11
2 P. coriandrifolium. Lvs. bipinnate; pet. white, upper purp.-velined, very large. 1f. 12
3 P. zonale. Horse-shoe G. Lvs. orbicular-cordate, slightly lobed, toothed, zoned; stem fleshy, shrubby; petals cuneiform; flowers umbellos. 2—3f. Numerous varieties.

β. MARGINATUM. Silver-edged; the leaves bordered with white.

4 P. équinans. Lvs. round, reniform, scarcely lobed, crenate viscid; pet. obov. 2—3f.
5 P. Fothergillii. Lvs. renifm., 5-lobed, crenate, zoned; stip. toothed, ciliate; pet. obov.
8 P. fragrans. Nutmeg G. Branches thick velvety, lvs. very soft; stip. subulate. Fls. w.
9 P. Alchemilloides. Villous; lvs. 5-lobed; peduncle few-flowered; fls. pink-colored.
10 P. Peltatum. Cey-leaved G. Br. flabby; lvs. more or less peltate; fls. purplish.
11 P. Glaucom. Glabrous, glaucous; lvs. lanceolate, entire; ped. 1-2-flowered. 3f.
12 P. Grandiflorum. Glab., glaucous; lvs. 5-lobed, toothed at end; fls. very large. 3f.
13 P. Betulinum. Smoothish; lvs. ovate, unequally serrate; ped. 2-4-flowered. Pale. 3f.
14 P. Watsônii. Lvs. orbicular, cordate, some lobed, dentate; fls. large, varieg. 3f.
15 P. Grayvelonis. Rose Ger. Lvs. palmately 7-lobed; lobes toothed, revolute, very rough at the edge; umbels many-flowered, capitate. 3f. Very fragrant.
16 P. Rádula. Lvs. palmate, rough, lobes narrow, rolled at edge, pinnatifid with linear segments; umbels few-flowered. 3f. Fragrance mint-like.
17 P. Quercifolium. Hispid; lvs. sinuate-pinnatifid, often spotted, cordate at base. 3f.

7. Tropæolum, L. Indian Cress. Nasturtion. Fls. irregular. Sep. 5, produced behind into a free spur. Pet. 5, the 2 upper exterior, different from the 3 lower. Stamens 8, free, unequal, perfect. Style 1. Ov. 3-celled, in fruit separating from the short axis into 3 hardened achenia. 5 Leaves alternate. Stipule 0. Flowers showy. S. Am. (See Addenda.)
1 T. Majus L. Nasturtion. Lvs. peltate, roundish, repand on the margin; pet. obtuse, the 3 lower fringed and long-clawed at base. Flowers orange, scarlet, crimson, &c.
2 T. Minus. Smaller, erect; petals pointed, yellow to white, or variegated. Peru.
3 T. Lobbiánum. Leaves peltate, reniform, wavy, fixed near the base; petals crenate, rounded, the 2 lower fringe-toothed, all shades of red. Columbia.
4 T. Perignonum. Canary Bird. Leaves deeply 5—7-lobed, lobes toothed; spur hooked; petals light yellow, 2 of them large and much lobed. A tall climber.

8. Impatiens, L. Touch-me-not. Sepals colored, 4 (the upper one double), the lowest saccate and spurred. Petals apparently 2, each of them 2-lobed (double). Stamens 5, short, the anthers cohering at
apex; caps. often 1-celled by the obliteration of the dissepiments, 5-valved, bursting elastically.—Sts. smooth, succulent, tender, subpellucid, with tu-
mid joints. Lvs. simple, alternate, serrate. Figs. 27, 28, 315.
1 **Ruta** Nutt. Lvs. oblong-ovate; ped. 2-4-flowered, elongated; lower gibbous
sepals dilated-conical, broader than long, with a very short, recurved spur; fls. pale
yellow, sparingly dotted. 1 Wet shades. 3–4f. Aug.
2 **Fulva** Nutt. Lvs. rhombic ovate; ped. 2-4-flowered, short; lower gibbous sepal
acutely conical, longer than broad, with an elongated, closely reflexed spur; fls. deep
orange, spotted. 1 Damp grounds. 2–3f. July.
3 **Balsamia** L. *Balsamine*. Lvs. lanceolate, serrate, upper ones alternate; ped.
clustered; spur shorter than the flower. 1 E. India. Fls. large, white and red.

**Order XXXI. RUTACEÆ. Rueworts.**

*Herbs or generally shrubs or trees*, with the extispulate leaves dotted with
transparent glands containing aromatic or acrid oil. *Flowers* regular, 3–5-
merous, hypogynous, perfect or polygamous. *Stamens* as many or twice as
many as the sepals. *Pistils* 2–5, separate or united, styles united. *Fruit*
capsular or separating into its component, 1–2-seeded *carpels*.

§ RUTACEÆ. Flowers perfect. (Herbs. Stamens 10.) (6)
a Petals equal, concave. Capsule 5-lobed .............. Ruta. 1
a Petals unequal, clawed. Capsules separable .............. DICTAMNUS. 2

§ ZANTHOXYLACEÆ. Flowers 4 & 5. (Trees, shrubs). (6)
b Pistils 3–5, separate below. Stamens 3–6 ...... ZANTHOXYLUM. 3
b Pistils 2, united. Samara 2-seeded .............. Ptelea. 4

1. Ruta, L. *Rue*. Calyx of 4 or 5 sepals, united at base. Petals 4 or
5, concave, obovate, distinct, torus surrounded by 10 nectariferous pores.

R. **Grayêolens** L. *Common Rue*. Suffruticous, nearly glabrous; leaves 2–3 pinnately
divided, segm. oblong, obtuse, terminal ones obovate-cuneate, all entire or irregularly
clawed; fls. terminal, coriaceous; pet. entire. 3f. Greenish.

2. **DICTAMNUS**, L. *Fraxinella*. Calyx of 5, deciduous sepals;
petals 5, unguiculate, unequal; filaments 10, declinate, with glandular
dots; capsules 5, slightly united. 2 Native of Germany.

D. **Albus** Willd. St. simple; lvs. pinnate, the rachis more or less winged; fls. in a large,
terminal, erect panicle.—In gardens. 1–2f. Fls. showy.

β. **Ruba**. Fls. purple; rachis of the leaves winged.

3. **ZANTHOXYLUM**, L. *Prickly Ash*. (*Σανγνίζα*, yellow, ξυλον, 
wood.) Sepals 4 or 5, rarely obsolete. Petals 4 or 5. Sta. as many as the
petals in 5, rudimentary in 2. Pistils 3 to 5, distinct below, with cohe-
rent styles, in fruit crustaceous, 2-valved, 1 or 2-seeded. 5 With sharp
prickles, pinnate leaves, and small, greenish flowers.

1 **Carolinianum** Lam. Prickly; fls. 9–11, ovate, sessile, equal at base; umbels

2 **Z. Americanum** Mill. Prickly; fls. 7–13, falcate-lanceolate, very inequili-
etal, petiolulate; panicles terminal; sep. minute; bark warted around the prickles.

3. **fruticosum.** Shrub; lvs. ovate-oblong, scarcely pointed; ovaries 2. S.

3 Z. Floridänus N. Satin-wood. Unarmed; lfts. 5—7, 9 ovate-lanceolate, 6 a liptical, obtuse; fls. minute; carp. 1—2, 1-seeded, obovoid. S. Fla.

4. **PTELEA, L.** Shrub Trefoil. (Πτέληα, the elm-tree; from the resemblance of the fruits.) 6 5. Sepals 3 to 6, mostly 4, much shorter than the spreading petals. 5 Stamens longer than the petals and alternate with them, very short and imperfect in 6. Ovary of 2 united carpels. Stig 2. Fruit 2-celled, 2-seeded samaræ, with a broad, orbicular margin. 5 Lvs 3—5-foliate. Fls. cymous.

1 P. trifoliàta L. Lvs. 3-foliate, lfts. sessile, ovate, short-acuminate, lateral ones in equilateral, terminal ones cuneate at base; cymes corymbous; stam. mostly 4; style short. Rocky places, N. Y. S. and W. 6—8f. Fls. white, odorous. June.

6. *mollis.* Young branches, petioles and leaves beneath, soft-downy and hoary. S

2 P. Baldwinii T. & G. Lvs. glabrons, very small; lfts. sessile, cleft, obtuse; stam. 4; stig. sessile. E. Fla. 1f. Branches numerous and scraggy. Lvs. 1f.

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**Order XXXII. AURANTIACEÆ. ORANGEWORTS.**

Trees or shrubs, glabrous, abounding in little transparent receptacles of volatile oil, with leaves alternate, 1-3-foliate or pinnate. Flowers regular, 3—5-merous. Stamens with flat filaments, distinct or cohering in one or several sets. Ovary compound of several united carpels. Style 1. Fruit (hesperidium) many-celled, pulpy, covered with a thick rind. Albumen 0. Cotyledon thick. Figs. 37, 363.

**CITRUS, L.** (Χίρπιον, the citron; the fruit of one of the species.) Sepals and petals in 5's. Anthers 20, or some other and higher multiple of 5, versatile, the connective articulated to the filament. Filaments dilated at base, polyadelphous. Berry 9—18-celled. § 5 A noble E. Indian genus Lvs. 1-foliate, entire, evergreen. Petiole often winged.

1 C. vulgaris Risso. Bitter Orange. Petiole winged; lvs. elliptical, acute, crenulate; stam. 20; fruit globular, with a thin rind and bitter pulp. S. Fla. 15—20f. § Asia.

2 C. Aurántium. Sweet Orange. Petiole scarcely winged; lft. obovate, acute, crenulate; stam. 20; fr. globous, with a thin rind and sweet pulp. 30f.

3 C. Liméïta. Lime. Petioles not at all winged; lft. ovate-orbicular, serrate; stam. 30; fr. globous, with a sweet pulp, and a protuberance at top. 15f.

4 C. Limïon. Lemon. Petioles somewhat winged; stam. 35; fr. obovate-spheroid, with a thin rind and very acid pulp. 20f. Fr. yellow.

5 C. decúmana. Shaddock. Petioles broadly winged; lft. obtuse, emarginate; fr very large, with a thick rind. 15f. Fruit green-yellow. 5' diam.

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**Order XXXIV. SIMARUBACEÆ. QUASSIAWORTS.**

Trees or shrubs with bitter bark, alternate, exstipulate, pinnate leaves, and small, diclinous, regular, hypogynous 3—5-merous flowers. Stamens as many or twice as many as the petals, inserted on the hypogynous disk. Styles 2—5. Ovaries 2—5-lobed or carpelled. Fruit 1—5 one-seeded drupes or samaras.
§ Leaves abruptly pinnate. Flowers dioecious. Styles united. Fruit baccate...... ......SIMIRUBA. 1
§ Leaves odd-pinnate. Flowers polygamous. Styles distinct. Fruit a samara...... ......AILANTHUS. 2

1. SIMARÚBA, Aubl. QUASSIA. (Its name in Guiana) 55
S. glauca DC. Leaflets 4–8, alternate, entire, obtuse, coriaceous. S. Fla. Tree, 40f.

2. AILÁNTHUS, Desf. CHINESE "TREE-OF-HEAVEN." (Ailanto, its name in China) 2 2 Sep. 5. Pet. 5. 2 Stam. 2–3. Ov. 3–5. Sty. lateral. Fr. 1-celled, 1-seeded samara, with oblong margins. 2 Stam. 10. 2 Ovaries, styles, and samara as in 2. 55 Oriental, with odd-pinnate leaves. Flowers in panicles.

A. GLANDULOSUS Desf. Lfts. glabrous, 21–41, ovate or oblong-lanceolate, acuminate, with 1 or 2 obtuse, glandular teeth each side at base, terminal one long-petiolate. Parks, &c. 40–60f. Flowers greenish, ill-scented. June.

ORDER XXXV. BURSERACEÆ. BURSERIDS.


* Flowers perfect, 4-parted. Stamens 8, hypogynous. Leaves opposite.......... ...........AMYRIS. 1
* Flowers polygamous, 4 and 6-parted. Stamens 8–10; disk crenate. Leaves alternate....BURSERA. 2

1. AMÝRIS, L. BALM-OF-GILEAD. (Múρpα, myrrh; from its perfumed gum.) 55 Flowers in panicles, white.

A. Floridána N. Torch-wood. Shrub; lvs. opposite, trifoliate, on short petioles, lfts. ovate, obtuse, entire, petiolulate; drupes small, globular. E. Fla.

2. BURSERA, L. (To Joachin Burser, an Italian botanist.) 5
B. gummífera Jacq. Lfts. 3–9, petiolulate, ovate, acum., entire; frs. racemed. Fla.

ORDER XXXVI. ANACARDIACEÆ. SUMACS.

Trees or shrubs with a resinous, gummy, caustic, or even milky juice. Leaves alternate, simple, or ternate, or unequally pinnate, without pellucid dots. Flowers with bracts, commonly dioecious, small. Sepals 3–5, united at base, persistent. Petals of the same number (sometimes 0), imbricated. Stamens as many as petals, alternate with them, perigynous. Ovary 1-celled, free. Ovule 1. Stigmas 3. Fruit a berry or drupe, usually the latter, and 1-seeded. Albumen 0.

RHUS, L. SUMAC. (The ancient name, from Celtic, rhudd, red?) Calyx of 5 sepals united at base. Pet. and stam. 5. Sty. 3. Stig. capitate. Fruit a small, 1-seeded, subglobose, dry drupe.—Small trees or shrubs. Leaves alternate, mostly compound. Flowers often, by abortion, imperfect, greenish.
ORDER 37.—SAPINDACEÆ. 73

§ Leaves simple. Flowers perfect (or all abortive in cultivation)...........Nos. 10, 11
§ Leaves compound. Flowers dioecious. A tree. South Florida............No. 9
§ Leaves compound. Flowers polygamous...
   a Flowers in clustered spikes preceding the trifoliate leaves...........No. 8
   b Flowers in axillary panicles, with the 3-13-foliate lvs. Poisonous...Nos. 5—7
   c Flowers in terminal thyrses, with the 9-31-foliate leaves...
   b Common petiole winged between the leaflets......................No. 4

1 R. glabra L. Lvs. and branches glabrous; lfts. 11—31, lanceolate, acuminate, acutely serrate, whitish beneath; fr. red, with crimson hairs. Thickets and pastures. 6—15f. The fruit hairs are extremely acid, and dye red. June, July.


β. laciníata. Lfts. Irregularly gashed; panicles leafy. Hanover, N. H. (RicARD.)

3 R. púmila Mx. Procumbent, villous-pubescent; lfts. 9—13, oval or oblong, coarsely toothed; drupes red, silky pubescent. N. Car. to Ga. Branches 1f high.

4 R. copallína L. Mountain Sumac. Branches and petioles pubescent; lfts. 9—21, ovate-lanceolate, mostly entire, unequally divided; fr. common to the air, in dense panicles; drupes red, hairy. Rocky hills. 2—8f. Thrss. sessile. July.


8 R. aromática Alt. Sweet Sumac. Lfts. sessile, incisely crenate, pubescent beneath, terminal one ovate, terminal one rhomboid; lfts. in close aments, preceding the leaves; drupe globous, villous. Coppes. 2—6f. Flowers yellowish. May.

9 R. Metópium L. Lfts. 3—7, smooth, entire, ovate, acuminate; drupes smooth, round. 30f.

10 R. cotínóides N. Smooth; lvs. ovate, obtuse, entire, acute at base, thin, long-stalked; lfts. minute, in loose, erect panicles; drupes smooth. Mts. Car. to Ark.

11 R. Cótinis. Venetian Sumac. Smoke-tree. Lvs. obvate, entire, thick; flowers mostly abortive, pedicels diffusely branched and hairy. Italy.

ORDER XXXVII. SAPINDACEÆ. MAPLEWORTS.

Trees, shrubs, or rarely herbs, with simple or compound, alternate or opposite leaves. Flowers mostly unsymmetrical, often irregular, 4 or 5-merous, with the sepals and petals both imbricated in the bud, with the stamens 5 to 10, inserted on a hypogynous or perigynous disk. Ovary 2 or 3-celled, lobed, and with 1 or 2 (rarely more) ovules in each cell. Embryo mostly curved or convoluted, with little or no albumen. Figs. 100, 224, 230, 236, 237, 308, 312, 444, 515.

I. ACERINEÆ.—Leaves opposite. Flowers regular, dichinious. Fruit a double samara...
   a Disk annular. Petals 4 or 5 or 0. Leaves simple, lobed.................ACER. 1
   a Disk obsolete. Petals none. Leaves pinately compound..............NEGUNDO. 2

II. STAPHYLÈÆ.—Leaves opposite. Flowers regular, perfect. Stamens 5......STAPHYLA. 3

III. HIPPOCASTANÆ.—Leaves opposite. Flowers irregular. Stamens 7......ASCULUS. 4

IV SAPINDEÆ.—Leaves alternate. Flowers polygamo-dioecious...
ORDER 37.—SAPINDACEÆ.

b Petals 5 or 4, regular. Ovules 2 or 3 in each cell. Trees. South Florida... HYPELEA.
b Petals 4, irregular. Trees. KELKLEUTERHA, No. 7............. Vines........... CARDIOSPERMUM. 6
b Petals 0. Ovules 2 in each cell. Capsules winged. Shrub. South Fla.... DODONÉA.

1. ACER. MAPLE. (The ancient name, meaning sharp, vigorous.) Fls. polygamous. Cal. 5 (4–9)-cleft. Cor. 5 (4–9)-petalled or 0. Stam. 8 (4–12). Sty. 2. Samaræ 2-winged, united at base, by abortion 1-seeded. Leaves simple, palmately 5 (rarely 3–9)-lobed. (See Addenda.)

§ Flowers in dense, umbellate clusters, appearing before the leaves........ Nos. 1 2
§ Flowers in pendulous corymb, yellowish, appearing with the leaves..... Nos. 3, 4
§ Flowers in terminal racemes, greenish, appearing after the leaves...(a)
  a Shrubs or small trees, native. Leaves 3-lobed.............................. Nos. 5, 6
  a Large trees, exotic, cultivated. Leaves 5-7-lobed..................... Nos. 7, 8

1 A. rubrum L. Red Maple. Swamp Maple. Lvs. cordate, acutely and incisely toothed, the sinuses acute, glaucous beneath; ped. elongated in fruit; pet. linear-oblong; ovaries and fruit smooth. Swamps. 30–80ft. Flowers red. April.

3. tridentes. Lvs. 3-lobed, rounded at base; flowers yellowish. N. J. to La. 20ft.

2 A. dasycarpum Ehrh. White Maple. Lvs. truncated at base, unequally and in closely toothed, with obtuse sinuses, white and smooth beneath; fls. greenish, with downy ovaries; petals 0; fruit divergent. Woods. 50ft. Mar. April. (Fig. 308.)

3 A. saccharinum L. Sugar Maple. Rock Maple. Lvs. subcordate at base, acuminate, remotely toothed, with rounded and shallow sinuses, glaucous beneath; fls. pedunculate, pendulous. Rocky hills, N. 40–70ft. A noble tree.

4 A. nigrum Mx. Black Maple. Sugar Tree. Lvs. cordate, with the sinuses closed, lobes divericate, sinnate-dentate, paler beneath, with the veins beneath and the petals pubescent; flowers on long, slender pedicels. Vt. to Ind. 30–70ft. April.


6 A. spicatum Lam. Mountain Maple-bush. Lvs. 3-5-lobed, acute, dentate, pubescent beneath; racemes erect, compound. Woody hills. 5–8ft. Flowers greenish.

7 A. PSEUDO-PLATANUS L. Sycamore. Lvs. cordate, glabrous, glaucous beneath, lobes acute, unequally dentate; raceme pendulous; fruit smooth. Europe. 40ft.

8 A. MACROPHYLLUM Ph., with large, very deeply 5-lobed leaves, nodding racemes, and hispid fruit. Oregon. 30–50ft.

2. NEGÚNDO, Mënch. Box Elder. ASH MAPLE. Flowers 2 & 3. Corolla 0; 2 flowers racemed, 3 fascicled. Disk O. Stam. 3–5. Fruit as in the last genus. Leaves compound, pinnately 3–5-foliolate.

N. aceroides Mënch. Lvs. ovate, acuminate, remotely and unequally dentate; 2 rac. long and pendulous; fruit obovate, with large wings dilated upward. A handsome tree, 20–40ft. N. Y. to Car. and Cal. ! April.

3. STAPHYLEA, L. BLADDER-NUT. (A Greek word, meaning a cluster of grapes; from the form of the fructification.) Fls. 2. Calyx of 5, colored, persistent sepals. Pet. and sta. 5. Styles 3. Caps. 2–3, membranous and inflated, slightly cohering. Seeds not arilled. With opposite, 3–7-foliolate lvs. and caducous stipules. Fig. 444.

S. trifólia L. Lvs. 3, ovate, acuminate, serrate; fls. in drooping cymous panicles, white; pet. ciliate at base. Can. to Car. and Tenn. 6–10ft. Caps. large. May.

4. ESCULUS, L. HORSE CHESTNUT. BUCKEYE. Calyx 5-toothed;
Order 38.—Celastraceae.

Cor. irregular, 4 or 5-petalled; sta. 7 (6 to 8), distinct, unequal. Style filiform, ov. 3-celled, with 2 ovules in each cell. Fruit coriaceous, 2-3-valved, containing but one or very few large, smooth seeds. Cotyledons thick, bulky, inseparable. With opposite, digitate, 5-7-foliate leaves. Fls. paniculate, terminal. Fig. 100.

Pavia. Fruit smooth. Petals 4, erect, the two upper clawed. Buckeye. Nos. 1—3

Esculus proper. Fruit prickly. Petals 4 or 5, spreading. Nos. 4, 5

1 Pavia. Lfts. 5—7, shining, oblong-lanceolate; cuneate at base, short-acute, finely serrate; fls. red, very irregular in a lax, thyrsoid raceme; pet. as long as stamens; cal. half as long as the two shorter petals. S. 3—10f. Mar. April.

2 Pavia. Lfts. 5—7, obovate, acuminate, serrate, velvety canescent beneath; petals 4 white, somewhat similar and spreading, thrice shorter than the capillary stamens. S. 2—9f. Fls. very numerous.

3 flava. Sweet Buckeye. Lfts. 5—7, oblong or elliptic-ovate, acuminate, serulate, pubescent beneath; fls. in thyrsoid, pubescent panicles; pet. very unequal, longer than the stamens. W. and S. 6—70f. Yellowish. April, May.

4 glabra. Willd. Ohio Buckeye. Lfts. 5, oval or oblong, acuminate, serrate or serulate; fls. in lax thyrsoid panicles; pet. 4, half as long as the stamens. River banks, W. Tree 20—40f, ill-scented, with small, yellowish flowers. June.

5 Hippocastanum L. Horse Chestnut. Lvs. of 7 obovate lfts.; pet. 5, spreading; fruit prickly. Tertiary. A noble tree, in parks, &c. June.

5 Sapindus, L. Soap-berry. (That is, by syncope, Sapo Indicus, Indian soap.) Sep. 4 or 5. Pet. as many, or one less by abortion, appended inside with a gland, scale, or beard. Sta. 8—10. Stig. 3. Fruit 3, connate, globular, fleshy carpels, often by abortion 2 or 1. Seed large, solitary. Lvs. alternate, pinnate, exstipulate.

S. marginatus. Common petioles wingless; lfts. 9—18, ovate-lanceolate, long-pointed, very inequilateral, short-stalked, entire, glabrous, shining above; flowers in white, dense panicles. Ga. to Ark. 20—40f. Fruit globular.


1. **Celástrus**, L. Staff-tree. Fls. often imperfect. Sep. and pet. 5. Disk 5-lobed, bearing the 5 stamens on its edge. Caps. subglobose, or 3-angled, 3-celled. Seeds with an arillus, 1 or 2 in each cell. \( \frac{1}{2} \) With alternate, deciduous lvs. and minute, deciduous stipules.


2. **Euónymus**, Tour. Burning Bush. (*Eú, good, óvová, name.*) Fl. perfect; calyx flat, of 5 (sometimes 4 or 6) united sepals. Corolla flat, inserted on the outer margin of the broad disk. Stamens 5, with short filaments. Caps. colored, 5-angled, 5-celled, 5-valved. Seeds wholly invested with a scarlet aril. \( \frac{1}{2} \) \( \frac{1}{2} \) Lvs. opposite, serrate. Flowers purple.

1. **E. atropurpúreus** Jacq. Lvs. elliptic-ovate, petiolate, acuminate, finely serrate, puberulent beneath; ped. compressed, many-flowered; fls. usually 4-merous; capsule smooth, lobed. Woods. 4–10 f. Fruit crimson. June. Varieties in cultivation have orange-red or even whitish fruit.

2. **E. Americánus** L. Branches 4-angled; lvs. oval and elliptic-lanceolate, acuminate, acute, or obtuse, smooth, subsessile; ped. round, about 3-flowered; fls. mostly pentamorous; caps. warty. Woods. 2–5 f. Fruit dark red. June.

3. **E. Européus**, has smooth, shining, lance-oblong, serrate leaves, the flattened ped. 3-flowered; fls. 4-parted. Europe. Not hardy North. (See Addenda.)

**Order XL. Rhamnaceae. Buckthorns.**

Shrubs or small trees, often spiny, with simple, alternate, stipulate leaves, with flowers regular, sometimes apetalous or otherwise imperfect; with the stamens perigynous, as many (4 or 5) as the valvate sepals, alternate with them, and opposite to the petals when they are present. Disk perigynous. Capsule or drupe with one albuminous seed in each cell.

* Leaves opposite or subopposite, with opposite branches...\( a \)
  - Flowers small, in axillary clusters or umbels. S. Fls. .......... *Scutia*. 1
  - Flowers minute, spicate, in terminal panicles. .......... *Sageretia*. 1
  - Leaves alternate.—\( b \) Shrubs climbing by twining. Petals sessile. .......... *Berchemia*. 2
  - Leaves alternate.—\( c \) Clusters of (white) flowers terminal. Pet. ungulate. .......... *Ceanothus*. 3
  - Clusters axillary. Pet. 4, 5, or 0, on the margin of disk. .......... *Rhamnus*. 5

1. **Sageretía**, Brongn. (Named for M. Sageret, a French florist and veg. physiologist.) Calyx 5-cleft. Petals 5, cucullate. Sta. 5. Ovary immersed in the entire disk, with a 3-lobed stigma. Drupe 3-celled. \( \frac{1}{2} \) With slender branches. Fls. in rigid, interrupted spikes.

S. *Michauxii* Brongn. Branches at length spiny; leaves ovate or oblong-ovate, subsessile, shining, subentire. Sandy coast. Car. to Fla. Trailing, 6–16 f. October.
2. BERCHÈMIA, Neckler. SUPPLE JACK. Calyx 5-parted. Pet. 5, convolute, enclosing the 5 stamens. Ovary half immersed in the disk, but free from it, 2-celled. Style bifid. Drupe oblong, with a bony, 2-celled nut. 5 5 Unarmed. Lvs. pinnate-veined. Panicles terminal, small.

B. volùbilis DC. Climbing, glabrous; lvs. ovate, straight-veined, repandly serrate; drupe dark purple. Damp soils, S. Stem supple, 10–20f. May, June.

4. CEANÒTHUS, L. JERSEY Tea. RED-ROOT. Calyx tubular-campanulate, 5-cleft. Petals 5, saccate, arched, with long claws. Sta. mostly exerted. Style 3-cleft. Capsule obtusely triangular, 3-celled, 3-seeded, surrounded at base by the persistent tube of the calyx. 5 5 Thornless. Fls. small, aggregated at the end of the branches.

1 C. Americanus L. Leaves oblong-ovate, or ovate, serrate, 3-veined; flowering branches leafy or leafless, elongated. Dry woods. 2–4f. June.

2 C. ovàlis Bw. Lvs. ovale-lanceolate or narrowly oblong, with glandular serratures, 3-veined, veins pubescent beneath; thyrse corymbose, abbreviated. Vt. to Mich. 2–3f. Less common than No. 1. Lvs. smooth, shining. May.

3 C. microphyllus Mx. Diffusely branched, branches very slender; leaves minute, obovate, rigid, glabrous, strigous beneath. Pine-barrens, S. 1–2f. April.

β. serpyllifolius. Very slender; branches filiform; lvs. oval (2–3" long). S.

5. RHÁMNUS, L. BUCKTHORN. (The Greek name.) Calyx urceolate, 4 or 5-cleft. Pet. 4 or 5, notched, lobed, or entire, or sometimes wanting. Ov. free, not immersed in the thin torus, 2–4-celled. Styles 2–4, more or less united. Drupe containing 2–4 cartilaginous nuts. 5 Lvs. alternate, rarely opposite. Fls. in axillary clusters.

§ Flowers tetramerous. Leaves with arcuate veinslets. 1–2f. Nos. 1, 2
§ Flowers pentamorous. Leaves with the veinslets nearly straight. 3, 4

1 R. catharticus L. Thorny; lvs. ovate, denticulate-serrate; fls. fascicled; polygamo-dioicus, mostly tetrandrous; sty. 4, at apex distinct and recurved; fr. globular, 4-seeded. Hedges, rarely wild. 10–15f. Drupes black, cathartic. May. § Eur.

2 R. lanceolàtus Ph. Thornless; lvs. lanceolate or oblong, acute at each end, the earlier ones obtuse; fls. 1–3 together; pet. 4, minute; sty. 2 at apex, distinct; drupe 2-seeded. Pa. to Iowa (Colman). Rare. 4–8f. May.

3 R. alnifòlius L'Her. Unarmed; lvs. oval, acute, serrate; ped. aggregate, 1-flowcred; fls. mostly pentandrous and apetalous; sep. acute; styles 3, united, very short; fruit 3-seeded. Pa. to Can. 2–4f. June.

4 R. Carolinianus Walt. Unarmed; leaves oblong-oval, serrulate, acute, paler beneath; fls. perfect, in short, axillary umbels, petals minute; stigmas 3; fr. 3-seeded. River banks, Va. to Fla. 7–15f. June.

Order XLI. VITACEÆ. VINES.

Shrubs with a watery juice, tumid nodes, and usually climbing by tendrils. Flowers small, regular, racemous, often polygamous or dioecious. Calyx minute, truncated, the limb obsolete or 5-toothed. Petals hypogynous, valvate in aestivation, as many as and opposite to the stamens. Stamens inserted on the disk which surrounds the 2-celled, 1-styled ovary. Fruit a berry, usually 4-seeded. Seeds bony. Albumen hard. Figs. 187, 250.

VITIS, L. GRAPE-VINES. (Celtic gwyd, a tree or shrub.) Petals 4 or
5, deciduous, cohering at the top, or distinct and spreading. Ovaries 2-celled, cells 2-ovuled. Fruit a globular berry, 1-4-seeded. $^a$ Lvs. simple or compound. Ped. opposite the lvs. often changed to tendrils. Fls. small, clustered.

§ Vitis proper. Petals cohering at the top, and falling without expanding... $^a$
§ Cissus. Petals free, expanding before falling. Tendrils coiling, or 0... $^b$
§ Ampelopsis. Petals free, expanding. Tendrils with an adhesive foot... No. 9
  a Leaves beneath clothed with a whitish or rusty wool
  b Leaves glabrous except the veins, and green both sides... Nos. 4, 5, 10
  $^3$ Leaves simple, angular or entire... No. 6
  $^b$ Leaves pinnately compound. Nos. 7, 8

2 V. aestivallis L. Lvs. broadly cordate, 3-5-lobed or palmate-sinuate, coarsely dentate, with scattered ferruginous hairs beneath; fertile racemes long, panicled, berries small. Shady banks. Fruit deep blue, small, ripe in September.
3 V. Caribbea DC. Hoary; lvs. round-cordate, 3-lobed or entire, smooth above. Fls.
4 V. cordifolia Mx. Frost Grape. Lvs. cordate, acuminated, somewhat equally toothed, smooth, or pubescent beneath the veins and petioles; rac. loose, many-fld.; berries small. River banks. 10—30 f. Fruit blackish, ripe in November.
5 V. vulpina L. Muscadine. Scuppernong. Lvs. (small) cordate, slightly 3-angled or lobed, shining on both sides, coarsely toothed, the teeth not acuminate; rac. composed of many capitate umbels. Va. to Fla. Fruit large. purple. few.
6 V. indivisa Wild. Lvs. simple, cordate or truncate at the base, often angular-lobed; flowers 5-merous; berry 1 or 2-seeded. Swamps. S. Fruit small (2%).
7 V. bipinnata T. & G. Lvs. bipinnate, lfts. incisedly serrate, glabrous; flowers 5 merous. S. States along rivers. Fruit small, black. No tendrils.
8 V. incisa N. Lvs. 3-foliate, thick; lfts. 2-3-lobed; berry 1-seeded. Fla. to La.
9 V. quinquefolia Lam. Virginia Creeper. Lvs. digitate, lfts. 5, oblong, acuminated, dentate; berries dark blue, smaller than peas. Acid. Woods, thickets. 20—40 f.
10 V. vinifera L. European Wine-grape. Lvs. cordate, sinuatly 5-lobed, glabrous; flowers all perfect. Europe. Many varieties.

Order XLII. POLYGALACEÆ. MILKWORTS.

Herbs or shrubs, with the leaves mostly simple and without stipules. Flowers irregular, unsymmetrical, hypogynous, perfect. Sepals 5, unequal, distinct, some or all of them colored. Petals 3, often 5, and 2 of them scale-like. Stamens 4 to 8, distinct, or cohering in a tube which is split on the upper side. Ovary superior, compound, with suspended ovules, united styles and stigmas. Fruit a 2-seeded pod. Seeds pendulous, with or without a caruncle and albumen.

Seaps 5, unequal, 2 larger, wing-shaped, petaloid. Petals 3. Stamens 8. POLYGALA. 1
Seaps 5, nearly equal. 3 of the 5 petals long-clawed. Stamens 4. KRAMERIA. 2

1. POLYGALA, Tourn. MILKWORT. (Πολύγαλος, much, γαλακτός, milk; said to favor the lacteal secretions of animals.) Fls. very irregular. Sep. 5, 2 of them wing-shaped and petaloid. Pet. 3, cohering by their claws to the filaments, lower one carinate and often crested on the back. Stam. 6 or 8, filaments united into a split tube. Anth. 1-celled. Caps. obcordate,
2-celled, 2-seeded, loculicidal. Sd. appended with a various caruncle at the hilum. * Mostly herbs, bitter, and with simple leaves. Flowers often of two forms, the subterranean apetalous.

* Leaves alternate.—a Fls. purple, solitary, 2–4. Perennial.
   —b Fls. purple, racemed, many. Biennial.
   —d Fls. purple. Spike capitulate.—Caruncle double.
   —e Car. appears simple. (1) No. 9–11

* Lvs. vertic. on the stem.—a Spikes solitary, large. Biennial.
   —b Spikes ™, corymbed, small. Biën. Nos. 14, 15

1 P. paucifolia L. St. simple, erect, naked below; lvs. ovate, acute, smooth; terminal fls. large, crested, radical ones apetalous. 2 Woods. 3–4'. Flowers few, large (10'), very showy. May, June.

2 P. grandiflora Walt. Ascending, pubescent; lvs. ovate-lanceolate to lance-linear, acute; fls. distant, pendulous after blooming, wings large, roundish, covering the fruit, keel as long as the wings (3'), crestless. (2) Dry soils, S. 9–12'. May–Aug.

3 P. polygama Walt. Sts. simple, numerous, glabrous; lvs. linear-oblong, mucronate, obtuse; fls. racemed, short-pedicelled, those of the stem winged, those of the root wingless; keel cristate. (2) Fields. 6–12'. Rac. showy. Fls. 2'. June, July.

4 P. Sénega L. Senecio Snake-root. St. erect, smooth, simple, leafy; lvs. lanceolate, tapering at each end; fls. slightly crested, in a terminal spike-form, slender raceme. 2 Woods, W. States, rare in E. 8–14'. Spike 1–2'. Leaves 1–2'. July.

β. latifolia. Leaves ovate, acuminate at each end. Leaves 2–3'. Ind.

5 P. alba N. St. angular, branched above; lvs. linear; spike lance-linear, pointed, on a long stalk. 2' Ala. to La. 6–12'. Spikes 1–3'.

6 P. setacea Mx. Sts. filiform, simple, apparently leafless (lvs. minute, deltoid-acum.); spike (small) oblong, acute; wings short-pointed, shorter than the petals; caruncle enclosing the short stipe of the hairy seed. 2' South. 1f. Leaves 1'. June.

7 P. incarnata L. Glaucescent; st. erect, slender, mostly simple; lvs. few, scattered, linear-subulate; spike oblong; wings lanceolate, cuspidate; claws of the petals united into a long, cleft tube; seed very hairy. (2) N. J. to Fla. 1–2f. June.

8 P. Chapmání T. & G. Very slender, simple, or nearly so; lvs. linear-subulate; spike loose, roundish-oblong, rather acute; wings obovate, slightly clawed; caruncle lateral on the thin-haired seed. (2) South. 1f.

9 P. Nuttallii T. & G. St. erect, somewhat fastigiate; lvs. linear; spikes acute, roundish-oblong, dense; wings elliptical, attenuate at base; crest minute; caruncle notched, lateral on the thick seed-stipe. (2) Mass., R. I., to La. 6–10'. August.

10 P. fastigiata Nutt. Slender and much branched above; lvs. linear; spikes roundish, loose-flowered; wings ovate-oblong, distinctly clawed; caruncle broad, nearly embracing the small seed-stipe (immature). (2) N. J. to Fla. 8–12'. July+

11 P. sanguínea L. St. branching at top; lvs. linear and lance-linear; spikes oblong, obtuse, dense; wings oval or ovate, obtuse, subsessile; caruncle mostly simple, nearly as long as the hairy seed. (1) Wet grounds. 10'. Leaves 1'. July+

12 P. lúceta L. St. mostly simple; root leaves spatulate, obtuse, attenuate at base; canline ones lanceolate, acute; rac. ovate-globous, obtuse, dense; fls. pedicellate; wings ovate, mucronate, keel with a minute crest. (2) Sands, N. J. to Fla. 1f. June+

13 P. nana DC. Low, ascending; lvs. obovate and spatulate, mostly radical; heads ovate, becoming oblong, dense; wings lance-ovate, cuspidate-acuminate, twice longer than the slightly-crested keel. (2) Pine woods, S. 4'. April, May.

14 P. ramósa Ell. Erect, corymbose branched above; spikes loose, oblong, numerous, forming der ee, level-topped cymes; radical lvs. few, spatulate, cauleine oblong-linear; seed oval caruncled. (2) Swamps, Del. to Fla. 1f. June.
P. cymosa Wait. Tall, corymbose branched at top; lvs. mostly radical, linear, pointed, crowded; stem lvs. very few, linear-subulate; racemes spike-like, forming a dense, fastigate cyme; seed globular, naked. Swamps. S. 2–5f. June–+

P. verticillata L. St. branched above, erect; lvs. linear, verticillate both on the stem and opposite branches; fls. crested; calyceine wings roundish; seed oblong, smooth, caruncle hardly half as long. Dry hills. 6–8'. July–+

β. ambiguus. Branches and upper lvs. alternate; spikes long; fls. scattered.

P. Boykinii T. & G. Sts. erect from an ascending base, simple; lvs. obovate and lanceolate; spike slender, pointed, dense; caruncle two-thirds the length of the very hairy seed. 2 South. 12–18'. June–Aug.

P. leptostachys Shuttle. Sts. filiform, strict; lvs. setaceous, in 4's or 5's, remote; spikes linear; seed smooth. Dry sands, Fla. 1f. Greenish.

P. Hookeri T. & G. Sts. weak, 4-angled; lvs. in 4's, linear; spikes lance-ovate, pointed. Pine woods, Fla. to Tex. 1f. Flowers pale red.

P. cruciata L. St. erect, winged at the angles, fastigiate; lvs. in 4's, linear-oblong, punctate; spikes ovate, dense, obtuse, subsessile; caruncle as long as the ovoid smooth seed. Dry. 3–12'. July, Aug.

β. cuspidata. Lvs. linear; heads squarrose with the wing-cusps. South.

P. brevifolia Nutt. Slender, branched above; lvs. linear, short, remote, in 4's, or on the branches scattered; spike oblong, dense, obtuse, on long peduncles; wings ovate-lanceolate, acute; seed just as in No. 20. N. Y. to Fla. 1f. August.

P. speciosa. Shrub 6f; lvs. cuneate-oblong, alternate; fls. purple, in terminal rac.


P. oppositifolia. Shrub 3f; lvs. opp., sessile, cordate, smooth; fls. roseate, large.

P. latifolia. Shrub 3f; lvs. opposite, ovate, glaucous, downy beneath; fls. purple.

2. KRAMERIA, L. Ovary 1-celled, with 2 collateral ovules. Seed with no caruncle and no albumen. Racemes terminal.

Order 43.—Leguminosae.

§ Pods flat, composed of 1 or more 1-seeded joints. Petals united. Stamens 4—10. *Mimosa.* 1

§ Pods continuous,—m prickly, 4-sided and 4-valved. Petals united. Sta. 8—10. *Schrankia.* 2

—m smooth,—n Petals distinct. Pod linear. Stamens 6 or 10. *Desmanthus.* 3

—n Petals distinct. Pod oblong. Stamens 10... *Neptunia.* 4


—n Petals distinct, yiw. Shrubs. *Stamens Co. Acacia.* (5+6) 58

§§ Flowers perfect, red or yellow, showy. Trees or shrubs. *Lvs. bipinnate.* *Poaiana.* (9a) 59

§§ Flowers perfect, red or rose-colored. Trees with simple broad leaves..... *Ceris.* 9

§§ Flowers perfect, yellow (in our species). Herbs with pinnate leaves...... *Cassia.* 8

§§ Flowers imperfect, greenish. —Trees thorny. *Lvs. pinnate and bipinnate. *Gleditschi.* 7

I. Podalyreæ.—c Trees. Leaves pinnate. Pod flat and thin.............. *Cladastis.* 10

—c Trees or shrubs. *Lvs. ternate.* *Callistachys,* 60, or pinnate in. *Sophora* (10-c) 11

—c Shrubs in the greenhouse, with simple, spiny-toothed leaves... *Chorizema.* (10-c) 62

—c Herbs.—p Pod inflated, stipitate. Leaves 1-3-foliate.......... *Baptisia.* 11

—p Pod flattened, sessile. Leaves 3-foliate.......................... *Thermopsis.* 12

J. Vicieæ.—d Erect. Tendrils obsolete. Fls. white, with a black spot on each wing. *Para.* 13

—d Climbing.—g Leaflets serrate. Pods 2-seeded........................... *Cicer.* 14

—g Lvs. entire.—q Sty. grooved on the back. Sds. 3—9 glob. *Pisum.* 15

—q Sty. flattened on the bb. Sds. 3—9, flattish. *Lathyrus.* 16

—q Sty. flattish. Seeds 1 or 2, *penshaped.* *Lens.* (17b) 64

—q Style filiform. Seeds 2—7, roundish...... *Vicia.* 17

K. Hedysarææ.—c Fls. yellow.—e Leaves palmately 4-foliate. Stam. monadelphous. *Zornia.* 18


—e Lvs. pinnately 3-7-foliate. Stam. monadelphous. *Chapmania.* 20

—e Leaves pinnately 3-foliate. Pod slender at base, *Stylosanthus.* 21

—e Leaves pinnately 4-foliate. Pod gibbose at base. *Arachis.* 22

—e Lvs. cyanic.—u Lvs. pinnate, 5-21-foliate.—t umbels pedunculate. *Coronilla.* 23

—u Lvs. pin 3-foliate.—t stipulate. Pod 3-7-jointed. *Desmodium.* 25

—t exstipitate. Pod 1-jointed. *Lespedeza.* 26

L. Lotusæ.—(including Genisteæ, Gen. 27—30, *Trifolieæ,* 31—34, and *Galegæ,* 35—48).

/ Leaves wanting; if present, simple. Flowers yellow.................... *Spartium.* 27

/ Leaves present, simple. Flowers yellow.—v Keel oblong, straight. *Genista.* 28

—v Keel falcate, pointed. *Crotalaria.* 29

/ Leaves palmately 5-15-foliate (rarely simple). (Genus 35, or)............ *Lupinus.* 30

/ Leaves palmately 3-foliate.—w Small tree with yellow hanging racemes. *Laburnum.* 31

—w Shrubs. Fls. ylv., axil. Some of the lvs. simple. *Cytisus.* (31a) 65

—w Herbs with straight, small pods. Fls. capitata. *Trifolium.* 32

/ Lvs. pinnately 3-foliate.—x Pods curved or spiral. Fls. in spikes, heads. &c........... *Medicago.* 33

—x Pods long and long-pointed. Flowers axillary. *Trigonella.* (33a) 66

—x Pods 1-2-seeded. Rac. (red, Gen. 50) white or yellow. *Medicago.* 34

—x Pod 1-seeded.—y Fls. yellow. Lvs. resinous dotted...... *Genus 43

—y Fls. cyanic.—e Lvs. dark-colored........ *Psoralea.* 35

—e Lvs. not dotted...... (In Genus 26

/ Lvs. pinnate, with no odd leaflet.—e 15 to 25 pairs. Tall. Fls. yellow. *S....* *Sesbania.* 36

—e 1 to 6 pairs. Flowers purple. Cult. *Orobus.* (36a) 63

/ Lvs. odd-pinnate,—h dotted with dark glanda.—k Shrubs. Fls. spicate........... *Amorpha.* 37

—k Herbs 10-androus.... *Dalea.* 38

—k Herb 5-androus.... *Petalostemon.* 39

—k dotless.—l Herbs. Style glabrous. Pod partly 2-celled... *Astragalus.* 40

—l Herbs. Style hairy. Pod 1-celled........ *Tephrosia.* 41

—f Herbs. Style glabrous. Pod 1-celled........... *Indigofera.* 42

—f Trees or shrubs. Flowers white or roseate....... *Robinia.* 43

—f Shrubs with yellow flowers........... *Colutea.* 44

—f Shrubs with scarlet flowers........... *Chilanthus.* (44a) 67

A. Phaselidæ.—h Lvs. pinnate, 5-15-foliate.—m Vine shrubby. Keel falcate........... *Wisteria.* 45

—m Herbs. Keel (straight, Gen. 41) spiral........ *Apios.* 46

—q Leaves pinnately 3—rarely 1—foliate. (*n)

n Flowers yellow. Legumes 5-seeded..................... *Vigna.* 47

n Flowers yellow. Legumes 1-2-seeded................... *Rhynchosia.* 48

n Flowers cyanic. (*q)
**Haseolcs. Dolichos.** Centrosmia.  

- Keel with stamens and style spirally twisted. Bushy or twining  
- Keel straight or merely incurved.  
  - Shrubby at base. Flowers and seeds scarlet. Wings and keel very st. rt.  
  - Herbs. - x Calyx ebracteolate. Style beardless. Petals suberect, pale.  
  - x Calyx 2-bracteolate, - y 4-cleft. Style beardless. Fils. pale.  
  - y 4-toothed. Style bearded at top.  
  - y 5-cleft, long. Style bearded inside.  
  - y 5-cleft, short. Style bearded at top.  

1. **Mimosa.** L. Sensitive Plant. (Mimosa, a buffoon: the leaves seem sporting with the hand that touches them.) Fils. x x. y Calyx valvate, 5-toothed. Cor. 0, or 5-toothed. Stam. 4—15. Legume separated into 1-seeded joints. x Like the perfect, but without ovaries or fruit.  


3. **Desmánthus.** Willd. (Deputy, a bundle, x x. Sos, flower.) Cal. valvate, 5-toothed. Pet. 5, distinct. Stam. 5 or 10, distinct. Pod dry, flat, 2-valved, 4–6-seeded, smooth. y With bipinnate lvs. and white fls. in axillary, pedunculate heads. Petioles with 1 or more glands.  

4. **Neptúnea.** Lour. Anthers 10, crowned with a stipitate gland. Pod oblong, oblique, deflexed on the stipe, 2-valved. Otherwise as in Desmánthus.  

5. **Albizzia.** Durazz. Calyx 4- or 5-toothed. Petals united into a funnel-form corolla. Stamens oo, monadelphous at base, very long. Pod linear and flat, jointless, dry, 2-valved, many-seeded.  

A. **Julibrásin. Silk Tree.** Tree about 20 f., glabrous, thornless; pinnae 8—12 pairs, each with 20—30 pairs of halised leaflets (being one-sided), acute; heads pedunculate, forming a terminal panicle; corollas white, with the innumerable long silky stamens purplish; pods some contracted between the seeds. Very ornamental, hardy South, sparingly naturalized in the Gulf States.
6. **GYMNÓCLADUS**, Lam. *Coffee Tree*. (Γυμνός, naked, ἀκήδος, a shoot; for its coarse, naked shoots in winter.) Fls. ζ. Cal. tubular, 5-cleft, equal. Pet. 5, inserted into the summit of the tube. ζ Stam. 10, distinct. ζ Style 1. Leg. 1-celled, oblong, very large, pulpy within. Δ Unarmed, with unequally bipinnate lvs. Lfts. ovate, acuminate. Fig. 480.

G. **Canadénsis** Lam.—Woods, N. Y. to Ill. and Tenn. 50f. Rac. greenish; seeds round, polished, brown, very hard, ½ diam. May—July.


1 G. **tricáanthus** L. Branches armed with stout, triple, or multiplex spines; lfts. alternate, oblong-lanceolate, obtuse; leg. linear-oblong, compressed, many-seeded. Ya. to Mo. and La. 40—70f. Wood very heavy. Pods 8—18'. May—July.


8. **CÁSSIA**, L. *Senna*. (Hebrew Katzioth.) Sep. 5, scarcely united at base, nearly equal. Pet. 5, unequal, but not papilionaceous. Stam. distinct, 10, or by abortion fewer, anth. opening by terminal pores, the three upper often sterile. Pod many-seeded, 1-celled or many-celled transversely. Δ or herbs. Lvs. abruptly pinnate. Fls. mostly yellow. Fig. 357.

§ Stam. 5 or 10, all perfect. Sep. acute. Lfts. small. Stip. persistent........Nos. 1, 2
§ Stam. 10, the 3 upper abortive. Sep. obtuse. Lfts. large. Stip. deciduous..(a)

a Gland on the petiole at or near the base........ Nos. 3, 4

a Gland on the rachis between the two lowest leaflets........ Nos. 5, 6

1 C. **Chamaecristra** L. *Sensitive Pea*. Lfts. 8—13 pairs, oblong-linear, obtuse, mucronate; lfs. large, pedicellate, 2 or 4 in each fascicle; anth. 10, unequal, all fertile. (a) Dry soils. 12—18'. Flowers large, 2 petals spotted: August.

2 C. **nicitáns** L. *Wild Sensitive Plant*. Lfts. 6—15 pairs, oblong-linear, obtuse, mucronate, sessile; lfs. small, 2 or 3 in each subsessile fascicle; stam. 5, subequal. (a) Sandy soils. 1f. Flowers small (¾), pale yellow. July.

3 C. **Marilánda** L. *American Senna*. Lfts. 6—9 pairs, oblong-lanceolate, mucronate, an obvoid gland near the base of the common petiole; lfs. racemed; pod curved, 12—20-seeded. (a) Stony places. 4—5f. Flowers showy. Aug.

4 C. **occidentálls** L. Lfts. 3—6 pairs, ovate or lance-ovate, sharply acuminate; lfs. in short racemes; pod nearly straight, 25—40-seeded. (a) Va. to Ga. 5—6f. July. §

5 C. **obtusifólla** L. Lts. about 6, obovate, obtuse; pod long (6') and narrow. recurved, 20—40-seeded; seeds longitudinal. (a) Dry soil, S. 1—4f. July, Aug.

6 C. **melanocárpa** Vegel. Shrubby; lfts. 3—3 pairs, narrowly lanceolate, acute, cordaceous; rac. as long as the leaves. Ga. §


1 C. **Siliquástrum**. Lvs. round-reniform; flowers more open than in No. 2. Eur. 30f.

10. CLADÁSTRIS, Raf. YELLOW-WOOD. Cal. 5-toothed, teeth short, obtuse. Pet. of nearly equal length, those of the keel distinct and straight like the wings. Vex. large, roundish, reflexed. Stam. 10, distinct. Fil. glabrous, incurved. Leg. flat and thin, short-stipled, 5 or 6-seeded. § With yellow wood, pinnate leaves, and pendulous clusters of white flowers.

C. tinctoria Raf. —Hills, Ky. and Tenn. 20—40f. Lfts. 7—11, oval, pointed, 3'; rac. 6—10', res. intoing Robinia. April, May.

11. BAPTISIA, Vent. WILD INDIGO. (Báptisía, to dye; a use to which some species are applied.) Cal. 4—5-cleft half way, persistent. Pet. of about equal length, those of the keel nearly distinct and straight. Vex. orbicular, emarginate. Pod inflated, stipitate, many (or by abortion few)-seeded. § Lvs. palmately 3-fol. or simple,

§ Leaves simple. Flowers yellow............................Nos. 1, 2
§ Leaves 3-foliate.—Flowers blue, in few elongated racemes.....................No. 3
—Flowers white, in few elongated racemes... (a)
—Flowers yellow, solitary or in short racemes... (b)


2 B. simplicifólía Croom. Lvs. broadly ovate, obtuse, sessile; rac. terminal, elongated, many-flowered. Quincy, Fla. 2—3f. Pod ovate. 6—12f. June.


4 B. leucophèa Nutt. Lfts. obovate, varying to obovate; stip. triangular-ovate; rac. nodding, the many flowers turned to the upper side on their pedicels; pod ovoid, inflated. Prairies, W. and S. 2—3f. Flowers large. April.

5 B. villósà Ell. Lfts. lance-oblong, or obovate; stip. lance-linear, persistent; rac. long, declining; bracts minute, deciduous; ped. not secund; leg. obovul. N. Car. to Ga.: rare. 2—3f. Plant of rough aspect, as well as No. 4. June, July.


7 B. alba R. Br. Fastigate-branched above; petioles slender; lfts. elliptic-obovate, acute at base; stip. and bracts minute, caducous; rac. erect or nodding, on a long peduncle. In rich soils, Va. to Flá. 2—3f. March, April.

8 B. lanceolátà Ell. Much branched, bushy; lvs. subsessile; lfts. narrowly elliptic to obovate, obtuse, petiolulate; fls. axillary, subsessile, short-pedicelled; pod obovate-globose. Pine woods, S. 1f. Flowers large, dull yellow. April, May.

β. stricta. Erect, strict; lfts. obovate, very obtuse; rac. few-flwd., termin. La. Flá.


10 B. microphýlla N. Smooth, bushy; lvs. small, 2—3-foliate below. simple, sessile above; stip. and bracts large, persistent; fls. small, axillary, and in terminal racemes. S. Car. to Flá. 2—3f. (B. stipulacea Ravenel.)
11 B. Lecóntil T. & G. Pubescent; lvs. short-petioled; lfts. obovate-oblong; pedicels with 2 bractlets; bracts persistent; pod short-stipled; branches, stipules, and racemes as in No. 9. Ga. Fls. 2f. May.


1 1 T. mollis M. A. Curtis. Pubescent, diffusely branched; lfts. obovate-oblong; stip. leafy, as long as the petioles; ped. shorter than calyx. Woods, N. Car. 2f. April.

2 T. fraxinifólia Curt. Smoothish, slender, branching; petioles longer than the stipules; lfts. wedge-oblong; ped. as long as the flower. Mts. Tenn. Car. 2f. May.

3 T. Caroliniana Curt. St. stout, simple; petioles as long as the ovate clasping stipules; lfts. obl.-obov.; fls. on short ped. with decid. bracts. Mts. N. Car. 4f. June.

13. FABA, Möench. Coffee Bean. Fls. as in Vicia. Seeds oblong, with a long scar (hilum) on the narrower end, and leathery, tumid legumes. Lvs. equally pinnate, with the tendril obsolete (in the following species, Peduncle shorter than the flowers.


14. CICER ARIETÍNUM, the Chick Pea, rarely cultivated, may be known by its serrated leaflets, a character quite strange in this Order.

15. PISUM, L. Pea. (Celtic pis, Lat. pisum, Eng. pea, Fr. pois.) Style dilated above, grooved on the back, villous and stigmatic on the inner side. Otherwise as in Lathyrus. Figs. 59, 60, 190.

P. satívum L. Lfts. ovate, entire, usually 4; stip. ovate, semicordate at base, crenate; ped. several-flowered. Nativity unknown. Many varieties.

16. LÁTHYRUS, L. Calyx campanulate, the two upper sepals short-est. Stam. diadelphous (9 and 1). Style flat, dilated above, ascending, bent at a right angle with the ovary, pubescent or villous along the inner side next the free stamen. Pod oblong, several-seeded. Leaves abruptly pinnate, of 1 to several pairs of leaflets. Petioles produced into tendrils. Peduncles axillary. Fig. 497.

* Native.—α Leaflets a single pair. Southern................................. No. 1
   —α Leaflets commonly 3 pairs. Perennial............................... Nos. 2, 3, 4
   —α Leaflets commonly 5 pairs. Perennial............................... Nos. 5, 6
* Exotic.—β Leaflets a single pair........................................... Nos. 7—9
   —β Leaflets 3 to 6 pairs. (Species of Orobus).......................... Nos. 10—12

1 L. pusíllus Ell. St. winged; lfts. 2, linear-lanceolate, acute at each end; stip. conspicuous, lance-falcate, half-sagittate; ped. long. S. Car. to La. Purple. May.

2 L. ochróléucus Hook. St. slender; lfts. broadly ovate; stip. semicordate, large; ped. 7-10-flowered, shorter than the leaves; fls. cream-white. Shades. N. 3f. June.
3 L. palústris L. St. winged; stip. semisagittate, mucronate; lfts. 2 or 3 pairs, lance-linear or oblong, mucronate; ped. 3-5-flowered, equaling the leaves. Wet thickets, N. Eng. to Oreg. 1-2f. Blue-purple. June—July.

4 L. myrtifóllus Muhl. St. slender, 4 angled; lfts. elliptic-oblong, obtuse; stip. ovate, entire; ped. longer than lvs., 5-flwd. N. E. to Va. and Ind. 2-4f. Pale purpl. JL

5 L. venósus Muhl. St. 4 angled; stip. semisagittate, lanceolate, very small; ped. 8-16-flowered, shorter than the leaves; lfts. 4—7 pairs, somewhat alternate, obtusish, mucronate. Shady banks. 2-3f. Flowers large, purple. June, July.

6 L. marítimus Bw. Beach Pea. St. 4 angled, compressed; petioles flat above; stip. cordate-hastate, nearly as large as the 8—12 ovate leaflets; ped. many-flowered. Sandy shores. N. Y. to Oreg. 1—2f. Leaves pale green. Flowers blue. May, June.


10 L. vernus. Lfts. 6, ovate, acuminate; lfts. red-purple-blue. Europe. 1f. April.


17. VÍCIA, L. Vetch. (Celtic gwig, whence Gr. βύκιον, Lat. vicia, Fr. vesse, and Eng. vetèla.) Style filiform, bent at right angles with the ovary, villous beneath the stigma on the outside (next the keel). Otherwise nearly as in Lathyrus.

* Peduncles 1-2-flowered, shorter (in flower) than the leaves..............Nos. 1—3
* Peduncles 3-20-flowered.—a Leaflets 3—6, very narrow..................No. 4
  —a Leaflets 8—20.—b Stipules long-toothed..................No. 5
  —b Stipules entire..................Nos. 6—8


3 V. micrántha N. Lfts. 4—6, linear, acute, obtuse or retuse; lfts. mostly solitary, minute, pale; pod 1”, sabre-shaped, erect, 6—10-seeded; seeds black. S. 2—3f.

4 V. acutifólia Ell. Leaflets 3—6, linear, acute; stip. lance-linear; tendrils mostly simple; rac. 3—9-flowered, longer than the leaves. Ga. Fls. 2—4f. Whitish.

5 V. americánà Muhl. Ped. 4—8-flowered, shorter than the lvs.; stip. semisagittate, deeply dentate; lfts. 10—14, elliptic-lanceolate, obtuse; ped oblong-linear, compressed, reticulated. N. Y. westward. 1—3f. Blue-purple. May.

6 V. caroliniana Walt. Pedicel 6—12-flowered, rather shorter than the lvs.; lfts. loose; calyx teeth very short; stip. lance-linear; lfts. 8—12, linear-oblong or linear, smoothish; ped oblong. Woods and banks. 4—6f. Pale purple. May.

7 V. crácca L. Tufted Vetch. Fls. imbricated, 12—20 or more in the raceme; lfts. 12—24, oblong, puberulent; stip. semisagittate, linear-subulate, entire. Thickets. 2—3f. Flowers blue-purple, 4”. July.

8 V. hírsuta Koch. Hairy; lfts. 8—20, linear, truncate, mucronate; ped. 3—6-flowered shorter than leaves; leg. hirsute, 2-seeded. Fields. 1—3f. June. §

18. ZÓRNA, Gmel. (For John Zorne, M. D., of Bavaria.) Calyx bilabiate, upper lip obtuse, emarginate, lower 3-cleft. Vex. orbicular, with the sides revolute. Sta. monadelphous, the alternate anthers different. Pod
Compressed, of 2–5 roundish joints. 2 Lvs. palmately 2–4-foliate with sagittate stip., which are enlarged above and supply the place of bracts.


1 E. hispida. Willd. Erect, scabrous; lfts. very smooth, 27–37, oblong-linear, obtuse; rac. 3-5-flowered; pod 6-9-jointed. 1 Marshes, Pa. and S. 2–3f.

2 E. viscidula. Mx. Slender, procumbent, viscid pubescent; lfts. 7–11, obovate; ped. filiform, 1 or 2-flowered; pod 2 or 3-jointed. 1 Sandy fields, S.


21. STYLOSÁNTHES, Swartz. (Στῦλος, a style, ἄνθος.) Fls. of two kinds. 2 Calyx bibracteolate at base, the tube slender and stalk-like, with the corolla inserted on its throat. Vex. orbicular. Sta. 10, monadelphous. Ov. sterile, with a filiform style. 2 Cal. and corolla 0. Ov. between 2 bracteoles. Leg. 1–2-jointed, unicinate with the short, persistent style.—Lvs. pinnately trifoliolate.


22. ARACHIS, Willd. PEANUT. (Lat. arácóς, used by Pliny to designate some subterranean plant.) Calyx bilabiata. Cor. resupinate. St. monadelphous. Pod gibbous at base, coriaceous, veiny, turgid, and indehiscent, the joints not separating.—S. American herbs, with equally pinnate leaves and yellow flowers.

A. hypogèæa. Willd. Leaflets 2 pairs, oval or roundish, cuneate at base; stip. entire, lance-subulate, as long as the leaflets; fruit subterranean. Cult. South.

23. CORONÍLLA, L. (Lat. corona, a crown; from the inflorescence.) Calyx bilabiata. Petals unguiculate. Loment somewhat terete, jointed. Seeds mostly cylindrical. 5 4 Lvs. unequally pinnate. Fls. in simple, pedunculate umbels, rose-colored.

1 C. émerus. Scorpion Senna. St. woody, angular; ped. about 3-flowered; claws of the petals thrice longer than the calyx. France. 3f. May.


24. HEDYSÁRUM, L. (Ἥδυς, sweet, ἀρωματικός, smell.) Calyx cleft into 5 linear-subulate, subequal segments. Keel obliquely truncate, longer
than the wings. Sta. diadelphous (9 and 1), and, with the style, abrupt by bent near the summit. Pod (loment) of several 1-seeded joints connected by their middle. 2f Leaves unequally pinnate.


25. **DESMÓDIUM, DC. Bush Trefoil.** Calyx more or less bilabiately. Vex. roundish, keel obtuse. Sta. diadelphous (9 and 1) sometimes monadelphous. Pod (loment) compressed, jointed, constricted most on the lower (dorsal) suture, the joints 1-seeded, separable, mostly aculeate and adhesive. 2f 5 Leaves pinnately trifoliate. Flowers in racemes or often large, loose panicles, purplish, in Summer. Figs. 191, 355.

§ Legumes distinctly stipitate, the stipes about as long as the joints... (a)
- a Stems prostrate, creeping. Leaflets round or oval..............Nos. 1–2f
- b Stems erect. Leaflets broadly ovate, or (in No. 6) narrowly...(b)
  - b Calyx teeth shorter than the tube..............Nos. 3–5
  - b Calyx teeth longer than the tube,—upper one notched... Nos. 6–8
- c Leaflets small, orbicular or oval..............Nos. 16–18
- c Leaflets long, linear. No. 19. Lfts. oblong.†, No. 20

1 **D. rotundifolium** DC. Plant prostrate, downy; leaflets suborbicular; bracts and stipules broadly ovate, acuminate; racemes few-flowered; loment constricted on both margins nearly alike. Rocky woods. 2–3f. Purplish. August.

2 **D. ochroleucum** Curt. Plant decumbent, smoothish; lfts. ovate, rarely single; stip. ovate, pointed; raceme long, fls. white; loment twisted. Woods, Md. & S. (Porter).

3 **D. nudiflorum** DC. Lfts. roundish ovate, bluntly acuminate, slightly glaucous beneath; scape radical, panicked, smooth; joints of the loment obtusely triangular. Woods, com. St. 1f, scape 2–3f, with many small purple flowers.

4 **D. acuminatum** DC. Plant erect, simple, pubescent, leafy only at top; leaflets ovate, long-acuminate, the odd one round-rhomboidal; pan. terminal, on a very long peduncle. Woods, com. 8–12', the panicle 2–3f. Fls. small, flesh-color. Pod 3-jointed.

5 **D. pauciflorum** DC. St. assurgent, leafy all the way, retrorsely hairy; lfts. thin, obliquely ovate, acutish, terminal one rhomboidal; rac. terminal, the flowers few, in pairs; petals all distinct, spreading. Woods, N. Y. to Ill. and La. 1f. Whitish.

6 **D. paniculatum** DC. Erect, slender, nearly glabrous; lfts. oblong-lanceolate, obtuse; stip. subulate, deciduous; fls. on slender pedicels in panicked racemes; loment of about 3 triangular joints. Woods, common, 2–3f. Purple.

7 **D. viridisflorum** Beck. Densely pubescent; lfts. ovate, scabrous above, whitened beneath; stip. lance-ovate, acuminate; pan. naked, very long; pod of 3 or 4 triangular joints. Alluvion, N. Y. and S. 3–4f, rigid. Violet, fading to green.


**β. monophyllum.** Dwarf, simple; lower lvs. 1-foliate. Uxbridge. Ms. 1f. (Bickard.)
Order 43.—Leguminosae.

9. *Glabéllum* DC. St. smoothish; lfts. ovate, small, rough-pubescent on both sides; pod of 3 or 4 triangular, minutely hispid joints. Shades, Car.


11. *Canescens* DC. St. striate, scabrous; lfts. ovate, rather obtuse, scabrous on the upper surface, soft-villous beneath; pan. densely canescent, naked; joints of the loment 4, obliquely oval, hispid. Woods. 3f.


17. *Maríandicum* Boott. Erect, slender, nearly smooth; lfts. ovate, obtuse, subcordate at base, the lateral ones as long as the petioles; loment stipe as long as the calyx, joints 1 or 2. Woods. 2—3f. Violet.

18. *Lineátum* DC. Slender, reclining; st. finely striate with colored lines; lfts. small, roundish oval, green both sides; pod quite sessile in the calyx, joints about 2. Dry woods. 2 or 3f.

19. *Strictum* DC. Slender, nearly glabrous; lvs. petiolate; lfts. linear, elongated; pan. few-flowered; pod hispid, incurved, of 1—3 lunately triangular joints, with a filiform stigmas. Pine woods, N. J. and S. 2f.

20. *Gyrans*. Moving-plant. Lateral lfts. very small; pods pendulous. From Bengal. Wonderful for the leaves, which in warm weather are always in motion.


§ Fls. all complete. Calyx villous, long. Cor. whitish with a purple spot...Nos. 1, 2
§ Fls. partly apetalous. Calyx short. Corolla violet.—a Stems upright......Nos. 3, 4
—a Stems prostrate........No. 5

1. *Capitata* Mx. Bush Clover. Lfts. elliptical to linear, silky beneath; stip. subulate; fascicles of flowers ovate, subcapitate, shorter than the leaves, axillary; loment hairy, shorter than the villous calyx. Dry soils, Can. to Car. 2—4f.

2. *Hirta* Ell. Stem villous; lfts. roundish oval, pubescent beneath; rac. capitata, axillary, oblong, longer than the leaves; corolla and pod about as long as the calyx. Dry woods. 2—4f. Flowers reddish-white.

3. *Steúvi* Nutt. Branched and bushy, tomentous or pubescent; lfts. oval-obovate or roundish, longer than the petiole; rac. axillary, capitate or loose; pod villous-pubescent. Dry soils, Mass. to Ga. 2f. Variable.

4. *Violaceae* Pers. Erect or diffuse, sparingly pubescent; lfts. oval, varying to oblong and linear, obtuse, macronate, as long as the petioles; rac. axillary few-flowered, the apetalous ones generally below. Dry woods. *Leaflets* 1'.
ORDER 43.—LEGUMINOSÆ.

1. **Crotalaria**. Flowers many, in clusters shorter than the leaves.
2. **Pisum**. Leaflets linear; rigid; flowers in short fascicles. Erect.
3. **Vicia**. Leaflets ovolate; upper peduncle longer than the leaves.

5. **Lupinus**, L. **Common Broom.** (Σπάρτιον, a rope; formerly made of the Broom.) Calyx spathe-like, split behind, teeth very short. Keel incurved, acuminate, longer than the wings. Otherwise like Genista.


27. **Spartium**, L. **Common Broom.** Perfectly typical of the Genistaceae. The spathaceous calyx, the narrow, 2-parted petioles of the leaves, the cleft calyx and the small 3-toothed stamens are all characteristic of the family. The flowers are yellow, the stamens monadelphous. The genus includes about 20 species, naturalized in Europe. Other species, such as Genista hispanica and Genista anglica, are also naturalized in North America.

29. **Crotalaria**, L. **Rattle-pod.** (Kρόταλον, a rattle; from the rattling of the loose seeds in the horny pod.) Calyx 5-cleft, somewhat bilabiate. Vex. cordate, large. Keel acuminate. Stam. 10, monadelphous. Filamentous sheath cleft on the upper side. Pod pedicellate, turgid.—Herbs or shrubs. Lvs. simple or palmately compound. Flowers yellow.


29. **Crotalaria**, L. **Rattle-pod.** (Kρόταλον, a rattle; from the rattling of the loose seeds in the horny pod.) Calyx 5-cleft, somewhat bilabiate. Vex. cordate, large. Keel acuminate. Stam. 10, monadelphous. Filamentous sheath cleft on the upper side. Pod pedicellate, turgid.—Herbs or shrubs. Lvs. simple or palmately compound. Flowers yellow.


29. **Crotalaria**, L. **Rattle-pod.** (Kρόταλον, a rattle; from the rattling of the loose seeds in the horny pod.) Calyx 5-cleft, somewhat bilabiate. Vex. cordate, large. Keel acuminate. Stam. 10, monadelphous. Filamentous sheath cleft on the upper side. Pod pedicellate, turgid.—Herbs or shrubs. Lvs. simple or palmately compound. Flowers yellow.
31. **LABURNUM**, Benth. Calyx campanulate, bilabiate, upper lip 2-, lower 3-toothed. Vex. ovate, erect, as long as the straight wings. Fil. diadelphous (9 and 1). Leg. continuous, tapering to the base, several-seeded. $\frac{1}{2}$ Leaves palmately trifoliate. Flowers mostly yellow.

1 L. **vulgare** L. **Golden Chain.** Arborescent; lfts. oblong-ovate, acute at base, acuminate; raceme elongated (1f), pendulous; legume hisrate. Europe. 15f.

2 L. **alpinum** L. Arborescent; lfts. oblong-ovate, rounded at base; raceme long, simple, pendulous; legume glabrous. Alps. 30f.


$\frac{1}{2}$ Flowers yellow, in small, dense, roundish heads. Legume 1-seeded.……..Nos. 1, 2

$\frac{1}{2}$ Flowers cyanic,—c pedicellate, finally deflexed….(a)

$\frac{1}{2}$ c subsessile, never deflexed….(b)

a Heads small, on stalks some ten times longer. Legume 4-seeded.……..Nos. 3, 4

b Heads large, on stalks two or three times longer.……..Nos. 5, 6

b Calyx teeth plumose, longer than the whitish corolla.……..No. 7

d Calyx teeth shorter than the purple or roseate corolla.……..Nos. 8-10

1 T. **procumbens** L. **Yellow Clover.** St. procumbent or ascending; lfts. denticulate, terminal one stalked; stip. ovate-lanceolate, acuminate, much shorter than the petioles; heads small, subglobose; style short. (1) Dry soils, N. H. to Va. 1-2f. Jn.

2 T. **agrarium** L. St. ascending or erect; lfts. denticulate, all subsessile; stipules linear-lanceolate, cohering with and longer than the petiole; heads ovoid-elliptic; style equalizing the pod. (1) Dry fields, N. H. to Va. 1f. July.

3 T. **Carolinianum** Mx. Slender, diffuse; lfts. cuneate-obovate, the middle one obcordate; stip. ovate-acuminate, foliaceous; cal. teeth thrice longer than its tube. (1) Fields, S.

4 T. **repens** L. **White Clover.** Shamrock. St. creeping, diffuse; lfts. obcordate, denticulate; stip. narrow, scarious; cal. teeth shorter than the tube. 2 Pastures, &c.

5 T. **reflexum** L. **Buffalo Clover.** Pubescent; ascending or procumbent; lfts. obovate, serrulate; stip. leafy, semicordate; cal. teeth nearly as long as the petiole; leg. 4-seeded. (2) Prairies, W. and S. 8-10'. April—June.

6 T. **stoloniferum** Muhl. Glabrous, creeping; lfts. broadly obcordate, dentilicate; stip. leafy, ovate-lanceolate; cal. teeth not half the length of the corolla; legume 2-seeded. W. States. 6-12'. May, June.

7 T. **arvense** L. Hds. cylindrical, very hairy; cal. teeth setaceous, longer than the cor.; leaflets narrow-obovate. (1) Dry, sandy fields. 5-10'. June—Aug. $\frac{1}{2}$ Eur.

8 T. **pratense** L. **Red Clover.** Ascending, thinly hisrate; lfts. spotted, oval, entire; stip. ovate, cuspidate-acuminate; heads sessile; lower tooth of the cal. longer than the four others which are equal. 2 Fields and meadows. 2f.

9 T. **média** L. **Zig-zag Clover.** St. suberect, branching, flexuous, nearly glabrous; lfts. not spotted, oblong, subentire; stip. lanceolate, acuminate; heads ovoid-globous, pedunculate; cal. teeth setaceous, hairy. 2 Hills, N. $\frac{1}{2}$ Eur.
33. **MEDITAGRO**, L. MEDEICK. Calyx 5-cleft. Cor. deciduous. Vex. free and remote from the keel. Leg. variously curved, or spirally coiled or twisted.—Lvs. pinnately 3-foliolate, denticulate. European.

* Pods smooth........Nos. 1, 2, 3. ** Pods spiny.........Nos. 4, 5, 6.

1 **M. lupulina** L. None-such. Procumbent, pubescent; lfts. wedge-ovoblate; fls. yellow; pod reniform, 1-seeded. (1) Waste grounds. 6—20'. May—July. §

2 **M. sativa** L. Lucerne. Erect, glabrous; lfts. oblong-lanceolate; stip. lance-linear; fls. violet-purple, large; pod spiral. 2'S Fields: rare. 2—3f. June, July. §

3 **M. scutellata** L. Snails. Lfts. elliptical and ovoblate; ped. 1—3-flowered, shorter than the leaf; pod coiled like a snail-shell. Gardens. July. §

4 **M. denticulata** Wild. Lfts. ovobate; stip. bristly-gashed; ped. with 1—3 yellow flowers; pod loosely spiral, outer edge grooved and doubly echinate. 1—2f. June. §

5 **M. maculata** Wild. Lfts. orbiculate, with a purple spot; ped. 2—3-flowered; pod compactly spiral, outer edge grooved and doubly spiny. 1 §

6 **M. intertexta** L. Hedgehog. Lfts. rhomboidal; stip. gashed; pod spirally coiled in 5 or 6 turns, bordered with bristly prickles. Rare. §


1 **M. officinalis** Wild. Fls. yellow; lfts. obovate-oblong, obtuse; stem erect, with spreading branches. Alluvion. 3f. Raceme slender, one-sided. §

2 **M. alba** Lam. Sweet-scented Clover. Fls. white; lfts. ovate-oblong, truncate, mucronate; vex. longer than the other petals. Fields. 4—6f.

35. **PSORALEA**. Cal. 5-cleft, campanulate. Segm. acuminate, lower one longest. Stam. diadelphous, rarely somewhat monadelphous. Pod as long as the calyx, 1-seeded, indehiscent. 27. Usually glandular-dotted. Stip. cohering with the base of the petiole. Flowers cyanic.

* Leaves, at least the upper ones, 1-foliolate, lowest 3-foliolate........Nos. 1, 2
* Leaves all pinnately 3-foliolate......................Nos. 3, 4, 5
* Leaves pinnately 19—21-foliolate......................No. 6
* Leaves palmately 3—7-foliolate.—a Silky or smooth. Fls. loosely spicate...Nos. 7, 8, 9
  —a Villos. Flowers densely capitulate....Nos. 10, 11

1 **P. canescens** Mx. Bushy, downy-canescens; lower lvs. palmately 3-foliolate; lfts. roundish obovate, dotted, upper simple. Woods, S. 2f.

2 **P. virgata** N. Virgata, smoothish; lowest lvs. pinnately 3-foliolate; lfts. linear or oblong, often all simple; spikes rather dense. Ga. 2f.

3 **P. stipulata** T. & G. Smoothish; lfts. elliptic-ovate, obtuse; stipules large, ovate; ped. as long as the leaves; spikes capitulate. Falls of Ohio, Ky.

4 **P. mellilotoides** Mx. Smoothish; lfts. lance-oblong, obtuse; stip. lanceolate; ped. much longer than the leaves. Dry soils, S. and W. 2f.

5 **P. onobrychis** N. Pubescent; lfts. ovate, acuminate; stipules filamentous; pod long, with slender spikes. Thickets, W. 3—5f. June, July.


7 **P. Lupinellus** Mx. Slender, glabrous; lfts. 5—7, linear-filiform; rac. elongated; fls. violet; pod 5-shaped. Woods, S. 2f. May, June.
36. **SESBANIA**, Pers. Calyx bell-shaped. Vex. spreading or reflexed. Keel incurved, with long claws. Leg. linear or oblong, or few-seeded. Seeds transverse.—Lvs. abruptly pinnate, with many leaflets. Raceme axillary, loose (yellowish). Fig. 356.


2 **S. platycarpa** Pers. Tall, glabrous; lfts. as above; pod oblong-elliptic, valves double, the inner membranous, 2-seeded. (1) S. 10f. Aug. (Glottidium Flor. DC.)


* Leaves stalked (lowest leaflets remote from base). Legume 2-seeded.........No. 1
* Leaves sessile or nearly so. Lfts. 16—20 pairs. Legume 1-seeded.........Nos. 2, 3

1 **A. fruticosa** L. Scarcely pubescent; lfts. 9—19, oval, obtuse (1); cal. teeth short, obtuse, the lowest pointed. W. and S. to Rocky Mts. 6—16f. May, June.

2 **A. herbacea** Walt. Pubescent or not; lfts. 41—51, oblong, obtuse (7'); cal. teeth subequal, villous, upper obtuse, lower acute. South. 2—4f. June, July.


**D. alopecuroides** Wild. Glabrous and much branched; lfts. 8—14 pairs, linear-oval, obtuse or retuse, punctate beneath; spike pedunculate, oblong-cylindric, silky-villous. (1) Ill. to Ala. and W. 2f. Flowers white and violet. August.

39. **PETALOSTÉMON**, Mx. Calyx 5-toothed, nearly equal. Pet. 5, on filiform claws, 4 of them nearly equal, alternate with the stamens and united with the staminate tube. Stam. 5, monadelphous, tube cleft. Leg. 1-seeded, indehiscent, included in the calyx. 2f. Leaves unequally pinnate, exstipellate. Flowers in dense, pedunculate, oblong spikes or heads.

§ **KUHNISTERA** Lam. Icads corymbed, each with an involucre of scales; calyx teeth long, plumous, pappus-like, setaceous.........................No. 5

$ **PETALOSTEMON** proper. Spikes solitary, not involucrate. Calyx teeth short... (a)

a Bracts awn-pointed, longer than the calyx. West........................Nos. 1, 2

a Bracts not awned, short, acute or obtuse. South........................Nos. 3, 4

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**Order 43. Leguminosae**

8 **P. floribunda** N. Canescent; lfts. 3, rarely 5, dotted, oblong to linear; rac. slender; ped. as long as the flowers (3'); pod smooth. Ill. and W. 3f. June.

9 **P. argophylla** Ph. Erect, silky-white; lfts. elliptic, obtuse, 5, rarely 3; ped. much longer than the leaves; lfs. whorled. Wis. to Dakota (Matthews.)

10 **P. subacaulis** T. & G. Nearly stemless, hirsute; lvs. 7-folliate on very long petioles; lfts. obovate-oblong; ped. long, rigid; cal. teeth obtuse. Tenn. April.

11 **P. esculenta** Ph. Erect, rigid, diffuse, white-haired; lfts. 5, oblanceolate; petioles long, ped. longer (3'); head oblong; sep. and bracts long, pointed. Minn. to Dakota (Matthews, Colman.) 1f. Tubers farinaceous.
ORDER 43.—LEGUMINOSÆ.

1 P. candidum Mx. Glabrous, erect; lfts. 7—9, all sessile, linear-lanceolate, mucronate, glandular beneath; spikes on long peduncles; bracts longer than the white petals. Dry prairies, S. and W. Slender. 2f. Leaflets 1'. July.

2 P. violaceum Mx. Minute pubescent, erect; lfts. 5, linear, glandular beneath; spikes pedunculate; bracts shorter than the violet petals. Prairies, West. 2f. Leaflets 1'. Heads 1' long, brilliant. July, Aug.


5 P. corymbósum Mx. St. corymbously branched; spikes capitate, sessile; bracts broad, colored, the outer leaf-bearing; lfts. linear, 5—7. South. 2f. White. Sept.

40. ASTRÁGALUS, L. MILK VETCH. Calyx 5-toothed. Pet. elongated, erect, clawed. Vex. narrow, equaling or exceeding the obtuse keel. Stam. diadelphous (9 and 1). Legume mostly turgid, 2-valved, 1-celled, or 2-celled partly or completely by the intrusion of the sutures. Seeds 1—∞, funiculus slender. 2¢ chiefly. Leaves unequally pinnate. Flowers in spikes or racemes. (Including Phaca, L.)

§ Legume abruptly stipitate, oblong, straight-pubescent……………… Nos. 1, 2
§ Legume sessile in the calyx.—a Fls. white or yellowish……….(6)

b Legume straight, ovoid-oblong, smooth, dry, turgid……………Nos. 3, 4
b Legume curved, oblong, woolly or velvety, dry, flattened…………Nos. 5, 6

c Legume curved, crescent-shaped, 1-celled, smooth……………..No. 7

c Legume globular, fleshy; when dry splitting into two……………Nos. 8, 9

1 A. Robbinsi i Oakes. Erect; lfts. 5—11, elliptical; cor. white, twice longer than the calyx; pod puberulent, 1-celled. Rocky shores, Vt. Rare. 8—14'. Cor. white, 5". May, June.


3 A. Canadénsis L. Canescent, tall; lfts. 21—31, elliptical; bracts as long as the calyx; fls. greenish; pod 2-celled. Banks. 2—3f. Pod 6". July, August.


7 A. obcordátus Ell. Low, assurgent, smoothish; lfts. 7—12 pairs, 4", oblong to obovate, coriaceous at apex; ped. as long as the leaves, 8—15-flowered; pod deflexed, incurved, pointed. Ill. to Ga. 6—10'. April—June. (A. distortus T. & G.)

8 A. carycopárus Ker. Low, diffuse, whitish, downy or nearly smooth; leaves stalked; lfts. 15—21, obovate; ped. longer; fls. 8—10", capitate; pod as large as a grape, smoothish, easterly. Ill. W. and S. May. (A. Mexicanus DC.)

9 A. Platténsis N. Villous, diffuse; lfts. 8—12 pairs, oblong; stip. lanceolate; rac. capitate; pod ovoid, villous. Gravel, Ill. Tenn. and W. May.

41. TEPHROŚIA, L. GOAT'S RUE. CAT-GUT. Calyx with 5, nearly equal, subulate teeth. Bracteoles 0. Vex. large, orbicular. Keel obtuse, cohering with the wings. Sta. diadelphous (in the following species) or monadelphous. Legume linear, much compressed, many-seeded. 2¢ Lvs. unequally pinnate. Leaflets mucronate. Flowers white-purple.
Flowers large (9-10" long) in a leafy terminal cluster. Lfts. 15-27. ..........No. 1
Fls. small, spicate, on long peduncles.—a Lfts. 9-17. Pods downy......Nos. 2, 3, 4
—c Lfts. 5-9. Pods smoothish......Nos 5, 6


2 T. spícētā T & G. Rusty-villous, diffuse; lfts. oval-oblong, obtuse or retuse; ped. very long; calyx teeth longer than tube. S. 1-3f. July.

3 T. hispīdula Ph. Minutely hispid or pubescent, slender, decumbent; lfts. elliptic-oblong, acute; cal. teeth not longer than tube. S. 1-2f. May—July.

4 T. ambi güa M. A. Curt. Smoothish, decumbent; lfts. 7-15, oblong-blancheolate, truncate, brownish beneath; ped. angular, 2-3-flowered, as long as the leaves; calyx teeth shorter than tube. S. 1f. June, July.

5 T. grácēlis Wood. Slender, diffuse, subglabrous; lvs. stalked; lfts. oblong-ovate, emarginate; ped. twice longer than the leaves; fls. on slender pedicels; cal. teeth very short; pod smooth. Fls. to La. 6-12f.

6 T. crysophylla Ph. Prostrate, rust-pubescent; lvs. sessile; lfts. round-obovate, acute, wavy, yellowish; pedunc. much longer than the leaves; calyx teeth subulate. Dry woods, Ga. Fls. to Tex. 10-20f. May—July.

42. INDIGÓFERA, L. INDIGO-PLANT. Calyx with 5 acute segments. Vex. roundish, emarginate. Keel spurred each side, at length reflexed. Legume 2-valved, 1 to oo-seeded. § 24 Stip. small, distinct from the petiole. Leaves odd-pinnate. Legume pendulous.

§ Racemes longer than the leaves. Leaflets obovate-oblong, obtuse........Nos. 1, 2
§ Racemes shorter than the leaves. Leaflets oval. Naturalized South........Nos. 3, 4


2 L. leptosēpala N. Decumbent, strigous; lfts. 7-9, subsessile; calyx teeth subulate; fls. pale-scarlet; pod linear, 6-9-seeded. Ga. Fls. to Ark. 2-3f.

3 L. tinctorīa L. Erect; lfts. 9-11; pod terete, torulous, curved. Waste pl. § E. Ind.

4 L. Anīl L. Erect; lfts. 7-11; pod flattened, even, with thick edges. Waste. § W. Ind.

43. ROBÍNIA, L. LOCUST. Calyx 5-cleft, the 2 upper segments more or less coherent. Vex. large. Alæ obtuse. Sta. diadelphous (9 and 1). Style bearded inside. Legume compressed, elongated, many-seeded. § 5 With stipular spines. Lvs. odd-pinnate. Fls. showy, in axillary racemes. Fragrant. Fig. 402.

1 R. Pseudacēcia L. Common Locust. Branches armed with spines; lfts. ovate and oblong-ovate; rac. pendulous, white, smooth, as well as the pods. Penn. S. and W. Introduced everywhere. 30-50f. Wood very durable. April, May.


3 R. hispīd L. Rose Acacia. Spines almost wanting, shrub mostly hispid; rac. oose, mostly pendulous; fls. large, rose-red. Mts. S. 3-8f. May, June. 1

44. COLÚTEA, L. BLADDER SENNA. Calyx 5-toothed. Vex. with 2 callosities, expanded, larger than the obtuse carina. Stig. lateral, under the hooked summit of the style, which is longitudinally bearded on the back side. Legume inflated, scarious. § Leaves odd-pinnate.

C. arborēscens L. Lfte. elliptical, retuse; vex. shortly gibbous behind. Mt. Vesuvius.

45. **WISTÀRIA**, Nutt. Cal. bilabiate, upper lip emarginate, the lower one 3 subequal teeth. Vex. with 2 callosities ascending the claw and separating above. Wings and keel falcate, the former adhering at top. Legume torulous. Seeds many, reniform. \(\frac{1}{2}\) Leaves odd-pinnate. Race-me large, with large, colored bracts. Flowers lilac-purple.

1 **W. frutécens** DC. Pubescent when young, at length glabrous; Ifs. 9–13, ovate or elliptic-lanceolate, acute; raceme densely \(\infty\)-flowered; calyx teeth obtuse; ovary glabrous. Swamps, S. 15–30f. Woody. April, May.

2 **W. consequàna** Benth. Pubescent; Ifs. 9–13, ovate or oblong-lanceolate, acuminate; raceme loose, pendulous, 1f long; calyx teeth acuminate. China. April.

46. **APIOS**, L. **GROUND NUT.** Calyx obscurely bilabiate, the upper lip of 2 very short, rounded teeth, the 2 lateral teeth nearly obsolete, the lower one acute and elongated. Keel falcate, pushing back the broad, plicate vex. at top. \(\frac{1}{2}\) Glabrous. Root bearing edible tubers. Leaves pinnately 5–7-foliate.


47. **VIGNA**, Savi. (To Dominic Vigna, commentator on Theophrastus.) Calyx of 4 lobes, the upper twice broader, the lower longer. Vex. broad, with 2 callosities near the base of the limb. Keel not twisted. Stigma lateral. Legume terete. \(\frac{1}{2}\) Leaves pinnately trifoliate.

V. hirsùta Feay. Plant hirsute, the stem retrorsely so; cal. with 1 bractlet at base, segm. all acute, the lower acuminate; Ifs. ovate-lanceolate, pointed. Marshes, S. Car. Fla. to La. 6–10f. Flowers pale yellow, 6". Pod 2', 4–6-seeded. July–Sept.

48. **RHYNCHÒSIA**, DC. Calyx somewhat bilabiate, or 4-parted, with the upper segment 2-cleft. Vex. without callosities. Keel falcate. Style glabrous. Legume oblique, short, compressed, 1–2-seeded. Seeds carunculate. \(\frac{1}{2}\) \(\frac{1}{2}\) Leaves resinous-dotted beneath, pinnately 3-foliate, sometimes reduced to a single leaflet. Flowers yellow.

§ **Phaseloídeae.** Twining. Raceme long, \(\infty\)-flowered. Calyx teeth short... No. 1

§ **Arctophýllum.** Low, or twining. Flowers in fascicles or short racemes.

Calyx teeth leafy, as long as the corolla........... No. 2, 3 4

§ **Orthodánum.** Erect. Ped. 1-flowered, axillary. Calyx teeth subulate... No. 5

1 **R. mínima** DC. Scrambling; Ifs. thin, rhomboidal; rac. with about 12 remote, reflexed fls.; pod torulous, 6" long. Banks, S. Car. to Fla. and La. 3–5f, delicate.

2 **R. simpliciólia** (Eill.) Low, erect, pubescent; lvs. reduced to a single leaflet, orbicular or reniform, obtuse. Sandy woods, S. 1–3'. Leaves 1'. April, May.

3 **R. volúbilis** Wood. Twining, pubescent; Ifs. 3-fol.; Ifs. oval or orbicular; rac. 3–10-flwd.; calyx teeth ovate, cuspidate. Dry woods, S. 3–4f. Lfs. 1'. June, July.

4 **R. erécta** Wood. Tall, velvety pubescent; Ifs. 3-foliate; Ifs. oval, acute; sepals scarcely united, lance-ovate to linear. Dry. Md. to Fla. 2–5f. June–Aug.

5 **R. galactóides** Chapm. St. erect, rigid, branched; Ifs. small, elliptic or oval, margins revolute; ped. half as long as the flowers. Ala. Fla. 2–3f.

49. **PHASEÓLUS**, L. **KIDNEY-BEAN.** Cal. upper lip 2-toothed, lower 3-toothed. Keel with the stamens and style spirally twisted. Leg. com-

§ Flowers arranged in racemes. Legume falcate. July—Sept. ..................... No. 1
§ Flowers few, capitate on long stalks. Legume straight, linear. .......... Nos. 2-4
Exotic.—a Stems climbing. ....................... Nos. 5, 6, 7
—a Stem erect, bushy. ....................... No. 8

1 P. perennis Walt. Wild Bean Vine. Twining, pubescent; rac. paniculate, mostly in pairs, axillary; lfts. ovate, acuminate, 3-veined; leg. pendulous, falcate, broad-macronate. Dry woods: common. 4-7f. Pod 2'.

2 P. diversifolius Pers. St. prostrate, scabrous; lfts. angular, 2-3-lobed or entire; ped. longer than leaf; pod pubescent, broadly-linear, cylindric. Sandy shores. 3-5f.

3 P. hévolus L. St. slender; lfts. between oblong-ovate and lance-ovate, not lobed; ped. slender, several times longer than the leaves; pod straight, cylindric, 8-10-seeded. Sandy fields. 3-5f.

4 P. pacificus Benth. Stem slender, retroserly hirsute; lfts. linear-oblong, not lobed, as long as the petiole, hirsute; pod hirsute, 5-8-seeded. Prairies, Ill. (Mead) and W. 2-4f.

5 P. vulgaris. Lfts. ovate, acuminate; rac. solitary; pod pendulous, long-pointed; seed reniform, variously colored. ① E. Ind. Flowers white. 3-8f.

6 P. Lunátus. Lima B. Lfts. ovate-deltoid; pod broad, flat, falcate, with large, flat, white seeds; flowers whitish. ① E. Ind. 6-12f.

7 P. multiflorus. Scarlet Pole B. Lfts. ovate, acute; rac. as long as the lvs.; fls. scarlet; pod pendulous, seeds reniform. ① S. Am. 6-10f.

8 P. Nanus. Bush B. Lfts. broad-ovate, acute; pod torulous; flowers and seeds white. ① India. 1f. There are many varieties.

50. ERYTHRINA, L. Calyx truncate or lobed. Vex. long, lanceolate, with no callosities. Wings and keel much smaller. Stam. straight, nearly as long as the vexillum. Style glabrous. Legume torulous. ⑤ ⑤ ⑤ Often prickly. Leaves pinnately trifoliate. Flowers racemed.

1 E. herbácea L. Glabrous; lfts. rhombic-hastate, with 3 rounded, shallow lobes; petioles with here and there a small hooked prickle; rac. terminal; flowers slender, deep scarlet, 2'. Rich soils, S. Rhizome thick. 3-4f. April.

2 E. Crista-galli. Shrub or tree; lfts. ovate or elliptical, with hooked prickles beneath; banner recurved; fls. scarlet, in large racemes. Planted South.


2 A. Pitcheri T. & G. Stem rusty-villous; lfts. rhomboid-ovate; rac. erect, often branched; bracts broad, conspicuous. N. Orleans and W. Seeds blackish.

§ Leaves pinnate, 7-9-foliate. Sts. prostrate, twining. Lvs. coriaceous.........No. 1
§ Leaves pinnately 3-foliate. Sts. prostrate, twining. Pods 12-18" long...Nos. 2-4
§ Leaves pinnately 3-foliate. Sts. erect or ascending. Petioles longer than lfts...Nos. 5, 6
2 G. glabétila Mx. St. nearly glabrous; lfts. elliptic-oblong, emarginate at each end, shining above, a little hairy beneath; rac. pedunculate, about the length of the leaves; flowers 6", pedicellate. 24 Arid soils, N. J. to Fla. 2-4f. Rose-purple.
3 G. mollis Mx. St. softly pubescent; lfts. oval, obtuse, nearly smooth above, softly villous and whitish beneath; rac. longer than the leaves, pedunculate, fasciculate; lfs. 4", on very short pedicels; pod villous. 24 Dry soils, Md. to Ga. 2-4f.
β. microphýlla. Lfts. small (1-6"), oval; lfs, solitary, and nearly sessile in the upper axils; pods 5 or 6-seeded. Ga. Fla. (Miss S. Keen.)
4 G. pilósa N. St. pubescent or smoothish; lfts. thin, oblong-ovate or oval, obtuse or retuse at both ends; rac. very slender, twice or thrice longer than the leaves, with scattered, distant flowers. 24 Dry soils. 3-7f. Leaflets 1-2'. Flowers 4".
5 G. brachýpoda T. & G. Slender, branching; lfts. oblong, odd one petiolulate; rac. stalked, shorter than the leaves. 24 Sandy woods, W. Fla. 2-3f, ascending.
6 G. sessilifóra T. & G. St. simple, flexuous; lfts. oblong-linear, odd one subsessile; rac. very short, sessile. Sandy woods, S. 1-2f. Lfts. 1'-20'. Pod erect.

53. DÓLICHOS, L. Calyx 4-lobed, the upper lobe 2-toothed or entire. Vex. with 2 or 4 callosities at the base of the limb. The free stamen spurred at base. Legume flattened with a few oval, flattened seeds. ½ Leaves pinnately 3-foliate.

1 D. multíflórus T. & G. Lfts. ample, orbicular, acute, thin, pubescent; racemes equaling the petioles, densely CC-flwd. at the top of the stout peduncle; calyx upper lip entire; pod 4-5-seeded. 24 Banks, Ga. to La.
2 D. Hálel Wood. Lfts. ample, round-ovate, acuminate; petioles 3 times longer than the few-(3-8)-flwd., stalked raceme; pod broad, 2-3-seeded, the point incurved. 24 N. Orleans and W. (Dr. J. Hale.) Pod 2.'
3 D. sesquipédaís. Pods smooth, suberete, very long (1f). W. Ind. + South.
4 D. Cat-láng. Pods linear, erect, twin at top of the long ped. E. Ind. + South.

54. CLITÓRIA, L. Calyx bifracteolate, 5-toothed, segm. acuminate. Vex. large, spreading, roundish, emarginate, not spurred. Keel smaller than the wings, acute, on long claws. Legume linear-oblong, torulous, several-seeded. ½ Leaves pinnately 3-5-foliate. Flowers very large, solitary, or several together.

C. Mariána L. Glabrous; lfts. 3, oblong-ovate or lanceolate, obtuse, lateral ones petiolulate; ped. short, 1-3-flwd.; bracteoles and bracts very short; pod 3-4-seeded. 24 Dry soils, N. J. to Fla. 1-3f. Flowers pale purple. July, Aug.

55. CENTROSÉMA, DC. Sep. lance-linear, slightly united, the lower longest and with 2 broad bractlets. Vex. very large, with a short spur on the back near the base. Keel and stamens much shorter, incurved Legume long, linear, margined and long-pointed. ½ Leaves pinnately 3 olate. Flowers very large, purple.

C. Virginiána Benth. St. very slender; lfts. oblong-ovate to oblong-linear, firm, very veiny, the veins incurved; ped. 1-4-flowered, bractlets larger (not longer) than the calyx; pod veined along the margin. 24 Dry soils, S. 2-5f. July, August.
Order 43.—Leguminosæ.

56. Kennédyà, Vent. Two upper lobes of calyx half-united. Banne
broad, spreading, keel as long as the wings, incurved. Legume linear.
A Australian twiners with brilliant flowers in clusters. Leaves 3-nate.
1 k. Comptonianà. Smoothish; lfts. 3, ovate, retuse, veiny; peduncle bearing an
erect raceme of many bright blue flowers, very ornamental in the conservatory. 12f.
2 K. Rubicénda. Hairy; lfts. ovate; ped. 3-flwd., fls. dark-red or crimson, to scarlet. 5f.

57. Hardenbérgia, Benth. Two upper teeth of calyx united. Banner
broad, spreading, keel much shorter than wings. Legume linear.
A Australian. Flowers in racemes, very delicate. Leaflet mostly but 1.
H. monophyllà. Plant very smooth; lft. lance-ovate; rac. erect; fls. blue-purple. 10f.

58. Acácìa, Necker. Calyx valvate, 4- or 5-toothed. Pet. 4 or 5, small,
distinct or nearly so. Sta. numerous, distinct. Legume not jointed,
dry, 2-valved, co-seeded. Beautiful trees or shrubs, native of warm cli-
mates. Lvs. twice pinnate, or reduced to phyllodia (§ 321). Fls. yellow
or yellowish, in spikes or heads, very numerous and showy.

§ Leaves bipinnate. Flowers collected in heads or spikes..................... Nos. 1-3
§ Leaves abortive—reduced to flattened petioles (phyllodia) with their edges
vertical. Flowers yellow,—x in globular, solitary heads ......................... Nos. 4, 5
—x in globular, racemed heads ..................... Nos. 6, 7
—x in cylindrical spikes ..................... Nos. 8-11

1 A. Farnesiàna L. Sponge Tree. Tree armed with straight stipular spines; lvs.
with 4-8 pairs of pinnae, leaflets 15–20 pairs, oblong, crowded; ped. 2 or 3 together.
Naturalized along the Gulf, Fla. to N. Orleans. Pods 2–3’ long. (Vachellia, C.-B.)

2 A. álbiaàn. Shrub from Mexico, 5f, with stipular spines, silvery-pubescent; leaves
with 8 or 9 pairs of pinnae, leaflets 19–30 pairs, linear-oblong, glabrous; flowers
white, the heads in axillary racemes. 3–5 together.

3 A. dealbàtà. Shrub thornless, 5f, from N. Holland, all velvety-pubescent; pinnae
35 pairs, leaflets 30–35 pairs, linear, crowded; heads in axillary racemes.

4 A. juniperìna. Shrub from N. Holland, spinescent; phyllodia linear-subulate, pun-
gent; branches terete, hairy or downy; heads solitary; petals 5.

5 A. armàtà. Shrub 5–8f, downy or hairy, with spinescent stipules; phyllodia half-
oblong-obovate, entire, 1-veined; heads solitary; pods velvety. N. Holland.

6 A. vestítà. Shrub 6f, clothed with a soft down; leaves (phyllodia) halved, elliptic-
oblong-obovate; heads loosely racemmed along the ped., one being terminal. N. Holland.

7 A. cultípfórìs. Shrub 6f, smooth and glaucous; leaves curved, triangular-lanceo-
late, coriaceous; heads in racemes, panicked at the end of the branches.

8 A. vertícellàtà. Shrub bushy, leafy, with the phyllodia and leaf-like stipules crowded
and irregularly whorled; spikes oblong, solitary, axillary. New Holland.

9 A. longípôlia. Shrub 5f, unarmed, with the phyllodia long, linear-lanceolate, 3-
veined at base, veiny above; spikes axillary, in pairs; flowers 4-parted. N. S. Wales.

10 A. líneàris. Shrub 5f, unarmed, with phyllodia very long (7") and narrowly lin-
car, 1-veined; spikes axillary, many, often branched; calyx 4-parted.

11 A. florébìnda. Shrub or small tree, 6-10f; phyllodia linear-lanceolate, attenuate
both ways, 3-5-veined; spikes simple, axillary, solitary; calyx 4-toothed. N. Holland.

59. Poinçíanà, L Sepals 5, united just at base. Petals broad, un-
guiculate, spreading. Stam. 10, very long, decurved with the slender style. Legume flat.
A Tropical. Leaflets very many, no odd one. Fls. large.

1 P. pulchérrìma. Shrub prickly (used in the W. Ind. for hedges, hence called Flower-
fence); leaflets oval-oblong; fls. 2’ broad, orange, with crimson filaments 2’ long. 10f.
Order 43.—LeguminosÆ.

2 P. Gillœisi. From S. Am. Thornless; lfts. very small; fls. 2’. ylw., the pet. subequal, subsessile, glandular-ciliate at apex, [one spotted. From Madagascar. 10f.
3 P. regia, has crimson flowers 3’ broad, the petals long-clawed, crenate-edged, upper


1 C. lanceolata. Hairy, half-shrubby; leaflets lanceolate, apparently whorled in 3’s.
2 C. ovata. Pubescent; leaves ovate, acute; spike short and broad, many-flowered.

61. Sophora, L. Keel obtuse, not shorter than the wings or roundish banner. Pod stipitate, many-seeded, moniliform, indehiscent. Seeds globular. 5 5 Leaves odd-pinnate. Panicles terminal.

1 S. tomentosa. L. Shrub 4—6f, hoary-tomentous; lfts. about 15. oblong, thick; fls. in long racemes, yellow, handsome; calyx obscurely 5-toothed; pod 6’. Coast, Flia.
2 S. japonica. Tree 30—40f, from Japan, hardy from Philadelphia south. Leaflets about 13. smooth; panicles large, erect, open, white, in July and August.

62. Chorozonea ilicifolia. Shrub from N. Holland, 3f, bushy, with thick spinescent, holly-like, simple leaves, and a profusion of deep orange or scarlet racemes. Calyx 2-lipped. Keel shorter than the wings. Pod inflated, many-seeded.

63. Orobus, Tourn. Bitter Vetch. Calyx obtuse at base, deeper cleft on upper side. Cor. long, keel incurved, shorter than wings or banner. Sty. terete, downy above. 2 1fts. 2—12, rachis ending in a short point. 1 O. vernus. Lfts. 6, ovate, pointed; stip. 1-sag., entire; fls. blue and purp. Apr. 1f.
3 O. Atropurpureus. Leaflets 6, linear; flowers dark purple, in long 1-sided racemes.

64. Lens esculenta. Lentil. Herb cultivated for food at the East since the times of Esau, seldom seen here. Stem weak, 1f. Leaves of many pairs of oblong leaflets, Ending in a branched tendril. Raceme of 2 or 3 pale flowers succeeded by a short broad pod. Seed exactly lens-shaped, giving the name. 1

65. Cytisus, L. Cal. 2-lipped, with 5 teeth, keel obtuse, straightish. Style incurved or at length involute. Seeds with a scale at the hilum (strophiolate). 5 Leaves of 3 leaflets, the upper becoming simple. C. Scoriarus. Scotch Broom. Shrub with smooth angular, virgate branches; lfts. oblong; pedicels solitary, axillary; flowers yellow, showy; pods hairy at edge. Europe.


1 C. puniceus. Shrub smoothish, 4f; leaflets about 17, oblong. retuse, alternate; flowers 3’ wide, crimson-red, in dense hanging racemes of superb appearance.
2 C. dampiereii. Shrub hairy, 4f; leaflets about 17, oval. acute; flowers very large, scarlet, with a black prominence at the base of the banner. Flowers freely.
Order XLIV.—Rosaceæ. Roseworts.

Herbs, shrubs, or trees, with alternate, stipulate leaves and regular flowers. Sepals 5, rarely fewer, united, often re-enforced by as many bractlets. Petals 5, rarely 0, distinct, inserted on the disk which lines the calyx tube. Stamens ∞, rarely few, distinct, inserted with the petals (perigynous) Ovaries 1, 2, 5, or ∞, distinct, or often coherent with each other, or immersed in the tube of the calyx. Fruit a drupe, or achenia, or a dry or juicy etario (§ 158), or pome. Seeds 1 or few in each carpel, anatropous, exalbuminous. Embryo straight. Figs. 5, 33, 38, 117, 139, 158, 183–5, 188, 197, 244, 251, 285, 297, 300–1, 307, 358, 365–6, 400, 428.

A Ovary superior, and the fruit not enclosed in the tube of the calyx... (a)
A Ovary inferior, and the fruit enclosed in the calyx tube... (m)

a Carpels 1, forming a drupe in fruit. Calyx deciduous. Trees or shrubs... (b)

a Carpels 2—∞. Calyx persistent, bractless. Shrubs or herbs... (c)

a Carpels 4—∞. Calyx persistent, with 5 bractlets added. Herbs mostly... (f)

b Tribe I. Chrysobalanaceæ. Style lateral. Ovules 2, ascending... Chrysobalanus. 1

b Tribe II. Amygdaleæ. Style terminal. Ovules 2, pendulous... Prunus. 2

c Tribe III. Spiréeæ. Carpels 2–8, several-seeded follicles in fruit... (d)

d Petals obovate, equal, imbricate in the bud... Spiræa. 3

d Petals lance-linear, convolute in the bud... Gillenia. 4

c Tribe IV. Rubeæ. Carpels 2—∞, 1-seeded drupes or achenia... (e)

e Shrubs unarmed. Carpels 5–8. Petals 5 (or ∞), yellow... Kerria. 5

e Shrubs unarmed. Carpels 2–4. Petals 0. Calyx leafy... Nectarinia. 6

e Shrubs prickly. Carpels ∞, drupaceous and juicy... Rubus. 7

e Herbs not prickly. Carpels 5–10 (2–6 in No. 12), dry... Dalibarda. 8

f Tribe V. Fragariideæ. Carpels 4—∞, 1-seeded achenia in fruit... (g)

q Style persistent on the dry achenia... A Petals 8 or 9... Dryas. 9

A Petals 5... Geum. 10

q Style deciduous... B Torus pulpy, globular, red... Fragaria. 11

B Torus spongy or dry... B Bractlets minute or 0... Waldsteinia. 12

B Bractlets 5... Potentilla. 13

m Tribe VI. Sanguisorbeæ. Carpels 1–3, acheniate. Petals 0 or 5... (n)

n Stamens 1–4. Style lateral. Flowers spetalous, scattered... Alchemilla. 14

n Stamens 4—∞. Style terminal. Flowers spetalous, spicate... Poterium. 15

n Stamens 10–15. Styles 2. Petals 5, yellow... Agrimonia. 16

m Tribe VII. Roseæ. Carpels ∞, 1-seeded, free in the calyx tube... Rosa. 17

m Tribe VIII. Pomeæ. Carpels 2–6, consolidated with the calyx tube... (o)

o Petals oblong-obovate. Carpels half-2-celled... Amelanchier. 18

o Petals roundish... p Carpels 1-seeded... Crataegus. 19

p Carpels 2-seeded... Pyrus. 20

p Carpels 3–6-seeded... Cydonia. 21


C. oblongifolius Mx. Lvs. oblong, varying to oblongate, subsessile, pedicels and calyx tomentose-hoary; filaments and ovary glabrous; drupe as large as a plum. Pine-barrens, Ga. Ala. Fla. 8–12f. Leaves shining. Flowers small, white.

§ Prunus. Drupe smooth, more or less glaucous with a bloom. Stone smooth, more or less flattened. Leaves mostly convolute (rolled) in vernation. Plums... (a)
   a Umbels 2-5-flowered. Leaves conspicuously acuminate.............. Nos. 1
   a Umbels 2-5-flowered. Leaves acute or obtuse ..................... Nos. 2, 3, 4
   a Umbels 1-2-flowered. Leaves acute, obvolute, or oval............ Nos. 5, 6

Leaves conduplicate (folded §854) in vernation. Cherries... (b)
   b Flowers in lateral leafless umbels. Drupes small. Native......... Nos. 7, 8
   b Flowers in lateral leafless umbels. Drupes large. Exotic......... Nos. 9, 10
   b Flowers in racemes—c terminating the leafy branches ............ Nos. 11, 12
   c in the axils of the evergreen leaves ......................... No. 13

convolute in bud, expanding after the flowers. Apricots............. Nos. 14, 15

§ Amygdalus. Drupe tomentous or smooth. Stone rugous-furrowed, compressed. Leaves conduplicate in vernation... (d)
   d Fruit with a soft juicy pulp. Small trees. Peach, &c............ No. 16
   d Fruit with a hard dry pulp. Trees or low shrubs. Almond.. Nos. 17, 18, 19

1 P. Americana Marsh. Red Plum. Yellow Plum. Somewhat thorny; lvs. oblong-oval and obvolute, abruptly and strongly acuminate, doubly serrate; drupes roundish oval, reddish orange, with a tough skin. Low woods. 10—15f. May. t

2 P. maritima Wang. Beach Plum. Lvs. oval or obvolute, slightly acuminate, sharply serrate; pedioles with 2 glands; umbels few-flowered; ped. short, pubescent; fruit nearly round. Sea beach, Me. to Va. 3—4f. Fruit size of a grape. May.

3 P. umbellata Ell. Lvs. lanceolate or lance-oval, acute or barely acuminate, obscurely serrate; pedioles glandless; umbels 3-5-flowered, precocious; fruit oval, small, glaucous, red. Dry soils, South. 10—15f. Fruit pleasant. May.

4 P. Chicasa Mx. Chickasaw Plum. Branches spinous; lvs. oblong-lanceolate or oblong-elliptical, glandular serrate, not at all acuminate; pedioles short, smooth; drupe globose. Thickets, South. 6—12f. Fruit red or yellowish. April.

5 P. spinosa L. β. insititia, Bullace Plum. Branches thorny; lvs. pubescent beneath; obvolute-elliptical, varying to ovate, sharply and doubly dentate; umbels 1-2-flowered; fruit glabrous, black, glaucous. Roadsides. 15—20f. §

6 P. domestica L. Common Garden Plum. Damson Plum. Branches unarmed; lvs. ovate or ovate-lanceolate, acute; pedioles nearly solitary; drupe globose, oval, ovoid, and obvolute. Long cultivated. 15f. Italy.

7 P. pumila L. Sand Cherry. Lvs. oblong-ovate or obvolute, acute, subacute, smooth, paler beneath; umbels few-flowered, sessile; drupe ovoid. Shrub trailing in sandy soils. 1—2f. Fruit small, dark red, pleasant. May.


9 P. Avium L. Ox-heart. English Cherry. Branches erect or ascending; lvs. oblong-ovate, acuminate, hairy beneath; umbels sessile, with rather long pedicels; drupe ovoid-globose, subacute at base. Gardens, parks. 30—50f. t

10 P. Cerasus L. Sour Cherry. Large Red. Morello, &c. Branches spreading; lvs. ovate-lanceolate, acute at apex, narrowed at base, nearly smooth; fls. with short pedicels; drupes globose. Tree 15—20f. t

11 P. scorbeta Ehr. Black or Wild Cherry. Lvs. firm, oval-oblong or elliptic, acuminate, smooth, shining above, unequally glandular-serrate; pedioles with 2—4 glands; raceme long; drupes black. Woods. 50—80f. Bark black. May.

12 P. Virginiana L. Choke Cherry. Lvs. smooth, oval or obvolute, short-pointed, thin, not shining, with sharp, subulate serratures, veins bearded at base; pedioles with 2 glands; raceme short. Thickets. 5—20f. Fruit blackish, astringent. May.

13 P. Caroliniana Ait. Cherry Laurel. Lvs. oblong-ovulate, acuminate, on short pedioles, entire, coriaceous; fls. small, in numerous, dense racemes shorter than the leaves; drupes persistent, poisonous. Banks, S. 30—50f. April. t
ORDER 44.—ROSACEÆ.

14 P. ARMENIACA Willd. Apricot. Lvs. broadly ovate, acuminate, subcordate at base, denticulate; stip. palmate; fls. sessile, subsolitary; drupe large, subglobous. From Armenia. 10—15f. Fruit purple-yellow, 1—2".

15 P. DASYCARPA Ehrh. Black Apricot. Lvs. ovate, acuminate, doubly serrate; petioles with 1 or 2 glands; fls. pedicellate; drupe subglobous. From Siberia. 10—15f. Fruit dark purple, in July. Flowers white, April.

16 P. VULGARIS Mill. Peach. Lvs. lanceolate, serrate, with all the serratures acute; fls. solitary, subsessile, preceding the leaves; drupe tomentous. Persia. 8—15f. Fls. roseo-color, with the odor of prussic acid. Fruit yellow-purple.

β. LEVIS. Nectarine. Drupes glabrous, yellow, purple, red, large.

17 P. COMMUNIS. Almond. Lvs. lanceolate, serrate, with the lower serratures glandular; flowers sessile, in pairs. Barbary. 15f. Varies with flowers double.

18 P. NANA. Dwarf single-flowering Almond. Lvs. ovate, attenuate at base, simply and finely serrate; flowers subsessile. Russia. 3f. May, June.

19 P. LANCEOLATA. Dwarf double-flowering Almond. Lvs. lanceolate, doubly serrate; fls. pedicellate, covering the stems. China. 2—3f. Roseate. (Amygd. pumila, Ait.)


§ Shrubs, with stipulate, simple, lobed leaves. Carpels inflated... No. 1

§ Shrubs, with stipulate, pinnate leaves. Carpels 5, united. Exotic... No 2

§ Shrubs, without stipules. Leaves simple. Ovaries distinct... (a)

(a) Flowers in umbels or corymbs.—b Corymb compound, terminal. Mts:... No. 3

—b Clusters many. Gardens. Exotic... Nos. 4—7

(a) Flowers in a terminal panicle,—c roseate-purple... Nos. 8, 9

—c white, rarely blush-colored... Nos. 10—12

§ Herbs, without stipules. Leaves tripinnate. Ovaries 5, drooping... No. 13

§ Herbs, stipulate. Leaves pinnately divided.—d Flowers rose-purple... No. 14

—d Flowers white... Nos. 15—17

1 S. opulifolia L. Ninebark. Lvs. roundish, 3-lobed, doubly serrate; fls. white, in pedunculate corymbs; carp. 3—5. By streams. Rare. 4f. June.

2 S. sorbifolia. Lvs. odd-pinnate; fls. lanceolate, acuminate, doubly serrate, terminal one lobed; fls. white, in terminal panicles. Siberia. 6f. May.

3 S. corymbosa Raf. Lvs. ovate, cut-serrate above, whitish beneath; fls. golden yellow, white or roseate, in a dense, level-topped corymb; styles and carpels generally 3. Penn. Ky. and S. 1—2f. May, June.

4 S. hypericifolia. St. Peter’s Wreath. Lvs. obovate-oblong, subentire; fls. in many lateral clusters, on short branches, white, mostly double. Europe. 3f. May.

5 S. prunifolia. Branches virgate; lvs. ovate, petiolate, serrate, 5-veined. silky beneath; fls. in 3’s—5’s (very double). white. Japan. Beautiful.

6 S. Reeyesiana. Lvs. lanceolate, serrate, 3-lobed or pinnatifid, glaucous beneath; rac. capitate, pedunculate, often forming long wreaths. June.

7 S. trilobata. Lvs. roundish, lobed, crenate. veiny; fls. corymbed. Alps.


9 S. Douglasi. Much like No. 8, but larger, smoother, and with redder fls. Oregon.

10 S. salicifolia L. Nearly smooth; lvs. lanceolate to oblongate, serrate; rac panicled, dense or lax, white, often with a blush; carp. 5. Meadows, thickets. Common. Stem purplish. 3—4f. Stam. conspicuous as in other species. July. ♦

12 S. LEVIGATA. Lvs. obovate-oblong, very smooth and entire, sessile. Siberia.

13 S. ARUNCEUS L. Goat's Beard. Lvs. tripinnae; lfts. oblong-lanceolate, acuminate, straight-veined, doubly serrate, odd ones lance-ovate; pan. large, of numerous slender racemes; carpels 3-5, glabrous, 1". Mts. N. Y. to Ga. 3-5f. July.

14 S. IOBATA L. Queen-of-the-Prairie. Lvs. pinnatifids, the term. lobe largest, pedately 7-9-parted, lobes all doubly serrate; stip. reniform; panicle large, roseate, exceedingly delicate; carpels 6-8. Low prairies, W. & S. 4-5f. June, July. *

15 S. ULMARIA. Double Meadow-sweet. Lvs. interruptedly pinnate, white-downy beneath; lfts. lance-ovate, the terminal one large, palmately 3-5-lobed. Eur. Jul.

16 S. FILIPENDULA. Pride-of-the-Meadow. Lfts. 9-21, pinnatifid-serrate, minute ones between; stip. clasping, large; corymbs lax; sep. reflexed. Europe. Root tuberos.

17 S. JAPONICA. Lvs. biternate; lfts. oblong, acuminate, cordate, their stalks bearded at base; panicule terminal; flowers with 10 stamens and 2 styles, pure white. 3-4f


5. KERRIA, DC. Calyx of 5, acuminate, nearly distinct sepals. Cor. of 5 petals. Ov. 5-8, smooth, globose, ovules solitary. Sty.: filiform. Ach. globose. ½ Stems virgate. Lvs. simple, ovate, acuminate, doubly serrate, with stipules. Flowers terminal on the branches, solitary or few together, orange yellow.

K. JAPONICA. Japan Globe-flower.—Gardens. 5-8f. Flowers double.


N. ALABAMÉNSIS Gr.—Tuscaloosa, Ala. (Rev. R. D. Nevius.) 2-3f.

7. RUBUS, L. Bramble. Calyx spreading, 5-parted. Pet. 5, deciduous. Stam. ∞, inserted into the border of the disk. Ovaries many, with 2 ovules, one of them abortive. Achenia pulpy, drupaceous. ¶ With 2 stems, armed with prickles. Inflorescence imperfectly centrifugal. Fruit esculent, July—Sept. Flowers in May, June. Fig. 185.

§ Fruit inseparable from the juicy, deciduous receptacle. BLACKBERRIES... (a)

a Stems (mostly) erect, stout, armed with stout, recurved prickles...... Nos. 1, 2

a Stems procumbent, trailing, mostly with slender, minute prickles...... Nos. 3-5

$$ Fruit separating from the dry, persistent receptacle. RASPBERRIES... (b)

b Leaves simple, lobed. Not prickly.................. Nos. 6-8

b Leaves compound.—Stems not prickly, herbaceous.......................... No. 9

—Stems prickly, shrubby.—Corollas single...... Nos. 10-12

—Corollas double........ No. 13

1 R. VILLÉSUS Ait. High Blackberry. Pubescent, viscid, and prickly; st. recurved
Order 44.—ROSACEÆ.

at top, angular; lfts. 3-5, ovate, acuminate, serrate; petals prickly; calyx acuminate; raceme leafless, ∞-flowered; fruit ovoid, small-grained, sweet. Thickets. 3-6f.

Fruit black, in August.

β. frondosus. Lawton B. Smoothish; rac. leafy at base, short; fr. subglobous, large-grained, very acid. Fields and gardens.

γ. humilis. Trailing; leaves smaller; peduncles few-flowered.

2 R. cuneifolius Ph. Sand B. Pubescent; lvs. 3-foliate; lfts. wedge-ovobate, entire at base, dentate above; racemes few-flowered, loose. Sandy woods, L. I. to Fla. 2–3f. Pet. white, thrice longer than calyx. May, June.

3 R. hispidus L. Hispid with retrorse bristles; lvs. 2-foliate, smooth, green both sides; lfts. obovate, thickish, persistent; fls. and fr. small, corymbed, on filiform pedicels. Damp woods. 3–7f long. Fruit sour. May, June.

β. setosus. Lvs. oblancoolate; fruit red. (R. setosus Bw.)

4 R. Canadensis L. Northern Dewberry. Slightly prickly; lvs. 3 (rarely 5)-foliate; lfts. elliptic or rhomb-oval, acuminate, thin; ped. long, hardly in clusters; fruit large, black, very sweet in August. Stony fields, North.

5 R. trivialis Mx. Southern Dewberry. Prickly and bristly; lvs. 3-5-foliate, thick. ovate-oblong or oval; ped. 1-3-flowered; sep. obtuse, reflexed. South.

6 R. odoratus L. Mulberry. St. erect or reclining, unarmed, glandular-pilosus; lvs. palmately 3-5-lobed, middle lobe longest, unequally serrate; fls. large, in terminal corymbs; pet. orbicular, purple. Woods: common. 3–5f. Fr. red, sweet, in Aug.

7 R. Nutk anus Moxno. Somewhat pilous; lvs. broad, 5-lobed, lobes nearly equal, coarsely serrate; ped. few-flowered; sep. long-acuminate, shorter than the very large, round-ovate, white petals. Mich., Wis. to Oreg. 5–7f.

8 R. Chamæmorus L. Cloudberry. Herbaceae, dioecious; st. decumbent at base, erect, unarmed, 1-fld.; lvs. mostly but 2, cordate reniform, rugous, with 5-rounded lobes, serrate; sep. obtuse; pet. obovate, white. White Mts. 1f. June.

9 R. triflorus Rich. Branches herbaceous, green; lvs. 3- or 5-foliate; lfts. nearly smooth, thin, rhombic-ovate, acute, odd one petiolulate; stip. ovate, entire; pet. erect, oblong-obovate. Hilly woods, N. Fruit few-grained, dark red.

10 R. strigosus Mx. Wild Red Raspberry. St. strongly hispid; lvs. pinnately 3- or 5-foliate; lfts. oblong-ovate or oval, obtuse at base, canescent-tomentous beneath, odd one stalked; cor. cup-shaped, white. Old fields, N. Common. Fruit red.


12 R. Idæus. Garden R. Hispid or prickly; lvs. pinnately 3-5-foliate; lfts. rhomb-ovate, acuminate, hoary-tomentous beneath; sep. hoary-tomentous, pointed, longer than the white petals; fruit red, white, or yellow. § 1

13 R. Rosæfolius. Bridal Rose. Prickles straight; lvs. pinnately 3-7-foliate; lfts. lance-ovate, doubly serrate, velvety; flowers large, white. Mauritius.


D. repens L. Low, pubescent, bearing creeping shoots; lvs. simple, roundish-cordate, crenate; stipule linear-setaceous; calyx spreading in flower, erect in fruit. 12 Damp woods, Penn. to Can. 2–12'. Scapes with 1 small white flower. June.


10. GEUM, L. AVENS. Calyx 5-cleft, with 5 alternate segments or bractlets smaller and exterior. Pet. 5. Sta. ∞. Ach. ∞, aggregated
on a dry receptacle, and caudate with the persistent, mostly jointed, geniculate and bearded style. 2f Leaves pinnately divided.

§ Sieversia. Style straight, jointless, all of it persistent. Flowers large...Nos. 1, 2

§ Geum proper. Style bent and jointed in the middle, upper part deciduous... (a)
   a Head of fruits raised on a stipe. Flowers yellow or purple............Nos. 3, 4
   a Head of fruits sessile (no stipe).—b Flowers yellow......................Nos. 5, 6
   —b Flowers white...........................................Nos. 7, 8

1 G. triflorum Ph. Villous, erect, about 3-flowered; lvs. mostly radical, interruptedly pinnate, of numerous cuneate, incisely dentate, subequal lfts.; bractlets linear, longer than the sepals; styles plumpous, very long in fruit (2–3'). N–W. States, rare in the North. 8–12'. Flowers purplish-white. May, June.

2. G. radiatum Mx. Hirsute or smoothish; stem erect, nearly leafless; root lvs. lyrate, the terminal leaflet large, reniform, lobed and toothed, lateral ones minute; bractlets minute; pet. obcordate, yellow, large; styles hairy at base. White Mts. N. H., Roan Mt. N. Car. 9–15'. (G. Peckii Ph.)

3 G. vernum T. & G. Smoothish; lvs. pinnately divided, incisedly lobed and toothed, the lowest often simple; fls. small, yellow; sep. reflexed; tors long, conspicuously stipitate. W. and S–W. 20–22'. Stipules large. April–June.

4 G. rivale L. Pubescent; st. subsimple; radical lvs. lyrate; stip. ovate, acute; lfs. nodding, purple; pet. as long as the erect cal. segments, purplish-yellow; upper joint of the persistent style plumpous. Wet meadows, N. and M. 1–2f. June.


6 G. macrophyllum Wild. Hispid; lvs. Interruptedly lyrate-pinnate, the terminal lft. much the largest, roundish cordate, 3–5', all unequally dentate; petals longer than the calyx; recept. nearly smooth. White Mts. and Can. 1–2f. June, July.

7 G. album Gmel. Smoothish-or pubescent; root lvs. ternate or often simple, upper lvs. simple; lfts. ovate, lobed and dentate; pet. as long as calyx; tors white-bristly. Thickets. Common. 2–3f. July. (G. Virginianum T. & G. &c.) (See Addenda.)

8 G. Virginianum L. Hirsute; lvs. pinnate below, then ternate, the upper simple; lfts. incisedly lobed, wedge-lanceolate, very acute, cut-toothed; pet. shorter than calyx; tors nearly naked. Wet thickets. 2–3f. Stout. July.


§ Bractlets entire; petals white. Stemless, stoloniferous.......................Nos. 1, 2

§ Duchesnia. Bractlets 3-lobed; petals yellow. Stems trailing..................No. 3

1 F. Virginiana Ehrh. Pubescent; lvs. thick; cal. of the fruit erect-spreading; acm. imbedded in pits in the globose receptacle; ped. commonly shorter than the lvs. Fields and gardens. 6–12'. Some of its varieties are polygamo-dieious.


2 F. vesca L. Alpine, Wood, or English Strawberry. Villous-pubescent; cal. of the fruit spreading or reflexed; ach. superficial on the conical or hemispherical receptacle, which is without pits; lvs. thin. Fields and woods.

β. pallida. Fruit white. A var. well established in Wayne Co. N.Y. (Hankenson.)

3 F. indica Ait. Pubescent, rooting at the joints; lfts. ovate, obtuse, incisely crenate-serrate; stip. lanceolate, free; pedicels axillary, solitary 1-flowered; bractlets leafy in fruit. 2f Damp places, Penn. and S. § India.
12. WALDSTEINIA, Willd. Dry Strawberry. Cal. 5-cleft, with 5 alternate, sometimes minute and deciduous bractlets. Pet. 5 or more, sessile, deciduous. Sta. \( \infty \). Sty. 2—6. Ach. few, dry, on a dry receptacle. 2? Aculeolent, with lobed or divided leaves, and yellow flowers.

1 W. fragaroides Traut. Lvs. trifoliate; lfts. broad-cuneiform, incisedly dentate-ciliate; scapes bracteate, many-flowered. Hilly woods. 8'. June.

2 W. lobata T. & G. Lvs. simple, roundish, cordate, 3-5-lobed, incisedly crenate; scapes filiform, bracted, 3-7-flowered. Hills, South. 6'. May, June.


§ SIBBALDIA. Stamens 5. Achenia 5—10, styles lateral. Low herbs. Mts. ... No. 1

§ COMARUM. Sta. \( \infty \). Flowers brown-purple. Torus in fruit ovoid, spongy. ... No. 2

§ POTENTILLA proper. Sta. \( \infty \). Flowers yellow to white. Torus not enlarged... (a)

a Leaves pinnately 3-foliolate. No. 3, 4, 5

b Leaves pinnately 5-foliolate. Flowers yellow... No. 3, 7

a Leaves pinnate—b Shrubs, with the flowers axillary above... No. 8

—b Herbs, with the flowers axillary, solitary... No. 9, 10

—b Herbs, with the flowers in terminal cymes... Nos. 11, 12

Exotic species, with fls. roseate and purple... Nos. 13, 14

1 P. procumbens Clairv. Lfts. 3, obovate, 3-toothed at apex, hairy beneath; fls. corymbed. White Mts. (?) (Pursh), and N. (Sibbaldia L.)

2 P. palustris Scop. Lvs. pinnate; lfts. 3—7, lance-oblanceolate, obtuse, sharply serrate, hoary beneath; sep. much longer than the purple petals; torus persistent, large, tasteless. 2? Swamps, N. 1—2f. June. (Comarum L.)

3 P. Norvegica L. Hirsute; st. erect, dichotomous above; lfts. 3, elliptical or obovate, dentate-serrate, petiolulate; cymes leafy; cal. exceeding the emarginate pale-yellow petals; sty. terminal. 2? Old fields, thickets, Can. to Car. 1—4f. July—Sept.

4 P. tridentata Ait. Smooth; st. ascending, woody and creeping at base; lfts. 3, obovate-ovate, evergreen, entire, with 3 large teeth at the apex; cymes nearly naked; petals white, obovate. 2? High Mts. N. Eng. 6—12f. June.

5 P. minima Haller? St. pubescent, ascending, mostly 1-flowered; lfts. 3, obovate, obtuse, incisedly serrate with 5—9 teeth above; petals yellow, longer than the sepals. 2? White Mountains. 1—3f., tufted. June, July.

6 P. canadensis L. Villous-pubescent, procumbent, producing runners: lfts. 5, obovate, cut-toothed above; pedicels axillary, solitary, 1-flowered.

\( \alpha. \) pumila. Small and delicate, flowering in Apr. May, everywhere.


7 P. argentea L. St. ascending, tomentose; lfts. 5, oblong-cuneiform, with a few, large, incised teeth, smooth above, silvery canescent beneath, sesille; flowers in a cymous corymb, small (3'). 2? Rocky hills, N. 6—10'. June—Sept.

8 P. fruticosa L. St. fruticos, very branching, hirsute, erect; lfts. 5—7, linear-oblanceolate, all sesille, margin entire and revolute; petals large, much longer than the calyx. A low, bushy shrub, N. States. 1—2f. Flowers 1'. June—Aug.


10 P. paradóxa N. Decumbent at base, pubescent; lvs. pinnate; lfts. 7—9, ovate-oblong, incised, upper ones confluent; ped. solitary, recurved in fruit; ach. 2-lobed. (a) Shores of Sodus Bay (Hankenson), W. to Oreg. 1f. June—July.
11 P. Pennsylvánica L. Erect, whitish-downy; lfts. 5—9, oblong, obtuse, pinnatifid, upper ones larger; cyme fastigate, at length loose. 2c N. Eng.: rare.

12 P. argúta Ph. Erect, grayish, pubescent and villous; radical lvs. on long petioles, 7-9-foliate, canaline few, 3-7-foliolate; lfts. broadly ovate, cut-serrate, crowded; fls. in dense terminal cymes. 2c By streams, N. and W. 2—3f, stout. May, June.

13 P. NEPALÁNSIS. Root lvs. quinate; stem ternate; lfts. wedge-oblong, serrate; stip. large, adnate, entire. 2c Nepal. 14f. Flowers large, rose, scarlet, orange, &c.

14 P. ATROSANGÜÍNEA. Lvs. ternate; lfts. obovate, cut-serrate, white-downy beneath; sep. elliptic; pet. obcordate. 2c Nepal. 14f. Flowers crimson, often double.

14. ALCHEMILLA, L. LADIES' MANTLE. Calyx 4-toothed, with 4 external bractlets. Petals 0. Sta. 1—4. Carp. (1—4) mostly solitary, with the style lateral. Stig. capitate. Seed suspended. Low herbs, with palmately lobed or incised leaves and small green flowers. Fig. 33.

1 A. arvénsis Scop. Paradey Pieri. Lvs. crenate at base, incisely 3-lobed or parted, the segm. 2-3-cleft, pubescent; fls. axillary. 2c E. Va. A small weed. § Europe.

2 A. alpínus L. Lvs. radical, silky beneath, 5—7-parted, cut-serrate at apex; fls. corymbed. High Mts. of N. Eng. (Pursh, 1816.) ♀ Europe.

15. POTÉRIUM, L. BURNET. Calyx tube contracted at the top. Lobes 4, imbricated, petaloid, deciduous. Pet. 0. Sta. 4—∞, exserted. Styles slender, 1—3. Stig. penicillate. Ach. included in the hardened, 4-angled calyx tube. 2c Lvs. unequally pinnate, with long stalks and adnate stipules. Lfts. petiolulate, serrate. Fls. in a spike or head, on a long peduncle or scape, often ∞. (Includes Sanguisorba L.)

1 P. Canádènse (L.) Glabrous; lfts. many, ovate or oval, obtuse, cordate, with serrate stipels and stipules; spikes cylindric (3'); stam. 4, long exserted. Wet meadows along the mountains. Can. to Ga. 2—4f. Flowers green-white. Aug.

2 P. Sanguisórba L. Glabrous; leaflets many, ovate or roundish, deeply serrate, heads subglobose; sta. ∞, in the lower lfs. L. Hurón (Hooker) and W. Purp. ♀ Aug.


1 A. Eupatória L. Lfts. 5 to 7, lance-oval or obovate, with small ones interposed, coarsely dentate; stip. large, dentate; pet. twice longer than the reflexed calyx. Dry soils, common. 1—3f. Rac. spicate, 6—1f. Fls. 3—4f' broad. July, Aug.


β. incísa. Lfts. incisely pinnatifid. South. (A. incisa T. & G.)

17. ROSA, Tourn. ROSE. Calyx tube urceolate, contracted at the orifice, lined with the fleshy disk. Petals 5 (greatly multiplied by cultivation). St. ∞, inserted into the rim of the disk. Ach. ∞, bony, hispid, borne free within the calyx tube. ♀ Prickly. Lvs. odd-pinnate. Stip. mostly adnate to the petiole. Figs. 35, 139, 197, 301.

Obs. Our innumerable varieties of garden Roses have mostly originated with the few species mentioned below. To define these varieties in order to their recognition would generally be impossible, for their forms are as evanescent as their names are arbitrary. All that we propose is to aid the learner in tracing back each form to the species whence it sprung. This will be easily done in all cases except with the hybrids.
**ORDER 44.—** ROSACEÆ.

- **Wild Roses,** with simple, 5-petalled flowers, open in June and July...($)
  - § Leaflets 3, rarely 5, smooth. Branches long, climbing or trailing. Nos. 1, 2
  - § Leaflets 5—9, —a rusty glandular and fragrant beneath. Nos. 3, 4
    - —a not glandular. Erect. —b Prickles stout, falcate. No. 5
    - —b Prickles weak, straight. Nos. 6, 7, 8

- **Garden Roses,** with either simple or double flowers...($$)
  - §§ Styles cohering in an exserted column. Climbers... (a)
    - a Leaflets 3—5, mostly 3. Prickles stout, deflexed. No. 1
    - a Leaflets 5—9. —b Stipules and sepals mostly entire. Nos. 9, 10
      - —b Stipules, or sepals, dissected. Prickles slender. Nos. 11, 12
  - §§ Styles separate. —c Stipules nearly free, and caducous. Nos. 2, 13, 14
    - —c Stipules adnate to the petiole. —d Prickles falcate... (e)
      - —d Prickles straight... (f)
    - e Leaflets not at all glandular. Shrubs erect, often slender. Nos. 15, 16, 17
    - e Leaflets glandular and fragrant beneath, downy or not... Nos. 3, 18, 19
      - f Lvs. and often the calyx, glandular. Fls. roseate or yellow. Nos. 20, 21
      - f Lvs. not at all glandular. Prickles numerous, weak, or 0., Nos. 22, 23, 24

1 **R. setigera** Mx. **Prairie Rose.** Spines strong, straightforward; lfts. ovate; stlp. adnent; fls. in corymbs, deep roseate, becoming pale, scentless; styles united in an exserted column. Prairies, &c., N. Y. W. and S. 12—20 ft. June, July. †
  - Var. **Prairie Queen, Baltimore Belle, Rosa Superba,** &c.

2 **R. laevigata** Mx. **Cherokee R.** Prickles very strong, recurved; lfts. elliptical, evergreen, polished; stlp. free, setaceous; fls. solitary, large, white; calyx bristle; styles separate. Tenn. to Fla. 15—30 ft. §? In hedges and gardens.

3 **R. rubiginosa** L. **Sweet Briar. Eglantine.** Prickles strong, recurved, many weak ones intermixed; lfts. broad-oval; fls. solitary; fruit obovoid and, with the pedicels, glandular hispid. Fields, roadsides. 4—8 ft. Fls. light red, single or double.
  - Var. **Clementine, Maiden, Royal, Scarlet, Tree-double, White,** &c.

4 **R. micrantha** Smith. Prickles strong, recurved, few and equal; lfts. ovate; fls. solitary, small (15); mostly white. Pastures, &c. N. Eng. 6—8 ft. June.

5 **R. Carolina L. Swamp R.** Tall, erect, glabrous; lfts. elliptical, glaucous beneath, not shining; fls. corymbed; fr. depressed-globulous, dark red, with hispid peduncles. Damp woods. 4—8 ft. Fls. varying from red to white. June, July.

6 **R. lucida** Ehrh. **Wild R.** Prickles scattered, setaceous; lfts. elliptical, simply serrate, shining above; fls. in pairs (1—3); fr. depressed-globulous and, with the pedicels, glandular-hispid. Dry woods. 1—3 ft. Branches greenish. Fls. red.

7 **R. nitida** Willd. **Wild R.** Stems reddish with very numerous reddish prickles; lfts. narrow-lanceolate, smooth and shining; fls. solitary; calyx hispid. Swamps, N. Eng. 1—2 ft. Fls. red. Fr. scarlet. Perhaps a variety of No. 6.

8 **R. blanda** Alt. **Thornless Wild R.** Prickles few, slender, deciduous; lfts. oblong, obtuse, not shining; stlp. broad; ped. short, and with the calyx smooth and glaucous; fr. globosus. Dry hills, N. and M. 2—3 ft. Petals reddish.

9 **R. sempervirens**. Prickles subequal; lfts. thick, evergreen; fls. clustered, mostly white; fr. round-ovoid, yellow, glandular-hispid. S. Eur. 6—12 ft.

10 **R. arkansana** Aiton. **Arkansheir R.** Prickles unequal, falcate; lfts. ovate, acute, deciduous, glaucous beneath; fls. solitary or clustered, white to purple. Eur. 20 ft.

11 **R. moschata** L. **Musk R.** Lfts. lanceolate, acuminate; stlp. very narrow; sep. long-appendaged, pinnatifid; fls. panicled, peculiarly fragrant, white. Asia. 10—12 ft.

12 **R. multiflora** L. **Japan R.** Lfts. lance-ovate, rugous, soft; stlp. pectinate-fringed; fls. corymbed; sep. short and ped. tomentous. South. 15—20 ft. Pet. wh. to purp. §†
  - Var. **Boursault, Seven Sisters, Russel's,** &c.

13 **R. bracteata** L. **Macartney R.** Erect; prickles recurved; lfts. 5—9, obovate, shining; stlp. bristle-fringed; fls. solitary, with large bracts under the tomentous calyx. China. 2—3 ft. Fls. white, creamy, &c. § S.
14 **R. BÁNSLE.** *Thornless R.* Prickles none; lfts. lanceolate, 3–5, subentire; fls. small, in umbels; fruit globose, nearly black. China.

15 **R. INDICA.** *Chinese Monthly R.* Bengal R. Lfts. 3–5, ovate, pointed, shining; stip. very narrow; sep. subentire; stam. infixed; fruit top-shaped. China. 1–8f. Fls. white to crimson. April to November.

β. *LAWRENCIANA.* Miss Lawrence’s R. Aculeate; fls. small (1), pink-purple.

Other var. *Nightingale, Youland of Aragon, Giant of Battles, Cloth of Gold (sulphur-yellow), and the favorite Tea Roses.*

16 **R. canáNA.** *Dog R.* Prickles strong, compressed; lfts. 5–9, with acute, incurved serratures; stip. rather broad, serrulate; sep. deflexed after flowering, deciduous; fr. ovoid, red. Eur. 4–8f. Fls. often simple, red. Often runs wild.


17 **R. CINNAMÔMEA.** *Cinnamon R.* Lfts. 5–7, oval-oblong, grayish-downy beneath; stip. broad, involute, pointed; ped. and cal. glabrous; sep. as long as the petals, closed and persistent on the fruit. Eur. 6–12f. Purple.

18 **R. DAMASCÈNA.** *Damask R.* Prickles broad, unequal; lfts. large, broad-elliptic, whitish-downy; sep. reflexed. Levant. 3–4f. Fls. pale roseate, very fragrant. The common Monthly is a variety.

19 **R. ALBA.** *White R.* Erect, tall; prickles slender, or 0; lfts. round-ovate; petioles and veins downy, glandular; sep. pinnatifid; fr. ovoid. Eur. Stout, 4–8f. Flowers large, clustered, sweet-scented, pure white, semidouble.


Var. very numerous, among which is the incomparable *Miss Rose.*

21 **R. EGLANTÈRIA.** *Yellow R.* *Austrian Eglantine.* Branches red, all prickly; lfts. 5–7, small, broad-oval, or obovate; sep. smooth, entire; pet. large, yellow. Aust. 3f.

Var. The *Copper Austrian,* single; *Persian Yellow,* double, and others.

22 **R. ALPÌNA.** *Bourauct R.* Climbing; lfts. 5–11, ovate or obovate, sharply serrate; ped. deflexed after flowering, and sep. connivent on the ovoid hip. Alps. 10–20f. Older stems thornless. Fls. clustered, pink, blue, crimson, &c.

23 **R. GÁLILICA.** *Common French R.* Erect; leaflets 5–7, oval to lanceolate, thick; fls. erect, with large spreading red petals; sep. ovate, some viscid. Eur. 2–5f.

Var. 300 or more; as the *Velvet, Carmine, Carnation.* Some are variegated, as *York-and-Lancaster, Tricolor, Picoté, Nosegay,* &c.

24 **R. PIMPINELLIÀFÓLIA.** *Scotch R.* *Burnet R.* Very prickly, erect; lfts. 5–9, round-ovate, obtuse, smooth; sep. entire, finally convergent on the fruit; fls. small, roseate; but there are varieties with purple and even yellow flowers.


A. **Canadénisis T. & G.** Lvs. oval or oblong-ovate, sharply serrate, smooth; raceme loose; calyx segments lance-triangular; fruit globose, purplish. Woods: common. 5–35f. Flowers showy, in early Spring. Fruit pleasant, ripe in June.

β. *oblongifólia.* Shrub; lvs. oblong-ovate, mucronate; pet. oblong-ovate.


δ. *alatifólia.* Lvs. round-oval, serrate near apex; pet. linear-oblong. 15–30f.


19. **CRATÈGUS, L. THORN.** *HAWTHORN.* Calyx urceolate, limb 5-cleft. Pet. 5. Sta. oo. Ov. 1–5, with as many styles. Pome fleshy, containing 1–5 bony, 1-seeded carpels, and crowned at the summit by the
persistent calyx and disk. 5 Armed with thorns. Lvs. simple, often lobed. Bracts subulate, deciduous. Fls. corymbose, white or purplish.

§ Corymb 6-30-flw., appearing with the leaves. Fruit red or yellowish... (a)
   a Villous or pubescent. Leaves plicate or sulcate along the veins.... Nos. 1, 2
   a Pubescent. Leaves plain, not at all plicate, cleft or not. Nos. 3, 4
   a Glabrous throughout. — b Leaves abrupt at base, lobed, petaled.... Nos. 5-7
      — b Leaves attenuate at base, seldom lobed.... Nos. 8, 9
§ Corymb 1-6-flowered,— c appearing before the downy leaves.... No. 10
   c appearing with the leaves,— d pubescent.... No. 11
   — d glabrous.... Nos. 12, 13

1 C. tomentosa L. Black Thorn. Lvs. broad-ovate or oval, abrupt at base, doubly serrate or cut-lobed, villous beneath when young, and plicate; fls. large, in compound pubescent corymbs; fruit oval, large (6%), 2-5-seeded, red. Can. to Ky. and Car. Mts. April—June. Fruit July, Aug. Varies greatly.

2 1. plicata, Lvs small, glabrous, strongly plicate. Vt., N. H., N. Y.
   γ. pyrifolia. Lvs. elliptic, acute at base, thinly pubescent. Styles 3. * W.
   δ. flavellata. Lvs. fan-shaped; corymbs glandular-pubescent. W.
   ε. mollis. Lvs. large, soft-villous, subordenate, many-lobed; corymbs canescently-villus; fruit downy when young. Ohio to Iowa.

2 C. punctata Jacq. Lvs. cuneiform-ovate, doubly and often incisely serrate, entire at base, and narrowed to a short, winged petiole, veins straight and prominent, corymbs villous-downy; styles 3; fruit globose, punctate. Woods. 12—25f. April—June. (See Addenda.)

3 C. arboréscens Ell. Thornless; lvs. lanceolate, acute at each end, deeply serrate; calyx hairy; segments subulate, obtuse, entire; corymbs very numerous; styles 5; fruit ovoid, red, 3". Ga. Fla. and W. 20—30f. March, April.

4 C. apifolia Mx. Thorny. Lvs. deltoid, truncate at base, cut-lobed and toothed; petioles slender; styles 2 or 3. Woods. S. 8—12f. March, April.

5 C. Oxyacantha L. Hawthorn. Lvs. wedge-ovate, 3-5-lobed at apex; corymbs glabrous, white to purple; styles 1—3; fruit small, red. Hedges, &c. 8—18f. §

6 C. coccinea L. White Thorn. Lvs. broadly ovate, acutely serrate, 7-9-lobed (lobes shallow), thin, abrupt at base; petioles long, slender, and (with the calyx) subglandular; styles 3—5. Thickets: common. 10—20f. May.

7 C. cordata Alt. Washington Thorn. Lvs. cordate-ovate, somewhat deltoid, incisely and often deeply 3-5-lobed, serrate, with long petioles; sep. short; sty. 5; fr. small, globose-depressed. Banks, Va. to Fla. ’15—20f. †

8 C. Crus-galli L. Cock-spur Thorn. Lvs. obovate-cuneiform, tapering to a short petiole, serrate, coriaceous, shining above; spines very long; corymbs glabrous; sep. lanceolate, sub-serrate; styles 1 (2 or 3). Thickets. 10—20f. Fruit pyriform. June.

9 C. spathulata Mx. Lvs. small, coriaceous, shining, oblong-spatulate, attenuated to the sub-sessile base, crenate above, sometimes lobed; corymbs numerous, lateral, 20-25-flowered; sepals very short; fruit very small, scarlet. South. 10—15f. June.

10 C. æstivàlis T. & G. Apple Haw. Young lvs. mast-downy, older smooth above, elliptic, repand, short-stalked; corymbs glabrous, 2-5-flowered; fruit large (8—9"), globose, red. Wet shores, S. 20—30f. Fruit pleasant, in May. (See Addenda.)

11 C. parviflora Alt. Thorns straight and slender; lvs. cuneate-ovate, sub-sessile; fls. subordinately, villous-tomentous; sep. incised, leafy, as long as the petals; sty. 5; fr. large, roundish, yellowish. Sandy woods, N. J. and S. 4—7f. April, May.

12 C. flava Alt. Summer Haw. Thorns straight or arcuate; lvs. rhombo-ovate, attenuated into a glandular petiole; corymbs 1 (often 2 or 3)-flowered; styles 4 or 5; fruit large, pear-shaped. Va. to Fla. 15—25f. April, May.

13 C. viridis L. Thorns few and short; lvs. roundish or oval, acute at each end, sharply and doubly toothed above; petioles glandless; corymbs 3-6-flowered; styles 2 or 3; fruit large, globose. Iowa to Fla. 12—18f. April, May.

§ *Pyrus*. Leaves simple, glandless. Styles distinct. Pome pyriform. No. 1


§ *Arônia*. Leaves simple, glandular on the midvein. Styles united, &c. No. 5

§ *Sorbus*. Leaves pinnate. Styles 2–5, distinct. Pome small (scarlet)........Nos 6, 7

1 **P. commùnis.** *Pear-tree*. Lvs. ovate-lanceolate, obscurely crenate, glabrous and polished above, acute or acuminate; coryms racemose; cal. and pedicels pubescent; styles 5, distinct and villous at base. Europe. 20–35f.

2 **P. Malus.** *Common Apple-tree*. Lvs. ovate or oblong-ovate, serrate, not lobed, downy, the veins all incurved; coryms subumbellate; pet. with short claws; styles 5, united and villous at base. Europe. 20–30f. Nearly §

3 **P. coronària** L. *Wild Crab-tree*. Lvs. ovate, rounded at base, cut-serrate, often suboblongate, straight-veined, soon smoothish; sep. subulate; fls. large, roseate, corymbed, fragrant; pome large (18'), sour. Glades. 10–20f. May.

4 **P. angustifòlia** Ait. Lvs. lanceolate, often acute at base, crenate-serrate or subentire, short-stalked; sep. ovate; styles distinct. Pa. and S. 20–30f. March.

5 **P. arbutifòlia** L.f. *Choke Berry*. Downy; lvs. oblong or obovate, crenate-serrate, narrowly at base into a short petiole; fruit pyriform or subglobose, dark red. Damp woods. 5–10f. Fruit size of currants. May, June.

*§ 3 melanocarpa*.Nearly smooth; fruit blackish purple. Swamps. 2–4f.


7 **P. Aucúparia.** *English Mountain Ash*. Lfts. as in *P. Americana*, except that they are always smooth on both sides, and, with the serratures, less acute at apex, flowers corymbose; fruit globose. Europe. 20–40f. 


1 **C. vulgàris.** Lvs. oblong-ovate, obtuse at base, acute at apex, very entire, smooth above, tomentose beneath; fls. solitary, large, roseate; pome tomentose, obovoid. Europe. 8–12f. Stems crooked. April, May.

2 **C. Japònica.** *Japan Quince*. Lvs. glabrous, shining, coriaceous, ovate-lanceolate, acute at each end, serrulate; stip. reniform; spines short, straight; fls. axillary, sub-sessile, crimson. Japan. 5–6f. Very bushy. April, May.

**Order XLV. SAXIFRAGACEÆ. Saxifragas.**

*Herbs or shrubs*. Leaves alternate or opposite, sometimes stipulate. Sepals 4 or 5, cohering more or less, and partly or wholly adherent. Petals as many as the sepals, inserted between the lobes of the calyx. Stamens as many as the petals, and alternate with them, or 2 to 10 times as many. Ovary mostly inferior, usually of 2 (2–4) carpels cohering at base and distinct or united above. Fruit generally capsular, 1–2-celled. Seeds small, many, albuminuous. Figs. 25, 52, 53, 132, 250, 273.

A large order, now including Ribes and Parnassia, each often regarded as constituting separate orders.
ORDER 45.—SAXIFRAGACEÆ. 113

I. SAXIFRAGÆÆ. Herbs. Stipules none or adnate. Petals imbricate, rarely convolute in the bud. Calyx free or partly adherent... (a)

α Petals wanting. Ovary adherent, 1-celled. Stamens 10. .................. CHRYSOSPLENIUM. 1

β Petals pinnatifid. Ovary half adherent, 1-celled. Stamens 5 or 10. ........ MITELLA. 2

γ Petals entire.—d Stam. 10.—e Ovary 1-celled, nearly free. .................. TIAELLA. 3

—e Ovary 2-celled. Fls. perfect. Lvs. simple... SAXIFRAGA. 4

—e Ovary 2-celled. Fls. polyg. Lvs. compound... ASTILBE. 5

—d Stam. 5.—f Ovary 2-celled, adherent. Seed rough. ........ BOYKIA. 6

—f Ovary 2-celled, free. Seed wing-margined... SULLIVANIA. 7

—f Ovary 1-celled.—g Styles and carpels 2. .................. HEECHERIA. 8

—g Styles and carpels 5. .......... LEPURPETALON. 9

—g Stigmas and carpels 4...... PARNASSIA. 10

II. ESCALLONIÆ. Shrubs with alternate leaves, no stipules, and a valvate corolla bud... (b)

b Calyx free from the 2-celled ovary. Stamens 5. Capsule ☞-seeded......... ITRA. 11

b Calyx adherent to the ovary. Stam. 5. Berry ☞-seeded. (From S. Am.) ESLCALLONIA. 12

III. HYDRANGEÆ. Shrubs with opposite, simple leaves, and no stipules... (c)

c Corolla valvate in the bud.—a Gymes radiate. Shrub erect.................. HYDRANGEA. 13

—a Gymes naked. Shrub climbing... DECEMURIA. 14

c Corolla convolute in the bud.—κ Stamens 20–40 Petals 4. .................. PHILADELPHUS. 15

—κ Stamens 10. Petals 5. (Asiatic)........... DEUTZIA. 16

IV. RIBESÆÆ. Shrubs with alternate, palmately-lobed leaves, and baccate fr... RIBES. 17


C. AMÉRICAÉNUM Schw. Lvs. opposite, roundish, slightly crenate, tapering to the petiole; cal. 4-cleft. Cool springs, Northward. 3–6'. Calyx yellowish. Apr. May.

2. MITELLA, Tourn. MITRE-WORT. Calyx 5-cleft, adherent to the base of the ovary. Pet. 5, pinnately pinnatifid, inserted on the throat of the calyx. Sta. 5 or 10, included. Sty. 2, short. Caps. 2-beaked, 1-celled, with two equal valves. ☼ Flowers small, in a slender raceme or spike.

1 M. diphylla L. Lvs. cordate, acute, sublobate, serrate-dentate, radical ones on long petioles, the cauline 2, opposite, subesesse; fls. white, in a long, loose spike. Woods, N. Eng. to Car. 1f. May, June. Curious.

2 M. nuda L. Lvs. orbicular-reniform, doubly crenate, with scattered hairs above; scape filiform, few-fldw., naked or with a single leaf; pet. pinnatifid with filiform segments. Damp woods, N. Eng. N. Y.: rare. 6'. Very delicate. June.

3. TIARÉLLA, L. BISHOP’S CAP. Calyx 5-parted, the lobes obtuse Pet. 5, entire, the claws inserted on the calyx. Sta. 10, exserted, inserted into the calyx. Sty. 2. Caps. 1-celled, 2-valved, one valve much larger. ☼ Flowers white.

T. cordifolia L. Lvs. cordate, acutely lobed, mucronate-dentate, pilous; scape ra-
cemous; stolons creeping. Rocky woods, Can. to Ga. Common North. 1f.

4. SAXIFRAGA, L. SAXIFRAGE. Sep. 5, more or less united, often adnate to the base of the ovary. Pet. 5, entire, inserted on the tube of the calyx. Sta. 10. Anth. 2-celled, with longitudinal dehiscence. Caps. of 2 connate carpels, opening between the 2 diverging, acuminate beaks (styles). Seeds ☼. ☼

§ Leaves opposite (small) on the prostrate stem. Flowers purplish ......... No. 1

§ Leaves alternate on the ascending stem. Flowers yellow or white ....... Nos. 2, 3, 4

§ Leaves rosulate at the base of the mostly leafless scape... (a)
1 S. oppositifolia L. Lvs. opposite, obovate, carinate, obtuse, punctate, persistent; fls. solitary; cal. free; pet. large, obovate, 5-veined, longer than the stamens. Rocky cliffs, Willoughby Lake, Vt. June.

2 S. aizoides L. Capsules, leafy; lvs. linear-oblong, thick, flat; sep. ovate, slightly adherent; pet. oblong, yellow, longer than the sepals; capsules as long as the styles. With No. 1, and N. W. June.

3 S. rivularis L. St. weak, ascending, 3-5-flowered; radical lvs. petiolate, reniform, crenately lobed. cauline lanceolate, subentire; cal. lobes broad-ovate, nearly as long as the white, ovate petals. White Mts. and N.

4 S. tricuspidata Retz. St. thick, erect; lower lvs. crowded, oblong, 3-cuspidate; fls. few, large, somewhat corymbed; sep. thick, ovate, shorter than the oblong-obovate, yellow, dotted petals. Lake shores, Can. and N.

5 S. leucanthemifolia Mx. Viscid-pubescent; lvs. radical, spatulate, cut-dentate, tapering to a petiole; scape diffusely paniculate; calyx free, reflexed; pet. unequal, white, 3 of them spotted. Mts. S. 18'.

6 S. erosa Ph. Viscid-pubescent; lvs. radical, thin, oblong-lanceolate, acute, with erose teeth; panicle oblong, loose, with leafy bracts; cal. free, with reflexed, obtuse sepals as long as the equal, obtuse white petals. Mts. Pa. to Car. 15'.

7 S. Careyana Gr. Lvs. round-ovate to deltoid, coarsely dentate, abrupt at base; panicle diffuse; pet. equal, ovate or oblong, white, dotted, twice longer than the recurved sepals. Mts. S. (and S. Caroliniana Gray).

8 S. aizoon Jacq. Lvs. spatulate, obtuse, bordered with white cartilaginous teeth, and a marginal row of impressed dots; flowers corymbose paniculate; pet. obovate, white. Rocky shores, N. Ver. to Mich. and N. 5—10'. July.

9 S. Virginiana Mx. Early Saxifraga. Lvs. spatulate obovate, crenately toothed, shorter than the broad petiole; scape nearly leafless, paniculately branched; petals white, oblong, much exceeding the calyx. Rocks, common. 4—12'. April, May.

10 S. Pennsilvànica L. Lvs. oblong-lanceolate, rather acute, tapering at base, denticulate; scape forming a diffuse panicle; fls. pedicellate; pet. greenish, linear-lanceolate, but little longer than the cal. Wet meadows, N. Eng. to O. 1—2f. May, Jn.

11 S. sarmentosa. With creeping runners; leaves roundish; pet. white, 2 longer than the other 3; scapes naked; plant hairy. China. Pretty for baskets.


A. decandra Don. St. tall, angular; lfts. subcordate, incisely lobed, mucronate-serate; sterile flowers mostly apetalous; sta. 10. Mts. South. 4—6f. June—August.


B. aconitifolia Nutt. St. viscid-glandular; lvs. smoothish, deeply 5-7-lobed (like those of Aconitum); cyme fastigate, the fls. secund. Mts. S. 1—2f. July.

7. Sullivantia, T. & G. Calyx adherent to the base of the ovary


8. HEUCHERA, L. Alum Root. Calyx of 5 obtuse segm. Cor. of 5 small, entire petals, inserted with the 5 stamens on the throat of the calyx. Cap. 1-celled, 2-beaked, dehiscent between the beaks. Seeds many, with a rough, close testa. 2 Lvs. radical, long-petioled, petioles with adnate stipules at base.

§ Fls. small (1—2" long), regular; stamens and style much exserted........Nos. 1—3
§ Fis. larger (3—5" long), oblique; stamens and style short..................Nos. 4, 5

1 H. Americana Willd. Viecid-pubescent; leaves roundish, cordate, somewhat 7-lobed; pan. elongated, loose, divaricate; cal. obtuse, short, about equaling the spatulate petals; stam. much exserted. Shades, W. and S., rare N. 2—4f. May, June.

2 H. villósa Mx. Villous, with rusty, spreading hairs; radical lvs. round-cordate, thin, glabrous above, 7—9-lobed; pan. loose, filiform; pet. white, about as long and narrow as the filaments. Mts. Md. to N. Car. and Ky. 1—3f. June, July.

3 H. caulisèns Ph. Smooth or nearly so; lvs. 5—7-lobed, dentate; pan. loose, slender; scape bearing one or two leaves below; pet. linear-spatulate, twice longer than the calyx. Mts. Car. Tenn. Ky. 1—2f. (H. Curtisii Gr.)

4 H. pubésçens Ph. Lvs. glabrous, round-cordate, 7—9-lobed; panicle dichotomous, geniculate; style exerted, stam. included; pet. white. Mts. Middle States.

5 H. hispída Ph. Lvs. hispid-rough, 5—7-lobed, lobes very obtuse; fls. scattered; pet. spatulate, purple; sta. a little exerted. Mts. S. and prairies W. June.


L. spatulatùm Ell.—Hard soils S. Stems scarcely 1'; leaves spatulate, veinless; fls. large in proportion, white. March, April.


1 P. Caroliniana L. Sterile filaments 3 in each group, each with a little round head; pet. sessile; lvs. broad-oval, rounded at base, one sessile on the scape. Wet meadows. 10—15'. Flower handsome, 1' broad. June—August.

2 P. asariòlia Vent. Sterile fil. 3 in each set; pet. abruptly clawed; lvs. reniform. Mts. Va. and Car. 10'. Lvs. large (1—2').

3 P. palustris L. Sterile fil. pellucid, setaceous, 9—15 in each set; cauline leaf, if any, sessile; radical lvs. all cordate. Bogs, Mich. N. and W. 6'. Fls. 1'. August.

11. ITEA, L. Calyx small, with 5 subulate segm. Pet. 5, lance-linear, inflexed, inserted with the 5 stam. on the calyx. Styles united. Caps. 2-
celled, 2-furrowed, 8-12-seeded. " With alternate, simple leaves, and a simple, spicate, terminal raceme of white flowers.


12. ESCALLÓNIA RUBRA and E. GLANDULOSA are handsome shrubs, with evergreen leaves and scarlet flowers, prized in the greenhouse. S. Am.


§ Cymes paniculate. Lvs. sinuate-lobed. Fls. rose-white......................No. 1
§ Cymes corymbose, level-topped. Leaves undivided......................Nos. 2, 3, 4

1 H. quercifólia Bartram. Lvs. deeply sinuate-lobed, dentate, tomentous beneath, and on the petioles and veins above; cymes paniculate, radiant, the sterile fls. very large and numerous. Shady banks, S. 4—8f. A superb plant. †

2 H. arboréscens L. Lvs. ovate, obtuse or cordate at base, acuminate, serrate-den- tate, paler beneath; nearly smooth; fls. white-red. Banks, S. and W. 5—6f.

3 H. radiáta Walt. Lvs. ovate, abrupt or cordate at base, acuminate, serrate, silvery-tomentous beneath; fls. white. Uplands, S. 6—8f.

4 H. hortén sis L. Changeable Hydrangea. Lvs. elliptical, narrowed at each end, den- tate-serrate, strongly veined, smooth. China? 1—3f. In cultivation the fls. are gen- erally all neutral, of varying hues, white, blue, pink, &c.

14. DECUMÁRIA, L. Calyx 7-10-toothed, tube adherent to the 5-10-celled ovary. Pet. as many as calyx teeth, valvate in the bud. Sta. 3 times as many as the petals, in one row. Stig. radiate. Caps. many-ribbed, crowned with the style, ∞-seeded. † With rootlets, opposite leaves and cymes of white, fragrant flowers.

D. bárbara L.—A beautiful climber, in damp woods, S. 15—30f.

15. PHILADELPHUS, L. FALSE SYRINGA. Calyx 4-5-parted, half superior, persistent. Cor. 4-5-petalled. Sty. 4-cleft. Sta. 20—40, shorter than the petals. Caps. 4-celled, 4-valved, with loculicidal dehiscence. Sds. many, arilled. † Handsome. Leaves opposite, exstipulate.

1 P. inodór us L. Lvs. ovate, acute or pointed, 3 (rarely 5)-veined, smooth, entire or with remote slender teeth; calyx lobes ovate, acute, as long as the tube; styles united; fls. scentless, 1 or several together, pure white, Y. Uplands, S. 5—8f. May—Jl.

2 P. grandifór us. Pubescent; flowers larger (14); sepals acuminate. Cultivated.

3 P. hirsút us. Fls. larger; leaves and flowers smaller, the latter 7", Mt. woods.

2 P. coronári us. Mock Orange. Glabrous; lvs. ovate, remotely serrate above, 5-7- veined; flowers in dense clusters, cream-white, very fragrant; styles separate. S. Europe. 5—8f. June, July.

16. DEÚTZIA, Thunb. Pet. 5, valvate or imbricate in bud. Sta. 10, the alternate longer, fil. dilated, 3-toothed, middle tooth antheriferous. Ov inferior. Caps. 3—5-celled. † Leaves opposite. Fls. numerous, white.

1 D. scabra. Lvs. ovate, acute, serrate, rough-hairy; racemes terminal, dense; styles 3; flowers bell-shaped. Japan. 5—8f. Very fragrant. June.

2 D. gráficíls. Foliage similar to the other, but smooth. Shrubs only 2—3f, branches covered with flowers in June.
17. **RIBES, L. CURRANTS.** Calyx tube ovoid, adherent to the one-celled ovary, limb tubular or bell-shaped, 4–5-crenate. Pet. 4–5, small, inserted with the 4–5 stamens on the top of the calyx tube. Sty. 2. Berry filled with pulp, with 2 parietal placentæ. Seeds ∞, albuminous. § 5b Leaves alternate, palmately lobed. 3–6f. Styles often united.

§ **Ribesia.** *Currants.* Stems and berries not prickly. Flowers in racemes... (a)

a Flowers greenish or red. Lvs. plicate in the bud.—b Fruit smooth... Nos. 1, 2, 3—b Fruit hairy... Nos. 4, 5, 6

a Flowers bright yellow. Leaves convolute in the bud................................. No. 7

§ **Grossularia.** *Gooseberries.* Stems spinescent. Leaves plicate... (c)

c Peduncles 5–8-flowered. Style 2-crenate. Berries small, hispid... No. 8

c Peduncles 1–3-flowered.—d Calyx tube and fruit prickly... Nos. 9, 10—d Fruit smooth.—e Leaves crenate at base...... No. 11

e Leaves not crenate... Nos. 12, 13, 14

1. **R. rubrum** L. *Common Red Currant.* Lvs. oblong 3–5-lobed, pubescent beneath, subcordate; rac. smoothish, pendulous; calyx limb rotate; bracts short; fr. globose, glabrous, red, rarely amber. Woods, Vt. Wisc. +


3. **R. Nigra** L. *Black Currant.* Lvs. 3–5-lobed, resinous-dotted beneath, not cordate; rac. lax, hairy; calyx bell-shaped; fruit roundish, black. Enr. 4–5f.

4. **R. Sanguineum.** Lvs. 3–5-lobed, white-downy beneath, cordate; rac. long, lax, all rose-red; calyx segments spreading; styles united; fruit blue. Oregon.


6. **R. Resinosum** Ph. Clothéd with resinous-glandular hairs; lvs. 3–5-lobed, roundish; raceme erect; calyx spreading. Mts. Car. (Lost.)

7. **R. Aureum** Ph. Glabrous; lvs. 3-lobed, subentire, shorter than their stalks; raceme lax; calyx limb tubular, longer than the pedicels; fruit oval, yellow, soon brown. Mo. to Oreg. 6–10f. Flowers fragrant.

8. **R. Lacístre** Polr. Spiny and prickly; lvs. deeply 3–5-lobed and incised, cordate; raceme hairy; style 2-crenate; fruit hispid. Swamps, Northward.

9. **R. Cynósbatl** L. *Prickly Currant.* Spines in pairs, prickles few or none; lvs. cordate, lobed, pubescent, cut-dentate; styles united to the top; fruit brown-purple, with long spines, eatable. Thickets, Northward. May.

10. **R. Speciosum.** Glabrous; lvs. roundish, lobed, crenate, polished; spines long, in 3's; flowers nearly solitary, pendulous, scarlet. California. Very handsome.

11. **R. Hírtellum** Mx. Spines few and short, prickles 0; lvs. roundish, lobed, toothed; calyx limb bell-shaped, lobes twice longer than the petals; stamens exerted; style 2-crenate. Rocky woods, N. Eng. to Wisc. Fruit purple.

12. **R. Rotundifólium** Mx. Spines few and short; prickles few or 0; lvs. roundish, lobed, cut-crenate-dentate, smooth or downy; calyx lobes linear, reflexed; stamens and styles much exerted. Rocky woods. May.

13. **R. Uva-Crispa.** *English Currant.* Spiny; lvs. roundish, short-stalked, hairy beneath; peduncle hairy, 1-flowered; fruit oval or globose, large (8–12’), red, green, amber, white, &c. Europe.

**ORDER XLVI. CRASSULACEÆ. HOUSE-LEeks.**

*Plants* herbaceous or shrubby, succulent. *Leaves* entire or pinnatifid. *Stipules* 0. *Flowers* sessile, usually in cymes and perfectly symmetrical.
ORDER 46.—CRASSULACEÆ.

Sepals 3—20, more or less united at base, persistent. Petals as many as the sepals. Stamens as many as the petals, and alternating with them, or twice as many. Ovaries as many as the petals. Filaments distinct. Anthers 2-celled, bursting lengthwise. Fruit distinct follicles or a capsule, many-seeded. Figs. 8, 9, 468.

§ Carpels distinct, forming a circle of follicles...(*)
   * Petals distinct.—a Flowers all 3- or 4-parted. Stamens 3 or 4. .......... TILLIÆA. 4
   —a Flowers 5-, or 4- and 5-parted. Stamens 8 or 10. ............. SEDUM. 8
   —a Flowers all 5-parted. Stamens 5. .......... CRASSULÀ. 3
   —a Flowers 6-12-parted, with cleft hypogynous scales. SEMPÉRVIVUM. 4

Petals united at base.—b Flowers 4-parted. Stamens 8. ............. BRYOPHYLLUM. 5
   —b Flowers 5-parted. Stamens 5. .......... ROCÈA. 6
   —b Flowers 5-parted. Stamens 10. .......... ÈCHIKVÈRIA. 7

§ Carpels united into a many-seeded capsule...(*)
   x Flowers 4-parted, with 8 stamens. .......... DIAMORPHA. 8
   x Flowers 5-parted, with 10 stamens. Petals often wanting. .......... PENTHORUM. 9

1. TILLIÆA, Mx. PIGMY-WEEP. Calyx of 3 or 4 sepals united at base. Petals 3 or 4, equal. Sta. 3 or 4. Caps. 3 or 4, distinct, follicular, opening by the inner surface, 2- or many-seeded. * Very small. Lvs. opposite.

T. simplex Nutt. St. ascending or erect, rooting at base; lvs. connate at base, linear-oblong, fleshy; flowers axillary, solitary, subsessile, their parts in 4's; pet. greenish; carpels 8-10-seeded. 1 Maddy banks, Ct. to Md. 1—2'. July—Sep

2. SEDUM, L. STONE-CROP. Sep. 4 or 5, united at base. Pet. 4 or 5, distinct, spreading. Sta. 8—10. Carp. 4—5, distinct, many-seeded, with an entire scale at the base of each. 2 Lvs. fleshy. Inflorescence cymous.

§ Fls. in scorpion racemes or spikes, or axillary, the latter often 4-parted...Nos. 1—4
§ Fls. in corymbous cymes, all 5-parted.—a Leaves mostly alternate ...... Nos. 5—7
   —a Leaves opposite, and whorled......No. 8

1 S. ternàtum Mx. Leaves scattered, flat, obovate, the lower mostly in whorls of 3, the upper spatulate; spikes 3, rarely 2—4, radiating, secund; central flower 5-parted, the rest 4-parted, white. Damp woods. 3—8'. May, June.

2 S. Nèvii Gr. Stem weak, branched, 3—5'; leaves alternate, imbricated, small, obvate-spatulate; petals lance-linear, white. Mts., Va. (Porter), and S. June, July.

3 S. pulchéllum Mx. Leaves linear, alternate, crowded; spikes radiating, dense flowered, secund, central flower 5-, the others 4-parted, rose-purple. Rocks, Va. to Tex. 4—12'. May—July. Very pretty in gardens.

4 S. aère L. English Moss. Procumbent, diffuse; leaves very small, fleshy, crowded, alternate, appressed; cyme leafy, somewhat trifid; fls. yellow. Gardens. Jl. § Eur.

5 S. Rhodiolà DC. Stems clustered, erect, 5—10'; leaves mostly scattered, obovate, with several angular teeth or entire, crowded; flowers 4-parted, in a small cyme at top, yellowish, àncious. Rocks, Penn. (Prof. Porter), Me., and Can.

6 S. telephíoidèse Mx. Ascending, tall; lvs. round-oval to lance-oval, narrowed to the base, subtendent, alternate; pet. acuminate, pink. Rocks, Md., and S. Stems 1 f, leaves 1—2'. Flowers numerous, in a terminal branching cyme. June.


8 S. SIEBOLDII. Lvs. opposite, or in 3's, roundish, glaucous, sessile; cymes dense, leafy
3. CRASSULA, Haw. Parts of the flower all in 5's, distinct and free. Scales at base of ovaries 5. 5 Fleshy plants, from S. Africa, remarkable for the perfect symmetry of their flowers.

1. C. ARBORESCENS. Stem shrubby, terete, erect; lvs. opposite, fleshy, roundish, cuspidate, flattish, glaucous, dotted above; cyme 3-parted; flowers handsome, roseate.

2. C. LÁCTEA. Stem erect, twisted below, branched; lvs. ovate, narrowed to the connate bases, dotted along the margin; cyme panicked, with many white star-like flowers. Leaves bright green. From S. Africa, as are many other species.

4. SEMPERVÍVUM, L. LIVE-FOREVER. House-leek. Sep. 6—20, nearly distinct. Petals and pistils as many, and stamens twice as many. Scales lacerated. 5 Leaves thick and fleshy, crowded.

5. BRYOPHYLLUM CALYCINUM. Evergreen, fleshy, 2f. Leaves opposite, 3-5-foliolate, with thick, oval, crenate leaflets. Flowers in a loose, terminal panicle, with an inflated calyx and a tubular, exerted, purplish corolla, which has a 4-lobed limb. The plant is propagated from the leaves, which produce buds on their margins becoming new plants,—like ovules from a carpellary leaf.

6. ROCHEA, DC. Corolla funnel-form, 5-cleft. Sepals, stamens, ovaries, and hypogynous scales each 5. 5 Fleshy. S. African.

1. R. FALCÁTA. Shrub 2f; leaves opposite, the pairs some united at base, glaucous, oblong, deflexed-falcate; flowers in corymbose cymes, red, open, fragrant.


7. ECHEVÈRIA, DC. Corolla tubular to bell-form, 5-lobed or parted. Calyx 5-cleft. Stamens 10. Ovaries 5, with 5 scales. 5 Fleshy.

1. E. GRANDIFÓLLIA. Plant 2f, erect, glaucous with a bloom; lvs. spatulate to obovate, acute, the lowest large, roseate; flowers urn-shaped, panicked, orange-red. From Mexico.

2. E. COCCÍSEA. Plant 2f, erect; leaves obovate-cuneate, acute, scattered; flowers carmine outside, yellow within, in a tall leafy spike. Mexico.

8. DIAMÓRPHA, N. Fls. 4-parted, with 8 stamens. Carp. 4, united below, at length spreading, opening by an irregular valve on the back, 4-8-seeded. Small, fleshy, tufted, with cymes of white or pink flowers.

D. pusílla N.—Sunny rocks, S. 1—3'. Leaves oval, sessile, 1". March, April.

9. PENTHÓRUM, L. VIRGINIA STONE-CROP. Calyx of 5 sepals united at base. Pct. 5 or 0. Sta. 10. Caps. of 5 united carpels, 5-angled, 5-celled, 5-beaked, dehiscent by an obliquely-terminal valve. Seeds 0, minute. 4 Not succulent. Lvs. alternate. Fls. yellowish, cymous.

P. sedoides L. Stem branched and angular above; leaves nearly sessile, lanceolate, acute, serrate; fls. in second, radiating racemes. Wet places. 10—16'. July—Sept.
**Order XLVII. HAMAMELACEÆ. Witch Hazelworts.**

Shrubs or trees with alternate simple leaves and deciduous stipules. Flowers in heads or spikes, often 5 or 8. Calyx adherent. Petals linear, or 0. Stamens twice as many as the petals, the opposite sterile and scale-like, or ∞. Ovaries of 2 carpels, 2-celled, 2-styled, ovules 2 or ∞. Fruit a woody capsule, 2-beaked, 2-celled, 1-2-seeded.

§ Petals 4. Calyx 4-lobed. Stamens 4. Flowers mostly y. .............................HAMAMELIS. 1
§ Petals 0. Calyx truncate. Stamens 20–22. Flowers y. .............................FOTHERGILLA. 2
§ Petals 0. Calyx 0. Stamens ∞. Flowers y, in globular heads. ......................LIQUIDAMBAR. 3

1. **HAMAMELIS, L. Witch Hazel.** Calyx with an involucre of 2–3 bracts at base. Pet. very long, linear. Sterile stamens scale-like, opposite the petals, alternating with the 4 fertile ones. Caps. nut-like, 2-celled, 2-beaked. 5 Flowers yellow.


2. **FOTHERGILLA, L. flius.** Calyx campanulate, truncate and obliquely 5-7-toothed, bearing the stamens in one marginal row. Styles distinct. Caps. 2-lobed. 5 Lvs. oval or obovate, expanding after the dense spikes of flowers.

**F. alnifolia** L.f.—Swamps, Va. to Fla. 2–4f. Calyx white, fringed with the long white or pink filaments. Styles long, recurved. March, April.

3. **LIQUIDAMBAR, L. Sweet Gum Tree.** Involucre 4-parted, deciduous. 3 Ament conical. 6 Ament globular. Calyx a scale, if any. Fruit a globular sorosis (§ 171), woody, consisting of the scales, and capsules which open between their beaks. Ovules ∞, 1 or 2 maturing. 3 Leaves and gum fragrant. Twigs winged with corky bark.

**L. styraeiflua** L. Lvs. palmate, with 5 acuminate, serrate lobes; veins villous at their bases. A large and handsome tree, Conn. to Ill. and S. 60f. May.

**Order XLVIII. HALORAGACEÆ. The Hippurids.**

Herbs mostly aquatic, with incomplete or minute √—√ flowers. Calyx tube adherent. Petals 0–4. Stamens 1–8. Pollen 4-grained. Ovary 1–4-celled. Styles 1–4, distinct, one pendulous ovule in each cell. Fruit indehiscent, 1–4-celled, 1–4-seeded. Seed pendulous, anatropous, albuminous. (Formerly joined to Onagraceæ.)

* Flowers 3-parted, apetalous, perfect ................................................ PROSERPINACA. 1
* Flowers 4-parted, monoeious; petals 4 or 0 ........................................... MYRIOPHYLLUM. 2
* Flowers 1-parted, apetalous, perfect ................................................ HIPPURIS. 3

1. **PROSERPINACA, L. Mermaid Weed.** Calyx tube adherent to the ovary, 3-sided, limb 3-parted. Pet. none. Sta. 3. Stig. 3. Fruit 3-angled, 3-celled, bony, crowned with the calyx. 3 Roots creeping. Lvs. alternate. Fls. greenish.
1 P. palústris L. Lvs. linear-lanceolate, sharply serrate above the water, those below (if any) pinnatifid. 2' Swamps: common. 6–23'. Lvs. 1–2'. June, July.

2 P. pectináceca Lam. Lvs. all pectinate, with linear-subulate segm.; fr. obtusely 3-angled. 2' Sandy swamps, Ms. (rare) to Fla. 5–10'; long creepers at base. Jl. Ang.

2. MYRIOPHYLLUM, Vaill. Water Milfoil. Flowers 2, or frequently 3. Calyx 4-toothed in the 2 or 3 flowers, 4-parted in the 3. Pet. 4, often inconspicuous or none. Sta. 4–8. Stig. 4. pubescent, sessile. Fr. of 4 nut-like carpels, cohering by their inner angles. Submersed lvs. parted into capillary segments. Upper fls. usually 2, middle ones 3, lower 2, greenish, emerging in summer.

§ Stamens 8. Carpels smooth and even. Leaves whorled in 3's, rarely in 4's. Nos. 1, 2
§ Stamens 4.—Carpels ridged on the back. Leaves whorled in 4's and 5's. Nos. 3, 4—Carpels smooth and even. Leaves alternate or wanting... Nos. 5, 6

1 M. spicátum L. Floral lvs. ovate, entire, shorter than the flowers, the rest all pinnately capillary; fls. in term. spikes. Deep waters, fls. emerging. 10f.

2 M. verticillátum L. Floral lvs. pectinate-pinnatifid, much longer than the flowers, the lower pinnately-setaceous. Spikes leafy, terminal. Slow waters.

3 M. heterophyllum Mx. Floral lvs. ovate-lanceolate, serrate, longer than the fls. crowded, the rest pinnately or pectinately capillary. Ponds; rare.

4 M. scabrátum Mx. Floral lvs. linear, pectinately toothed; fr. roughened, sharply angled; verticils axillary. Shallow waters. 6–12'. Capillary segments few.

5 M. tenélhum Bw. Erect and almost leafless; floral leaves or bracts alternate, minute, entire, obtuse; fls. 2; petals linear. Water edges, N. Eng. N. Y. and N. Scapes 4–12', from long creeping rhizomes. Fls. purplish-white, sessile.

6 M. ambiguum Nutt. Lvs. many, submersed ones pinnate, with capillary segments, middle ones pectinate, upper linear; fls. mostly 2. Floating in ponds and ditches. Ms. to Ga.

β. limósium. Small, procumbent, rooting, in muddy places; lvs. all linear.
γ. capitáceum. Very slender; lvs. all immersed and capillary, in ponds.

3. HIPPÚRIS, L. Mare's Tail. Calyx with a minute, entire limb crowning the ovary. Cor. 0. Sta. 1, inserted on the margin of the calyx. Anth. 2-lobed, compressed. Style 1, longer than the stamen, stigmatic the whole length. Seed 1. St. simple. Lvs. verticillate, entire. Fls. axillary, greenish.

H. vulgáris L. Lvs. in verticils of 8 to 12, linear, acute, smooth, entire; fls. solitary, minute. Borders of ponds, marshes. N. and W.: rare. 1–2f. Dakotah (Matthews)

ORDER LI. MYRTACEÆ. Myrtleblooms.

Trees and shrubs, without stipules. Leaves opposite, entire, punctate, usually with a vein running close to the margin. Calyx adherent below to the compound ovary, the limb 4- or 5-cleft, valvate. Petals as many as the segments of the calyx. Stamens numerous. Anthers introrse. Style and stigma simple. Fruit with many seeds. Albumen none.

Our Myrtleblooms are either tender exotics, or indigenous far South. The following table must suffice for their recognition.

* Calyx truncate. Petals connate into a caducous calypta or lid... (a)
  a Fruit a capsule. Stam. free. Australian trees, alternate-leaved..............Eucalyptus.
  a Fruit a berry. Stam. free. Leaves opposite. Small trees in S. Florida....... Calyptranthes.
  Cal. 5-lobed. Pet. 5, spreading. Stam. long-exserted. Shrubs. Cultivated... (b)
5. Stamens united into 5 sets. Fruit capsular. Lvs. alternate or opposite. *Austral. Melaleuca.* 1
6. Stamens distinct.—c Flowers in dense lateral cymes. (Lvs. alternate.) *Austral. Callicistemon.* 3
   —c Flowers solitary, axillary. Sepals equal. Lvs. opposite...*Myrtus.* 4

1. EUGÊNIA JAMBOS. Rose Apple. Tree (20—30' in India), with lanceolate leaves. Flowers white, in terminal showy cymes. Fruit round-ovoid, crowned with the calyx, 1¾ diam., yellow, with a thick rind, which has a sweetish, rose-like flavor.

2. MELALEUCA HYPERICIFOLIA. Shrubby, 5f, with opposite, elliptic-oblong, shining, 3-veined leaves on the drooping branches. Flowers of a splendid red, in slender spikes, with innumerable stamens (½' long) radiating in all directions.—*M. Leucadendron,* the famous *Canepunt Tree* of the East, has long lance-linear leaves, white fls. spiked on the pendant branchlets. The trunk is black and the branches white.

3. CALLISTEMON LANCEOLATUM. Bottle-brush. Beautiful shrub, with long, thick, lanceolate leaves, and the flowers in dense, cylindrical spikes, crimson stamens innumerable, radiant at right angles, suggesting the English name. Often cultivated.

4. MYRTUS COMMUNIS. Myrtle. Evergreen shrub or tree of S. Europe, emblematic of victory in honorable contests. The leaves are long, ovate, shining; the flowers pure white or rose-tinged, with innumerable stamens, and the berries black.

**Order LII. MELASTOMACEÆ. MELASTOMES.**

Trees, shrubs, or herbs, with square branches and usually no stipules. Leaves opposite, undivided, dotless, and 3–5-veined. Calyx tube urceolate, adherent, at least to the angles of the ovary. Petals 4—6, convolute in bud. Stamens definite. Anthers opening by terminal pores. Fruit capsular or baccate.—Genera more than a hundred, all tropical except the following.


§ Anthers curved, saccate and appendaged at base. Flowers purplish... (a)
   a Stem square, winged. Leaves ovate to lanceolate, bristly-serrate.... Nos. 1. 2
   a Stem terete or teretish. Leaves lanceolate to linear.................. Nos. 3. 4

§ Anthers straight, oblong.—b Stems simple, with purple flowers...... Nos. 5. 6
   —b Stems brachiate, with yellow flowers.......... No. 7

2 R. stricta Ph. Stem tall, strongly 4-winged, glabrous; leaves acuminate, glabrous; calyx glabrous, tube very short. Bogs, S. 3—4f. Purple. June, July.

β. linearis. Diffusely branched; lvs. almost linear. South. (R. lanceolata Walt.)
5 R. ciliósa Mx. Stem 1—2f, squarish; leaves broad-ovate, sparsely hispid above, margin ciliate with long bristles; flowers few, subsessile, terminal; calyx glabrous, lobes acute. Damp woods, Md. to Fla. Petals roundish. June—August.
6 R. serruláta N. Stem 6—8', square; leaves small, roundish-oval, glabrous both sides, serrulate-ciliolate; calyx glandular-hispid, lobes obtuse. Swamps, S.
7. R. lutea Walt. Leaves oblong-linear; flowers panicked; calyx much constricted above the ovary, limb bell-form, with cuspidate teeth. Damp woods, S. 18°.

2. CENTRADENIA rosea, from Mexico, is often seen in conservatories. A small shrub, with opposite, lanceolate leaves (one of each pair much smaller or obsolete). Fls. 4-parted, roseate, in numerous hanging clusters. Sta. 8, anthers appendaged.—C. grandifolia has the large lanceolate leaves crimson beneath, and cymes erect.

ORDER LIII. LYTHRACEÆ. LOOSESTRIFES.

Plants with entire, distipulate, mostly opposite leaves, with a tubular calyx bearing the (4–7) petals and stamens in its throat, and a compound ovary and style. Stamens 4–14, rarely ∞. Fruit capsular and free, or baccate, 2–6, or by abortion, 1-celled, ∞-seeded. Albumen 0.

§ Herbs—a Flowers irregular Calyx inflated, gibbous at base.................CUPHEA. 3
—α Flowers regular—b Calyx cylindrical, striate, with 5 minute horns......LYTHRUM. 4
—β Calyx campanulate—c 5 teeth with 5 long horns......NASEA. 5
—c 4 teeth with 4 short horns......AMMANIA. 6
—c 4 teeth. Horns 0. Petals 0. DIDYLLIS. 7


2. PUNICA GRANATUM. Pomegranate. Lvs. lanceolate. Pet. 5, oval, obtuse, erect, scarlet, large. Fr. large, cr., crowned with the calyx, eatable, of singular structure, being 3-celled below and 5-celled above, 10–20f. Hardy in Fla. and La. (Eur.)


1. C. viscosissima Jacq. 1 Viscid-pubescent; branches alternate; lvs. opp., lance-ovate; flowers violet-purple, short-stalked, 1 in each axil; capsules bursting laterally before ripe. Wet grounds, Mass., W. and S. Not common. 9–18'. August.

2. C. PLATYCÉNTRA. Low, bushy perennial; leaves lanceolate; fls. with a scarlet calyx tube and short, purple petals, produced in profusion all Sum. From Mex. Not hardy.

3. C. STRIGULÓSA. Shrubby, hispid and viscid; lvs. oblong-ovate; cal. scarlet, gibbous at base; petals 6, subequal, large, violet-purple, varying to yellow; sta. 11, hairy.

4. C. SILENOIDES. Lvs. lanceolate; cal. green and red; pet. 5, purple, 2 large and 3 small.

4. LYTHRUM, L. Loosestrife. Calyx cylindrical, striate, limb 4–6-toothed, with as many intermediate, minute processes. Pet. 4–6, equal. Stam. as many or twice as many as the petals, inserted in the calyx. Style filiform. Capsule 2-celled, many-seeded. 2t Mostly with entire leaves and purple or pale flowers. June—Aug.

§ Stamens as many as the petals. Flowers axillary, solitary..............Nos. 1–4
§ Stamens twice as many as the petals. Flowers spicate or racemose........Nos. 4, 5

1. L. hyssopifolium L. Grase-poly. Glabrous, slender; branches square; lvs. alternate or opposite, linear or oblong-lanceolate, obtuse; fls. solitary, axillary, subsessile: pet. and stam. 5 or 6. Low grounds, coastward, Ms., N. Y. Rare. 6–10'.

2. L. alátum Ph. Glabrous, erect, branched; stem winged below; lvs. lance-ovate, acute, sessile, broadest at base, alternate and opposite; flowers axillary, solitary with 6 wavy petals and 6 short stamens. Damp. S. and W. 1–2f.

3. L. LINEÄRE L. St. slender, somewhat 4-angled, branched above; lvs. linear, mostly opposite, obtuse; fls. nearly sessile: pet. and sta. 6. Swamps, N. J. to Fls. 2–4f.
4 L. Salicària L. More or less pubescent; lvs. lanceolate, cordate at base; fls. nearly sessile, in a long, somewhat verticillate, interrupted spike; pet. 6 or 7; stam. twice as many. Wet meadows, N. Eng., N. Y. Rare. 2-5f. Fls. showy, purple.  

5. NESÆA, Juss. Calyx short, broadly campanulate, with 5 erect teeth, and 5 elongated, spreading, hornlike processes. Sta. 10, alternate ones very long. Sty. filiform. Caps. globose, included, ∞-seeded. 2f Lvs. opposite or verticillate. Flowers axillary, purple. 

6. AMMÁNNIA, L. Calyx campanulate, 4-5-toothed or lobed, generally with as many hornlike processes, alternating with the lobes. Pet. 4 or 5. Sta. as many, rarely twice as many as the calyx lobes. Capsule globular, 2-4-celled, ∞-seeded. ① Stems square and leaves opposite, entire. Flowers axillary. 

A. hûmîllis Mx. St. branched from the base, ascending; lvs. lanceolate, obtuse, tapering at base into a short petiole; fls. solitary, closely sessile, all the parts in 4's; sty. very short. Ditches. A low herb, with inconspicuous flowers. Ang., Sept. 

2 A. latîfoliâ L. St. erect, branching; lvs. linear-lanceolate, acute, dilated and auricled at the sessile base; cal. 4-angled, 4-horned; fls. crowded. Wet, W. 1-2f. Purp. 


D. diândra.—Ponds and sluggish streams, Ill. and S. 10-20' long. Jn.-Ang. 

Order LIV. ONAGRACEÆ. ONAGRADS. 

Herbs, rarely shrubs, with the flowers 4-(sometimes 2 or 3)-parted, with the calyx tube adhering to the 2-4-celled ovary, and teeth valvate in the bud; the petals convolute in the bud, sometimes obsolete as well as the calyx teeth. Stamens as many or twice as many as the petals or calyx teeth. Ovary 2-4-celled, styles united, and stigmas capitate or 4-lobed. Fruit capsular or baccate, 2-4-celled. Seeds with little or no albumen. 

Figs. 18, 54, 183, 317, 385. 

<1> Stamens 8, or twice as many as the petals or sepals...① 

α Calyx tube not prolonged above the ovary.—β Seeds comous. ..EPILÔBIUM. 1 

β Seeds glabrous. ..JUSSIÆA. 2 

α Calyx tube prolonged,—γ the free summit slender.—δ Seeds comous, ∞ ..ZAUSCHNERIA. 3 

δ Seeds glabrous, ∞ ..ENGÔTHERIA. 4 

γ Seeds glabrous, 1-4..GADRA. 5 

δ the free summit enlarged,—ε short. Pet. clawed...CLARKIA. 6 

ε long. Pet. sessile...FUCHSIA. 7 

<2> Stamens 4 or 2, as many as the sepals.—δ Flowers 4-parted...LUDWIGIA. 8 

δ Flowers 2-parted...CHÛSCIA. 9 

1. EPILÔBIUM, L. WILLOW-Herb. Rose Bay. Cal. tube not prolonged beyond the ovary, limb deeply 4-cleft, deciduous. Sta. 8. Stig...
often with 4 spreading lobes. Ov. and caps. linear, 4-cornered, 4-celled, 4-valved. Seeds ∞, comous with long silky hairs. 2 Flowers purple to white. July—Sept.

* Lvs. alternate. Fls. showy, expanding. Stig. with 4 long lobes. Sty. declined. No. 1
* Lvs. opposite. Fls. small. Stigma undivided.—a Petals entire .......... Nos. 2, 3
  —a Petals 2-lobed .......... Nos. 4, 5

1 **E. angustifolium** L. St. simple, erect; lvs. lanceolate, subentire with a marginal vein; rac. long, terminal, spicate; pet. unguiculate, purple; stig. with 4 linear, revolute lobes. In newly-cleared lands, fence-rows, &c., E. and W. 4–6f.

  β. canescens. Flowers pure white throughout; ovaries silvery canescence.

2 **E. alpinum** L. St. creeping at base, usually with 2 pubescent lines, few-flowered; lvs. glabrous, oblong-ovate, obtuse; caps. glabrous. High Mts. N. 6–12f. Fls. pale-roseate.

  β. nutans. Taller (1f), nodding at the summit; lvs. oblong, dentate. White Mts.


5 **E. coloratum** Muhl. Nearly smooth, much branched; lvs. lance-oblong, dentate, some petiolate, often with reddish veins; pet. 2-cleft, rose-color. Wet. 1–3f.

2. **JUSSIÉA**, L. Calyx tube long, but not produced beyond the ovary; the lobes 4–6, leafy, persistent. Pet. 4–6, spreading. Sta. 8–12. Pod 4–6-celled, long, opening between the ribs. Seeds very numerous.—Herbs with alternate leaves and yellow flowers.

1 **J. decurrens** DC. Glabrous; fls. 4-parted, 9′; st. erect, branched, winged by the decurrent, lanceolate lvs.; pod clavate, 4-angled. 2f Wet. Pa., and S. 6–20′. Jl.–Sep.

2 **J. repens** L. Smooth, or hairy above, creeping, with erect branches; fls. 5-parted, 2′; lvs. lanceolate to oblong, narrowed to the slender pet.; ov. much shorter than the ped. 2f Ponds, ditches, Pa. to Ill., and S. 2–3f. May–Aug. (J. grandiflora Mich.)

3 **J. leptocarpa** N. Hairy; fls. mostly 6-parted, small (9′); lvs. lanceolate, subsessile; pod slender, much longer than the ped. 1 Marshes, Fls. to La. 1–2f. June.

3. **ZAUSCHNERIA** CALIFÓRNICÁ. 2 Bushy, hairy-viscid, with lanceolate leaves and scarlet (varying to white) flowers resembling Fuchsias. Sta. exserted.


* Native. Fls. nocturnal, yellow. Pods sessile, oblong, terete .......... Nos. 1–3
* Native. Fls. diurnal, yellow. Pods club-shaped, 4-angled and 4-ribbed... (a)
  a Calyx tube not longer than the ovary. Fls. 5′ or 6′ diameter .......... Nos. 4, 5
  a Calyx tube about twice longer than the ovary. Fls. 15′–18′ .......... Nos. 6–8
  a Calyx tube 3 or 4 times longer than the ovary. Fls. 2′–4′ .......... Nos. 9, 10
* Exotic.—b Fls. yellow, large. Tube much longer than the ovary .......... Nos. 11, 12
  —b Fls. white, very large. Pods 4-winged and 4-ribbed .......... Nos. 13, 14
  —b Fls. purple or roseate. Tube short, funnel-form. GODETTIÁ .......... Nos. 15–18

1 **Œ. biénis** L. St. erect, hirsute; lvs. ovate-lanceolate, repand-denticulate; fls. in a terminal, leafy spike; cal. tube 2 to 3 times longer than the ovary; stam. shorter than the obcordate or obtuse petals; pod oblong, obtusely 4-angled. Com. 2–5f.
b. muricata. Stem rough-hirsute; petals but little longer than the stamens.
y. grandiflora. St. branching; pet. much longer than stam., deeply obcordate. t
b. parviflora. Calyx tube elongated; petals small, as long as the stamens.
&. cruciata. Petals linear-oblong, shorter than the stamens.
c. canescens. Petals enlarged; whole plant canescently hairy.

2 OE. rhombipetalum N. St. erect, tall, smooth; lvs. lance-linear; pet. rhombic-elliptical, pointed; cal. tube 3–4 times longer than ovary. t Prairies, W. 2–8f. t

3 OE. sinuata L. Pubescent, decumbent at base; lvs. oval-oblong, sinuate-dentate, or incised; fss. axillary, solitary; tube twice longer than ovary. t N. J. and S. 3–9f.


4 OE. pumila L. Low, pubescent, half-erect; lvs. lanceolate; fls. 6", in a leafy spike; calyx tube shorter than the oblong-clavate ovary. t Meadows, Can. to Car. 6–10f.

5 OE. chrysanthum Mx. Ascending, slender; fss. small (5") crowded, spicate; lvs. lanceolate; cal. tube as long as the ovary; pet. emarginate. t N. Y. to Wis. 12–18f.

6 OE. fruticosum L. St. rigid, hairy or downy; lvs. lance-oblanceolate; rac. corymbed; fls. 1½" diam.; pod oblong-clavate, 4-winged, downy, pedicellate. t Hard soils. 1–3f.

7 OE. riparia N. St. slender, branched, purple, and polished; lvs. linear-lanceolate, petiolate, denticulate; rac. corymbed; fls. large (1½""). Banks, N. J., and S. 1–2f. May +.

8 OE. linearis Mx. Hairy-puberulent, subsimple; lvs. linear, subentire, obtuse; fls. large, corymbed; pod obvoid. t Montank Pt. to Tenn., and S. 1–1½f. May, June.

9 OE. glauca Mx. Smooth, glaucous; lvs. ovate, sessile, pointed; fls. large, clustered at the ends of the branches; pod oblong. t Va. to Ky., and S. 2–3f. May–July.

10 OE. Missourinensis Sims. Simple, decumbent; lvs. thick, lanceolate, petiolate; fls. very large (4"), tube very long; pod very large, 4-winged. Dry hills, Mo. July–Oct.

11 OE. nocturna. St. erect, downy; lvs. lanceolate, repand-dentate. t S. Af. 2f.

12 OE. longiflora. Simple, hairy; lvs. lanceolate, denticulate; pet. 2-lobed. t S. Am.

13 OE. speciosa. Lvs. plumatifid below; fls. diurnal, white, fading red. t Ark. 1½f.

14 OE. tetraphylla. Lvs. plumatifid below; fls. nocturn., large, pure wh. t Mex. 1–2½f.

15 OE. rubicunda. Erect; lvs. lance-linear; pet. rose-purp., orange at base. t Cal. 2f.

6 OE. Lindleyi. Diffusely branched; lvs. lance-lin.; pet. lilac, red at base. t Cal. 1½f.

17 OE. vinsoga. Erect; lvs. linear-oblong; pet. white-purp.; fls. 2½ broad. t Cal. 2f.

18 OE. lepida. Erect, simple; lvs. lance-obl.; pet. pale-purp., crimson-spotted at edge.

5. GAURA, L. Calyx tube much prolonged above the ovary, cylindric, limb 4-cleft. Pet. 4, unguiculate, somewhat unequal. Sta. 8, declinate, alternate ones a little shorter. Ovary oblong, 4-celled, nut usually by abortion, 1-celled, 1–4-seeded.—Herbaceous or shrubby. Lvs. alternate. Flowers white and red, in slender spikes. July, August.

1 G. diennis L. St. branched, pubescent; lvs. lance-oblong, spikes dense; cal. tube as long as the segments, the pet. rather shorter. t Dry bluffs, rare, handsome. 3–5f.

2 G. filipes Sch. Paniculate and naked above; lvs. linear-oblong, tufted at the base of the slender racemes; calyx segments longer than the tube or petals; pod obvoid-clavate, on slender pedicels. Dry soils, S. and W. 3–5f.

3 G. angustifolium Mx. Pubescent; lvs. linear, very acute; calyx seg. much longer than tube or pet.; pod sessile, ovoid, sharply 4-angled. S. Car. to Fla. Fls. small, wh

4 G. Lindheimeri. Erect, much branched; lvs. lin.; cal. red; pet. blue, long in bloom.

6. CLÁRKIA, Ph. Calyx tube slightly prolonged beyond the ovary, limb 4-parted, deciduous. Pet. 4, unguiculate, 3-lobed or entire, claws with 2 minute teeth. Sta. 8. Sty. 1, filiform. Stig. 4-lobed. Capsule largest at base, 4-celled, 4-valved, many-seeded. (1) Herbs (from Oreg. and Cal.) with showy, axillary flowers.

1 C. fulchella. Lvs. lin.-lanceolate; pet. 3-parted; 4 sterile sta. Fls. wh., rose, or lilac

8. **LUDWIGIA**, L. Bastard Loosestrife. Calyx tube not prolonged beyond the ovary, limb 4-lobed, mostly persistent. Pet. 4, equal, obcordate, often minute or none. Sta. 4, opposite the sepals. Sty. short. Caps. short, 4-celled, 4-valved, many-seeded, and crowned with the persistent calyx lobes. 2§ and mostly 22. Leaves entire. Flowers in summer.

§ Leaves opposite. Stems creeping.—a Petals none. Flowers very small...Nos. 1, 2
—a Petals yellow, showy.........................Nos. 3, 4

§ Leaves alternate, sessile. Stems mostly erect...b
b Petals large, yellow. Pods pedicellate, short....Nos. 5–7
b Petals small, yellowish. Pods sessile, elongated, smooth............Nos. 8, 9
b Petals 0 or minute.—c Pods elongated, hairy or smooth.............Nos. 10, 11
—c Pods short, rounded, shorter than the sepals. Nos. 12, 13
—c Pods short, square,—d axillary..................Nos. 14–16
—d capitulate.................................No. 17

1 L. palústris Ell. Water Purslane. Creeping or floating, smooth, some fleshy; lvs. ovate-spatulate, on winged petioles; fls. sessile, solitary, apetalous; pod oblong (2'), with 4 green angles. Stem 10–18', round, reddish.

2 L. spatuláta T. & G. Ascending, branched, downy, not fleshy; lvs. obovate-spat., on winged petioles; fls. very small, sess.; pod ovoid, 4-sided, downy. Fla. 6–12'.

3 L. natans Ell. Creeping or floating, smooth; lvs. oblong, on margined petioles; fls. sessile; pet. as long as the calyx; ov. with 2 bractlets at base. Swamps, S. Pod 4'.

4 L. arcuátá Walt. Creeping, smoothish; lvs. linear-oblongate, tapering to the slender base; fls. solitary, on ped. twice longer than the lvs.; petals bright yellow, longer than the narrow sepals; pod clavate, finally arculate. Va. to Fla. 3–10'.

5 L. alternifólia L. Seed Box. Erect, glabrous; lvs. lanceolate, acute; ped. axillary, 2-bracted; sep. large, purplish, crowning the 4-winged pod. Swamps. 1–3f.

6 L. hirtélla Raf. Erect, hairy; lvs. ovate-oblong, obtuse; ped. axillary, 2-bracted; sep. shorter than the yellow petals; pod 4-winged, subglobose. Wet. N. J. to Fla. 1–3f.

7 L. virgáta Ph. Erect, with virgate branches, smoothish; lvs. oblong to linear, obtuse; fls. large; pet. longer than the leafy calyx, which is finally persistent and reflexed on the roundish-cubical 4-winged pod. Dry soils. S. 2–3f. Flowers 1'.

8 L. lineáris Walt. Slender, with erect branches; lvs. lance-linear, acute; fls. axillary, sessile; pet. obovate-obl.; pod clavate, 4-sided, longer than sep. N. J. and S. 2f

9 L. linifólia Poir. Simple, erect from a creeping base; lvs. spreading, lin., attenuate at base; sep. ovate, pointed, equalling the pet. and oblong pods. Mud. S. 1f. Lvs. 1'.

10 L. cylindrica Ell. Smooth; lvs. lanceolate; fls. minute, 1–3 together, apetalous; pod slender, cylindrical, blunt, longer than the calyx segm. S. Car. to Fla. and La. 3f

11 L. plíosa Walt Villous-pubescent; lvs. lanceolate; fls. axillary and spiked above; pod villous, oblong, 4-sided, as long as the ovate, pointed sepals. Swamps, S. 2f.
12. *L. sphaerocarpa* Ell. Lvs. lanceolate, attenuate to base; ped. subsol., bractless, short; sep. as long as the small subglobose pod. Wet swamps, Mass. to Ga.: rare. 3f.

13. *L. microcarpa* Mx. Ascending from a creeping base; lvs. spatulate-ovobate-sep. roundish, acuminate, larger than the very small obvoid pod. Wet, S. 1f.


15. *L. lanceolata* Ell: (Chapm.) St. stout, terete; lvs. lanceolate; fls. in all the axils green, apetalous; pod cubical, with sharp angles. Swamps, Ga. Fl. 1-2f, bushy.

16. *L. polycarpa* Short & Peter. Lvs. lance-linear, on the runners ob lanceolate; fls. solitary, with 2 subulate bractlets at base; pod cubical-ohconic. Swamps, W. 1-3f.

17. *L. capitata* Mx. Erect; lvs. lance-linear to lance-obl., obtuse at the sessile base; flowers sessile, crowded in a terminal bracted head or spike. Wet barrens, S. 2-3f.


2. *C. alpina* L. Smooth; st. ascending at base, weak; lvs. broad-cordate, diaphanous, dentate, as long as the petioles; bracts setaceous; caps. pubescent. Wet, rocky woods, N. Eng. to Oreg. 6-10'. Fls. white. Plant small and delicate. July, Aug.

**ORDER LV. LOASACEÆ. LOASADS.**

*Herbs* often hispid with stinging hairs, with leaves opposite or alternate and no stipules. *Calyx* adherent to the ovary, 4 or 5-parted, lobes persistent, equal. *Petals* 5, or 10 in 2 circles. *Stamens* ∞. *Ovary* 1-celled, with several parietal placenta.


—Branching herbs. Leaves alternate.

1. *M. oligospérma* Nutt. Very rough, with barbed hairs; stem dichotomous; lvs. ovate-lanceolate, lobed or incisedly toothed; pet. entire, cuspidate, longer than the 20+ sta.; caps. 3-5-seeded. 2' Dry rocks, Ill. Mo. and S. 1f. Fls. deep yellow, 9'. May—Jl.

2. *M. Floridâna* Nutt. Slightly roughened; lvs. deltoid-ovate, unequally toothed, petiolate; pet. wedge-oval, obtuse; sta. 30; caps. 6-seeded. Fla. 1f. Fls. small, yellow.


L. *lateritéa*. *Brick-red L.* Climbing, stinging; leaves palmately lobed, cordate; fls. large, on long stalks, brick-red to orange. Chili. 20f. June—October.

**ORDER LVI. TURNERACEÆ.**

*Herbs* with alternate, exstipulate leaves, solitary, 5-parted flowers, a free calyx bearing the 5 petals and 5 stamens in its throat. *Ovary* 1-celled, with
3 parietal placenta. **Styles** 3, distinct. **Fruit** a 3-valved capsule. **Seeds** albuminous, strophiolate.

**TURNÈRA, L.** Calyx campanulate. **Styles** 3. **Stigmas** 2-5- parted or fringed. Caps. of 3 valves separating to the base. Herbs pubescent or tomentous. Flowers on jointed pedicels, yellow. (Piriqueta, Aub.)

1 **T. cistoides** L. Hairy, erect; **lvs. lanceolate, obtuse, denticulate; the upper bracts-like, shorter than the peduncles; pet. obovate, cor. 1.' Dry. S. 1f. June, July.

2 **T. tomentosa.** Tomentous; **lvs. oblong (1'), longer than the peduncles. Fls. 1f.

3 **T. glabra** (Chapm.) Smooth, branched; ped. 2-3 times longer than lin. **lvs.**

**ORDER LVII. PASSIFLORACEÆ. Passionworts.**

*Plants* often woody, climbing by tendrils, with alternate leaves and leafy stipules. **Flowers** perfect, 5-parted. Calyx tubular, the throat crowned with several rows of sterile filaments, and the corolla above them. **Stamens** 5, monadelphous, sheathing the stipe of the ovary. **Fruit** fleshy, **∞-seeded.** Figs. 111, 112, 348.

**PASSIFLÓRA, L.** Passion-flower (*i. e.*, emblematic of our Saviour's passion). Cal. colored, deeply 5-parted, the throat with a complex filamentous crown. **Ov.** raised on a stipe. **Stig.** 3, with 5 large anthers. Fr. a pulpy berry. & Fls. large, wonderful and beautiful. May—July.

1 **P. lutea** L. **Lvs.** glabrous, cordate, 3-lobed, obtuse; petioles glandless; ped. mostly in pairs; pet. gr.-yel., narrower and much longer than sep. 2; Woods, O., and S. 10f.

2 **P. incarnàta.** Lvs. deeply 3-lobed, serrate; petioles with 2 glands above; involucr 3-leaved; crown triple, roseate. 2; Dry fields, Va. to Fla. 20-30f. Pet. wh.

3 **P. corùlea.** Shrubby; **lvs.** palmately 5-parted, entire; invol. 3-bracted; petioles glandular; pet. longer than the crown, blue, purple, and white. Brazil. Not hardy

**ORDER LVIII. CUCURBITACEÆ. Cucurbits.**

*Herbs* succulent, creeping or climbing by tendrils, with alternate leaves. **Flowers** monœcious or polygamous, never blue. **Calyx** 5-toothed; adherent. **Petals** 5, often united, inserted on the calyx. **Stamens** 5, generally cohering in 3 sets. **Anthers** united, contorted. **Ovary** 1-celled, with 3 parietal placenta often filling the cells. **Fruit** a pepo or membranous. **Seeds** flat, with no albumen, often arilled. Figs. 186, 476, 482.

§ **Corolla** white,—a 6-cleft. **Stigmas** 2. **Fruit** echinate

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1. **ECHINOCÝSTIS, T. & G.** Flowers &. Calyx of 6 filiform-subulate segments, shorter than the corolla. **Petals** 6, united at base into a rotate-campanulate corolla. § Sta. 3, diadelphous. § Abortive fil. 3, dis-
tinct, minute. Style very short. Stig. 2, large. Fruit roundish, inflated, echinate, 4-seeded.  


1. **C. pepo**. **Pumpkin.** Rough-hispid; lvs. very large, cordate, 5-lobed or angled; fls. large, 2 long-stalked; fr. very large, rounded, smooth, torulous, finally yellow.  

2. **C. melo féro.** **Flat Squash.** Hairv; lvs. cordate, 5-lobed; fr. depressed-orbiculcar, margin torulous, smooth or warty, whitish. Hybridizes with No. 1.

3. **C. verrucosa.** **Crookneck S.** Hairv; lvs. cordate, deeply 5-lobed; fr. oblong or clava- vate, often elongated and curved at base. The varieties are numerous.  

β. **medulloso.** **Vegetable Marrow.** Lvs. triangular in outline, deeply 3-lobed; fr. oblong or club-form, dark-green and wh. 10—20' long. Highly prized in England.

4. **C. máxima.** **Mammoth S. Winter S.** Rough-hairy; lvs. round-reniform, obusely 5-lobed; fruit 10'—31' diam., with a lobed, yellowish-white surface and dense pulp.


38.
C. vulgaris Schrad. Hirsute; lvs. somewhat 5-lobed, the lobes sinuate-pinnatifid, glaucous beneath; fls. with a bract; fr. dark-spotted. 1 India. Africa.


* Leaves angular, not lobed, subcordate. Tendrils simple.................Nos. 1, 2
* Leaves deeply-lobed or cleft. Tendrils simple or forked..............Nos. 3–5

1 C. sativus. Cucumber. Rough; lf. angles acute; fr. oblong, prickly when young. 3
3 C. anguria. Prickly C. Lvs. sinuate-lobed; tendrils simple; fr. ovoid, echinate.
4 C. colocynthis. Colocynth. Lvs. cut-lobed; tend. short; fr. round, yel., very bitter.
5 C. angustus. Serpent C. Lvs. 3-5-lobed; tendrils forked; fr. long, coiled, snake-like.

ORDER LIX. BEGONIACEÆ. BEGONIADS.

Herbs or shrubby plants, with alternate, inequilateral leaves, and diclinous, unsymmetrical flowers. Perianth of 2–∞ lvs., all petaloid or the inner only. Stamina ∞, anth. connate. Ovary inferior, 3-angled or winged, 3-celled, the placenta in the angles. Styles united at base. Albumen 0, or thin.

BEGÔNIA, L. 2 Sepals 2. Pet. 2, rarely more, or 0. 2 Sepals 2, larger than the 4 petals. Cap. with 3 angles unequally winged, opening below the apex. Sds. ∞, minute. 2½ Lvs. alternate, stipulate, with the sides unequal, margins toothed or lobed. Fls. often showy. Species 320, mostly tropical, often found in the greenhouse. Much mixed.

§ Leaves feather-veined, and glabrous as well as the whole plant............Nos. 1–4
§ Leaves palmi-veined, with 5–9 veins from near the base... (a)
   a Plant glabrous throughout. Leaves toothed or crenulate............Nos. 5–7
   a Leaves hairy, at least on the deeply 5–9-lobed margins..............Nos. 8, 9
   a Leaves hairy, at least on the undulate or toothed margins...(b)
   b Staminate flowers with 2 sepals only, the petals usually 0...........Nos. 10, 11
   b Staminate flowers with 2 sepals and 2 petals. E. India............Nos. 12–15

1 B. maculata. Very smooth; lvs. ovate-oblong, wavy, cordate, white-spotted above, purple beneath; fls. white or flesh-colored, in forked cymes. Brazil. (B. argentea.)

2 B. fuchsoides. Smooth; lvs. oblong to obovate, obtuse at base, serrulate; fls. bright red, drooping like Fuchsia, in many terminal cymes, very handsome. N. Granada.

3 B. semprevirens. Leaves briefly on the crenate edges, ovate, subcordate; fls. white to rose-colored, 1¼–1½", in an open panicle, with scarious, persistent bracts. Brazil.

4 B. incarnata. Leaves bristle-serrate, ovate to oblong; fls. roseate, large, in compound, pendulous cymes, with caduncous bracts or 0. Mexico. (B. insignis.)

5 B. nitida. Leaves ovate, half-cordate, subcrenate, shining, green as well as the stipules; flowers purplish-white, with caduncous bracts, on axillary peduncles. W. Ind.

6 B. sanguinea. Leaves oblique-ovate, deeply cordate, crenulate, red beneath, large; flowers white, small, many, in cymes longer than the leaves. Stalks red.

7 B. coccinæa. Leaves oblique-oblong, half cordate, dentate; stipules obovate, caducous; flowers scarlet, pendulous, 8° broad, in cymes equalling the leaves (50).

8 B. hieracifolia. Leaves roundish, palmately 7-crenate, lobes toothed; fringed scales on the petiole above; scape long, with many roseate flowers, 1' diameter. Mexico.

9 B. parviflora. Shrub rusty-downy; leaves ample, roundish, subcordate, 7-9-lobed, lobes serrulate; cymes 1' long, with numerous small pale flowers. Peru.
Order LX. CACTACEÆ. INDIAN FIGS.

Plants with a green fleshy caudex or stock, angular or jointed, mostly leafless, armed with numerous prickles and terrible spines. Flowers solitary, mostly very showy. Sepals = on the surface. Petals and stamens = on the top of the ovary or calyx tube. Fruit fleshy, 1-celled, with parietal placenta. Style filiform, with stellate stigmas. Figs. 472, 487.

1. OPUNTIA, Mill. INDIAN FIG. Sep. and pet. = adnate to the ovary, not produced into a tube above it, longer than the stamens, the inner obovate. Stig. 4—10. Berry smoothish or prickly. 5 Branches composed of fleshy, mostly flattened joints. Lvs. small, deciduous, alternate, with tufts of prickles in their axils. Flowers large, yellow.


4. Rafinésquii Eng. Stock prostrate, bright green; lvs. spreading, subulate, longer (3—4’); spines 1—5 in each axil; petals 10—12, often purplish at base. Ky. to Ill., and W.

5. Missourïënsis DC. Stock prostrate; leaves minute, the axes bristly and with whorl of many spines; fruit prickly, dry. Wis., along the rivers, and W. June.

6. polyanthâ Haw. Erect; joints oblong, the upper bearing many flowers at top; spines strong, yellow, unequal; stigmas 6; fruit small, 6-seeded. Waysides, Fla. Jn.

7. Pes-Corvi Leconte. Stk. prostrate; joints compressed-cylindric, small (2’); spines in pairs, unequal; pet. few, spatulate; stig. 4; fr. small, prickly, 1—4-seeded. Ga., Fla.

8. Brasiliënsis. Stock cylindrical, 6—10’; branches short, bearing ovate joints, which are thin and somewhat leaf-like; spines 1—3 together, sharp and strong. Brazil.

2. EPIPHYLLUM TRUNCÂTUM. Stock consisting of short, flat, notched joints, truncate at top; flowers at top of the joints, 2—3’ long, conspicuously oblique. Style longer than the stamens or 6—8—10 reflexed petals. From Brazil. 1f.
3. **Phyllocactus** Phyllanthoïdes. Stock consisting of narrow, ensiform, crenate joints, fleshy but leaf-like. Flowers 4' long, open by day, with many rose-colored petals and sepals longer than the tube, gradually spreading. Mexico.

2 **P. Ackermannii**. Fls. scarlet; pet. channelled, pointed, very many, 3—4'. Mexico.

3 **P. Phyllanthus**. Spleenwort. Joints ensiform, serrate; fls. 9—12', the white funnel-form cor. much shorter than the slender tube, opening by night, fragrant. S. Am.

4. **Cereus**, DC. Sep. and pet. imbricated, adnate to and prolonged into a long tube above the ovary. Sta. and style filiform, adnate to the tube. Stig. 10. Berry scaly with the remains of the sepals. ½ Stock fleshy, green, prismatic, often jointed, with fascicles of spines on the ridges.

1 **C. grandiflorus**. *Night-blooming C*. Stock long, about 5-angled; flowers very large, nocturnal; pet. spreading 6—8', pearl-white; sep. yellow. Mex. A magnificent flower.

2 **C. Triangularis**. Stock 3-angled, prickles bristly; fl. very large, white; sep. green.

3 **C. flagelliformis**. Stock slender, long, prostrate, 10-angled, hispid; fls. pink-color, smaller, open by day many days in succession; tube longer than the petals.

4 **C. serpentinus**. Stock 12-angled, 4'; spines white, bristly; fls. pale, open by night.

5 **C. speciosissimus**. Stock 3- or 4-angled, erect, 4'; angles winged, undulate; fls. large (4' long), with many red or crimson petals and white stamens, diurnal. Common.

6 **C. senilis**. *Old-Man C*. Stk. erect, oblong, with tufts of long, white, hair-like bristles.

5. **Melocactus** Communs. Stock very succulent, roundish ovate, 1/2, 12-18-ribbed, surmounted by a sort of spadix, consisting mostly of dense wool, in which at the top the small red flowers are imbedded. W. Indies.

**Order LXI. Ficoideæ. Mesembryanthæ.**

*Plants* fleshy, of forms variously singular, with entire, mostly opposite leaves, and solitary, regular flowers, remarkable for their profusion and duration. Calyx lobes 4 or 5. Petals ∞—5, or rarely 0. Stamens ∞, distinct, perigynous. Ovary more or less adherent. Stigmas 2—∞. Capsules 1—∞-celled, ∞-seeded. Embryo curved.

§ Petals and stamens ∞, in several rows. Capsule fleshy, valvate..........**Mesembryanthemum**. 1

§ Petals none, stamens ∞—5. Capsule 3-5-celled, circumsessile..........**Sesuvium**. 2 (& p. 446)

1. **Mesembryanthemum**, L. *Ice Plant*. Calyx lobes 5. Pet. linear, inserted with the filiform stamens on the calyx tube. 2½ Air bubbles beneath the epidermis appear like dew or frost.

1 **M. crystallinum**. Procumbent, fleshy; lvs. large, ovate, acute, wavy at the margin, 3-veined beneath. 2½ Greece. Stem 1f. Flowers white, all summer. Not hardy.

2 **M. grandiflorum**. Procumbent; lvs. cord. ovate; cal. 4-cleft, 2-horned; pet. pink. Afr.


**Order LXIII. Umbelliferae. Umbelworts.**

*Herbs* with hollow, striate stems, sheathing petioles, and flowers in um-
bels. Calyx adherent to the ovary. Petals 5, usually inflected at the point. Stamens 5. Ovaries 2-carpelled, surmounted by the fleshy disk which bears the petals and stamens. Styles 2, distinct, or united at their thickened bases. Fruit a cremocarp (§151), consisting of 2 coherent achenia called mericarps, which separate along the middle space, which is called the commissure.

Carpophore, the slender, simple, or forked axis attached to and supporting the mericarps at top, enclosed between them at the commissure.

Ribs, 5 ridges traversing each mericarp lengthwise, and often 4 intermediate or secondary ones, some, all, or none of them winged.

Vitta, little tubular receptacles of colored volatile oil imbedded in the substance of the pericarp, just beneath the intervals of the ribs, and also sometimes in the face of the commissure.

Embryo in the base of abundant, horny albumen.

Figs. 42, 177, 235, 238, 303, 334-5, 360, 442-3.

A large and well-defined Order. As the flowers in all are nearly alike, the genera are best distinguished by characters taken from the fruit—the number and form of the ribs, the presence or absence of vitta, the form of the albumen at the commissure, &c. These parts, therefore, minute as they are, will require the special attention of the student.

§ Flowers in simple umbels, sometimes spicate. Leaves simple... (a)
§ Flowers in capitulate umbels, &c., sessile, forming dense heads... (b)
§ Flowers in regularly-compound umbels, not sessile in heads... (2)
2 Fruit flattened on the back, singly-winged on the margin only... (c)
2 Fruit flattened on the back, doubly-winged on the margin only... (d)
2 Fruit flattened on the sides, or tereete and not flattened either way... (e)
3 Fruit slender, tereteis, 2-3 times longer than wide. Flowers white... (f)
3 Fruit nearly as broad as long... (g)
3 Fruit yellow... (h)
4 Ribs of the fruit either succinate, or crenulate-winged... (i)
4 Ribs smooth, entire, winged or sharply prominent... (j)
4 Ribs obtuse or obsolete... (k)
Calyx teeth obsolete or 0... (l)
Calyx teeth prominent... (m)
a Fruit flat, orbicular. Leaves round or roundish... (n)
a Fruit globular. Leaves linear, fleshy phyllodium... (o)
b Flowers partly sterile. Fruit densely succinate, few... (p)
b Flowers all fertile. Fruit scaly, many in the head... (q)
c Flowers of two sorts, the marigual with enlarged corollas, radiant... (r)
c Flowers all alike... (s)
Fruit with a thick, corky margin. Vitta... (t)
Fruit with a thin margin. Vitta... (u)
Seed adherent to the pericarp. Intervals with single vitta... (v)
Seed loose in the pericarp. Intervals with numerous vitta... (w)
Beak slender, longer than the fruit, all without vitta. South... (x)
Beak short or none... (y)
Fruit clavate, upwardly bispic... (z)
Fruit smooth, linear-oblong. Styles very short... (a)
Fruit smooth, elliptical. Styles very slender... (b)
Involucels of 5 ovate, entire bracts. Leaves simple, entire... (c)
Involucels of 3 subulate bracts... (d)
Fruit laterally compressed... (e)
Fruit suberete transversely... (f)
Fruit laterally compressed. Vitta... (g)
Fruit transversely suberete. Vitta... (h)
Calyx teeth prominent. Ribs of the fruit succinate... (i)
Calyx teeth obsolete. Ribs of the fruit crenulate-undulate... (j)
Marginal wings twice broader than the dorsal... (k)
Marginal and dorsal ribs alike sharp... (l)
Fruit a double globe. Petals not inflected. Low, early-flowering... (m)
Fruit ovate-oblong. Petals emarginate-inflected. Involucra... (n)
1. HYDRACOTYLE, L. PENNYWORT. Calyx limb obsolete. Pet. spreading, the point not notched. Carpels 5-ribbed, without vittæ. 

1 H. Americana L. St. filiform; lvs. round-reiniform, slightly lobed, crenate; umb. sessile, 3-5-flwd.; fr. orbicular. 2' Damp shades. 2-6'. Plant very smooth and shining.


1 S. MARLIÁNDECA L. Lvs. 5-7-parted, digitate, mostly radical; segm. thick, oblong, incisely serrate; sterile fls. many, pedicellate, fertile ones sessile; cal. segm. entire; styles slender, conspicuous, recurved. Woods: common. 2-3'. May-July.

2 S. CANADÉNIS L. Lower lvs. 5-parted, upper 3-parted; segm. cuneate-obovate, mucronate-serrate; sterile fls. few, much shorter than the fertile; sty. shorter than the prickles. Woods, thickets: com. 1-3'. Umb. few-flwd. Jn.-Aug.

4. ERÝNGIUM, Tourn. Fls. sessile, collected in dense heads. Cal lobes somewhat leafy. Pet. inflexed. Sty. filiform. Fr. scaly or tuberculate, obovate, terete, without vittæ or ribs. 2* 2 Fls. blue or white, bracteate; lower bracts involucrate, the others smaller and chafy. Summer.

1 E. yuccæfólium Mx. Erect; lvs. broadly linear, parallel-veined, ciliate with remote, soft spines; invol. bracts entire, spinescent, shorter than the ovoid-glob. heads. 

2 E. Baldwinii Spr. Sts. prostrate, filiform; rt. lvs. wedge-oblong, st. lvs. 3-parted, segm. lance-line., cut-toothed; invol. scales and chaff alike; lds. oblong. Fls. 10'. Blue.

3 E. prostratum Baldwin. Sts. prostrate, filiform, rooting; lvs. of two forms at the same node, small, some ovate, some 3-parted with lance-linear segm.; invol. scales linear, longer than the small oblong heads; fs. blue. 4 Swamps. Ga. Fls. 6-12'. Jn.+ 

β. foliosum. Bracts of the invol. leafy, twice longer than the heads. Fls. La.

4 E. aromaticum Baldwin. Sts. assurgent; vs. short (1'), pinnate, with cupulate segm., the 3 terminal largest; hds. globous (6-S'); invol. scales 5. Dry. Fls. 9-19.'

5 E. Mettaueri. Erect, tall; lvs. linear-terete, consisting chiefly of the fistulos, jointed midvein, barely winged and toothed; bracts 8-10, leafy. Wet. Fls. 4-6f.

6 E. Virginianum Lam. Erect; lvs. lance-oblong to linear, flat, the lower long-stalked, upper uncinate-serrate; bracts longer than the roundish head. 4 Swamps. Fr. 2-4f. Hds. in umbel-like cymes, numerous, 5-6'. Rare with lvs. all linear. Jl. Aug.

7 E. virgatum Lam. Erect; lvs. oval or oblong, thin, pelti. dantate, the upper sessile; bracts 6-8, longer than the depressed, cymous heads. 4 Wet, S. 2-4f.

5. HERACLEUM, L. Cow Parsnip. Calyx 5-toothed. Pet. often radiant in the exterior flowers, and apparently deeply 2-cleft. Fruit compressed, flat, with a broad, flat margin, and 3 obtuse, dorsal ribs to each carpel; intervals with single vittae. Seeds flat. 4 Stout, with large umbels. Involucre deciduous. Involucels many-leaved.


7. PEUCEDANUM, L. Fruit ovate, oval, or roundish, compressed on the back, the margin acute or broadly winged, carpels plane or convex, intervals with single vittae. Seeds plano-convex. 4 2 Smooth, rarely pubescent. Lvs. pinnately or ternately divided or decompound. Umbels compound, with or without involucr. Fls. yellow or white. Fig. 238.

§ EUPEUCEDANUM. Cal. 5-toothed. Lvs. pinnatisect. Fr. narrowly winged. Yellow...1, 2

§ ARCHEMA. Cal. 5-toothed. Lfts. 1-11, narrow. Fr. narrowly winged. Fls. white. 3-5

§ PASTINACA. Calyx teeth 0. Lfts. oval. Fruit broadly winged. Flowers yellow....No. 6

1 P. fenniculaceum N. and other species with radical, pinnatisect leaves grow in Kansas, and W. (Rev. J. H. Carruth.)

2 P. graveolens. Dill. Lvs. cauline, tripinnate; seg. capillary; umb. on long stalks; fr. oval, flat, brown, aromatic, pungent, medicinal. 2 Spain. 2f. (Anethum, C-B.)

3 P. rigidum Cowbain. St. rigid, striate; lvs. pinnate; lfts. 3-11, lance-ovate, sub entire; umb. 2 or 3, spreading, with slender rays; fr. with large purp. vittae. 4 Swamps, N. Y., W. and S. 2-5f. August.

β. ambigua, has the leaflets linear and entire.

4 P. ternatum. Stem slender, smooth; lvs. on long petioles, ternate; segm. very long, linear, entire, 3-veined; invol. 0-3-leaved; involucel 4-6-leaved. Swamps, in pine-barrens, S. 2-3f. Sept.—Nov. (Nephrphylum longifolium, C-B.)

5 P. teretifolium. Tall, slender, smooth; lvs. reduced to filistrar, jointed phyllodia, terete, tapering, 6-16' long; fr. 3'; invol. 5-6-leaved. 2 Wet, S. (Tiedmannia, C-B.)
6. **P. sativum.** Root fusiform; stem furrowed; lvs. pinnate, downy beneath; lfts. oblong, incisely toothed, the terminal 3-lobed; umbels large; involucra near; 0. 3f. July—Sept. ‡ Wild and Common Parsnip.

8. **ANGÉLICA, L.** Calyx teeth obsolete. Fruit dorsally compressed, doubly winged. Carpels 5-ribbed, the 3 dorsal ribs filiform, the 2 marginal winged, intervals with single vittæ. Carpophore 2-parted. Seed semi-terete. 2f. Leaves bi- or tri-ternate, sessile. Umbels terminal. Invol. 0 or few-leaved. Involucels many-leaved.

A. **Curtisii** Buckley. Lvs. biternate or with 3 quinate divisions; lfts. thin, ovate or lance-ovate, acuminate, incisely toothed; fr. broadly winged. Ms. Pa., & S. Aug.

9. **ARCHANGÉLICA, Hoffm. Angelica.** Calyx teeth short. Fr. dorsally compressed, with 3 carinate, thick ribs upon each carpel, and 2 marginal ones dilated into membranous wings. Seed loose in the ripe carpel, covered with vittæ. 2f. Petioles usually large, inflated and 3-parted. Umbels perfect. Involucels many-leaved. Fls. greenish white. Fig. 177.

* Involucels less than half the length of the pedicels. Fruit 3½' long, winged.... No. 1
* Involucels about as long as the pedicels.—α Fruit scarcely winged.............. No. 2
—α Fruit broadly winged.............. Nos. 3, 4

1. **A. atropurpúrea** Hoffm. St. dark purple, furrowed; petioles 3-parted, the divisions quinate; lfts. incisely toothed, terminal lft. rhomboidal, sessile, the others deciduous. Meadows, E. and W. 4—6f. Stout, aromatic. June.

2. **A. peregrina** N. St. striate; lfts. divisions ternate, segm. incisely serrate; involucel of many bracts, as long as the pedicels; fruit ribs corky, thick. Sea-coast, Mass. to Labrador. 2—3f. July. (A. Gmelini DC.)

3. **A. hirsuta** T. & G. Stem striate, the summit with the umbels tomentous-hirsute; lvs. bispinately divided, the divisions quinate; segm. oblong, acutish, the upper pair connate, but not deciduous at base. Dry woods, N. Y. to Car. 2—5f. July.

4. **A. dentata** Chapm. Slender, smooth; lvs. 1—2-ternate; segm. lance-ovate, incised; umbels few-rayed; involucel 5—6-leaved, as long as the pedicels. Ga. Fls. 2—3f. Jul. +

10. **SCANDIX, L. Venus's Comb.** Cal. limb obsolete. Fr. laterally compressed or nearly terete, attenuated into a beak which is longer than the seed. Carpels with 5 obtuse, equal ribs. Vittæ 0, or scarcely any. (1) or (2) Lvs. finely dissected. Invol. 0. Involucel 5—7-leaved. Flowers white.

**S. apculata** Wild. Petioles and peduncles slender; lvs. finely dissected into subulate segments; umbels 3-rayed; fruit with beak and forked style 9½. Ga. 1f. § Eur.


1. **O. longistylis** DC. Sty. filiform, nearly as long as the ovary; fr. clavate; rt. spicy and sweet-flavored; st. and lvs. smoothish. Rich woods, Can. to Va. 1—3f. Fruit 1½.

2. **O. brevistyilis** DC. Sty. conical, scarcely as long as the breadth of the ovary; fr. somewhat tapering at the summit; root nauseous; plant hairy. Woods. 1—3f.

12. **CHÆROPHYLLUM, L. Chervil.** Calyx limb obsolete. Fruit laterally compressed, linear or oblong, contracted above but scarcely
beaked. Carpels with 5 obtuse, equal ribs, intervals with single vittæ. Commissure deeply sulcate. 1 2 Leaves 2–3-pinnately divided. Segm. incisely cleft or toothed. Invol. 0, or few-leaved. Involucel many-leaved. Flowers mostly white. Umb. mostly sessile.

1 C. procumbens Lam. Slender, spreading, smoothish; lf. segm. trifid and pinnatifid, lobes oblong, obtuse; umb. few-rayed, sessile or pedunculate; fr. acute, ribs narrower than the intervals. Damp woods, Ill. to Penn., and S. 1–2f. April, May.


3 C. sativum. Garden C. Lf. segm. ovate, cut or cleft; fr. smooth, shining. Eur. 18'.


C. canadensis DC.—Common in moist woods. Plant smooth, 2–3f, with large lfts. (2' by 2'). Umb. panicled, slender, involucels minute. Fr. 2' long, styles 1'. Jn.–Sept.


B. rotundifolium L. Lvs. (phylloidia) roundish-ovate, entire, perfoliate; invol. 0; involucels of 5, ovate, mucronate bracts. 1 Fields, N.Y. to Va. Rare. § Europe.

15. CARUM, L. Caraway. Alexanders. Cal. teeth minute or 0. Disk broad-conic. Fr. ovate or oblong, laterally compressed. Carpels 5-angled, with 5–10 prominent, filiform, equal ribs, the two lateral bordering the commissure. Intervals with a single, rarely 2, vitta. Seeds subterete.—Leaves ternate to decompound. Involucra various.

§ Zizia. Lvs. simple, or 1-2-ternate, ovate. Cal. teeth minute. Pet. yellow...Nos. 1, 2
§ Carum. Lvs. pinnately or ternately dissected. Cal. teeth 0. Pet. white...Nos. 3, 4

1 C. aëreum. Golden Alexanders. Lvs. 1-2-ternate; lfts. thin, lance-oblong, sharply serrate; umb. rays 1'; invol. 0; involucels 3-lvd.; fr. oval, the ribs acute or winged. 2f Meadows and banks. 1–2f. Smooth throughout. Fls. deep, yel. Jn. (Thaspium, N.)

2 C. cordatum. Root lvs. simple, cordate, crenate, on long stalks; st. lvs. becoming 3-parted, ternate, or quinate, serrate; fr. roundish-oval, with acute or winged ribs; fls. yellow, varying to brownish. Rocky shades. 2–3f. May, June. (Thaspium, N.)

3 C. petroselinum B. & H. Parsley. Leaf segm. numerous, wedge-ovate to lance-oblong, acute, incised; invol. lvs. few or 0; involucels subulate. 2f Greece. 2–3f. Jn.

4 C. carvi. Caraway. Lf. segm. numerous, linear to filiform; invol. 1-lvd. or 0; involucels 0. 2f Europe. 2–3f. Lvs. large. Fls. white. Fr. oblong, aromatic. June.

16. THASPİUM, Nutt. Golden Alexanders. Calyx margin 5-toothed. Fruit ovoid, transversely subterete. Carpels semiterete, with 5 prominent or winged ribs, the lateral margined. Intervals with single vitta. 2f Umbels without an invol. Involucels 3-lvd., lateral. Fls. yellow.
1 T. barbinóde N. St. pubescent at the nodes; lvs. trinerved and pinnatifid; lfts. wedge-ovate, cut-serrate; fr. large (\( \frac{3}{7} \)), elliptical, 6-winged. River banks. St. 2–3f., angular and grooved. Rays 2\(^{f}\), each 20-flowered. Flowers deep yellow. June.

2 T. Wálteri Shutt. Stem rough-puberulent above; lvs. trinerved to ternate; lfts. pinnatifid with linear-oblong segments; fr. oblong, narrowly 8–10-winged. Barrens, Ky. to E. Tenn. and W. Car. (Zizia pinnatifida Buckley.)

17. PIMPINELLA, L. ANISE. Zizia. Calyx teeth obsolete. Fruit ovate, oval, or roundish, laterally compressed and contracted at the commissure, ribs very slender, with many vittæ. Styles slender. Seeds teretely 5angled. 2 Leaves compound. Involuta 0, or scarcely any.

1 P. integrifólla (B. & H.) Smooth, glaucous; lvs. bi- or tri-nerved, with elliptic-oblong, entire, acute lfts. (11); umb. (yellow) with 13 very slender (2–3\(^{f}\)) rays; fr. oval, with 3 vittæ in each interval. Rocky woods. 1–2f. May–July. (Zizia, DC.)


18. FOÉNICULUM, Adams. FENNEL. Fruit elliptic-oblong, subterete. Carpels each with 5 carinate ribs, intervals with single vittæ. Involuca 0. Leaves bilaterally dissected. Flowers yellow.

F. vulgáre. Leaf segm. linear-subulate, elongated, or filiform; umb. of 15–30 unequal rays. 2 Europe. 3–5f. The turgid seeds are warmly aromatic. (Anethum, C-B.)

19. DAUCUS, Tourn. CARROT. Calyx limb 5-toothed. Pet. the 2 outer often largest and deeply 2-cleft. Fr. oblong. Carpels with 5 primary, bristly ribs, and 4 secondary, the latter more prominent, winged, and divided each into a single row of prickles, and having single vittæ beneath. 2 Involuta pinnatifid. Involucels of entire or 3-cleft bracts. Fls. white, the central one abortive.

1 D. Caróta L. Stem hispid; lvs. triplinerved, the segm. linear, cuspitate-pointed; umbels dense, concave; invol. pinnate. Fields, waysides: common. 3f. § Eur. In cultivation the root becomes conical, fleshy, red to yellow, and nutritious. Jl.—Sept.

2 D. pusíllus Mx. Slender, retrorsely hispid; lvs. bispinatid, divisions deeply lobed with linear-oblong, merely acute segments; invol. bispinatid. Dry soils, S. Car. to Fla., and W. 1–3f. June.


21. SELÍNUM, L. Calyx teeth obsolete. Fr. ovoid to oblong, terete. Carpels slightly compressed on the back, semiterete, with 5 winged ribs, the lateral wings broadest, intervals with 1 (rarely 2) vitæ. 2 Glabrous, tall, branched. Lvs. pinnately decomposed. Umb. rays \( \infty \). Invol. bracts 0–few. Involucels \( \infty \)-bracted. Fig. 303.
S. Canadénse B. & H. Petioles large, sheath-like, inflated; lf. segm. linear-oblong, very acute, or acuminate; nmb. 12-rayed, long-stalked; bracts lin.-filiform; fls. white, conspicuous. Wet woods, Me. to Va. and Wis., rare. 3–5f. Aug., Sept. (Conioselinum.)

22. LIGÚSTICUM, L. Lovage. Calyx teeth minute. Fruit as in Selinum, except that the intervals are filled with numerous vittae. 2f Glabrous. Lvs. ternately divided. Involucra few—3-bracted. Fls. white.

1 L. Scóticum L. Sea L. Lvs. 2–1 ternate; lfts. rhombic-ovate, cut-dentate, some oblique; invol. bracts 0–linear; fr. oblong. Sea-coast, northward. 2f. Fruit 5", July.

2 L. acteóllum Mx. Angelico. Lvs. triternate, with ovate, dent-serrate leaflets; umbels panicled or triply compound; involucra about 3-bracted; fruit short. Woods, Ms. to Tenn. 3–6f. May—July.


§ HELÓSCIADUM. Lvs. simply pinnate. Involucres 0–bracted. Fr. roundish... Nos. 1–3

§ EUCÁPIUM. Lvs. pinnately decompound. Involucres 0. Involucres 1-leaved... Nos. 4–6

1 A. lineáre. Stem angular, tall; lfts. 9–11 (3 above), linear-oblong or linear, tapering to a very acute point, serrate; umb. pedunculate; invol. 0–bracted; fr. globular with very prominent ribs. 2f. Wet. 2–4f. July, Aug. (Sium, C-B.)

2 A. Carsónii (Durand). Erect, branched; lfts. 3–7, lin. to ovate, serrate to gashed fr. broadly ovate, the ribs filiform, with broad intervals. Wet. Coua. to Penn. Jn., Jl.

3 A. nodílórum. Stems procumbent; lvs. pinnate; lfts. lance-oblong, equally serrate; umb. opposite the lvs., subsessile; invol. 0–2-lv. 1f. Wet. S. Car. 1–2f. Apr. §

4 A..leptóphyllum. Erect or diffuse; lf. segm. linear to filiform; umb. opp. the lvs., sessile; fr. very small (½′), globular, with thick ribs. 1f. Ga. to La. Jn. (Helosc.)

5 A. divaricátum. Small and slender; lf. segm. filiform or capillary, obtuse; umb. very small, pedunculate, 3–5-rayed; fr. rough with minute scales. (1) Dry sands, S. 2–8'. March, April. (Leptocaulis, N.)

6 A. gravéolens. Celery. Lvs. on long petioles, segm. broad-spatulate, incised, upper lvs. 3-parted and cut-lobed; invol. 0; fr. roundish. 2f Eur. Well known as a salad.

E. Americana N. Lvs. mostly radical; segm. lance-lin., 1' long, acute, upper lvs. in 3 long, entire seg.; umb. long-stalked, 3-10-rayed. Prairies, O. to Ill. and Tenn. 3-4f.


1 C. maculata L. St. streaked with purple; lower lvs. ternate and quinate, upper binate; segments lanceolate, mucronately serrate, the veins running to the notches. Wet meadows. 3-6f. Smooth, glaucous. Leaflets 1-3'. Fruit 1/2", 10-ribbed. Umbels 3'. July, August.

2 C. bulbifera L. Lvs. binate; lfts. linear, with remote, divergent teeth; lvs. of the branches 3-cleft or simple, subopposite, bearing bulblets in their axils. Swamps, Can. to Penn. and W. 3-4f. Leaflets 2-4' by 1-4'. Umbels few. August.


S. latifolium L. St. angular, sulcate; lfts. oblong-lanceolate, acutely and coarsely serrate, barely acute; cal. teeth conspicuous. Swamps, Ind. (Green Co.!) and Can. 3-4f. Lfts. 4-6' by 1-2', 2-10-toothed. Umb. with 30-30 long (3-4') rays. Jl., Aug.

29. DISCOPLEURA, DC. Bishop-weed. Cal. teeth subulate, persistent. Fr. ovate, often didymous. Carp. 5-ribbed, the 3 dorsal ribs filiform, subacute, prominent, the 2 lateral united with a thick, accessory margin; intervals with single vitæ. Stds. subterete. 1 Lvs. capitaceous dissected. Umbels compound. Bracts of the invol. cleft. Fls. white.


30. CORIANDRUM, L. Coriander. Cal. with 5 conspicuous teeth. Outer petals radiant, inflex-bifid. Fr. globose. Carp. cohering, with the 5 depressed, primary ribs, and 4 secondary more prominent ones, seeds concave on the face. 1 Smooth. Invol. 0 or 1-leaved. Involucels 3 leaved, unilateral.

C. sativum L. Lvs. bipinnate, lower ones with broad-cuneate lfts., upper with linear lfts.; carp. hemispherical. Europe. 2f. Cultivated for its spicy fruit.
ORDER LXIV. ARALIACEÆ. ARALIADS.

Trees, shrubs or herbs closely allied to the Umbelworts in the leaves, inflorescence and flowers, but the styles and cells of the ovary are usually more than 2 (3 to 5), and cells 1-ovuled. Fruit baccate or dry, 3-5-celled, with 1 alburninous seed in each cell, and the petals not inflected. Fig. 242.

1. ARALIA, L. Wild Sarsaparilla. Cal. tube adherent, limb 5-toothed. Pet. 5, ovate, spreading. Stam. 5, epigynous. Styles 5, recurved above, persistent. Fr. a berry, 5-celled, 5-seeded, and 5-angled when dry, 2 ft. Lvs. pinnately compound, alternate. Umbels several or many, white or greenish, in summer.

* Plants low (1-2 ft.), with few (3-7) umbels corymbose, arranged .......... Nos. 1, 2
* Plants tall (3-12 ft.), with numerous umbels in racemes .......... Nos. 3, 4

1 A. nudicaulis L. Nearly stemless, with 1 ternate-pinnate leaf longer than the scape, which bears 3 umbels at top; plant smooth. 2 ft. Rich, Rocky wds. E. & W. 1 ft.

2 A. hispida L. Wild Elder. Stem shrubby and hispid-prickly at base, herbaceous above; lvs. 1-2-pinnate; lfts. ovate, cut-serrate, often lobed; umbels about 5, long-stalked, forming a terminal corymb. 2 ft. Dry fields. N. Eng. to Va. 1-2 ft. Fr. blue-bk.

3 A. racemosa L. Pentynorrel. Herbaceous, smooth, branched; lvs. large, bi-terinate-pinnate, lfts. ovate, serrate; umb. small, 2 ft. in a panicle of racemes. 2 ft. Rocky woods. 3-5 ft. Root aromatic, an ingredient in small beer.

4 A. spinosa L. Angelica-tree. Hercules Club. Shrub prickly; lvs. bi-and tri-pinnate, lfts. thick, ovate, cusp-pointed, glaucous beneath. Damp woods, O. to Fla. 8-12-20 ft. Trunk usually simple, bearing all the lvs. and panicles at the top.

2. GINSENG. (Panax, L. in part.) Dicccious-polygamous. Cal. tube adherent, limb obsolete. Pet. 5, ovate, obtuse. Stam. 5, epigynous. Sty. 2 or 3, distinct, erect. Fruit baccate, 2- or 3-seeded. 3 Styles obsolete. 2 ft. Root tuberous. Stem simple, bearing 3 leaves in a whorl and one umbel. Flowers white. Fig. 242.

1 G. trifolium. Ground-nut. Root a round tuber; stem low (3-6 ft.); lvs. palmately 3-5-foliate, lfts. lance-oblong, serrate, sub Lanceolate; peduncle longer than the pedicels; sty. 3; berries 3-lobed, greenish-yellow. Low woods; com. May. Root farinaceous.

2 G. quinquefolium. True Ginseng. Root fusiform, fleshy; st. taller (1 ft.); lvs. palmately 5-foliate, lfts. ample, ovate, petiolate, acuminate, serrate; peduncle shorter than the pedicels; sty. 2; berries 2-seeded, bright red. Rocky woods. Jn.-Aug.


H. HELIX. Stems woody, slender, climbing high by radicating fibres; lvs. dark green, with whitish veins, roundish ovate, 5-angled; umbels corymbed; fr. black. Europe.

ORDER LXV. CORNACEÆ. CORNELS.

Trees and shrubs, seldom herbs, without stipules. Leaves opposite or rarely alternate, simple, with pinnate veinlets. Calyx adherent to the
ovary, the limb minute, toothed or lobed. Petals distinct, alternate with
the calyx teeth, valvate in the bud, often 0. Stamens same number as
petals, inserted on the margin of the epigynous disk (in the ♀ flowers) Ovary
1- or 2-celled. Fruit a baccate drupe, crowned with the calyx. Fig. 45C.

1. CORNUS, L. Dogwood. Flowers perfect. Calyx limb of 4 minute
Drupe baccate, with a 2- or 3-celled nut. ♀♂ Lvs. entire. Flowers in
cymes, often involucrate. Floral envelopes valvate in aestivation. Bark
bitter, tonic. Fig. 430.

♀ Cymes subtended by a 4-leaved, white involucre. Fruit red.... Nos. 1, 2
♂ Cymes naked.—♀ Lvs. alternate, clustered at the ends of the branches.... No. 3
—♂ Lvs. opposite.—♂ Twigs and cymes pubescent ......... Nos. 4, 5
—♂ Twigs, &c., glabrous.—♂ Drupes blue. Nos. 6, 7
—♂ Drupes wh... Nos. 8, 9

1 C. Canadensis L. Low Cornel. Herbaceous, low; upper lvs. whorled, veiny, on
short petioles; st. simple; invol. lvs. ovate. 2° Damp woods, N. 4-8'. May, June.
2 C. flórida L. Flowering Dogwood. Arboreous; lvs. opposite, ovate. acuminate,
entire; lfs. small, in a close, cymose umbel or head, surrounded by a very large, 4-lwr.
3 C. alternifólia L. Lvs. alternate; oval, acute, hoary beneath; branches alternate,
wartv; drupes purple, globous. Shrub or tree, 8-20', with a flattened top. June.
4 C. serícea L. Branches spreading, purplish, branchlets woolly; lvs. ovate or ellipti-
tical, acuminate, silky-pubescent beneath; cymes depressed, woolly; cal. teeth lance-
olate; drupes light blue. Shrub 5-9'. Flowers yellowish white, crowded. June.
5 C. aspérisfólia Mx. Branches erect, brownish, branchlets rough-downy; lvs. lance-
oval, scabrous above, downy beneath; cymes hispid; sep. minute. W. and S. May +.
6 C. stricta Lam. Branches erect, brown, smooth; lvs. ovate to lanceolate, smooth
and green both sides, long-acuminate; cymes loose, smooth; sepals subulate, half as
long as the ovary; anth. and fr. pale blue. Swamps, Va. to Fla. 8-12'. April.
7 C. circlináta L. Branches warty; lvs. round-oval, white-tomentose beneath; cymes
spreading, depressed; drupes light blue. Shrub 5-10'. E. and W. Lvs. large. June.
8 C. paniculáta L'Her. Branches erect, grayish, smooth; leaves ovate-lanceolate,
acuminate, hoary beneath; cymes and drupes small, paniculate, white. 6f. May, Jn.
9 C. stolonífera Mx. Red Oster. St. often stoloniferous; branches smooth; shoots
virgate, reddish-purple; lvs. broad-ovate, acute, pubescent, hoary beneath; cymes
naked, flat; berries bluish-white. Small tree, E. and W. 8-10'. May, June.

2. NYSSA, L. Tupelo. Gum-tree. Fls. dioecious or polygamous.
♂ Calyx tube very short, limb truncate. Pet. 5, oblong. Sta. mostly 10,
inserted in the bottom of the calyx. Ov. 0. ♀ Calyx tube oblong, adher-
ent to the 1-celled ovary, limb as in ♀. Pet. 2-5, oblong, often 0. Sty.
large, stigmatic on one side. Drupe oval, 1-seeded. ♀ with small green
fls. clustered on axillary peduncles, the sterile more numerous. Apr. June.

1 N. multifórà Wang Lvs. oblong-ovate, acutish or obtuse at each end, entire;
the petiole, midvein, and margin villous; fertile peduncles 3-5-flowered; sty. revo-
lute; nut short, ovate, striate, obtuse. Tree 30-70'. Drupe blue-black. +
2 N. unífórà Walt. Swamp Tupelo. Lvs. green, oblong-ovate or ovate, long-petio-
late; fertile fls. solitary, 3-bracted, on slender peduncles; sty. nearly straight; sterile
fls. 5-10; drupe oblong, as large as a plum. Tree 50-80', in swamps, S.
3 N. capitátà Walt. Ogeechee Lime. Leaves oval or oblong, short-petiolate, entire,
ORDER 66.—CAPRIFIOLIACEÆ.

whitened beneath, obtuse at apex, acute at base; fertile fls. solitary, on short peduncles, downy, 3-4-bracted, with 5 petals and 10 stamens; sterile fls. 20—30 in each dense globular head; fruit large, oblong. River banks, S. 20—30f.

COHORT 2, GAMOPETALÆ,

Or Monopetalous Exogens.—Plants having a double perianth, consisting of both calyx and corolla, the latter composed of petals partially or wholly united. (Cohort 3, page 278.)

ORDER LXVI. CAPRIFIOLIACEÆ. Honeysuckles.

Shrubs, rarely herbs, often twining with opposite leaves; no stipules. Flowers clustered and often fragrant, 5-parted and often irregular. Corolla monopetalous, tubular or rotate. Stamens inserted on the corolla tube, rarely one less than the lobes. Ovary adherent to the calyx. Style 1, stigmas 3 to 5. Fruit a berry, drupe, or capsule. Embryo small, in fleshy albumen. Figs. 67, 383, 390, 466, 471, 477.

I. LONICERÆ. Corolla tubular, with a filiform style... (a)

\( a \) Herbs.—b Corolla 5-lobed, the stamens but 4. \( \ldots \) LINN.ÉA. 1

\( b \) Corolla 5-lobed, the stamens 5. \( \ldots \) TRIOSTEUM. 2

\( a \) Shrubs.—c Corolla bell-shaped, regular. Berry 4-celled, 2-seeded. \( \ldots \) SYMPHORICARFUS. 3

\( b \) Corolla tubular, lobes unequal. Berry 2-3-celled. \( \ldots \) LONICERA. 4

\( c \) Corolla funnel-form. Capsule 2-celled, \( \ldots \) DIERVILLA. 5

II. SAMBUCÆ. Corolla rotate, deeply 5-lobed. Stigmas sessile... (b)

\( b \) Shrubs with pinnate leaves. Berry 3-seeded. \( \ldots \) SAMBUCUS. 6

\( b \) Shrubs with simple leaves. Drupe 1-seeded. \( \ldots \) VIBURNUM. 7


2. TRIÈSTEUM, L. Feverwort. Calyx tube ovoid, limb 5-parted, segm. linear, nearly as long as the corolla. Cor. tubular, gibbous at base, limb 5-lobed, subequal. Sta. 5, included. Stig. capitate, lobed. Fr. drupaceous, crowned with the calyx, 3-celled, containing 3 ribbed, bony seeds. 2f. Coarse, hairy, with large, connate leaves and axillary flowers.

1 T. perfoliátum L. Hirsute; lvs. oval, acuminate; fls. verticillate or clustered, sessile, brownish-purple. Rocky woods. 2—4f. Fruit orange-colored, 6f. June.


3. SYMPHORICARFUS, Dill. Snowberry. Calyx tube globose, limb 4—5-toothed. Cor. funnel- or bell-shaped, the limb in 4—5 equal lobes. Sta. 4 or 5. Stig. capitate. Berry globose, 4-celled, 2-seeded (two opposite cells abortive). 5 Leaves oval, entire. Flowers small, roseate.
Order 66.—CAPRIFOLIACEÆ.

1 S. racemosus Mx. Fls. in terminal, loose, interrupted, often leafy rac.; cor. campanulate, densely bearded within; sty. and sta. included; berries snow-white. W. Vt. to Wis. and Pa., on rocky banks. 2–3f. A smooth, handsome shrub. July—Aug. ♀


3 S. vulgäris Mx. Lvs. roundish-oval; spikes axillary, subsessile, capitane, and crowded; cor. lobes nearly glabrous; sta. and bearded style included; berries dark red. River banks, Penn. to Iowa, and S. 2–3f. Flowers greenish-red. July.


§ XYLÓSTEON. Shrubs erect. Leaves never connate. Flowers in pairs...(a)
   a Corolla gibbous at base, lobes somewhat irregular. .......... Nos. 1—3
   b Corola not gibbous, lobes spreading, equal, roseate. .......... No. 4

§ CAPRIFOLIUM. Shrubs climbing. Flowers sessile, mostly whorled...(b)
   b Leaves all distinct. Corolla ringeunt. Cultivated exotics. .......... Nos. 5, 6
   c Leaves (the upper pair) connate-perfoliate...(c)
      c Corolla subequal, both tube and limb scarlet. .......... Nos. 7
      c Corolla limb ringente, d tube equal (not gibbous) at base. .......... Nos. 8—10
      —d tube gibbous at the base. .......... Nos. 11, 12


2 L. oblongifolia Hook. Lvs. oblong or oval, velvety beneath; cor. limb deeply bilabiate; ped. long, filiform, erect; berries connate or united into one, globose, purpl. Swamps, N. Y., W. and N. 2—3f. Purple-yellow. ♀

3 L. corulea L. Lvs. oval-oblong, ciliate, obtuse, villous both sides, at length smoothish; ped. short, reflexed in fruit; bracts longer than the ovaries; cor. lobes short, subequal; berries connate, deep blue. Rocky woods, Ms. N. Y. and N. 2–3f.

4 L. Tartaráca. Tartarian Honeysuckle. Much branched; lvs. ovate, cordate, polished; cor. segm. oblong, obtuse, purple-white. Russia. 4–10f.


6 L. Periclyménus Tourn. Woodbine. Lvs. deciduous, elliptical, acute, on short petioles; fls. in dense, terminal heads, red, yellow. Europe. 15f.

β. QUERCIFOLIUM. Leaves sinate-lobed.


8 L. flava Sims. Yellow Honeysuckle. Lvs. ovate, glaucous both sides; spikes terminal, of about 2 close whors; cor. smooth, slender, bright yellow; sta. exserted. N. Y., W. and S. Shrub scarcely twining. Corolla 15'. ♀

9 L. grata Ait. Evergreen Honeysuckle. Lvs. evergreen, obovate, smooth, glaucous beneath; fls. in sessile, terminal, and axillary whors; cor. ringent, long, slender, red-dish without, yellowish within. Damp woods, M. and W. States. 12f.

10 L. CAPRIFOLIUM. Italian Honeysuckle. Lvs. deciduous; fls. in a single, terminal verticil; lips of corolla revolute, red, yellow, white. Europe.

11 L. parvifóra Lam. Lvs. smooth, shining above, glaucous beneath, oblong, all sessile or connate, the upper pair perfoliate; fls. in heads of 1 or more approximate whors; cor. glabrous, short, yellow-red: fil. bearded. Rocky woods. 8–10f.

β. Douglaíst. Lvs. large, pubes. beneath, lower petiolate; fls. pubes. O., and W.


1 D. trifida Mœch. Lvs. ovate, on distinct petioles; ped. 1-3-flwld.; pod attenuate at top beneath the calyx limb. Thickets, Can. to Car. 2f, bushy. Fls. greenish-yellow.

2 D. sessilifolia Buckley. Lvs. lance-oblong, sessile or subamplexicaul; peduncles 3-5-flwld., crowded in the axils above; caps. short-beaked. High Mts. N. Car. 2—4f.


1 S. Canadensis L. Woody, with large pith; lfts. 7—11, oblong-oval, acuminate, smooth; cymes fastigiate; berries dark-purple. Hedgerows, thickets: common. 3—12f. Cymes broad, white. May—July.


7. VIBURNUM, L. Calyx small, 5-toothed, persistent. Cor. rotate, limb 5-lobed, seg. obtuse. Stam. 5. Stig. 1—3, sessile. Fr. a drupe, 1-celled, 1-seeded,—a stony nut covered with soft pulp. ♀♀ Lvs. simple, petioles often minutely stipulate. Fls. white, in compound flat cymes, which are often radiant. Fig. 383.

$ Cymes radiant,—the outer flowers sterile and showy. Leaves stipuled ……Nos. 1, 2

$ Cymes not radiant,—the flowers all alike perfect. (a)

a Leaves 3-lobed, palmately 3-5-veined, with setaceous stipules ……Nos. 3, 4

a Leaves not lobed,—b coarsely toothed, straight-veined. Cyme stalked …Nos. 5—7

—b finely and sharply serrate. Cymes sessile. June …Nos. 8, 9

—b entire, or nearly so.—c Species native …… …Nos. 10, 11

—c Species exotic …………Nos. 12, 13

4 V. lantanoïdes L. Hobble-bush. Leaves round-cordate, abruptly acuminate, unequally serrate; petioles and veins rusty-downy; cyme sessile; fruit ovate. Rocky woods, N. 5f. Shoots often reclined and rooting. Handsome. May.

2 V. Ópulus L. High Cranberry. Smooth; lvs. 3-lobed, 3-veined, broader than long, rounded at base, lobes acuminate, crenate dentate; petioles glandular; cymes pedunculate. Borders of woods, N. 8—12f. Fruit bright red, very acid. June.

β. ROSEUM. Snow-ball. Fls. all neutral, in globose cymes. ♠


4 V. paucifórum Fyale. Lvs. roundish, 5-veined at base, with 3 short lobes, serrate; cymes few-flowered; stamens included; fr. red. Mts. N.: rare. 2—3f.


6 V. pubéscens Ph. Lvs. ovate, acuminate, broadly dentate, hairy most beneath; petioles short, downy; fr. black, nut plano-convex, grooved. Rocks, Can. to Car. 2—3f.

7 V. molle Mx. Poison Haw. Downy throughout, with forked or stellate hairs; lvs. broad oval, acute, crenate dentate; fr. blue, nut grooved. Woods. Ky. to Fla. 10f. May

9 V. prunifolium L. Black Hawthorne. Sloe. Lvs. shining, oval or ovate, obtuse, sharply uncinate-serrulate; petioles slightly margined; cymes sessile; fr. blackish, oval, sweet. Woods, N. Y. to Ga. and Ill. 10–20 ft. A small tree. Lvs. 2–3′.

β. furfurnilum. Fossom Hawth. Lvs. lance-oval, rusty beneath; fr. tasteless. S.

10 V. nudum L. Smooth; lvs. oval-oblong, or lance-oval, subrevolute at edge, entire or subcrenulate, not shining, velvety and dotted beneath; petioles not winged; cymes on short stalks. Thickets. 10–20 ft. Lvs. 3–4′. Drupes bluish, eatable. Apr.–Jn.

β. angustifolium. Lvs. lance-oblong, acute at both ends, subentire. S.

γ. Cassinoides. Lvs. ovate or oval, denticulate, obtuse, acute, &c. N.

δ. ovale. Lvs. small (1′), oval, obtuse, very entire. South.


12 V. Tinus. Laurestine. Lvs. lance-oval, entire, thick, shining. Eur. 5 ft.


ORDER LXVII. RUBIACEÆ. Madderworts.

Plants with opposite or verticillate, entire leaves. Stipules between the petioles sometimes leaflike or 0. Calyx tube adherent to the ovary; limb 4- to 5-cleft. Corolla regular, inserted upon the calyx tube, and of the same number of divisions. Stamens inserted upon the tube of the corolla, equal in number and alternate with its segments. Ovaries 2- (rarely more)-celled. Style single or partly divided. Fruit various.

§ STELLATÆ. Herbs with the leaves in whorls of 4–8 and no stipules. (a)

a Flowers 4-parted. Fruit twin, separating into 2 nutlets.................................................GALIUM. 1

b Flowers 5-parted. Fruit twin, separable, baccate, smooth................................................RUBIA. 2

CINCHONÆ. Leaves opposite or in whorls of 3, with stipules. (c) —b Shrubs or trees. (d)

c Flowers in pairs, with a double ovary. Berry double.................................................MICHETTA. 3

c Flowers separate. Carpels 2, –e each 1-seeded, separating in fruit. (f) —e each 20- seeded, forming a capsule. (g)

f Fls. in clusters.–h Both carpels open after separating....................................................BORRERIA. S. Fls. 4

h One carpel open, the other indehiscent.................................................................SPERMACOCK. 4

f Flowers subsolitary. Both carpels indehiscent.–k dry...................................................DODIA. 5

k baccate.................................................ERNODA Litoralis. S. Fls. 6

g Corolla funnel-form. Seeds 16+, cup-shaped..............................................................HOUSTONIA. 6

g Corolla wheel-shaped. Seeds 80+, angular.................................................................OLDENLANDIA. 7

d Flowers capitate, in round, dense heads. Leaves often ternate. (a)

d Flowers not capitate.—m Carpels 2–10, each 1-seeded. In S. Florida. (a) —m Carpels 2–5, each 20-seeded. Florida. (a)

n Carpels 2–4, fewer than the lobes of the corolla. Fruit fleshy. (p)

n Carpels 4–10, symmetrical with the corolla lobes. (q)

l Flowers 4-parted, white. Fruit compacted but distinct, dry.............................................CEPHALANTHUS. 3

l Flowers 5-parted, red. Drupes united into a compact berry.............................................MORINDA ROSEA. S. Fls. 3

p Leaves opposite. Racemes axillary. Carpels flattened....................................................CHICOCOCA racemosa. 3

p Leaves opposite. Corymb terminal. Carpels angular.....................................................PSYCHOTRIA. 3

p Leaves in 3′, linear, rigid. Racemes axillary. Shrub...................................................STREMPHIA maritima. 3

q Spikes axillary, forked. Anthers on the throat of corolla...................................................GUETTARDA. 3

q Panicles axillary. Filaments inserted on the base of corolla...........................................ERITHALIS Frutea. 3

o Fruit baccate, 5-celled. Corolla tubular. Stigma entire....................................................HAMELIA patens. 3

o Fruit baccate, 2-celled. Cor. funnel-form, white. t. Cape Jessamine. GARDENIA. p. 445. 3

o Fruit capsular.—p Flowers in radiate cymes. A slender tree........................................PIENKENETIA. 3

—q Flowers in cymes, not radiant, red. Shrub.................................................................BLOOM. 10

—t Flowers solitary, axillary. Shrub 6–10 ft. .................................................................EXOSTEMMA. S. Fls. 10
1. **Galium**, L. **Cleavers.** **Bedstraw.** Calyx limb minutely 4-toothed. Cor. rotate, 4-cleft. Sta. 4, short. Sty. 2. Carpels 2, united, separating into 2 1-seeded, indischiscent nutlets.—Herbs with slender, 4-angled stems. Verticils of 4, 6, or 8 leaves, rarely of 5.

- Flowers yellow. Leaves in whorls of about 8. Fruit smooth............ No. 1
- Flowers dull-purple. Leaves (large) in whorls of 4. Fruit hispid or not. Nos. 2-4
- Flowers white.—b Leaves in 4's only. Fruit dry. Panicle terminal........ No. 5
- b Leaves in 4's only. Fruit smooth, purple berries........ Nos. 6, 7
- b Leaves in 4's—6's.—c Fruit hispid with hooked hairs........ No. 8
- c Fruit smooth or nearly so, dry. Nos. 9-11
- b Leaves in 8's, long and narrow. Fruit hispid........ No. 12


2 **G. pilosum** Ait. Hirsute; ls. in 4's, oval, punctate with pellucid dots; ped. several times 2- or 3-forked; fls. pedicellate, densely hispid. 2 Dry thickets. 1-2 ft. June.

3 **G. circinzans** Mx. Wild Liquorice. Smoothish; ls. oval or ovate-lanceolate, obtuse, 3-veined, ciliate on the margins and veins; ped. divaricate, few-flowered; fr. subsessile, nodding, hispid. 2 Woods: common. 8-12 ft. July.

β. **lanceolatum**. Very smooth; leaves lanceolate, 2' long; fruit sessile.

γ. **monianum**. Dwarf; leaves obovate. White Mountains. (Oakes.)

4 **G. latifolium** Mx. St. erect. smooth; ls. lanceolate, 3-veined, very acute; ped. axillary (leafy) and terminal, about twice 3-forked; purple flowers and smooth fruit on filiform pedicels. 2 Woody hills, Pa. S. and W. 2 ft. July.

5 **G. boreale** L. Erect, smooth; ls. linear-lanceolate, rather acute, 3-veined, smooth; fls. in a terminal pyramidal panicle. 2 Shaded rocks, N. 1 ft. July.

6 **G. hispidulum** Mx. Diffuse, minutely hispid; ls. oval, thickish, mostly acute; ped. axillary, 1-3-flwd.; fr. large, bluish-purple. 2 Sandy. S. 2 ft. May—Oct.

7 **G. uniflorum** Mx. Glabrous, cespitose, slender; ls. linear, acute; ped. axillary, solitary, mostly 1-flwd. bracted; fr. purple. 2 Damp woods, S. 1 ft. May.

8 **G. trilorum** Mx. Stems weak, rough on the angles; ls. in 5's and 6's, lance-elliptic, cusp-pointed, 1-veined; ped. mostly 3-flowered. 2 Moist woods. 1-2 ft. July.

9 **G. asprellum** Mx. Rough Cleavers. St. diffuse, very branching, rough backward; ls. in 6's, 5's, or 4's, lanceolate, acuminate, or cuspitate, margin and midvein retrorsely aculeate; ped. short, in 2's or 3's. 2 Thickets, N. 2-5 ft. July.

10 **G. trifidum** L. Dyer's Cleavers. Goose-grass. St. decumbent, very branching, roughish with retrorse prickles; ls. in 6's and 4's, linear-oblong or oblongate, obtuse, rough-edged; flowers mostly 3-parted. 2 Swamps. 6' ft. July.—Variable.

β. **tinctorum**. Ped. 3-6-flowered; parts of the flower in 4's. The root dyes red.

γ. **latifolium**. Lvs. in 4's, oblongate; ped. 3-flowered; fls. 4-parted.

11 **G. concinnum** T. & G. St. decumbent, diffuse, scabrous; ls. in 6's, linear, glabrous, 1-veined, scabrous upward on the margins; ped. filiform, twice or thrice 3-forked, panicled. 2 Dry woods, Pa. Va. Ill. 1 ft. June.

12 **G. Aparine** L. St. weak, procumbent, retrorsely prickly; ls. in 8's, 7's, or 6's, linear-oblongate, mucronate; ped. axillary, 1-2-flwd. 1) Wet thickets, N. 3-5 ft. Jn.

2. **Rubia**, Tourn. **Madder.** Like Galium, but its flowers are mostly 5-merous, and its fruit always smooth and berry-like.

R. **tinctorum** L. Stem weak, rough backward; ls. in 6's, lanceolate, aculeate; fls. brownish-yellow, paniculate above, with 3-forked peduncles. Europe. 3-5 ft.

3. **Mitchella**, L. **Partridge Berry.** Flowers 2 on each double ovary Cal. 4-parted. Cor. funnel-shaped, hairy within. Stam. 4, short,
inserted on the corolla. Stig. 4. Berry composed of the 2 united ovaries, each 4-seeded. | Smooth. Leaves opposite.


4. **SPERMACOCÉ,** L. Cal. 2-4-parted. Cor. tubular, limb 4-lobed. Stam. 4. Stig. 2-cleft. Fr. dry, 2-celled, crowned with the calyx, separating into 1 open and 1 indiscisent carpel. Sds. 2.—Low herbs. Stip. bristly. Flowers small, in dense, axillary, sessile whorls, or clusters, white.

1 S. glabra Mx. Glabrous; lvs. lanceolate; cal. 4-toothed; cor. funnel-form, short, throat hairy; anth. included in the tube; stig. sub sessile. 2 River banks, W. 1-2f.

2 S. Chapmanii T. & G. Nearly glabrous; lvs. oblong-lanceolate; cor. funnel-form, thrice longer than the calyx, and stam. exserted. Fl. Ga. 10'.

3 S. involucrata Ph. Hispidly hairy; lvs. ovate-lanceolate; heads terminal, involucrate; stam. exserted. Carolina (Fraser). 1f. Leaves oblique.

5. **DIÓDIA,** L. Carpels 2, rarely 3, separating, each 1-seeded and indiscisent. Fls. otherwise as in Spermacocé.—Herbs. Stip. fringed with bristles. Fls. few or solitary, axillary, sessile, small, white; the tube often slender. Summer.

1 D. Virginica L. Procumbent; lvs. lanceolate, sessile; corolla tube slender, with a broad, spreading limb; stam. exserted. 2 Damp places. 1-2f. Varies with the lvs. ovate-lanceolate; also with the leaves more or less hairy.

2 D. teres Walt. Erect or ascending, nearly terete; lvs. lance-linear, rigid, sessile; bristles long; cor. reddish-white, with a wide tube and short limb; stam. scarcely exserted. 1 Sandy fields, N. J. to Ill., and S. 5-19'.

6. **HOUSTONIÁ,** L. BLUETS. Cal. 4-toothed or cleft, persistent. Cor. tubular, the 4 lobes spreading. Fil. 4, inserted on the corolla. Style 1. Anth. and stig. dimorphous, that is, in some plants the former exserted and the latter included—in others the style exserted and anthers included. Caps. 2-lobed, the upper half free, cells few- (8-20)-seeded.—Herbs. Stip. connate with the petiole, entire. Fls. solitary or in cymes, white, bluish, &c.

$ Corolla salver-form, glabrous. Peduncles 1-flowered—terminal......Nos. 1, 2
——axillary. .........Nos. 3, 4

$ Corolla funnel-form. Peduncles 1-flowered, cymous.—b Lvs. lance-ovate.....No. 5
——b Lvs. lance-linear..Nos. 6, 7

1 H. corúlea L. Dwarf Pink. Innocence. Cæspitose; radical lvs. ovate-spatulate, petiolate; stts. erect, numerous, dichotomous; ped. filiform, 1-2-flowered. 2 Moist soils. 3-5'. Flowers 5', pale blue, with a yellow centre. May, June. Pretty.

β. minor. Branches divaricate; flowers smaller (3-4' wide). South.

2 H. serpyllifólia Mx. Cæspitose; stts. filiform, procumbent; lvs. roundish-ovate, petiolate, ciliolate; ped. terminal, very long. 2't Mts. of Car., Tenn. 6-12'. May—Jl.

3 H. minima Beck. Glabrous; lvs. linear-spatulate; ped. at first nearly radical, at length axillary, often not longer than the leaves; seeds concave, smooth. 2 Prairies, Ill. to La. 1-3'. Flowers rose-color, 3-4'. March—May.

4 H. rotundifólia Mx. Procumbent, creeping, leafy; lvs. roundish-oval, abrupt at base, petiolate; ped. mostly longer than the leaves; caps. emarginate, few-seeded. 2 Sandy, damp places, S. In patches. 2-5'. Flowers white. Mar.—Dec.

5 H. purpúrea L. Erect; lvs. 3-5-veined, closely sessile; cymes 3-7-flowered, often clustered; calyx segm. lance-linear, longer than the ped. 2' Penn., S. and W. 1f. White-purple. May—July. Very pretty.
6 **H. longifolia** Gaert. Radical leaves oval-elliptic, cauline linear or lance-linear, 1-veined; fls. in small, paniculate cymes; sepals shorter than the pod.

**β. tenuifolia.** Much branched; leaves very narrow; ped. filiform.

**γ. ciliolata.** Leaves oblong-linear, obtuse, often ciliate; branches erect. N. and W.,—all the forms, on river banks and prairies. 1f. June, July.

7 **H. angustifolia** Mx. Slender, tall, strictly erect; lvs. narrowly linear, 1-veined; fls. very numerous, short-pedicelled, in compact, terminal cymules; cal. lobes subulate; caps. obovoid or top-shaped. 2f. Prairies, Ill. to La. 1-2f. June—July.

7. **OLDENLANDIA**, L. Calyx 4- or 5-lobed, persistent. Cor. funnel-form, with a short tube, little longer than the calyx, 4-5-lobed. Sta. 4-5. Sty. short or 0. Stig. 2. Caps. wholly adherent. Seeds very numerous and minute (40—60 in each cell).—Herbs erect or prostrate. Stipules with 2—4 subulate points each side. Flowers small, axillary, white.

1 **O. glomerata** Mx. **Creeping Greenhead.** Stems assurgent; lvs. ovate-lanceolate, pubescent, narrowed at the base; fls. glomerate in the axils and terminal; cor. shorter than the leafy calyx teeth. Swamps, N. Y. to La. 1—12f. June—Sept.


3 **O. Hali.** Weak, diffuse, succulent; lvs. oval-oblong, acute; fls. subsolitary, white, pentamerous. 2f. River banks, Fla. to La. 8—10f.

8. **CEPHALANTHUS**, L. **Button Bush.** Calyx limb 4-toothed. Cor. tubular, slender, 4-cleft. Sta. 4. Sty. much exserted.—Shrubs with opposite lvs. and short stip. Fls. in globous heads, without an involucre.

C. **occidentalis** L. Lvs. opposite and in 3’s, oval, acuminate, entire, smooth; heads pedunculate. Margins of streams. 6f. Heads nearly 1’ diam. July.

9. **PÍNCKNEYA**, Mx. Calyx 5-parted, one of the segm. in the outer flowers changed to a large, rose-colored bract. Cor. tubular, lobes 5, spreading. Sta. 5, exserted. Stig. 2-lobed. Caps. 2-valved, oo-seeded. 3f. Lvs. large, ovate. Cymes corymbose, terminal, splendidly radiant. Cor. purplish.

P. **pubescens** Mx.—Swamps, S.: common. 15—25f. Pods size of a hazel-nut. May, June.—In cultivation it is a shrub, flowering when 8—12f high.


1 **B. triphylla.** Lvs. in whorls of 3’s; cymes corymb; fls. scarlet. Mexico. 2f.

2 **B. versicolor.** Lvs. opp.; cymes racemèd; cor. clavate, curved, red and purp. S. Am.

**ORDER LXVIII. VALERIANACEÆ. VALERIANS.**

*Herbs with opposite leaves and no stipules. Calyx adherent, the limb either membranous or resembling a pappus. Corolla tubular or funnel-form, 4-5-lobed, sometimes spurred at base. Stamens distinct, inserted into the corolla tube alternate with, and generally fewer than its lobes. Ovary inferior, with one perfect cell and two abortive ones. Seeds solitary, pendulous, in a dry, indehiscent pericarp.*

1. **VALERIANA**, L. **Valerian.** Calyx limb at first very small, in-

§ Stems climbing and twining. Leaves ternately divided, long-stalked. ... No. 1
§ Stem erect.—a Leaves and leaflets broad, somewhat ovate. Root fibrous... Nos. 2, 3
—a Leaves and leaflets narrow, nearly linear. Root fusiform. ... No. 4
† Garden exotics, native of Europe. ... Nos. 5–8

1 V. scandens L. Glabrous; fls. ovate, thin, entire, pointed; cymes diffusely pinnated, axillary and terminal; corolla very short. E. Fla. 4–6 ft, slender.

2 V. pauciflora Mx. Rt. lvs. ovate, cordate, crenate-serrate; caulis of 3–7 ovate, toothed fls.; cor. tube long (7–8") and slender, rose-white. O. to Va. and W. 1–2 ft.

3 V. sylvatica Richd. Rt. lvs. ovate or oblong, never cordate, entire; caulis of 5–11 lance-ovate, entire fls.; cor. short (3–4") roseate. Swamps, Vt. and W.

4 V. édulis N. Smooth, thickish; root lvs. linear-spatulate, entire; caulis of 3–7 lance-linear, acute asgl., the margins ciliate; cor. white, short (3–3/4''), in a dense panicle. Low grounds, O. Wis. and W. The thick root is edible. 1–3 ft.

5 V. dioica. Root lvs. undivided; caulis pinnatifid; fls. panicked, 6–8, blush. 1 ft.

6 V. Phu. Root lvs. undivided; caulis pinnate; fls. corymbed, white. 3 ft.

7 V. officinalis. Lvs. all pinnate and toothed; fls. corymbed, blush-colored. 3 ft.

8 V. Pyrenàica. Lvs. cordate, toothed, upper pinnate; fls. corymbed, pink-red. 1–2 ft.

2. VALERIANÉLLA, Mænch. DC. Calyx limb obsolete. Cor. tube short, not spurred, limb 5-lobed, regular. Sta. 3. Stig. 3-cleft or entire. Fr. 3-celled, 1-seeded, 2 cells empty. 1 Stems forked above. Lvs. opposite, oblong or linear, entire or toothed, sessile. Fls. in dense, terminal cymelets. The specific characters are afforded mainly by the fruit. (Fedia, Gaert. T. & G.)

* Flowers pale blue. Fruit orbicular, fertile cell larger than the empty ... No. 1
* Flowers white.—a Fruit ovoid, fertile cell larger than the empty ... Nos. 2, 3
—a Fruit subglobous, empty cells larger than the fertile ... Nos. 4, 5

1 V. oltòria Mænch. Lamb Lettuce. Fr. finally broader than long; fertile cell with a corky back, seed laterally compressed. Fields, N. Y. to Va.; rare. 8–12'. June.

2 V. Fagopýrum. Fruit smooth, ovoid-triangular, the empty cells at the obtuse angle, and no groove between; fls. large (1½'). W. N–Y. to Wis. 1 ft. June.

3 V. radiàta Drfr. Fruit pubescent, ovoid, somewhat 4-angled, 1-toothed at apex; empty cells with a groove between; fls. small (½''). N. Y. (Howe) to Mich., and S.

4 V. umbilicàta. Fr. inflated, apex 1-toothed, the anterior face deeply umbilicate and perforated into the empty cells, which are much larger. Ohio (Sullivant).

5 V. patellària. Fruit orbicular, flattened, the empty cells widely divergent at length forming a winged margin to the fertile cell. N. Y. to O. (Howé, Sullivant.)

ORDER LXIX. DIPSACEÆ. TEASEWLWORTS.

Herbs with whorled or opposite leaves and no stipules. Flowers in dense heads, surrounded by an involucre as in Composite. Calyx adherent, pappus-like, surrounded by a special scarious involucel. Corolla tubular. Stamens 4, alternate with the lobes of corolla, and distinct. Ovary inferior, 1-celled, 1-ovuled. Style 1, simple. Fruit dry, indehiscent, with a single suspended seed. Fig. 441.

1. DIPSACUS, L. TEASEL. Fls. in heads. Involucre many-leaved.
Order 70.—Compositæ.

Involucel 4-sided, closely investing the calyx and fruit. Cor. 4-cleft, lobes erect. Fruit 1-seeded, crowned with the calyx. 3. Stout, prickly. Leaves connate at base. Hds. oblong, the middle zone of florets first expanding.

1. **D. sylvéstris** Mill. Wild T. Lvs. satin or jagged; bracts slender, erect, pungent, longer than the heads; chaff pungent, with a straight point. Waysides and hedges, Mass. to Cal. 5f. Flowers bluish. July. § Europe.

2. **D. FULLONUM.** Fullers' T. Leaves serrate or entire; bracts of the involucre spreading; chaff rigid, erect, with sharp, hooked points. Europe. 4f. July.


S. **ATROPURPUREA.** Mourning Bride. Leaves pinnatifid and incised; heads radiate; receptacle cylindric. India. 3f. Purple. Beautiful.

β. **CANDIDISSIMA.** Flowers pure white.—There are many other varieties.

Order LXX. Compositæ. Asterworts.

Plants herbaceous or shrubby, with compound flowers (of the old botanists), i.e., the flowers in dense heads (capitula) surrounded by an involucre of many bracts (scales), with 5 united anthers, and the fruit an achenium (cypsela). Leaves alternate or opposite, exstipulate, simple, yet often much divided. Flowers (florets) ∞, crowded, sessile, on the receptacle with or without pales (chaff). Calyx adherent, the limb wanting or divided into bristles, hairs, &c. (pappus). Corolla tubular, of 5 lobes with a marginal vein, often ligulate or bilabiate. Stamens 5, alternate with the lobes of the corolla, anthers cohering into a tube. Ovary 1-celled, with 1 erect ovule. Style single, with 2 stigmas at summit. Fruit a cypsela (§ 151), dry, indehiscent, 1-seeded, often crowned with a pappus. (See § 104, 348, 362.)


An immense and perfectly natural assemblage, of about 1000 genera and 9000 species. In the United States very few are shrubby.

The flowers are perfect or variously diclinous. If the head has all its flowers of one kind, whether ♀, or ♂, or ♂ ♀, it is homogamous; if of different kinds, it is heterogamous.—The following are De Candolle's Suborders and Tribes, with a convenient artificial analysis appended.

I. **Tubulifloræ.**—Corolla of the perfect flowers tubular, 5-lobed. (A.)

<table>
<thead>
<tr>
<th>Tribe</th>
<th>vernoniacæ.</th>
<th>Branches of the style long, slender, terete, and hispid all over. Heads discoid. Flowers all alike, perfect.</th>
<th>Nos. 1–3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tribe</td>
<td>asteroideæ.</td>
<td>Branches of the style flat, linear, downy above and opposite the distinct, stigmatic lines, appended at top. Heads discoid or radiate.</td>
<td>Nos. 16–34</td>
</tr>
<tr>
<td>Tribe</td>
<td>SeneCionideæ.</td>
<td>Branches of the style linear, fringed at the top, truncate or extended into a conical, hispid appendage.</td>
<td>Nos. 35–89</td>
</tr>
<tr>
<td>Tribe</td>
<td>cynareæ.</td>
<td>Style thickened or node-like at top. Branches not appended, the stigmatic lines not prominent, reaching the apex.</td>
<td>Nos. 90–98</td>
</tr>
</tbody>
</table>

II. **Ligulifloræ.**—Corollas all ligulate (radiant), flowers all perfect. (B.)

| Tribe | Cichoraceæ. | Branches of the style long, obtuse, pubescent all over; stigmatic lines commencing below their middle. Juice milky. | Nos. 99–115 |
### III. LABIATIFLORÆ.—Corolla of the perfect flowers bilabiate. (C.)

**Table 7, MULISIACEÆ.** Style nearly as in Cynarea, the branches obtuse, very convex outside, minutely downy at the top. .......................................................... ..........No. 116

#### A. Suborder TUBULIFLORÆ.

| Heads discoid, that is, without rays... | 1 (1) |
| Heads radiate, i. e., the outer flowers ligulate... | 2 (8) |
| Receptacle naked, i. e., with no pales or bristles among the flowers... | 3 (2) |
| Receptacle chaffy, bearing pales among the flowers... | 4 (6) |
| Receptacle bearing bristles, or deeply alveolate (honeycombed)... | 5 (7) |
| 2 Pappus a circle of 5—20 chaffy scales... | 6 (a) |
| 2 Pappus none, or a short, toothed margin... | 7 (b) |
| 2 Pappus composed of many capillary bristles... | 8 (c) |
| 3 Leaves opposite. (Heads homogamous)... | 9 (d) |
| 3 Leaves alternate... | 10 (e) |
| 4 Heads homogamous,—flowers all perfect... | 11 (c) |
| 4 Heads heterogamous,—flowers not all perfect... | 12 (d) |
| 5 Scales herbaceous, often deciduous... | 13 (e) |
| 5 Scales scarious, persistent, often colored... | 14 (f) |
| 6 Leaves alternate... | 15 (g) |
| 6 Leaves opposite... | 16 (h) |
| 7 Pappus none, or consisting of scales... | 17 (i) |
| 7 Pappus composed of many bristles... | 18 (j) |
| 8 Receptacle naked (not chaffy), or (in No. 67) deeply honeycomb-celled... | 19 (k) |
| 8 Receptacle chaffy, with pales among the flowers... | 20 (l) |
| 9 Pappus of 5—12 scales, which are 1-awned or (in No. 62) cleft-bristly... | 21 (m) |
| 9 Pappus none, or of a few short awns... | 22 (n) |
| 9 Pappus of many capillary bristles... | 23 (o) |
| 10 Rays cyanic, in a single row... | 24 (p) |
| 10 Rays cyanic, in several rows... | 25 (q) |
| 10 Rays yellow, in about one row... | 26 (r) |
| 11 Pappus double, or of very unequal bristles... | 27 (s) |
| 11 Pappus simple, the bristles all similar... | 28 (t) |
| 12 Involucre scales imbricated, the outer shorter... | 29 (u) |
| 12 Involucre scales equal, not imbricated... | 30 (v) |
| 13 Disk and ray flowers both fertile, the latter pistillate... | 31 (w) |
| 13 Disk flowers sterile, ray flowers fertile... | 32 (x) |
| 13 Disk flowers fertile, ray flowers sterile... | 33 (y) |
| 14 Rays yellow... | 34 (z) |
| 14 Rays cyanic... | 35 (a) |
| 15 Achenia obcompressed, often beaked... | 36 (b) |
| 15 Achenia compressed laterally, or not at all... | 37 (c) |

| a Corolla lobes one-sided. Head large, many-flowered... | 38 (d) |
| a Corolla lobes one-sided. Heads 4—5-flowered, aggregated... | 39 (e) |
| a Corolla lobes equal.—Leaves opposite. Pappus awned... | 40 (f) |
| a Corolla lobes equal.—Leaves opposite. Pappus obtuse... | 41 (g) |
| a Corolla lobes equal.—Leaves alternate. Pappus scales 8—10... | 42 (h) |
| a Corolla lobes equal.—Leaves alternate. Pappus scales 12—20... | 43 (i) |
| b Leaves opposite. Flowers diclinous, obscure... | 44 (j) |
| b Leaves alternate. Flowers yellow. Disk conical... | 45 (k) |
| b Leaves alternate. Flowers yellow. Disk convex... | 46 (l) |
| b Leaves alternate. Flowers yellow. Disk convex... | 47 (m) |
| b Leaves alternate. Flowers yellow. Disk convex... | 48 (n) |
| b Leaves alternate. Flowers yellow. Disk convex... | 49 (o) |
| b Leaves alternate. Flowers yellow. Disk convex... | 50 (p) |
| b Leaves alternate. Flowers yellow. Disk convex... | 51 (q) |
| b Leaves alternate. Flowers yellow. Disk convex... | 52 (r) |
| c Scales of the involucre in one row.—Flowers cyanic... | 53 (s) |
| c Scales of the involucre in one row.—Flowers yellow... | 54 (t) |
| c Scales imbricated.—Flowers yellow... | 55 (u) |
| c Scales imbricated.—Flowers yellow... | 56 (v) |
| c Scales imbricated.—Flowers yellow... | 57 (w) |
| c Scales imbricated.—Flowers yellow... | 58 (x) |

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**Order 70.—COMPOSITÆ.** 153
ORDER 70.—COMPOSITÆ.

d Achenia 13-striate. Flowers purple. .......... Brickellia. 9
  Achenia 5-angled.—Receptacle conical. Flowers blue. Conoclinium. 12
    —Receptacle flat. —Scales 4 or 5. Mikania. 11
    —Scales 8–20. Euapotium. 10
s Shrubs. Flower discous, the g and h in different heads. Baccharis. 34
h Herbs.—Stem winged. Heads spicate. ............. Pterocaulon. 35
    —Stem wingless.—Heads, corymbs, purplish. Pluchea. 33
    —Heads paniculate.—Pappus reddish. Conyza. 31
    —Pappus white. Erechtites. 85
f Receptacle cleft except in the centre. .......... Filago. 80
f Receptacle naked.—Heads discous. Antennaria. 79
    —Heads heterogamous.—Involucre erect. Gnaphaliun. 78
    —Involucre radiate. Helichrysum. 83
  Scales dry, fadeless. Pappus 4-texth. Stem winged. Ammorum. 81
g Scales dry, fadeless. Pappus of scale-like awns. Xeranthemum. 84
  Scales herbaceous.—Flowers heterocephalous. Fruit a burr. Xanthium. 48
  —Flowers all perfect.—Pappus of 5 or 6 scales. Marshallia. 69
  —Pappus of many bristles. Carphephorus. 6
h Flowers yellow. Pappus 2 inversely hispid awns. Bidens. 59
h Flowers yellow. Pappus 2 erectly hispid awns. Coreopsis. 58
h Flowers whitish,—heterocephalous. Anthers yellowish. Ambrosia. 47
    —monocious. Anthers yellow. Iva. 40
    —all perfect. Anthers black. Melanthera. 49
  Outer scales of the invol. leafy. Pappus none. Carthamus. 91
  Outer scales pectinate or ciliate-fringed, or entire. Centaurea. 93
  Pappus plumulos. Achenia obvolute. Cynara. 90
  Pappus plumulos. Achenia oblong. Cirsium. 97
  Pappus scabrous,—triple, each row by 10’s. Cnicus. 95
    —simple.—Scales spinous, (Corda, p. 392, or). Onopordum. 95
    —Scales hooked. Lappa. 98
  Leaves opposite. Pappus scales deeply cleft into bristles. Dysodia. 62
  Leaves alternate.—Receptacle with deep horned cells. Baldwinia. 68
    —Receptacle with shallow fringed cells. Gaillardia. 63
    —Receptacle areolate.—Rays all yellow. Heliumun. 67
    —Rays spotted at base. Gazania. 64
  Leaves opposite. Involucre double, outer 8 united. Dahlia. 23
  Leaves opposite. Involucre single. Scales united. Tagetes. 91
  Leaves alternate.—Pappus of a few short awns or bristles. Bolotina. 21
    —Pappus a membranous margin. Mathicaria. 73
    —Pappus 0.—Rays fertile, disk sterile. Calendula. 91
    —Flowers all fertile.—Involucre scales equal. Bellis. 22
    —Invol. broad, flat. Leucanthemum. 72
    —Invol. hemispherical. Chrysanthemum. 75
m Rays 4 or 5. Involucre oblong, imbricated. Cypselas very silky. Sericocarpus. 17
m Rays 5–75. Involucre loosely or closely imbricated. Pap, simple, copious. Aster. 18
m Rays 8–12. Involucre imbricated. Pappus double, the outer very short. Diplopappus. 19
m Rays 40–200. Involucre scarcely imbricated, scales nearly equal. Erigeron. 20
  Flowers discous, purplish. Leaves all radical. Nardosia. 14
  Flowers all fertile.—Native. Scales subequal, flat. Fruit smoothish. Erigeron. 20
    —Exotic. Scales subequal, keeled. Fruit hairy. Agatha. 16
    —Exotic. Scales imbricated. Pappus double. Callistephus. 21
  Pappus double in the disk flowers, none in the rays. Heterotheca. 29
  Pappus double in both disk and ray flowers. Chrysopsis. 30
p Heads large, about 20-rayed. Pappus in one row. Inula. 32
p Heads very small, 1–15-rayed.—Pappus 1 row, shorter than achenia. Breschychlæ. 5
    —Pappus 1 row, tawny, longer than achenia. Isopappus. 23
  Pappus irregularly 2-rowed, white. Solidago. 26
r Head solitary, on a scape with alternate bracts. Tussilago. 13
r Heads corymbs, &c.—Leaves alternate. Senecio. 87
    —Leaves opposite. Arnica. 88
s Shrubby. Pappus 4-toothed, obscure. Borrichia. 36
s Herbaceous.—Scales (the 4 outer) united into a cup. Tetragononothica. 52
B. Suborder LIGULIFLORÆ.

§§ Pappus none, or consisting of little scales...(a)
§§ Pappus double (of scales and bristles), or simple and plumose...(b)
§§ Pappus composed of capillary bristles, not plumous...(*)
* Achenia terete or angular, not flattened...(c)
* Achenia evidently flattened...(d)

a Flowers yellow. Pappus none. Heads paniculate.......................... LAMPSANA. 99
b Flowers purple. Pappus none. Heads solitary or umbellate........... APOGON. 100

Flowers blue.—Pappus of many little scales. Receptacle naked.................. CICHORIUM. 101
—Pappus of 5 scales. Receptacle chaffy.......................... CATANANCHE. 107
b Flowers yellow. Feathery pappus on a long filiform beak............ TRAGOPOGON. 105
b Flowers yellow. Feathery pappus on a short beak or sessile........ LEONTODON. 104
b Flowers yellow. Pappus of many bristles with the scales............. CYNTHIA. 103
—Pappus of 5 bristles and 5 scales.................................. KHIGIA. 102
c Flowers whitish or purplish, mostly nodding. Stem leafy.................. NABALUS. 105
c Flowers rose-purple, erect. (Stem almost leafless)..................... LYGODESMIA. 109
c Flowers yellow.—Achenia long-beaked. Pappus white............. TARAXACUM. 112
—Achenia long-beaked. Pappus reddish........................... PYRROPPAPUS. 111
—Achenia not beaked.—Pappus dull-white or tawny............... HIKRACIUM. 105
—Pappus bright white........................................ TRXOMON. 110
d Achenia contracted into a slender beak. Flowers mostly yellow.... LACTUCA. 113
d Achenia scarcely beaked.—Flowers mostly blue................... MULGEDIUM. 114
—Flowers yellow. Pappus silky................................... SONCHUS. 115

C. Suborder LABIATIFLORÆ.

§§ Head radiate, solitary, nodding in bud. Pappus capillary................... CHAPTALIA. 117

1 VERNONIA, Schreb. IRON WEED. Fls. all tubular, perfect. Invol. of ovate, imbricated scales, the inner longest. Recept. naked. Pap. double, the exterior chaffy, the interior capillary. 2 5 Leaves alternate. Fls. purple (in our species). Cymes corymbed. Figs. 446-8.

§ Scales of the involucr all obtuse and closely appressed. Stem tall, grooved. No. 1
§ Scales of the invol. (usually all)—a with slender, flexuous points................... Nos. 2, 3
—a with acute or mucronate points. South...Nos. 4-6

2 V. Novemberense Willd. Lvs. many, lanceolate, serrulate, rough; cyme fastigate; invol. scales filiform at the ends, or the upper cuspitate. Com. 3–6f. Aug.

3 V. seaberrima N. Lvs. all sessile, lanceolate and lance-linear, margins revolute, subentire; hds. 20–30-flowered; scales lanceolate, ciliate, protracted into long, flexuous points. Pine-barrens, S. 2–3f. June–August.

4 V. augustifolia T. & G. Lvs. many, the lower oval or oblong; invol. bell-form, 20-flowered; scales acute or mucronate, short. Dry woods, Fla. 2–3f. June, July.

5 V. ovallifolia Cass. Lvs. ovate, or oval-oblong; invol. and scales imbricated, linear, narrowed at base; Barrens, S. 2f. September.

6 V. oligophylla Cass. Lvs. mostly radical, oblong-obovate, the 2 or 3 cauline bract-like, lanceolate; scales spreading, acuminated. S. 2f. June, July.

2. STOKESIA, L'Her. Fls. all tubular, the marginal larger, ray-like, irregular; scales of the invol. imbricated, in several rows, the outer spinulose and leaf-like. Recept. naked. Cypsela 4-angled. Pap. of 4 or 5 awn-like, rigid, deciduous scales. 2f. Erect, with a downy stem, alternate lvs., and large terminal heads of showy blue flowers.

S. cyma L'Her.—Wet woods, S. Car. and W.: very rare. 2f. Lvs. glabrous, entire. Bracts spinulose at base, gradually becoming scales. ♦


1 E. Carolinianus Willd. St. much branched, leafy, hairy; lvs. somewhat hairy, ovate or oval-oblong, obtuse, crenate-serrate. Dry soils, Pa. S. and W. 2f.


4. AGERATUM, L. Heads ∞-flowered, 6, discoid. Scales linear, imbricated, pointed. Recept. naked. Corollas all tubular. Cyp. 5-angled, narrowed at base. Pap. 5 or 10, chaffy, awned scales. 12 Mostly tropical, with opposite, petioled lvs. and corymbed heads. Fig. 75.

A. conyzoides L. Branching; lvs. ovate, tooth-crenate, acute or cordate at base, somewhat rugose; pap. scales 6, as long as the corolla, but much shorter than the conspicuous styles. Wet places, near Savannah. 1–1½f. Blue or white. Apr.–Jn. β. Mexicana. Lvs. all, or nearly all, cordate. Fls. light blue, perpetual. ♦


rigid, shorter than the flowers. 24 Sts. simple, leafy, corymbose at top, with middle-sized heads of purple flowers in Autumn. (Liatris, Mx. Ell.)

* Scales of the involucre acute, downy-tomentous. Leaves acute ........... Nos. 1, 2
* Scales of the involucre rounded-obtuse, nearly glabrous. Leaves obtuse .. Nos. 3, 4

1 C. pseudo-liatris Cass. Lvs. linear-subulate, rigid, closely appressed to and covering the stem; hds. few, rac. or cor.; plant downy, erect. W. Fla. to La. 2f.

2 C. tomentosus T. & G. Lvs. lanceolate, petiolate, the cauline lance-ovate, sessile, small, erect; plant tomentous, corymbs loose. Swamp, S. 2f.

3 C. bellidiformis T. & G. Low, nearly smooth, tufted; lvs. spatulate below, linear above; hds. few, in a loose corymb; scales herbaceous. Sand hills, N. Car. 1f.

4 C. corymbosus T. & G. St. single, stout, erect, hairy; lvs. oblanceolate, the upper oblong, sessile; corymb dense; scales scarious-edged. Swamps, S. 3f.


§ Heads in a corymb or thyrse-like panicle. Root fibrous, no tuber.............. Nos. 1-3
§ Heads in a spike or a simple raceme. Root a roundish tuber... (a)
  a Scales of the involucre colored and petaloid at their lengthened ends..... No. 4
  a Scales not petaloid, green or slightly tinged at the end... (b)
  b Pappus evidently plumose. Corollas (13 to 60) hairy within......... Nos. 5, 6
  b Pappus evidently plumose. Cor. (3 to 5) smooth within. South... Nos. 7, 8
  b Pappus only barbellate (smooth to the naked eye)... (c)
  c Heads 20-40-flowered, roundish, with rounded scales............. No. 9
  c Heads 7-15-flowered.—d Scales all similar, obtuse. ........... Nos. 10, 11
    —d Scales all, or the inner only, acute... Nos. 12, 13
  c Heads 3-7-flowered,—e in a regular spike, raceme (or panicle)... Nos. 14-16
    —e in one-sided spikes or racemes............. No. 17

1 L. odoratissima Willd. Vanilla Plant. Deer’s Tongue. Smooth; lvs. obovate-spatulate, obtune, thick, the cauline oblong; heads 7-8-flowered, in a loose, compound corymb. Pine-barrens, Va. to Fla. 1—3f. Used to perfume tobacco.

2 L. paniculata Willd. Viscid-tomentous; lvs. lance-spatulate, the cauline small, pointed; hds. 5-flw., in an oblong, dense panicle, white-purple. Damp. S. 2—3f.

3 L. fruticosa N. Shrubby, smooth; lvs. obovate, fleshy, veinless, the lowest opposite; hds. corymbed, 5-flowered; scales lanceolate, acute, dotted. E. Fla. Lvs. 17.

4 L. elegans Willd. Hairy above; lvs. oblanceolate, cauline linear; rac. dense, 1f; hds. 4-5-flowered, scales longer and more showy than the flowers. Woods, S. 4f.

5 L. squarrosa Willd. Blazing Star. St. 2—3f; lvs. linear, the lower narrowest at base; rac. leafy; hds. few, 13-40-flowered, 9—12” long, scales squarrose-scaping, the outer leafy, inner sharp-pointed. Dry soils, Penn. to Fla and W.

6 L. cylindracea Mx. St. low (6—18”), slender; lvs. linear, rigid; hds. few, cylindrical, 15-20-flowered; scales short, rounded, appressed. Dry. N. Y. and W.

7 L. Boykinii T. & G. Lvs. linear, dotted; hds. 3 or 4-flowered in a close, virgate spike; scales pointed and spreading at the tips. Near Columbus, Ga. 1—2f.

8 L. tenulifolia L. Lvs. narrowly linear or filiform; hds. 5-flw., crowded in a long raceme; scales oblong, obtuse-morunculate. Woods, S. 2—4f. Fine.

9 L. scariosa L. Gay Feather. Scabrons-pubescent; lvs. lanceolate, the lower on long petioles, upper linear; hds. remotely racemed; invol. hemispherical, with obovate, very obtuse scales. Dry soils. 4—5f. Beautiful.

10 L. spicata Willd. Lvs. lance-linear, the lower narrowed at base; hds. sessile, in a long spike; scales oblong, obtuse, narrow-margined. N. J., W. and S. 2—5f.

12 L. pilosa Willd. Downy and hairy, stout; lvs. linear and lance-linear; hds. loosely racemmed, scales lance-oblong, obtuse, the inner linear. N. Car. Rare.

13 L. heterophylla R. Br. Glabrous; lvs. lanceolate, the upper greatly diminished; hds. spiked, scales lance-acuminate, spreading. N. Car. to Ga. Rare.

14 L. gracilis Ph. Pubescent; lvs. linear, 1-veined, the lower lanceolate; heads on slender stalks, in a long virgate rac.; scales oblong, obtuse. Dry. Ga. Fl. 2−5f.

15 L. pychnostachia Mx. Hirsute; lvs. rigid, lanceolate, the upper narrow-lin- ear; spike dense, thick, of numerous cylindric heads; scales appressed, with acute, scarious, colored and spreading tips. Prairies. Ill. to Tex. 3−5f. Spike 10−20'.

16 L. Chapmánii T. & G. Tomentous; lvs. linear, obtusish, the upper very short; hds. cylindric. 3-flowered, densely spiked; scales acum. fr. hairy. Fla. 1−2f.

17 L. pauciflóra Ph. St. pubescent, recurved; lvs. linear, short, the lowest lance-linear; rac. recurved. With the hds. all turned to the 'upper side'; hds. 4−5-flowered; scales lance-oblong, acute. Dry sand-hills, S. 1−3f. (L. secunda Ell.)


K. eupatoríoides L. St. somewhat viscid-pubescent; lvs. lance-ovate to lance-lin., resinous-dotted, petiolate, toothed or entire. Dry solns. N. J., W. and S.


B. cordífolía Ell. Pubescent; lvs. triangular, truncate or cordate, crenate, petiolate; hds. 30−40-flowered, scales obtuse; pap. purple. Ga. Fla. 2−4f. August.


§ Leaves mostly alternate, pinnately dissected. Heads paniculate, very ☺. Nos. 1, 2
§ Leaves mostly opposite or verticillate,— ☺ pinnately dissected. Hds. corymbed...No. 3
— ☺ undivided. Heads corymbed. ...Nos. 3, 4

* Scales imbricated in several rows, the outer gradually shorter... (a)
  a Flowers bluish. Leaves opposite. Scales strongly striate....No. 4
  a Flowers purplish. Lvs. whorled. Scales streaked and flesh-colored...Nos. 5−7
  a Flowers white, 5 only in each head. Lvs. submersile. (exc. No. 15). (b)
    b Leaves acute at base. Scales with acute white points....Nos. 8−10
    b Leaves obtuse at base. Scales obtuse, short, downy....Nos. 11−14
    b Leaves obtuse, roundish or truncate at the base....Nos. 15−19
    a Flowers white, 7−15 in each head. Leaves various...Nos. 19−22
* Scales all of equal length, in about 1 row. Leaves petiolate.... Nos. 23−25

1 E. fóeniculácéum Wildl. Very branching; lvs. all alternate, compoudly pin- nate, in linear-filliform segments, the upper setaceous, simple; heads 3−5-flowered. Fields, Pa. (rare) to Fla. 3−10f. Flowers yellowish-white, 1−2" long.
2 E. coronopifolium Willd. Much branched, pubescent; leaves mostly alternate (the lower opp.), twice pinnatifid, with lance-linear lobes and segm., the upper linear, simple; hds. 5-flowered, scales 10. Dry soils, S. 3–5f. Flowers white, 2".

3 E. pinnatifidum Ell. Pubescent; lvs. lacinate-pinnatifid, segm. linear, toothed or entire, the lower whorled in 4’s, middle opp., upper alter., corymb fastigate; hds. small, ∞, 5-9-flowered; scales oblong, mucronate. Pine woods, S. 3–4f.

4 E. ivaefolium L. Lvs. opposite, lanceolate, tapering to each end, 3-vened; heads pedicellate, 13-20-flowered; scales 20, imbricated, erect, obtuse, with 3–5 distinct striae. Woods, Miss. and Fla. 3–5f. Blue.

5 E. purpureum L. Stem solid, purple at the joints; lvs. feather-veneined, in whorls of 3’s–5’s, thin, ovate to lanceolate, coarsely serrate. Dry. 3–6f.

6 E. fistulosum Barratt. Trumpet-weed. Stem hollow, striate, glabrous, glaucous-purple; lvs. lance-oblong, in 5’s, 6’s, finely serrate; corymb globose, with whorled rays. Thickets. 6–10f. Lvs. 8’. Corymb 1f. (E. purpureum. B. T. & G.)

7 E. maculatum L. Stem solid, marked with purple glands and lines; leaves 3-vened, ovate in 3’s–5’s. Low grounds: common. 3–5f. (E. purpureum. B. Darl.)

8 E. scábridum Ell.? (Chapm.) St. stout, tomentous; lvs. lance-ovate, acute, ser., 3-vened from base; scales lance-obli., cupulifide, edged, shorter than fls. Car. Fla. 2f.

9 E. album L. Rough-downy; lvs. lance-oblong, acutish; hds. oblong, 5-flowered; scales white-scarious at the point, longer than the fls. Sands, N. J. and S. 2f.

10 E. lunólepis T. & G. Nearly smooth; lvs. lance-linear, obtuse; heads 5-flwed.; scales white-scarious at the tip, as long as the fls. Sands, L. I. and S. 2–3f.


12 E. parvifórum Ell. Lvs. lanceolate, sessile, acutely serrate above, 3-vened; heads 2’d., crowded; outer scales very short, inner linear. Damp. Va. to Fla. 2–3f.

13 E. altissimum L. Tall, downy; lvs. lanceolate, few-toothed above, conspicuously 3-vened; scales 8–12, elliptical, 34’; fls. 5’’. Dry. Pa. to Car., and W. 3–7f.

14 E. cuneófolium Willd. Downy; lvs. small, glaucous, obovate-oblong, 3-vened, apex obtuse and subserrate; scales oval, 2f.’’; fls. 4’’. Rich shades, S. Car. to Fla. 2f.

15 E. teurifólium Willd. Rough-down; leaves sessile, ovate, veiny, the lower doubly serr.; scales elliptical, faintly striate, rather acute. Damp. Mass. to La. 2–3f.

16 E. sessilifolium L. Smooth; leaves half-clasping, lance-ovate, serrate; inner scales oblong-obovate, obtuse. Rocky woods, Mass. to Ind., and S. 2–4f. Lvs. 3–5’.

17 E. rotundifolium Willd. Hoarhound. Downy; lvs. roundish ovate, subcorporate, 3-vened, sessile, coarsely toothed; inner scales acuminate, as long as the fls. Dry fields, N. J. and S. A compact, bushy plant. 3f.

18 E. mikánioïdes Chapm. St. creeping at base, ascending; lvs. deltoid, truncate at base, petioles subconnate; scales lanceolate, acute. Isl. St. Vincent, Fla. 1–2f.


21 E. perforátum L. Thoroughwort. Boneed. Hairly; lvs. lanceolate, each pair united at base around the stem; heads about 12-flowered, in a large, dense corymb; scales lance-oblong, acute. Low grounds: common. 3–4f. A powerful tonic.


25 E. incarnátum Walt. Diffusely branched; leaves long-petioled, deltoid-ovate, pointed, coarsely crenate-dentate; hds. on slender ped., 15–30-flwed.; scales lin.-subulate, 3-striate; lobes of the corolla pale purple. Damp soils, N. Car. to Fla. 8f.
11. **MIRÁNIA**, Willd. **Climbing Boneset.** Fls. all tubular, ♀. In volucre 4-leaved, 4-flowered. Receptacle and flowers as in Eupatorium. 2♂ Climbing and twining. Leaves opposite.

**M. scandens** Willd. Smooth; lvs. cordate, repand-toothed, acuminate, the lobes divaricate; hds. in pedunculate, axillary corymbs. Thickets, Ms. to Ga. Not common. Clusters on the short, lateral branches, of white or pink-colored flowers. Aug. Sept.


**C. celestínum** DC. Much branched; lvs. deltoid-ovate, truncate or subcordate, crenate-serrate, petiolate; scales linear. 2♂ Cymes, Pa., S. and W. 1–2f. Aug. Sept.


**T. Fàrfara** L.—Cold, clayey banks, N. and M. Scape 3′, appearing with its single head of yellow flowers in March and April, before the large angular leaves.

14. **NARDÓSMIA**, Cass. Heads radiate, oo-flowered, somewhat ♀♂. Fls. of the ray ♀, of the disk ♂, but abortive in the sterile plant. Invol. simple. Recep. flat, naked. Pappus capillary. 2♂ Leaves radical. Fls. cyanic. The ray flowers of the sterile heads are in a single row; of the fertile in several rows, but very narrow.

**N. palmáta** Hook. Scape with a thryse or corymb; lvs. roundish-cordate, 5-7-lobed, woolly beneath, coarsely dentate. Swamps, N. Eng. and W. Rare. May.

15. **ADENOCAÚLON**, Hook. Fls. few, all tubular, of the margin ♀, of the disk ♂. Scales equal, in one series. Recep. naked. Cyp. clavate, exerted, bearing stalked glands above. Pap. 0. 2♂ Nearly acaulescent, with alternate leaves, and small, paniculate heads, also gland-bearing.


16. **AGATHÉA**, Cass. Heads as in Erigeron, but the scales are 1-veined, keeled or channelled, and the cypselae rough-haired. 1♂ 5 S. Afr. Leaves opposite. Disk flowers yellow, rays blue. (Cineraria, L.)

**A. amelloïdes** Lvs. ovate or oval, petiolate, entire, scabrous. Not hardy. A bean-tiful shrub, often cultivated in the greenhouse. 1–2f. Heads solitary.


**2 S. conyzóides** Nees. Some pubescent; lvs. lance-oval, acute, serrate, the lower narrowed into a petiole; rays short; pappus rusty. Woods, Ms. to Fla. 1–2f. Jl. Aug.

**3 S. tortífolius** Nees. Grayish pubescent; lvs. short, oblong-ovate, sess., twisted to a vertical position, both sides alike; pappus white. Woods, Va. to Fla. 2f. Sept.
18. ASTER, L. Invol. oblong, imbricate. Scales loose, often with green tips, the outer spreading. Disk fls. tubular, ray fls. in one row, ligulate, 3-toothed at apex, finally revolute. Recep. flat, alveolate. Pap. simple, capillary. Cypsela compressed. 24 Very abundant in the U. S., flowering in late summer and autumn. Lvs. alternate, diminishing gradually upward. Disk-flowers yellow, changing to purple; ray-flowers blue, purple, or white, never yellow. Figs. 146, 388. (See also p. 446.)

A Scales of the involucre tipped with green or wholly green...(§ 1, 2, 3)
B Scales distinate of green tips, white or scarious. Lvs. never cordate...(§ 4-p)

§ 1. Bròtia. Heads corymbous, large. Rays 6-15, white. Lvs. cordate...Nos. 1, 2

§ 2. Calliástrum. Heads corymbous or few, large. Rays 12-30, violet-blue. Pap. bristles unequally thickened. Lvs. rigid, not cordate...{(a)
   a Lvs. ovate to lanceolate, serrate more or less. Fr. smoothish...Nos. 3-5
   a Leaves lance-linear to linear,-b entire, merely acute...............Nos. 6, 7
   -b bristly-fringed, pungent...........Nos. 3, 9

§ 3. Astèria. Hds. paniced or racemed, rarely few. Pap. equal, soft...(c)
   c Leaves petiolate, the lower cordate,—d evidently serrate.............Nos. 10, 11
   -d entire or obscurely serrate...Nos. 12-15
   c Leaves all sessile, entire, silky-canescent both sides. Pap. tawny....Nos. 16, 17
   c Lvs. not silky,—d claspings with a cordate or auriculate base,...{(f)
   -d claspings with a broad base not cord. or auric...(h)
   -d sessile with a narrow base, not clasping...(m)

f Lvs. very small (1"-3''), entire. Scales with spreading tips.............Nos. 18, 19
f Leaves ordinary (1"-6').—e Scales with abrupt, appressed tips............Nos. 20, 21
   -e Scales loosely spreading. Lvs. entire...Nos. 22-25
   -e Scales very loose. Lvs. long, serrate...Nos. 26, 27
   h Scales of the involucre closely imbricated (obtuse, No. 20), acute....Nos. 28-31
   h Scales loose, or spreading, or recurved.—k Pappus bright-colored...Nos. 32-34
   -k Pappus tawny-brown...Nos. 35, 36

m Scales squarrous-spreading at the tips.—o Hds. large (6'-1'), purple...Nos. 37, 38
   -o Hds. small (2'-4'), whitish...Nos.45-47

m Scales loosely divergent, straight. Heads medium size, rays pale...... No. 43
m Scales erect, straight, in 1 row. Heads 2-3, or solitary, rays white...No. 44
m Scales closely imbricated.—n Hds. medium (3'-6'), purp. or pale...Nos. 43, 44, 31
   -n Heads small (2'-3''), white or pale...Nos. 39-41

§ 4. Scandós.—p Lvs. lanceolate, broadly or narrowly. Scales obtusish...Nos. 49-51
   -p Lvs. subulate or lin. Scales very acute.—s Hds. large, few...Nos.52, 53
   -s Hds. small, many...54-56

1 A. corymbósus Ait. Nearly smooth; lvs. thin, ovate-acuminate, serrate, the petals wingless; rays 6-9. Dry woods, N., M. 1-2f. Heads oblong, 4". Lvs. large.

2 A. macrophyllus Willd. Rough-pubescent; leaves thickish, ovate, serrate with close teeth, petioles some winged; rays 8-15. Woods, N. 1-2f. Lvs. very large. Hds.6'.

3 A. miráblís T. & G. Lvs. ovate, serrate, the lowest petiolate, the ramal roundish; invol. hemispherical, scales obtuse; rays about 20. S. Car. Very rare.

4 A. ràdula Ait. Lvs. lanceolate, acuminate, sessile, sharp-serrate, rough and rugous, invol. squarrouus with the spreading scale-tips; rays 20. N. 1-3f.

5 A. spectáblís Ait. Lvs. lance-oblong, sessile, entire, the lower sub serrate; invol hemispherical, scales linear-spataulate, ciliate. Sands, Mass. to Fla. 1-2f.

6 A. surculósus Mx. Root a creeping, knotted rhizome; lvs. lance-linear and linear, heads 1-5; scales linear-oblong, ciliate, inner obtuse. Wet. N. J. to Car. 1f.

β. gráctilis. Heads 8-12, smaller; rays 12; scales but slightly spreading.

7 A. paludósus L. Slender, glabrous; lvs. long, linear; hds. 1-6; scales lance-linear rays 30, longer than the (6") invol. Swamps, S. 2-3f. Heads very large.
8 A. spinulösus Chapm. Bristly-hairy, rigid; lvs. narrowly linear, pungent, bristle fringed; heads few, spicate; scales spine-pointed; rays 13, blue. Fla. 1f.

9 A. eryngifolius T. & G. Hairy, rigid; lvs. lance-linear, pungent, fringed with spiny teeth; heads very large, 1—4, loosely racemel; scales green, rigid, lanceolate, long-pointed; rays many, white. Fla. 1—2f. (Prinopsis Chapmani, C-B.)

10 A. cordifolius L. Stem paniculate; leaves sharply serrate, acuminet; petioles winged; scales appressed, with short green tips. Woods and glades, N. and W.: com. 1—3f. Heads numerous, rather small, blue varying to white, in a large panicle.


12 A. undulátus L. Racemose-paniculate, rough, grayish; lvs. ovate-oblong, undulate-crenate, the base, or the winged petioles, cordate-clasping, the upper acute, entire, sessile; scales appressed. Woods. 2f. Blu. (A. diversifolius Mx.)

β. aspérulius. Lowest petals yellower, not clasping; lvs. scarcely cordate. Com.

13 A. azúreus Lindl. Slender, rigid, rough; lvs. below on slender petioles, cordate-lanceolate, the others successively lanceolate, linear, and subulate, acute at each end; rac. paniculate, heads obconic; scales acute, appressed. Woods, prairies, W. 2f.

14 A. Shórtii Hook. Smoothish, subsimple; lvs. lance-ovate, deeply cordate, petiole, long-pointed, entire, the upper sessile; rac. paniculate; heads obconic; scales green-tipped, shorter than the disk, Rocky banks, O. to Wis. and Ark. 3f.

15 A. anómalus Eng. Lvs. as in No. 13; scales with linear, spreading, leafy tips; hds. large; rays spreading, 15—18", bright blue. Rocks, Ill. Mo. (Mr. J. Wolf) 2—4f.

16 A. sericéeus Vent. Bushy; lvs. silvery-silky both sides, lance-oblong, sessile; hds. large, terminal on the short, leafy branchlet; scales spreading at tip; fr. glabrous; rays 15—25, violet blue. Banks, Mich. (H. Mapes) to Iowa, and S. 1—2f.

17 A. cóncolor L. Subsimple; lvs. grayish-silky, lance-oblong, the upper cusp-pointed; heads in a terminal, virgate raceme; scales lanceolate, appressed; fruit silky; rays purple. Pine-barrens, N. J. to Fla. 2—3f. Aspect of Liatris.

18 A. squárrósus Walt. Slender, with simple, 1-flowered branches; leaves very small, triangular, heart-clasping, reflexed-squarrous; scales with spreading green tips; fr. pubescent. Dry soils, S. 2—3f. Rays 20, blue.

19 A. adnátus N. Slender, rough; lvs. oblong to lanceolate, erect, adhering to the stem by the midvein, the summit only free. Sands, Fla. to La. 2—3f.


21 A. laevís L. Very smooth; branchlets 1-flwd.; lvs. oblong, entire, shining, lowest lanceolate, sub serrate, upper auriculate; scales with a broad, acute, appressed tip; heads large, rich blue, showy. Low woods. 2—3f.

β. lavígatús. Not glaucous; leaves linear-lanceolate; scales linear.

γ. cyántus. Plant glaucous; leaves thickened, very entire. Beautiful Asters.

22 A. paténs L. Pubescent; rac. paniculate; lvs. ovate-oblong, cordate-clasping, ciliate at edge; heads large, terminal on the leafy branchlets; scales lax, green-tipped; rays 20, violet-blue. Dry sols, Mass. to Ga. 2—3f.

β. philógífolius. Leaves lance-ovate, auriculate-clasping, very acute.

23 A. améthystínus N. Hoary-puberulent; rac. paniculate; lvs. lin.-oblong, acute, some auricled at the clasping base; heads broad-bell-shaped (3"); scales erect, with only the green tips spreading. Damp, Mass. to Ill. (J. Wolf) 2—3f.

24 A. Novæ-Anglicæ L. Corymbous-paniculate, pubescent; lvs. lanceolate and lance-linear, auriculate-clasping; scales equal, lax, glandular-viscid, green their whole length; rays 70+, deep purple. Damp. 4—6f.—Varies with the rays rose-purple, or rarely, white. Fine in cultivation.

25 A. Carolíniánus Walt. Rough-downy; branches divaricate; lvs. lance-ovate, entire, clasping with small auriculate lobes; heads very large, scattered; scales with spreading green tips; rays rose-purple. Damp, S. 6—13f.

26 A. punicéus L. Hispid, panicled; lvs. lance-oblong, auriculate-clasping, sp
pressed-rate; scales 2-rowed, long, revolute; heads large, showy, with 30–60 narrow, pale-purple rays. Swamps, Can. to Car., and W. 4–6 ft. Stem often red.

β. virgatus Ell. Smooth, virgate branches racemed; leaves long-linear, the lower toothed, upper clasping, erect; scales short; rays blue. S. Rare.

30 A. mutabilis Alt. Stem smooth, paniculate-branched from base, dense-flwd.; leaves linear-paniculate, serrulate, clasping, thickish, upper lance-oblong, entire; heads medium; scales lanceolate, loose, much shorter than the disk; rays pale. Wet. Ill. (J. Wolf.) 2–3 ft.

31 A. cárneas Nees. Smoothish; branches leafy, ascending, racemed with 1-headed branchlets; lvs. uniform, linear-pancicate, pointed, only the upper clasping; scales acute, shorter than the disk. Moist, E. and W. Heads larger than in No. 30, purple to rose, showy. Stem often red, 2–3 ft high.

32 A. vircatæ Ell. Smooth, virgate branches racemed; leaves linear-pancicate, ciliato-serrulate, half-clasping, graded above into numerous subulate bracts and spreading, pointed scales; fruit glabrous. Ga. to La. 3-4 ft.

33 A. Novi-Bélgii L. St. smoothish, branches pubescent; lvs. subclasping, lance-oblong to linear, pointed, the lower subse rate; heads large, racemed or subcorymbed; scales subequal, loose, equalling the disk. N. Y. to Ill. 2–4 ft. Blue. (A. násiflora Alt.)

β. latifolius. Branches slender, corymbed at end; lvs. very narrow. W. Showy.

34 A. longifolius Lam. Stem glabrous, paniculate-spread; lvs. lance-linear to linear, long, pointed, subclasping, nearly or quite entire, upper subulate; heads large; scales linear-subulate, the outer spreading. E. and W. 2–6 ft. Blue.

β. præaltus. Tall, strict, with thyrsloid panicles, medium heads; lvs. serrulate.


36 A. oblongifolius N. Hairy, bushy; branches spreading; leaves obl.-pancicate, acute, entire, clasping, graded above into subulate bracts and subequal spreading scales. Va. (Harper's Ferry) to Iowa and Mo. Rays purple. 1–2 ft.

37 A. grandiflorus L. Rough, bristly-hairy; branches some corymbed, 1-flowered; lvs. small, linear-oblong, obtuse; lds. very large, blue-purple; scales obtuse. S. 2 ft.

38 A. Curtísii T. & G. Smooth, racemose; lvs. thin, sessile, lanceolate, acuminate, subentire; scales with green spreading tips; heads large, showy. Mts. N. Car.

39 A. dumósus L. Rac. paniculate; lvs. linear to oblong, sessile, lowest subse rate; invol. obtuse at base, closely imbricated; scales obtuse; heads small, rays 20+, purplish-white. Dry woods, &c.: common. 1–2 ft. Lvs. very numerous, 3½–3½.

β. coriúfolius, is a starved, attenuate form, very slender every way.

40 A. Tradescánti L. Smoothish, slender, much branched; lvs. lance-linear, long, remotely serrulate, teeth sharp, upper leaves entire, all sessile; heads many, subse cund; scales close; rays small, pale. Fields, copses. 2–4 ft. Leaves 5½–5½.

β. frágilis. Leaves nearly linear, minutely serrulate; heads scattered.

41 A. miser L. Hairy or downy, very leafy; branches spreading, racemose; lvs. all lanceolate, tapering both ways, sessile, sharply serrate in the middle, the ramal smaller; entire; scales acute, close; rays whitish, short. Old fields. 6–30 ft. —Varies greatly. Lvs. 5½–1½, broad or narrow. Hds. dense or scattered. Rays 15+, 2–3 ft.
42. **A. simplex** Willd. Loosely corymbose-paniculate, smoothish; lvs. lanceolate, acuminate, the lower serrate; heads scattered; scales loosely imbricated, linear-subulate. Low grounds: common. 3–6f. Heads twice larger than No. 41, blue to white.

43. **A. teniiifolius** Linn. Paniculate-branching, with 1-flowered branchlets; lvs. linear-lanceolate to lance-linear, slender-pointed, sessile, remotely serrulate, upper entire; scales linear-subulate, equalling the disk. Moist fields. 2–6f.

44. **A. subaspers Lindl.** Pubescent above; racemous-branched, branches short, dense-flwd.; lvs. lance-acuminate, appressed-serrate, rough, attenuate to a petiole, upper reduced, entire, sessile; invol. closely imbricated; rays purpl. Dry. Ill. 2f. (Wolf.)

45. **A. ericoides** Linn. Smoothish; branches virgate, branchlets secund, 1-headed; lvs. lance-lin. to subulate; dds. small; sc. as long as disk, with subulate-mucronate spreading tips. Rocky fields. 1–3f. Lvs. 4"–4", attenuate-mucronate. Rays white or purplish.

46. **A. racemmosus** Ell. Rough-downy; branches slender, erect; hds. very small (2"), spicate-racemous, crowded above; lvs. linear, sessile, rigid, 3"–3". Coast. S. Car. 2f.

47. **A. multiflorus** Linn. Graysih-downy, diffusely branched; lvs. linear, entire, sess., obtuse-mucronate; hds. small; sc. with obtuse spreading tips. Dry fields. 1f. Very bushy, with crowded racemes. Rays about 12, pale, 2–3" long.

48. **A. graminifolius** Ph. Slender, with filiform erect branches, 6–12f. lvs. linear, crowded below; ped. slender, leafless, 1-flwd.; sc. subulate-linear; rays abov. 20, white or rose. Rocks, Vt. N. H.; rare. (Willoughby Lake, Vt., Bradford, Vt., Whirl Mt.)

49. **A. acuminatus** Mex. St. simple, flexuous, angular, branching into a corymbous panicle above; lvs. broad-lanceolate, narrowed and entire at the base, serrate and acuminate; scales lax, linear. Wooded hills, N. 1f. Rays 12–14, long, white.

50. **A. nemoralis** Ait. Branches corymbed or 0; ped. 1-flwd., nearly naked, filiform; lvs. narrowly lanceolate, acute at each end, veiny, subentire; sc. very acute, loose, shorter than the disk; rays long, about 20. Wet woods. 1f. White-purple.


52. **A. flexuosus** N. Smooth, slender, flexuous; branches leafy, 1-flwd.; lvs. fleshy, long-lance-linear to subulate; hds. large; rays short, many, purple. Marshes. 1f.


54. **A. limittensis** Linn. Sea Aster. ① Smooth, much branched, paniculate; lvs. lance-linear to subulate; scales in 3 rows; rays minute, scarcely exerted. Marshes. 1f.

55. **A. subulatus** Mex. ① Smooth, slender, much branched, corymbed; lvs. linear-subulate; rays many, narrow, in 1 row, longer than the disk, blue. Wet. S. 1–3f.

β. **exillos.** Taller (2–4f), less branched; heads few, rays pale purple. Ga.


Rays whitish. Some of the longer bristles clavellate.—Ach. smoothish. Aug., Nos. 2, 3

—Ach. villous. Sept. Oct. ... No. 4

1 **D. linnarifolius** Hook. St. clustered, leafy; branches 1-flwd., fastigate; lvs. lin., entire, 1-vened, obtuse, rigid, rough. Dry-places. 1f. Heads rather large, showy.

2 **D. umbellatius** Hook. Smooth, simple, strict, with ∞ heads in a level corymb;
ivs. long (4-6), lanceolate, acuminate; sc. obtuse; fr. pubescent in lines. Low grounds 2-4f. Stems purplish. Rays about 12, 3-4" long. Handsome.

\( \beta. \) amyllinus. St. roughish above; ivs. ovate-lanceolate; sc. rather loose. 2-3f

3 **D. cornifolius** Less. Rough above, some hairy in lines; hds. few, corym.-panicle; ivs. elliptical, thin, long-pointed both ways, entire; scales shorter than the disk obtuse; cypsela glabrous. Woods, Can. to Car. 1-2f. Rays about 10, white.

4 **D. obovatus** (Ell.) Cinerous-pubescent; heads corymbed; ivs. obovate-oblong, acute; sc. lin.-subulate, rusty yellow; fr. villous; rays white. Damp shades, S. 2-3f

20. **ERIGERON**, L. **FLEABANE.** White-weed. Heads subhemispherical. Ray-flowers 2 (40-200), narrow, linear. Fis. of the disk \( \gamma \), \( \infty \) Recep. flat or convex, naked. Invol. scales nearly in one row and equal. Pap. generally simple. Herbs with alternate ivs., rays cyanic, disk yellow

\( \delta \) Rays minute, shorter than the cylindrical involucrare, white. Pappus simple...1, 2, 10.

\( \delta \) Rays long, showy, 30-40. Pappus simple. Ivvs. all radical. Hds. corymbose. No. 3

\( \delta \) Rays long, showy, 50-200.—a Pappus simple. Leaves clasping. Corymbose...Nos. 4-6

—a Pappus double. Leaves sessile. Corymbose...Nos. 7-9

1 **E. Canadense** L. Erect; invol. oblong; rays 40-50, crowded, minute; pap. simple; stem hairy, panicleate; leaves lanceolate. 1 A common weed. 6'-6". Ji.—Oct.

2 **E. divaricatum** Mx. Decumbent and diffusely branched, hirsute; ivs. linear and subulate; ivs. very small, loosely corymbose. 2 Dry soil, W. and S-W. 6'-2f. Purp

3 **E. nudafulle** Mx. Glabrous; ivvs. obovate or spatulate, radical, rosulate, entire hds. few; rays narrow, white. 2 Pine-barrens, S. Scape bracted, slender. 18'. Jn. Ji.

4 **E. bellidiifolium** Muhl. Robins' Plantain. Hirsute; radical ivvs. obovate, obtuse, suberrate; stem ivvs. remote, mostly entire, clasping; hds. 3-7; rays 50-60, purple, linear-spatulate. 2 Dry soils: common. 1-2f. May. June. Handsome.

5 **E. philadelphicum** L. Pubescent or hirsute; ivs. thin, lower spatulate, crenate-dentate, upper clasping, sometimes corydace-auriculate; heads few or few, on long, slender ped.; rays 15-200, filiform, reddish. 2 Damp; com. 2f. St. ivvs. various. Jn.—Aug.

6 **E. quercifolium** Lam. Pubescent; root ivvs. oblong-ovate, lyrate-pinnatifid, or deeply sinuate-toothed, the cauleine sharply serrate, clasping; heads \( \infty \), small, with innumerable filiform flesh-colored rays. 2f. Low grounds. S. May

7 **E. annuum** Pers. Common Fleabane. White-weed. Hirsute, branching; leaves coarsely serrate; ovate to lanceolate, the lower on winged stalks; rays very numerous, narrow, white. 1 2 Fields: common. 2-4f. June—Aug.

8 **E. strigosum** L. Rough, with short, appressed hairs, or nearly smooth; ivs. lanceolate, tapering to each end, entire, or with a few large teeth in the middle, lower ones 3-veined and petiolate; pan, corymbose, white. 2 Grass lands: com. 2f. Jn.—Oct.

9 **E. glabellum** Nutt. Ivvs. smooth, entire, spatulate, long-tapering at base, upper lanceolate and lance-linear, sessile, acuminate; heads 4-6, pubescent; rays very numerous, pale blue. Wis. to Dak. 12'-18'. July, Aug.

10 **E. acre** L. Erect, 1f; ivvs. entire, oblong to lanceolate; heads few or many, hemispherical, with bluish-purple rays as long as the pappus. Lake Superior (Porter).

21. **CALLISTEPHUS**, Cass. **CHINA ASTER.** Ray flowers \( \varphi \), \( \infty \), disk-flowers \( \varphi \). Involucre hemispherical. Recep. subconvex. Pappus double, each in ... series, outer series short, chaffy-setaceous, with the setae united into a crown; inner series of long, filiform, scabrous, deciduous bristles.

C. **CHINENSIS.** Stem hispid; branches divergent. 1-flwd.; leaves ovate, coarsely dentate, petiolate, cauleine ones sessile, cuneate at base. China? Cultivation has produced innumerable varieties, double and semi-double, of every color. Aug., Sept. 1

22 **BELLIS,** L. **GARDEN DAISY.** Rays \( \infty \), \( \varphi \). Disk \( \varphi \). Involucel
hemispherical, of equal scales. Recep. subalveolate, conical. Pap. none.

1 B. integrifolia Mx. Annual, diffusely branched; lvs. entire, spatulate-ovate to lance-oblong; sc. with scarious margins; rays violet-purple. Ky. to Tex. 6–12'. Mar.–May.


23. DÂHLIA, L. Rays ♀. Disk ♂. Invol. double, the outer series of many distinct scales, the inner of 8 scales united at base. Recep. chaffy. Pappus none. 2¢ Splendid Mexican herbs. Leaves opposite, pinnate.


2 B. glastifolia L'Her. Lvs. linear-lanceolate, the lowest crenate; heads in a loose paniculate corymb; fruit obovate, with 2 long awns. Prairies, W. & S. 3–7f. Rays 30.

3 B. decurrens. Lvs. lance-oblong, the broad base decurrent on the green, winged stem; heads corymbed, globular in fruit; fruit obovate, with 2 awns and several minute bristles; rays purple. Bottoms. Ill. (J. Wolf) (B. glastifolia. ♀ T. & G.)

4 B. diffusa Ell. Lvs. lance-linear to subulate, entire; hds. small, in a diffuse panicle; fruit obovate, with 2 short (half its own length) awns. Prairies, W. & S. 2–6f.

25. BRACHYCHÆTA, T. & G. FALSE GOLDENROD. Pap. a single row of scale-like bristles, shorter than the obconic cypselæ. Otherwise as in Solidago. The golden yellow heads arranged in little clusters, forming 1 or more unilateral racemes.


26. SOLIDÀGO, L. GOLDENROD. Fls. of the ray about 5, ♀, remote; of the disk ♂. Invol. oblong, imbricate, with appressed scales. Recep. punctate, narrow. Pap. simple, capillary, scabrous. 2¢ Very abundant in the U. S. Stem erect, branching near the top. Lvs. alternate. Hds. small, with 1–15 (very rarely 0) small rays. Fls. yellow (one species whitish), expanding in the autumnal months. Fig. 319. (Addenda.)

§ Shrubs 1–3f. Leaves punctate, veinless, entire. Rays 1–3. CHRYSAOMA.........No. 1

§ Herbs. Scales of involucr with spreading herbaceous tips. CHRYSASTRUM.. No. 2–4

§ Herbs. Scales imbricated, erect, scarious, seldom herbaceous... (a)

a Inflorescence chiefly axillary, in clusters or short racemes... (b)

a Inflorescence terminal, virgate or paniculate... (d)

a Inflorescence terminal, in a fastigate corymb... (e)

b Rays white or cream-white. Clusters approximate above............ . No. 5
Order 70.—COMPOSITÆ.

₁ Ray golden yellow.—c Cypsela glabrous. Scales acute. Nos. 6, 7
c Cypsela pubescent. Scales obtuse. Nos. 8—10

2 Clusters or racemes erect, not second. Leaves feather-veined...

₃ Clusters or racemes recurved and second (one-sided)...

₄ Heads large, with loose scales. Alpine plants. Nos. 11—13
₅ Heads not large.—f Plants glabrous. Rays 4—7. Nos. 14—16

₇ Leaves evidently feather-veined, mostly serrate...
₈ Leaves evidently 3-veined. Herbs inland, not maritlime...
₉ Leaves 3- or 1-veined, fleshy. Very smooth, salt-marsh herbs. Nos. 19, 20
₊ Leaves not veiny, thick, subentire. Herbs some downy, inland. Nos. 21—23
₋ Leaves entire or very nearly so. Nos. 24—26

₃ Hairs on the disk far if at all panicled. Nos. 41, 42
₄ Heads close, forming a compact panicle. Nos. 43—45
₅ Hds. large, rays fewer than the disk fls.—x St. and larc. lvs. smooth. Nos. 46—49
₆—x Plant hairy. Lvs. oblong. Nos. 50, 51
₇ Hds. small, rays more numerous than the disk flowers. Euthamia. Nos. 52, 53

1 S. pauciflósculósa Mx. Bushy, glabrous, glaucescent and some viscid; lvs. lance-linear, entire, sessile; rac. erect, panicled; lfts. 5—7, rays 1—3, large. Coast, S.

2 S. discóidea (Ell.) Downy-canescence; hds. about 12-flwld., with no rays; rac. erect, in a long, narrow panicle; lvs. ovate to lanceolate, serraté. Ga. Fla., and W. 3f.

3 S. squarrósa Muhl. Pubescent; hds. very large, CO-flwld., rays 9—12; panicle long, spike-like; lvs. smooth, broad-oval to elliptic, serraté. Hills, Can. to Ga. 2—5f.

4 S. petiólárīs Ait. Pubescent, strigate; hds. 20—25-flwld., rays 6—10; rac. long, compound; lvs. rough, small, oval to elliptic, the upper subpetiolar; scales subulate, the outer herbaceous, loose, spreading. Uplands, S. and W. 1—3f. (S. squarrólosa, C-B.)

5 S. bícōlor L. Hairy, simple; leaves elliptical, the lower serraté; heads glomerate, virgate-panicled above; scales obtuse; rays about 8, whitish. Hills. 2f.

β. hírsúta. Rays yellow, as well as the disk flowers. Penn. (S. hírsúta N.)

6 S. Búcckleyl T. & G. Villous-pubescent; leaves oblong, serraté, acute at each end; clusters shorter than the leaves; lfts. 15—20, rays 4—6; scales glabrous, rather acute; fruit compressed, glabrous. Interior of Alabama. 2—3f. Leaves 3'. October.


8 S. latífōlla Muhl. Stem flexuous, angular, downy above; lvs. broad-ovate or oval, acuminate both ways, deeply serraté; racemes axillary and terminal, dense or loose; cypselá silky-pubescent; flowers 9—12, rays 3—4. Woody vales. 2f.


9 S. ambíguá Ait. Smooth or smoothish; st. tall, angled; lvs. long-lanceolate, acuminate, finely serraté, the upper reduced and shorter than the racemes; heads large; scales obtuse, oblong; fruit hairy. Mts. N. Car. 3f. Leaves 4—5'.

β. Curtisit (T. & G.) Rac. shorter than the lvs.; sc. lin.-oblong; fr. silky. N. Car

10 S. caslā L. Stem slender, recurved at top, terete, smooth, glaucescent; lvs. lin.-lanceolate, pointed, the lower serraté; lfts. 6—10, rays 3—5, oval; racemes axillary, usually short; fruit puberulent. Hilly woods. 2—4f. Very elegant, wreath-like.

11 S. thyrsoídeá Meyer. St. stout, simple, angular; lvs. ovate, acute, sharply and unequally toothed, the lower on long petioles; hds. large, in a narrow, downy raceme or panicile, rays 8—10; cyp. glabrous. Mt. woods. Me. to N-Y. 1—4f. Coarse and showy.
13 S. virgàrea L. β. alpina (Bw.) St. dwarf, furrowed, simple; lvs. oval, sub-serrate or entire, narrowed to a petiole, upper lanceolate; hds. few (1–9), large, rays 10–12; sc. acute, very thin. Tops of high mts. Me. to N. Y., shores of L. Sup. 3–6'. y. glomerata. Taller; lvs. ovate-oblong, serrate; hds. very large. Mts. N. Car.

13 S. humìllis Ph. Glabrous, simple; lvs. oblanceolate, crenate-serrate, acute, the lower obtuse, petiolar; rac. paniculate; hds. middle-size, about 12-flwd.; sc. obtuse. Mt. streams, N. H. and N. 6–12'–2f.—Varies with the branches pubescent above.

14 S. virgàta Mx. Tall, virgate, with a simple raceme at top; lvs. thickish, entire, ob lanceolate, the lower subserate, petiolar: hds. about 15-flwd., rays 6–7; fr. pubescent. Damp pine-barrens, N. J. to Fla. 3–5f. Rac. 6'–1f. long, of small clusters.

15 S. stricta Ait. Strict, simple; lvs. lanceolate, lower serrate, very long-petiolate, upper entire, panicle slender; heads 10–12-flowered; scales obtuse; rays 5 or 6. Wet woods, N. 2f.

16 S. speciòsa N. Stout, simple; lvs. lanceolate, entire, thick, lower very broad, subserate, petiolar; panicle thyrsoid; ped. pubescent; rays, 6–8, large. Thickets: not common. 3–6f. Very handsome.—Varies with the panicle slender or virgate.

17 S. verna Curtis. Hoary-pubescent; stem few-lvd., loosely paniculate; lvs. ovate to lance-ovate, the lower finely serrate; rays, 10–12. Barrens, S. Fls. in May, June.

18 S. pubérula N. Puberulent as if dusty, strict, simple; lvs. oblanceolate to lanceolate, the lower subserate; pan. dense, compound; sc. linear-subulate; fls. 20–25, rays about 10, elongated. In woods. Stem purplish, 2–3f. Heads rather large.


20 S. angustifòlia Ell. Lvs. thick, entire, erect, 1-veined, the lower lanceolate; pan. dense, virgate; hds. 15–20-flowered, rays 7; ped. glabrous. Swamps, S. 2–4f.


22 S. odóræ Ait. St. terete, smoothish, slender; lvs. lin.-lanceolate, abrupt at base, acute, pellucid-punctate; rays 2–4, disk-fls. 3–4. Dry hills and woods. 2–3f. The plant is yellowish-green, fragrant, and yields by distillation a fragrant oil.

β. rétróra. Lvs. linear to subulate, acute, often twisted; rays 1–3. Ga.

23 S. tortìfolia Ell. St. rough-pubescent; lvs. many, linear, small, subentire, not punctate, often twisted at base; lc. obtuse; rays 3–5, disk-fls. 3–5. Dry fields, S. 2–3f.

24 S. nemoràllis Ait. Dusty-subtomentous; lvs. obscurely 3-veined, roughish, acute, attenuate at base; hds. small; fls. 10–15, rays 5–6, conspicuous. Dry fields, roadsides. 1–2f.—Varies with stem much branched, or with stem and panicle simple and slender.

25 S. rupéstris Raf. Smooth, slender; lvs. linear-lanceolate, plainly 3-veined; hds. small, in a simple panicle; fls. 15, rays very short. Rocky banks, Ind. Ky. 2–3f.

26 S. Leavenwórthli T. & G. St. minutely downy, very leafy; lvs. smooth, lin.-lanceolate, entire above; panicle open; heads rather large; ray and disk flowers each 10–12. Damp soils, South. 2–3 feet high.

27 S. Missouríensis N. Low, simple; lvs. lance-lin., tapering both ways, shining, the lowest oblanceolate, with slender serratures; rac. small, dense; pedicels glabrous; hds. small, 12–15-flwd.; sc. with greenish tips; rays about 8. Dry prairies, Ill. Mo. 1–2f.

28 S. serótìna Willd. St. terete, striate, tall; lvs. slightly serrate, lin.-lanceolate, veins beneath pubescent; ped. pubescent; hds. env. 15, 15–20-flwd. Low grounds. 3–6f.

29 S. gigántea Ait. St. striate, tall; lvs. lanceolate, with sharp, spreading serratures; strongly 3-veined; pan. downy-hirsute; hds. 15–20-flwd. 4–7f. Generally much branched.

30 S. Canadénsis L. St. downy; lvs. lanceolate, acuminate, rough; hds. very numerous and small; fls. 12–17, rays short and obscure, about 7. Copses, ledges; com. 2–5f.

β. pròceræ. St. and lvs. beneath villous; hds. and rays larger. Low grounds. 4–7f.

31 S. Shòrttii T. & G. St. minutely rough-downy; lvs. lance-oblong, acute, smooth pan. contracted, elongated; sc. with greenish tips; fls. 10–15, rays 5–7. O. Ky. 2f.

32 S. gracìllìma T. & G. Smooth, slender; lvs. lance-spatulate, obtuse, to linear, entire; panicle narrow, hds. 9–12-flowered, scales obtuse; rays 0. Barrens, Fla. 2f.
33 S. brachyphylla Chapm. Pubescent; leaves spatulate to round-oval, serrulate; rac. spreading; scales obtuse, rigid; disk-fls. 3–5, rays 0. Dry soils, Ga. Fla. 3f.

34 S. altissima L. Hairy, tall; lvs. lanceolate, very velvety, rough and wrinkled, the lower serrate; scales acute; rays 6–8. Fields: common. 3–5f. Variable.

35 S. Drummondii T. & G. Minute, velvety; lvs. ovate or broad-oval, acute both ways, sharply serrate, veiny; scales oblong-obtuse; rays 4–5. Ill. opp. St. Louis. 1–2f.

36 S. Rádula N. Rough-downy, simple; lvs. oblong-lanceolate, tapering to base, serrate above, very rough and rigid; hds. small, rays 5, disk-fls. 3–6. Ill. to La. 1–2f.

37 S. amplexicaulis T. & G. Rough-pubescent, subsimple; lvs. broad-cordate to ovate, serrate; petioles wing-clasping; rays 1–3. Dry woods, W. Fla. to La. 2–3f.

38 S. ulmifolia Willd. Stem glabrous, with hairy branches; lvs. thin, elliptic-ovate, acuminate, serrate, tapering to base, smooth above, villous beneath; raceme recurved; hds. small, scales acute, rays 3–4, disk-fls. 3–4. Thickets, N. and W. 3f.

39 S. Boottii Hkr. Stem glabrous, with hairy branches; lvs. ovate to lance-ovate, pointed at both ends, serrate; pan. long, loose; hds. middle-size, scales oblong, obtuse; rays 2–5, disk-flowers 8–12. Sandy soils, S. 2–3f. —Varies with stem downy.


41 S. Muhlenbergii T. & G. St. furrowed; lvs. smooth both sides, strongly serrate, ovate to lanceolate, pointed both ways; rac. axillary, remote, spreading; hds. 15–20-flowered, scales linear, obtuse. Damp woods, N. H. to Pa. 2–3f.

42 S. pátula Muhl. St. angular-irriate; lvs. elliptic, acute, serrate, very rough above, the lower oblong-spatulate; panicle loose; scales obtuse, flowers 12–15. N. and W. 3f.

43 S. elliptica Ait. Glabrous, leafy; lvs. elliptic, acute both ways, sub serrate; pan. pyramidal; rays very short, 5–8, disk-fls. 6–7; scales obtuse. Marshes, R. I. to Ga. β. Elliottii. Panicle more widely spreading. South. (S. Elliottii T. & G.)

44 S. argáta Ait. Strict; lvs. smooth, unequally serrate with divergent teeth, oblong-ovate to elliptical; pan. corymbosus; rays about 10, disk-fls. 9–10; cyp. smooth Woods, meadows; common. 3f. Plant smooth and shining.

β. juncce. Leaves lanceolate, upper entire; rays twice longer than involucre.

45 S. neglecta T. & G. St. striate; leaves lanceolate to linear, the lower divergent-serrate, long-stalked; panicle oblong or pyramidal; rays 6–10, disk-flowers 7–12; cypsela smooth. Swamps, Me. to Penn., and W. 3–4f. Root leaves 6–12'.

46 S. Ohéndis Hiddell. Entirely smooth; lvs. entire, lanceolate, flat, obtuse, to oblong-lanceolate, abruptly-acute, the lower on long stalks; hds. numerous, large, 15–20-flowered, rays about 6. Meadows and prairies, West N-Y. to Ind. and Wisc. 2–3f.

47 S. Riddélli Frank. Stout, nearly smooth; root lvs. very long, lance-linear, long-pointed, on long petioles, the cauline clasping, carinate, acute; heads 20–24-flowered, densely clustered in the level corymb. Wet prairies, O. to Mo., and N. 15–30'.

48 S. corymbîosa Ell. Glabrous, with the corymbosus branches hisrate; lvs. sessile, lance-oval thick, rigid, smooth; hds. large, rays 10, disk-fls. 20; fr. smooth. Ga. 4–6f.

49 S. Aughtonîi T. & G. Low, smooth; lvs. lin.-lanceolate, acute, flat, entire, tapering to base or petiole; hds. few, large, 20–30-flwld., rays 9 or 10. N. Y. Mich. 1–2f.

50 S. rigida L. Stout, rough-hairy; lvs. rigid, ovate to oblong, serrate, upper minute; hds. very large (4–5'), scales obtuse, rays 7–10, disk-fls. 25+. Dry. Ct., S. and W. 3–5f.

51 S. splêthâmae Curtis. Low, villous; lvs. lance-oval to oblong, thin, sharply serrate; hds. middle-size; scales lanceolate, acute; rays 6–8, disk-fls. 15–20. High mts. N. Car.


53 S. tenûifîlla Ph. St. angular, smooth, much branched; lvs. narrowly linear, 1-veined, the axils leafy; corymb open, loose; rays about 10. Dry fields, coastward.

27. BIGELÔVIA, DC. Fls. 3–4, all tubular, Ø. Rays 0. Invol. cylindrical, as long as the flowers. Scales rigid, linear, closely imbricated.
Recep. pointed by a scale-like cusp. Fr. obconic, hirsute. Pap. bristles in one row. 4 Glabrous, slender. Leaves alternate, entire. Heads fastigially corymbous, with yellow flowers and colored scales.


**I. divaricâtus** T. & G. Scabrous, hispid; lvs. lin.-lanceolate, taper-pointed each way; ped. slender, naked; rays 6–8, disk-fls. 10–13; pappus tawny. Dry. Ga. Fla. to Tex.

29. **HETEROTHÈCA**, Cass. Hds. ∞-flowered. Rays in one series, ♂; disk-fls. ♀. Scales imbricated, appressed. Recep. alveolate, fringed. Fr. minutely canescent, of the ray without pappus (naked), of the disk with a double pap., the outer very short, scale-like, the inner of capillary bristles. 4 Hairy, corymbiously branched, with alternate leaves and yellow flowers.

**H. scâbra** DC. St. flexuous, striate; lvs. scabrous, oblong-ovate, dentate; pet. wing-clasping; hds. large, rays 15–20; pappus tawny red, the outer white. S. 2–3f. Sept. Oct.


§ Leaves linear and lance-linear, grass-like, veined. Cypsela linear. . . . . . Nos. 1–4

♀ Leaves oblong. Cypsela clavellate.—a Corymb simple, umbel-like. . . . . . Nos. 5–7 —a Corymb compound or paniculate. Nos. 8–10

1 **C. graminifòlla** N. Canescent with long, silky hairs; stem leafy to the top; lvs. linear, the upper reduced; hds. many, large, loosely corymbed. Del. to Fla. 2f. Sept.

2 **C. oligântlia** Chapm. Canescent with silky hairs; st. almost leafless above; hds. quite large, few, on slender peduncles; lvs. lance-lin. Damp sands, Fla. 2f. Apr. May.

3 **C. pinifòlia** Ell. Glabrous; lvs. narrowly linear to setaceous, rigid, erect; hds. solitary, few; cyp. villous; pap. reddish-brown, the outer whitish. Hills, Ga. 1–2f. Sept.


5 **C. Marlâna** N. Silky-arachnoid, simple; lvs. oblong-lanceolate, smooth when old, the lower spatulate, rather obtuse, upper reduced, acute; hds. about 7, large, 15–20-rayed; ped. and acute scales glandular. 2 Barrens, N. J. to Fla. 2f. Sept.

6 **C. gossýpina** N. Cottony-tomentous, simple; lvs. uniform, ovate-oblong, obtuse, the lower tapering to base; hds. few, large; ped. short, glandular. 5 Md. to Fl. in barrens. 1–2f. Lower leaves rarely siminate-toothed. (C. dentata Ell.) Sept.

7 **C. villôsa** N. Villous-pubescent, leafy to top; lvs. acute, lower oblong-spatulate, the upper oblong-linear, bristly-ciliate; hds. large, umbel expanded. Ill. to Ala. 2f.

8 **C. trichophyîla** N. Silky-villous, branching, leafy; lvs. oblong to lance-linear, the lower obtuse; corymb large; ped. and scales smoothish. 2 Barrens, S. 2–3f. Sept.

9 **C. scabrêlia** T. & G. Dusty-scabrous, stout, branched; lvs. oblong-lanceolate, the lower narrowed to base, upper acute; corymb large; ped. glandular. Fla. 2f. Oct.

10 **C. décumbens** Chapm. Silky-villous, decumbent; lvs. lance-oblong, obtuse, with leafy axils, lower spat.-oblong; hds. very large, paniculate, glandular. Fla. 3–4f. Nov.

* C. ambigua * DC. Cinereous-pubescent; lower lvs. sinuate-lobed, acute, middle re-


I. **Helènium** L. Lvs. amplexicaul, ovate, rugous, downy beneath; hds. solitary, termi-


1 P. bifrons * DC. Pubescent, leafy; lvs. oval-oblong, acute, finely serrate, cordate-
amplexicaul, veiny; heads in compound, corymbose clusters. ☞ Damp, S. 2f.

2 P. camphoràta * DC. Lvs. ovate-lanceolate, somewhat pubescent, acute, sessile or short-petioled, serrate; fls. in crowded corymba; sc. viscid-downy, pointed. ☜ Salt marshes, Mass. to Fla. 1–3f. Stout, some fleshy, with upright branches. Aug. Sept.

3 P. purpuràscens * DC. Glabrous-tomentous; lvs. ovate-lanceolate, serrate, on slender petioles; hds. on slender ped.; sc. downy, acute. ☜ Swamps. 1–2f. Fla. Sept.

4 P. fætida * DC. Nearly glabrous, very leafy; lvs. broadly lanceolate, acute or acu-
minate at each end, petiolate, obtusely sub serrate; heads numerous, in paniculate corymba; scales smoothish, acute. ☞ Open hills, W. & S. 1–2f. Aug.–Oct.


1 B. halimítfólla * L. Whitish-scurfy; lvs. obovate, incisely- or repand-dentate above, the highest lanceolate; panicle compound, leafy; fascicles pedunculate, terminal, in a dense panicle. Sea-coast, Conn. to Fla. 6–12f. A handsome shrub.

2 B. glomerulíflóra * Pers. Minute syn. scurfy; lvs. all obovate, very obtuse, repand-
few-toothed; heads in sessile, axillary glomerules. Coast, Va. to La. 3–6f.


P. pychnostáchyum * Ell. Simple; lvs. lanceolate, smooth above, cream-white-
tomentous beneath, as well as one side of the wings of the stem. Sandy soils, S. 2–3f. Spike 2–3′. May–Aug. A curious plant.

Scales imbricated, the outer leafy. Recep. flat, chaffy, the chaff rigid, persistent. Fr. 4-angular, crowned with a 4-toothed pappus. 5 5 Maritime, with opposite leaves and solitary yellow heads.

1 B. frutescens DC. Canescent, downy; lvs. oblong-ovate, repand, obtuse-cuspidate, subconnate at base; chaff of the recep. rigidly cuspidate. Marshes, Va. to Fla. 1-3f.

2 B. arboriscens DC. Smoothish; lvs. spatulate, entire; chaff obtuse. S. Fla. 8f.

37. ECLIPTA, L. Ray-fls. ♀, numerous, narrow; disk ♂, mostly 4-toothed. Scales 10—12, in two rows, leafy, lance-ovate. Recep. flat. Chaff liristly. Cypsela somewhat angular or 2-edged. Pap. 0. 1 Strigous. Lvs. opposite. Heads axillary and terminal, solitary. Flowers white. Fig. 72.

E. alba (L.) Erect or diffuse, with short, appressed hairs; lvs. lance-oblong, tapering to each end, subseriate; ped. longer than the hds.; scales lanceolate. Damp soils, Ill. to Md., and S. 1-3f. Rays minute. (E. erecta L. E. procumbens Mx. Cotula alba L., &c.)

38. GALINSÓGA, R. & P. Rays 4 or 5, small, obtuse, ♀. Invol. scales 4 or 5, ovate, thin. Recep. conical, chaffy. Cyp. angular. Pappus of small, fringed scales, or 0. 1 Leaves opposite, 3-veined. Heads small, with white rays and yellow disk-flowers.


1 P. Canadénsis L. Viscid-villosus; lvs. petiolate, acuminate, lower pinnatifid, upper 3-lobed or entire, rays shorter than the invol. Can. to Car. and Ill. 3—5f. June.

2 P. uvedália L. Haary and rough, stout; lvs. 3-lobed, acute, decurrent into the petiole; lobes sinuate-angled; rays 7—12, much longer than the involucrè. In highland woods, N. Y. to Ill., and S. 3—6f. Lvs. very large (as also in No. 1). Hds. showy.

40. CHRYSÓGONUM, L. Rays about 5, ♀, fertile; disk ♂ but sterile. Scales in two rows of about 5 each, the outer leafy, the inner chaffy. Recep. flat, chaffy. Cyp. of the ray obcompressed, obovate, each embraced by a chaff scale, of the disk abortive. Pappus a small, 2—3-toothed crown 2. A little prostrate herb, with opposite leaves and solitary, pedunculate, bright yellow vermal flowers.

C. Virgínianum L.—In rich shady soils, Md. to Ill., and South. Acaulescent, finally canescent. One of the earliest flowers of Spring.


* Stem nearly leafless, scape-like. Lvs. very large, alternate, mostly radical... Nos. 1—3
* Stem leafy.—a Leaves verticillate, in whorls of 3's, rarely 4's........ Nos. 4, 5 β.
  —a Leaves opposite, rarely the highest scattered................ Nos. 5—7
  —a Leaves alternate (the lowest opposite or verticillate or alternate). No. 8
  —a Leaves connate-perfoliate................................................. No. 9
1 S. laeclinatam L. Polar Plant. Very rough, with white, hispid hairs; leaves (19) pinnately parted, petiolate, segments sinuate-lobed or entire; heads spicate, distant; scales ovate, appended and squarrous at apex. Prairies, W. 5—10 ft. July—Sept.

2 S. terebinthinaceum L. Prairie Burdock. St. glabrous; lvs. ovate to oblong, cordate, tooth-serrate, obtuse (1—2 ft); hds. panicked; scales round-oval; rays about 20; fr. winged. Prairies, W. and S. 4—8 ft. Exudes much resin. Hds. 3' broad, rays 1' long.

β. pinnatifidum. Lvs. more or less deeply lobed or pinnatifid. Prairies.


4 S. trifoliatum L. St. glabrous, terete or 6-angled; lvs. lanceolate, acute, short-petiolated, in 3's or 4's, upper opp.; cyme loose; fr. oval, 2-toothed. Dry, O. to Fla. 4—6 ft.

5 S. integrifolium Mx. Scabrouts; st. 4-angled; lvs. opp., sessile, ovate-lanceolate, entire, cordate; corymb close; fr. broad-winged, 2-toothed. Prairies, W. and S. 2—3 ft.

β. ternatum. Stem 6-angled; lvs. verticillate in 3's. With the common form.


8 S. Asteriscus L. Hispid or hairy; lvs. lanceolate, crenate-serrate, petiolate; scales leafy; fruit broad-ovablate, 2-toothed. Dry soil, Va. to Fla. 2—4 ft. June—Aug.

β. pinnatum. Downy, low; leaves elliptical; heads small; fruit truncate.

9 S. perfoliatum L. Cup-plant. Stem square; leaves large, thin, ovate, forming a cup with their connate bases; heads on long peduncles; fruit broad-ovablate, winged, notched. By streams, W. and S. 4—7 ft. Heads large. July, Aug.


2 B. subacaulis N. Caulescent, at length some caulescent, roughish canescent; lvs. sinuate-pinnatifid; scapes tall, bearing a single head. Ga. Fla. May, June.

43. MÁDIA, Molina. Invol. scales as many as the rays, complicate and embracing the compressed cypselæ. Recep. chaffy at its border. Rays 5—15, 2; disk-fls. 2, but often sterile. Pap. 0. 1 Hairy and glandular.

M. élegans. Lvs. lance-linear, sessile; heads corymbed; rays linear-cuneate, 3-toothed at apex, yellow, with a purple base. From California, very showy. (Madiania, DC.)


S. speciosa. Leaves pinnatifid, with oblong cut segments; rays linear-oblong, spreading 2', yellow, disk dark purple. 1 ft. Blooms profusely from July to Oct.

45. PARTHÉNÍUM, L. Rays 5, very short, fertile; disk-fls. ∞, tubular, sterile. Invol. hemispherical. Sc. in two series, outer ovate, inner
orbicular. Recep. conical, chaffy. Cyp. 5, compressed, coloring with 2 contiguous pales. American herbes with alternate leaves. (Flowers white.)


2 P. Hysteróphorus L. Puberulent, decumbent; lvs. bipinnatifid, the upper linear; heads numerous, very small, in a diffuse panicle. River banks, Fla. to La.


3 I. imbricaria Walt. 2 Terete, glabrous; lvs. fleshy, linear-lanceolate, sessile; heads drooping, in leafy racemes; scales 6–9, obtuse, imbricated in 2 rows, with torn edges. Sea-coast, S. 1–2f.

47. AMBROSIA, Tourn. Horse-weed. Monocious. Sterile involucr of several scales united into a depressed, hemispherical cup, many-flowered. Anth. approximate, but distinct. Fertile involucr 1-leaved, entire or 5-toothed, 1-flowered. Cor. 0. Sty. 2. Sta. 0.—Herbaceous plants with mostly opposite leaves and unsightly flowers. July—Sept. Figs. 73, 342.

§ Sterile heads sessile, densely spicate, chaffy. Leaves alternate......... No. 1
§ Sterile heads pedicellate, racemed, not chaffy.—a Leaves opposite.......... No. 2
—a Leaves alternate......... Nos. 3, 4

1 A. bidentata Mx. Hairy and leafy, with simple branches; lvs. sessile or clasping, oblong, with a single tooth on each side near the base; fertile hds. axillary; fr. 4-angled, acutely pointed, the ribs produced into 4 short spines. 1 Prairie, Ill. to La. 1–5f. 3

2 A. tridid L. Rough-hairy; lvs. 3-lobed, serrate, lobes oval-lanceolate, acuminate; fr. with 3 ribs ending below the conical top. 1 Along streams, &c. 5–10f. Aug. 5

β. integrifolia. Leaves ovate, acuminate, often some of them 3-lobed.

3 A. artemisiifólia L. Hog-weed. Lvs. twice-pinnatifid, smoothish, petioles ciliate; sterile hds. in panicled racemes, fertile axillary, sessile. 1 Gardens, fields. 2–3f.

4 A. psilóstachya DC. Whitish, woolly, branching and leafy; lvs. rigid, the lower opp., bipinnatifid, upper pinnatifid; rac. spike-like; fr. hairy. 1 Prairie, Wis. to Tex. 5


1 X. Strumárium L. Rough, unarmed, branching; lvs. cordate, lobed, 3-veined, unequally serrate; fruit elliptical, armed with stiff, hooked thorns, and ending with 2 spreading, straight horns. Fields, waysides, N., M. 2–5f. Aug. Unsightly.

2 X. spinósus L. Whitish-downy, armed with triple, slender, subaxillary spines; lvs. lance-ovate, 3-lobed, dentate, or entire; 2 invol. oblong Waysides, &c. 2f. Sept.

49. MELÁNHERA, Cass. Fls. all tubular, 2. Scales in 2 subequal series. Recep. chaffy, the pales partly investing the fls. Cyp. short, truncate,
angular. Pap. a few minute caducous awns or bristles. 24 Scabrous, with square stems, opposite, petioled, 3-veined leaves and long peduncled heads. Corolla white. Anthers black, tipped with a white appendage.


2 M. deltoides Mx. Lvs. ovate-deltoid; scales ovate; pales or chaff obtuse. S. Fla.

50. ZINNIA, L. Ray-fls. ligulate, ♀; disk tubular, ♂. Sc. oval, margined, imbricate. Recep. chaffy, conical. Pap. of the disk of 1 or 2 erect, flat awns. 1 American herbs, with opposite, entire leaves and solitary terminal heads. Rays bright-colored, showy.

1 Z. multiflora L. Lvs. lance-oblange, sess.; peduncles scarcely longer than the lvs.; rays oval, shorter than the invol.; fr. 1-awned; pales entire. Fields. S. 6–2f. May, Ju., &.

2 Z. elegans L. Lvs. ovate, cordate, sessile and clasping; peduncles much longer than the leaves; pales serrated; fruit 2-awned. Mexico. 2–4f. Fls. single or double, of all colors, often brilliant, blooming in gardens throughout the Summer.


β. gracilis. Slender, 2f; lvs. lance-ovate, scabrous, acute at base.

γ. scabræ. Stem and leaves scabrous, yellowish; leaves truncate at base. W. 6f.

52. Tetragonotheca, Dill. Hds. radiate. Invil. double, the outer of 4 leafy bracts united at base, the inner of 8 small scales similar to the chaff of the conical receptacle. Ach. smooth, truncate, destitute of pappus. 24 Clothed with viscid hairs, opposite leaves, with 1 or few yellow-flowered, large heads, on long peduncles.


2 E. angustifolia DC. St. hispid, slender; lvs. all entire, hispid-pubescent, 3-veined, lanceolate to lance-linear; rays 13–15, narrow, 1–2' long. Prairies and marshes, Ill. Mo., and S. 2–3f. Rays sometimes white. May–July. (See Addenda.)

3 E. atrorubens N. Smooth or rough; stem simple, farrowed; lvs. lance-linear to linear, rigid, the lower 3-veined; rays 8–11, shorter than the disk. (1') scales in 3 rows; pappus of 4 teeth. Damp barrens, Ga. Fla., and W. 2f. June–Aug.

54. RUBBÉCKIA, L. Invil. scales nearly equal, leafy, in a double row, 6 in each. Ray-fls. neutral; disk ♂. Recep. conic or columnar, with
unarmed pales or chaff. Cyp. 4-angled. Pap. a lacerate or toothed margin, or 0. 2 Leaves alternate. Heads large. Rays yellow.

§ Rays large, drooping. — a Leaves divided. Disk ovoid or rounded. Nos. 1, 2

— a Leaves undivided. Disk columnar. Nos. 3, 4

§ Rays spreading. Disk dark purple, conical or rounded. b Leaves deeply lobed or parted, the upper undivided. Nos. 5, 6

b Leaves undivided. — c Pales of the disk whitish downy. Nos. 7, 8

— c Pales dark purple as well as the flowers. Nos. 9—12


2 R. heterophylla T. & G. Downy; lvs. coarsely toothed, 3-lobed or parted, the lowest often round-cordate, highest ovate; disk globose; pales acute. Fla. 4f. Aug.

3 R. maxima N. Glabrous; leaves thin, ample, oval to oblong, subentire, the upper clasping; head solitary, on a long ped.; rays 2'. Wet barrens. Fla. to La. 7f. Aug.

4 R. nitida N. Glabrous and shining; leaves thick, lanceolate, acute, 3-5-veined; heads few or solitary; disk brown; rays 9—12, near 2'. Swamps. S. 4f. July.

5 R. subtomentosa Ph. Tomentous-downy, corymbous; leaves serrate, the lower 3- or 4-lobed; disk ovate; disk globose; pales bearded, obtuse; rays 10—15, orange-yellow, 1'. Prairies, W. and S-W. 3—5f. July. Aug.

6 R. triloba L. Hairly, panically branched; lvs. coarsely serrate, 3-lobed to ovate-lanceolate, the lowest cut-pinnate or undivided; hds. rather small, disk conical, dark purple; pales smooth, awned. Fields. M., W. 3—4f. Aug. Sept.

7 R. mollis Ell. Soft-woolly all over; lvs. oblong, sessile or clasping; sc. reflexed; disk dark purplish, with canescent pales; rays 15—20, 1'. W. Ga. 2—3f. Lvs. small. Aug.—Oct.


11 R. spectosa Wend. Hairy and downy; branches slender, leafless above; lvs. strongly dentate, acuminate, ovate to lanceolate, 5—3-veined, lower long-petiolate; sc. much shorter than the 18 rays; pales smooth, acute. Ill. to Va. 2—4f. Aug.—Oct.

12 R. Amplexifolia. (a) Branching, glabrous; lvs. cordate-clasping; rays spotted at base, brilliant. La. (Dracopelis)


1 L. pinnata T. & G. Rough; lvs. all pinnate, divisions 5—7, 2-parted or entire; rays light yellow, twice longer than the ovoid yellowish disk. W. N-Y., W., and S. 2—4f.

2 L. columnaris. Rough, branching; root lvs. undivided, oblanceolate; stem lvs. pinnatifid; disk nearly 2' long, longer than the 5—8 broad rays, which, in Variety pulcherrima, are crimson, tipped with yellow. Montana. 2f.

56. HÉLIÁNTHUS, L. SUN-FLOWER. Ray-fls. neutral; disk z. Sc. of the invol. imbricated in several series. Recep. flat or convex, the chaff persistent, embracing the fruit. Pap. of 2 or 4 chaffy awns, mostly deciduous. Fruit compressed or 4-angled. 12 Rough. Lvs. opposite, the up-
per often alternate, mostly tripli-veined. Rays yellow; disk yellow or pur-
pie: in late Summer and Autumn. Figs. 74, 261, 483-4.

§ HELIANTHELLA (T. & G.) Pap. persistent. Lvs. scattered, 1-veined Nos. 24, 25
§ HELIANTHUS proper. Pappus deciduous. Lower leaves opposite..(*

* Disk (its corollas and pales) dark purple, mostly convex..(a)
  a Herbs annual. Leaves chiefly alternate...........................Nos. 1, 2
  b Herbs perennial. Leaves opposite...e Scales acuminate........Nos. 3-5
  e Sc. obtuse or barely acute..Nos. 6, 7

* Disk (its corollas and pales) yellow...(b)
  b Leaves chiefly alternate and feather-veined.....................Nos. 8-11
  b Leaves chiefly opposite and 3-veined or tripli-veined...(c
  c Scales erect, closely imbricated.--f Plants green, rough......Nos. 12, 13
  --f Plants whitish, downy...Nos. 14, 15
  c Scales loosely spreading. Heads large, 9-15-rayed...(d)
  d Scales lance-linear, longer than disk. Leaves thin.......Nos. 16, 17
  d Scale: lance-ovate, as long as the disk. Leaves thick...Nos. 18-21
  c Scales loosely spreading. Heads small, 5-8-rayed............Nos. 22, 23

1 H. annuus L. Great Sunflower. Erect, stout; lvs. all coriace, only the lowest op-
posite; hds. very large (6-12), nodding; fr. glabrous. Gardens and fields. 2-10f. § S.
America.—A variety with the flowers all ligulate is sometimes found in gardens.

2 H. dubbis N. Decumbent, slender; leaves mostly alternate, ovate, serrate, petio-
late; hds. small; scales with slender points; fr. pubescent. Shores, E. Fla. to La. 1-2f.

3 H. Rádula T. & G. Hirsute, simple, bearing a single head; lvs. roundish-obovate
or obvate, obtuse, ovate; scales and pales lanceolate, acuminate, erect; rays 7-10, rarely 0.

4 H. heterophyllus N. Slightly hispid, slender, bearing a single head; lvs. entire,
the lower oval, upper linear-lanceolate; scales acuminate, erect, ciliate; pales acute;

5 H. angustifóllus L. Erect, slender, scabrous or hispid; lvs. lance-linear, taper-
ing to a long point, 1-veined, rigid; heads few; scales lance-linear, the long point

6 H. rigidus Desf. Rigid, sub-simple; lvs. lanceolate, pointed, rough both sides; hds.
few; scales ovate, acute, short; rays 12-20. Prairies, Ws. Mo. to La. 2-3f.

7 H. atrorubens L. Ped. few, long, leafless; st. hirsute below; lvs. ovate or oval,
obtusish, on winged petales; sc. oblong, obtuse, 3-veined. Dry soils. S. 2-4f.

8 H. gigántus L. Rough or hairy; lvs. lanceolate, serrate, pointed, on ciliate, winged
petales; scales lance-linear, ciliate; rays 12-20; pappus of 3 short, fringed scales
Can. to Car. and Ky. 4-10f.—Varies with the leaves mostly opposite.

9 H. tomentósus Mx. Stout, pubescent, branched; lvs. ovate to long-lanceolate,
acuminate, subcordate, the lower petalate; scales long-pointed, villous, spreading;
pales hairy and 3-toothed at top. Dry hills, Ill. to Ga. 4-8f. Rays 15".

10 H. grosse-serrátor Martens. St. smooth and glaucous; lvs. lanceolate or lance-
oveate, long-acuminate, sharply serrate, downy beneath, on winged stalks; scales
loose, subulate, as long as the disk; rays 15-20. W. and S. 4-6f.

11 H. tuberósus L. Jerusalem Artichoke. Root bearing oblong tubers; lvs. corialate
ovate to ovate, acuminate; petioles ciliate. Fields, hedges. 4f. § Brazil.

12 H. lítifórus Pers. St. branched above; lvs. thick, lance-oval, rounded, serrate,
on short stalks; scales ovate-lanceolate; rays 12-20, 3'. Woods, W. and S.W. 3-4f.

13 H. occidentállus Riddell. Slender, simple, nearly naked above; lvs. oval, sub-
serrate, on long hairy petales; hds. 1-5, small; scales lance-oval. Sandy. W. 3f.

14 H. mollis Lam. Canescent-tomentous, sub-simple; lvs. ovate, sessile, cordate-
classing, acuminate; sc. lanceolate; pales entire, acute; rays 15-25. O. to Mo. 2-4f.

15 H. clinèeres, $S$. Sulleóntii (T. & G.) Clinereus-pubescent; stem virgate,
branched above; lvs. ovate-oblong, narrowed to the sessile base, the lower to a winged
petale; pales pointed, with 2 lateral teeth; rays about 20. Ohío. 2-3f.
16 H. decapetalus L. Lvs. all opposite, thin, ovate, acuminate, toothed, on winged stalks, scabrous above, smoothish beneath.—Varies with the invol. scales enlarged and leaflike, or only lance-linear. Can. to Penn. 3–4f.


18 H. doronicoides Lam. Branching; lvs. ovate to lance-ovate, acuminate, serrate; scales lance-linear; rays 12–15, 1f², very showy. W. and S. 4–7f.


19 H. strumosus L. Smooth below; lvs. all similar, ovate-lanceolate, acuminate, serrulate; heads few, about 10-rayed; scales ciliate, squarros. Swamps. 3–5f.

20 H. hirsutus Raf. St. simple or forked, hirsute; lvs. petiolate, ovate-lanceolate, subsessile, hirsute beneath; scales lance-ovate, hairy; rays 11–15. Dry, W. and S. 6f. β. pubescens. Leaves tomentos beneath, subsessile. (II. pubescens Hook.)

21 H. divaricatus L. St. smooth, simple, or forked; lvs. rough, lance-ovate, long-petiolate from an abrupt sessile base; heads few, corymbos. Woods, &c. 4–5f.

β. ? scaberrimus. Stem subsimple; leaves thick, exceedingly rough and rigid, opposite or ternately verticillate, rounded at base W.

22 H. microcephalus T. & G. St. smooth or hispid, branched; lvs. lanceolate, acuminate, narrowed to a short petiole, rough above, whitish-downy beneath; scales lanceolate; rays 5–8, spreading 1°. Dry, W. and S. 3–5f. (H. Schwefelitzii T. & G.)

23 H. longifolius Ph. Smooth throughout, branching; lvs. lance-oblong to lance-linear, acute, the lowest petiolate, serrulate; heads few; scales ovate-lanceolate; rays 6–10, spreading 1f²–2f. Damp. S. 3–5f. (H. lavigitius T. & G.)

24 H. grandiflorus. Rough-downy; simple, leafy; lvs. 1–2f, lance-linear, sessile; scales lanceolate, loose; rays 15–20, near 2f; pappus 2 fringed scales. E. Fla. 3f.


57. ACTINOMERIS, Nutt. Heads many-flwd.; ray-fls. 4–14, rarely 0. Invols. scales foliaceous, subequal, in 1–3 series. Reccep. conical or convex, chaffy. Ach. compressed, flat, obovate, mostly winged and 2-awned. 2f Plants tall, with 3-veined, serrate leaves. Heads corymbos. Rays when present yellow. Autumn.

§ Actinomeris. Pappus of 2 awns. Stems tall, corymbose...2


a Rays wanting. Disk corollas white. Stem narrowly winged.............No. 2

b Rays 4–14, flowers all yellow. Scales in 2 or 3 series......................Nos. 3–5

1 A. paniciflora N. Lvs. opp. or alternate, lanceolate to elliptical, rigid, obtuse; hds, 1–3, discoid, yellow; fr. narrowly winged, the disk cupshaped. Barrens, Fla. 1–2f.

2 A. alba T. & G. Lvs. narrow-lanceolate, acute both ways, serrulate; scales lance-linear, few, in one series; fruit broadly winged. S. Car. to Fla. and La. 7f.

3 A. helianthoides N. Stem winged; lvs. alternate, ovate-lanceolate, decurrent, acuminate, serrate, rough, hairy; rays 1f long, 6–14, unequal; scales erect; fruit narrowly winged. Copes, prairies, Ohio to Ga., and W. 2–4f. June, July.

4 A. squarrosa N. Stem winged, tall (6–10f); lvs. alternate, some opposite, lance-oblung, long (6–14f), pointed both ways, decurrent; heads small; scales spreading or deflexed; rays 4–8, regular, short. Alluvion, N. Y., W. and S. Homely.

5 A. nudicaulis N. Stem wingless, branched and leafless above; lvs. oblong, unequally serrate, closely sessile; rays 7–12, broadly winged. Ga. Fla. Ala. 2–3f.

58. COREOPSIS, L. Tick-seed. Rays about 8, rarely 0. Involucre double, each 6–12-leaved. Reccep. chaffy. Cyp. obovate-compress, emarginate, each commonly with a 2-toothed, upwardly-hispid pappus, sometimes
Order 70.—Compositae.

none. Leaves mostly opposite. Rays usually yellow; disk-flowers yellow or dark purple.

§ Corollas of the disk dark purple...(a)
   a Ray-flowers yellow with a purple base. Achenia incurved.............Nos. 1-3
   a Ray-flowers wholly yellow. Achenia not incurved, 2-awned. Summer......Nos. 4-6

§ Corollas of the disk yellow. Rays rose-colored. Leaves simple............Nos. 7, 8

§ Corollas of the disk and ray all yellow (disk brownish in No. 9)...(b)
   b Leaves sessile, divided often so as to appear verticillate.............Nos. 9-19
   b Leaves petiolate, never serrate,—c pinate with lance-linear segments..Nos. 13, 14
       —c simple, or rarely anriched below.....Nos. 15, 16
   b Leaves petiolate, serrated,—d simple. Achenia awns obsolete........Nos. 17, 18
       —d compound.—e Rays about 8.............Nos. 19-21
       —e Rays wanting.............Nos. 22, 23

1 C. Drummondii. (1) Pubescent; lvs. pinnately (1-5)-divided; segm. oval or oblong, entire; sc. lance-acuminate; rays unequally 5-toothed. Tex. 1-2f. Rays ample, showy.

2 C. tintoria. (1) Glabrous; lvs. alternate, some pinate; lobes lin.-oblung and linear; scales very short, acute; rays 3-lobed at apex. Nebraska. 1-3f. Beautiful. Summer.

3 C. Atkinsoniana. 2 Lf. lobes linear-spatulate to linear; sc. oblong, obtuse; rays 3-lobed; fr. distinctly winged. Columbia River, Oreg. Hds. handsome, like C. tintoria.

4 C. gladiata Walt. St. terete; lvs. alternate, thick, some ternately divided, lance-oblung to lance-linear; outer scales lance-ovate; fr. fringed, awns 2, slender; rays 3-toothed at the dilated apex. Moist barrens, S. 2-3f. Heads several, corimboid.

5 C. angustifolia Ait. St. square; lvs. opposite (mostly), undivided, spatulate to linear, obtuse; outer, ovate, obtuse; fr. wing-fringed, awns 2, short; rays 3-lobed. S.

6 C. Emleder Ell. St. angular above; lvs. opp., lance-ovate to lanceolate; outer scales oblong, obtuse; fruit margined, ciliate, the 2 awns very short. Ga. (Elliotl) and Fla.

7 C. nudata Nutt. Very slender; lvs. few, terete, rush-like, alternate, the lower very long; hds. few; rays wedge-ovate, crenate-lobed at apex. 2 Swamps, Ga. Fla. 2f.

8 C. rosea N. Branching; lvs. opp., 1-veined, linear; ped. short; outer sc. very short; rays oblong, obscurely tridentate. 2 Wet grounds, Ms. to Ga. 8-16'. Delicate. Jl. Aug.

9 C. sentifolia Mx. Minute downy or glabrous; lvs. opposite, ternate, sessile, appearing in whorls of 6; lvs. lanceolate, varying to linear-lanceolate or even to linear; scales downy, obtuse; rays entire. 2 Dry, Va. Ky. to Ga. 1-2f. July, Aug.

10 C. delphiniifolia Lam. Lvs. opp., sessile, divided into lfts. which are each again 2-5-parted; segm. linear, entire, acute; disk-fs. brown at the tips. 2 Va. to Fla. 2f. Aug.

11 C. verticillata L. Branched; lvs. 3-divided, closely sessile, the divisions 1-2-pinately-parted; segm. filiform-lin.; rays 1-3-toothed. 2 Moist, Md. to Ga. 1-3f. Jn.-Aug.

12 C. palmata N. St. angled, striate, leafy to top; lvs. sessile, deeply 3-cleft, rigid; lobes linear, acutish, entire or again cleft; fr. linear-elliptic. 2 Prairies, W. 1-2. July.

13 C. tritertiis L. St. simple, tall, corymbose; lvs. opp., stalked, thick, 3-5-divided; segm. lanceolate, entire, acute; hds. small; rays obtuse. 2 Dry, W. and S. 4-8f. Jl.

14 C. grandiflora N. St. low; hds. solitary, large, on long naked stalks; lvs. lanceolate, mostly divided into lance-lin. seg.; rays 4-5-cleft. 2 Mo. to Tex. Much like No.15.

15 C. lanceolata L. Ascending; lower lvs. ob lanceolate, upper lanceolate, all entire; heads solitary, on long naked peduncles; rays 4-5-toothed. 2 Damp sols, West and So.th. Head showy. Rays about 8, spreading 2' or more. June—Aug. 1

16 C. auriculata L. Lower lvs. round-ovate, petiolate, some of them with 2-smal lateral segm. (auriculate) at base, the upper oblong, subsessile; hds. few, on long ped., outer scales oblong-linear. Dry sols, Ill. to Va., and S. 1-2f. May—Aug.

17 C. latifolia Mx. Very glabrous, tall; lvs. thin, opp., ovate to oblong, acuminate, unequally toothed; hds. small, rays 5 or 6, entire, large; sc. lin., spreading. Ms. S. Aug.

18 C. arguta Ph. Stem strict; lvs. simple, ovate to lanceolate, petiolate, acuminate, sharply serrate; scales oblong; rays 9-12, 3-toothed; awns obsolete. Hills, S. 2-5f.

20. **C. aristosa** Mx. Sparsely pubescent; lvs. pinnately 5-9-parted, segm. lance-lln., incised; hds. small, rays large; outer scales 10-12, linear; awns slender, spreading, as long as the fruit. 2 Low woods, W. 2-3f. Rays expanding 18". Aug.-Oct.-Varies with the outer involucre leafy; and with the awns short, &c.

21. **C. trichospérmata** Mx. Stem glabrous, square, dichotomous; lvs. pinnately 5-7-parted, segm. lanceolate, cut; rays entire, large; cyp. narrowly cuneate, with 2 short, stout awns. 3 Wet grounds, Mass. to Ill. (J. Wolf), and Car. 1-2f. Fls. showy. Jl. Aug.

22. **C. discoidea** T. & G. Glabrous, much branched; leaves terminal, long-petiolate; lfts. lance-ovate, dentate; hds. small (2-3"); fr. linear-cuneate, the 2 stont awns (upwardly hispid) half as long and equalling the corolla. 3 Wet, W. and S. 1-3f. Jl.-Sept.

23. **C. bidentoides** N. Glabrous, paniculate; lvs. simple, lanceolate, serrate; heads 7-11; fr. lin.-oblong, the slender (up-hispid) awns longer than cor. 1 Pa. Del.: rare.


§ Cypsela linear-subulate, tapering to the top, 3-4-angled, 2-6-awned. Nos. 1-3

§ Cypsela oblong-rotate, broader at the top, flat, 2-4-awned. Nos. 4-7

1. **B. leucántha** Willd. Lvs. in 3-5 serrate lobes; hds. with 5 white rays. S. Fla. 1f.

2. **B. bipinnata** L. **Spanish Needles.** Lvs. bipinnate, lfts. lanceolate, pinnatifid; rays very short, obovate, 3, 4, or 6; sc. all equal in length. 1 Waste grounds, Ct. to Ill. 2-4f.

3. **B. Beckii** Torr. St. subsimple; submersed lvs. capillaceous-multifid, emersed lvs. lanceolate, connate, acutely serrate or cut; rays longer than the involucre. 2 Slow waters, Vi. (rare), W. and N. Stem 2-3f. Heads solitary, terminal.

4. **B. frondósata** L. **Beggarticks.** Rays 0; outer sc. leafy, 6 times longer than the lfts.; lower leaves pinnate, serrate, upper lanceolate, serrate; awns 2. 1 Fields; com. 2f.

5. **B. connáta** Willd. Rays 0; outer sc. leafy, longer than the head; lvs. lanceolate, serrate, subconnate at base, lower some trifid; awns 3. 1 Swamps, E. and W. 1-3f.

6. **B. cérnua** L. Rays 0-1-8, small; hds. cernuous; outer scales as long as the disk; leaves all lanceolate, subconnate, dentate. 1 Swamps, ditches, E. and W. 1-2f.

7. **B. chrysanthémidés** L. Lvs. oblong, attenuate at each end, connate at base, regularly serrate; rays thrice longer than the involucre. 1 Ditches: common. 6'-2f.

60. **SPILÁNTHUS**, L. **Invol. shorter than the disk, double, appressed.** Recip. conical, chaffy, the pales embracing the flowers. Cyp. of the disk compressed, with 1-3 bristly awns or awnless, of the ray (when present) 3-angled. Herbs with acrid taste, opposite leaves, and solitary, yellow heads. Chiefly tropical. Aug.-Oct. (Acmella, Rich.)

1. **S. repens** Mx. Diffuse, rooting at the lower joints; lvs. lanceolate, subconnate, acute at each end, petiolate; rays about 12; fr. awnless, not ciliolate. 2 Wet, S. Car. to Fla.


61. **VERBÉSÍNA**, L. **Crown-Beard.** Rays 2, few or none; disk ½. Sc. in 2 or more series, imbricated, erect. Chaff concave or embracing the flowers. Achenia compressed, 2-awned. 2 ½ Leaves often decurrent serrate or lobed. Heads solitary or corymbous.

1. **V. Sieglisbecki** Mx. Stem 4-winged; lvs. opposite, ovate, serrate, acuminate, 3
Order 70.—*Compositæ. 181

veined, tapering to the winged petiole; hds. corymbous, yellow; rays 1-3; fr. wingless. 2 Dry, W. and S. 5f. Aug. Sept.

2 V. *Virginica* L. Stem narrowly winged; lvs. alternate, lance-ovate, sub serrate, feather-veined, tapering to the sessile base; rays 3-4, white; fruit narrowly winged. 2 Dry woods, Pa. to La. 4f. August.

3 V. *sinuata* Ell. St. wingless, striate-angled; lvs. alternate, ovate, acuminate, contracted to a long slender base and petiole, irregularly repand-toothed or lobed; rays 3-5, white; fr. broadly winged. 2 Sandy fields, S. 2-4f, with ample lvs. Sept.—Nov.


1 G. *lanceolată* Mex. Lvs. lanceolate to linear; sc. as long as the dark purple disk; rays 8-10, small, yellow; recept. naked. 2 Barrens, S. Car. to Fla. and Tex. 1-2f.

2 G. *picta*. Lvs. lanceolate; sc. hairy, longer than disk; rays 10-12, violet-purple with yellow teeth; recept. fimbriate with slender awns. 1 Dak. to Tex. 2f. Handsome.


G. *speciosa*. Trailing, half-shrubby; leaves oblong, entire or pinnatifid, smooth above, white-tomentous beneath; rays (1') orange-yellow, each with an eye of white and chocolate at its base. Singularly beautiful.

65. *Paláfóxia*, Lagasca. Rays 2 or 0. Sc. 8-15, scarios at tip, shorter than the disk. Recep. flat, naked. Cyp. 4-angled, slender at base. Pap. of 6-12 membranous, denticulate, pointed scales. 2 With scattered, narrow, entire lvs. and cyanic fls. in a corymb. (Polypterus, N.) 11-Sept.

P. *integríflóla* T. & G. Rough; lvs. lance-linear, 1-veined; rays none; pap. of 8-10 pointed scales with fringed edges. Barrens, Ga. and Fla. 3-5f. Heads purplish.


H. *scabiosès* L'Her. Leaf segm. linear-oblong; corymb simple; sc. obovate, white, greenish at base, longer than the disk; fr. pubescent. W. and S. 1-2f. Apr.—June.

67. *Helénium*, L. Rays 2 or neutral, 3-5-cleft at the expone.

§ HELLENIÁSTRUM. Rays pistillate. Pappus awned. Heads corymbose...(a)
   a Disk globular, its corollas 5-toothed. Pappus awned...................Nos. 1—3
   a Disk oblong, its corollas 4-toothed. Pappus scales obtuse...............No. 4

§ LEPTÓPODA. Rays mostly neutral and fruitless...(b)
   b Heads corymbose, on short peduncles. Pappus awned. Disk globous.....No. 5
   b Head solitary, on a long ped. Disk convex.—c Cypselae glabrous......Nos. 6, 7
   —c Cypselae hairy.......Nos 8—10

1 H. autumnâle L. St. strongly winged; lvs. lanceolate, serrate, decurrent, heads loosely corymbose. 2f Damp. 2—3f. Hds. large, with drooping rays. Sept. Very bitter.

2 H. parviflorum N. St. scarcely winged; lvs. lanceolate, subentire, slightly decurrent; sc. filiform, shorter than the globular disk; hds. small, few. Ga. (Nuttall.) Scarce.

3 H. tenulóflorum N. St. and numerous fastigate branches wingless; lvs. crowded, linear or filiform, fascicled; sc. subulate. 2 Fields, Ga.to La. 1—2f. Rays spread 10°.

4 H. quadridentâtum Lab. Much branched, strongly winged; lvs. oblong, some lobed or toothed; disk oblong, longer than the rays. Swamps, S-W. 1—3f. June—Aug.

5 H. Brachýpoda. St. strongly winged, branches few, corymbose, 1-headed; hds. small (4"), rays 8—12, short (3—4"); disk brown-purp., globular. Damp, Ill.to Ga. 1—2f.

6 H. Leptópoda. Smooth; st. simple, clustered, naked above; lvs. lanceolate to oblong-linear, some decurrent; rays 20—30, spreading 14°; disk convex. Moist soils, S. Car. to Fla. 2f. March, April.

7 H. Incisum. Smooth; lvs. lanceolate, sessile, not decurrent, sinuate-pinnatifid or incised; rays about 40, in 2 or 3 rows; fruit glabrous. Low barrens, Ga., and W. 2f.


9 H. brevíflorum. Pubescent above, single, often some branched; lvs. lance-obl. to linear, obtuse. the radical spathulate, cauleine subdecurrent. Wet. S. 2f. May, June.

10 H. fimbriátum. Smooth; often branched; leaves lance-linear, subentire, acute, decurrent; pap. scales deeply cleft into a fringe of bristles. Barrens, Fla. 1—2f. Apr. +


1 B. unífóra N. St. simple, puberulent, with 1 large head; rays about 20; lvs. below linear-spatulate; pap. scales 9. Swamps, Va. and S. 1—2f. Rays spreading 2°.


69. MARSHÁLLIA, Schreb. FALSE SCARISH. Invol. scales lance-linear, subequal, erect, in 1 or 2 rows. Recep. convex, with linear, rigid pales. Fls. all tubular, ¥. Cor. lobes slender, spreading. Cyp. 5-angled. Pappus of 5 or 6 membranous, awned scales. ¥ Simple or branched, with alternate, entire, 3-veined leaves, and solitary, long-stalked heads of purplish flowers, resembling a Scabish. Ornamental.

1 M. latifólia Ph. St. simple, leafy; lvs. ovate-lanceolate, acuminate, sessile; scales
70. ANTHEMIS, L. Chamomile, &c. Invol. hemispherical, with subequal, small imbricated scales. Rays numerous, generally 8. Recep. chaffy (at least at summit), convex or conical. Disk-flowers 5. Cypsela ribbed, smooth, linear or clavate. Pappus a slight border, or 0.—Herbs with 1-3-pinnatifid leaves, usually strong-scented. (Rays white.)

§ Chamamelum. Rays pustillate. Lvs. mostly alternate....Nos. 1, 2
§ Maruta. Rays neutral. Cypselae club-shaped or obovoid. Lvs. alternate....No. 3


2 A. nobilis L. Garden C. St. prostrate, branched from base, woolly; lvs. hairy, decumbent-pinnatifid, segm. lin.-subulate; pales some shorter than the fls. 2' Gardens, rarely in fields. Aromatic. § Enr.—Var. with fls. double (florets all radiate). Jl.–Sept


1 A. Milleri Di. Lvs. bipinnatifid, with linear, dentate, mucronate segments; stem furrowed, corymbed at top; sc. oblong, rays 4–5, short. Fields, waste grounds, everywhere. 1–2f. June–Sept.—A variety with rose-purple flowers, is very pretty.

2 A. ptármica L. Sneezewort. Leaves linear, acuminate, sharply serrate, smooth; hds. loosely corymbed; rays 8–12, longer than invol. (double in cult.) Rare. 15. §


1 L. vulgaré Lam. St. simple or branched; caniline lvs. clasping, few, lance-oblong, obtuse, cut-pinnatifid at base; scales brown at the edge. Too common in our fields and pastures. 2f. Rays spreading 1/2. July–Sept. § Europe. [N. Y. (Gerard.)
§ tubulifórme (Tenney). Ray-fls. tubular, very slender, 5–3 lobed. Po'keepsie,

2 L. Pasturién Godron. Feverfew. Branched; lvs. petiolate, 2-3-pinnate, segm. ovate, cut; hds. corymbed. Gardens, rarely in fields. 2f. Often double. (Matriaria, C-B.)

73. MATRICÁRIA, Tourn. Mother-Carey. Invol. scales imbricated, with scarious margins. Recep. conical or convex, naked. Rays 6 or 0. Pap. a membranous border on the cyp., or 0.—Herbs with alternate leaves.


74. TANACETUM, L. Tansy. Invol. hemispherical, imbricate, the
scales all minute. Recep. convex, naked. Pap. a slight membranous border. Cyp. with a large, epigynous disk.—Lvs. alternate, much dissected. Flowers yellow, discoid.

1 **T. vulgare** L. Lvs. pinnatifid, segm. oblong-lanceolate, pinnatifid and cut-serrate; hds. fastigiate-corymbose, ray-fls. terete, tubular, 3-toothed. 2¢ Waysides. 2-3f. Aug.

2 **T. Huronense** Nutt. Lvs. bipinnatifid, lobes oblong, often again pinnatifid; heads large, corymbed; ray-fls. flattened, unequally 3-5-cleft. 2¢ Sandy shores, W. 2-3f.

### 75. CHRYSAanthemum, L.

Invol. bell-shaped, sc. imbricated, scarios on the edges. Recep. flat or convex, naked in the disk. Rays 2, disk-fls. 4, 5-toothed. Cyp. angular or compressed. Pap. 0 or tooth-like.—Plants ornamental, from E. Asia, with alternate, lobed lvs. and large rays. Fig. 387.

§ Pyrèthrum. Cypselae wingless, angular, all alike. Plants perennial....Nos. 1-3

§ Chrysantherum. Cyp. of the ray 3-angled, of the disk compressed. 0....Nos. 4, 5

1 **C. Sinense**. Shubby; lvs. sinuate-pinnatifid, thick, glaucous; rays much longer than the obtuse scales. Beautiful flowers of all colors, late in Autumn. 2-3f.

2 **C. Indicum**. Shubby; leaves incisely-pinnatifid, thin, flaccid; rays little longer than the obtuse scales, spreading about 1/4. Heads much smaller than in No. 1.

3 **C. Roseum**. Perennial, glabrous; lvs. 2-3-pinnatisect; hds. solitary, terminal; scales brown-edged; rays rose-colored or white, often double. 2¢ Heads 1/4 broad.

4 **C. Coronarium**. Annual; lvs. clasping, bipinnatifid, lobes dilated at summit; flowers large, terminal, yellow; pappus none. S. Europe. 3f. Varieties double, &c. Aug.

5 **C. Carniâtum. Tricolorum C.** Annual; lvs. thick, bipinnatifid; scales carinate; rays white, yellow at base, disk purple. Barbary. 1-2f. Flowers all Summer.

### 76. ARTEMESIA, L.


§ Absinthium. Recep. villous or hairy. Fls. all fertile, heterogamous....Nos. 1, 3

§ Abrótanum. Recep. naked. Fls. all fertile.—a Lvs. or segm. lanceolate....Nos. 3, 4—\( a \) Lvs. or segm. linear....Nos. 5-7

§ Dracúnculus. Recep. naked. Disk-fls. sterile.—b Lvs. trifid or entire...Nos. 8, 9—\( b \) Lvs. pinnatisect....Nos. 10-12

1 **A. Absinthium** L. Common W. Leaves multifid, clothed with short silky down both sides; seg. lanceolate; hds. hemispherical, drooping. Waysides, N. 1-2f. § Eur.

2 **A. frígida** Wild. Lvs. silky canescent, the calyume pinnatifid; seg. linear, 3-5-cleft; hds. small, glob., drooping; inner sc. woolly. Rocky hills, Minn. Dak., and W. 6-12f.

3 **A. Ludoviciana** N. Canescence-tomentous; leaves lanceolate, the lower serrate or pinnatifid, upper entire; heads ovoid, in a slender, leafy panicle. 2¢ Shores, Mich. and W. 2-5f. Heads small and crowded.

4 **A. vulgáris** L. Mugwort. Lvs. canescent-tomentous beneath, pinnatifid with lanceolate segments, upper entire; heads erect, ovoid, subsessile, in a branched panicle. Waysides, N. and W. 3f. § Europe.

5 **A. Abrótanum. Southernwood.** Hoary; leaves bipinnatisect; heads hemispherical, nodding, downy. From S. Europe. 3f. [dng. Eur. 3f.

6 **A. Pôntica. Roman W.** Lvs. hoary beneath, 2-3-pinnatisect; heads globular, nod-

7 **A. biénnes** Wild. Erect, glabrous, simple; lvs. 1-2-pinnatifid, lobes sharply serrate or cut, those above subentire; hds. globular, erect, epicate, in a virgate, leafy panicle. 2¢ Common westward, migrating E. to Poe’ keepsie (Gerard), and to Pa. 1-3f. Aug +

9 A. dracunculoides Ph. Canescence when young, branched; lvs. lin.-filiform, the radical often trifid; hds. small, globose; inner scales roundish, outer oblong. 2f N-W.

10 A. borealis Pal. Tufted, silky-villous, simple; lower lvs. petiolate, lance-linear, entire at base, ternately, pinnately, or bipinnately parted at apex with lin. lobes; hds. hemispherical; scales colored. 2f. Shores of Lake Superior, N. and W. 6-12′.

11 A. Canadensis Mx. Sea W. Glabrous (mostly); lvs. 1-2-pinnatisect with linear seg.; hds. roundish, sessile, in a pan. of glomerules. 2f Lake shores, N. 2-4f. Hds. 1′.

12 A. caudata Mx. Glabrous, simple, densely paniculate; lvs. 3-2-1-pinnatisect with alternate, filiform segm.; heads globous, pedicellate, erect. 2f Coast, N. H. to Ga. 4f.

77. SOLIVA, R. & P. Invol. of 5-15 scales in 1 row. Recep. flat, naked. Fertile fls. in several rows, apetalous; 2 fls. few, interior, with a 3-5-toothed corolla. Cyp. obcompressed, tipped with the persistent style and no pappus.—Little matted herbs with pinnatifid lvs. and sessile heads.

S. nasturtiifolia DC. Lf. lobes 5-9, oblong, obtuse; ec. 10-15; fr. obconic, rugous, crowned with a dense tuft of wool instead of a pappus. Sandy shores, S. 1-3′.

78. GNAPHÁLIUM, L. Cudweed. EVERLASTING. Heads discoid, heterogamous. Invol. imbricate with scarious, colored scales. Marginal fls. 2, subulate, mostly in several rows; central fls. 3. Recep. flat, naked. Pappus a single row of scabrous, hair-like bristles.—Herbs generally clothed with whitish wool. Leaves alternate, entire.

* Heads in terminal corymbous clusters. August..............................Nos. 1-3
* Heads in axillary, somewhat spicate clusters.................................Nos. 4, 5

1 G. decurvens Lvs. Lvs. decurrent, linear-lanceolate, very acute, naked above, white and woolly beneath; fls. in dense, roundish, terminal clusters. 2f. Hilly pastures, N. Eng. to Penn. and Mich. 2f. Lvs. green above. Fls. yellow, scales white.

2 G. polycephalum Mx. Woolly; lvs. sessile, linear-lanceolate, acute, scabrous above; hds. capitate, corymbous; sc. ovate-lanceolate, acute. 1 Dry, 1-2f. Fragrant.

3 G. uliginosum L. Cudweed. St. diffusely branched, woolly; lvs. sessile, linear-lanceolate; hds. small (1′ wide), in terminal, crowded, leafy clusters; scales obtuse, yellowish or brownish; fruit smooth. 1 Moist hollows, N. M. W. 4-6′.

4 G. purpureum L. Erect; lvs. linear- or obovate-epatulate, canescence beneath, green above; hds. sessile, crowded; sc. acuminated, purplish. 1 Dry fields. 8-12′. June.

5 G. supinum Villars. Caspithous, woolly; lvs. linear; hds. few, oblong, in a spicate raceme or solitary; scales acute, brown. White Mountains. 2-4′. Rare.

6 G. petidium, from S. Africa, has yellow heads, entire, cespitose leaves. 2f. Hardy.

79. ANTENNÁRIA, Br. EVERLASTING. Heads 2 3. Invol. of imbricate, colored scales. 2 Cor. filiform. Recep. subconvex, alveolate. Pap. a single row of bristles. 2f. Tomentous. Lvs. alternate, entire. Hds. corymbous, with white or brownish, never yellow scales.


2 A. plantaginifolia Br. Mouse-ear E. Simple, with running stolons; leaves oval to spatulate, the cauline small, bract-like; hds. in a close terminal cluster, purplish, all in some plants, all in others, in early Spring. Borders of woods. 5-8′.

80. FILÀGO, Tourn. Cotton Rose. Heads heterogamous. Recep. columnar, naked at top, chaffy below, with pales resembling the scales,
each with a ♀ fl. in its axil. Cyp. terete, the central with a hairy pappus.
—Herbs canescent-downy. July, Aug. §.

F. Germánica L. Lvs. erect, crowded, linear-lanceolate; hds. in capitulate clusters, which are successively proliferous; scales cuspid., straw-color. ① Fields, E. 6–10'.

81. AMMÖBIUM, Br. Invol. imbricated, sc. with broad, scariosus, spreading tips. Recep. broad-conic, chaffy. Fls. all tubular, ♀. Cyp. 4-angled, 4-toothed. ② Australia. Stems winged with the decurrent leaves.


1 H. BRACTÉATUM. Branching, puberulent; lvs. lanceolate to linear, repand, acuminate; hds. terminal, bracted at base; outer scales brownish, the inner radiant, yelw. to wh.

2 H. MACRÁNTHUM. Subsimple, secrabrous; lvs. spatulate to lance-oblong, obtuse, en tire; hd. 1 or few, large, white outside, roseate within; inner scales radiant. ①—4. β. COMPOSITUM. Hds. composite (or double), purple, carmine, yellow, white.

γ. ATROSANGUINEUM. Hds. composite, with deep crimson scales and pappus. 18'.


X. RADIÀTUM. Eternal Flower. Erect, branched. Lvs. linear-oblong; hds. 1–2' diam.


§ Scales of the invol. cohering, about 12. Flowers 60–80, scarlet..........................No. 8.
§ Scaies of the invol. distinct,—a about 12. Flowers 20–30, white..........................No. 1.
§ a 5 only. Fls. 5.—b Lvs. cordate or lobed....Nos. 2–4.
§ b Lvs. never cordate......Nos. 5–7.
1 C. suavĕolens L. Glabrous; st. striate-angular; lvs. on winged petioles, hastate-sagittate, dentate, green on both sides; fls. white. 2; Ct., W. and S.; rare. 4—3f. Ang.  
2 C. reniformis Muhl. St. sulcate-angled; lvs. palmately-veined, nearly smooth, green, petiolate, lower reniform, upper flabelliform. 2; Woods, Ill. to Car. 3—6f. Jl.  
3 C. atriplicifolia L. St. terete; lvs. petiolate, smooth, glaucous beneath, palmate-veined, angularly-lobed and dentate, the lower subcordate. N. Y., S. and W. 3—5f. Jl.  
4 C. diversifolia T. & G. Not glaucous; st. striate-angled; lower lvs. cordate-ovate, obtuse, repand-dentate, upper 3—5-lobed, subbastic. 2; Swamps, Fla. 2—3f. May+.  
5 C. tuberosa N. St. angular-sulcate; lvs. oval or ovate, strongly 5—7—veined, not glaucous, petiolate, lower petioles very long. 2; Swamps, W. and S. 2—5f. May—Jl.  
6 C. ovata Ell. St. terete; lvs. glaucous beneath, 3—5—veined, ovate and oval, entire or undulate-margined, contracted at base into petioles. 2; Swamps, S. 3—4f. July+.  
7 C. lanceolatæ N. St. terete; lvs. 3—veined, glaucous beneath, lanceolate to lance-linear, the lower tapering to petioles, upper sessile; corymb simple. 2; Ga. Fla. 5f.  
87. SENECIO, L. GROUNDSEL. Invol. of many equal scales, or invested with a few shorter ones at base. Fls. all tubular, or usually radiate and rays. Recep. not chaffy. Pap. simple, capillary and copious. —A vast genus of herbs and shrubs. Lvs. alternate. Fls. mostly yellow, exceeding the invol. Fig. 160.  
§ Rays none. Root annual. (A perennial climber, No. 11.) …………………..… No. 1  
§ Rays yellow.—α Radical leaves undivided. Achenia glabrous……………… Nos. 2, 3  
—α Radical leaves undivided. Achenia pubescent……………… Nos. 4, 5  
—α Radical leaves divided, as well as the cauleine……………… Nos. 6, 7  
§ Rays purple, &c. Species of Cineraria, L. &c. in the greenhouse……………… Nos. 8—10  
1 S. vulgaris L. St. paniculate, erect, angular; lvs. sinuate-pinnatifid, dentate, amplexicaul. A weed in gardens, &c. 1f. 18'. Flowers all Summer.  
2 S. aurosc L. Radical lvs. ovate, cordate, crenate-serrate, petiolate, cauleine ones lorate-pinnatifid, dentate, terminal segments lanceolate; ped. subumbellate, thick; rays 8—12; fr. glabrous. 2; Woods, meadows. 1—2f. Rays spread 1'. May—Ang.  
β. Balsamita. Pubescent; lvs. few, small, the radical lance-oblong. Rocks.  
γ. græcitis. Root lvs. roundish, on long petioles, cauleine linear-oblong, dentate.  
δ. obovatus. Root leaves obovate to oblong-spatulate; peduncles long.  
ε. lanceolatus. Lvs. lanceolate, the cauleine pinnatifid at base. Vt. Rare.  
ζ. discoides (Porter). Rays none; lvs. obovate-spatulate, cauleine pinnatifid. Penn.  
3 S. obovatus L. Tomentous, becoming glabrous; root lvs. obovate or roundish, crenate, with an attenuated, sessile base; cauleine few, small, cut-pinnate; corymb small, rays 10—12, spreading 1'. 2; Va. to Fla. 1f. Stem nearly leafless. May.  
4 S. tormentos L. Rad. lvs. ovate, cordate, crenate-serrate, petiolate, cauleine ones lorate-pinnatifid, dentate, long-petioled, crenate, upper sessile or none; rays 12—15, spreading 16'. 2; Va. & S.  
5 S. anonymus Wood. Cottony-tomentous; root lvs. oblanceolate, obtuse, crenately toothed or lobed, cauleine pinnatifid, the lobes dentate; hds. small, rays 6—9, spreading 6'. 2; Thickets, Ala. (Montgomery). 2f. Corymbs compound. May, June.  
6 S. Canadensis L. Lvs. glabrous, bipinnatifid; seg. lobed, obtuse, the few upper pinnatifid; corymb compound; rays 9—2. 2; Canada (Kalm), Mts. N. Car.  
9 S. lanata. Lvs. roundish, angular, cordate, woolly beneath; rays vivid purple inside, wh. outside; disk white or blue. 2; Canaries. 3f. Shrubby.—Many varieties.
10. **S. eruendus**. Lvs. angular, cordate, cut-toothed, purple beneath, the petioles winged, ear-shaped at the base; heads in a broad corymb, crimson, purple, white. 2° Canaries. A common handsome greenhouse plant.

11. **S. scandens**. German ivy. Climbing and twining; leaves smooth, roundish-cordate, 5-7 angled or lobed; corymbs axillary, of small rayless yellow heads. 2° S. Africa. Blooms freely in California, rarely in our greenhouses.


2. **A. nudicaulis** Ell. Hairy; st. nearly naked; lvs. all sessile, ovate, subentire, the cauline bract-like; heads large, rays 12, spreading 2°; fruit glabrous. Wet sands, Va. to Fla. 1° April, May.


R. nudicaulis Shutt. St. simple, erect; branches 1-flwd.; root lvs. ample, ovate, narrowed to long winged petioles; stem lvs. small, subsesile. Mts., Tenn. 1°


1. **C. Scólymus**. Garden Artichoke. Lvs. subspinous, pinnate, and undivided; invol. scales ovate. Gardens. The heads are used as asparagus. Coarse plants.

2. **C. Cardunculus**. Cardoon. Lvs. spiny, all pinnatifid; invol. scales ovate. S. Eur. The petioles, blanched by culture, are used as celery.


3. **T. Flórida**. Erect, corymbose branched; lvs. lanceolate, opposite, aristate-serrate; rays mostly 3, large, yellow. Mexico. 18°


C. officinális. Viscid-pubescent; stem branched; lvs. oblong, acute, mucronate, sessile; hds. terminal, solitary; large, brilliant, orange, lemon, double, &c. June–Sep.

93. **Centaurea**, L. Knap-weed. Bachelor’s-button. Hds. discoid. Invol. imbricate. Fls. all tubular, the marginal often enlarged, ray-like, neutral. Pappus filiform, scale-form, or 0. 1° 2° Lvs. alternate.

* Scales of the involucrè with a fringed or pectinate appendage.............................................Nos. 1, 2
* Scales not appendaged, -a merely ciliate or spinescent.............................................Nos. 3, 4
  -a nor ciliate nor spinescent (Amberboa).............................................Nos. 5, 6
Order 70.—Compositae.

1 C. Americana N. Erect, sparingly branched; leaves sessile, glabrous, repand-toothed, ovate-oblong to lanceolate; hds. few, very large, with the marginal fls. much enlarged, pale-purple. ① Ark. La. and ② Ill. 2—4f. Appendages straw-yellow.

2 C. nigra L. Erect, branched, pubescent; lvs. angular-lyrate to lanceolate, dentate; sc. ovate; marg. fls. not enlarged, all purpl. ② Fields. Append. dark brown. ① Eur.

3 C. Cyanius L. Bachelor’s-button. Erect, branched, downy; lvs. linear; sc. ciliate-serrate; outer fls. much enlarged. ① Fields, gardens. Purple, blue, white.


5 C. Moschata L. Lvs. lyrate, dentate; invol. subglobous, smooth; sc. ovate; ray-fl. scarcely enlarged; pap. 0. ③ Persia. Purple, varying to white. July—October.

6 C. suaveolens. Yellow Sweet Sultan. Lvs. oblong, toothed, the upper pinnatifid at base; ray fls. much enlarged, yellow; pap. chaff-like. ① Levant. 1—2f. July—Sept.


C. benedictus L. Lvs. somewhat decurrent; dentate and spiny; invol. doubly spinous, woolly, bracteate. Fields, &c.: rare. ②f. Heads large, yellow. §


* Leaves decurrent on the stem more or less, floccose-woolly beneath.........Nos. 1, 2
* Leaves not decurrent,—a white-tomentous both sides. Plants low, stout...Nos. 3, 4
   —a white tomentous beneath only. Plants slender...Nos. 5—7
   —a green both sides.—b Hds. leafy-bracted at base...Nos. 8, 9
   —b Hds. naked, few, large (1’). Nos. 10, 11
   —b Hds. naked, many, small.......No. 12

1 C. lanceolatum Scop. Common Thistle. Lvs. decurrent, pinnatifid, hispid, the segments divaricate and spinous; hds. several, ovoid, villous; scales lanceolate, tipped with a spine, spreading. ② N. and M.: common. 3—4f. Heads purple.

2 C. Lecontii T. & G. Slender, subsimple, with few hds.; lvs. lin.-lanceolate, more or less decurrent, hoary beneath, teeth few, spinous; scales not spinous. cuspidate heads large (1’ diameter), purple. Swamps, Ga. Fla. to La. 2f.
3 C. Pitcheri T. & G. White-tomentous; lvs. pinnatifid, segm. linear, spinous, margins revolute; scales spine-pointed; flowers ochroleucous. 2 Lake shores, W. June, July.

4 C. undulatum Spr. White-tomentous; lvs. lance-oblong, sinuate-pinnatifid, wavy, prickly; scales scarcely prickly; flowers purple. ② Mich., and N. 1–2f.

5 C. discolor Spr. Slender, much branched; lvs. pinnatifid, segm. 2-lobed, divericate, spinous; scales ovate, tipped with a spreading spine. ② N. 3–5f. July +.

6 C. altissimum Spr. Tall, branching, villous, leafy to the top; lvs. lance-oblong, often sinuate-dentate, or pinnatifid, spinous; scales lance-ovate, the outer with a spreading spine. Fields, M. and W. 3–5f. Purple. August.


8 C. horridulum Mx. Cottony when young; leaves cut-pinnatifid, spinous; heads large, invested by a whorl of very spiny bracts; scales sharp-pointed. ② Uplands, N. Eng. to Fla. Flowers purple or cream-color. 1–3f. April–August.


10 C. muticum Mx. Lvs. pinnatifid; heads on naked peduncles, bractless; invol. unarmed, with webbed and glutinous scales. ② Damp. 3–7f. Hds. 1'. Aug., Sept.

β. glabrum. Nearly glabrous; lvs. lance-linear, lobed; scales with minute spines. S.

11 C. repandum Mx. Lvs. crowded to top, at length green both sides, clasping, lin.-oblong, wavy, spinous-ciliate; hds. 1 or 2; inner scales subulate. Barrens, S. 1–2f.

12 C. arvense Scop. Canada Thistle. Lvs. sinuate-pinnatifid, wavy, lance-oblong; hds. panicked, small (5/'), numerous; scales with minute prickles. 2 Waysides, fields, N. and W. A pernicious weed, hard to extirpate. 3f. Very prickly, except its heads.

13 C. pulcherimum with yellow flowers, 3f high, is rarely planted in borders.


98. LÁPPA, Tourn. BURDOCK. Heads discoid, homogamous. Invol. globose, the scales imbricated and hooked at the extremity. Recep. bristly. Pap. bristly, scabrous, caduous. ② European herbs. Lvs. alternate, large, cordate, petiolate. Hds. panicked, pink-purple, very adhesive by the hooks.

L. officinállis Allioni.—A coarse weed, in waste and cultivated grounds, E. and W. 3f. (L. major Gärtn.)—Varies with small hds. and lvs. somewhat pinnatifid. (L. minor DC.)

99. LAMPsÁNA, Tourn. NIPPLEWORT. Hds. radiant, 8–12-flwrd. Invol. cylindrical, angular. Scales 8, erect, in one row, with 2 or 3 minute bractlets at base. Recep. naked. Cyp. glabrous. Pap. 0.—Slender, oriental herbs, with small, yellow heads, in paniculate corymbs.

L. commúnis L. Stem leafy; lvs. ovate, petiolate, dentate; ped. cylindrical; invol. angular in fruit. ① Waysides, Quebec, Boston, and W. Rare.


A. húmílis Ell.—Woods, S. Car. to Fla. and La. 3–12'. Slender, smooth; lvs. varying to linear, entire or lyrate lobed. Heads 3' broad. March–June.

101. CICHÓRIUM, Tourn. CHICORY. Invol. double, the outer of 5
leafy scales, the inner of about 8 linear ones. Receptacle chaffy. Pappus scaly. Cypselae not rostrate, obscurely 5-sided.—Oriental herbs with bright blue flowers, about 20 in a head.

1. C. Íntybus L. Root lvs, runcinate, cauleine bract-like; heads axillary, subsessile, mostly in pairs. 2' Dooryards, waysides. E. 2-3f. Rays large, showy, 5-toothed. The root, or its extract, is often mixed with coffee. July—Sept. § Europe.

2. C. Endivia. Endive. Root leaves sinuate-dentate or pinnatifid, cauleine auricled at base; heads axillary, 3-5 together. ① India. Cultivated as a salad.


1. K. Virginica Willd. Early lvs. rounded-spatulate, subentire, the later toothed and pinnatifid; scapes 1-5 or more, 1'-10' high. Rocks and sands. Hds. 5-6'. May.+

2. K. Caroliniana N. Early lvs. lin.-oblanceolate, few-toothed, later lvs. lyrate-pin natifid, or angular-lobed; scapes 1-5 or more, 2'-12'. Sands. S. Feb.—May.

103. CÝNTHIA, Don. Invol. nearly simple, of equal, narrow scales. Recep. flat, alveolate. Pap. double, the outer minute, scaly, inner copious, capillary. Cyp. short. 2' Lvs. alternate or all radical. Fls. 15-20, yellow.


2. C. Dandell DC. Acaulescent; scapes leafless, simple, 1-flwd.; lvs. spatulate-obli. to lance-lin., entire or toothed, rarely pinnatifid. Md. to Ga. and Tex. 6-18'. Mar.—Jn.

104. LEÓNTODON, L. Autumn Dandelion. Invol. imbricate, the outer sc. very short. Recep. naked. Pap. plumous, persistent on the somewhat rostrate cypselae.—Acaulescent herbs with yellow fls., many in a head.


105. TRAGOPÓGON, L. Vegetable Oyster. Invol. simple, of many leaves. Recep. naked. Pap. plumous. Cyp. longitudinally striate, contracted into a long, filiform beak. ② European, with long, grass-like lvs.

T. porridóllus L. Invol. much longer than the corolla; lvs. lance-linear; ped. thick ened upward; pappus tawny. Waysides, &c. N. Y. (Hankenson). 3f. June. § ♂

106. HIERÁCIUM, Tourn. Hawkweed. Invol. more or less imbricated, ovoid, many-flwd. Sc. very unequal. Cyp. not rostrate. Pap. a single row of copious, tawny, fragile bristles. 2' Lvs. alternate, entire or toothed.

* Heads 40-50-flwd. Invol. more or less imbricated. Cyp. blunt at tc. ① Nos. 1, 2
* Heads 12-30-flwd. Involucre simple.—① Achenia contracted at the top. ② Nos. 3, 4
  —① Achenia not contracted upward...Nos. 5, 6

2 **H. scabrum** Mx. Leafy, rough-hirsute, glandular above; lvs. obovate to elliptic subentire; invol. scarcely imbricated; fr. red. Hilly woods. 1–3f. Hds. 9". Aug.


4 **H. Gronovii** L. Hairy, paniculate, glandular at top; lvs. obovate to lance-oblong, slightly toothed, the cauline sessile, often few; fr. 20–33, narrowed above.—Varies with stems leafy or subnaked; pan. close or diffuse. Dry hills: com. 1–3f. Aug. +.

5 **H. venosum** L. Scape or stem leafless, or with one leaf, paniculate, smooth; lvs. obovate, entire, nearly glabrous, with purple veins; scales smooth; fls. 20; fr. linear. Woods, E. and W. 1–2f. Hds. on slender ped., broader (9") than in No. 4. Jl., Aug.

6 **H. paniculatum** L. Slender, leafy, diffusely paniculate; lvs. lanceolate, glabrous; ped. very slender; fls. 10–20; fr. short-cylindric, black. Woods; com. 2–3f. Aug.


§ Heads pendulous, glabrous. Leaves variously lobed or shaped... (d)

a Dwarf species (6–10' high) native of high mountains.... Nos. 1, 2

b Tall (3–5' high).—c Heads 5–6-flowered.... No. 3

c Heads 8–12-flowered.—d Pappus tawny.... No. 4

d Pappus straw-colored.... Nos. 5, 6

§ Heads nodding or erect, hairy. Leaves mostly undivided... (b)

b Heads about 12–flowered. Pappus straw-color.... Nos. 7, 8

b Heads about 25-flowered. Pappus tawny or dusky.... No. 9

1 **N. Boottii** DC. St. simple, dwarf; lvs. hastate-cordate to lanceolate, mostly entire; heads racemid; flowers 10–18, inner scales 10–15. High mountains, N. July +.

2 **N. nanus** DC. Smooth, simple; lvs. deltoid-hastate and variously lobed, upper lanceolate, all petiolate; hds. clustered-paniculate; sc. 8, fls. 10–12. White Mts. Aug.

3 **N. altissimus** Hook. Smooth, strict, paniculate, tall, leafy; lvs. petiolate, palmately 3–5-cleft, or lobed, varying to hastate, cordate, or even ovate, dentate; hds. 6' long, yellowish, forming a slender, leafy panicle; sc. 5. Woods, N. 3–5f. August.


5 **N. Fraserti** DC. Earth-gall. Smoothish, corymbose-paniculate; lvs. hastate or deltoid, rarely 5–7-lobed, on winged stalks, upper lanceolate.—Varies with the leaves all lanceolate and merely toothed. Hard soils, Conn. to Fla. 2–4f. August.

6 **N. virgátus** DC. Glanceous, simple, strict; lvs. elminate-pinnatifid, narrow, the upper toothed or entire; panicle or raceme virgate. Sands, N. J. to Fla. 2–4f. Sept., Oct.


8 **N. asper** T. & G. Rough-downy, simple, strict; leaves oval-oblong to lance-oblong, dentate; hds. erect. fascicled in a spicate panicle; fls. yellowish. W. 2–4f. Sept.
9 N. crepidíneus DC. Smoothish, tall, stout, corymb.-paniculate; lvs. broadly triangled-ovate to lanceolate, toothed, petiolate; hds. nodding, of 12 sc. and 25-35 ochre-leucous fls. Fields, thickets, W. States. 5-8 fl. Larger than any of the foregoing. Sept.


1 L. aphylla DC. St. scape-like, erect, slender, forked above; lvs. nearly all radical, short, linear-filiform; heads 5-flowered. Pine woods, Ga. Fls. 2 fl. May.

2 L. júncea N. St. much branched; lvs. lance-linear; fls. 5. Min. (Matthews), and W.


T. cuspidátum Ph. Rt. fusiform; lvs. linear-lanceolate, woolly at the edge; scales lanceolate, cuspidate-pointed. Prairies, Ill. Wis., and West. April–June.

111. PYRRHOPÁPPUS, DC. FALSE DANDELION. Invol. double, the outer row numerous, loose and spreading. Receptacle naked. Cyp. 5-grooved, at length long-beaked, bearing a copious, soft, capillary, reddish pap. 1 2 fl. Hds. solitary on long ped., large, with numerous deep yel. fls.

P. Carolínianus DC. St. simple or branched, scape-like; lvs. mostly radical, lanceolate, acute, sinuate-toothed, lobed, or pinnatifid. Fields, Md. to Fls. May–July.

112. TARÁXACUM, Desf. DANDELION. Invol. double, the outer of small scales, much shorter than the inner appressed row. Recept. naked. Cyp. produced into a long beak crowned with the copious, white, capillary pappus.—Aculeous herbs, with runcinate leaves. Figs. 68, 346, 492.


113. LACTÚCA, Tourn. LETTUCE. Invol. few-flowered, scales imbricated in 2 or more unequal rows. Cyp. obcompressed (flattened same way as the scales), glabrous, abruptly narrowed to a long, filiform beak. Pappus copious, soft, capillary, white.—Herbs with leafy stems and paniculate heads of variable colors. Fig. 77.

1 L. Canadénsis L. β. elongáta. Trumpet Milkweed. St. tall, hollow; lvs. pale beneath, clasping, runc.-pinnatifid, upper lance., entire; heads racemous-paniculate, with few scales and 12+ fls. 2 Rich soils, thickets. 3-6 fl. Yel. to purplish. JI., Aug. β. sanguínea. Stem, fl. veins, and fls. purple; lvs. some hairy, glaucous beneath. γ. graminífolia. Lvs. long, linear, the lower few-lobed, upper entire. South. 5. integrífolia. Lvs. lanceolate, all entire, lower some sagittate at base.

2 L. sativa. Garden Lettuce. Stem corymbous; lvs. roundish, the upper cordate; fls. white. 4 Said to be § in some places, when its lvs. become dentate-lobed and prickly.


§ Flowers bright yellow, in showy heads. Achenia angular. Perennial.……No. 1


1 **S. arvensis** L. Smooth, erect, hispid above; leaves runcinate-pinnatifid, spinulose-dentate, clasping with short auricles at base; hds. subumbellate. Fields, waysides, N. Eng., N. Y. 2f. §

2 **S. asper** Vill. Leaves cordate, amplexicaul, oblong-lanceolate, undulate, spinulose-dentate; ped. subumbellate; fruit oval-obovate, 3-ribbed on each side. 1-2f. §

3 **S. oleraceus** L. Lvs. sagittate-amplexical, runcin.-pinnatifid, subspinulose, dentate; ped. downy; involucre at length smooth; fruit many-ribs. Rubbish. 2-3f. §

116. **HUMEÀ ELEGANS**. Tall, 4f, branching above into an ample capillary panicle; lvs. lance-ovate, clasping; heads numerous, small, drooping, with dry, coarse scales, and 3 or 4 carmine-red florets, with no pales or pappus. N. Hol. July—Oct.


**C. tomentàsa** Vent. White-tomentous; lvs. oblong-ovate to lance-oval; hd. nodding in bud, erect in fl., on the scape. Moist barrens, S. 6-12'. Rays 20, rose-colored.

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* Pappus bright white. Corollas blue................................. Nos. 1, 2
* Pappus tawny. Corollas cream-colored, turning purplish.......... No. 3

1 **M. Floridànum** DC. Smooth; lvs. runcinately pinnate-parted, segm. few, sinuate-dentate or angular; pan. loose, hds. 9". 2f. Thickets, N. Y., W. and S. 3-6f. 

**β. acumìnàtum**. Lvs. lance-ovate, acuminate, toothed, or the lower subruncinate.

2 **M. pulchélìum** N. Smooth and glaucous, strict; lvs. lance-oblong to lin., entire, or the lowest runcinate; pan. corymbed; fls. bright blue. L. Huron to Oreg. 2-7f.

3 **M. leucophèum** DC. Tall, leafy; lvs. lyrate-runcinate, coarsely-toothed; ped. scaly-bracted; pan. long, compound; fr. scarcely beaked. 2f. Moist thickets. 5-10f.

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**Order LXXI. LOBELIÀCEÀE. Lobeliads.**

* Herbs or shrubs with a milky juice, alternate, exstipulate leaves and scattered flowers. **Calyx** 5-lobed or entire. **Corolla** monopetalous, irregular, split down to the base on one side. ** Stamens** 5, free from the corolla, united into a tube at least by their anthers. **Ovary** adherent to the calyx tube. **Style** 1. **Stigma** surrounded by a fringe. **Fruit** a capsule 2-3-(rarely 1)-celled. **Seeds** numerous, albuminuous.


† Corollas scarlet or bright crimson, large...* Exotic, Nos. 13, 16....* Native, No. 1
† Corollas blue, or blue and white.....† Exotic, Nos. 17, 18....† Native...(*a)
1. **L. cardinalis** L. *Cardinal Flower*. Tall, simple, glabrous; lvs. oblong-lanceolate, slightly toothed, acute at each end, sessile; fls. in a terminal, bracted, second raceme; stem longer than the corolla. 2. Swamps. 2–4f. Splendid.


3. **L. glandulosa** Walt. Subsimple, leafless above; lvs. lance-lin., atnatis, and with the lanceolate, auricled sepals some glandular-toothed; fls. few, remote, large (9''); cal. hispid or smoothish, short. 2. Damp barsens, Va., and S. 1–4f. Sept.–Oct.

4. **L. breviflora** N. Erect, simple, hispid; lvs. 1', crowded, oblong-lin., denticulate; sep. ovate, fringe-toothed, half as long as cor. Damp, Fl. to La. 18'. (L. Ludov. C-B.)

5. **L. leptostachys** A. DC. Glabrous, erect, simple, virgate; lvs. lance-oblong; fls. small (4''), spike not secund; auricles awl-shaped, long. 2. Prairies, W. and S. 1–2f.

6. **L. puberula** Mx. Downy or smoothish, erect, simple; lvs. elliptic-ovate, denticulate; fls. large (7–9''), in a long, second spike; auricles ear-shaped. N. J., W. and S. 2f.

7. **L. amena** Mx. Erect, simple, smooth; lvs. lanceolate, pointed both ways; fls. large (8–9''), second, numerous, in a long rac.; bracts very small. 2. Swamps, Va., and S. 2f.

8. **L. spicata** Lam. Erect, simple, puberulent; lvs. oblong, mostly obtuse; fls. small (3–4''), crowded in a slender rac.; pedicels and bracts as long as the fl. Dry soils. 1–2f.


10. **L. Boykinii** T. & G. Slender, smooth; branches erect; lvs. awl-shaped, erect; fls. small (4''), on filiform ped. in long, loose racemes. Wet sands, Ga. Fl. 2f. Lvs. 6'.'

11. **L. Nuttallii** DC. Erect, very slender, smooth; lvs. few, linear, remote; fls. few, small (3''); ped. as long as cor.; cal. tube almost none. 2. Swamps, L. I., and S. 1–4f.

12. **L. Kálimi** L. Simple or branched; rt. lvs. spatulate, st. lvs. lance-lin. to lin., all obtuse; rac. loose, leafy; ped. about equalling the showy blue-wh. fls., minutely bract- ed, or naked (in same specimen); cor. 5', lobes obovate. Rocky swamps, E. & W. 6–18'.

13. **L. paludósa** N. Lvs. lin.-spat., thickish, obtuse, petiolate; scape simple, nearly naked; rac. loose, ped. about as long as the cal. 2. Bogs, Del., and S. 2–3f. Lvs. 5–10'.

14. **L. Dortmánnna**, L. Lvs. submerged, tufted, linear, entire, hollow into 2 longitudinal cells, short, obtuse; scape simple, nearly naked; fls. in a terminal raceme, remote, pedicellate, nodding. 2. In ponds, N. States. 2–3f. Only the fls. emerging.

15. **L. Fulgens**, Downey, erect, simple; fls. narrow-lanc., revolute at edge. 2. Mex. 3f.

16. **L. splendens**. Smooth, erect; lvs. narrow-lanc., flat; fls. large, in long rac. Mex. 3f.


18. **L. Celes庭a**, a garden variety, with larger blue flowers, yellow in the centre.


1. **D. Élegans**. Stem few-branched, angular; lvs. ovate, acute; ovary curved, 3-angled, longer than the lvs.; corolla blue with a white palate. Oregon! 6–12'. July, Aug.

2. **D. Fulchélla**. Stem much branched; fls. obtuse; fls. 8', middle lobe longest. Cal.1
**Order 72. CAMPA NULACEÆ. BELLWORTS.**

cal. *Ovary* adherent to the calyx, 2 or more celled. *Capsule* crowned with the remains of the calyx, loculicidal. *Seeds* many. Figs. 62, 63.

§ Calyx tube short. Pod roundish, opening at the sides. Cor. bell or wheel form. ... *CAMPANULA.* 1
§ Calyx tube elongated. Pod prismatic, opening at the sides. Corolla wheel-form. ... *SPECULARIA.* 2
§ Calyx tube short. Pod ovoid, opening at the top. Corolla bowl-form. ... *PLATYTODON.* 3

1. **CAMPÁ NULA,** Tourn. *Calyx* mostly 5-cleft. Cor. campanulate, or subrotate, 5-lobed, closed at base by the broad, valve-like bases of the 5 stamens. *Stig.* 3-5-cleft. *Caps.* 3-5-celled, opening by lateral pores. Mostly 2*. Flowers in racemes or spikes, or few and axillary.

§ Native or naturalized. — a *Flowers rotate, deeply 5-lobed.* ... *No. 1*
— a *Flowers campanulate, few, or scattered.* ... *Nos. 2-4*
— a *Flowers funnel-form, crowded above.* ... *No. 5*
§ Exotic. — b *Sepals appended at base.* *Stig.* 3 or 5. *Corolla bell-shaped.* *... Nos. 6, 7*
— b *Sepals not appended.* *Stig.* 3. — c *Corolla bowl-shaped.* ... *Nos. 8, 9*
— c *Corolla bell-shaped.* ... *Nos. 10, 11*
— c *Cor. rotate-spreading.* ... *Nos. 12, 13*

1 C. **Americàna** L. Tall, erect; *Ivs.* ovate-lanceolate, acuminate, uncinately serrate, contracted to a winged petiole, veins often ciliate; *fls.* axillary, sessile; *style* exserted, decaurved. 2* Dry coxes: common. 2-4f. *Fls.* 1' broad, spreading, flat. *Aug.* 1

2 C. **rotundifólia** L. *Hare-bell.* St. weak, slender; radial *Ivs.* ovate or reniform-cordate, cuneate-linear, entire; *fls.* few, nodding, bell-shaped and blue. 2* Damp rocks. *N. States.* 1f. Very delicate. *June, July.* *Rt. Ivs.* seldom found with the *fls.*

3 C. **aparinoides** Ph. *Stem* weak, slender, branching above, triangular, the angles inversely acute; *Ivs.* lance-linear, subentire; *fls.* terminal. 4'/ long, white. In wet meadows. 1-1lf, leaning on the grass like a Galium. *June—Aug.*

4 C. **divaricáta** Mx. *Glabrous,* erect, with slender, divaricate, paniculate branches; *Ivs.* narrow-lanceolate, pointed at each end, sharply dentate; *fls.* campanulate, pendulous on the slender branchlets. *Rocky woods.* *Va., W., and S.* 2f. *July.*

5 C. **glomeràta** L. St. angular, simple, smooth; *Ivs.* lance-oblong, cordate, the lower petiolate; *fls.* crowded above, *cor. funnel-form, violet-blue.* *Fields,* *Mass.* 2f. § *Eu.*

6 C. **Médium**. *Canterbury-bell,* erect, hispid; *Ivs.* lanceolate; *fls.* 1'/; *stig.* 5. *2 Eu.* 3f.

7 C. **speciosa**. *Erect; Ivs.* lance-linear; *fls.* racemed, nodding; *stig.* 3. *2 Eu.* 2f.

8 C. **pyramidális**. *Smooth, branched; Ivs.* lance-ovate; *fls.* broad, racemed. *2 Eu.* 6f.

9 C. **persicífolia**. *Smooth; Ivs.* lance-linear, thick; *fls.* broad, axillary. *2 Eu.* 3f.

10 C. **Trachélium**. *St. angular, hairy; Ivs.* ovate, cord. dentate; ped. 1-3-flwd. *2 Eu.* 4f.

11 C. **rapunculoídes**. *Rough; Ivs.* ovate, pointed; *rac.* spicate; *fls.* nodding. *2 Eu.* 2f.

12 C. **Lóreyl.* *St. erect. ang.; Ivs.* obov. to lance-ovate; *cal. hairy; cor.* 2'/ broad. *1 Eu.*

13 C. **Gargáncía**. *St. diffuse; Ivs.* cord.-reniform to ovate; *fls.* small, star-shaped. *2 Eu.*

ORDER 73.—ERICACEÆ.


2 S. Ludovaliéna Torr. St. branched, branches slender; lvs. ovate, acute, subentire, sess. or slightly clasping; ovaries slender, fls. smaller (5'/broad). S. Car. to La. 1–2f.


P. GRANDIFLÓRUM. Lvs. lance-ovate, serrate; fls. 2', blue var. to wh., few, terminal. 18'.

ORDER LXXIII. ERICACEÆ. HEATHWORTS.

Plants shrubby or suffruticous, sometimes herbaceous, with Leaves simple, alternate or opposite, mostly evergreen, without stipules. Corolla regular or somewhat irregular, 4–5-cleft, the petals rarely distinct. Stamens as many or twice as many as the petals, free, hypogynous. Anthers 2-celled, generally open by pores, often appended. Pollen (except in Monotrop-ee) compounded of 4 united grains. Embryo straight, lying in the axis of, or in the end of fleshy albumen. Figs. 64, 89, 90, 99, 114, 248, 255, 311, 438.

§ Ovary adherent, in fruit a berry crowned by the calyx teeth. Shrubs... (Suborder I.)

§ Ovary free.—x Shrubs, trees. Capsule or berry with the cells 2-3-celled... (Suborder II.)

—x Shrubs. Fruit a capsule with the cells one-seeded... (Suborder III.)

—x Herbs half-woody, low.—y Leaves evergreen. Stamens distinct... (Suborder IV.)

—y Leaves evergreen. Filaments united... (Suborder V.)

—y Leaves none. Plants without verdure... (Suborder VI.)

I. VACCINEÆ.—a Figs. 5-parted. Berries 10-seeded. Shrubs often resinous-dotted... GAYLUSSEACIA. 1

—a Flowers 5-parted. Berries 2-3-seeded. Shrubs dotless... VACCINIUM. 2

—a Flowers 4-parted.—b Petals narrow, reflexed. Berries red... OXYCOCUS. 3

—b Petals short, spreading. Berries white... CHIOGENES. 4

II. ERICINEÆ.—c Figs. 4-parted. Sepals colored, larger than the corolla... CALLUNA. 5

—c Flowers 4-parted. Sepals small... (Gen. 11, or)... ERICA. 6

—c Flowers 5-parted.—d Petals distinct, or very nearly polyetalous... (m)

—d Petals united, monopetalous... (e)

e Corolla funnel- or bell-form, with spreading lobes... (k)

e Corolla urceolate (ovoid, cylindrical or globular), lobes small... (f)

e Corolla saucer-form, holding the anthers in 10 pits... KALMIA. 7

e Corolla saucer-form, very fragrant. Trailing shrublet... EPIGEA. 8

f Fruit fleshy, the matured ovary 5-seeded... ARCTOSTAPHYLOS. 9

f Fruit fleshy, the matured calyx 2-3-seeded... GAULTHERIA. 10

f Fr. dry, capsular.—g Septical. Lvs. linear, heath-like... MENGISIA. 11

—g Ionctal. —h Lvs. linear, moss-like... CASSIOPE. 12

—h Lvs. ample, Shrubs... ANDROMEDA. 13

—h Lvs. ample. Trees... OXYDENDRUM. 14

k Stamens 5, included. Plant and leaves very small... LOISELLEURIA. 15

k Stamens 5 (rarely more), long-exserted. Cor. funnel-form... AZALEA. 16

k Stamens 10 (rarely fewer), exserted. Cor. bell-form... RHODODENDRON. 17

m Corolla very irregular, open before the leaves appear... RHODORA. 18

m Cor. regular.—n 7-petalled. Stamens 14... BIFARIA. 19

—n 5-petalled.—o Capsule 5-celled... LEDUM. 20

—o Caps. 3-celled.—p Fls. umbelléd... LEIOPHYLLUM. 21

—p Fls. raceméd... CLETHRA. 22

III. CYRILLEÆ.—r Flowers 4-parted, with 8 stamens and a 2-celled capsule... ELLIOTTIA. 23

—r Flowers 5-parted.—s With 5 stamens and a 2-celled capsule... CYRILLA. 24

—s With 10 stamens. Caps. 3-celled, 2-winged... MYLOCARUM. 22
1. GAYLUSSÀCIA, H. B. K. Huckleberry. Calyx adherent, 5-toothed. Cor. urceolate or campanulate, 5-cleft or toothed. Sta. 10. Anth. awnless, the cells produced upward into tubular beaks opening at the apex. Berry drupe-like, globular, 10-celled, 10-seeded. § 5 Leaves alternate. Flowers in lateral, bracted racemes, white or reddish, small. Fruit black or dark blue, sweet. May, June.

§ Leaves evergreen, very smooth, with no resinous dots, crenulate............. No. 1
§ Leaves deciduous, sprinkled with resinous dots beneath, entire.............Nos. 2–4

1 G. brachýcera (Michx). Box H. Lvs. oval to ovate, thick and firm; rac. dense, ped. very short; cor. short-ovoid; berries light blue. Rocky hills, Pa. to Va.: rare. 1ff.

2 G. dumósa T. & G. Minutely hairy and glandular; lvs. obovate-oblong, mucronate; bracts persistent; cor. short-bell-form; ber. black, large, insipid. Me. to Fla. 1–2ff.

3 G. resínsa T. & G. Black H. Branches shiny; lvs. oval to lance-obl.; rac. 1-sided, deciduous bracts, ped. short as the fls.; cor. 5-angled, contracted at mouth; sty. exserted; fr. black, round, sweet and eatable, ripe in Aug. Thickets, Can. to Va., and W. 2ff.


2. VACCÍNIUM, L. Blueberry. Calyx adherent, 5-toothed. Cor. urceolate, campanulate or cylindrical, limb 4- or 5-cleft, reflexed. Sta. 8 or 10, included. Anth. with 2 awns on the back, or awnless, the 2 cells prolonged into a tube opening at apex. Berry 4 or 5 (or partly 8–10)-celled, cells oo-seeded. § 5 Leaves alternate. Flowers solitary or racemous, white or reddish, small. Fruit generally eatable. Fig. 90.

§ Anthers 2-awned back of the 2 horns. Leaves deciduous... (a)
   a Filaments smooth. Fruit 4-5-celled, blue. Shrubs 1ff or less........ Nos. 1, 2
   a Filaments hairy. Fruit partly 10-celled. Taller (2–20f high)........ Nos. 3, 4

§ Anthers 2-horned, without the awns. Filaments 10, hairy... (b)
   b Leaves evergreen. Flowers 4-parted. Fruit 4-celled....................... No. 5
   b Leaves evergreen. Flowers 5-parted. Fruit partly 10-celled........ Nos. 6, 7
   b Lvs. deciduous. Fr. partly 10-celled. Fls. in short, close racemes... (c)
      c Corolla bell-shaped. Leaves hairy both sides, entire................ No. 8
      c Corolla cylindrical. Leaves smooth or nearly so..................... Nos. 9–11
      c Corolla ovoid, evidently contracted at the mouth................... Nos. 11–13

1 V. ulíginósum L. Bilberry. Procmembent; lvs. obovate, obtuse, dull, glaucescent beneath; fls. solitary, axillary; cor. ovoid-globous, 4-cleft; stam. 8. White Mts. Jn., Jl.


3 V. stamiíneum L. Deerberry. Lvs. oval-lanceolate, acute, dull, glaucescent beneath; pedicels solitary, axillary, nodding; cor. bell-spreading, seg. acute, oblong; anth. 10, with the long tubes exserted. Dry woods. 2–3ff. Fruit greenish-white. May, June.

4 V. arbóreum Mx. Lvs. obovate, acute at base, mucronate, veiny, shining above

5 V. Vitis-idea L. Decumbent, much branched, smooth, evergreen; lvs. 4–7½, oval, obtuse, thick, margin revolute, pale beneath; fls. solitary or in short clusters, 4-petalled; corolla campanulate. Hills and mts., N. Eng.: rare. June, July.

6 V. Myrsinites Mx. Erect, much branched; lvs. small, elliptical, acute at each end, glabrous, serrulate; fls. in small lateral clusters of 2–5; cor. ovoid, urceolate; style slightly exerted. Woods, S. 1 ft. Whole plant often purplish. March, April.

7 V. myrtifolium Mx. St. simple, decumbent at base, from long, creeping roots; lvs. 1–2½, cuneate-obovate or oval, pale beneath; fls. in dense, sessile, lateral clusters of 6–12; cor. oblong-cylindric; fr. round, black. Woods, S. 1 ft. Mar., April.

8 V. Canadense Rich. Branches reddish-green, pubescent, leathery; lvs. elliptical-lanceolate, acute at each end; rac. fasciculate, sessile, subterminal; cor. campanulate; cal. lobes acute. Rocky thickets, N. Eng., and W. 8–12 ft. Berries blue, sweet. May.


β. nigrum. Dark green; berries black and shining, without bloom.


10 V. vacillans Soland. Low, bushy; lvs. oval to ovate, acute or mucronate, pale green, dull, glaucous beneath, minutely serrulate; rac. dense-flowered, preceding the full-grown lvs. Hilly woods, N. Eng. to Tenn. 1–2½ ft. Fr. blue-black, sweet. May, Jun.

11 V. corymbosum L. Common High Blueberry. Tall; flowering branches nearly leafless; leaves oval to lanceolate, acute or acuminate at each end, entire, pubescent when young, often glaucous beneath; rac. short, sessile; cor. cylindrical to ovoid. Low woods. 5–10 ft. March–June.—Varies exceedingly.

β. virgatum. Branchlets leafless, covered with rose-colored rac. Sts. virgate. 5½ ft. S. amanum. Lvs. oblong; fls. cylindrical, large, roseate; sty. included; fr. bl. 8½ ft.

δ. fuscatum. Lvs. serrulate; ped. elongated; sty. exserted; fls. striped with red. 3½ ft.

ε. glabrum. Plant glabrous throughout, the leaves entire. Rare.

12 V. galizans Mx. Flowering branches leafy; lvs. sessile, cuneate-lanceolate, sub-serrate, veiny, glabrous when old; flowers in small, sessile fascicles; corolla small, yellowish; style exerted; fruit small, black. Swamps, S. 1 ft. April+

13 V. hirsutum Buckley. Whole plant, with fls. and fr., densely hirsute; lvs. ovate, entire; corolla oblong, nearly closed at mouth; berry round. Mts. of N. Car. 1½ ft.


b 1. Delicate, with alternate lvs., red and purple berries on slender ped.

* Stem erect, with membranous, deciduous leaves. Berries sweetish...........No. 1
* Stem prostrate, slender. Leaves evergreen, small. Berries acid.............Nos. 2, 3

1 O. erythrocarpús Ell. Lvs. oval, acuminate, thin, ciliate-serrulate; fls. axillary, solitary, the long segments at length reflexed. Mts. of Va. and Car. 1–2½ ft. June.

2 O. palústris Pers. Sts. filiform, purple; lvs. ovate, entire, revolute on the margin; pedicels terminal, 1-flowered: corolla pink, segments ovate. Alpine bogs, N.

3 O. macrocarpús Pers. St. filiform; lvs. oblong, obtuse at each end, edges revolute, glaucous beneath; pedicels axillary, elongated, 1-flowered; corolla segments linear-lanceolate. Sphagnous swamps, Va., and N. Fruit large, valuable. June.

white, 4-celled, many-seeded. Delicate. Lvs. very small, alternate, with the flavor of the Checkerberry. Cor. small, wh., axillary, solitary. Fig. 248.


5. CALLUNA, Salisb. HEATHER. Cal. of 4 scarious, colored sepals. Cor. campanulate, 4-parted, shorter than the calyx. Stam. 8. Anth. 2-crested on the back, cells opening laterally. Stig. 4-lobed. Caps. 4-celled, 8-seeded, 4-valved. Lvs. opposite, minute, crowded. Fls. axillary, or crowded in 1-sided racemes, scarious, roseate, with 4—6 scarious bracts.


1 E. cinerea L. Scotch Heath. Stems clustered; branchlets and linear lvs. (1") in 3's, crowded; fls. racemose-clustered on the upper branchlets; cal. colored, with few or no bracts, ∞; cor. purple, oval, 2"; anh. included, awned beneath. Sandy "moors," Nantucket Is.! Found by Mrs. E. E. Atwater, June, 1868. Apparently indigenous.

2 E. carnea. Very slender, 6—10"; leaves in 3's or 4's, 2—3" long, obtuse; flowers axillary; corolla 2/4, and calyx 1", flesh-color; anthers dark-purple, exerted. A.ps. April.—Of the 400 known species, only this is yet common in cultivation.

7. KÁLMIA, L. AMERICAN LAUREL. Cal. 5-parted. Cor. with 10 prominences beneath and 10 corresponding cavities within, including the 10 anthers. Border 5-lobed. Fil. elastic. Caps. 5-celled, many-seeded.

5 Beautiful, N. American. Leaves entire, evergreen, coriaceous. Flowers in racemose corymbs, white and red, in May—July.

* Flowers in terminal corymbs. Leaves thick, mostly acute..................Nos. 1, 2
* Flowers in lateral corymbs. Leaves obtuse...........................Nos. 3, 4
* Flowers solitary, axillary. Sepals nearly as long as the corolla...........No. 5

1 K. latifólia L. Calico Bush. Spoon-wood. Lvs. alternate and ternate, oval lanceolate, acute at each end, smooth and green on both sides; corymbs terminal, viscidly pubescent. Woods, Me. to O., Ky., and Fla. 5—20f. Profusely and splendidly flowering.


3 K. angustifólia L. Sheep-poison. Lvs. ternate and opposite, elliptical-lanceolate, petiolate, obtuse at each end, smooth; corymbs lateral; bracts linear-lanceolate. Hills and copse, Can. to Ky. and Car. 2—4f. Flowers deep purple, few in each cluster.

4 K. cuncáta Mx. Lvs. scattered, sessile, cuneate-oblong, obtuse, mucronate, glandular-pubescent beneath; flowers white, in sessile clusters. Swamps, Car.: rare. 3f.

5 K. hirsútá Walt. Slender, branchless, hairy; leaves scattered or opposite, ovate to linear-oblong, as long as the pedicels (4—6¼) Barrens, S.: common. 1f. Fls. 7/16.

8. EPÍGÉA, L. TRAILING ARBUTUS. MAY-FLOWER. Cal. large, 5-parted, with 3 bracts at base. Cor. salver-form, tube villous within, limb
5-parted, spreading. Stam. 10. Anth. dehiscent by 2 longitudinal openings. Caps. 5-celled, 5-valved. \( \text{E. repens} \) L.—Rocky woods, N. Eng. to Pa., Ky., and N. Stems half-shrubby, hairy, 10—15' long. Lvs. evergreen, 2'. Fls. rose-colored, delightfully fragrant. Apr., May.

9. ARCTOSTÁPHYLOS, Adans. BEAR-BERRY. Cal. 5-parted, persistent. Cor. ovoid, diaphanous at the base, limb with 5 small recurved segments. Anth. 10, with 2 long, reflexed awns, and opening by pores. Drupe or berry 5—10-celled, the cells 1-seeded. Succulent. Leaves alternate. Racemes terminal.

1 A. Uva-ursi Spr. Lvs. entire, thick, evergreen, shining above, obovate; flowers drooping; drupe red, as large as a currant, the nut 5-seeded. Rocky hills, N. May.

2 A. alpina Spr. Lvs. thin, serrate, deciduous, obovate, acute, strongly netted; ped. hardly longer than the bractlets; drupes black. High mts., Me., N. II., and N.

10. GAULTHERÍA, Kalm. CHECKERBERRY. WINTERGREEN. Cal. 5-cleft, with 2 bracts at the base. Cor. ovoid-tubular, limb with 5 small, revolute lobes. Fil. 10, hisrute. Caps. 5-celled, invested by the calyx, which becomes a berry. Succulent. Leaves alternate. Pedicels bibracteolate.

G. procumbens L. St. procumbent, with the branches erect or ascending; lvs. obovate, mucronate, denticulate, crowded at the top; fls. few, drooping, terminal. Woods and pastures, Can. to Penn. and Ky. 3'. Red berries and leaves spicy. June—Sept.

11. MENZIESÍA, Smith. Cal. deeply 4- or 5-cleft. Cor. urceolate or campanulate, 4- or 5-lobed. Sta. 8 or 10, anth. opening by terminal pores. Caps. 4- or 5-celled, opening septicidally. Seeds \( \infty \). Low, shrubby plants, of various habits. Flowers in terminal clusters.

\( \text{§ Phylloclade}, \) Salisb. Lvs. evergreen, heath-like. Fls. 5-parted, bell-form... No. 1

\( \text{§ Menziesia proper}. \) Leaves deciduous. Flowers 4-parted, urceolate...... No. 2

1 M. taxifólia Robbins. Mountain Health. St. prostrate at base; lvs. linear, obtuse; pedicels erect, slender, terminal, aggregate, 1-flowered. Alpine bogs, N. H., Me., and N. 6—12'. Leaves 6—7'. Flowers purple, the ped. 18'. June.

2 M. ferrugínea Smith. \( \beta. \) globularis Sims. Shrubs low, straggling, pubescent; leaves lance-oval, ciliate; flowers small, nodding, on slender pedicels, greenish-purple. Mts., Penn. to Car. 3—4f. June.

12. CASSIOPE, Don. MOSS-PLANT. Sep. bractless, imbricated, ovate. Cor. globular-campanulate, 4- or 5-lobed. Anth. 8 or 10, pendulous, cella opening by a terminal pore, with a long reflexed awn behind. Caps. 4- or 5-celled, valves 2-parted. Placenta pendulous, \( \infty \)-seeded. \( \theta \) Small, alpine, moss-like or heath-like shrubs. Flowers solitary, pedicellate.

C. hypnóides Don. Stem filiform, tufted; leaves evergreen, subulate, smooth, crowded; flowers 5-parted, purple, nodding. High mts., N. H., N. Y., Me. 2—3f. Jn.

13. ANDRÓMEDA, L. Cal. 5-parted, persistent, not becoming fleshy in fruit. Cor. urceolate, the mouth more or less contracted, 5-toothed. Anth 10, cells 2, opening by a terminal pore. Caps. 5-celled, 5-valved, often re-enforced with 5 external valvelets. Seeds \( \infty \). With entire, or serrulate, alternate leaves. Figs. 64, 438.
§ Sepals imbricate in the bud. Capsules globular... (c)
§ Sepals imbricate in the bud. Capsule depressed... (a)
  a Fls. solitary, axillary. Pericarp double. Anth. awhless. (Cassandra). Nos. 1, 2
  a Flowers in axillary racemes. Pericarp simple, with 5 entire valves... (b)
  b Anth. awhless. Bractlets at the base of the pedicels. (Leucothoe). Nos. 2–5
  b Anth. 2-awned. Bractlets at the base of the calyx. (Eubotrys)... Nos. 6, 7
  c Flowers in a terminal nodding umbel. Cor. globular. (Euandromeda)... No. 8
  c Flowers in racemes, panicked or axillary... (d)
  d Capsule with 5 narrow valvelets applied to the sutures... (e)
  d Capsule naked. Corolla ovoid. Anthers 2-awned. (Portunia)... Nos. 9, 10
  e Corolla oblong. Filaments or anthers 2-awned. (Pieris)... Nos. 11–13
  e Corolla globular. Filaments and anth. awhless. (Lyonia)... Nos. 14–16

1 A. calyculata L. Leather-leaf. Lvs. oblong, obtuse, flat, acute at base, rusty beneath; fls. white, each with a leaf, in leafy racemes; cal. 2-bractleted at base, sep. acute; inner pericarp 10-valved, thin. Bogs, Can. to Car. and Wis. 3f. April +

2 A. angustifolia Ph. Leaves linear-lanceolate, acute, the margins revolute; calyx segments acuminate, 2-bracteolate. Otherwise as No. 1. Swamps, S. Car., Ga.


6 A. racemosa L. Lvs. lance-ovale, slightly pointed, serrulate, deciduous; rac. strict, ascending, terminal, naked, long and 1-sided; sep. ovate, acuminate; anth. cells each 2-awned at apex; seeds wingless. Wet woods. 2–6f. Rac. 2–3', white. Jn., July.

7 A. recurva Buckley. Lvs. deciduous, lance-ovate, acuminate; anth. cells each 1-awned; pod 5-lobed; sds. winged, flat; branches recurved-spread. Ms., Va., N. Car.


9 A. floribunda Lyon (Ph.) Lvs. thick, evergreen, lance-oblong, acute or pointed, bristy-serrulate; rac. paniculate, crowded; bractlets minute; cor. white; anth. awns 2, reflexed, white. Ms., Va. to Ga. 2–10f. Flowers numerous and handsome. Apr.

10 A. phillyreifolia Hook. Lvs. thick, shining, evergreen, elliptic-oblong, obtuse, serrulate above; rac. subterminal, loose; sep. lanceolate; cor. oval; anth. each with 2 long reflexed black awns. Woods, Quincy, Fla. 1–3f. (A. Croomic, C-B.)


β? rhombifolia. Leaves broad-oval; sepals 4 as long as the ovoid corolla. Fla.

12 A. Mariana L. Stagger-bush. Lvs. thin, deciduous, oval, entire, acutish; flowering branches leafless; fls. large (4–5''), white or reddish, in lateral crowded fascicles; sepals linear, 4 as long as the cylindrical corolla. Sands, N. J. to Fla. 3f. June, July.

13 A. speciosa Mx. Lvs. oval, obtuse, serrate, velvty, deciduous; flowering stems mostly leafless, branched; sepals 4 as long as the large bell-shaped white corolla. Swamps, S. June.—Varies with the leaves broad, crenate, whitish beneath.

14 A. ligustrina Muhl. Pubescent; lvs. deciduous, lance-oblative to oblative, short-acuminate, serrulate; rac. panicked on the leafless flowering branches. Wet sols, Ct. to Fla. 6f. June.—Var. with small lvs. scattered among the small (1') downy fls. S.

15 A. serruginea Walt. Lvs. thick, rigid, evergreen, obolate to oblanceolate, rusty beneath, revolute-edged; umb. axillary; fls. small (1''); valvelets nearly as broad as the valves. Pine-barrens, S. 3–20f. Shrub or small tree. Apr., May. (A. rigida Ph.)

16 A. montana Buckley. Lvs. evergreen, lance-ovate, ciliate-serrulate; fls. in large panicles; pedicels pubescent, with 3 linear bractlets. Ms., N. Car. 4–6f.


15. LOISELEURIA, Desv. ALPINE AZALEA. Calyx 5-parted, lobes equal. Cor. subcampanulate, 5-parted, regular. Sta. 5, equal, erect, shorter than the corolla, anth. dehiscing laterally. Style straight, included. Caps. 2- or 3-celled, 2- or 3-valved, $\infty$-seeded. 5 Delicate, procumbent, tufted, with opposite, petiolate, entire leaves. Pedicels terminal, solitary, 1-flowered. Corolla rose-color.

L. procumbens Desv.—Summit of the White Mts., N. II. A tiny shrub, 3-6'. Lvs. elliptical, 3', margins revolute. Flowers nearly sessile. June, July.

16. AZÁLEA, L. SWAMP PINK. Cal. small, 5-parted. Cor. funnel-form, somewhat irregular, with 5 spreading lobes. Sta. 5. Fil. and style long, exserted, declined, anth. opening by pores. Caps. 5-celled, 5-valved, $\infty$-seeded. 5 Erect. Lvs. alternate, deciduous, oblong or obovate, entire. Flowers in umbellate clusters, terminal, large and showy. Fig. 114.

§ Calyx lobes all (or rarely one excepted) very short or minute........... Nos. 1, 2
§ Calyx lobes all oblong and of conspicuous length.—a Native............. Nos. 3, 4
—a Exotic.................................. Nos. 5, 6

1 A. viscosa L. Branchlets hispid; leaves obovate-oblong, the edges, midvein, and petiole bristly; fls. appearing after the lvs., very viscid, the tube much longer than the segments; stamens exserted; style much longer. Swamps. 4-10 ft. May—July.

β. nitida. Lvs. smooth, green, shining, obovate-oblong. Dry woods, N. 1-2 ft.


2 A. nudiflora L. Pinxter-bloom. Young branchlets and lvs. beneath pubescent: clusters naked, appearing with or before the young lvs.; corolla slightly viscid, tube downy, scarcely longer than the segm. Woods: more common S. 3-7 ft. Apr.—Varies with the flowers pink, deep purple, white-variegated, white with a buff centre, and buff all over; the latter two fragrant. Also, with 10—20 stamens.

3 A. calendulacea Mx. Flaming Pinxter. Young branchlets pubescent; lvs. attenuated to the base, corymbs nearly or quite leafless; tube of the cor. hiscrete, not viscid, shorter than the ample lobes. Upland woods, O., Pa., and S. 3-10 ft. May, Jn.—The splendid flowers vary to yellow-scarlet, flame-color, brick-red, saffron-yellow, &c.

4 A. arboréscens Ph. Branches smooth; lvs. obovate, glabrous, glaucous beneath, margins ciliate; corymbs leafy with full-grown leaves; corolla tube not viscid, longer than the lobes. Mts., Penn., and S. 10—20 ft. May—July.


6 A. PONTICA. Lvs. oblong, acute, margin ciliate; fls. viscid, corymbed, after the lvs.; tube equalling the limb, yellow, very fragrant. Asia Minor.

17. RHODODÉNDRON, L. Rose Bay. Calyx small, deeply 5-parted, persistent. Cor. campanulate, often slightly unequal, 5-lobed. Stam. 10 (rarely fewer), mostly decline, anthers opening by 2 terminal pores. Caps. 5-celled, 5-valved, many-seeded. 5 With alternate, entire leaves. Flowers in dense, terminal umbels from large, scaly buds. Figs. 99, 311.
* Leaves obtuse at each end. Flowers purple or lilac, not spotted............ Nos. 1, 2
* Leaves acute or acuminate, dotted or discolored beneath. Fls. spotted... Nos. 3, 4, 5
* Leaves acuminate, scarcely paler beneath. Flowers very broad, purple..............No. 0

1 **R. Lapponicum** Wahl. *Lapland Rose Bay*. Dwarf; lvs. elliptical, very small, roughened with concave rusty scales both sides; fls. small (7'), lobes equal, purple; sta. 5, 7, or 10, exserted. High mts., N. Eng., N. Y. 8–10', very bushy. June, July.

2 **R. Catawbiense** Mx. *Catawba Rose Bay*. Lvs. oval, rounded-obtuse at each end, paler beneath, smooth; cal. lobes oblong, elongated; cor. broad-campanulate, lilac-purple, large (14''); stam. 10. High mts., Va., N. Car. 3–6f. Lvs. 3–5'. Jn. 1

3 **R. punctatum** Andr. Lvs. elliptical, acute or acuminate, glabrous, the lower surface and dense corymbs covered with resinous dots; fls. bell-funnel-form, pink-red, green-spotted within, the lobes wavy. Uplands; Car., Ga. 4–6f. Lvs. 2–3'. Jn. Ji ḟ. *Chapmani*. Lvs. oval-obovate, obtuse, small (1–2'); sepals minute. W. Fla.

4 **R. maximum** L. Lvs. obovate-oblong, acute, smooth, coriaceous, rusty, beneath, revolute on the margin; cal. lobes oval, obtuse; cor. white to roseate, spotted within; lobes unequal, roundish. Along streams, N. Eng. to Ga. 6–20f. Splendid. ḟ

5 **R. Arboreum** Lvs. lanceolate, silvery-spotted beneath; cor. lobes crenulate and curled, white, buff, red, crimson, &c.; calyx downy. Himilmaich Mts. 5–20f.

6 **R. Ponticum**. Lvs. lance-oblong, attenuated to each end, smooth, green both sides; corolla bell-rotate; calyx smooth. Asia Minor. Low bush, flowers broad (2'), purple.

18. **RHODORA**, Dunham. Cor. adnate to the 5-toothed calyx, deeply divided into 3 segments, upper one much the broadest, 2–3 lobed at the apex, in bud enfolding the 2 lower. Sta. 10, declinate, fil. unequal, anthers opening by 2 pores. Caps. 5-celled, 5-valved. Cells many-seeded. ḟ With alternate leaves, and pale-purple flowers. April, May.

**R. Canadensis** L.—Woods or swamps, N. Eng. to Penn. 2–3f. Fls. in terminal clusters, 1', appearing before the oblong leaves, which are downy-canescent beneath.


**B. racemosa** Vent. Branches hispid and glutinous; lvs. ovate-lanceolate, glabrous; racemes terminal, white. Sandy soils, Ga., Fla. 3–4f. June, July.

20. **LÉDUM, L.** *Labrador Tea*. Calyx minute, 4-toothed. Cor. 5-petalled, spreading. Sta. 5–10, exserted, anthers opening by 2 terminal pores. Caps. 5-celled, opening at the base. ḟ Lvs. alternate, entire lvs., and fls. in dense, furfuraceous tomentose beneath, coriaceous. Fls. in terminal corymbs, white.

**L. latifolium** Ait. Lvs. elliptic-oblong, strongly revolute at edge; sta. 5–7, scarcely exserted. Mountains, Penn., to Greenland. 2–4f. May–July.


**L. buxifolium** Ell.—Pine-barrens, N. J. to Car. 8–12f. Leaves shining. May.

Order 73.—ERICACEÆ. 205

∞-seeded, enclosed by the calyx. Æ Lvs. alternate, petiolate. Flowers white, in downy-canescent racemes. Bracts deciduous.

1 C. alniifōlia L. Lvs. cuneiform-ovate, acute, acuminately serrate, green on both sides, smooth or slightly pubescent beneath; racemes terminal, elongated, simple or branched; bracts subulate. Swamps, N. Eng. to Ga. 3—8f. Fragrant. July, Aug. Û C. tomentosa. Lvs. tomentous beneath; spikes subpancled; fls. 3". S. Apr.—Jn, y. scabra. Lvs. coarsely serrate, rough-downy both sides. Ga. (Bainbridge). Pet. 2'.

2 C. acuminātā Mex. Arborescent; lvs. glabrous, glaucous beneath, oval, acuminately abruptly acute at base, finely serrate, on slender petioles; rac. terminal, solitary; bracts long, caducous. Mts., Va., Ky., to Car. 10—18f. Lvs. 4—6'. July, August.


C. racemifōra Walt. Sandy swamps, S. 12—18f. Lvs. 2—3'. Rac. 4—6'. June.


26. PYROLA, Salisb. WINTERGREEN. Cal. 5-parted. Pet. 5, equal. Sta. 10, anth. large, pendulous, fixed by the apex, 2-horned at base, opening by 2 pores at top. Style thick, as if sheathed. Stig. 5, appearing as rays or tubercles. Caps. 5-celled, opening at the angles, many-seeded. Æ Low, scarcely shrubby, evergreen herbs. Lvs. radical or nearly so, entire. Scapes mostly racemous, from a decumbent stem or rhizome. Fig. 99.

Æ Stamens and style straight. Stigmas petitate, 5-rayed. June, July………Nos. 1, 2
Æ Stamens ascending. Style declined and curved. Stigmas 5-tubercled. (a)

a Leaves dull (not shining). Petals greenish-white…………………………Nos. 3, 4
a Leaves thick and shining. Flowers white or rose-colored………………Nos. 5, 6

1 P. minor L. Lvs. round-ovate, repand-crenulate, longer than their petioles; rac. spike-like; corolla globular, including the short style. Woods, N. H., and N. July

2 P. secundā L. Lvs. broadly ovate, acute, subserate, longer than the petiole; rac. secund; cor. oblong; style exerted. Woods, N. States. 5—8'. Lvs. near the base, Û P. pumīla (Paine) Lvs. near orbicular, thin; scape 3-6-flowered, 4—8'. N. Y.

3 P. chlorāntha Swartz. Lvs. orbicular, crenulate, shorter (1') than the petiole; scape tall (6—12'), few-flowered; segm. of the cal. very short, obtuse; pet. half-open, oval, greenish; anth. conspicuously tubular. Woods, N. States and Can. June, Jly.

4 P. elliptica N. Leaves oval or elliptical, thin, longer than their petioles; scape naked, 6-10-flowered; sep. very short and obtuse; anth. pores blunt; fls. nodding, fragrant. Woods, N. States and C. 3—9'. Petioles white. June, July.

5 I. decidua Walt. Nearly smooth; lvs. thin, 1—2', lance-oval, pointed, blunt-serrate; ped. short as the petioles, 2 clustered; seeds obtusely ribbed. S. 6—9f. 

6 I. Amelanchier Curt. Leaves (variable) ovate, oblong to lanceolate, acute or pointed, serrulate, thin, downy beneath; ped. short as the petioles, 2 clustered, 2 solitaire; drupe red. Hills and mts., N. Y. to S. Car. (Prinos ambiguus Pl.)

7 I. ambigua Chapm. Lvs. oval or elliptical, acute (scarcely pointed), serrulate or nearly entire, smoothish; 2 ped. much longer than the pet., clustered, 2 short, solitary. Wet grounds, S. 4—9f. March, April. (Prinos ambiguus Mx.)

2. NEMOPANTHES, Raf. Parts of the flower in 4's or 5's. Calyx very small. Petals linear-oblong, shorter than the stamens. Stig. sessile. Drupe globular, red, with 4, rarely 5, smooth, horny nutlets (seeds). Nos. 1 Lvs. entire, smooth, thin. Fls. white, small, on slender pedicels, 5 2 6.


3. PRINOS, L. Winter-Berry. Fls. small, habitually 6-parted and perfect, but often fruitless. Calyx 6-cleft. Cor. monopetalous, subrotate, 6-parted. Sta. 6 (in the sterile flowers rarely fewer, in the fertile rarely more). Berry 6-seeded, seeds with a smooth, cartilaginous testa. Nos. 5 With alternate lvs., small white fls., and red or black berries. (See Addenda.)

§ Leaves deciduous, thin. Berries red. (No. 3a, p. 446, and)......... Nos. 1—3

§ Leaves evergreen, thick, shining. Berries black.......................... Nos. 4, 5

1 P. verticillatus L. Black Alder. Lvs. oblanceolate or elliptical, acuminate, mucronate-serrate, small; pedicels shorter than the petioles; berries scarlet, in close bunches as if verticillate, all Winter. Low woods. 8f. Leaves 1—1½'. July.

2 P. lanceolatus Ph. Lvs. lanceolate, long-acuminate, sharp-serrate, glab., 1—3'; fls. subsessile, the sterile 3-androus; berries large, red. Swamps, S. (Dr. J. Hale.)

3 P. laevigatus Ph. Leaves lanceolate, appressed-serrulate, glabrous, shining above, short-acuminate; ped. longer than the pet., in 2's or 3's. Swamps, Can. to Va. 7f. Jn.

4 P. glaber L. Ink Berry. Lvs. coriaceous, cuneate-lanceolate, glabrous, serrate at the end; ped. longer than the pet., 1—3-flowered. Swamps, Ms. to La. 3—4f. Jn., Jl.

5 P. coriaceus Ph. Lvs. thick, obovate, serrate at the end, glabrous, shining; fls. all solitary, on very short peduncles, 6—8-parted. Woods, S. 4—6f. Lvs. 2'. May.

Order LXXVI. STYRACACEÆ.

Trees or shrubs with alternate, simple leaves, destitute of stipules. Flowers or racemes solitary, axillary, bracteate. Calyx 5-, rarely 4-lobed. Corolla 5-, rarely 4- or 6-lobed, imbricated in bud. Stamens definite or ò, unequal in length, usually cohering. Anthers innate, 2-celled. Ovaries adherent, 2—5-celled, the partitions sometimes hardly reaching the centre. Fruit drupaceous, generally with but one fertile cell. Seeds 5—1.
1. **Símplocos**, Jacq. Cal. 5-cleft. Cor. 5-parted, spreading. Sta. ∞, in 5 clusters, one attached to the base of each petal. Fil. slender. Anth. globular. Ovary 3-celled, half-adherent. Drupe dry, with a 3-celled, mostly 1-seeded nut. With clusters or racemes of small yellow flowers.


3. **HALESIA**, Ellis. **SNOWDROP TREE.** Cal. obconic, brieefly 4-lobed. Cor. inserted into the calyx, campánulate with a narrow base, 4-parted. Sta. 8—12, connate into a tube below. Sty. filiform. Fr. dry, 2-4-winged. Sds. 1—3. Lvs. alternate, abruptly acuminated, finely denticulate or entire. Flowers in advance of the leaves, pendulous, in lateral clusters of 3—5, white, showy.

**Order LXXVII. EBENACE.Æ. EBONADS.**

**Trees or shrubs** without milky juice and with a heavy wood. Leaves alternate, exstipulate, coriaceous, entire. Inflorescence axillary. **Flowers** by abortion dioecious, seldom perfect. Calyx free, 3-6-cleft, divisions nearly equal, persistent. Corolla regular, 3-6-cleft, often pubescent, imbricate in aestivation. Stamens twice or 4 times as many as the lobes of the corolla. **Fruit** a fleshy, oval, or globous berry. **Seeds** large, suspended, albuminous.

**Diospyros**, Dalesch. **Persimmon.** Fls. Cor. tubular or campánulate, convolute in bud. Sta. mostly 16. Fil. shorter than the anthers. Style 0. Sta. mostly 8, without anthers. Style 2-4-cleft. Berry ovoid or globous, 4-12-, mostly 8-celled, cells 1-seeded. A large genus, mostly tropical.

**D. Virginiana** L. Lvs. elliptic, abruptly acuminated, entire; racemes axillary, 3-1-flowered, pedicels shorter than the flowers; calyx 4-cleft; stamens 8. Woods, lat. 42°, and S. 10—30f. Berry large as a plum, sweet after frost.
Order LXXXIII. SAPOTACEÆ. SOAPWORTS.

Trees or shrubs, mostly with a milky juice, and simple, entire leaves. Flowers small, regular, perfect, mostly in axillary clusters. Calyx free, persistent. Corolla hypogynous, short, stamens usually as many as its lobes and opposite to them, inserted into its tube along with one or more rows or appendages. Anthers extrorse. Ovary 4–12-celled, with a single anatropous ovule in each cell. Seeds large. (Included Theophrastaceae.)

* Corolla 6–8-cleft, with a pair of appendages at each sinus. S. Fla. ................. MINUSOPS Sieberi DC.
* Corolla 5-cleft, —a with a single appendage at each sinus. S. Fla. .......... SIDEROXYLON pallidum Jq.
  —a with a pair of, &c.—b Sterile stamens fringed. S. Fla. ... DIPLOIS salicifolia A. DC.
  —b Sterile stamens entire. .................................. BUMELIA. 1

BUMELIA, Swartz. Cal. 5-parted. Cor. 5-cleft, with a pair of appendages between the lobes. Sta. 5, opposite the lobes, alternate with 5 petaloid, sterile stamens. Ov. 5-celled. Sty. filiform. Drupe ellipsoid, 1-seeded, exalbaceous. § 5 Wood hard and firm. Lvs. entire, of a firm texture. Fls. aggregated, white or greenish. Our species are all more or less spiny, and with very tough twigs.

* Leaves hairy beneath .... Nos. 1, 2. ** Leaves glabrous both sides .... Nos. 3, 4

4 B. reclinata Vent. Lvs. obovate, obtuse, small (9–12quot;); clusters 15–20-flwd.; ped. slender, half as long as the leaf. River banks, S. Car. to Fla. A straggling shrub. Jn., Jl.

Order LXXXIII. PRIMULACEÆ. PRIMWORTS.


§ Ovary half-inferior. Capsule opening by valves. Leaves undivided. (Tribe IV.)
§ Ovary superior.—a Capsule opening by valves. Leaves pectinate. (Tribe I.)
  —a Capsule opening by valves. Leaves undivided. (Tribe II.)
  —a Capsule opening by a lid. Leaves undivided. (Tribe III.)

I. HOTTONIAE.= Corolla salver-form. Plants floating. Leaves verticillate. HOTTONIA. 1

II. PRIMULAE.—a Acaulescent.—b Corolla limb spreading, tube cylindrical. PRIMULA. 2
  —b Corolla limb spreading, tube ovoid. ANDROSACE. 3
  —b Corolla lobes reflexed.—c Stam. exerted. DODECATHYON. 4
  —c Stam. included. CYCLAMEN. 5
  —d Catalysed.—d Corolla wanting. Leaves opposite. GLAUX. 6
  —d Corolla 7-parted. Leaves in one whorl. TRIDENTALIS. 7
  —d Cor. 5- or 6-parted. Lvs. opp. or whorled. LYSIMACHIA. 8

III. ANAGALLIDÆ.—c Flowers 5-parted, scarlet. Leaves opposite. ANAGALLIS. 9
  —c Flowers 4-parted, white? Leaves scattered. CENTUNCULUS. 10

IV. SAMOLEÆ. Flowers 5-parted. Leaves alternate. SAMOLUS. 11
1. **Hottònìa**, L. Water-feather. Calyx 5-parted. Cor. salver-form, with a short tube, and a flat, 5-lobed limb. Sta. inserted in the tube of the corolla, included. Stig. globous. Caps. globous-acuminate. 2; Fleshy, with pectinate-pinnatifid, submersed, radical leaves.

**H. Inflàta** Ell. St. immersed, with a whorl of lvs. (1–2") at or near the surface; scapes clustered, jointed, hollow, 5–10', bearing several whorls of small white fls. Pools, N. and S. April–June. Curious.

2. **Prímùla**, L. Primrose. **Auricùla**. Cal. angular, 5-cleft. Cor. salver-shaped or often rather funnel-shaped, with 5 entire or notched or bifid lobes. Sta. included, fil. very short. Caps. ovoid, 5-valved, valves often bifid, opening at the top, 5-seeded.—Herbs with the leaves all radical and flowers in an involucrate umbel, often showy.

* Native, wild species. Corolla salver-form, the lobes abruptly spreading... Nos. 1, 2
* Exotic.—Corolla salver-form, the lobes abruptly spreading... Nos. 3, 4
   —Corolla funnel-form.—b Leaves rugous, hairy, toothed... Nos. 5, 6
   —b Leaves plain, smooth, often entire... Nos. 7, 8

1 **P. Mistassinica** Mx. Lvs. spatulate, dent-crenate, green both sides; invol. 1-8-flwd., 4 as long as pedicels; cor. lobes obcordate, tube much exserted. Lake shores, Vt. (Willoughby) N. Y. (Seneca), and N. 3–7'. Fls. 5" broad, white. Jn. Delicate.

2 **P. farínosa** L. **Bird’s-eye** P. Lvs. lance-elliptic, obtuse, dentic. at throat, whitish-mealy beneath, as well as the 3-20-flwd. invol.; cor. pale-purple, with a yellow centre, its lobes bifid. Lake shores, Mich., Me. (A. H. Smith), and N. 6–12'. June, July.

3 **P. grandifìlìa**. **Common** P. Lvs. obovate-oblong; umb. radical; cor. limb flat, yellow, varying to all shades of orange, and red, to white, single or double. Europe.

4 **P. purpurea**. Lvs. lanceolate, obtuse, yellowish-mealy beneath; scape longer than the leaves; invol. 5-valved, as long as the pedicels; cor. lobes obcordate, tube much exserted. Lake shores, Europe. (P. veris.)

5 **P. officinális**. **Cowslip** P. Lvs. oblong, hairy beneath; fls. all nodding; cal. angular; cor. concave. Whole varieties are raised from the seed. Europe. (P. veris.)

6 **P. Elàtìor**. **Ox-lip** P. Lvs. hairy both sides; outer fls. nodding; cor. flat. Eur. 1f. Yel.

7 **P. Auricùla**. Lvs. obovate, fleshy; scape 5-flowered, as long as the leaves; bracts short; caly whole. Alps. The varieties are innumerable and beautiful.

8 **P. calýcìna**. Leaves lanceolate, entire, acute, edged with white; invol. 3-5-flwd., as long as the pedicels; cal. tube inflated; corolla lobes emarginate. Austria. Purple.

3. **Andròsàce**, Tourn. Cal. 5-cleft or toothed. Cor. funnel-form or salver-form, the 5 lobes entire, tube constricted at the throat, ovate, shorter than the calyx. Fil. and style very short. Caps. globous. Minute caespituous herbs, with radical, rossulate leaves. (Scape bearing an umbel.)

**A. occidentàlis** Ph. Lvs. oblong-spatulate and ovate, entire, glabrous; scape 5-flowered; bracts oval, pedicels slender; calyx angular, segments longer than the small white corolla. 1 Gravelly shores, Ill., and W. 1–3'.


1 C. Europæum. Lvs. crenate; petals lance-ovate, fragrant, roseate. Europe.
2 C. Cûmx. Lvs. entire; petals round-ovate, inodorous, purple. Asia Minor.

6. Glauk, L. Black Saltwort. Calyx campanulate, 5-lobed, colored. Corolla none. Sta. 5. Caps. roundish, surrounded by the calyx, 5-valved, 5-seeded. 2\(\frac{1}{2}\) Maritime, branching, glabrous, with opposite leaves and small, axillary, solitary flowers.


7. Trientalis, L. Chickweed-Wintergreen. Cal. and cor. 7-(6—8) parted, spreading. Sta. 7 (6—8). Fruit capsular, somewhat fleshy, \(\infty\)-seeded. 2\(\frac{1}{2}\) St. low, simple. Lvs. subverticillate. Pedicels 1-flowered.

T. Americàna Ph. St. erect, simple, leafless at base; lvs. glomerate at top of the stem, few, narrow-lanceolate, serrulate, acuminate; sepals linear, acuminate. Rocky woods: com. 3—6'. Pedicels 1—4, filiform; corolla white, starlike, 6'. May, June.

8. Lysimáchia, L. Loose-strife. Fls. 5—rarely 6— or 7—parted. Cor. wheel-shaped, the petals nearly or quite distinct. Sta. 5, on the base of the corolla. Fil. often somewhat connate or with intervening, sterile ones. Capsules globous, 5—10-valved, opening at the apex. Seeds few or many. 2\(\frac{1}{2}\) With opposite or verticillate entire leaves. (Flowers yellow.)

§ Petals 5—7, distinct, dotted, with 5—7 intervening teeth. (Naumburgia)………No. 1
§ Petals 5, united at base, that is, monopetalous…(a)
 a Sterile filaments 0, the perfect stamens monadelphous…(c)
 a Sterile filaments 5 short teeth alternate with the perfect stamens…(d)
 c Flowers whorled, in a long, terminal, bracted raceme………………Nos. 2, 3
 c Flowers not racemed—axillary or paniculate…………………Nos. 4—6
 d Leaves acute at base, tapering to the short petiole. …………Nos. 7, 8
 d Leaves rounded or abrupt at base, long-petioled………………Nos. 9, 10

1 L. thyrsifìora L. St. simple; lvs. dotted, linear-elliptical, pointed, sessile; thyrsoid racemes from the middle axils pedunculate, shorter than the leaves; pet. linear, brown-dotted. Meadows, N. Eng. to O., and N. 2f. June. (Naumburgia C-B.)

2 L. strìcta Ait. Lvs. opposite, rarely in 3's, lanceolate to lance-linear, acute, sessile, dotted; axils producing bulbils after flowering; fls. whorled, in a long, open, terminal raceme, yellow, with purple streaks. Low grounds. 1—2f. July.

β. angustifòlla (Chapm.) Lvs. very narrow, obtuse; petals acute. South.

3 L. Herbemőnti Ell. St. simple: fls. whorled in 4's or 5's, ovate to lance-ovate, pointed, sessile, revolute at edge, dotted; fls. racemed, dotted. Carolina: rare. 2f.

4 L. Frärsci Duby. Glandular-downy at top; lvs. opposite, ovate or ovate-cordate, pointed, petiolate, dotted; fls. in a terminal panicle; sep. fringed. S. Car. (Fraser).

5 L. quadrifòlia L. Erect, simple; lvs. in whorls of 4's (rarely 5's or 3's), lanceolate, pointed, sessile, dotted; ped. slender, solitary in each axil; pet. ovate, obtuse. Damp shades, Can. to Car. and Ky. 15'. Corolla yellow, with purple lines. June.

6 L. nummulària L. Moneywort. Trailing, weak; lvs. roundish, subcordate, on short petioles, opposite, dotless; fls. solitary, large, showy. Fields and gardens. §
Order 82.—Plantaginaceae.

7 L. longifolia Ph. St. slender, flexuous, 4-angled; lvs. linear, shining, revolute at edge; fls. large, in pairs or 4's, terminal on the stem or short branches; petals broad-ovate, crosse-dentate; anthers large. Low prairies. W. and S. 15—20'. July.

β. tenus. Leaves lance-linear, flat, edges not revolute. Miss. and La.

8 L. lanceolata Walt. St. angular above; leaves lance-oblung, acute at each end, subsessile, velvety, ciliate at base; ped. solitary, axillary. Meadows. 12—18'. July.

β. heterophylla. Lower lvs. oval or oblong, petiolate; flowers at the summit.

9 L. ciliata L. St. erect, 4-angled; lvs. opposite, ovalate to lance-ovate, rounded at base, petiolo disting, ciliate; flowers nodding, mostly opposite, in the upper axils, large (1'); stamina. Thickets, along streams. 2—3'. Often branched. Jl.


10 L. radicans Hook. St. square, long, trailing, rooting at the joints; br. slender; lvs. lance-ovate, acute, on long pet.; fls. small (4'). Swamps, Va., and S. 2—4'. Jl.

9. ANAGALLIS, L. Scarlet Pimpernel. Calyx 5-parted. Cor. rotate, deeply 5-parted, tube 0. Sta. 5, hairy, anth. introrse. Caps. globular, thin, opening all around (pyxis).—Herbs with square stems and opposite or whorled entire leaves. Pedicels axillary, solitary. Fig. 249.

A. arvensis L. Procumbent; lvs. broad-ovate, sessile, shorter (6—10') than the curved ped.; sepals lance-linear, as long as the roundish crenate-glandular, red petals. (1) Fields, waysides. The flowers (sometimes blue, Dr. Buel) close at 2 p.m., or on the approach of foul weather; hence called the Poor Man's Weather-glass.

10. CENTUNCULUS, L. False Pimpernel. Cal. 4-parted. Cor. urceolate-rotate, 4-cleft, shorter than the calyx. Sta. 4, beardless, united at base. Capsules globose, circumscissile. Seeds very minute. (1) Very diminutive, with alternate lvs. Fls. axillary, solitary, subsessile, white?

C. minimus L. St. ascending, branched; leaves subsessile, oval, obtuse, entire, the lower opposite; sep. linear-subulate. Wet, Ill., and S. 1—6'. April—July.


1 S. Valerandi L. (S. floribundus K.) St. simple or branched; lvs. obtuse, wedge-oval, the lower petiolate; fls. in a raceme or panicle of racemes, pedicells with a minute bract at the middle; petals longer than the sepals. Wet gravelly. 6—12'.

2 S. ebracteatus Kunth. Erect, leafy below; lvs. obovate-spatulate; fls. racemed, ped. bractless; cor. white, 3 times longer than the calyx (9'). Marshes. Fla., and W.

Order LXXXII. Plantaginaceae. Ribworts.

Herbs rarely shrubby, with radical leaves and the flowers in spikes on scapes. Flowers regular, tetramerous. Stamens 4—2, alternate with the lobes of the corolla, and inserted on its tube. Anthers versatile, filaments usually slender and exserted. Fruit a membranous pyxis, with 1, 2, or many albuminous seeds.

PLANTAGO, L. PLANTAIN. RIBWORT. Sep. 4, membranous, persistent. Cor. limb 4-toothed, spreading, persistent on the fruit. Stamens 4 (rarely 2), the long, slender filaments exserted, or in some of the fls. in

1 C. Europæum. Lvs. crenate; petals lance-ovate, fragrant, roseate. Europe.
2 C. Còum. Lvs. entire; petals round-ovate, inodorous, purple. Asia Minor.


T. Americànà Ph. St. erect, simple, leafless at base; lvs. glomerate at top of the stem, few, narrow-lanceolate, serrulate, acuminate; sepals linear, acuminate. Rocky woods: com. 3–6’. Pedicels 1–4, filiform; corolla white, starlike, 6’. May, June.

8. **LYSIMÁCHIA**, L. LOOSE-STRIFE. Fls. 5-(rarely 6- or 7-) parted. Cor. wheel-shaped, the petals nearly or quite distinct. Sta. 5, on the base of the corolla. Fil. often somewhat connate or with intervening, sterile ones. Capsules globose, 5–10-valved, opening at the apex. Seeds few or many. 2f With opposite or verticillate entire leaves. (Flowers yellow.)

§ Petals 5–7, distinct, dotted, with 5–7 intervening teeth. (Naumbergia)…….. No. 1
§ Petals 5, united at base, that is, monopetalous… (a)
   a Sterile filaments 0, the perfect stamens monadelphous… (c)
   a Sterile filaments 5 short teeth alternate with the perfect stamens…(d)
   c Flowers whorled, in a long, terminal, bracted raceme…………… Nos. 2, 3
   c Flowers not racemed—axillary or paniculate……… Nos. 4–5
   a Leaves acute at base, tapering to the short petiole. ……… Nos. 7, 8
   d Leaves rounded or abrupt at base, long-petioled……… Nos. 9, 10

1 L. thyrsifòra L. St. simple; lvs. dotted, linear-elliptical, pointed, sessile; thyr- sold racemes from the middle axils pedunculate, shorter than the leaves; pet. linear, brown-dotted. Meadows, N. Eng. to O., and N. 2f. June. (Naumbergia C-B.)

2 L. strìcta Ait. Lvs. opposite, rarely in 3’s, lanceolate to lance-linear, acute, sessile, dotted; axils producing bulbites after flowering; fls. whorled, in a long, open, terminal raceme, yellow, with purple streaks. Low grounds. 1–2f. July.
β. angustifòlia (Chapm.) Lvs. very narrow, obtuse; petals acute. South.

3 L. Herbemonti Ell. St. simple: lvs. whorled in 4’s or 5’s, ovate to lance-ovate, pointed, sessile, revolute at edge, dotted; fls. racemod, dotted. Carolina: rare. 2f.

4 L. Fráseri Duby. Glandular-downy at top; lvs. opposite, ovate or ovate-cordate, pointed, petiolate, dotted; fls. in a terminal panicle; sep. fringed. S. Car. (Fraser).

5 L. quadrifòlia L. Erect, simple; lvs. in whorls of 4’s (rarely 5’s or 3’s), lanceo- late, pointed, sessile, dotted; ped. slender, solitary in each axil; pet. oval, obtuse. Damp shades, Can. to Car. and Ky. 18’. Corolla yellow, with purple lines. June.

6 L. nummulària L. Moneywort. Trailing, weak; lvs. roundish, subcordate, on short petioles, opposite, dotless; fls. solitary, large, showy. Fields and gardens. §
Order 82.—Plantaginaceae.

7. L. longifolia Ph. St. slender, flexuous, 4-angled; lvs. linear, shining, revolute at edge; fls. large, in pairs or 4's, terminal on the stem or short branches; petals broad-ovate, crose-dentate; anthers large. Low prairies. W. and S. 1f—20'. July.

8. L. lanceolata Walt. St. angular above; leaves lance-oblong, acute at each end, subsessile, veiny, ciliate at base; ped. solitary, axillary. Meadows. 12—18'. July.

9. L. heterophylla. Lower lvs. oval or oblong, petiolate; flowers at the summit.

10. L. radicans Hook. St. square, long, trailing, rooting at the joints; br. slender; lvs. lance-ovate, acute, on long pet.; fls. small (4'). Swamps, Va., and S. 2—4f. Jl.

9. Anagallis, L. Scarlet Pimpernel. Calyx 5-parted. Cor. rotate, deeply 5-parted, tube 0. Sta. 5, hairy, anth. introrse. Caps. globular, thin, opening all around (pyxis).—Herbs with square stems and opposite or whorled entire leaves. Pedicels axillary, solitary. Fig. 249.

A. arvensis L. Procumbent; lvs. broad-ovate, sessile, shorter (6—10') than the curved ped.; sepals lance-linear, as long as the roundish crenate-glandular, red petals. (1) Fields, waysides. The flowers (sometimes blue, Dr. Buel) close at 2 p. m., or on the approach of foul weather; hence called the Poor Man's Weather-glass.

10. Centunculus, L. False Pimpernel. Cal. 4-parted. Cor. urceolate-rotate, 4-cleft, shorter than the calyx. Sta. 4, beardless, united at base. Capsules globous, circumscissile. Seeds very minute. (1) Very diminutive, with alternate lvs. Fls. axillary, solitary, subsessile, white?

C. minimus L. St. ascending, branched; leaves subsessile, oval, obtuse, entire, the lower opposite; sep. linear-subulate. Wet, Ill., and S. 1—6'. April—July.


1 S. Valerândi L. (S. floribundus K.) St. simple or branched; lvs. obtuse, wedge-oval, the lower petiolate; fls. in a raceme or panicle of racemes, pedicels with a minute bract near the middle; petals longer than the sepals. Wet gravel. 6—12'.

2 S. ebracteâtus Kunth. Erect, leafy below; lvs. obovate-spatulate; fls. racem. ped. bractless; cor. white, 3 times longer than the calyx (3'). Marshes. Fla., and W.

Order LXXXII. Plantaginaceae. Ribworts.

Herbs rarely shrubby, with radical leaves and the flowers in spikes on scapes. Flowers regular, tetramerous. Stamens 4—2, alternate with the lscs of the corolla, and inserted on its tube. Anthers versatile, filaments usually slender and exserted. Fruit a membranous pyxis, with 1, 2, or many albuminous seeds.

Plan tàgo, L. Plantain. Ribwort. Sep. 4, membranous, persistent. Cor. limb 4-toothed, spreading, persistent on the fruit. Stamens 4 (rarely 2), the long, slender filaments exserted, or in some of the fls. in
cluded. Ovary 2-(4)-celled. Pyxis membranous, opening below the middle by a lid, when the loose disseipment falls out with the seeds.—Herbs acauliscent. Fls. small, whitish, in a slender spike raised on a scape.

§ Flowers uniform; stamens exerted in all of them...{(a)}
A Seeds 7—16. Leaves broadly ovate, 7-veined. Spike dense...........No. 1
A Seeds 4 only. Leaves oblong or cordate, 3-7-veined..................Nos. 2, 3
A Seeds 2 only. Leaves lanceolate. Scape tall. May—October........Nos. 4, 5
A Seeds 2 or 4. Leaves linear, fleshy.................................No. 6
b Corolla lobes permanently spreading. Seeds 2, concave............Nos. 7, 8
b Corolla lobes closing, and erect on the fruit. Summer..............Nos. 9—11

1 P. major L. Common P. Leaves ovate, some toothed, smoothish, palmately 7-veined, ample; spikes 1—2ft high. 24 Door-yards: common. Long white elastic fibres are drawn from the veins when the leaf is plucked.

2 P. Kamtschátika Cham. Leaves elliptic-oblong, obtuse, 3-5-veined; spikes loose-flowered; bracts acute, shorter than the sepalas. Ala. (P. Rugellii C—B.)

3 P. cordáta Lam. Lvs. ovate, cordate or very abrupt at base, obscurely toothed, subpinnately 5—7—veined; fls. loosely spicate, larger than in No. 1; the bracts ovate, obtuse. 24 Along streams, Can. WIs., and S. As large as P. major. June, July.

4 P. lanceoláta L. Lvs. lanceolate, pointed at each end; scape angular, longer than the leaves; spike dense, ovate or cylindric, brown. 24 Meadows. 1—2ft.

5 P. sparsiflóra Mx. Leaves lanceolate or oblong, pointed each way; scape terete, longer than the leaves; spike long, loose, interrupted. S. and S-W. 6—18'.

6 P. marítima L. 8. juncoídes. Leaves linear, glabrous, fleshy, nearly as long as the slender scape; spike loose, bracts roundish. Coast, N. J., and N. 4—12'.

7 P. aristáta Mx. Lvs. linear, woolly at base, smoothish above; scape longer; spike dense; bracts long, rigid, awn-like (5') override round-cordate, spreading, conspicuous; seeds 2, boat-shaped. Prairies, Ill. 6—10'. June, July. (P. Patagonica, 8. (Gray.))

8 P. gnaphalóides L. White-woolly; lvs. oblong to linear; spike dense, exceeding the lvs.; bracts deltoid, not exceeding the calyx. Wis. to Tex. 3—6'. June, Jl.

9 P. Virginíca L. Hoary pubescent; lvs. elliptical, 3-5-veined; scapes and spikes elongated, dense-flowered; cor. closed on the pod, erect; seeds rarely more than 2; bracts shorter than the cal. 2 Dry hills and rocks, Conn., W. and S. 5—10'. May—Sept.

10 P. heterophyía L. Lvs. linear, entire, or some of them with a few slender teeth; ped. many, as long as the leaves; spikes loose; pod conoid, twice longer than the calyx, crowned with the closed cor., 10—24-seeded. 2 Wet, Penn., and S. 4—8'.

11 P. pusílla N. Thinly pubescent; lvs. filiform-linear, shorter than the capillary, few-flowered scapes; pod crested, longer than the calyx, 4-seeded. 2 Conn. (Mr. Bowles), W. and S. 1—3'. Seeds oblong. May—July.

Order LXXXIII. PLUMBAGINACEÁE. LEADWORTS.

Herbs or undershrubs with the leaves alternate or all clustered at the root. Flowers regular. Calyx tubular, 5-toothed, plaited, persistent. Corolla hypococrateriform, of 5 petals united at base, or sometimes almost distinct. Stamens 5, hypogynous and opposite the petals, or inserted on their claws. Ovary 1-celled, free from the calyx. Styles 5 (seldom 3 or 4). Fruit a utricle, or dehiscent by valves, containing 1 anatropous seed.

I. STATICÉÁE. Styles distinct, at least above. Utricle not valvate. Leaves radical...{(a)}

II PLUMBAGINÉÁE. Style 1, with 5 stigmas. Pod subvalvate. Leaves cauline...{(b)}...PLUMBAGO. 3

a Stigmas filiform. Styles glabrous. Scape branching..........................STATICE. 1
a Stigmas filiform. Styles plumos. Scape capitulate............................ARMERIA. 2
1. **STÁTICE**, L. *MARSH ROSEMARY*. Calyx funnel-form, limb scarious, 5-nerved, 5-parted. Pet. scarcely united at base. Fil. 5, adnate to the very base of the corolla. Ovary crowned with the 5 glabrous, filiform styles, utricle opening crosswise. 2* Herbs with the scape branching, the flowers 3-bracted, sessile on the 3-bracted branchlet.

8. **Límónium** L. Very smooth. Leaves oblong to oblanclate, acute, tipped with a bristle, long-stalked; scapes terete, corymbous-paniculate; fls. separate or in pairs, on the upper side of the branchlets, blue-purple. Marshes. 6—12. July—October.


1 P. *Cápenísis*. Shrubby; lvs. oblong, entire, white-scaly beneath; fls. in short terminal spikes, pale blue, the tube 1' or more in length. S. Africa. 2—4f. Hardy S. 2 P. *cerúlea*. Herbaceous; lvs. acuminate; fls. in loose spikes, blue. 6". 2f. S. Am. 3 P. *coccínea*. Herb tall; lvs. oblong, large; spikes long, loose; fls. scar. 1—2f. India.

**Order LXXXIV. LENTIBULACEÆ. BUTTERWORTS.**

Herbs small, growing in water or wet places, with showy, bilabiate fls. on scapes. Calyx inferior, of 2 or 3 sepals. Corolla irregular, bilabiate, personate, spurred. Stamens 2, included within the corolla and inserted on its upper lip. Anthers 1-celled. Ovary 1-celled, with a free, central placenta. Style 1. Stigma cleft. Fruit, capsule many-seeded. Seeds minute. Embryo straight, with no albumen. Fig. 399.

§ In wet, rocky places. Leaves broad, entire. Corolla throat open...............................PINGUICULA. 1
§ In water, floating. Leaves dissected. Corolla throat closed...............................UTRICULARIA. 2


* Corollas blue, purple, or white, lobes very unequal..............................Nos. 1—3
* Corollas yellow, the lobes nearly equal........................................No. 4

1 P. *vulgáris* L. Scape and calyx a little downy; cor. lips very unequal, lobes obtuse, entire; spur cylindrical, straightish. N. Y. (rare), and N. 6—8'. Cor. 1' long.

2 P. *elátior* Mx. Lvs. ovate to spatulate; scapes villous near the base; cal. glandu-
lär; corolla lobes obtuse, 2-lobulate; spur half as long as the tube, blunt. S. Car. to Fla. Scape very slender, 8—12' high. Lvs. 1' or less. Fls. 1'. (P. australis N.)

3 P. plumifla Mx. Lvs. glabrous, roundish-ovate; corolla tube oblong, lobes emarginate; spur acute, nearly as long as tube. Ga., Fla. 2'—4'. Fls. 4—5' long.

4 P. lutea Walt. Lvs. elliptic to obovate; cor. bell-shaped, nearly regular, the lobes sinuate-dentate; spur slender, as long as corolla. S. 5—8'. Fls. 9' broad.


§ Floating. Scape involucrate with a whorl of large inflated petioles. No. 1

§ Floating. Scape naked, branches bearing bulbils and bladders... (a)

§ Stems creeping and rooting in mud, with few or no air-bladders... (b)

a Flowers purple. Branches whorled, submersed. No. 2

a Flowers yellow.—c Bladders borne on the capillaceous leaves... (d)

c Bladders and leaves borne on separate branches... Nos. 3, 4

d Spur acute or retuse, about as long as the lips No. 5—7

d Spur obtuse, short. —c Fls. of 2 kinds, the lipless down on the stems... No. 8

—e Fls. of 1 kind only, all on the scapes Nos. 9—11

b Spur appressed and scarcely equalling the lower lip of the corolla... Nos. 12, 13

b Spur remote from the corolla, slender, acute... Nos. 14, 15

1 U. inflata Walt. Upper lvs. in a whorl of 5 or 6 at the surface of the water; pet. and midvein inflated, lower lvs. capillaceous, dissected, submerged; scape 4—5-flwd. 2. In ponds and ditches. Rhizome or stem long. Scape 8'. Fls. 8' broad, yellow, upper lip rounded, entire, lower lip 3-lobed. August.

2 U. purpurea Walt. Leaves all submersed, fibrous, whorled on the long stem; scape assurgent, 2-3-flowered; lower lip 3-lobed, bisaccate, longer than the conical spur beneath it. (1) Ponds. Scape 2—5'. Flowers 6' broad, violet-purple.

3 U. intermedia Hayne. Lvs. 2-ranked, crowded, 4—5 times forked, divisions linear-subulate, ciliate-denticulate, rigid, 2—3' long; bladders all on leafless branches; scape 2-3-flowered; spur conical, acute; corolla 6—8'. (l) Pools, Pa., and N. 6—8'.

4 U. Robbinsii Wood. Leaves alternate, 3—4 times forked, divisions flaccid, linear-capillary, entire, 8—13' long; bladders all on leafless branches; scape tall (8—13'), 4—7-flowered; spur fusiform; corolla 4—5'. (Dr. Robbins.)

5 U. striata Le Conte. Lvs. 3—4-furcate, divisions capillary; scape 2—6-flowered, 8—12'; fls. 6', on slender pedicels, lips subequal, 3-lobed, the upper striate with red, concave, the lower as long as the obtuse, notched spur. (l) L. I. to Fla.

6 U. longirostris Ell. Lvs. 2—3-furcate, with setaceous segments; scape 1—3-flowered (3—4'); lower lip entire, shorter than the subulate spur. South.

7 U. biflora Lam. Lvs. capillary, root-like, bearing numerous bladders; scape 2—5', 2-flowered; spur obtuse, notched, equalling the lower lips. W. and S.

8 U. clandestina N. Lvs. capillaceous-multifid, scattered, bladder-bearing; scape slender, 3—4', 2—3-flwd., seldom seen; cor. 5', spur shorter than the 6-lobed lower lip; ped. down on the stems 1', with 1 apetalous flower. 2. Ponds, Mass. to N. J. and Pa.

9 U. gibba L. Minute, with hair-like leaves and few utricles; scape 1—2-flwd., naked (2—3'); corolla spur blunt (gibbous) and short, lips many-lobed. 2. R. I. to Car.

10 U. vulgàris L. Lvs. capillaceous-multifid, fibrous; scaly, 5—12-flwd., 6—12'; spur conical, shorter than the closed lips (3—4'), divergent; fr. nodding. 2. Ponds.

11 U. minor L. Lvs. short, several times forked; sc. 3—6-flwd., 4—7'; cor. ringent, spur blunt, deflexed, much shorter than the obovate, flat lower lip; fr. nodding. 2.

12 U. bipartita Ell. Lvs. fibrous-multifid; sc. 1—3-flwd., 2—3'; cal. lower lip 2—parted; spur obtuse, half as long as the entire lower lip. Soft mud, South.
Order 85.—Orobanchaceæ. 217

13 U. subulata L. Minute, creeping; lvs. few, linear, entire, obtuse; sc. few, 1-5-flw., 3', with ovate bracts; spur acute, appressed to the lower 3-lobed lip. Springs.

14 U. resupinata Green. Rooting; lvs. linear-capillaceous, erect, undivided (17); scapes ±, simple, 1-flw., 1-bracted (3-6); spur ascending, remote from and shorter than the erect lips of the light-purple corolla (which is 4'). Muddy shores, N. Eng.

15 U. cornuta Mi. Scape rooting, tall (9-12'), scaly, 2-5-flw.; lvs. fugalor or 0; flowers subsessile, palatate very prominent; spur subulate, decurved away from the erect tube and limb. Mud or shallow pools. Flowers large, yellow.

Order LXXXV. Orobanchaceæ. Broom-rapes.

Herbs fleshy, leafless, growing parasitically upon the roots of other plants. Calyx 4-5-toothed, inferior, persistent. Corolla irregular, persistent, imbricate in aestivation. Stamens 4, didynamous. Anthers 2-celled, cells distinct, parallel, often bearded, at base. Ovary 1-celled, free from the calyx, with 2 or 4 parietal placentæ. Capsule enclosed within the withered corolla, 1-celled, 2-valved. Seeds very numerous and minute, with albumen.

* Flowers polygamous, on spicate branches, sterile above, fertile below. ............... Epiphecus. 1

* Flowers perfect,—a in one dense spike. Calyx split in front. ..................... Conopholis. 2

—a in one dense spike. Calyx 5-toothed. ....................... Phelipæa. 3

—solitary on long peduncles or scapes. ......................... Aphylloj. 4

1. EPIPHÉGUS, Nutt. Beechdrops. ♂ ♀ ♂ Upper fls. complete, but sterile, with a tubular, curved, 2-lipped cor. barely including the stamens. Lower fls. ♂, with a short, 4-toothed cor. and imperfect stamens. Caps. 2-valved, with 2 placenta on each valve.—A smooth, dull-red, leafless, branching plant, with sessile flowers all along the branches.


2. CONOPHOLIS, Wallroth. Squaw-root. Fls. ♂, crowded in a thick, scaly spike. Cal. with 2 bractlets at base, 4-toothed, split down in front. Cor. ringent, upper lip arched, notched, lower 3-lobed. Sta. exserted. Caps. 1-celled, 2-valved, with 2 placenta on each valve.—Stem simple, thick, short, covered with scales, the flowers in the upper axils.

C. Americana Wal.—In old woods: com. 4-7' high, and 1' thick, pale-yellowish. Ji.

3. PHELIPÆA, Tourn. Broom-rape. Fls. ♂, spiked or racemed. Cal. 2-bracted at base, 4-5-cleft. Cor. 2-lipped, including the stamens. Caps. 1-celled, 2-valved, with 2 placenta on each valve.—Stem thick, scaly.

P. Ludoviciana Don. Glandular-pubescent; stem thick, short; spike dense; cal. 5-cleft; cor. funnel-form, lips subequal; bracts ovate, obtuse. Alluvion, Ill.


2 A. fasciculáta T. & G. Stem 2-3' high, bearing many peduncles from near the summit, each with few scales and 1 purple flower. Mich., and W. 4-6'. May.
Order LXXXVI. BIGNONIACEÆ. Trumpet-flowers.

Trees, shrubs, or herbs, often climbing, with opposite, exstipulate leaves, and large, showy, monopetalous, irregular, 5-parted flowers. Stamens 2 or 4, often with 1 or 3 sterile rudiments. Anthers 2-celled. Ovary 2-car- pelled. Style 1. Stigma divided. Capsule woody, 2-valved, with few or many large seeds. Figs. 30, 31, 95, 199, 445.

1. CATÁLPA, Scop. CATÁLPA. Cal. 2-parted. Cor. campanulate, 4- or 5-cleft, the tube inflated. Sta. 2 fertile, 2 or 3 sterile. Stig. 2-lipped. Caps. 2-celled, long, cylindric. ℃ Lvs. opposite or in 3's, simple, petiolate. Flowers in large, showy, terminal panicles, May—July. Figs. 36-1, 445.

1 C. bignonioides Walt. Lvs. ample, thin, cordate-ovate, lustrous above, downy beneath, long-petioled; fls. in erect, pyramidal panicles, large, irregularly bell-shaped, white, with yellow and violet spots. A beautiful tree 30—50 ft. Native and cultivated.

2. BIGNÓNIA, Tourn. Cal. margin nearly entire. Cor. somewhat bilabiate, 5-cleft, bell-funnel-shaped. Sta. didynamous, 4 fertile, 1 a sterile filament. Caps. long and narrow, valves flat or scarcely convex, parallel with the partition. ℃ ℃ ℃ Often with tendrils.

1 B. capreolata L. Climbing, smooth; leaves binate, consisting of a pair of ever green, cordate-lanceolate leaflets and a branching tendril between them; fls. axillary, near 2', red-yellow; pod 6—7' long. Woods, S. 50 ft. Very slender. March—May.

2 B. Tweedíana. With yellow fls. 2', in panicles; cor. bilabiate. From Buenos Ayres.

3. TÉCÓMA, Juss. TRUMPET-FLOWER. Cal. campanulate, 5-toothed. Cor. tube short, throat dilated, limb 5-lobed, subequal. Sta. 4, didynamous, with the rudiment of a fifth, anther-cells 2, diverging. Caps. 2-celled, 2-valved, the valves contrary to the partition. Seeds winged. ℃ ℃ ℃ Lvs. opposite, odd-pinnate in the following.


3 T. grandiflóra. Climbing; fls. lance-ovate, pointed, dent-serrate; cor. scarcely longer than the 5-toothed calyx (3'), scarlet. China and Japan.


4. ECCREMOCARPS, R. & P. Calyx acutely 5-cleft, broader and much shorter than the tubular corolla, whose lobes are 5, rounded, reflexed.
Sta. 4, included. Caps. 1-celled, 2-valved, valves placentiferous in the middle. Half-shrubby climbers, from S. Am. Tender. (Calampelis, Don.)

1 E. scaber. Lvs. bipinnate; cor. tube inflated above the calyx, scarlet, drooping, 1'.
2 E. longiflora. Lvs. tripinnate; cor. tube cylindric, curved, yellow, 3', drooping.

5. MARTYNIA, L. UNICORN PLANT. Cal. 5-cleft, bracteolate at base. Cor. campanulate, tube gibbous at base, limb 5-lobed, unequal. Sta. 5, one rudimentary and sterile, four didynamous. Caps. coriaceous, ligneous, 4-celled, 2-valved, each valve terminating in a long, hooked beak. ① Chiefly southern, branching, viscid-hairy, strong-scented. Flowers large.

1 M. proboscidea Glox. Branches mostly decumbent; lvs. cordate, entire, roundish, villous, upper ones alternate; fls. on long, axillary peduncles; beaks 2 (when the valvès separate), hooked; corolla dull yellowish. Fields, thickets, S. and W. 2f. Jn.
2 M. fragrans. Lvs. roundish-3 lobed, sinuate-dentate; raceme few-flowered; corolla purple, yellow inside, fragrant; beaks shorter than the pod. Mexico.
3 M. Lutea, with large yellow funnel-form corollas, is from Brazil.

6. SÉSAMUM, L. OIL-SEED. Cal. 5-parted. Cor. campanulate, 3-cleft, the lower lobes the longest. Sta. 4, didynamous. Stig. lanceolate. Caps. 2-celled, the cells divided by the inflexed edges of the valves. ① E. India. Leaves petiolate, the lower opposite, upper alternate.

S. Indicum DC. Lvs. lance-ovate, lower ones 3-lobed, upper ones undivided, serrate: flowers axillary, sessile, pale purple. Fields and gardens. Seeds rich in oil. §

Order LXXXVII. GESNERIACEÆ. Gesnerworts.

Tropical plants, somewhat fleshy, with opposite or radical leaves, no stipules, and showy, somewhat irregular flowers. Calyx half adherent to the ovary (in the following genera), 5-parted. Corolla tubular, 5-lobed, imbricated in bud. Stamens 2 or 4, didynamous, with a rudiment. Style 1. Fruit a capsule nearly free, 1-celled, with 2 double, many-seeded placèae.

Corolla tube bell-form, equally tumid at base, limb oblique
Corolla bell-funnel-form, gibbous at base, limb short
Corolla salver-form, subequal, limb flat-spreadiug

1. GESNERIA, L. 2 With tuberous roots and toothed leaves. Sta. 4, with a rudiment, anthers cohering at first. Brazil.

1 G. Lindleyi. Lvs. opposite, ovate-oblong, rugous; flowers in a terminal raceme; corolla 18', scarlet or red, the limb very short. Brazil.
2 G. Douglasii. Leaves whorled, ovate, pubescent, with the numerous red-yellow flowers in their axils.—The species are many and much mixed.

2. GLOXINIA, L'Her. Has often radical leaves (or with very short stems), crenate, and large axillary or radical flowers. Stamens 4, with a fifth rudiment, anthers cohering. Brazil.

G. speciosa. Leaves oval-oblong, on long radical pedioles; ped. subradical, 1-flowered; corolla bell-shaped, 14', violet, varying to white.

3. ACHIMENES, Br. Erect, downy herbs, with scaly buds. Anth. 4, separate, the rudiment on the base of the corolla.
1 A. longiflora. Leaves oblong, pointed at both ends, serrate; corolla violet-purple 15"; calyx 4–5", pedicel still shorter, 1-flowered, axillary. Mexico.
2 A. cocinea. Leaves ovate, acuminate; corolla scarlet, 10", calyx 5", the pedicle longer, axillary, erect, with the flower nodding. Jamaica.

Order LXXXVIII. SCROPHULARIACEÆ. Figworts.

Herbs chiefly, without fragrance, the leaves and inflorescence various. Fils. irreg., (rarely 4-)parted, didynamous or diandrous (rarely pentandrous). Calyx free from the ovary, persistent. Corolla monopetalous, imbricated in bud. Stamens inserted in the tube of the corolla, 1 or 3 of them usually rudimentary. Ovary free, 2-celled, with 1 style, a 2-lobed stigma, and becoming in fruit a 2-celled, oo-seeded capsule, with axile placentæ and albuminous seeds. Figs. 70, 106, 134, 167, 434, 502.

1 Leaves alternate (or opposite), and the corolla spurred or saccate behind... (2)
2 Leaves opposite, and the corolla lower lip an inflated sac. (Tribe 2.)
3 Leaves opposite, and the corolla not spurred nor saccate... (5)

2 Inflorescence compound, centrifugal or terminal. Exotics. Tribe 1... (x)
3 Inflorescence simple, centripetal or axillary... (3)
4 Stamens 5. Corolla large, rotate, more or less irregular. Tribe 3... (a)
5 Stamens 4 or 2. Corolla minute, 4- or 5-lobed. Little herbs. Tribe 7... (b)
6 Stamens 4. Corolla large, upper lip exterior in the bud. Tribe 4... (b)
7 Stamens 4 or 2. Corolla lower lip exterior in the bud... (4)
8 Corolla bell- or thimble-shaped, oblique, lobes spreading. Tribe 8... (m)
9 Corolla bilabiate, upper lip vaulted and arched. Tribe 12... (p)

5 Stamens 2, exerted. Corolla rotate or salver-form. (Tribe 3.)
6 Stamens 2 (rarely 3), included. Corolla tubular, labiate, rotate, &c. Tribe 6... (e)
7 Stamens 4, perfect,—* the 5th a large, conspicuous rudiment. Tribe 5... (c)
8 The 5th a minute rudiment, or none... (8)
9 Inflorescence compound, in cymes or panicles. Tribe 5... (d)
10 Inflorescence simple.— Corolla wheel-shaped, largest lobe upward. Tribe 3... (a)
11 — Corolla salver-form, lobes about equal. Tribe 10... (a)
12 — Corolla bell-shaped, not helmeted. Tribe 11... (n)
13 — Corolla bilabiate and helmeted. Tribe 12... (q)

I. SALPIGLOSSIDEÆ. (Corolla in bud plicate at the clefts. Inflorescence cymous.)

Tribe 1. Salpiglossideæ.—2 Stamens 2. Corolla deeply many-cleft. Schizanthus...
  2— Stamens 4.—y Corolla tubular-funnel-form. Salpiglossem. 2
  3—y Cor. salver-form. Anth. unlike... Browallia. 3
  4—y Cor. salver-form. Anth. all alike... Brunfelsia. 4

II. ANTIARRHINIDÆ. (Corolla in bud imbricate, the upper lip covering the lower.)

Tribe 2. Calceolariæ. Flowers in cymes, very showy, cultivated. Calceolaria. 5
Tribe 3. Verbasceæ.—a Stamens 5, corolla not inverted, subregal. Verbascom. 6
  6—a Stamens 4. Cor. inverted on the twisted pedicels... Alonosia. 6
Tribe 4. Antirrhinæ.—b Corolla spurred. Pod opens by valves... Nemisia. 6
  7—b Corolla spurred. Pod opens by pores... Linaria. 9
  8—b Corolla saccate at base, throat closed... Antirrhinum. 10
  9—b Corolla throat open, naked inside. Climbers... Maurandia. 11
  10—b Corolla throat open, with 2 hairy lines. Climbers... Lophospermum. 12

Tribe 5. Cheleæ.—c Sterile filament a scale. Flowers small, lurid... Scrophularia. 13
  11—c Sterile filament shorter than the rest. Seeds winged... Chelone. 14
  12—c Sterile filament equaling the rest. Seeds wingless... Pentstemon. 15
  13—d Herbs. Corolla labiate, blue and white... Collinsia. 16
  14—d Shrubs slender. Corolla tube straight... Pussellia. 17
  15—d Shrubs erect. Corolla tube incurved... Physiola. 18
  16—d Trees. Corolla blue, tubular-bell-form... Pawsonia. 19

Tribe 6. Gratigæ.—e Calyx 5-angled. Corolla 2-lipped, 5-lobed, large... Mignon. 20
  17—e Calyx 5-angled. Corolla oblique, 4-lobed, large... Tohiena. 21
1. SCHIZANTHUS, R. & P. Cut-flower. Cor. irregular, the upper lip 5-cleft, external in aestivation, lower much smaller, 3-parted. Fil. 4, 2 of them sterile. Capsules 2-celled. 1 Chili. Leaves pinnatifid, alternate. Cymes supra-axillary.


3. BROWÁLLIA, L. Cor. salver-form, with a long tube, and oblique, 5-lobed limb. Anth. of the two posterior stamens halved, sub-1-celled. Lobes of the stigma broad, divaricate. Caps. membranous, valves bifid.—S. American herbs, with alternate, entire leaves and cyanic flowers.

4. BRUNFÉLISA, Sw. Corolla salver-form, with a long tube, and a broad 5-lobed limb. Sta. 4, all equal. Style incurved at apex, stig. of 2 broad lobes. Caps. coriaceous, valves entire.—S. American shrubs, with alternate, entire leaves and large blue flowers. (Francisea, Pohl.)
5. **CALCEOLÀRIA, L.** SLIPPER-FLOWER. Calyx 4-parted, valvate in bud. Cor. tube very short, limb 2-lobed, lobes entire, concave or spur-like, the lower inflated. Sta. 2, lateral, with no rudiments. Caps. ovoid conical, valves bifid.—S. American and New-Zealand herbs or shrubs, with opposite or whorled leaves and very curious flowers, of all colors, endlessly varied in cultivation.

§ Leaves pinnatisect. Anther cells separated, one empty. Annual.……….. No. 1
§ Leaves ovate to lanceolate. Fls. corymbs. Anth. cells contiguous.………Nos. 2—4

1 C. PINNÀTA. Rough-downy, weak, 1f, the lower lip orbital, pale-yellow.
2 C. CORYMBOSA. Erect; lower lip broad-ovate, obtuse, open beyond the middle, ylw.
3 C. CRENATÌFLÒRA. Villous; lower lip hanging, large, obovate, 3-furrowed, spotted, ylw.
4 C. INTEGRIFÒLÌA. Vscd; lower lip orbital, little longer than the upper, scarcely contracted at the base; upper lip twice longer than the calyx. Shrub. 2—3f.

6. **VERBÁSCUM, L.** MULLEIN. Cor. rotate, 5-lobed, unequal. Sta. 5, decline, all perfect. Caps. ovoid-globous, 2-valved. 1 Rarely 2f or suffruticos. Leaves alternate. Flowers in spikes or paniculate racemes. June—August. Fig. 434.

§ Leaves decurrent on the stem. Flowers in a long, thick spike, yellow………..No. 1
§ Leaves not decurrent.—a Flowers in racemes, white, yellow or purple…..Nos. 2, 3
—a Flowers paniculate, white or yellow………..Nos. 4, 5

1 V. ÌHÀPSUS L. Common Mullein. Leaves decurrent, densely tomentous on both sides; rac. spiked, dense; 3 of the sta. downy, 2 of them smooth. 2 Fields, waysides. 3—5f. Almost never branched, woolly all over. Flowers numerous. §

2 V. BLATTÀRIA L. Moth Mullein. Lvs. clasping, oblong, smooth, serrate; ped. 1-fld., solitary, racemous; filaments all bearing violet wool. 3 Waste grounds, waysides. 3f. Flowers 1' white or yellow. Stem often branched.

3 V. PHENÉCEUM. Leaves mostly radical, ovate to oblong, petiolate, smooth above, downy beneath; racemes rarely branched; flowers violet to red. 2 Eur. 3f.

4 V. LYCÈNTÌTIS L. White Mullein. Whitish tomentous; st. angular; leaves green above, the lower petiolate; fls. in loose fascicles, forming a pyramidal panicle; fls. all white-woolly. 2 Sandy fields, N. Y. to Ga. rare. Flowers pale yellow. § Eur.

5 V. PULVERÈLÈNTUM. Clothed in cottony, deciduous tomentum; lvs. tomentous both sides, ovate-oblong; fls. numerous, yellow, in a large panicle. 2 Eur.

7. **ALÓNSOA, R. & P.** Cor. resupinate by the twisted pedicel, rotate, 5-cleft, lobes very obtuse, unequal. Sta. 4, short, declinate. Caps. obtuse, flattened, septicidal.—S. American, very branching herbs, with opposite leaves, square branches, and terminal racemes of scarlet flowers.

1 A. INCÌSERÈLLÀ. Leaves lance-ovate, incisely serrate, petiolate; cor. 1' or less wide, 3—4 times longer than the calyx. 1 All Summer. From Chili.

8. **NEMÈSÌA, Vent.** Calyx 5-parted. Corolla personate, saccate or spurred behind, upper lip 4-lobed, lower entire. Sta. 4, lower pair circumflexed at base. Caps. compressed, with 2 keeled valves, and winged seeds. 1 S. Africa. 2 vs. opposite. Fls. solitary and axillary, or racemcd.

1 N. VERSÌCOLOR. Lvs. ovate to lanceolate and linear, entire or toothed; cor. lobes ob long, all subequal (4—5'''), spur 4'', incurved, acute. 3f. Blue-white.

2 N. FLORÌBÚNDA, has ovate leaves, an obtuse spur, and white-yellow flowers.

9. **LINÀRIA, Juss.** TOAD-FLAX. Calyx 5-parted. Corolla personate,
upper lip bifid, reflexed, lower 3-cleft, throat closed by the prominent palate, tube inflated, with a spur behind. Caps. 2-celled, bursting below the summit.—Herbs. Lower leaves generally opposite, upper alternate. Fls. solitaire, axillary, often forming terminal, leafy racemes. Fig. 70.

* Stems prostrate, creeping. Leaves broad, reniform or hastate. Eur. ... Nos. 1, 2
* Stems erect, with narrow leaves, mostly scattered. ... Nos. 3–5
* Stems erect, with broad lanceolate leaves, all verticillate. No. 6

1 L. Cymbalària. Lvs. palmate-veined, reniform, 5–7-lobed, mostly alternate; fls. axillary, small, yellow, spur shorter than tube. 2f. Smooth, delicate.


3 L. Canadénsis Dumont. Lvs. scattered, erect, linear, obtuse; fls. racemed; st. simple; scions procumbent; fls. blue. 1 Fields, waysides. 6–12'. Very slender. Flowers small, in a loose raceme. Spur filliform, long, short, or 0. June–Sept.


5 L. bipartítà. Erect; lvs. linear, alternate; ped. much longer than the lance-linear, scarious-edged sepals; cor. 8–10', violet, the palate orange.

6 L. thornithóphorum. Three Birds. Smooth, glaucous; leaves in 3's and 4's; fls. whorled, each resembling 3 little birds. 2f. Eur. 2–3f. Curious.

10. ANTIIRRHINUM, L. SNAP-DRAGON. Calyx 5-sepalled. Corolla gibbous (not spurred) at base of tube, throat closed (personate) by the prominent palate, upper lip bifid, reflexed, lower trifid. Sta. 4. Capsules opening by 2 or 3 pores, as in Linaria.—Herbs, European, &c., with the lower leaves opposite, the upper alternate. Flowers axillary, large, racemed above. Fig. 502.

1 A. majus. Erect; leaves lanceolate; fls. evidently racemed; sep. hairy, shorter than the cor. tube; cor. pink, purple, or scarlet, mouth yellow. 2f. 18'. Fls. 1'. Summer.

2 A. Orónrium. Low, spreading; lvs. oblong-lanceolate; fls. smaller than in A. majus (6'), the sepals equalling the cor., which is rose or white, with purp. spots. 1 Sum.

11. MAURÁNDIA, Ort. Calyx 5-parted. Cor. bilabiata, tube scarcely gibbous at base, throat open, with 2 prominent glabrous folds, upper lip of 2 rounded lobes, lower of 3. Sta. 4. Caps. oblique, opening by chinks below the apex. 2f. Mexican, climbing and twining, with large purple flowers all Summer.

1 M. antirrhiñinfloř. Leaves mostly triangular-hastate; fls. glabrous, 1', tube some gibbous at base, throat partly closed by the prominent hairy palate. 10f.

2 M. sempéreplórens. Lvs. cordate-hastate, angular; calyx glabrous; cor. bell-form, not gibbous (throat open), 14' long, pale violet or rose-colored. 10f.

3 M. Barclayána. Leaves broadly triangular-cordate or hastate; calyx clothed with long glandular hairs; cor. near 2' long, very oblique, purple, throat open. 10f.

12. LOPHÓSPERMUM, Don. Corolla tubular-campanulate, limb 5-lobed, subregular, throat open, between two hairy lines. Caps. globular. Seeds winged. Otherwise as in Maurandia. Fig. 106.
1 L. erubescens. Lvs. triangular-cordate, dentate-lobed, pubescent; cal. segm. ovate, hirsute; cor. downy, 2½—3½ long, red, with an ample border. 10—20f.

2 L. scandens. Lvs. cordate-ovate, pointed, coarse-toothed, smoothish; calyx segm. lance-ovate; cor. glabrous, 2', scarlet, limb erect-spreading. 10f.

13. SCROPHULARIA, L. Figwort. Calyx in 5 acute segments. Cor. subglobose, limb contracted, sub-bilabiate, lip with an internal, intermediate scale (sterile filament). Capsules 2-celled. Valves with 2 inflated margins.—Herbs or suffrutescent, often fetid. Leaves opposite. Cymes in simple or compound, terminal, thyrsoid panicles. Fig. 167.

S. nodosa L. Glabrous, tall, branching; leaves ovate, oblong, or lanceolate; fls. in loose pedunculate cymes, combined into an oblong panicle; sterile anther a roundish green scale on the dull, olive-colored corolla. 2' Thickets. 4—6f. July—Oct.

14. CHELONE, L. Turtle-head. Snake-head. Calyx deeply 5-parted, with 3 bracts at base. Cor. inflated, bilabiate. Sta. 4, woolly, the sterile filament shorter than the rest. Caps. valves entire. Seeds broadly winged. 2' With opposite leaves and sessile flowers in the upper axils.

1 C. glabra L. Smooth; lvs. subsessile, oblong-lanceolate, acuminate, serrate, acute at base; flowers densely spiked. By brooks and in wet places. 2f. Stems simple, in clumps. Flowers 1' long, white or roseate, with short gaping lips. Ang., Sept.

β. purpurea. Lvs. distinctly petiolate, acuminate; flowers rose-purple. West.


15. PENTSTÉMON, L. Beard-tongue. Calyx deeply 5-cleft. Cor. elongated, often ventricose, lower lip 3-lobed, spreading. The fifth filament (tongue) sterile, bearded, longer than the rest or about as long; anth. smooth. Seeds ∞, angular, not margined. 2' N. American, branching, paniculate. Leaves opposite, the lower petiolate, upper sessile or clasping. Flowers showy, red, violet, blue, or white, in Summer.

* Native E. of the Mississippi River, sometimes cultivated... (a)

a Leaves dissected. Corolla bell-shaped, lobes rounded, subequal... No. 1
b Leaves undivided, serrulate. Sterile filament (tongue) bearded... Nos. 2, 3

a Leaves entire. Tongue puberulent, widened and incurved at the apex... No. 4

* Native W. of the Mississippi, cultivated for ornament... (b)

b Leaves incisely pinnatifid. Corolla lobes subequal. Tongue smoothish... No. 5

b Leaves serrate, with pale purple or blue flowers. Tongue bearded... Nos. 6—8

b Leaves entire.—c Cor. strongly bilabiate, scarlet. Tongue bearded... No. 9

—c Cor. scarcely bilabiate,—d scarlet or crimson... Nos. 10—12

—d blue or violet... Nos. 13—15

1 P. disséctus Ell. Lvs. pinnately divided into linear segm.; fls. in a loose panicle; cor. with a curved tube, 9—10", purple; tongue bearded at apex. Dry. Ga. 2f. Jn., Jl.

2 P. pubécens Sol. Pubescent or glabrous; lvs. ovate-oblong to lanceolate; fls. in a loose panicle; cor. tube 7—9", gradually enlarged upward, pale purple, lower lip with two bearded folds inside, some longer than the upper. Hills and bluffs. 1—2f. †

3 P. Digitàlis N. Glabrous; lvs. elliptic to lanceolate, the upper clasping; fls. many, large, corolla tube abruptly enlarged to bell-form, pale blue or purplish, 12—15" long, throat widely open, beardless. Rich soils, Pa., W. and S. 2f. Leaves 3—6".

4 P. grandiòfúrus Fras. Glabrous and glaucous; lvs. oblong-ovate to roundish-ovate, upper clasping, all entire; panicle long, slender; corolla bell-shaped, 15", limb nearly regular, bluish purple. Ill., Wis., and W. 3f. Handsome. †
5 **P. Richardsdöni.** Smoothish, branching; fls. 1', violet, in leafy panicles. Oreg. 2f.

6 **P. ovátus.** Puberulent; lvs. cordate-clasping; fls. 9", numerous, light blue. Oreg. 2f.

7 **P. Colea.** Puber., tall; lvs. lance-ovate, clasping; fls. 2', broad-campanulate. Tex.

8 **P. campánulátus.** Glabrous; lvs. lance-linear to lance-ovate, long-pointed; panicle long, loose, 1-sided; corolla tube inflated, large, bell-shaped. Mexico.

9 **P. bareátus.** Smooth and glaucous; lvs. oblong to lance-linear; cor. tube long (13'), scarcely dilated upward, lower lip and tongue densely bearded. Mexico. 2–4f.

10 **P. Murrayánus.** Glaucous; lvs. connate-clasping, upper roundish; cor. 18", bright red, dilated upward, in a long virgate panicle; tongue smooth. Texas. 3f.

11 **P. Hartwegi.** Upper lvs. clasping; cor. tubular, 2', crimson; tongue glab. Mex. 3f.

12 **P. glaber.** Smooth and glaucous; sta. in bunches, simple; lvs. lanceolate to ovate, entire; flowers 18', in slender panicles, blue-crimson. Nebraska, and W. 2f.

13 **P. spectósus.** Tall; st. lvs. lanceolate, sessile; cor. blue, 18', mouth ample, tongue filiform, the panicle long, virgate, second, each cyme with 5–9 fls., very showy. Oreg.

14 **P. gentianódés.** Tall; st. lvs. broad-clasping; cor. 16", violet, mouth ample, tongue glabrous, dilated and retuse at apex, the panicle long, some leafy. Mexico. 3–4f.

15 **P. cerúleus.** Low, leafy; lvs. lance., sessile; cor. blue, 8'; tongue bearded. Neb.

16. **Collínśia,** Nutt. **Innocéncia.** Calyx 5-cleft. Cor. bilabiate, orifice closed, upper lip bifid, lower trifid, with the middle segment carinately saccate and closed over the declinate style and stamens. Caps. with 2 bifid valves. Seeds large, concavo-convex. ① With verticillate or opposite leaves, axillary and terminal flowers, very pretty.

1 **C. verna** N. Lvs. ovate to lanceolate, the cauline cordate-clasping, dentate; verticils 4–6-flwd.; cor. blue and white, twice longer than the calyx, 2 or 3 times shorter than the pedicel. Banks of streams, N. Y., and W. 8–18', branching. May, June.

2 **C. parvifóra** Doug. Lvs. ovate to lanceolate; verticils 2–6-flwd.; cor. blue, little longer than the calyx and little shorter than the pedicels. L. Sup., and W. 6–10'. Jun.

3 **C. bicolor.** Stem lvs. ovate, crenate, sessile; verticils 6–10-flwd.; calyx hairy, longer than the ped.; cor. 9", rose-violet and white. California. 2f. Hardy and handsome.

4 **C. grandiflóra** has lvs. thickish and all entire, with ⑧ large blue-purple fls. Oreg.

17. **Russéllia,** Jacq. Cal. 5-parted. Cor. tubular, limb sub-bilabiate, of 5 short rounded lobes, the 2 upper twin. Sta. 4, the fifth a small rudiment. Caps. subglobose, septicidal, valves bifid. Sds. ⑧, mixed with hairs. 抒 Mexican. Lvs. opposite or whorled, often minute or scale-like.

R. **Júcnea.** Very smooth, with long, drooping, rush-like branches; lvs. lanceolate to linear, or scale-like on the branches. Flowers scarlet, 1', remote in drooping racemes.


**P. Capěnsis.**—Shrub 2f, smooth and beautiful. Leaves lance-ovate, crenate, petiolate. Flowers pendulous, 1', crimson, yellow within.

19. **Paulóźnia,** Siebold. Calyx deeply 5-cleft, fleshy. Cor. tube long, declinate, enlarged above, limb oblique, with rounded segments. Sta. 4, arched downward, with no rudiment. Caps. acuminate, valves septiferous in the middle. Seeds ⑧, winged. 抒 From Japan, with very large cordate, ovate leaves and large blue-purple fragrant panicles.
226  ORDER 88.—SCROPHULARIACEÆ.

P. Imperialis.—In parks, 40 ft. high. Flower-buds formed in Autumn, opening in the following Spring. Corolla near 2'. Tree of rapid growth and kingly port.

20. MIMULUS, L. Monkey-flower. Calyx tubular, 5-angled, 5-toothed. Corolla ringent, the upper lip reflected at the sides, palate of the lower lip prominent. Stig. thick, bifid. Caps. oo-seeded.—Herbs prostrate or erect, with square stems and opposite lvs. Ped. axillary, solitary, 1-flwd.

§ Leaves pinnate-veined. Flowers blue (wild) or yellow (cultivated)......Nos. 1, 2, 6
§ Leaves palmate-veined. Flowers yellow or scarlet.................Nos. 3, 4, 5

1 M. ringens L. Lvs. sessile, smooth, lanceolate, acuminate; ped. axillary, longer than the flowers. 2 A common inhabitant of ditches and mud soils. 2f. Flowers large. (1'), pale blue, yellow-mouthed, appearing in July and August.

2 M. alatus Ait. Leaves petiolate, smooth, ovate, acuminate; ped. shorter than the fls.; st. winged at the 4 corners. 2f. N. Y., W. and S., in muddy places. 2f. Aug.

3 M. Jamésii Torr. Stems diffuse, rooting; leaves subentire, round-reniform, 5-7-veined, the upper as long as the peduncles of the small yellow fls. L. Sup., and W.

4 M. Luteus. Lvs. round-ovate, the cauline sessile or clasping, shorter than the peduncles; calyx ovoid, half as long as the broad, large, yellow, spotted flowers. Cal.

5 M. caudatus. Branching, villous-clammy; leaves ovate, narrowed to the clasping base, shorter than the long ped.; cal. large, inflated; cor. ample, rose-orange. Cal.


21. TORÈNIA, L. Calyx tubular, with prominent angles, oblique. Cor. ringent, upper lip notched, lower larger, trifid. Sta. 4, arched beneath the upper lip, the longer pair appended at base. Stigma double. Capsules included.—Herbs tropical, diffuse, with opp. leaves and racemcd fls.

T. Asiatica. Lvs. petiolate, lance-ovate, crenate-dentate; calyx acute at base, 4'; cor. twice longer, ample, pale purple tipped with violet. 2f+, trailing.


C. multifida Benth. Low, diffusely-branched, puberulent; leaves petiolate, pinnately dissected; segments linear or cuneate, lobed or entire, obtuse; cor. greenish, scarcely exserted (2'), lobes entire. 3 Sandy banks of rivers, O. to La. 6–12'. July.

23. HERPÉSTIS, Gært. Calyx unequally 5-parted. Corolla subbilabiate, upper lip emarginate or 2-lobed, lower 2-lobed. Sta. 4, fertile. Caps. 2-furrowed, valves parallel with the dissepiment. Seeds oo, small. 2f Obscure weeds with opposite leaves. Peduncles 1-flowered, axillary, or subracemous, often with "vo bractlets near the calyx.

§ Leaves feather-veined, o obsc. 1–3-veined. Cor. yellow, or bluish......Nos. 1, 2
§ Leaves palmately many-(5-9)-veined, subentire. Corolla blue..............Nos. 3, 4

1 H. nigréscens Benth. Erect; st. square, branched; leaves oblanceolate, crenate-serrate above; ped. equalling or exceeding the leaves; corolla yellowish, upper lip rounded, entire. Wet pl., S. 1–2fl. Cor. rather longer (5') than cal. Blackens in drying.

2 H. Monniera Humb. Prostrate, fleshy; lvs. wedge-obovate, subentire; ped. as long (9") as the lvs.; fls. few, bluish; cor. 4") wide, nearly regular. Wet banks, Pa., & S.

3 H. amplexicaulis Ph. Stem submersed, woolly; leaves ovate, cordate-clasping,
obscurely crenate, obtuse; ped. shorter than the calyx, cor. 6 longer, the upper lip emarginate; disk 10-toothed. Swamps, N. J., and S. 6–12'. August.

4 H. rotundifolia Ph. Creeping, smooth; lvs. round-obovate, entire; ped. 2 or 3 times longer than cal.; cor. upper lip notched. Pools, Ill. to La. 1f. Fls. 5'. Aug.

24. GRATIOLA. HEDGE HYSSOP. Calyx 5-parted, subequal. Cor. upper lip entire or slightly bifid, lower trifid, the palate not prominent. Sta. 2, fertile, mostly with 3 sterile filaments. Capsules 2-celled, 4-valved, valves inflexed at margin. \( \bigcirc \) Low, with opposite leaves. Peduncles axillary, 1-flowered, usually bibracteolate near the calyx.


§ Flowers pedunculate. Anther cells transverse. Plants smooth or viscid. (a)

a Sterile filaments none, or very minute and pointed. Nos. 1–3.

a Sterile filaments thread-like, tipped with a small head. Nos. 4–6

1 G. Virginiana L. St. ascending, branched; leaves lanceolate, sparingly toothed; ped. as long or longer than the lvs.; cor. twice longer than the cal.; sterile fil. none. \( \bigcirc \) Common. 4–8'. St. terete, branching, with white or pale-yellow flowers. July.

2 G. floridana Nutt. St. erect, branched; lvs. lanceolate, few-toothed; ped. longer than the leaves; 4 cor. 3 times longer than the calyx (7'), yellow. \( \bigcirc \) Fields, S. 6–9'.

3 G. sphærocarpâ Ell. Ascending, branched; leaves lance-ovate, attenuate to the base, sparingly toothed; ped. scarcely longer than the cal. Damp. 3–7'. W. and S.

4 G. aürea Muhl. Smooth; lvs. oblong-lanceolate, subentire, clasping; ped. as long as or longer than the leaves; cor. golden yellow. Muddy soils. 6–8'. August.

5 G. viscòsa Schw. Viscid-downy; leaves lance-ovate, sharp-serrate, clasping; ped. longer than the leaves; corolla white, twice longer than calyx, which is 2 or 3 times longer than the capsule. Wet places, Ky. to N. Car., and S. 9–12'. (G. Drummondii.)

6 G. ramòsa Walt. St. terete, creeping at base; leaves linear, acute, with few teeth near the apex; bractlets nearly 0; sep. linear; cor. white. Muddy shores, S. May–Jl.

7 G. pilòsa Mx. Erect, hispid; vs. ovate, few-toothed, clasping, rugous; cor. tube scarcely longer than the calyx, white. Wet, Md., and S. 9–12'. July–September.

8 G. subulàta Baldw. Erect, hispid; lvs. linear or lance-linear, margins revolute, entire; cor. tube slender, thrice longer than the calyx. Wet sands, Ga., Fla. Sept.

25. ILYSÁNTHES, Raf. Cal. 5-parted. Cor. upper lip short, erect, bifid, lower lip larger, spreading, trifid. Sta. 2, fertile; 2 sterile fil. forked, one of the divisions tipped with an obtuse gland, the other acute, or rarely with half an anther. Caps. ovate or oblong, about equaling the calyx.

1 I. gratioloides Benth. Branching, ascending 3–8'; lvs. oblong, obtuse, subsessile, obscurely dentate; cor. twice longer than the calyx, bluish-white, 4". A small weed-like herb, in wet places: common. Peduncles 3–6". July, August.

2 I. grandifòra Benth. Diffusely creeping; lvs. thick, roundish, entire, subclasping; ped. hirsute, 1', corolla 6' long, violet-blue. Sandy swamps, Ga. (Nuttall)

3 I. refràcta Benth. Erect, slender; lvs. clustered below, obovate to oblong, entire, the calicle remote, bract-like, linear-subulate; ped. filiform, refracted in fruit; cor. light-blue, 4 times longer than the calyx (5'). Damp pine woods, S. 6–10'. June.

4 I. saxìcola (Curts). Stems leafy, clustered; leaves oblong, obtuse, entire, sessile; ped. 3–4 times longer than the leaves (7–9'), refracted in fr.; cor. blue, 4'. S. Aug.

26. MICRÁNHTEMUM, Rich. Cal. 4-toothed or cleft. Cor. upper lip shorter, entire, lower trifid. Sta. 2, fertile, a glandular scale at the base of each, sterile filament. Style short, apex clavate or spatulate. Caps. 2-valved. \( \approx \) 1 Slender, glabrous, with opposite lvs. and minute fls.
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ORDER 88.—SCROPHULARIAC?

*M. orbiculātum* Mx. Sts. creeping and rooting, branches ascending 1–2'; lvs. orbiculār to obovate, 3-veined, entire, subsessile; fls. 4' long, lower lip of cor. longer than the calyx. Brickish mud, Del., and S. (M. micranthum, &c.)


H. crenātum Wood. Submersed stems flaccid, bearing the lvs. above; lvs. roundish, glabrous, crenate, abruptly at base, 1-3-veined, on flat, velvety petioles; pedicels 3', reflexed; corolla little exserted, white. Pools, Miss., La. (Dr. Hale).


A. pusillus Torr.—On wet rocks, Newton Co., Ga. Leaves nearly radical, linear, obtuse; 1–2' long; flowers minute, white. March, April.


L. tenuifōlia Nutt. Lvs. linear, scarcely distinct from the petiole; scape as long as the leaves; cor. segments oval-oblong, shorter than the cal. Mud, Penn., and N. 1'.

30. SYNTHYRIS, Benth. Calyx 4-parted. Corolla subcampanulate, segments 4, erect-spreading or 0. Sta. 2 (rarely 4), on the cor., exserted, anth. cells parallel, distinct. Caps. compressed, obtuse or emarginate. 2 N. American, with a thick root. Radical leaves petiolate, cauline bract-like, on the scape-like stem, alternate. Fls. racemose or spicate. May.

S. Houghtoniana Benth. Hairy; lvs. ovate, subcordate, crenulate, obtuse; stem or scape dense-flwed. above; cor. greenish, as long as the cal. Hills, Mich., and W. 1f.


§ Corolla light-yellow, tube twice longer than the lower lip.…….Nos. 1, 2
§ Corolla purple, white, brown, often spotted, tube inflated and short……Nos. 3–5
1 D. grandiflōra (or ochroleuca). Great Yellow F. Leaves ovate, velvety, serrulate, clasping; racemes downy, loose; corolla 14' long, segments very broad. 4f.
2 D. lūtea. Plant very smooth, with lance-oblong leaves; raceme smooth, with many flowers, all on one side; corolla 8–10' long, tube not inflated. 2f.
3 D. purpūræa. Purple F. Lvs. oblong, rugous, petiolate, crenate, large; flowers in a long, 1-sided raceme, thimble-shaped, purple or white, spotted. 2–3f.
4 D. ferrugīnea. Leaves very smooth, lance-oblong; corolla rusty-brown, the lower lip densely bearded, its middle segment ovate. 4f.
5 D. lanāta. Leaves lance-oblong, often woolly; flowers downy or woolly, white or brown; lower segment of the corolla obovate. 2f.
32. **VERÓNICA**, L. **SPEEDWELL**. Calyx 4-parted. Cor. subrotate, deeply 4-cleft, lower segments mostly narrow. Sta. 2, inserted into the tube, exserted. Caps. flattened, often obcordate, 2-celled, few-seeded.—Our species are herbs. Leaves opposite. Flowers solitary, axillary or in racemes, blue, flesh-colored, or white.

§ Tender shrubs (Australian) with axillary racemes of blue flowers...........Nos. 16, 17
§ Herbs tall (European) with opposite lvs. and terminal rac. of blue fls....Nos. 14, 15
§ Herbs tall, with whorled leaves, terminal racemes, and tubular flowers....Nos. 1, 2
§ Herbs low, weak (3-12'). Leaves opposite (at base). Corolla rotate... (a)
  a Racemes opposite, axillary. Capsule roundish, emarginate.............Nos. 3, 4
  a Racemes alternate, axillary. Capsule not rounded, very flat...........Nos. 5, 6
  a Racemes terminal, or the flowers axillary and not racemose... (b)
    b Floral lvs. like the rest, not longer than the recurved peduncles...Nos. 7-9
    b Floral leaves bract-like, longer than the erect peduncles... (c)
      c Perennial. Peduncles equalling or exceeding the calyx.....Nos. 10-1.
      c Annual. Peduncles shorter than the calyx or none............Nos. 12-13

1 **V. Virginica** L. **Culver's Physic.** Erect, tall, glabrous or downy; lvs. whorled in 4's-6's, lance-ovate to lance-linear; spikes mostly several, paniculate. 2 In thickets, Vt., W. and S. 2-5f. Corolla white, with exserted style and stamens. July.

2 **V. Sinútica.** Hardly different from No. 1, but it has blue flowers. Siberia. 3f.

3 **V. Anagallis** L. Glabrous, erect; lvs. sessile, clasping and subcordate, lanceolate, acute, entire or serrulate; rac. in opposite axils; caps. orbicular, slightly notched. 2 Brooks and pools. Plant fleshy, 1f. Flowers small, blue-purple. June, July.

4 **V. Americana** Schw. **Brooklime.** Glabrous, decumbent at base, erect above; lvs. ovate or ovate-oblong, serrate, petiolate, abrapt at base; rac. loose; caps. roundish, turgid, emarginate. 2 In clear streams. 12-18', fleshy. Fls. blue. June, July.

5 **V. scutellata** L. Glabrous, ascending, weak; lvs. linear or lance-linear, sessile, acute, remotely denticulate; rac. very loose; capsule flat, broader than long, cordate at both ends. 2 Swamps, N. and W. 1f. Fls. flesh-color, rather large. June-Aug.

6 **V. officinállis** L. Roughish-downy, prostrate, branching; lvs. wedge-oblong, obtuse, serrate, short-petioled; racemes dense, with pale-blue flowers; capsule downy, triangular-obcordate. 2 Dry fields. 6-12'. May-July. § Europe.

7 **V. Buxbáumii** Tenore. Prostrate, hairy; lvs. roundish-ovate, coarsely crenate-serrate, the floral similar, all on short petioles; ped. longer than the lvs.; caps. triangular-obcordate, broader than long. 2 Waste grounds, E.: rare. 7-12'. Cor. blue. § Europe.

8 **V. agréstis** L. **Neckweed.** Hairy, procumbent, diffuse; lvs. cordate-ovate, deeply crenate-serrate, floral similar, all petiolate; ped. as long as the lvs.; caps. roundish, acutely notched, 00-seeded. 1 Fields, E.: rare. 2-8'. Light blue. May-Sept. § Europe.

9 **V. hederaefólía** L. Prostrate, plnls; lvs. petiolate, cordate, roundish, coarsely 3-5-toothed or lobed, shorter than the ped.; sep. triangular, subcordate, acute, closed in fruit; caps. turgid, 4-seeded. 1 Hard soils, E.: rare. Cor. blue. Mar.-May. § Europe.

10 **V. alpína** L. Branched at base, ascending 1-5'; lvs. roundish-oval to elliptical, very obtuse, toothed or entire, subsessile; racemes hairy, densely few-flwd.; capsule obovate, notched. 2 Summits of White Mts., N. H., and R. Mts. Fls. small, blue.

11 **V. serpyllífolía** L. Branched below, ascending 3-12'; lvs. oval, obtuse, subcrenate, the lower rounded and petiolate, upper bract-like, oblong, entire; rac. smoothish, loose; caps. obcordate, broader than long. 2 Pastures: com. Cor. blue-wh. May-Aug.

12 **V. peregrína** L. Smoothish, ascending; lvs. petiolate, oblong, few-toothed, obtuse, upper obl.-lin., entire; fls. subsessile, whitish; caps. roundish, slightly notched, 00-seeded. 1 Clay soils, fields: com. 4-10'. Plant rather fleshy. May, June.

13 **V. arvénsis** L. **Corn S.** Hairy, branched; lvs. below round-ovate, subcordate, petiolate, crenate, the upper lanceolate; corolla pale blue, pencilled, shorter than the calyx (as in No. 12); caps. obcordate. 1 Dry fields: com. 2-6'. May, June. § Eur.
14 V. spicata. Erect, 1-2; leaves opposite, lanceolate, petiolate, serrate; racemes mostly solitary; pedicels shorter than the calyx; corolla blue, showy. 24 Europe.

15 V. paniculata. Erect, bushy, 1-3; leaves opposite and in 3's, lanceolate, acute at base, petiolate; rac. panicled; ped. longer than the calyx. 24 Many garden varieties, hybrids between this and No. 14, all with handsome blue racemes. Europe.

16 V. speciosa. Very smooth, shrubby, with oblong-obovate entire lvs., dense short (2) racemes in the upper axils, and violet-blue flowers, very beautiful. 1-3.

17 V. salicifolia. Smooth (tree-like at home), with lanceolate, acute, entire leaves, dense glandular-downy racemes (3'), and innumerable blue flowers. 2-5f.


B. Americana L. Rough-hispid, slender; leaves oblong to linear, few-toothed, obtuse, 3-veined; spike long-stalked, 6-12-flowered; cor. tube 6-7" long, limb half as long, deep blue. Woods, N. Y., and S. 2-3f, nearly leafless above.

34. Macranthera, Torr. Calyx lobes 5, long and narrow. Cor. tubular, with an oblique limb, short entire segments, and 4 long exserted subequal stamens. Style long, filiform. Caps. ovate, acuminate. 24 Tall, with opposite pinnatifid leaves and yellow fls. on long decurved peduncles.


§ Tube of the corolla woolly within, incurved, as long as the limb.………No. 1
§ Tube of the corolla much shorter than the subtorate limb. Leaves small. Nos. 2, 3

1 S. macrophylla N. Tall, smoothish; lvs. large, pinnatifid, with lance-oblong incised segments, upper serrate or entire. 24? Woods, W. 4-6f. Cor. 6f. July.

2 S. pectinata Ph. Viscid-downy, profusely branched; lvs. small (1' and less), pin natifid, seg. few, narrow and entire; caps. acute at base. Dry, S. 3f. Aug.—Oct.


* Calyx segments entire.—a Plants pubescent……………………………………………………..Nos. 1, 2
—a Plants glabrous………………………………………………………………………….Nos. 3 4

* Calyx segments toothed or pinnatifid. Plants downy……………………………………………..Nos. 5, 1

1 D. flava Wood. Plant pubescent, subsimple; lvs. lance-oblong, entire, or toothed, the lower pinnatifid or incised; cal. lobes oblong, obtuse, shorter than the tube; ped very short. Woods. 2-4f. A showy herb. Corollas 18*. (G. flava L.)
2 D. grandiflora Wood. Minutely pubescent, branched; lvs. petiolate, lance-ovate, pinnatifid, toothed, or entire; ped. as long as the calyx; cal. tube as long as the lobes (2"), corolla 2' long. Wis., Ill. (J. Wolf), and S. (G. grandiflora Benth.)

3 D. quercifolia Benth. Glabrous and glanaceous, branched; lvs. petiolate, the lower binnatifid, upper lance-oblong; cal. lobes longer than the tube, both as long as the pedicels; corolla 2'. Thickets. 3–5f. Common.

4 D. integrifolia Wood. Glabrous, subsimple; lvs. lanceolate, acute, entire or nearly so; pedicels shorter than the calyx. Woods, Pa., and W. 1–2f. August.

5 D. pedicularia Benth. Smoothish or downy; lvs. lance-ovate, pinnatifd with toothed segments; pedicels longer than the hairy calyx, whose toothed segments are about as long as its top-shaped tube. Dry woods. 2–3f. Corolla 15/".

6 D. pectinata (Torr.) Very hairy; lvs. lanceolate, pectinate-pinnatifid, seg. toothed; calyx longer than the pedicels, segm. longer than tube. Woods, S. 3f. Corolla 13/".

37. GERÁRDIA, L. Cal. 5-toothed or cleft. Cor. tubular, ventricious or subcampanulate, tube longer than the 5 broad, entire, unequal lobes. Sta. didymamous, in pairs, shorter than the corolla. Caps. obtuse or pointed, ∞-seeded.—American herbs, rarely shrubby. Leaves opposite (except No. 4). Flowers axillary, solitary, purple or rose-color. July—Sept.

§ OTHOPHYLLA. Calyx segments longer than its tube. Two anthers shorter…No. 1

§ GERÁRDIA proper. Calyx segments short, equal. Anthers all equal…(a)

a Cor. 2-lipped, upper lip very short, straight. Peduncles slender. S…Nos. 2, 3

a Corolla subequal, all spreading, throat often hairy…(b)

b Leaves all alternate, filiform. Flowers large, on long peduncles. S…No. 4

b Leaves opposite, rarely the upper alternate and bract-like…(c)

c Peduncles equalling or exceeding the small (1-inch) flowers…………………Nos. 5–7

c Peduncles much shorter than the flowers.—d Lvs. setaceous or none…Nos. 8, 9

—d Lvs. linear, 1–2" long…Nos. 10–12

1 G. auriculata Mx. Erect, subsimple, rough-hairy; lvs. lance-ovate, the upper auriculate at base; fls. nearly sessile, 7'" long. 1 Low grounds, Pa. to Car., and W. 2f.

2 G. Mettanaer Wood. Smooth, slender, diffusely branched; lvs. linear-filiform; ped. filiform, many times longer than the calyx; cor. 8", upper lip vaulted, notched, lower 3 rounded lobes, tube with spots and 2 yellow stripes within. 1 Wet sandy places, Mid. Fla. (Dr. Mettaner, 1853). 1–2f. Lvs. 1'–1/2". (G. divaricata Chapm.)

β. ? clausta. Cor. tube flattened on the back, throat closed by the inflected lip. Fla.

3 G. nuda Wood. Smooth, filiform, branched; lvs. (except a few at the base) all reduced to minute bracts scarcely 1" long; fls. all terminal, small (5"); caps. glabrous, exceeding the calyx. Middle Fla. (Dr. Mettaner, 1855). (G. filicaulis Chapm.)

4 G. filifolia N. St. terete, much branched; leaves filiform, alternate and fascicled; ped. 1', much longer than the leaves; cor. smooth, 9/". 2 Barrens, Ga., Fla. 2–3f.

5 G. linifolia N. 2 Stems virgate, clustered at root, smooth; lvs. opposite, erect, linear, 3–1'; ped. 8–12", cal. 2", truncate; cor. 1', spotted. Wet barrens, S. 2–3f.

6 G. tenulifolia Vahl. Smooth, panically branched; leaves linear to filiform, 1", often coiled; ped. as long as the leaves, longer than the flowers, which are 90" long; calyx teeth very short, acute; capsule globose. Fields and woods. 1f.

7 G. Skinneriana Wood (1848). Roughish; st. virgate, angular, few-branched; lvs. linear, rather obtuse, 1'; ped. axillary, very long (1–2'); cal. 1", teeth obtuse; cor. small (5")", rose-color, not fringed. Low grounds, W. and S. 1–2f. Unlike all the rest, this species does not blacken in drying. (G. parvifolis, Cham.)

8 G. setacea Walt. (not Benth.) Glabrous, widely branched; lvs. bristle-form, 1' and less; fls. mostly terminal on the filiform, bracted branchlets, large; ped. 2–4"; cal. 1", teeth very acute, short; cor. 10", densely fringed. 1 Barrens, Pa., S. and W. 2f.

9 G. aphylia N. Slender, angular, branched above; lvs. minute, setaceous, 1/", or 0; ped. lateral and term., 1–3"; calyx 1", teeth obtuse; corolla 8". 1 Wet, S. 2–3f.
10 **G. maritima** Raf. St. angular, with short branches; lvs. linear, fleshy 6–8"; cor. 7", some of the lobes fringed; ped. very short; cal. trunc. ① Salt marshes. 4–10'.

11 **G. purpurea** L. St. angular, branched; leaves linear, acute, rough-edged, 1–2"; ped. shorter than the calyx, tube truncate with setaceous acute teeth; corolla large (1'), smooth or downy. ① Low grounds. 1–2–4f. Variable.

12 **G. aspera** Doug. St. roughish, branched; lvs. narrowly linear, rough-hispid, 1'–2 times as long as the cal. (3–6'), teeth lance-acute; cor. 1'. ① W. 1–2f.

38. **CASTILLÈJA**, L. Painted Cup. Calyx tubular, 2–4-cleft. Cor. upper lip linear, very long, arched and keeled, enfolding the didynamous stamens, anth. oblong-linear, with unequal lobes, the exterior fixed by the middle, interior pendulous. ② ③ Leaves alternate, the floral often colored at the apex. Flowers subsessile, in terminal, leafy bracts.

1 **C. coccinea** Spreng. Lvs. sessile, pinnatifid with linear segments; bracts about 3-cleft, scarlet (sometimes yellow), exceeding the corolla; cal. 2-cleft, nearly equalling the cor., segments notched. ② Wet meadows, E. (rare) and W. 8–12'. May, June.

2 **C. sessiliflora** Ph. Hairy-downy; lvs. sessile, clasping, oblong-linear, mostly trifid, not colored; calyx sessile, elongated; spikes dense; corolla long, exserted, arched, segments of the lower lip acuminate. ② Prairies, N-W. ①f. May.

3 **C. pallida** Kunth. Lvs. linear, undivided, 3-veined, the upper lanceolate, the floral subovate, subdendate at the end, white; calyx with acute teeth, shorter than the corolla. ② ① White Mountains, Green Mountains, and N-W. ①f. August.


S. **Americana** L.—Sandy marshes, N. Y. to Fla. 1–2f, stout, simple, downy. Lvs. lance-ovate, 3-veined, diminishing upward; corolla brown, 1–1½' long. June.


1 **P. Canadénsis** L. Hairy, simple; lvs. alternate, petiolate, lance-oblong, pinnatifid with toothed segments; spike short, dense, leafy; cor. abruptly incurved, with 2 setaceous teeth; capsule ensiform-beaked. ② Pastures, copses. 1f. May–July.

2 **P. lanceolátà** Max. Smoothish, branching; lvs. subopposite, lance-oblong, doubly cut-crenate; spike elongated, loose at base; corolla upper lip larger and covering the lower; capsule short, ovold. ② Shady banks, N. Y. to Va. and Wls. 1–2f. Sept.

41. **RHINÀNTHUS**, L. Yellow Rattle. Calyx 4-toothed, ventricouss. Cor. tube cylindrical, as long as the calyx, limb ringent, galea appended, compressed, lip broader, deeply divided into 3 obtuse segments. Caps. 2-valved, compressed, obtuse. ① Erect, with opposite leaves.

K. **Crista-galli** L. Mostly glabrous; lvs. oblong or lanceolate; cor. ② longer than the calyx; appendages of the galea (upper lip) transversely ovate, broader than long; seeds winged, rattling when ripe. Plymouth, Mass., Lake Superior, and N. ①f.

42. **EUPHRÁSIA**, L. Eyebright. Calyx 4-cleft. Upper lip of the
Order 89.—ACANTHACEÆ.

Cor. galeate, concave, apex 2-lobed, the lobes broad and spreading, lower lip spreading, trid, palate not folded. Sta. unequal, ascending beneath the galea. Capsule oblong, compressed, ∞-seeded.—Herbs with opposite leaves and the flowers in spikes.

**E. officinàlis** L. Lvs. ovate or oblong, the cauline obtruse, crenate, bracts acute, ent-serrate with cuspidate teeth; calyx lobes subequal; corolla light-blue, lower lobes deeply notched. ① White Mountains, Lake Superior. 2–6'. Leaves 1–3'.


M. pratense, **b. Americanum** (Benth.) Leaves linear-lanceolate, petiolate, glabrous, the upper broader and toothed at base; fls. axillary, distinct; cal. teeth slender, half as long as the yellowish corolla. ① Woods: common. 6–10', branched. Jn.—Sept.

Order LXXXIX. ACANTHACEÆ. ACANTHADS.

Herbs or shrubs with opposite, simple leaves and regular, bracted flowers. Calyx 5-parted, equal or unequal, imbricated in the bud. Corolla 5-merous, tubular below, limb more or less bilabiate, convolute in bud. Stamens didynamous or diandrous, inserted on the tube of the corolla. Fruit a 2-celled, 4–12-seeded capsule. Seeds supported by hooks or cup-shaped processes of the placenta, exalbominous.

§ Seeds destitute of hooked supports...①(a)
   a Corolla regular. Seeds few, resting on little cups. Vines... Thunbergia. 1
   a Corolla bilabiate. Seeds many, with no supports... Eletraria. 2

§ Seeds resting on hooks proceeding from the placenta...②(b)
   b Corolla funnel-form, subregular. Stamens 4, unequal... Ruellia. 3
   b Corolla bilabiate, ringent. Stamens 4. Pod terete... Hygrophila. 4
   b Corolla bilabiate, the upper lip wanting. Stamens 4. ① Rare... Acanthus mollis
   b Corolla bilabiate. Stamens 2.—Corolla inverted, upper lip 3-toothed... Dictyotera. 5
      → Corolla straight, lower lip 3-lobed... Dianthera. 6
      → Corolla straight, lower lip 3-parted... Cyrtandra. 7

1. **THUNBÈRGIA**, L. Calyx short, toothed or truncate, with 2 large bractlets at base. Cor. funnel-bell-form, limb 5-lobed, nearly regular. Sta. 4, unequal, included. Caps. beaked, 3–4-seeded. ⑤ ⑤ Fls. showy, axillary.

T. alata. A climbing vine, silky-hairy, with cordate-sagittate lvs. on winged pet.; fls. 1/4' deep and broad, purple, with a yellow, buff, orange or white border. E. Africa.

2. **ELYTRÀRIA**, Vahl. Calyx with 4 or 5 unequal segments. Cor bilabiate, lower lip of 3 bifid segments. Sta. 2 fertile, 2 sterile, included. Caps. 8-seeded.—Herbs acaulescent, with (oblong) leaves at base and clasping bracts on the scapes, and the small flowers in a terminal spike.

E. virgàta Mx. Scapes several, glabrous, covered with the bracts, which are ovate, cuspidate, ciliate, the upper subtending the white flowers; calyx with 2 linear bractlets at base, ciliate. ② Wet plains, S. Car. to Fla. 1f. August.

3. **RUÉLLIA**, L. Calyx 5-parted into slender segments. Cor. funnel-form, limb spreading, subequally 5-lobed. Sta. 4, included, didynamous
Caps. narrow. Seeds 4—16, resting on hooks. 2¢ Low, with tumid joints, opposite leaves, and showy axillary blue, purple, or white flowers.

§ Dipteracanthus. Anthers pointless. Style bifid. Seeds 8—12. ... Nos. 1—2

§ Callophanes. Anthers pointed at base. Style simple. Seeds 4. South ... (a)

a Stems erect from a creeping base, with obtuse leaves. ... Nos. 4, 5

a Stems creeping, diffuse, with the leaves entire. ... Nos. 6, 7

1 R. strepens L. Erect, smoothish, with obovate to oblong-petiolate lvs. ; ped. very short, 1—4-flowered; bractlets as long as the narrow sepals, little shorter than the slender corolla tube. Dry soils, W. and S. 9—16'. Leaves 2—5'. June, July.

2 R. elliptica Ph. Erect, white-hairy, with lvs. obovate to oblong, abrupt at base and subsessile; bractlets and sepals not half as long as the tube of the corolla. Rich soils, W. and S. 1 f or more. Leaves 1—2'. Flowers 2—2½'. June—September.

3 R. tubiflora Le Conte. Downy; leaves oblong to lanceolate, sessile; fls. solitary; sep. lance-linear, ♀ as long as the long tube of the white cor. Ga., Fla. June—Aug.

4 R. oblongifolia Mx. Very downy; lvs. obovate to oval, subsessile; fls. 1—3 together, bractlets and sepals as long as tube of the spotted corolla. Dry, Ga., Fla.

5 R. riparia (Chapm.) Smoothish, simple; lvs. oblong, petiolate; flowers clustered, small (6'), white, bractlets, sepals, and corolla tube equal. Mid. Fla. 12—18'.

6 R. humistrata Mx. Smooth; lvs. oblong-oval, petiolate; flowers 1—3 together, bractlets shorter than the secatceous sepals. Rich soils, S. Car. to Fla.

7 R. linears T. & G. Small, rough-downy; leaves linear-oblong, imbricated, the bractlets similar; capsule 4-angled; with 2—4 seeds. S. Fla.

4. Hygróphila, R. Br. Calyx half-5-cleft, with narrow segments Cor. ringent, lower lip trifid. St'a. 4, unequal, cells of the anth. divergent-sagittate, violet. Stig. subulate. Caps. terete, oo-seeded. 2¢ ≈ Stoloniferous, 4-angled. Flowers clustered in the axils. (See Addenda.)


5. Dícliptera, Juss. Fls. in bracted heads. Cal. 5-parted. Cor. bilabiate, inverted, upper lip 3-toothed, sta. 2, anth. cells equal, one placed above the other. Caps. 4-seeded, the partitions and valves separating. 2¢

1 D. brachiata Spr. Smooth; st. 6-angled, brachiately branched; leaves lanceolate, long-petiolate, acuminate; heads few-flowered, the upper approximate, sessile, lower often pedunculate; flowers purple, 5—6". River banks, S. 1—2f. June—Aug.

2 D. Háclei Riddell. St. downy, mostly simple; leaves lance-ovate, petiolate; bractlets and sepals fringed with long hairs; corolla 5" long. Fla. to La. 1—2f. Jn.—Aug.

3 D. assúrgens Juss., with scarlet (1') corollas in 1-sided spikes, grows in S. Fla.

6. Dianthéra, Gron. (Rhytiglóssa, Nees, and C-B.) Cal. 5-parted. Cor. bilabiate, upper lip notched, lower 3-lobed. Stamens 2, anth. cells unequal, one placed above the other. Capsule flattened, 4-seeded above the middle. 2¢ ≈ Lvs. smooth, entire. Flowers in bracted spikes or heads.

1 D. Americana L. Erect, angular, tall; leaves long-lanceolate, wavy, as long (3—4') as the peduncles; bracts and sepals lanceolate, 9'; the ringent corolla 6", violet-purple. Banks, N. Y., W. and S. 2—3f. June, July.

2 D. ensífórmis Wood. Erect from a creeping base, slender; leaves linear, oblique or ensiform, thick, shorter (3—4') than the peduncles; flowers spicate; calyx 6'; corolla purple, 1'. Fla. April. (D. crassifolia Chapm.)
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3. D. ovata. Walt. St. square, ascending, 4—8'; leaves lance-ovate, acute, longer than the 3-4-flowered peduncles; corolla pale-purple, 3—4'. S. Car. to Fla.

4. D. humilis. Wood. Erect, square, 1—1½; leaves lance-elliptical, shorter than the 10-flowered, 1-sided spikes; corolla 5', purple. Fla. to La. (Justicia Mx.)


C. carnea. Stem tall, stent, with ample ovate to oblong leaves, and large, showy, termary spikes of many flesh-colored flowers. In the greenhouse.

Order XCI. Verbenaceæ. Verbains.

Herbs (or generally shrubs and trees) with opposite, exstipulate leaves. Flowers with a bilabiate or more or less irregular monopetalous corolla.

Stamens 4, didynamous, rarely equal, sometimes only 2. Style 1. Fruit dry or drupaceous, 2—4-celled (1-celled in Phryma), forming as many 1-seeded nutlets. Seeds erect or pendulous, with little or no albumen.

§ Herbs. Fruit dry, consisting of—

a 4 one-seeded nutlets. Stamens 4. Corolla 5-lobed. ................................................. Verbenæ. 1
a 2 two-seeded nutlets. Stamens 4. Corolla 5-cleft, minute, spicate. S. Fla. ...... Priya echinata. 2
a 2 one-seeded nutlets. Stamens 2. Flowers spicate, imbedded. S. Fla. .......... Stachytarphæa. 3
a 2 one-seeded nutlets. Stamens 4. Corolla 4-parted. ............................................. Lippiæ. 4
a 1 one-seeded nutlet, reflexed. Stamens 4. Corolla bilabiate ...................................... Phryma. 5

§ Shrubs. Fruit fleshy, berry-like (or a 2-celled capsule in No. 7)....

b leaves compound, digitate. Flowers 5-parted. Seed 1......................... Vitæ. 6
b leaves simple, toothed. —c Cymes axillary. Drupes 4-seeded. Callicarpæ. 7
—c Heads axillary. Drupes 2-seeded. Lantana. 8
b leaves simple, entire. —d Drupe 2-seeded. Spikes terminal. (Aloysia.) 9
d Drupe 4-seeded. S. Fla. .......................... Citharæxylum villosum. 10
d Drupe 8-seeded. S. Fla. .......................... Duranta Plumieri. 11
d Capsule 4-seeded. Flowers in heads. .................................. Avicennia tomentosa. 12

1. VERBÈNA, L. Verbain. Calyx 5-toothed, with one of the teeth often shorter. Cor. funnel-form, limb somewhat unequally 5-lobed, lobes emarginate. Sta. 4, included, the upper pair sometimes abortive. Drupe splitting into 4, 1-seeded, indescendent carpels.—Herbs or undershrubs.

Leaves opposite. Flowers sessile, mostly in spikes or heads.

§ Carymb; the open corollas of the spike forming a carymb. Stems weak...(a)

a Leaves 3-cleft or pinnatifid, the lobes cut-serrate or toothed.............. Nos. 1—3
a Leaves merely serrate or toothed, somewhat incised.......................... Nos. 4—7

§ Spicate; the open corollas lateral, in slender spikes...(b)

b Stem simple (mostly), bearing a single spike. Leaves oblong........... Nos. 8, 9
b Stem branched, with many spikes.—c Leaves mostly simple............. Nos. 10—12
—c Leaves much divided............. Nos. 13—15

1 V. Aubletia L. Lvs. ovate-oblong in outline, 3-parted, cænt, acute and petiolate at base; spikes pedunculate; bracts half as long as the cylindrical calyx. Dry soils, Va. to Ill., and S. 1f. Flowers lilac, varying in the gardens to purple. April, May.

2 V. Incisa. Leaves oblong to deltoid, rugous, cut-lobed and serrate, abrupt at base, petiolate; bracts ovate, a fourth as long as the glandular calyx; corolla rose-purple. 2 Brazil.

2 V. Multifida. Small, creeping, branched; leaves multifid into narrow, acute segments; bracts subulate, shorter than calyx. 1 Brazil. Red to white.
4. **V. venosa.** Nearly simple, with rigid, oblong-sessile, cut-serrate leaves; bracts subulate, longer than the calyx, both colored; corolla lilac to blue. 2 Brazil.

5. **V. chamaedrifolia.** Leaves oblong-ovate, short-petiolate; bracts subulate, not half the length of the long calyx; corollas scarlet to crimson. 24 Buenos Ayres.

6. **V. philogynia.** With many erect branches, and long-petioled, lance-deltoid leaves; bracts lanceolate, half as long as the calyx. Flowers large, red to blue.

7. **V. teuchroides** has very hairy, wrinkled, ovate-triangular, crenate leaves on short stalks, with large white to roseate sweet-scented flowers. 2 Brazil.

8. **V. angustifolia** Mx. Leaves oblong-linear, tapering to base, serrate, with furrowed veins; spikes 1 or few, slender; corolla deep-blue, bracts as long as the calyx (1'). 2 Rocks and hills, N. Y. to Va., and W. 1f. Leaves 2—3'. July.

9. **V. Caroliniana** L. Leaves oblong-obovate to oblong, crenate-toothed, sessile; spike loose; corolla large, roseate, bracts minute. 24 Dry soils, S. 1—2f. June.

10. **V. hastata** L. Common Vervain. Lvs. lanceolate, acuminate, cut-serrate, petiolate, the lower lobed or hastate; spikes panicked, dense, slender, erect and parallel; flowers blue. 24 Waysides; common. 3—6f. § Europe. July—September. Hybrids occur, with cleft leaves and loose-flowered spikes.

11. **V. urticaefolia** L. Leaves ovate to lance-ovate, serrate, acute, petiolate; spikes axillary and terminal, filiform, lax; bracts shorter than the calyx. 2 A homely weed, in waste grounds. 3f. Flowers minute, white. § Europe. July, August.


13. **V. bracteosa** Mx. Hairy, divaricately branched, leaves laciniate; bracts lance-linear, squarros on the peduncle and spikes, longer than the small blue flowers. 24 Dry fields, roadsides, N. Y., W. and S. 8—16'. June—September. (V. canescens.)

14. **V. officinalis** L. Smoothish, erect; leaves lanceolate to oblong, pinnately lobed or toothed, sub sessile; spikes slender, panicked; bracts not longer than the calyx; flowers purple, small. 24 Waysides, Conn. to Ga. 2—3f. (V. spuria L.)

15. **V. girgosa** Hook. Hoary, rough-downy, rigid; leaves oblong, 3-parted, incised, sessile; spikes strict, lax-flowered bracts long as calyx; corolla large. N. Ori. 2—3f.

2. **Lippia, L.** Fog-fruit. Cal. 2-parted. Cor. funnel-shaped, limb subulate, upper limb entire or emarginate, lower 3-lobed. Sta. didymous, included. Drupe dry, thin, enclosed in the calyx, 2-seeded. § 2f. Leaves opposite or whorled. Flowers small, whitish, in heads or spikes.

1 L. nodiflora Mx. St. 4-angled, geniculate, simple, creeping; lvs. lanceolate to ob lanceolate, cuneate at base, petiolate, shorter than the ped. Banks, Pa. to Ill., and S.

2 L. (Alloysia) citriodora. *Lemon Verbena.* Shrub smooth; leaves in 3's, lance-linear, punctate beneath, straight-veined, delightfully fragrant. 3f.


P. leptostachya L.—Rocky woods. 2—3f. Leaves large (3—6'), thin, coarselytoothed; flowers small, light-purple, in very slender spikes. July.

C. Americâna L. Pubescent; lvs. ovate, acuminate at each end, crenate-dentate, smooth above; clusters shorter than the petioles; fruit forming dense verticils. Light soils, S. Shrub much branched, 3–6f, with purple flowers and fruit.

5. LANTÀNA, L. Cal. minute, obsolescetely 4-toothed. Corolla funnel-form, the tube long-exserted, limb oblique, upper lip bifid or entire, lower tridid. Sta. 4, didynamous, included. Drupe fleshy, double, the parts separable, 1-seeded. § 3–6f. Tropical, with square stems, opposite peltate leaves, and capitate, handsome flowers, often fragrant.

* Corollas white or lilac, not becoming yellow or scarlet.....................Nos. 1–3
* Corollas white or yellow, changing to saffron, scarlet, crimson, &c........Nos. 4, 5

1 L. Nívea. Branches with reversed prickles; lvs. ovate to elliptic, crenate-serrate, as long as the peduncles; no involucre; flowers white, turning to blue. Brazil.

2 L. Selíowíâna. Branches strigous; lvs. rhombic to oblong, coarse-serrate, shorter than the peduncles; heads some involucrate; flowers reddish lilac. Brazil.

3 L. Involucrâta L. Whitish-downy; lvs. obovate to roundish, crenulate, as long as the peduncles; heads involucrate with the outer ovate bracts, lilac. S. Flá.

4 L. Míxta. Prickles reversed or 0; lvs. ovate, crenate, abrupt at base, shorter than the peduncles; bracts as long as the corollas, which are white at first, then changing to yellow, then orange, and lastly red. Brazil.

5 L. Cómarâ L. Often prickly; lvs. as in No. 4, but equalling the peduncles; bracts half as long as the corollas, which are successively yellow, orange, red. Ga., Flá.


1 V. Agnus-cástus. Leaflets 5 or 7, lanceolate, entire, pointed both ways; panicles white-tomentous, terminal, interrupted; corolla purplish. Hardy. S.

2 V. Negúnádo. Leaflets 3 or 5, oblong, serrate, acuminate. Mauritius.

3 V. Incísa. Leaflets 5 or 7, incisely pinnatifid, acuminate. China.

Order XCI. Labiátae. Labiáte Plants.

Herbs with square stems, and opposite, aromatic, exstipulate leaves. Flowers axillary, in verticillasters, sometimes as if spiked or in heads. Corolla labiate (rarely regular), upper lip external in the bud. Stamens 4, didynamous, or only 2. Ovary free, deeply 4-lobed, the single style arising from between the lobes. Fruit composed of 4 (or by abortion fewer) separable 1-seeded nuts or achenia. Figs. 23, 69, 96, 281, 392, 318, 384:

§ Stamens 2, perfect.—p ascending beneath the galea; anthers 1-celled. (Tribe IV.) —p ascending through a cleft in the galea; anthers 2-celled... (b)

—p exserted, distant; anthers 2-celled... (c)

§ Stamens 4, perfect.—q all declined toward the lower lip. ( Tribe I.) —q erect, or ascending toward the upper lip... (2)

2 Stamens of equal length, corolla almost regular, 4-5-lobed...(*c)

2 Stamens, the upper pair longer than the lower (outer), and calyx 13-15-veined. (Tribe V.) Stamens, the lower pair longer than the upper (interior) pair... (3)

3 Stamens divergent, apart, mostly straight and exserted... (c)

3 Stamens parallel, ascending and long-exserted from the upper side... (b)

3 Stamens parallel, ascending in pairs beneath the upper lip... (4)

4 Calyx 13-veined, 5-toothed, and somewhat 2-lipped... (f)

4 Calyx 5-10-veined, or irregularly netted... (5)
5 Calyx strongly 2-lipped, upper lip truncate, closed in fruit... (A)
5 Calyx not 2-lipped, 3 or 4-lobed, open in fruit... (B)
5 Calyx subequally 5-toothed, teeth not spinescent... (m)
5 Calyx subequally 5-toothed, teeth spinescent... (n)
5 Calyx unequally 3-8-toothed... (c)

I. OCIMOIDEÆ.—
C Corolla upper lip 4-lobed, lower entire, flattish........... Ocimum 1
C Corolla upper lip 4-lobed, lower saccate, deflexed........ Hypitis 2
C Corolla upper lip 3-4-lobed, lower boat-form, involving the sta. Coleus 3
C Corolla upper lip 2-lobed, lower 3-lobed.................. Lavandula 4

II. AJUGOIDEÆ.—
5 Stamens 2, exerted through a fissure in the tube........... Amethystea 5
5 Stamens 4, exerted through a fissure in the tube........... Truchium 6
5 Stamens very long, involute, arching the corolla........... Trichostemma 7
5 Corolla limb equally 5-lobed. Stamens short.............. Santanthes 8

III SATUEREJAE.—(Stamens diverging or ascending, 2-celled. Corolla lobes flattish, spreading.)
C Corolla limb obliquely 5-lobed. Leaves purple............. Perilla 9
C Corolla limb 4-lobed, upper lobe broadest.................. Mentha 10
C Corolla nearly regular, 4-lobed. Calyx naked in the throat... Lycopus 11
C Corolla bilabiata,—C cyanic, throat naked. Stamens straight..... Cinula 12
C Corolla bilabiata,—C cyanic, throat naked. Stamens ascending... Hedraena 13
C Corolla bilabiata,—C yellow, throat with a hairy ring inside... Collinsonia 14
C Calyx 15-veined. Stamens exerted, divergent................ Hyssopus 15
C Calyx 10-veined, the veins obscured by hairs. Corolla yellow, fringed... Collinsonia 14
C Calyx 10-13-veined,—C throat naked.—C Stamens straight, divergent.... Pycanthemum 16
—u Sta. ascending, anth. spareless.......................... Satureja 17
—u Sta. ascending, anth. spurred............................. Dickandra 18
—u Stamens short, minute...................................... Thymus 20

f Tube of the corolla straight. Leaves small, subcrenate or entire... Calamintha 21
f Tube of the corolla curved upward. Leaves large, coarse-crenate... Melissa 22

IV. MONARDEÆ.—Connective long, transverse, distancing the anther cells........... Salvia 23
—Connective continuous with fil. tothet at the juncture................... Rosmarinus 24
—Connective inconspicuous.—w Calyx subequally toothed......... Monarda 25
—w Calyx bilabiata, aristate......................... Blemmyllia 26

V NEPETEÆ.—Stamens distant, exerted. Flowers in terminal spikes......... Lophanthus 27
—Stamens all ascending.—x Anther cells divergent, much........... Nepeta 28
—x Anther cells divergent, little............................. Dracoccephalum 29
—x Anther cells parallel. Fls. large........................... Cedronella 30

VI. STACHYDEÆ.—(Stamens parallel, ascending. Cor. upper lip galeate. Cal. 5-10-veined.)
A Calyx lips toothed, upper 3 teeth minute, lower 2 large........... Brunella 31
A Calyx lips entire, upper with an appendage on the back........... Scutellaria 32
k Calyx 3-lobed. Anthers all distinct. Flowers purple streaked...... Macbridea 33
k Calyx 4-lobed. Anthers, the highest pair connate................. Synandra 33
m Corolla tube inflated in the midst, whitish. Lips small........ Phystostegia 35
m Corolla tube inflated at the throat, purple. Lower lip long...... Lamium 36
m Corolla inflated in the broad, concave upper lip, purple or yellow..... Phloxmis 37
m Corolla not inflated, short.—g Calyx salver-form, 10-ribbed......... Ballota 38
—g Calyx broad-bell-form, netted................................. Mollucella 39
n Anthers opening transversely, ciliate-fringed. Leaves notched..... Galerosis 40
n Anthers opening lengthwise.—z Achenia rounded at the top. Native... Stachys 41
—z Achenia rounded at the top. Cultivated.................. Betonica 42
—z Achenia truncate, 3-angled at top............................ Leonurus 43
o Corolla white, upper lip flattish. Style equally bifid............... Marrubium 44
o Corolla white, upper lip concave. Style unequally bifid. South... Leucas 45
o Corolla scarlet, exerted. Calyx upper tooth longest.................. Leonotis 45

1. OCIMUM, L. Sweet Basil. Upper lip of calyx orbicular, lower 4-fid. Cor. resupinate, one lip 4-cleft, the other undivided. Stam. 4, declined, the lower pair longer, the upper often with a process at their base. Verticils 6-flowered, in terminal, interrupted racemes.

O. basileicum L. Lvs. smooth, ovate-oblong, subdentate, petiolute; cal. ciliate. 1
Plant 6—12", in the kitchen-gardens. Very fragrant.
2. **CÔLEUS**, Lour. Cal. deflexed in fruit, unequally 5-toothed. Cor. decurved, upper lip obtusely 3-4-cleft, lower longer, entire, concave, involving the 4 stamens. ① Verticils 6-∞-flowered. Asia.

**C. BLÜMEL.** Leaves large, ovate, bluntly serrate; verticillasters distinct, ∞-flowered.

②f. Tender, cultivated for its splendid leaves, which are marked with crimson, green, and bronze. Flowers inconspicuous.

3. **HYPTIS**, L. Calyx 5-toothed, teeth acute or subulate. Cor. tube cylindric, limb 5-lobed, the lower abruptly deflexed, contracted at its base, the 4 others flat, erect or spreading. Stam. 4, declinate. Ach. ovoid or oblong.—In our species the flowers are in involucrate heads. Summer.

**H. radiata** Wild. Erect, glabrous; leaves lance-ovate to lance-linear, unequally and bluntly serrate, tapering to the petiole; heads opposite, pedunculate, at length globular, bracts seeming radiate. ②f Damp, S. 2-3f.

4. **LAVÁNDULA**, L. **LAVENDER.** Cal. ovoid-cylindric, with 5 short teeth, the upper one often largest. Cor. upper lip 2-lobed, lower 3-lobed, lobes all nearly equal, tube exserted, stamens included. ⑤

**L. spica.** Leaves hoary, linear-oblong-elliptic to linear-lanceolate, rolled at edge, sessile, in the interrupted spike bract-like; flowers small, lilac. Very fragrant, and yielding the well-known *Oil-of-Lavender*. 12-18'. July.

5. **AMETHÝSTEÀ, L.** Flowers as in Teucrium, but the stamens are only 2. ① From Siberia.

**A. cêrúléa.**—A branching, smooth herb, 1f high, with the leaves 3-parted and incised, and blue (to white) corollas little exceeding the calyx. July—Oct.

6. **TEÚCRÍUM, L.** **GERMANDER.** Cal. subcampanulate and subregular, in 5 acute segments. Cor. with the 4 upper lobes nearly equal, the lowest largest, roundish. Stam. 4, exserted from the deep cleft in the upper side of the tube.

**T. Canadénsé** L. Plant erect, hoary-pubescent; lvs. ovate-lanceolate, acute, serrate, petiolate; bracts linear-lanceolate, about as long as the calyx; spike long, of many crowded verticils of odd-looking purplish flowers. ②f Damp grounds. ②f July.

7. **TRICHOSTÉMA**, Lin. **BLUE CURLS.** Calyx very oblique, veiny, lower lip of 2 short teeth, upper twice as long, of 3, all acute. Cor. tube slender, limb obliquely 5-lobed. Filam. 4, very long, exserted and curved. ① Cymes loose, panicled. Corolla blue.

① **T. dichétopa** L. Lvs. oblong-lanceolate, attenuate at base, obtuse, entire pubescent, as well as the stem and branches. Dry soils, Mass., and S. 1f. August.

② **T. linéàre** N. Leaves linear, nearly smooth; stem and branches puberulent. Dry soils, N. Y. (at Salem), and S. 1f. Flowers as in the other, 4f. July, Aug.-

8. **ISÁNTHUS, Mx.** **FALSE PENNYROYAL.** Calyx equally 5-toothed, throat naked. Cor. 5-parted, tube straight and narrow, segm. ovate and equal. Stam. subequal, incurved, ascending, longer than the corolla. ④ Viscid, pubescent, with entire leaves acute at each end. Flowers axillary.


**P. ochmíodes**, $\beta$. **NANNÉNÉSIS**, is the Purple Perilla, a fine leaf-plant, 2f high, with large bronze-purple, ovate, cut-fringed leaves. ($\beta$. crispa Benth.)


* Leaves sessile. Verticils in a slender, terminal spike. .........................Nos. 1—3
* Leaves petiolate.—x Verticils in dense oblong spikes. .........................Nos. 4, 5
—x Verticils axillary, not in spikes. ............................................Nos. 6—8

1 **M. víridís** L. *Spearmint*. Smoothish; lvs. lance-oblong, acute, cut-serrate; spikes interrupted, attenuate above. Damp soils. 1—2f. § Europe.


4 **M. piperítica** L. *Peppermint*. Smooth; lvs. ovate to lanceolate, serrate; spikes 1', oblong to cylindrical; calyx smooth. Wet. 2f. § Europe.

5 **M. aqúática** L. Stem reflex-hairy; leaves ovate, serrate, hairy or smoothish; spike globular or oblong, calyx villous. Muddy. §


7 **M. arvéńskiis** L. Smoothish, ascending; leaves ovate, serrate above, entire and acute at base; calyx teeth acute. Fields, M. and W.: rare. §

8 **M. Canadensis** L. *Horsemint*. Upright, hoary-pubescent with spreading hairs; leaves lanceolate, very acute both ways; cymes shorter than the petioles; stamens exserted. Damp. Can. to Pa. and Ky.

$\beta$. boreális. Plant nearly smooth, with narrower leaves.

11. **LÝCOPUS**, L. Water Hoarhound. Cal. tubular, 4—5-cleft. Cor. subregular, 4-cleft, the tube as long as the calyx, upper segment broadest, emarginate. Stam. 2, distant, diverging, simple. 2f. Bog herbs, with the very small flowers in axillary, dense clusters.

1 **L. Virgínicus** L. *Bugle Weed*. Lvs. broad lanceolate, serrate, tapering and entire at both ends; calyx teeth 4, obtuse, spineless, shorter than the achenia. Common. 1—3f. Plant often purple, and often with long slender runners. July, August.

2 **L. Européus** L. Lvs. lance-ovate to lance-oblong, petiolate, acute, sinuate-toothed or lobed, the lower incised; calyx teeth 5, acuminate-spineless, longer than the smooth achenia. Common, and very variable. 1—2f. August.

$\beta$. **rubéllus**, with creeping stolons, and downy toothed lvs. (L. rubéllus Ménch.)
$\gamma$. **sinuátus**, with smooth sinuate-dentate leaves—no runners. (L. sinuatus Ell.)
$\delta$. **exaltátus**, Tall, with smooth leaves cut into linear teeth. (L. exaltatus Ell.)
$\epsilon$. **angustífolíus**, Leaves narrow, slightly toothed or subentire. (L. angust. N.)
$\zeta$. **sessífolíus**, Lvs. oblong, sessile or clasping, remotely toothed. N. J. (Porter).

12. **CUNILA**, L. **DITTANY**. Cal. 10-ribbed, equally 5-toothed, throat densely villous; upper lip of corolla flat, emarginate. Stam. 2, erect, exserted, distant.—Flowers numerous, pale red.

1 *H. pulegoides* Pers. Lvs. oblong, few-toothed, petiolate, narrowed to each end; verticils axillary, 6-flowered; corolla equalling the calyx. (1) Dry pastures. 6–19'. June–Aug. A small herb of pungent fragrance and taste, common and much used.

2 *H. hispida* Ph. Hairy, branching, with sessile, linear, obtuse leaves and verticils 6-flowered; corolla scarcely exceeding the calyx. (1) Banks, W. 2–5'. July.

14. **COLLINSONIA**, L. **HORSE BALM.** Cal. ovoid, 10-striate, upper lip truncate, 3-toothed, lower 2-cleft. Cor. exserted, bell-ribent, upper lip in 4 subequal lobes, lower longer, declined, fringed. Stam. 2 or 4, much exserted, divergent. 24 Coarse, strong scented, with large, ovate, serrate, petiolate lvs. and yellowish fls., in a terminal, leafless panicle or raceme.

* Stamens 4, perfect, long exserted. Leaves very large. South .................. Nos. 1, 2
* Stamens 2, perfect,—a the upper pair of filaments mere points .......................... Nos. 3, 4
—a the upper pair of filaments capitulate. South .......................... No. 5

1 *C. verticillata* Baldw. Viscid-downy above; lvs. broad-oval, 6–8', acute, petals 1–2'; racemes long, naked; flowers in whorls, 9''; lower lip strongly fringed. Lookout Mt., Tenn., and Middle Ga. 1–2f. Raceme 1f. May, June.


3 *C. Canadensis* L. Sparserly downy; leaves mucronate-serrate, acuminate, abrupt at base, 4–7''; lower petals slender; panicle 5–8', loose, bracts ovate; flowers 5–6''. Damp shades, Can. to La. (Hale). 3–4f. Summer.

4 *C. scabriflora* Ait. Leaves scabrous above, small (1½–2½'), acuminate, acute at base, petals slender, 1'; panicle leafy, fls. 4–5', calyx 1½'. Woods, S. 2f. Sept.


15. **HYSSOPUS**, L. **HYSSOP.** Calyx tubular, 15-striate, equally 5-toothed. Upper lip of the corolla erect, flat, emarginate, lower 3-parted, the middle segment largest, tube about as long as the calyx. Stamens 4.


* Calyx 2-lipped, in flat or loose cymes. Leaves petiolate, subsessile... (a)
* Calyx subregular, in roundish dense heads... (b)


(a) Teeth of the calyx ovate, acute, awnless .................... No. 1
(a) Teeth of the calyx tipped with bearded awns ................. Nos. 2–4
(b) Calyx teeth and bracts with naked awns as long as the corolla ... Nos. 5, 6
(b) Calyx teeth awnless, shorter than the corolla... (c)
c Heads panicked. Leaves subpetiolate, subentire. Nos. 7–9

1 P. albescens T. & G. Leaves lance-ovate, acute, whitened beneath, the upper whitened both sides; flowers in little 2nd racemes. Ala. to La. 2–3f.

2 P. Túllia Benth. Villous-pubescent; leaves ovate to lanceolate, acute or pointed; the floral whitened; inflorescence as in No. 1. Mountains, S.

3 P. incanum Mx. Wild Basil. Whitish, with a soft down; leaves ovate, rounded at base, slightly acuminate; the floral whitened both sides; cymes 1′ and less broad, not racemed; corolla pale red, dotted. Rocky woods, N. and W. 2–4f.


5 P. aristatum Mx. Smoothish; leaves ovate-oblong, acute, subseriate, rounded at base, petiolate; bracts rigid; heads few, 6–9′ diam. Barrens, N. J., and S. 1–2f.

6 P. hyssopifolium Benth. Smoothish; leaves linear-oblong, obtuse, nearly sessile and entire; heads few, large, 1′ diameter. Barrens, Va. to Fla. 1–2f.


8 P. pilòsum N. Heary with soft, spreading hairs; leaves lanceolate, acute at each end, subentire, subsessile; calyx teeth ovate-lanceolate, and with the bracts white-tomentous. Prairies, W. States, to Ga. 2f. Cymes dense, 6–9′.

9 P. mūticum Pers. Minutely white-downy at top; leaves ovate to lance-ovate, acute, rounded or subcordate at base; calyx teeth short, merely acute. In dry woods. 2–3f. Heads roundish, dense, 4–6′.

10 P. lanceolatum Ph. Leaves linear-lanceolate, entire, acute, rigid, abrupt at base, sessile; calyx teeth short, hairy; heads small (3–5′). Dry woods, Mass. to Car., and W. 1–2f. Handsome, fragrant, nearly smooth.

11 P. linifolium Ph. Glabrous; leaves linear, attenuated both ways; heads compact, corymbed; calyx teeth pungently awn-pointed. Dry soils. 1–2f.

12 P. nudum N. Glabrous, pale, subsimple; leaves few and small, ovate-oblong, obtuse, entire, sessile; calyx teeth acute, pubescent. Mts., N. Car. to Ga. 1–2f.

13 P. montànum Mx. Glabrous except the villous-ciliare ovate and linear bracts; leaves lanceolate, serrate, acute; heads involucrate. Mountains, Va. and Car. 1–2f. Resembles a Monarda. Fragrant.

17. SATURÉJA, L. Summer Savory. Calyx tubular, 10-ribbed, throat not hairy. Segments of the bilabiate corolla not equal. Stamens diverging, scarcely exserted.—Herbs with small leaves and purplish fls.

S. horténsis L. St. branching; lvs. linear-oblong, entire, acute at the end; ped. axillary, cymose. ① River banks, W., escaped from gardens: rare. §

18. DICERÁNDRA, Benth. Calyx 13-striate, tubular, upper lip subentire, lower bifid, throat hairy. Cor. tube exserted, straight, strongly 2-lipped, the upper cleft, emarginate, the lower spreading. Sta. 4, exserted, distant, anther cells divericate, each with a little horn. ① Branching, smooth, with loose cymes.

1 D. lineátífolla B. Stem and branches strict; lvs. linear, or linear-oblong; cymes stalked, of 1–5 showy pink flowers, forming slender panicles. Dry woods, Prince Edward County, Va. (Dr. Mettner), to Fla. (Miss Kees). 1f. October.

2 D. densiflóra B. Leaves lance-oblong; cymes sessile, 5-10-flowered. E. Fla.

19. ORÍGANUM, L. Marjoram. Calyx tube 10-striate, 5-toothed,
Order 91.—LABIATÆ.

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hairy in throat. Corolla tube scarcely exserted, upper lip erect, flat, emarginate, lower with 3 nearly equal segments. Stamens 4, ascending, distant. Leaves subentire. Fls. in dense oblong spikes, with imbricated bracts.

1 O. vulgäre L. Wild M. Leaves ovate, petiolate, hairy; spikes corymbed; bracts ovate, purplish; calyx teeth equal. Fields; rare. 1f. June, July.

2 O. Marjoränæ. Sweet M. Leaves oval or obovate, obtuse, petiolate, hoary-pubescent; bracts roundish; calyx tube split below. 1f. A kitchen vegetable.


1 T. Serpýillum L. Wild T. Stems creeping and ascending, leafy, each terminated with a small, dense, oblong head of flowers grateful to bees. §. June.

2 T. Vulgáræ. Stems erect from the decumbent base; lvs. oblong-ovate to lanceolate, the sides revolute; fls. in term., leafy spikes. Much branched. 6–10' high. Ju., Ji.

21. CALAMÍNTHA, Mœnch. CALAMINTH. Cal. tubular, 13-nerved, throat mostly hairy, upper lip 3-cleft, lower 2-cleft. Corolla tube straight, exserted, throat inflated, limb bilabiate, upper lip erect, entire or emarginate, lower spreading, its middle lobe largest. Stamens 4, the lower pair longer, usually ascending.

§ Herbs hairy. Cymes dense, capitulate, bracted. Calyx tube curved, 2-lipped... No. 1
§ Herbs hairy. Cymes loose, pedunculate. Calyx tube straight, 2-lipped...... No. 2
§ Herbs smooth. Cy. loose, sessile, bracted. Cal. straight, teeth subregular... No. 3
§ Shrubs low, slender, nearly smooth. Cymes few-flowered. Fls. large... Nos. 4–7


2 C. Népeta Link. Branched below, soft-villous; leaves small, broad-ovate, obtuse; cymes few-flowered, becoming some racemèd; corolla white, 3–4'; calyx 1'. Va., Tenn., to Ga. Roadside, &c. 2f. Strongly aromatic. July, August. § Europe.

3 C. glabélía B. Smooth, decumbent at base, diffusely branched; leaves narrowly oblong, tapering to base; verticils 6–10-flowered. Rocks, O. to Ark. 18'. Cor. 4–5', pale violet. Fragrant like Pennroyal. Often produces runners, and runs into
β. diversóllo. Flowering stems nearly erect, the barren prostrate like runners, bearing small oval leaves (3–4'). Rocks, Niagara, and N-W. 10'.

4 C. Caroliniana Sw. Smooth, simple; lvs. ovate, obtuse, crenate-serrate; bracts similar; cy. few-flw., on short stalks; cor. rose-purp., 7–9'. Dry woods, S. 15'. Ji.

5 C. coccínea B. shrub with virgate branches; lvs. narrowly ovate-oblong; verticils of 2–6 ample scar. fls.; cor. 15–18', gland-pubescent. Sandy shores, Fla. 2f.

6 C. canécens T. & G. Low shrub, minutely canescens-downy; leaves linear, with rolled edges, obtuse, crowded; fls. sol., opp., 3', rose-red. Sandy shores, Fla. 8–12'.

7 C. dentátæ Chapm. Tomentous; lvs. wedge-obovate, 2–4-toothed at apex. Fla. 2f.

22. MELÍSSA, Tourn. BALM. Calyx 13-ribbed, the upper lip 3-toothed, flattened and dilated, lower bifid. Cor. tube recurved-ascending, upper lip erect, flattish, lower spreading, 3-lobed, the middle lobe mostly broadest. Stamens ascending.

M. offícinális L. Pubescent; st. erect, branching; fls. in loose, axillary cymes;
leaves ovate, crenate-serrate, petiolate; bracts similar; corolla 7"; yellowish. Gardens, whence it has escaped into the fields and woods. 1—3f. July, August.

23. SÁLVIA, L. SAGE. Cal. striate, bilabiate, upper lip 3-toothed or entire, lower bifid, throat naked. Corolla ringent, tube equal, upper lip straight or falcate, lower spreading or pendent, 3-lobed. Stamens 2, connectile transverse on the filament, supporting at each end a cell of the halved anther. 5 2Figs. 96, 281.

* Native species.—§ Calyx limb 3-lobed. Lower anther cell wanting... Nos. 1—3
—§ Calyx deeply 2-lobed, 5-toothed. Both cells present... Nos. 4—6
* Species cultivated (No. 7 spontaneous).—a Flowers blue........... Nos. 7—9
—a Flowers white............. Nos. 10, 11
—a Flowers yellow............. No. 12
—a Flowers red.—b Herbaceous. Nos. 13, 14
—b Shrubby... Nos. 15, 16

1 S. azárea Lam. Smoothish, branching; lvs. linear-oblong and linear, subentire, acuminate; racemes slender; verticils 2-6-flowered; corolla pubescent, tube barely exerted; limb azure blue. 2f S. Car. to Fla. and La. 1—3f. Summer.

2 S. longifólla N.? Tall, branched, puberulent; leaves oblong-lanceolate, serrate; racemes slender; corolla 8—9", tube twice longer than calyx. 2f Ga. to Ark. 3—6f.

3 S. urticifólla L. Thinly pubescent; leaves rhomb-ovate, acute, serrate, decurrent on the petiole; verticils 4-10-flowered, distant in the raceme; corolla smooth, tube little longer than the calyx. 2f Hilly woods, Va., and S. 18'. May.

4 S. lyráta L. Lvs. radical, lyrate, erose-dentate, many, stem lvs. about 1 pair, linear spatulate, bract-like; lvs. in whorls, racemed at top of the square scape. 2f In woods 6—15'. Flowers 1', violet-purple. April—June.

5 S. obováta Ell. Lvs. broad-ovate, entire, the floral ovate; verticils remote in the raceme; corolla blue, 8", calyx 3". 2f Ga. to La. 1—2f. June, July.

6 S. Claytóni Ell. Lvs. cordate- to lance-ovate, sinuate-pinnatifid, and toothed, rugos, bracts ovate, pointed. 2f Sandy fields, S. Car.

7 S. Scárea L. Lvs. ample, rugose, broad-cordate, doubly crenate; bracts colored; corolla pale purple, upper lip high-arched. 2f Gardens, § in Penn.

8 S. officínális. Garden Sage. Shrubby; leaves lance-oblong, crenulate, rugous; corolla upper lip vaulted, equaling the lower. From S. Europe. 1f. July.

9 S. patens. Hispid and hairy; leaves ovate-deltoid or ovate-hastate, crenate; flowers very large; calyx bell-form, 7"; corolla blue, 2' long; stamen exerted. Mexico. 3f.

10 S. argéntea. Leaves white with wool, large, ovate, sinuate-lobed, the floral concave; flowers 18', racemed, the upper lip long-falcate. S. Europe.

11 S. chionántha, with large white-woolly, linear-lanceolate leaves and very large (2') white flowers with arched galea, is from Asia Minor.

12 S. áurea. Shrub 2—4f, with roundish ovate whitened leaves, the splendid yellow flowers 2', calyx 1', in dense racemes. From Africa.

13 S. coccinéa. Stem and ovate-cordate leaves beneath hoary-downy; verticils of 6—1C red smooth flowers (8") in a raceme; cal. 2 colored, 4'. 2f Cuba, § in Ga., &c. 1—2f.

14 S. pseudo-coccinéa, 3f high, is hispid with long spreading hairs, has ovate leaves rounded at base. Otherwise like No. 14. 2f

15 S. flúgens. Plant branching, weak-stemmed, pubescent, with lance-ovate, subcordate leaves, the corollas 2', bright red, opposite, in terminal racemes. Mexico.

16 S. spléndens. Plant erect, smooth, with ovate lvs. and opposite pubescent flowers; calyx 1', scarlet as well as the 2' corollas. The commonest species. Mexico. 3f.

24. ROSMARINUS, L. ROSEMARY. Calyx upper lip entire, lower bifid. Cor. upper lip 2-parted, lower lip reflexed, in 8 divisions, of which
the middle is the largest. Fil. 2, fertile, elongated, ascending toward the upper lip, having a tooth on the side. 5 S. Europe.

R. officinalis. Shrub evergreen with opposite, linear-oblong, obtuse, shining leaves. Flowers axillary and terminal, bright blue, fragrant of camphor. 4f.

25. MONÁRDA, L. MOUNTAIN MINT. Calyx elongated, cylindric, striate, subequally 5-toothed. Cor. ringent, tubular, upper lip linear, lower lip reflexed, 3-lobed, the middle lobe narrowest. Sta. 2, fertile, ascending beneath the upper lip, and mostly exerted, anth. cells divaricate at base, connate at apex. 2 Verticils few, dense, many-flwd., bracted. Jl.—Sept.

* Calyx densely hairy in the throat. Corolla purple or whitish..............Nos. 1, 2
* Calyx naked in the throat. Corolla scarlet or yellow..................Nos. 3, 4

1 M. fistulosa L. Horsemint. Wild Bergamot. Lvs. ovate to lanceolate, pointed, serrate or subentire, petiolate; flowers in large terminal heads; corollas 1’, exserted, greenish white, pale lilac, or blue. Thickets, W. Vt., W. and S. 2—4f. Variable.

2 M. Bradburiana N. Lvs. ovate to lanceolate, acute, rounded at base, subsessile; cal. curved, teeth spinescent (as in No. 1); bracts and corolla purple. Prairies, W. 3f.

3 M. punctata L. Lvs. lance-oblong, tapering to the petiole; bracts leafy, colored, longer than the pale yellow, brown-spotted corollas. Barrens, N. J., S. and W. 2—3f.

4 M. didyma L. St. branching, acutely 4-angled; lvs. broad-ovate, pointed, short-petiolate; heads terminal and subterminal, with large (15”) showy crimson corollas, and bracts stained with the same hue. Swamps: rare. Often cultivated. 2f.

26. BLEPHILIA, Raf. Calyx 13-veined, upper lip 3-toothed, lower lip shorter, 2-toothed, the teeth setaceous. Cor. upper lip short, erect, oblong, obtuse, entire, lower lip of 3 unequal, spreading lobes, the lateral ones orbicular. Stam. 2, fertile, ascending, exerted. 2 Verticils dense, approximate in a spike.

1 B. hirsuta Benth. Hirsute all over, wide-branched; lvs. ov.-lanceolate, pointed, serrate, petiolate; bracts oblong, acuminate, colored, shorter than the pale, purple-spotted flowers; cor. 5”. Damp woods, N. Eng., W. Pa., and W. 1—2f. June, July.


27. LOPHANTHUS, Benth. HEDGE HYSSOP. Cal. 15-ribbed, oblique, 5-cleft, upper segments longer. Cor. upper lip bifidly emarginate, lower lip 3-lobed, the middle lobe broader and crenate. Stam. diverging. 2 Tall, erect. Verticils spicate.

1 L. nepetoides B. Stem smooth, stout, angles sharp; lvs. ovate, pointed, serrate; calyx teeth ovate, obtusish, green, in spikes 2—3’ long; corollas inconspicuous, greenish white. Fence-rows, &c., M. and W. 3—6f. July, Aug.


3 L. anisatus B. Smooth; leaves ovate, &c., whitened beneath; calyx teeth as in No. 2; corolla azure-blue, fragrant of anise. Wis. to Dak. (Dr. Matthews.)

28. NÉPETA, L. CATMINT. GROUND IVY. Cal. tubular, 5-toothed; Cor. tube slender below, dilated and naked in the throat, upper lip emarginate, lower 3-lobed, the middle lobe largest and crenate, margin of the orifice reflected. Sta. ascending, anther cells divergent. Figs. 318, 384.
§ Tall. Verticils in a terminal raceme. Calyx nearly regular...............No. 1
§ Glechôma. Low, diffuse. Flowers axillary. Calyx curved, oblique ........No. 2

1 N. catâria L. Catnip. Erect, hoary-tomentous; lvs. petiolate, cordate, deltoid-ovate, coarsely crenate-serrate; flowers spiked, the whorls slightly peduncled. 2f About old buildings, &c. 2–3f. July. § The delight of cats.

2 N. Glechôma B. Gill-over-the-Ground. Leaves reniform, crenate; corolla 3 times longer than the calyx (10''), bluish purple, anthers forming 2 little crosses. 2f Creeping in grass, about walls, &c. 3'–1f. May. § Europe.

29. DRACOCÉPHALUM, L. DRAGON-HEAD. Calyx subequal, oblique, 5-cleft, upper segment larger. Cor. bilabiate, upper lip vaulted, emarginate, throat inflated, lower lip spreading, 3-cleft, middle lobe much larger, rounded or subdivided. Sta. 4, distinct, ascending, the upper pair longer. 2f

D. pârfidôrum N. Plant some downy, slender; leaves petiolate, lancolate, deeply serrate; flowers small, bluish, spicate. N. New York, and W.: rare. 18'. July.

30. CEDRÔNÈLLA, Mœnch. Cal. subcampanulate, 5-toothed. Cor. tube exserted, throat dilated, upper lip straight, flattish, emarginate or cleft, lower 3-fid, middle lobe largest. Stam. 4, ascending, the upper longer, another-cells parallel. Flowers spicate, bracted. Summer.

1 C. cordâta N. Pubescent, producing runners; leaves cordate, petiolate, bluntly crenate; spikes unilateral, corolla pale blue, 1'. 2f Rocks, O., Va.: rare. 1f. June.

2 C. Mèxicâna. Erect, with cordate-lanceolate, dentate leaves; flowers in a spike of close whorls, purple, large. Mexico. 2–3f. (Gardoquia (Lind.))

31. BRUNÉLLA, Tourn. SELF-HEAL. BLUE-CURLS. Cal. about 10-ribbed, upper lip dilated, truncate, with 3 short teeth, lower lip with 2 lancéolate teeth. Filam. forked, one point of the fork bearing the anther. 2f

B. vûlgâris L. Stem simple; leaves oblong-ovate, toothed, petiolate; flowers blue, in a large oblong-ovoid spike of dense verticils with reniform bracts. Low grounds, very common, varying from 8' to 2f. All Summer.

32. SCUTÈLÈRÀRIA, L. SKULL-CAP. Cal. campanulate, lips entire, upper one appended on the back and closed after flowering. Cor. upper lip vaulted, lower dilated, convex, tube much exserted, ascending, throat dilated. Stam. ascending beneath the upper lip, anthers approximate in pairs, achonia tubercular. 2f

§ Flowers large (7 to 13' long), racemed at top of the stem, with bracts... (a)
  a Bracts ovate, abruptly at base. Lips of corolla short. Petioles long...Nos. 1, 2, 3
  a Bracts lance-oblung, acute at base. Leaves notched, petiolate... (b)
  b Galea of the corolla longer than the lower lip.........................Nos. 4, 5
  b Galea of the corolla not longer than the lip.........................Nos. 6, 7
  a Bracts leaf-like, longer than the calyx. Leaves entire, subsessile... Nos. 8–10

Flowers large or small, opposite, solitary, in the axils of the leaves.... Nos. 11–13

§ Flowers small (9' long), in slender, axillary, one-sided racemes...............No. 14

1 S. versîcôlor N. Glandular-hairy, erect, branched; leaves broad-ovate, cordate, crenate, veiny; racemes long, many-flowered; bracts ovate, entire, subsessile; corolla 6–7'', lips blue, subequal, lateral lobes distinct. Pa., and W. States. 14–4f.

2 S. rugôsa Wood. Hairs and leaves as in No. 1, but the stem is weak, ascending, bracts petiolate, and the lower lip of the (9'') corolla pendent and twice longer than the upper. Rocky shores, Harper's Ferry, Va., and S-W. 18'.
3 **S. saxatilis** Rid. Smoothish and not glandular, weak, ascending; leaves as in Nos. 1, 2; bracts as in No. 2; corolla 8", lips equal, upper 3-lobed. Del., Va., and W. 2f.

4 **S. canescens** N. Erect, pubescent; leaves ovate to oblong, lower cordate; rac. terminal and axillary; bracts lance-linear; corolla 8", canescent, upper lip arched, remote from the lower. Dry soils, M. and W.: common. 1—3f. (S. arguta Bkly.)

5 **S. villüsa** Ell.? Slender, erect, stem finely tomentous; leaves lanceolate, acute both ways, serrate; flowers paniculate, bracts lance-linear; corolla 9", tube slender, galea strongly arched, 5 times longer than lip. Ga. (Dr. Feay). 2—3f.

6 **S. serratüa** Andr. Erect, subsimple, green, smoothish; leaves ovate, pointed both ways, serrate; rac. few-wd.; cor. 13", lips subequal. Woods, E. Pa., Ill., and S. 2—3f.

7 **S. pilüsa** Mx. Erect, subsimple, pubescent; leaves rhomb-ovate or oval, obtuse, remote, crenate-serr.; racemes terminal; corolla 9—12", lips distant. Pa. to Ga. 2f.

8 **S. integrifüla** L. Erect, subsimple, tomentous or downy; leaves ovate to lance-linear, obtuse, entire, or the lower crenate; flowers 9", much enlarged above, the lips subequal, in a terminal raceme. Dry soils, M. and S. 9—2f.

9 **S. Floridüana** Chapm. Slender, branching; leaves all linear, obtuse, entire, with rolled edges, lowest minute; corolla 1", enlarged above, lips subequal. W. Fla. 1f.

10 **S. macrántha** (or Japonica). In gardens, 1f, smooth (except the hairy calyx); lvs. clasping, lance-linear; flowers 1", blue, with subequal lips, handsome. China.

11 **S. nervüsa** Ph. Slender, erect, producing runners; leaves sessile, broad-cordate, crenate-serr., 3—5-veined; fls. few, 4", with small floral lvs. Rocks, M. and W. 8—15f.

12 **S. pársvula** Mx. Root a string of tubers, stem erect, 3—9"; lvs. ovate to oblong, obtuse, small (6"'), sessile, entire; fls. 3", exceeding the lvs., blue. Fields, M. and W.

13 **S. galericülata** L. **Common S.** Erect, branched, smoothish or downy; leaves nearly sessile, cordate-oblong or lanceolate, obscurely crenate, acute; flowers few, large (9—12"), sessile, axillary. Low meadows, Can. to Tenn. 12—18f.

14 **S. laterifüra** L. **Mad-dog S.** Smoothish, subsimple; lvs. petiolate, lanceolate, serrate; fls. 4", rac. axillary, secund, equalling the lvs. Ditches, N., W., M. 1—2f.

33. **MACBRüDEA**, Ell. Calyx 3-lobed, upper lobe oblong, narrow, lower rounded. Cor. tube long-exserted, throat inflated, upper lip erect, concave, lower short, spreading, the middle lobe rounded, broadest. Sta. ascending under the upper lip, anthers approximate by pairs. 2t Erect, subsimple, with large purple-white flowers in heads.

1 **M. pálchra** Ell. Lvs. wedge-lanceolate, acute, serrulate, the floral ovate; corolla 18", streaked with purple and white. Wet pine-barrens, S. 12—18'. Aug., Sept.

2 **M. aibala** Chapm. Lvs. wedge-oblong, obtuse, dentate; the floral roundish; corolla white; lower lobes of the calyx notched. Pine-barrens, W. Fla. 12—18'. July, Aug.

34. **SYNÁNDRA**, N. Cal. 4-cleft, segm. unequal, subulate, converging to one side. Upper lip of corolla entire, vaulted, the lower obtusely and unequally 3-lobed, throat inflated. Sta. ascending beneath the galea upper pair of anther. cohering, having the contiguous cells empty. 2 Flow ers solitary, axillary, somewhat spicate above. Figs. 69, 292.

**S. grandifüra** N.—Woods, O. to Tenn. 6—18'. Stem simple. Lvs. cordate-ovate, acuminate, petiolate. Cor. white, 1', with large lobes, purple-striate. June.

35. **PHYSOSTÉGIA**, Benth. **LION-HEART.** Cal. bell-form, 5-toothed Cor. much exserted, throat inflated, upper lip concave, entire, lower of 3 broad-spreading lobes. Sta. 4, separate, ascending beneath the upper lip. 2t Smooth, with lanc., serrate lvs. and term. spikes of showy rose-white fls.

**P. Flrugiuiana** B. Stems mostly simple; lvs. oblong to narrow-lanceolate, sessile
thick; spikes 4-rowed, ∞-flowered; corolla 8—15", spotted inside. Wet banks, M., W., and S. Often cultivated. 1—4f. August, September.—Variable.

36. LAMLIUM, L. HENBIT. Cal. 5-veined, with 5 subequal, subulate teeth. Cor. dilated at throat, upper lip vaueted, galeae, lower lip broad, emarginate, lateral lobes truncate, often toothed on each side near the margin of the dilated throat. Stamens 4, ascending. May—November.

* Weeds in waste grounds, with roundish leaves and small purple flowers...Nos. 1. 2
* Lvs. cordate, ovate. Fls. larger (1'), hairy in t"-coat, side-lobes toothed...Nos. 3, 4

1 L. amplexicaule L. Leaves cut-crenate, petiolate, the floral sessile-clasping; corolla slender (6''), galeae entire, side-lobes not toothed, throat spotted. (1) 6—10'.

2 L. purpureum L. Lvs. roundish to ovate, crenate, all petiolate; corolla slender, 6', hairy within, side-lobes with a subulate tooth, galea entire. ① Penn., &c.: rare.


4 L. maculatum (or rugosum). Leaves hairy, rugose, petiolate, marked with a white oblong spot along the midvein. Flowers as in No. 3, but purplish. Cultivated.

37. PHLOMIS, L. JERUSALEM SAGE. Calyx truncate 5-toothed. Cor. galea broad, keeled, lower lip spreading, 3-fld. Stamens ascending beneath the galea, the upper pair appendaged at base. Leaves rugose. Verticils showy, axillary.

P. tuberosa. Tall, smoothish, with large ovate-cordate, crenate leaves; fls. 30—40 in a whorl, purple, hairy inside. Scape in gardens and waste grounds.

38. BALLOTA, L. BLACK HOARHOUND. Cal. funnel-form, 10-veined, 5-toothed. Cor. tube cylindrical, as long as the calyx, upper lip concave, crenate, lower lip 3-cleft, middle segment largest, emarginate. Sta. 4, ascending, exserted. Achenia ovoid-triangular. ⑴


39. MOLUCCELLA, L. MOLUCCA BALM. SHELL FLOWER. Calyx campanulate, very large, the margin expanding, often repand-spinous. Corolla tube included, limb bilabiate. Stamens 4, ascending. ①


40. GALEOPSIS, L. HEMP NETTLE. Cal. 5-cleft, spinescent. Upper lip of the corolla vaulted, subcrenate, lower lip with 3 unequal lobes, having 2 teeth on its upper side, middle lobe largest, cleft and crenate. Sta. exserted, anth. cells transverse. ① Vert. distant, many-flwed. § Eur.

1 G. Tetráhit L. St. hispid, the internodes thickened upward; leaves ovate, hispid, serrate; cor. twice as long as the calyx, upper lip nearly straight, concave; corolla white-purple. A common weed in fields and waste grounds, N. States. 1—3f. Jn., Ji.

2 G. Ládanum L. Internodes equal; lvs. lanceolate, sub serrate, pubescent; upper lip of the corolla slightly crenate; corolla roseate. Waste soils: rare. 1f. August.

41. STACHYS, L. HEDGE NETTLE. Cal. tube angular, bell-form, 5- or 10-ribbed, with 5 acute or pungent teeth. Cor. upper lip erect-spreading or some vaulted, lower spreading, 3-lobed, mid-lobe largest. Stamens as-
cending, lower pair longer, anthers approximating by pairs. Verticils 2-
10-flowered, approximating in a terminal raceme.

Our species are much alike, yet easily distinguished. They have stems mostly hispid, lea

\* Plants 4, leaves smooth. Calyx teeth divaricately spreading ................. Nos. 1, 2
\* Plants hispid or hairy.—a 4 Calyx teeth spinescent. Lvs. subsessile..... Nos. 3, 4
—a Calyx teeth acute. Leaves petiolate............. Nos. 5, 6

1 S. hyssopifóllá Mx. Leaves sessile, linear-lanceolate, serrulate, small (1–2); calyx teeth half as long as the 7" corolla. Mass. to Mo., and S. 6–12.


3 S. palástris L. Stout, hirsute; leaves some pointed, large, hoary beneath; corolla twice longer (7–8") than the calyx teeth. Moist shades, Can. to Car. 1–4f.

4 S. áspera Mx. Slender, hispid; leaves pointed, sharp-serrate; calyx glabrous, teeth hispid, equalling the corolla tube. Damp soils: common. 2f. Not leafy.

5 S. cordáta Rid. Stout, with large, pointed leaves, crenate-dentate; calyx teeth triangular, much shorter than the corolla. 2f Shady banks, W. 2–5f.

6 S. arvensís L. Weak, diffuse; lvs. ovate-cordate, obtuse; bracts very short; calyx teeth lanceolate; corolla tube included, lips short. 2 Waste grounds, N.: rare. ƒ

42. BETÓNICA, Tourn. BETONY. Calyx tubular-bell-form, with 5 awn-like teeth. Cor. as in Stachys, but beardless inside. Stam. ascending parallel beneath the galea. Style bifid. Lower leaves long-petioled, corollate, all crenate. Verticils large, dense, in a terminal spike.

1 B. officínális L. Wood B. Spike interrupted at base; flowers purple, cor. twice longer than calyx (7"), galea entire. Gardens, and escaped. 1f. Rare. ƒ Europe.

2 B. grándiflórá. Villous; floral leaves clasping; verticils separate; corolla violet, large (15"), handsome, galea obcordate, glabrous. Gardens. 2f. Siberian.


1 L. Cardiaca L. Lvs. palmate-lobed, 3-fld. to lanceolate; corolla longer than the calyx, a hairy ring within. About dwellings. 3–5f. ƒ Asia.

2 L. marrubílástrum L. Leaves oblong-ovate, coarsely cut-serrate; cor. shorter than the calyx teeth, naked within. Waste grounds. 2–4f. ƒ Europe.

44. MARRÚBIUM, L. HOARHOUND. Cal. tubular, 5–10-striate, with 5 or 10 subequal teeth. Cor. upper lip erect, flattish or concave, entire or bifid, lower lip spreading, 3-lobed, middle lobe broadest, emarginate, tube included. Stam. included in the tube. 2f. Lvs. in dense verticils, white.


45. LEONÓTIS, Br. LION’S-ears. Calyx 10-veined, apex incurved, throat oblique, sub-10-toothed, upper tooth largest. Cor. tube exserted, upper lip concave, erect, entire, lower short, spreading, trifid. Sta. 4, under the galea, anth. in pairs. — Vert. dense, with numerous lin.-subulate bracts.

L. nepetárfóllá Br. Erect, stout; lvs. thin, ovate, crenate, on slender petioles; cal. teeth 8, spinescent; whorls very large; cor. scarlet, 10'. 1 Fields, S. 4–7f. ƒ Afr.
**Order XCII. BORRAGINACEÆ. Borrageworts.**

*Herbs* (shrubs or trees), with round stems and branches, not aromatic. 


*Petals* 5, united below, regular, very rarely irregular. *Stamens* 5, inserted in the tube. *Ovary* 4-lobed, or entire, forming in *fruit* 4 separate, 1-seeded achenia in the bottom of the persistent calyx. Figs. 141, 455.

1. **TOURNEFORTIA**, L. **Summer Heliotrope**. Cal. 5-parted. Cor. salver-form, throat naked. Sta. 5, included. Sty. short. Fr. 2-carpelled, 4-celled and 4-seeded. & With entire leaves and second spikes.

1. **H. Europæum** L. Erect, pubescent; lvs. oval, veiny, obtuse, petiolate; calyx spreading in fruit, hairly. & Rocky banks, moist fields, Va., and N.: rare. 8—12. §

2. **H. Curassavicum** L. Glabrous, ascending; leaves linear-oblong to spatulate, obtuse, tapering to base, veinless and glaucous. & Shores, W. and S. 1f.

3. **H. Peruvianum**. Shrubby, erect, pubescent; leaves rugous, lance-ovate, short-petiolate; corolla twice longer than the calyx, peculiarly fragrant. Peru.

4. **H. Corymbosum**. Pubescent, with lance-oblong leaves tapering both ways; flowers deep purple, less fragrant, but larger than in No. 3.

**H. Indicum** DC. Erect, branching, hairy; Ivs. ovate, crenate-serrulate, acute, velvety. rugosis, abruptly or subcordate at base; spike terminal, single (rarely forked); corolla much exerted; fruit with four empty cells. ① Fields, W. and S. 1—2f. §


**E. vulgāre** L. Plant rough with bristles and tubercles; Ivs. lanceolate; fls. large, handsome, violet-blue, many and crowded. ① Fields, Pa. to Va. 1f.


**L. arvénsis** L. Plant hispid, erect, branched above, with lanceolate, repand-denticulate leaves; flowers small, sky-blue with white scales, the bent tube longer than the calyx, in leafy racemes. Fields and waysides. 1f. § S. Europe.

6. **ECHINOSPÉRMUM**, Swartz. Burr-seed. Calyx 5-parted. Cor. hypocrateriform, throat closed with concave scales. Ach. erect, bearing 1—3 rows of echinate prickles, smooth between, compressed or angular, fixed to a central column.—Herbs with bracted racemes and small blue fls.

**E. Láppula** Lehm. Branched above; Ivs. hairy, lanceolate to linear; corolla longer than calyx, border concave; ach. with prickles in two rows. ① Dry soils. 1f. July.

7. **CYNOGLOSSUM**, Tourn. Hound's Tongue. Cal. 5-parted. Cor. short, funnel-form, concave, throat closed by 5 converging, convex scales. Ach. covered with echinate prickles, depressed, forming a broad pyramidal fruit, each fixed laterally to the style. Lvs. large. Cor. blue, purple or white.

§ Racemes without bracts, or nearly so.................................Nos. 1, 2
§ Racemes bracted at base, but the pedicels always extra-axillary...........No. 3

1 **C. officinālis** L. Common H. Silky-pubescent, leafy to the top; leaves oblong-lanceolate, the upper sessile; naked racemes panicled; corolla dull purple. ② Pastures, &c. 1—2f. Plant dull green, ill-scented. July. § Europe.

2 **C. Virginicum** L. Plant hairy, leafless above, with oblong-oval Ivs. below, and a terminal cluster of short spikes of pale-purple flowers. ② Woods, Va., N. and W.

3 **C. Morrisoni** DC. Beggar-ticks. Rough-pubescent, widely-branched; leaves acuminate; racemes forked; flowers very small, white; fruit with doubly barbed prickles adhering to all that pass. ① Rocky places. 2—3f. July.


**B. officinālis**. Rough-haired, branching; leaves ovate; flowers sky-blue, showy, in terminal, loose racemes. ② In old gardens, sowing itself. 1—2f. All Summer.

Cor. rotate, tube shorter than the calyx tube, throat closed. Sta. included
Achenia cup-form, toothed at the edges.—Oriental herbs.

1 **O. LINIFOLIA.** Erect, smooth, glaucous; leaves obovate to linear-lanceolate; corolla white, twice longer than calyx. ① Spain. 1f. June—August.

2 **O. Verna.** Runners creeping; leaves cordate to ovate, puberulent; racemes in pairs, few-flowered; flowers bright blue. **2** S. Europe. 6'. April, May.

10. **SYMPHYTUM**, Tourn. **Comfrey.** Cal. 5-parted. Cor. tubular-campanulate, orifice closed with 5, subulate scales, converging into a conc. Ach. smooth, ovoid, fixed by an excavated base. **24** Oriental herbs.

S. officinale L. Stem hairy, winged with the decurrent, lance-ovate leaves; fls. white or pink, in revolute racemes. Gardens and fields. 2—4f. Summer.

11. **ANCHUSA**, L. **Bugloss.** Cal. 5-parted. Cor. funnel-form, throat closed with 5 scales. Sta. included. Achenia excavated at base.—Europe.


1 **O. Virginianum** A. DC. Very rough with appressed, stiff bristles; lvs. oblanceolate, sessile, 5-veined; cor. hispid, ① longer than the lance-linear sepals, the segm. lance-subulate; anthers arrow-shaped. Dry soils. 15—30'. Corolla 4—5'.

2 **O. Caroliniánnum** DC. Shaggy with long, spreading, rusty-white bristles; leaves lance-oblanceolate, 7-veined; flowers shaggy-bristly; corolla near twice longer than sepals, the segments ovate, obtuse. By streams, M., W., S. 2—4f.

3 **O. molle** Mx. Hoary with soft appressed hairs; lvs. oblanceolate; corolla hispate, lobes triangular, pointed. Dry soils, W. 2—3f.

13. **MYOSÓTIS**, Dill. **Forget-me-not.** Cal. 5-cleft. Cor. salver-or funnel-form, tube about equalling the calyx, the 5 lobes convolute in bud, throat closed with short, concave scales. Ach. ovate, smooth, with a small cavity at base.—Herbs slightly villous. Racemes bractless, or with a few small leaves at the base. Flowers never axillary. May—Aug. Fig. 455.

§ Racemes one-sided. Calyx clothed with minute, appressed hairs, if any……...No. 1
§ Rac. two-sided. Calyx beset with spreading, minutely-hooked bristles…Nos. 2, 4

1 **M. palústris** Roth. Roughish-downy, or nearly smooth, branching; leaves lance-oblanceolate, obtuse; ped. spreading, longer (3—3") than the equal cal.; cor. 2—3" broad, blue, with a yellow centre. **24** Gardens; from Europe, also escaped in fields, &c.

β. laca, taller (1f), very slender; lvs. lin.-obl.; ped. 4—6" long. Swamps, ditches.

2 **M. arvénalis** L. Rough with tubercled hairs, branched; leaves oblanceolate, acute; rac. loose, naked; ped. spreading, longer (2—3") as the open, equal cal. **2** Fields. 6—15'.

3 **M. verna** N. (stricta Link.) Rough-bristly, with spathulate to lin.-oblanceolate lvs.; ped. ascending, as long as the closed, bilabiate calyx; racemes leafy at base. **1** Dry hills.

4 **M. versicolor** Pers. Stem very slender, hispid-villous; leaves oblanceolate; racemes leafless; pedicels shorter than the deeply and equally 5-cleft calyx; flowers yellow, varying to blue. Del. (Canby, Porter). **§** Europe. The true Forget-me-not.

14. **LITHOSPÉRMUM**, L. **Gromwell.** **Puccoon.** Cor. funnel-or
salver-form, limb 5-lobed, orifice open, with or without appendages, anth.
included. Stig. obtuse, bifid. Ach. bony, rugous or smooth, flat at base.
—Herbaceous or suffruticos, generally with a thick, reddish root. Flow-
er spiked or racemed, bracted, white or yellow. (See Addenda.)

§ Achenia rugous-tubercled. Corolla throat open, not appendaged, white......No. 1
§ Achenia smooth and white. Corolla throat appendaged.—a Fls. white...Nos. 2–1
—a Fls. yellow...Nos. 5–7

1 L. arvénse L. Wheat-thief. Leaves linear-lanceolate, obtuse, hairy; calyx nearly
equal to the corolla, with spreading segments. (1) A rough weed in fields. 1f–1¾'.
Root reddish. Fls. small, solitary in the upper axils. May, June. § Europe.

2 L. officinálé L. Erect, very branching above; lvs. lanceolate, acute, velvety; calyx
nearly equal to the tube of the corolla. ¼ Dry soils, N. and M. 1–2f. Flowers
small, pedicellate, in recurved, leafy racemes. July. § Europe.

3 L. latífoliúm Mx. Rough, erect, subsimple; leaves ovate, sessile, pointed both
ways; racemes leafy, sepals lance-linear. ¼ Thickets, N. Y. to Va., and W. 2f.

4 L. angustífoliúm Mx. Ascending, much branched; leaves linear, rigid; flowers
scattered; corolla hardly exerted. ¼ Sandy banks, W. 6–15'. Leaves 1¼.

5 L. cánescens Lehm. Pucoon. Erect, subsimple, soft-villous; leaves oblong or
linear-oblong, obtuse; stem revolute at top, with the showy orange-yellow flowers
axiary. ¼ Fields, prairies, N. Y., W. and S. 8–12'. June, July.

6 L. hírtum Lehm. Erect, simple, rough-haired; lvs. lance-linear, the floral lance-
olate; corolla twice longer than the linear sepals. ¼ Pa., W. and S. 8–15'. May.

7 L. longíflórum Spr. Slender, simple, cinereous-strigous; leaves linear; corolla
tube 4 times longer than the calyx (9–12¾'). Plains, W. 10–15'. July.

Cor. tube cylindrical, limb subcampanulate, 5-cleft, throat open, often with 5
folds or ridges between the insertion of the stamens. Sta. inserted at top of
the tube. Ach. smooth or reticulated. ¼ St. and lvs. usually glabrous, pellucid-punctate, the radical many-veined, cauliné sessile. Rac. terminal.

1 M. Virginica DC. Ascending, very smooth; root leaves large, obovate to ovate,
stem leaves sessile, lance-oblong, all entire, obtuse; fls. somewhat trumpet-shaped,
pendent, 10', blue to lilac, very handsome. Rich soils, N. Y., S. & W. 1–1¾f. May. †

2 M. marítima Don. Glabrous, weak; lvs. ovate, obtuse, fleshy, glaucous; corolla

3 M. paniculátà Don. Scabrous, erect; lvs. acuminate, cordate-ovate to oblong;
corolla thrice longer than calyx, blue to white. Lake Superior, and N. †

Order XCIII. HYDROPHYLLACEÆ. HYDROPHYLLS.

Herbs mostly, with alternate-lobed leaves and regular bluish flowers.
Calyx 5-cleft, usually with appendages at the clefts, persistent, frc. Cor-
rolla 5-lobed, often with 10 honey scales or furrows near the base. Stamens
5, inserted into the corolla, with a deeply bifid style. Ovary entire, ovoid,
free, 1-celled, with 2 parietal, several-seeded placenta. Fruit 2-valved,
filled by the placenta. Seeds reticulated, albuminous.

§ HYDROPHYLLEÆ. Ovary and pod 1-celled. Style bifid. Leaves cleft...(a)
§ HYDROLEÆ. Ovary and pod 2-celled, 2-valved. Styles 2. Leaves entire... (e)

a Lobes of the corolla convolute in the bud... (b)
a Lobes of the corolla imbricate (quinuncial) in the bud... (e)

§ Calyx appendaged between the sepals at base. Stamens as long as the cor... Nos. 2-4

1. H. appendiculatum Mx. Hairy; lvs. palmately 5-lobed, the lower pinnately divided, lobes pointed and toothed; sta. often included; appendages deflexed, much shorter (1") than sep. (4-5'); cor. blue. Woods, N. Y. to Wis., & Va. 1-4f. May.

2. H. Virginiicum L. Nearly smooth; leaves pinnatifid; segments oval-lanceolate, pointed, incised, the upper 3 confluent; petioles long; ped. still longer, bearing a roundish tuft of pale flowers with hisrate calyxes. Moist woods. 1f. June.

3. H. Canadense L. Lvs. smoothish, palmate, roundish, with 5-7 shallow lobes, unequally dentate, teeth obtuse-mucronate; fls. in crowded fascicles; ped. shorter than the forked petioles; cor. white or purplish. Alpine woods. 1-4f. June, Jl.

4. H. macrophyllum N. Whitish, with reversed hairs; leaves oblong-oval in outline, pinnatifid, and cut into blunt-mucronate teeth; cymes dense, globose, on long peduncles; corolla white, 6"; stamens 10". Rocky woods, W. and S. 1f. June.

2. NEMÓPHILA, N. Cal. 5-parted, the sinuses with reflexed appendages. Cor. wheel-bell-form, lobes rounded, convolute in bud, tube with 5 pairs of folds within. Sta. included. Ov. and caps. as in Hydrophyllum, the placentae each 2-12-ovuled. 1 Tender and fragile, with pinnately-parted leaves and solitary, showy flowers.

* Leaves all or the lower alternate. Flowers not spotted. ..................Nos. 1, 2
* Leaves all opposite. Flowers spotted with blue or brown................Nos. 3, 4

1. N. micrcocalyx F. & M. Smooth; leaves triangular, 5-3-cleft, with rounded, mucronate teeth; ped. and petioles slender; corolla 1-2', white, calyx still smaller; seeds 1 or 2. Damp woods, S. 3-12', very weak. April.

2. N. insignis. Lvs. oblong, with 7-9 ovate, acute lobes, shorter than peduncles; fls. 1' or more broad, the border pure blue with a white centre. California.

3. N. maculâta. Leaves 3-7-lobed, tapering and entire at base; flowers on long ped., 1' broad, white, with a violet spot on the apex of each lobe. California.

4. N. atomáhia. Leaves and peduncles nearly as in the last; flowers white, 10-12", sprinkled all over with small brown spots. Sierra Mountains.

3. ELLÍSIA, L. Cal. 5-parted, equaling the tubular-bell-form corolla, enlarged in fruit. Cor. tube minutely appendaged within. Sta. included. Caps. 2-valved, 4-2-seeded. Leaves pinnatifid, flowers white, May—July.

E. Nyctelea L. Weak, slender; lvs. petiolate, the upper alternate, lobes 9-11, lin. oblong; ped. 1-flowered, with calyx larger than corolla. Woods, Pa., W and S. 1f.
4. COSMÁNTHUS, Nolte. **MIAMI MIST.** Cal. 5-parted. Cor. wheel-
bell-form, tube not appended, lobes delicately fringe-toothed, as long as
the stamens. Ovary hairy. Capsule 2-valved, 4-seeded. 1 Delicate, with
alternate leaves and small pale flowers in long, bractless racemes.

1 C. Púrshii Wood. Nearly smooth, erect; lvs. pinnatifid, the upper sessile, lobes
5–7, oblong, acute; rac. 9–15-flowered; pedicels longer than the lance-linear, ciliate
sepal; fls. light blue, 5–6". River bottoms, Ill., Ky., to Ga. 8–12'. May, June.

2 C. fímbriátus Mx. Pubescent; stems clustered, assurgent; leaves pinnate, with
5–7 roundish or oblong-obtuse lobes; pedicels as long as the oblong-spatulate, ob-
tuse sepals; corolla white, 4–5". Mountains, Tenn., Va., to Ga. May.

5. PHACÉLIA, L. Cal. not appended. Corolla tubular-bell-form,
lobes entire, inbricate in bud, tube appended within. Sta. 5, generally
exserted. Ov. and caps. hispid, ovoid, 4–∞-seeded.—Herbs hispid, with
alternate leaves and 1-sided racemes. May, June.

§ Capsule 4-seeded. Corolla tube evidently appended within. Nos. 1–3
§ Eutôca. Caps. (or ovary) 8–∞-seeded. Cor. obscurely appended... (a)
a Seeds or ovules 6–8. Racemes simple. Native South. Nos. 4–6
b Seeds or ovules 20 or more. Rac. forked or corymb. Gardens. (1). Nos. 7–9

1 P. bipinnatífida Mx. Stem hairy, suberect, much branched; lvs. cut-pinnatifid,
long-petioled, segm. again incised; rac. forked or simple, loose; corolla twice longer
than calyx, 6'/blue. (2) Hilly woods, Ill. to N. C. and Ala. 1–2f.

2 P. tanacetífoliá. Hispid or hairy, tall, with pinnatisect leaves, long, dense ra-
cemes, corollas blue and long, exserted stamens. California. 1–2f.

3 P. congéstá. Hoary-pubescent; lvs. pinnate with very unequal alternate-cut lfts.;
lobes loose, spicate; flowers small, blue; stamens little exserted. California. 1f.

4 P. parvifíóra Ph. Stems smoothish, weak; lvs. all petiolate, pinnatifid or 3-flód.
lobes distant, small; fls. 4", pale; sep. smoothish. (3) Shady banks, Pa., and S. 9'.

5 P. maculátá Wood. Erect, branched, sparingly hisrate; lvs. pinnatifid, 5–7-lobed,
lower petiolo, upper sessile; fls. 7", violet-blue, 10-spotted around the yellow throat;
sepal bristly-ciliate, linear-oblong. (2) Stone Mountain, Ga., and W. 6–12'.

6 P. pusíllá Buckley. Pubescent; leaves sessile, pinnatifid, lobes abruptly pointed;
lfs. pale-blue or white; sepals linear-oblong; stamens exserted. Prairies, Ala.

7 P. Frankliníi Gray. Soft-hairy, erect; lvs. bipinnatifid with crowded lobes;
racemes short, dense, crowded, with blue fls. Isl. Royal (Porter) to Oreg. 1 Cultivated.

8 P. vícíscida. Viscid with glandular hairs, ovate, coarsely-toothed leaves, and long,
revolute racemes, unrolling as the large (9") purple-blue flowers expand. Cal. 1f.

9 P. Menziéshí. Lvs. linear, entire, or the lower with few linear-oblong lobes; flow-

6. WHITLÁVIA, Harvey. Cal. 5-parted. Cor. tubular-campanulate,
the 5 lobes abruptly spreading, throat slightly contracted. Sta. exserted.
Capsule ∞-seeded. 1 From Texas and California.

W. grándifíóra. Some viscid, with broad, ovate, petiolate, coarsely-toothed leaves,
loose racemes of large (1') deep-blue (or white) bell-shaped flowers. June—October.

7. HYDRÓLEA, L. Sep. 5. Cor. rotate-campanulate, 5-lobed, bear-
ing the 5 stamens. Styles 2, distinct. Capsule 2-celled, 2-valved, the pla-
centæ large, with ∞ minute seeds.—Herbs with entire leaves and cymes of
blue flowers. July—September.

1 H. corymbósa Macbriđe. Not spiny, some hairy above; lvs. lance-ovate, sessile;
branchlets corymb, each with a terminal, showy, azure flower. Ponds, S. 1–2f.
2. **H. quadrivalvis** Walt. Spiny, hispid; leaves lanceolate, petiolate; cymes 4-6 flowered; cor. azure-blue, 5-6" broad; sep. ovate. Slow waters, S. C., and W. 2fl.


**Order XCIV. POLEMONIACEÆ. PHLOXWORTS.**

*Herbs* with alternate or opposite leaves and 5-parted, regular, showy flowers. *Corolla* monopetalous, the lobes convolute, rarely imbricate in aestivation. *Stamens* 5, adherent to the corolla tube, and alternate with its lobes. *Ovary* 3-celled. *Stigma* 3-cleft. *Capsule* 3-celled, 3-valved, loculicidal. *Seeds* few or many, albuminous, attached to a permanent columella. Fig. 46.

I. **POLEMONIÆ.** Sepals united at base. Lobes of the corolla convolute in bud...\(a\) 7
II. **DIAPENSIEÆ.** Sepals distinct, oval. Lobes of the corolla imbricated in bud...\(b\) 1

- a Stamens unequal, included in the tube of the salver-form corolla......\(c\) 2
- a Stamens unequal, in the tube of the funnel-form (scarlet) corolla......\(d\) 2
- a Stamens equal and protruded from the corolla tube. *Seeds* \(\infty\)...\(e\)

- b Leaves undivided, opposite. Corolla wheel-funnel-form, *dentate*......\(f\) 3
- b Leaves variously divided. Ovary and pod \(\infty\)-seeded...\(g\)
- c Stamens equal and straight. Corolla of various forms..................\(h\) 4
- c Stamens declined in the bell-form corolla.—\(d\) Low herbs......\(i\) 5
- d Climbing shrubs..............\(j\) 6

1. **PHLOX, L. PHLOX. LICHINDEA.** Calyx prismatic, deeply 5-cleft. *Corolla* salver-form, the tube more or less curved. *Sta.* very unequally inserted, and included in the tube. Caps. 3-celled, cells each 1-seeded.—A highly ornamental North American genus. *Lvs.* mostly opposite, sessile, simple, entire. *Fls.* in terminal cymes, corymbed or panicled. Fig. 46.

- Lobes of the corolla rounded and entire at the end...\(1\)
  1. Panicle of cymes oblong or pyramidal, many-flowered..........Nos. 1, 2
  1. Panicle of cymes corymbed, level-topped, flowers fewer...\(2\)
  2. Plants glabrous. Calyx teeth shorter than its tube..............Nos. 3, 4
  2. Plants hairy. Calyx teeth attenuated, longer than the tube...\(3\)
  3. Leaves narrow, linear, or nearly so..................Nos. 5, 6
  3. Leaves broad, ovate or lanceolate, &c..................Nos. 7, 8 \(\beta\), 9

- Lobes of corolla notched or bifid at the end. 4 Leaves distant......Nos. 8, 10

  - 4 Leaves imbricated.............No. 11

1. **P. paniculàtâ** L. Smooth, erect; leaves oblong- or ovate-lanceolate, pointed at each end; *fls.* numerous, in a terminal panicle, pink-purple, varying to white; calyx teeth setaceous-pointed. \(\alpha\) Shady banks, Penn., W. and S. 2-3fl. July—Sept. \(\beta\) 2. **P. maculàtâ** L. Stem roughish, purple-spotted, upright; leaves thickish, lanceolate, the upper ovate-cordate; *fls.* many, purple, in an oblong panicle; calyx teeth lanceolate, acute. \(\gamma\) Moist fields, Penn. to Car., and W. 2-3fl. June—August.

- \(\beta\) 3. **P. Carolina** L. Ascending, often branched; leaves lanceolate, rounded at base, pointed; *fls.* rose-purple, in small, dense cymes. \(\gamma\) Prairies, woods, Pa., W. and S. 9'-2f. May—July.—\(\beta\) **ocàtâ** has roughish stems and ovate leaves.
4 P. glaberrima L. Slender, erect; leaves oblong- to lance-linear, taper-pointed, thick, with rolled margins; calyx teeth sharp-pointed; corollas pale-pink, few. 2. Prairies and barrens, Wis. to Ga. 1-3f. June, July.

5 P. pilosa L. Ascending, slender, glandular-hairy above; lvs. lanceolate to linear, attenuate to an acute apex; corymb loose; calyx teeth bristle-pointed, much longer than the tube; corolla small. 2 N. J. and S. May, June.


6 P. involucrata Wood. Hoary-pubescent, branched and ascending at base; lvs. linear-oblong, rather obtuse, clasping, flat, the floral similar and closely subtending the dense corymb as if involucrate; calyx teeth linear or subulate-spatulate; flowers purple to carmine. 2 Dry soils, S. 6-12'. May, June.

7 P. reptans Mx. Assurgent, with creeping stolons; lvs. obovate to ovate, obtuse; fls. few; sep. linear-subulate; cor. blue-purple. 2 Hills, Ind. to Pa., and S. 9f. Jun.

8 P. divaricata L. Low, diffuse, downy; lvs. ovate to lance-oblong, acute; flowers grayish-blue, lobes notched; sep. lin.-subulate. 2' N. Y. to Wis., and S. 1f. Apr., May.

b. Laphamii. Leaves ovate; corolla lobes obtuse, entire. Wis. (Lapham).

9 P. Drummondii Hook. Upright, forking, glandular-hairy; lvs. lanceolate to oblong, mostly alternate; sepals lance-setaceous, revolute; flowers in dense corymb, all shades in the gardens, white to purple, with a star. 1 Ga. 1 to Texas.

10 P. bifida Beck. Low, assurgent, diffuse; lvs. lance-ovate to lance-linear; fls. few, sepals linear, petals deeply bifid, purple. 2' Ill. to Mo.: rare. 6'. April.

11 P. subulata L. Moss Pink. Procumbent, much branched and very leafy, in tufts; leaves rigid, linear to subulate, fascicled; flowers pink to white, covering the tufts in May. 5-8'. Penn., S. and W., and in gardens.

2. COLLÔMIA coccinea. (1) From Chili, has bright carmine-red fls. in heads subtended by broad bracts. Leaves ovate-lanceolate, often 3-cleft at apex, alternate. Pods 3-seeded. 10-15'. June, July.

3. FÉNZLIA DIANTHOIDES. (1) California. A small pink-like herb, 3-6', with exquisitely beautiful flowers, 1', solitary, pink with 5 purple dots around a yellow eye, and the 5 lobes evenly notched at the end. Leaves linear, opposite.

4. GÎLIA, R. & P. Cal. teeth acute. Cor. funnel-form, the tube short or long, bearing the equal sta. more or less exerted and not declined. Pet. entire. Pod 25-seeded. —Herbs with elegant, showy flowers.

§ IPOMÔPSIS. Corolla tube long exerted, in thyrse-like racemes. Tall.........No. 1

§ LEPTOSIPHON. Corolla tube long, slender, in involucrate heads. Low.........No. 2

§ ECGLÔLLA. Corolla tube included in the calyx, scattered or capitulate.........Nos. 3, 4

1 G. coronopifolia Pers. Standing Cypress. A splendid herb 2-4f, plume-like in form, closely beset with delicate pinnatifid lvs. and bearing at top a long (1f) thyrse of bright red flowers (19f). (3) Sandy banks, S. C. to Fla., and W. July-Sept. τ

2 G. ANDROSÁCEA. Strict, simple, downy; lvs. opp., digitately 5-9-cleft into very narrow segments; cor. 1' or more long, lilac, purple or white. (1) Cal. 6-12'. May, Jun.

3 G. TĂFÇÔLL. Diffusely branched; lvs. 2-3-pinnatifid; flowers many, 3-colored, limb lilac, throat purple, tube yellow. A great favorite, from California.

4 G. CAPITÂTA, with the blue 6' flowers at length in round dense heads. Cal. and Oreg.

5. POLEMONIUM, L. Greek Valerian. Calyx and corolla bell-form, with suberec segments. Stamens equally inserted, declined, hairy at base. Capsules 3-valved, 3-celled. —Herbs weak, with alternate pinnately-divided leaves and terminal cymes, blue to white.

1 P. reptans L. Diffusely branched; leaves 7-11-foliate, leaflets acute; fls. nodding pod 3-cells 2- or 3-seeded. 2' Damp uplands, N. Y. to Wis., and S. 1-1½f. May.
2 P. coeruleum. Tall, with erect branches; leaflets 11–17, pointed; fls. erect; seeds ∞. Swamps, Vt., N. Y., N. J. (Dr. Howe, Prof. Porter). 2–3-f. Often cultivated.


§ DIAPÉNSIA proper. Anthers without awns. Flowers pedicellate..............No. 1
§ P'YXIDANTHERA. Anthers with the lower valve awned. Flowers sessile........No. 2

1 D. Lappénica L. A little tufted shrublet, with fleshy, evergreen, obtuse leaves, and the tiny white fls. raised on pedicels 1′ long. White Mountains. 2–3′. July.


ORDER XCV. CONVOLVULACEÆ. BINDWEEDS.

Chiefly twining or trailing herbs, sometimes parasitic, sometimes shrubby. Leaves (or scales when leafless) alternate. Flowers regular, pentamorous and 5-androus. Sepals imbricated. Corolla monopetalous, 5-plaited or lobed, convolute in bud. Ovary free, 2- (rarely 3-) celled or falsely 4-celled, or of 2 distinct, 1-ovuled pistils. Capsule 2–6-seeded. Embryo large, coiled in mucilaginous albumen. Figs. 48, 65, 81, 82, 200–10, 262.

III. CUSCUTINEÆ. Leafless, twining, orange-yellow parasites..................CUSCUTA. 11
H. DICONDREÆ. Leafy. 2 distinct ovaries with 2 distinct styles..................DICONDRA. 10
L. CONVOLVILOÆ. Leafy. Ovary 1. Capsule dehiscent. Seed-lobes leafy...1
a Styles 2 or 3, distinct or nearly so. Stamens included...2
b Ovary and pod 4-celled.—c Stamens exerted. Flowers small..............QUAMOCLIT. 1
—c Stamens included. Flowers large..................BATATAS. 3
b Ovary and pod 3-celled. Stigma capitate, granulate..................PHARBITIS. 3
b Ovary and pod 2-celled...4
  d Stigma 1, capitate.—e Stamens included..................IPOMÈA. 4
—e Stamens exerted. Flowers small..................CALONXYCATION. 5
d Stigmas 2,—x ovate, flattened. S. Fla..................JACQUIMONTIA VIBLACENT. 5
—x linear-terete. Calyx not bracted..................CONVOLVULUS. 6
—x oblong-terete. Calyx in 2 large bracts..................CALYSTEGIA. 7
Z Styles each bifid. Peduncle very short..................CYCLAMEN. 8
Z Styles each simple. Peduncles longer than the leaves..................STYLIUM. 9

1. QUAMOCLIT, Tourn. CYPRESS-VINE. Sep. 5, most yellow. Cor. tubular-cylindric, with a salver-form border. Sta. exerted. Style 1, stigma capitate, 2-lobed. Ov. 4-celled, cells 1-seeded. S From Tropical Am.

1 Q. vulgāris Choisy. Cypress-vine. Lvs. pinnatifid to the midvein, segm. linear, parallel, acute; ped. 1-flwd.; sep. ovate-lanceolate; cor. scarlet. An exceedingly delicate vine, in gardens, and often escaped S. July, Aug. §

2 Q. cocceîna Mecch. Leaves cordate, acuminate, entire or angular at base; ped. elongated, about 5-flowered; calyx awned; flowers light scarlet, limb nearly entire ½ broad. Along rivers S. and W. June–Aug. §

1. **B. littoralis** Chois. Creeping, sending out runners; lvs. smooth, thick, sinuate with 3–5 rounded lobes and cordate at base; ped. 1-flowered, as long as the leaf; sep. abrupt-pointed; seeds tomentous; corolla white. 2. Coast sands, S. Aug.—Oct.

2. **B. macrorhiza** Wood. Creeping or twining; lvs. cordate, lobed or entire, soft-downdy beneath; ped. 1-5-flowered, shorter than the leaves; cor. purple; seeds villous. 2. Sands, S. C.to Fla. Root very large. (Ipomoea Michauxii Swt.)

3. **B. édulis**, *Sweet Potato*. Lvs. 3-5 lobed or angled, lobes acute; ped. 3-5-flowered, as long as the petals. 2. W. Indies. Extensively cult. for its sweet tubers. Purple.


1. **P. purpúrea** Wood. Twining stem clothed with reversed hairs; lvs. cordate, entire; ped. 2-5-flowered; corolla large, dark purple, varying to blue, flesh-color, &c., appearing in long succession, in fields and gardens. June, July. §

2. **P. Nil** Chois. Some hairy; leaves cordate, 3-lobed; ped. 1-3-flowered, shorter than the petals; sepals ovate, long-pointed, corolla tube white, border indigo (nil) blue. Gardens, and in fields. July, Aug. §

3. **P. Hederáceae**, from S. Am., differs from *P. Nil* in the middle lobe of its lvs., which is ovate, and contracted at base; ped. 1-flwd.; cor. 2' or more broad, varying in purple and blue, blue and white, pink and white, &c.—The hybrid *P. Limbata* has a purple star with a white border and leaves scarcely lobed.

4. **P. Leárh**, from Mexico, has ped. longer than the cordate, velvet-silky leaves, each bearing a cluster of magenta-blue-red flowers. Greenhouse. 24. 10—15f.

4. **IPOMÉEÆ**, L. Cal. 5-sepalled. Cor. bell-funnel-form. Sta. included. Style 1, stigma capitata. Ov. and capsule 2-celled, cells 2-seeded.—Herbs, shrubs, or trees. Our species are herbs creeping or climbing.

* Flowers capitata, involucrata, small, blue. Sepals hairy.....................No. 1
* Flowers separate.—a Sepals bristly ciliata, capsules somewhat hairy......Nos. 2, 3
— a Sepals glabrous.— b Flowers purple. Maritime.....Nos. 4, 5
— b Flowers white, rarely yellow...Nos. 6-8


2. **I. commutatà R. & S.** Smoothish; lvs. cordate, entire or 3-lobed; ped. as long as the petals; flowers 2—5, purple to pink, 15"; sep. 5". 1. Fields, S. July—Oct.

3. **I. lacunósà L.** Puberulent; lvs. cordate, entire or angular-lobed; ped. as long as the petals; flowers 1—3, white, with a purplish rim, 1', sepals as long. 1. Dry fields and hills, Penn. to Ill., and S. 2—6f. August, September.

4. **I. Pes-Capric Sw.** Roughish; leaves roundish, emarginate or 2-lobed, thick; ped. as long as the petals; fls. 1—5, purple, 3' long. Coasts of Ga. and Fla. June+

5. **I. sagittifólia (Mx.)** Glabrous; lvs. cordate-sagittate; ped. as long as the petiole, much shorter than the one large (3') purple flower. 2. Marshes, S. June+

6. **I. sinuátà Ort.** Lvs. palmately 7-cleft, varying to sinuate-lobed; segments pinna-tifid; ped. 1- or 2-flowered; corolla white, 1'. 2. Ga., Fla. 20f. July—October.

7. **I. ciliátà Pers.** Leaves cordate, entire, acuminate; ped. 1-flowered, 2-bracted above; corolla large, yellow; sepals 8's long. 2. N. Car. and Tenn.

1-5-flowered, longer than the pediole; sepals 1⁄2 as long as the corolla; corolla 3', white with a purple centre. 24. N. Y. to Ill., and S. July, August.

5. CALONÝCTION speciósus (or Ipomēa Bona-nox), GOOD-NIGHT, is a tall climber of the W. Indies and S. Fla., often cultivated in the greenhouse. Flow- ers 4–7 on each long peduncle, very large, funnel-form, white.

6. CONVÔLVULUS, L. Bindweed. Sep. 5. Cor. bell-form. Style 1. Stigmas 2, thread-form, often revolute. Ovary and capsule 2-celled, 4-seeded.—Herbs or shrubs, twining or erect.

1. C. arvénsis L. Prostrate or climbing; leaves arrow-shaped to ear-shaped; ped. bearing 1 small rose-white flower and 2 bracts. 24 Fields; rare. June. §

2. C. trîcôlor. Stem weak, 1–3f high; leaves lance-ovate, sessile, shorter than the 1-flowered ped.; corolla yellow in centre, white next, border blue. (1) Europe.

7. CALYSTÈGIA, Br. Calyx 5-parted, included in 2 leaf-like bracts. Cor. bell-form, 5-plicate. Style 1. Stigmas 2, obtuse. Capsule 1-celled, 4-seeded.—Herbs, with the flowers solitary.

1. C. spîthamea Br. Erect or assurgent, 6–9' (a spans) high; leaves lance-oblong, as long as the peduncles; flowers white. 24 Can. to Penn., and W. June.

2. C. Ŝêpîlûm Br. Rutland Beauty. Glabrous, twining; lvs. cordate-sagittate, lobes truncate; bracts cordate; flowers many, large, white with a reddish tinge. 24 Hedges, thickets, Can. to Flá. 6–10'. May–July.

β. Catesbîiâna. Pubescent, with small leaves and short peduncles. S. y. û. paradoûa. Tomentose; bracts linear, remote from the flowers. (Pursh.)

8. EVÔLVULUS, L. Sep. 5. Cor. bell-, funnel-, or wheel-form. Sty. 2, each bifid. Ovary and capsule 2-celled, 4-seeded.—Herbs diffuse.

E. sericeus Swtz. Stem dividing at base into simple, filiform, procumbent branches; leaves lance-linear, sessile, 3-veined, silky beneath, 9'; ped. 1–2'', 1-flowered; corolla wheel-form, 5'', white. 24 Prairies, Ga., Flá., to La. 1f.


1. S. humîstrâta (and aquática) Walt. Hairy or smoothish; leaves oval, oblong, or linear, obtuse or retuse both ways, on short pediole; ped. longer than the leaves, 3 (1–5)flowered; bracts minute; styles less than 1 united; corolla 6–9', white. Sandy soils, Va. to O., and S. 2–5f. Lvs. 12–18'. (S. evoluloides Choisy.) Jn.–Sept.

2. S. Pickeringli (Torr.) Leaves linear, narrowed to subsessile base; bracts leafy, equaling the flower; styles more than 1 united, otherwise as No. 1. N. J. to N. C.


D. repens Forst. Lvs. round-cordate or reniform, the petiole longer than the blade or the 1-flowered peduncles; calyx villous, larger (3') than the whitish corolla (2'). Wet grounds, S. 3–12'. March—May.

11. CUSCUTA, Tourn.Dodder. Fls. 5-(rarely 4-)parted. Corolla globular-bell-form. Sta. appendaged with scales or fringes at base. Styles 2. Caps. 2-celled, 4-seeded. (1) Stems yellow to orange, thread-form, with minute scales for leaves, twining against the sun and living on other plants.

§ Stigmas filiform as well as the styles. Capsule regularly circumscissile.... . No 1

§ Stigmas capitate. Capsule indehiscent or bursting irregularly...(*)
\* Sepals distinct, with imbricated bracts added. Flowers sessile... Nos. 2, 3
\* Sepals united, bracts few and scattered. Flowers pedicellate...(d)
  a Corolla cylindrical, withering on the top of the capsule........ Nos. 4—6
  b Corolla bell-shaped, persistent at the base of the capsule...(b)'
  b' Lobes of the corolla acute or acuminate.......................... Nos. 7, 8
  b Lobes of the corolla obtuse........................................... Nos. 9—11

1 C. Epilinum Weih. Flax D. Fls. sessile in small, dense, remote beads; calyx 5-parted, scarcely shorter than the globular corolla or capsule. Flax fields. Jn. § Enr.

2 C. glomeratæa Chosy. Fls. in compact masses surrounding the foster stem while its own filiform stems decay; sepals 1", with many squarrous bracts; corolla white, 2", tubed-bell-form, 5-lobed. On the Composite, &c., W. and S.

3 C. compacta Juss. Fls. in large (1—2') masses, with thick stems; sep. and 3—5 bracts minute (4'); cor. slender, with 5 oblong lobes. N. Y., W. and S., on shrubs.

4 C. tenuiflora Eng. Pale, much branched, on high plants; fls. short-pedicelled; cor. tube slender, twice longer than the calyx or its own short obtuse lobes; capsule often but 1- or 2-seeded. Wet grounds, N. J., Pa., to Ill., and W.

5 C. indéxa Eng. Fls. pedicelled, mostly 4-parted; cor. flabby, its lobes erect and inflexed, margins crenulate; capsule brown, capped with the dead corolla. Prairies and open woods, Ill. to Va. and Ga. On Hazel, Rhus, &c.

6 C. decóra Chois. Fls. pedicellate, 5-parted, large (1'), flabby, white; cor. broad-bell-form, lobes acute; capsule enveloped by the dead corolla. Wet, Ill. to Fla.

7 C. chlorocarpæ Eng. Low, branching, orange; fls. 4-parted, short-pedicelled, 1", bell-form, the lobes of cal. and cor. acute; caps. large, greenish. Wis. to Del., & S.

8 C. arvénis Beyr. On low plants; flowers small (1''), 5-parted, pedicellate; corolla tube shorter than its pointed lobes, or the rounded sepals. N. Y. to Ill., and S. Jn., Jl.

9 C. obtusiífóra H. B. K. Low, bright orange; fls. pedicellate, dotted with red glands (β. glandulosa); sep. round-obtuse; caps. 1'/4. Mostly on Polygonum. Ga., S. and W.

10 C. Grónovill Wild. Stems thick, often high-climbing; fls. mostly 5-parted, at length densely panicled; corolla tube bell-form, longer than the calyx, its lobes obtuse, entire, spreading. Common in all the country. Flowers 1'/4.

11 C. rostráta Shutt. Fls. large (2—3''), in loose cymes; corolla deep bell-form, lobes obtuse; capsule 2—3', with a 2-pointed beak. Mountains, Md. to S. Car.

**Order XCVI. SOLANACEÆ. Nightshades.**

*Plants* herbaceous, rarely shrubby, with a colorless juice and alternate leaves often in pairs. *Flowers* mostly regular, often extra-axillary, 5-parted, on bractless pedicels. *Corolla* valvate or plicate in the bud, and often convolute. *Calyx* persistent. *Stamens* 5, adherent to the corolla tube, alternate with its lobes; anthers 2-celled. *Fruit* a 2-(rarely 3- or more) celled capsule or berry. *Seeds* ∞, with a curved embryo in fleshy albumen. Figs. 66, 113, 168, 360, 483-4.

1 § NOLANE. Ovaries few or ∞, distinct, simple. Corolla funnel-bell-form.............. NOLANA.

2 § SOLANE. Ovary 1, compound, 2-(or more) celled...(*)
  a Corolla wheel-form, the tube very short. Anthers convergent...(b)
  a' Corolla bell-form, the broad including the erect anthers...(c)
  b Corolla funnel-form, tube long and—c the limb somewhat unequal...(d)
  b' Stamens connate, opening by slits inside. Berry tortuous........................... Lycopersicum.
  c Stamens connivent, opening by terminal pores. Berry round...................... SOLANUM.
  b Stamens connivent, opening by slits. Berry dryish, angular....................Capsicum.
  e Corolla bluish. Berry dry, enclosed in the enlarged calyx...................... Nicandra.
  e Corolla yellowish. Berry juicy, enclosed in the enlarged calyx.................. Physalis.
  c Corolla purplish. Berry blackish, sitting on the open calyx........................ Atropa.
1. NOLANA, L. Calyx 5-parted. Cor. showy, funnel-bell-form. Ovaries 3—40, distinct, 1—6-celled, becoming as many drupes around the base of the style. $\frac{2}{3}$ From S. America, with blue flowers.

1 N. atriplicifolia. Stems procumbent; leaves thick, entire, ovate to spatulate, obtuse; flowers solitary, supra-axillary, with a yellow tube, azure-blue border, and white zone, numerous all Summer.

2 N. prostrata. Leaves ovate-oblong, tapering both ways; calyx segments triangular, scarlet, with dark-purple streaks. Otherwise as No. 1.


L. esculentum Mill. Hairy; st. herbaceous, weak; lvs. unequally pinnatifid, segments cut; corolla many-lobed; fruit turgid, furrowed, smooth. A coarse, strongly-scented herb with yellowish flowers and splendid fruit.

3. SOLANUM, L. POTATO. Calyx 5-parted, persistent. Cor. rotate, subcampanulate, tube very short, limb plicate, 5-cleft, lobed or angular. Anth. erect, connivent, distinct, opening at the top by 2 pores. Berry 2-celled, subglobose or depressed. Seeds ∞.—Herbs or shrubs. Peduncles terminal, becoming lateral by the extension of the axis. Figs. 260, 483—4.

§ Prickles none. Anthers obtuse... (a)

a Herbs, with the flowers and fruit in clusters...
   Nos. 1, 2
a Shrubby climbers, with clustered flowers and fruit...
   Nos. 3, 4
a Shrubs erect, with orange or scarlet berries...
   Nos. 5, 6

§ Plants armed with prickles. Anthers linear-oblong, pointed... (b)

b Flowers 5-parted. Calyx open in fruit. Anthers equal...
   Nos. 7—9
b Flowers 5-parted. Calyx closed on the fruit. Anthers unequal...
   Nos. 10, 11
b Flowers 6—9-parted. Calyx open with the large fruit...
   Nos. 12, 13

1 S. tuberosum L. Common Potato. Subterranean branches bearing tubers; leaves pinnatifid unequally and interruptedly; corolla 5-angled, ped. jointed. S. America. Cultivated since the 17th century. Many varieties.

2 S. nigrum L. Nightshade. Smoothish; leaves ovate, toothed, wavy, or entire; umbels lateral, drooping, flowers small (2—3'), whitish; berries black, as large as a peppercorn. Weed in old fields. 2—3f. Summer. § Europe.

3 S. dulcamara L. Bittersweet. Stems shrubby, slender, climbing; leaves cordate, entire or with 1 or 2 pairs of lobes at base; clusters terminal and lateral, corolla purplish, with 5 green spots; fruit red. July. § Europe.

4 S. jaeminoideae. Climbing high, smooth, lvs. ovate, entire; clusters blue-wh. Brazil.

5 S. pseudo-Capsicum. Jerusalem Cherry. Erect, like a dwarf tree; leaves oblong-lanceolate, smooth, shining; flowers solitary, white, berries scarlet, as large as cherries. Mauritius. 2—4f. Handsome.

6 S. laciniatum. Shrub erect, smooth; lvs. pinnatifid; fls. blue; fr. orange. Australia.

8 S. Virginiiänum L. Hairy and prickly; leaves deeply pinnatifid with angular-sinuate lobes; flowers pale-violet, 15", in leafy racemes. Va., and S. July.


10 S. rosträtüm. Hoary-tomentous and very prickly; leaves doubly sinuate-lobed; flowers yellow, 12–15"; fruit closed in the burr-like calyx. 1 Kansas.

11 S. heterodööüm. Very hairy and prickly; leaves doubly pinnatifid, lobes runcinate; flowers violet-blue. 1 From Texas. Fruit black.

12 S. Melöngeña (or esculentu). Egg Plant. Prickly; 1vs. ovate, wavy or sinuate; flowers violet; fruit very large, glossy-purple, prized as a great delicacy. E. India.—A variety has white fruit exactly imitating a goose-egg.

13 S. Texänüm. With scarlet fruit depressed-globous and lobed. From Tex. Mex.


C. ánnum. Red or Cayenne P. Herb with angular, branching stem, smooth ovate entire leaves and large roundish or lance-form red fruit. 1 Many varieties.

5. NICÁNDRA, Adans. APPLE OF PERU. Cal. 5-cleft, 5-angled, the angles compressed, sepals sagittate. Cor. campanulate. Sta. 5, incurved. Berry enveloped in the persistent calyx. 1 Peruvian. Summer.

N. physaloidës Adans. Herb smooth, with ample ovate-oblong, sinuate-angled 1vs.; flowers solitary, axillary, white, with blue spots. Gardens and fields. 2–5f. §

6. PHYŚALIS, L. GROUND CHERRY. Calyx 5-cleft, persistent, at length inflated. Cor. bell-rotate, tube very short, limb obscurely 5-lobed. Sta. 5, connivent. Berry globous, enclosed within the 5-angled calyx.—Herbs (rarely shrubs) with angular branches. Leaves alternate or unequally twin. Flowers solitary, nodding, extra-axillary, all Summer.

§ Anters yellow. Ped. elongated. Fruit edible, not filling the calyx... (a)
   a Corolla yellow with brown-purple in the centre.............................Nos. 1–3
   a Corolla yellow in centre as well as border.................................Nos. 4, 5
§ Anters blue or violet. Ped. shorter than the petals...(b)
  b Peduncles near 1' long. Berry not filling the closed calyx..................Nos. 6–9
  b Peduncles 2–3' long. Berry filling the open calyx..............................No. 9

1 P. viscösä L. Viscid-pubescent, diffuse; leaves ovate to oblong, mostly abrupt at base and bluntly toothed; corolla 8–10", fruiting-calyx 15'. 2 Dry soils. 1f.

2 P. Pennsylvánica L. Puberulent, decumbent; leaves ovate to lanceolate, re-pand-toothed or entire, base obtuse or acute; corolla slightly spotted, 6–8"; fruit-calyx rounded, 1'. 2 Dry soils, Penn., S. and W. 6–15'.

β. lanceolate. Pubescent; leaves tapering and acute both ways. S.

3 P. angustifölia N. Glabrous; leaves lance-linear, entire, thickish; fruit-calyx wing-angled, 1'; corolla 10–12". 2 Wet sands, Fla. 6–12'.

4 P. nyctaginëa Dun. Pubescent; leaves small, elliptic-ovate, blunt-toothed; calyx hairy; corolla small (5–6"), wholly yellow. South. 6–12'.

5 P. Alkekëngi L. Strawberry Tomato. Pubescent, erect; leaves deltoid-ovate, acuminate, re-pand; calyx reddening in fruit. 2 Gardens and fields. 1–2f.
6 P. pubéscens L. Viscid-tomentous, decumbent; leaves ovate or cordate, base unequal, repand; corolla spotted, 6"; fruit-calyx 5-angled. ① Damp. S. and W. 9-18'.

7 P. angulata L. Smooth, erect; lvs. ovate to oblong, acutely toothed; cor. small (3-6''); fruit-calyx ovoid-conic, longer than its stalk. ① Dry fields.

8 P. Linkiana Nees. Smooth, diffuse, 2f or more; leaves lance-oblong, attenuated both ways, subulate-toothed; corolla 6'; fruit-calyx 14'. ① S. C., Ga. (Dr. Feay).

9 P. Philadelphica Lam. Smoothish, erect; lvs. obliquely ovate, pointed, angular-repand; corolla 9', spotted and striped; berry large, red. ① M. and W. +

7. ĀTROPA, L. DEADLY NIGHTSHADE. Calyx 5-parted. Cor. campanulate, limb 5-cleft, valvate-plicate in bud. Stam. 5, distant, include l. Berry globose, 2-celled, sitting on the enlarged calyx. 24 Herbs of lurid colors. Leaves often twin.

A. Belladônna.—Europe. Leaves ovate, entire, large. Berries dark-purple. handsome but poisonous, like the whole plant. Medicinal.


H. niger L. Branched, very leafy, viscid-hairy and fetid; leaves sinuate-lobed, clasping; corolla straw-color, netted with purple, in one-sided spikes. ③ In old fields, and rubbish. 2f. Poisonous—medicinal. July.

9. PETUNIA, Juss. Cal. segments oblong-spatulate. Cor. funnel- or salver-form, tube cylindric, limb spreading, slightly unequal. Sta. 5, inserted in the middle of the tube, unequal, included. Caps. 2-celled. Seeds minute. South American herbs. Leaves alternate, entire, the floral twin. Flowers solitary, large, all Summer. Fig. 66.

1 P. NÝCTAGINIFLÓRA. Erect, diffusely branched, viscid-hairy; flowers white, tube slender, thrice longer than the calyx, limb spreading 14-9'. ②

2 P. VIOLÁCEA. Prostrate at base, then erect, viscid-hairy; flowers violet-purple, tube inflated, twice longer than the calyx. By admixture numerous varieties, single, double, striped, &c., are raised.


N. gráccis. Stems very slender and much branched; lvs. linear to spatulate; flowers 1' or more, white, lilac, purple, with a yellow eye.

11. LÝCIUM, L. MATRIMONY VINE. Cal. 2-5-cleft. Cor. tubular, bell- or funnel-form, 4- or 5-lobed. Sta. 4 or 5, exserted. Berry 2-celled, seeds several. ½ ½ Often spiny. Leaves alternate, entire, often clustered. Flowers small, solitary or in pairs.

L. Bárbarum L. Branches spiny, slender, pendulous or climbing; leaves lanceolate; corolla greenish-purple, 5-parted; calyx 3- or 4-toothed; berries small, orange-red. From Barbary. Planted for arbors walls, &c.
2 L. Carolinianum Mx. Branches rigid, spiny, upright; lvs. fleshy, club-shaped, clustered; flowers small, 4-parted, purple. Salt marshes, S. 3f.

12. DATURA, L. Thorn Apple. Calyx large, tubular, inflated, deciduous, or spathe-form. Cor. funnel-form, limb plicate in bud, with 5 or 10 cuspidate angles. Sta. 5. Caps. 2-celled, 4-valved, cells 2-parted. 15 Coarse, fetid, poisonous, with large, often handsome flowers. Fig. 108.

§ Calyx deciduous, its base persistent. Flowers suberect. 1...  (a)

a Limb of the corolla 5-toothed. Pods erect. Nos. 1–3

a Limb of the corolla 10-toothed. Pods drooping. Nos. 4, 5

§ Calyx persistent, splitting and spathaceous. Flowers erect. 1.  Nos. 6

§ Calyx persistent, often splitting. Flowers pendulous. Tree-like Nos. 7–9

1 D. Stramonium L. Jimson Weed. Stem forked; lvs. large, ovate, with unequal sides and angular teeth; corolla cream-white, 2' long. Waste grounds. 3f.  §

β. Tatuila. Stem purple; flowers bluish-white; stem 5–4f. S. and W. §

2 D. quercifolia. Leaves sinate-pinnatifid; flowers white, 5' broad. Mexico. 2f.

3 D. Fastuosa. Stem dark purple, with whitish, shining dots; lvs. lance-ovate; cor. violet without, white within, single or double, 7' long. 1 Egypt. Splendid.

4 D. Metel. Villous-pubescent; lvs. ovate; flowers white, 4' broad. Mexico. 3–4f.

5 D. Meteloides. Smoothish, slender; leaves ovate-oblong; flowers pure white or tinged with blue, 5' broad. Very fine. From Mexico.

6 D. Cerratocaula. Stem terete, thick, purple; leaves lance-ovate; corolla thrice longer (5–7') than the calyx, tube incurved, limb 10-toothed. Cuba.

7 D. arborea. Leaves lance-ovate, downy; calyx spathaceous, entire; corolla 8–10' long, white, green-veined; anthers distinct. Peru. Flowers often double.

8 D. suaveolens. Leaves ovate-oblong, entire; calyx 5-toothed; corolla 9–12' long, sweet-scented, white; anthers cohering. Mexico.

9 D. sanguinea, has flowers 8' long, limb red, tube yellow, with purple veins. Peru.

13. NICOTIANA, Tourn. Tobacco. Calyx urn-shaped, 5-toothed. Cor. funnel-form, 5-lobed. Sta. 5. Caps. 2-celled, 2–4-valved. 1 Coarse narcotics, with large, entire leaves and terminal fls. Jn.—Aug. Fig. 113.

1 N. rústica L. Viscid-pubescent; lvs. petiolate, ovate; corolla tube cylindric, lobes round-obtuse, greenish-yellow. Weed in N. Y., &c. 1–14f. §

2 N. Tabacum. Virginia T. Viscid-pubescent; leaf lanceolate, sessile and decurrent; corolla tube inflated in throat, lobes acute, rose-color. 4–6f.

3 N. Longiflóra. Branches spreading; upper leaves sessile, cordate-lanceolate; flowers racemced, white-purple-yellow, tube slender, 4'. Hardy South.

14. CESTRUM, L. Calyx often colored, 5-cleft. Cor. tubular-funnel-form, tube clavate, limb 5-cleft or 5-parted, plicate in bud. Sta. 5, included, adnate to cor. below. Style 1. Berry few-seeded. 7 S. American, with entire leaves and brilliant flowers in clusters, fragrant.

§ Habrothámus. Corolla clavate, red or purple, limb suberect.... Nos. 1, 2

§ Eucéstrum. Corolla club-funnel-form, yellow-orange, limb spreading.... Nos. 3, 4

1 C. Élegans. Lvs. lance-ovate; corolla purple, shining, 9' ; calyx purple, 3'. 5–6f.

2 C. Fasciculátum. Lvs. broad-ovate; corolla scarlet, 9'; calyx reddened, 3'. 5–6f.

3 C. Aurantiacum. Leaves lance-ovate; corolla tube inflated, orange-colored, 5'. 4f.

4 C. Parqui. Leaves narrow-lanceolate; corolla dull yellow, 6', tube terete.

15. FABIÁNA IMBRICATA, Ruiz & Pav., is a fine little shrub resembling a Tamarix, with small (6' long) ovate leaves covering the numerous branches, and small violet-white flowers. 7 Chili.
Order XCVII. GENTIANACEÆ. Gentianworts.

Herbs smooth, with a colorless, bitter juice, with entire, exstipulate leaves. Flowers regular, mostly centrifugal in inflorescence and convolute in the bud. Calyx persistent. Corolla withering, its lobes alternate with the stamens. Ovary free, 1-celled, with 2 more or less projecting parieta. Fruit a 2-valved, septicidal, co-seeded capsule, rarely baccate. Seeds with a minute, straight embryo in the axis of fleshy albumen. Fig 140.

I. GENTIANACEÆ. Corolla convolute (in No. 8 imbricate) in the bud. Leaves opposite... (b)

II. MЕНYANTHEÆ. Corolla valvate-induplicate in the bud. Leaves alternate or radical... (a)

a Petals beardless or nearly so. Leaves simple, floating. Limnanthemum. 10

b Sepals only 2. Corolla 4-parted, tubular-campanulate. Obolaria. 8

b Sepals as many as the petals, more or less united... (c)

c Corolla lobes furnished each with a spur in the middle of the back. Helenium. 7

c Corolla lobes furnished each with a large central gland. Frasera. 6

c Corolla lobes plain, without spurs or glands... (d)

d Leaves reduced to scales. Corolla deeply 4-parted. Bartonia. 5

d Leafy.—e Style none, stig. sessile. Corolla tubular. Gentiana. 4

—e Style present.—z Corolla tube longer than the limb. Erythraea. 3

—x Corolla tube shorter than the limb. Eustoma. 2

—z Corolla wheel-form, tube none. Sabinia. 1


§ LAPITHÉA. Corolla 7-12-(mostly 9)-parted, rose-red. Nos. 1, 2

§ SABBATIA proper. Corolla 5-(rarely 6)-parted... (a)

a Flowers white but —z paniculate or scattered. Nos. 3, 4

drying yellowish —x in a level-topped cyme. Branches opposite... Nos. 5, 6

a Flowers rose-red.—b Branches opposite... Nos. 7, 8

—b Branches alternate... Nos. 9, 10

1 S. chloroides Ph. Simple or forked; flowers 1—5, pedunculate, 20'; petals ob lanceolate, 10'; sepals linear-spatulate, 6'; leaves lanceolate to oblong. Wet grounds, Plymouth, Mass., R. I., and S. 1—2f. ①

2 S. gentianoides Ell. Strict, subsimple; leaves linear, exceeding the internodes; flowers sessile, 2-bracted, solitary, or several together; petals obovate, 10'; sepals lance-subulate, 4'. Wet barrens, Ga., Fla., and W. 1—2f.


3 S. calycosa Ph. Rigid, divaricately-forked; flowers few, distant; sepals ob lanceolate (5—8') as long as the petals; leaves oblong, 3-veined. Va., and S. 1f.

4 S. paniculata Ph. Stem much branched, terete, with 4 thread-like ridges branches mostly opposite; leaves small, oval, oblong to linear; panicle diffuse; sepals subulate, 3'; petals 6'. Low grounds, Va., and S. 1—2f.

β. Elliottii. Branches alternate; leaves mostly linear; petals 7 or 8'.

5 S. laceolata (Walt.) Corymbously-branched and 4-angled above; leaves ovate to lanceolate, 3-5-veined; flowers 6-parted, 1' broad. Barrens, N. J. to Fla. 2f.

6 S. macrophylla Hook. Stem terete throughout, corymbed at top; leaves crenated, thick, ovate, acuminate, 3-5-veined; flowers small (4' broad). Fla., La.

7 S. angulæris Ph. Stem with 4 winged angles. corymbose-panièled; leaves ovate, 5-veined, clasping; flowers 15—18' broad, with a greenish star. Wet meadows, N. Y. to Ill. and S. 10—18'.

8 S. brachiatæ Ell. Stem obtusely 4-angled, panièled; leaves lance-linear to linear.
lowest ovate; flowers 15", the star purple, bordered with green; petals oblong-ovate, obtuse. Prairies, Ind. to Va., and S. 1f.

9 S. gráccis Salsich. Very slender, diffuse; leaves oblong to linear-filiform; flowers distant; pet. elliptic, obtuse, 5", sep. filiform, 4". Wet, Mass. to Fla., and La. 2f. ß. stelláris. Suberect, the flowers larger (18" broad), the star yellow.

10 S. campestrís. Low (6-10"), erect; lvs. ovate to oblong; fls. few, 15" broad, the star yellow; calyx tube 5-winged; sepals as long as the broad petals. La.

2. EÚSTOMA, Don. Calyx 5- or 6-parted, with subulate segments. Cor. wheel-funnel-form, 5-6-parted. Sta. shorter than the style.—Herbs glaucous, with few large splendid blue flowers.

1 E. Russellìanum. Stem 1-2f, forked; lvs. ovate, cuspidate, subconnate; fls. long-stalked, expanding 3-4', petals oval. ① Ark. (Mr. Robertson).

2 E. exaltátum, taller, with flowers 2' broad, grows in S. Fla. (Chapman).

3. ERYTHRÉA, Renealm. Calyx 5-4-parted, angular. Cor. funnel-form, 5-4-parted, tube slender. Anth. 5-4, exserted, spirally twisted. Style slender. ① Stem squarish, 8'-10'. Leaves connate at base.

1 E. ramoáissíma, ß. Muhlenbergií (Griseb.) Stem 1-3-times-forked into a loose cyme; leaves ovate-oblong; flowers pedicellate, bright purple, 4". L. Is. to Va.: rare.

2 E. spícáta Pers. Stem forking, erect; leaves oval to lanceolate; fls. sessile, 8", spicate on the long branches, rose-white. Nantucket to Md. § Europe.

3 E. Centaurírum Pers. Erect; lvs. oblong, acutish at each end; flowers subsessile in the loosely corymbed cymes, rose-purple, 6". Oswego, N.Y. August. §

4. GENTIANÁ, Tourn. GENTIAN. Calyx 5- or 4-parted or entire. Cor. tubular, limb 5- or 4-cleft, closed or open. Sta. 5 or 4. Stig. 2, style 0 or very short. Capsule oblong, 1-celled, seeds numerous and minute.—Herbs with showy flowers in August to October.

§ Fls. 4-parted, fringed, sky-blue; no crown or folds. ① § Fls. 5-parted, blue, pedicellate, clustered; no fringe or folds. ① § Fls. 5-parted, corolla with folded appendages between the lobes. ① § Fls. ① a Flower solitary, terminal, somewhat stalked. Leaves linear.............No. 4 a Flowers clustered, sessile, - ß. ochroleucus or whitish.............No. 5, 6 - ß. blue; the corolla always closed.............No. 7 - ß. blue; the corolla open or expanding...Nos. 8-10

1 G. crínta Fréel. Fringed G. Stem and branches erect; leaves lanceolate, acute; petals obovate, finely fringed at margin. ① Moist soils, Can. to Ga., and W. 1f. A beautiful and interesting plant.

2 G. détoná L. Stem and few branches strict; leaves lance-linear; flowers solitary, long-stalked, petals crenate-ciliate. ① N. Y. to Wis. 1f.

3 G. quínqueflóra L. St. 4-angled; lvs. ovate to lanceolate, acute; fls. 7-8", pedicellate, clustered; sepals subulate, very short, or (in ß. parviflóra) lance-linear, 4"; corolla segments bristle-pointed. ② Fields and woods. 1f.

4 G. augústifólia Mx. Slender, erect; fl. 18-20" long; lvs. linear; sepals linear, 7-10"; corolla blue, lobes ovate, the cleft folds much shorter. N. J. to Fla. 1f. ß. virídísima. Flower nearly sessile, 15", greenish white, folds very short. S.

5 G. ochroleúcá Fréel. Lvs. smoothish, oval to elliptical, acutish both ends; calyx segments lance-linear, nearly equalling the 20" corolla. Pa. (Prof. Porter) to Fla. 1f.

6 G. alba Muhl. Very smooth, stout; lvs. lanceolate, the broad base clasping; fls. 2' long, calyx segments ovate, very short. Woods, prairies, M. and W. ①-2f.

7 G. Andréwsii Griseb. Closed Blue G. Simple, smooth; leaves oval-lanceolate;
cluster dense, terminal; calyx segments ovate-oblong, 3–4"; corolla 15", inflated, never opening, folds as long as segments. Wood, N. Eng. to Fl. 2f.

8 G. Saponària L. Subsimple, stout, smooth; leaves oblanceolate to lance-oblong, 3-veined; calyx segments linear, 6–8"; corolla 2", folds much shorter than the open erect lobes. N. J., Pa., to Ill., and S. 2f. Leaves 2–3'.

9 G. lineàris Wood. Simple, slender; lvs. lance-linear to linear, 1-(rarely 3)-veined; calyx segments subulate, 4–7"; corolla folds subentire, much shorter than the erect or spreading lobes. N. Eng. (rare) to Iowa and Ky. 1–14f. July–Sept.

10 G. pubèrula Mx. Slender, rough or puberulent; leaves 1', oval to ovate, very rough-edged, clasping, acute; calyx segm. lanceolate, 5"; corolla subcampanulate, 15", lobes very acute, folds short, cleft. Prairies, W. and S. 9–18'.

5. BARTÔNIA, Muhl. Screw-stem. Fls. 4-parted, persistent. Cor. subcampanulate, pet. slightly united. Stig. thick, some bifid. Sds. very ∞ and minute. 2. Slender, erect, with scale-like lvs. and small white fls.


2 B. tenéll a Muhl. Branched above, very slender, 5–12'; ped. opposite, erect, subequal, 4"; petals pointed, 1", sepals nearly as long. Wet. Mass. to Fl. Aug. 2. brachiàta. Pedicels bent outward and upward, some alternate. S.


7. HALÈNIA, Borkh. FELWORT. Flowers 4-parted, broad bell-form. Each petal prolonged at base into a spur, which is glandular at the end. Stigmas 2, sessile.—Flowers panicked.

H. defféx a Griseb. Erect, branched, lower leaves oblanceolate, upper lance-ovate, 3-5-veined; spurs slender, curved outward, half as long as the 4' greenish-yellow petals. 2 N. Eng. (rare) to Wis. 18'. Aug.


9. MENYÀNTHES, Tourn. BUCK BEAN. Cal. 5-parted. Cor. rotate or funnel-form, limb spreading, 5-lobed, villous within, no glands at the base. Stamens 5. Style 1, stigma bifid. Capsule 1-celled.—Bitter herbs, actively medicinal. Leaves trifoliate, nearly radical.

M. trifoliàta L.—In muddy places, Penn. to Cal., and N. 8–12'. Petioles long and round. Scapes bearing racemes of handsome, flesh-colored flowers. May.

10. LIMNÀNTHEMUM, Gmel. FLOATING HEART. Cal. 5-parted. Cor. rotate, each seg. with a glandular scale at base. Sty. short or 0, stig.
2-lobed. Caps. opening by decay. Stagnant water. Pet. long, bearing an umbel of small white fls. below the roundish leaf-blade, also oblong tubers.

1. **L. lacunosum** Griseb. Leaves small (1—2), smooth, round-reniform; seeds smooth and shining. N. Eng. to Fls. (Villafla lacunosa Vent.)

2. **L. trachyspermum** Gray. Lvs. large (3—5), dotted and pitted beneath; seeds muricate about the margins. Md. to Fls. and La. (Menyanthes, Mx.)

**Order XC VIII. Loganiaceæ.**

*Herbs or shrubs with opposite leaves, stipules between the petioles or at least a ridge, and with 4- or 5-parted regular gamopetalous flowers. Ovary superior, stigmas as many as the cells. Fruit a 2-celled capsule, or a 1-2-seeded drupe. Seeds winged or peltate, with albumen. Fig. 47.*

* Delicate, twining shrubs, with large yellow flowers. S..........................Gelsemium. 1
* Low herbs.—2 Flowers scarlet, tubular, with one style..................Spigelia. 2
* —2 Flowers small, white, 5-parted, in 1-sided racemes..................Mitreola. 3
* —2 Flowers small, white, 4-parted, in axillary cymes..................Polyfremum. 4


2. **Spigelia**, L. Pink-root. Calyx seg. linear-subulate. Cor. narrowly funnel-form, limb 5-cleft. Anth. 5, convergent. Caps. twin-lobed, few-seeded.—Herbs, with the flowers sessile in terminal spikes. Fig. 47.


1. **M. petiolata** T. & G. Branching; leaves ovate to lanceolate, tapering at base to a petiole; raceme loose-flowered. Va., and S. 1—2f.

2. **M. sessilifolia** T. & G. Nearly simple; leaves oval to elliptical, sessile, shorter than the internodes; raceme close-flowered. S. C. to Fls. 10—18.


**Order XC IX. Apocynaceæ. Dog-banes.**

*Plant with an acrid, milky juice, entire, exstipulate, mostly opposite Lvs.*
Flowers 5-parted, regular, the calyx persistent, the corolla twisted in aestivation. Stamens 5, with distinct filaments, anthers filled with granular pollen. Ovaries 2, distinct, but their stigmas blended into a head-shaped mass. Fruit 1—2 follicles, or capsular or baccate, with albuminous seeds.

§ Herbs erect, native.—\( a \) Corolla bell-form, white. Leaves opposite..........................\textit{Apocynum}. 1

\( a \) Corolla salver-form, blue. Leaves alternate..........................\textit{Amsonia}. 2

§ Half-shrubby, cultivated, trailing or erect. Corolla wide-spread.....................\textit{Vinca}. 3

§ Shrubs twining.—\( b \) Native. Flowers small, yellowish........................\textit{Forsteronia}. 4

\( b \) Cultivated. Flowers large, white..........................\textit{Echites}. 5

§ Shrubs erect.—\( c \) Leaves opposite or in 4's. Corolla yellow........................\textit{Allamanda}. 6

\( c \) Leaves opposite or in 3's. Corolla roseate..........................\textit{Nerium}. 7

\( c \) Leaves alternate. Flowers 3'/4. Fruit a drupe. S. Fla..........................\textit{Vallesia}.


1 \textit{A. androsemifolium} L. Leaves ovate; cymes terminal and lateral; cor. 3', with red stripes, tube longer than the calyx, lobes spreading. Hedges and fields. 3f. A handsome plant, smooth or downy.

2 \textit{A. cannabinum} L. Leaves oval to lance-oblong, often downy beneath; cymes terminal; corolla 1', tube not longer than the calyx, lobes erect. In shades. 2—4f Pods 3'/4 long. (A. hypericifolium Ait.)


1 \textit{A. Tabernæmontana} Walt. Leaves ovate-lanceolate, acuminate; sepals lance-acuminate; corolla 3'/4, vivid blue. Damp grounds, W. and S. 2f. May, June.—Varies with leaves lance-elliptic, and sepals acute.

2 \textit{A. ciliata} Walt. Leaves more or less crowded, linear or filiform, the margins ciliate; cluster long-stalked, corymbed, or soon panicked; corolla glabrous outside. Sands, S.: common. 1—2f. April, May.


\textit{F. diffîrîms} DC. Climbing; leaves round-oval to lance-oval, cuspidate-pointed; cymes axillary and terminal, stalked; calyx segments ovate, long-pointed; corolla 3—4'/4, pale yellow. Swamps, Va., and S. May—August.

4. \textit{Vinca}, L. Periwinkle. Cor. funnel- or salver-form, convolute, with the 5 lobes oblique, orifice 5-angled. Two glands at base of the ovary. Follicles 2, erect, slender. 3f. 3 Lvs. opposite. Flowers solitary, axillary.

1 \textit{V. minor}. Procumbent; leaves elliptic-lanceolate, not ciliate; sepals lanceolate; flowers scentless, violet, purple, or white. May, June. Europe.

2 \textit{V. major}. Decumbent; leaves ovate, ciliate at edges; sepals long, bristle-pointed. In shades, forming loose masses, leaves often silver-edged. Europe.

3 \textit{V. rosea}. Erect, soft-downy; leaves oval, obtuse; flowers large, roseate, often white or white-edged, perpetual. From Madagascar.
5. **ECHITES**, Br. Cor. funnel- or salver-form, not appended, lobes convolute, bearing the subsessile anthers in the throat; 5 glands at base of ovaries. Foll. 2, slender. Sds. comous. 5 Lvs. opp. (Mandevilla, Lindl.)

**E. suaveolens.** Climbing; leaves cordate-ovate, acuminate, shorter than the axillary or terminal racemes; flowers fragrant, 2'. S. America.

**E. umbellata** Jacq. and **E. Andréwsi** Chapm. are indigenous in S. Fla.

6. **ALLAMÁNDA** CATHÁRTICA. Shrub from Guyana, with slender branches, oblong thin-pointed leaves, and bright-yellow flowers 2'-3'. Cor. funnel-bell-form, lobes 5, rounded, throat appended. Ova. 1, becoming a pricky, 1-celled capsule.

7. **NÉRIUM**, L. **OLEANDER.** Corolla salver-form, convolute, throat crowned with 5 cleft scales. Anth. arrow-shaped, tipped with a long hairy bristle. 5 Lvs. lanceolate, acute both ways, thick and leathery, in 2's or 3's.

1 **N. OLEÁNDER.** Leaves lanceolate; scales of the crown each of 3 or 4 pointed unequal teeth; fls. clustered, inodorous, often double, 2'. Palestine. 5-10', very handsome.

2 **N. ODÓRUM.** Leaves linear-lanceolate; scales of the crown each 4-7-cleft; appendages of the anthers exserted; flowers fragrant. India.

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**Order C. ASCLEPIADACEÆ. ASCLEPIADS.**

*Plants* (chiefly herbs in the United States) with a milky juice, often twining. *Leaves* opposite (rarely whorled or scattered), without stipules, entire. *Flowers* generally umbellate, 5-parted, regular, the *sepals* and also the *petals* united at base, both valvate in aestivation. *Stamens* united, adherent to and covering the fleshy mass of the two united stigmas. *Pollen* cohering in masses. *Ovaries* 2, forming follicles in fruit.

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**Fig. 530.—1. Asclepias cornuti. 2. A flower, the petals and sepals reflexed, and the corona erect. 3. One of the segments of the corona with the horn bent inwardly. 4. A pair of pollen masses suspended from the glands. 5. A mature follicle. 6. Vertical section of P. phytolaccoides showing the two ovaries. 7. Lobe and horn of the corona.**

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§ Stems erect, leafy, herbaceous... (a)
§ Stems climbing, often shrubby... (c)
§ Stems low, leaves fleshy, all radical... **STAPELIA.** 13

a A little horn in each *hood* of the crown. Petals reflexed. **ASCLEPIAS.** 1

a No horns in the crown;—b Petals reflexed or spreading. **ACERATAS.** 2

—b Petals erect. **PODOSTIGMA.** 3
c Corolla salver-form, white, the crown in the bottom of the tube. **STEPHANOTIS.** 10
c Corolla wheel-form, flattish, the lobes spreading... (b)
c Corolla segments erect, crown 5-leaved,—d each leaflet 2-awned. **ENSLKENIA.** 4

—d leaflets awnless. **METASTELMA.** 5
1. **ASCLEPIAS**, L. **Milk-weed. Silk-weed.** Calyx and cor. segm. soon reflexed. Staminial crown of 5 distinct hoods (cucullate leaflets), each with a little curved horn from within. Anth. consolidated with the stig., forming a 5-angled truncate mass (antheridium), opening by 5 chinks. Pollen masses (pollinia) 5 pairs, hanging vertically by a pedicel from a cleft gland. Follicles 2, lance-shaped, seeds comous. 2+ Erect, with the flowers in simple umbels which are between the petioles or terminal. Jn.—Aug.

* Flowers whitish, greenish, or purple in various shades…(a)*
* Flowers orange-colored or scarlet. Leaves narrowly lanceolate……Nos. 15—17
  a Leaves ovate to lanceolate, narrowed to a petiole…(6)
  a Leaves ovate-oblong to cordate, sessile or clasping……Nos. 12—14
  a Leaves linear, very narrow…(x)*
* b Both crown and corolla greenish-purple. Pods woolly-spiny……Nos. 1, 2
  b Both crown and corolla pure purple. Pods smooth……Nos. 3, 4
* b Crown white; corolla white tinged with pink. Flowers small……Nos. 5—7
  b Crown white; corolla greenish-white.—C Umbels pedunculate……Nos. 8, 9
  —C Umbels subsessile. S.……Nos. 10, 11
* x Leaves all opposite, or rarely the highest alternate……Nos. 18, 19
  x Leaves mostly verticillate or scattered. Flowers greenish……Nos. 20, 21

1 **A. Cornúti** Desn. Leaves oblong-ovate, downy beneath, acutish at base and short-stalked, longer than the many-flowered umbels; hoods ovate; horns acute. Road sides and hedges. 2—4f. Leaves 5—8’. Flowers 6”.

2 **A. Sullivántif** Eng. Leaves ovate-oblong, smooth both sides, nearly sessile; hoods obovate; horns blunt; flowers 9”. Ohio to Ill. July.

3 **A. purpuráscens** L. Simple; leaves ovate to *elliptical*, acute mucronate; umbels subsolitary, terminal; peduncle 1—2’; pedicels 1’; horns horizontal. N. Eng. to N. Car., and W. 3—4f. Flowers large (6”), dark purple. Hoods lance-ovate.

4 **A. incarnáta** L. Branching above; leaves lanceolate; umbels many or few, some what panicked; flowers small (3’); ped. 1—2’. Wet places. 3—5f: common.  

* β. pulchra.* Hairy; leaves lance-ovale or -ovate. Very handsome.  

5 **A. ovállfólla** Desn. Low, downy; lvs. ovate, acutish; umbels subsessile, 10—15-flw’d.; pet. oval; hoods yellowish, obtu-e, longer than the horns. W. (A. Vaseyi C-B.)

6 **A. perénnis** Walt. Branched at base, half-shrubby, smooth; leaves thin, lanceolate, pointed both ways, long-stalked, exceeding the small white umbels; horns shorter than the horns. Low grounds, W. and S. 2f. (A. parviflora C-B.)

7 **A. quadrífólla** Ph. Simple, smooth; leaves ovate, acuminate, some of them in whorls of 4; umbels few, loose-flowered, long-stalked. Dry woods. 2f.

8 **A. variegáta** L. Simple, smoothish; leaves oval to lance-oval, short-pointed, acute at base; umbels densely *O*—flowered, small (1’—18’ diam.); hoods orbicular. 

* β. nívea.* Lvs. elliptical, pointed both ways; umb.10—15-flw’d. N. J., W. & S. 1—3f.

9 **A. phytołaccaídes** Ph. Tall, simple; leaves broadly ovate, pointed both ways, glaucous; umbels 8, with about 20 drooping fl’s.; peduncles and pedicels 1—3’ long; hoods truncate, with 4 unequal teeth; horns exerted. Damp shades. 4—5f.

10 **A. tomentósa** Ell. Woolly, stout; leaves lance-ovale, wavy, cuspidate; umbels lateral, with many large flowers; hoods obovate. truncate. Barrens. S.
11 A. obovata Ell. Tomentous; leaves obovate, obtuse, mucronate; umbels 10-14-flowered, lateral; fls. large, yellowish-green; hoods elongated. Gravels, Ga., Fla.
12 A. rubra L. Simple, glabrous; lvs. ovate, long and acutely pointed, subsessile; umbels panicked above, few; flowers red-purple; hoods acute, some longer than the slender exserted horns. Barrens, N. J., and S. 2-3f. Leaves 3-5'.
13 A. obtusifolia Mx. Simple, smooth; leaves oblong to oblong-ovate, subcordate, obtuse-mucronate; umbels 1-3, terminal, pedunculate, 15-25-flowered; hoods truncate, shorter than the sickle-shaped horn; flowers 6', red-green. M., W., S. 3f.
14 A. amplexicaulis Mx. Simple, flexuous, glaucous; lvs. ovate, coriaceous, obtuse, not mucronate; ped. lateral and terminal, with 3-5 pulpy-purple flowers; pedicels slender; hoods ovate, including the horns. Copses, S. 1-2f.
16 A. paupercula Mx. Smooth and virgate; leaves linear and oblong-linear, 4-6' long; umbels with few large yellow-red flowers at the naked summit. N. J., and S.
17 A. Curassavica L. Half-shrubby and branching at base; branches terete, leafy to the top; leaves lance-linear; umbels with few large scarlet flowers. S. Fla. Cult.
18 A. cinnerea Walt. Stem wiry, simple, naked above; leaves linear-filiform, 1-3', erect; umbels terminal, several, bracteolate, 3-5-flowered; peduncles 4-6''; pedicels 6-8''; corolla ashy-purple, 3-4''. Damp barrens, S. C. to Fla. 2-3f.
19 A. viridula Chapm. Stem and leaves as in No. 18; umbels 6-12-flowered, yellowish-green, shorter than the leaves. Fla.
20 A. Michauxii Desn. Stems diffuse; leaves linear, 3-4', scattered; umbels 3-5-flowered, often panicked, mostly shorter than the lvs.; fls. 3', fragrant. Sands, S. 1f.
21 A. verticillata Ell. Simple, slender, erect; leaves linear, very narrow, generally verticillate; umbels small, many, lateral, 1' diameter, pedunculate. Swamps. 2f.

2. ACERATES, Ell. Hoods of the crown destitute of a horn. Otherwise nearly as in Asclepias. 2t Flowers greenish. June—August.

§ Acerates proper. Umb. lateral; pet. reflexed; crown adnate to anth. Nos. 1-3

§ Anantherix. Umbels terminal; pet. spreading; crown free from anth. Nos. 4, 5

1 A. viridiflora Ell. Stout, whitish-downy; leaves thick, oval, obtuse, petiolate, varying to elliptic-lanceolate, or even to orbicular (Ga., Prof. Pond); umbels small, dense, sub sessile. Sands. 2f. Leaves excessively variable.

2 A. longiflora Ell. Rough-puberulent, simple; leaves alternate, lance-linear to linear; umbels lateral, pedunculate, densely many-flowered; flowers small, 3'', crown stipitate. Prairies, W. 2-3f. Peduncles 1'.

3 A. lanuginosa Desn. Low, stout, hairy; leaves lanceolate; umbel 1, on the naked summit of the stem, dense; crown sessile. Prairies, Wis. 1f.

4 A. connivens Desn. Strict, half-shrubby; leaves oval-oblong; umbels 7-12-flwd., along the naked summit of the stem; pet. 5'', oval, with a short cusp; hoods connivent over the anthers. Barrens, Ga., Fla. 2f. Leaves 20-30''.

5 A. paniculata Desn. St. angular; lvs. lance-oblong, obtuse; umbels clustered at the leafy top, 5-9-flowered; pet. large, half-erect, 7''; pods glabrous, seeds with long silky tufts. Ga. to Ill. and Kan. (Rev. J. H. Carruth.)

3. PODOSTIGMA, Ell. Cor. seg. 5, erect, oblong. Crown stipitate, hoods without horns. Follicles 2, long, slender, smooth. 2t Low and simple, with opposite leaves and supra-axillary few-flowered umbels.

P. pubescens Ell.—Wet grounds, S. A curious plant, with linear-oblong leaves and 3-5 umbels of yellowish-green flowers, in May, June. 1f.

4. ENSLENIA, Nutt. Cor. 5-parted, segments erect; hoods or scales
of the crown 5, free, each terminated by 2 filiform, flexuous lobes. Pollinia oblong, pendulous. Stig. 5-angled, conical. Follicles cylindraceous, smooth. ½ A twining herb, with opposite, cordate leaves, and cream-white flowers in small lateral corymbs.


5. METASTÉLMÀ, Br. Cor. somewhat bell-form, segments incurved at apex. Crown of 5 distinct scales. Stigma flat. Pods smooth, slender, seeds comous. ½ Lvs. cuspidate, smooth. Umb. of few small flowers

M. Fràseri Dcns. Leaves oval; umbels sessile; pet. ovate, ciliate, as long as the linear crown-scales. In Carolina (Fraser, in DC).

M. Schlectendalhii and other species grow in S. Fla. (Dr. Chapman.)


1 V. nigrum Mœnch. Herb somewhat twining, with lance-ovate, attenuately-acute leaves and small blackish clusters in the axils. Gardens and fields: rare.

2 V. scópariiun (N.) Shrubby at base, much branched; leaves thin, linear, 1'; clusters short-stalked, downy, with few green flowers; pods slender, 1'. Fla.


* GONÓLOBUS proper. Cor. rotate, flat, lobes linear to oblong, smoothish... Nos. 1–3

* CHTHAMÁLLA. Corolla bell-form, small (woolly), lobes ovate, 1'' long ... ... ... ... No. 4

1 G. macrophyllus (and leavis) Mx. Smooth, or with minute down and scattered hairs; leaves short-pointed, base-lobes open; umbels 5-flowered, buds conic-pointed; pet. linear-subulate, 4''; pod smooth, ribbed. Shady banks, Va. to Ky., and S. 3–5f.

2 G. obíquus Br. Hirsute with spreading; unequal hairs; leaves acuminate, base-lobes closed and some oblique; umbels 2–5-flowered, buds oblong, pet. linear-oblong 6''; pod mucratic, ribless. Banks, O. to Pa. and Ga. 3–5f.

3 G. hirsútus Mx. Hirsute; leaves acuminate; umbels 5–8-flowered, buds vivid. petals oblong, 3'', yellow, downy, pod mucratic. Woods, South. 4–5f.

4 G. prostrátus Ell. Branches from base, prostrate, 6–12''; leaves small (1''), reniform-cordate; umbels sessile, 3–5-flowered; corolla segments ovate, 1'', very woolly inside, dark purple. Sands, Ga. (Dr. Feay). (Cithamalia pubera Dcns.)

P. Græca L. Leaves ovate, acuminate, 3–4'; flowers panicked on a long peduncle; petals very hairy, linear, obtuse, purple. Gardens, &c. 10–15f. August. §

10. STEPHANOTIS, Pet.-Th. Sepals distinct. Cor. salver-form, limb 5-lobed, convolute in bud, tube including the 5-leaved crown in its enlarged base. ½ Leaves thick, very smooth.

S. floribunda. Leaves oval; flowers 5–8 on each peduncle, white and fragrant, tube ½, limb ½' broad. Greenhouse plant, from Madagascar.


H. CARNOSA. Branchlets puberulent; leaves oval-oblong; flowers in dense umbels, pink-colored, wax-like. Greenhouse plant, from E. India.


S. hirsuta, with erect, dull-green 4-sided branches, toothed on the angles, and flowers 3–4' broad, with purple, ciliate, lance-ovate petals.

ORDER XI. OLEACEÆ. OLIVEWORTS.

Trees and shrubs, with opposite, simple or compound leaves, and regular 4–8-parted diandrous flowers. Corolla rarely wanting, its divisions more in number than the stamens. Ovary free, 2-celled, with 2 (rarely 1 or ∞ ovules in each cell. Fig. 16.


§ Leaves opposite, unifoliate. Flowers white, 8–10-parted. .......... Nos. 1, 2
§ Leaves opposite, 3–9-foliate. Flowers white, 5-parted. .......... Nos. 3–5
§ Leaves alternate, 3–7-foliate. Flowers yellow, 5-parted .......... Nos. 6, 7

1 J. SAMBAC. Scarcely climbing; leaves ovate; petals 8, rounded, fragrant. India.
2 J. LAURIFOLIUM. Climbing; leaves lanceolate; pet. 9 or 10, linear, fragrant. India.
3 J. AzóRICOX. Diffuse; leaflets 3, ovate, shining; flowers very fragrant. Azores.
4 J. OFFICINALE. Climbing; lfts. 7, lanceolate; sep. linear, equaling cor. tube Asia.
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ORDER 101.—OLEACEÆ.

5 J. grandiflorum. Climbing; leaflets 9, oval, some confluent, the odd one pointed; sepals thrice shorter than the corolla tube; petals oval. India.

6 J. revolutum. Not climbing; lfts. ovate, pointed; pet. roundish, recurved. Asia.

7 J. odoratissimum. Climbing; lfts. oval, obtuse; fls. less fragrant than No. 6. Azores.

2. FORSYTHIA, Vahl. Calyx very short, deciduous. Cor. subcampanulate, lobes long, twisted in bud. Sta. inserted in the base of the tube, included. Seeds ∞ in the 2-celled pod. ¥ Leaves opposite or in 3's, appearing after the yellow flowers.

1 F. viridissima. Branches erect, strict, covered with flowers in early Spring, each flower separate, pedicellate, lateral; leaves lanceolate. China.

2 F. suspensa. Branches weak, pendulous; leaves ovate; flowers scattered. Japan.


1 S. vulgaris. Common L. Leaves cordate-ovate, entire, glabrous; flowers lilac to lilac-purple, in a dense thyrs, very fragrant. A beautiful shrub, from Hungary; varying with flowers blush, or white. April—June.

2 S. Persica. Persica L. Leaves lanceolate, acute, smooth, often pinnately cleft; thyrs loose, smaller, white, or lilac-blue. Persia.


* Racemes axillary, shorter than the coriaceous leaves.......................... Nos. 1—2
* Racemes in a large terminal panicle. (Visiana paniculata C-B)... .......... No. 4

1 O. Americana L. Leaves oblong to elliptic, entire, smooth, shining, attenuated to a petiole; raceme compound, scarce longer than the petiole; flowers dioecious; drupes globular. Swamps, N. J. to Fla. 15—20f.

2 O. Europaea. Leaves lanceolate, mucronate; racemes longer than the petioles; drupes oval. Europe. Cultivated in California, rarely far South. 20—40f.

3 O. frigrans. Shrub; leaves lance-oblong, serrate; flowers small, white, very fragrant, in axillary corymb, white-red; styles 2. China. (Osmantus.)

4 O. clavata. Shrub with ovate entire leaves and many small flowers in large panicles; style 1. cub-shaped, exserted like the stamens. China. Hardy S.


L. vulgare L. Leaves lanceolate to obovate, 1—2', obtuse or acute, thick but deciduous; flowers small, in small thyrses; anthers partly exserted, but shorter than the ovate corolla lobes. Planted in hedges. May, June. ¥ Europe.

6. CHIONANTHUS, L. Fringe Tree. Cal. short, 4-parted. Cor. tube very short, including the 2 stamens, the limb of 4 linear lobes. Style very short. Drupe fleshy, with a bony 1-seeded nut. ¥ ¥ With opposite leaves and white flowers in panicles.

C. Virginicus L. Leaves oval to oblong; panicle with filiform branches and pedicels:
petals very narrow, drooping, 10". A highly ornamental shrub or small tree, in
woods. S. Penn., and S. April—June.

7. FORESTIÈRA, Poir. Dioecious, apetalous; buds ∞-flowered. ♂ Flowers sessile, crowded, each flower a pair of stamens surrounded by
calyx of 4 sepals. ♀ Flowers pedicellate, umbellate, no calyx, an ovary
tipped with a slender style and capitate stigma, cells 2, ovules 4. Drupe
1-seeded. ? Leaves opposite, simple. Flowers minute.

1 F. acuminata Poir. Glabrous; leaves lance-elliptic, pointed both ways, serru-
late, petiolate; drupe linear-oblong, pointed. Streams, Ill. to Ga. 15f.

2 F. ligustrina Poir. Some downy; leaves ovate to oblong, obtuse, attenuate to a
petiole, serrulate; drupe oval-oblong. Banks, Ga., Fla.

3 F. porulosa Poir. Smooth; leaves lance-oblong, obtuse, sessile, dotted and rusty
beneath; drupe round-ovoid. Coast of E. Ga. and Fla.

8. FRÁXINUS, Tourn. Ash. Fls. ♂ or ♀. Cal. 4-toothed, rarely 0. Cor. of 2 or 4 oblong or linear petals, or 0. Sta. 2. Stig. bifid.
Samara 2-celled, flattened, winged at apex, 4-ovuled, but 2-seeded. ? Leaves opposite, odd-pinnate, petiolate. Flowers racemed or panicled.
Wood valuable for timber. April, May. Fig. 16.

§ Native species, all dioecious and petalous, in woods, &c... (a)
§ European species, polygamous, planted for shade, &c. Nos. 1-2
a Calyx persistent at the terete base of the samara. No. 3
a Calyx persistent at the narrow, flattened base of the samara. Nos. 4-6
a Calyx none, the samara naked at the broad base. Nos. 7-8

1 F. Ornus. Flowering Ash. Lfts. 7—9, lanceolate, serrate above; buds pubescent;
panicles dense; petals 2 or 4, linear-oblong, white; fruit lance-linear. Parks.

2 F. Excelsior. European Ash. Leaflets 11—13, lance-oblong, serrate; racemes short,
dense; fruit linear-oblong, notched at end; pet. and calyx 0. A tall tree, in parks,
&c. Β. Péndula, the Weeping Ash, is one of its varieties.

3 F. Americana L. White Ash. Leaflets 7—9, ovate, acuminate, subentire, shining;
panicles loose; fruit calyptrae, the seed portion terete, half as long as the oblong
wing. A forest tree 40—80f. Timber excellent.

4 F. pubescens Walt. Red Ash. Leaflets 7—9, lance-ovate, acuminate, subulate,
petioles and branchlets velutin-pubescent; fruit calyptrae at the acute base, gradu-
ally widened into the oblong-cylindrical wing. Wet woods. 30—60f.

5 F. viridis Mx. f. Green Ash. Lfts. 7—9, lance-ovate, serrate, long-pointed, bright
green, and, with the petioles and branchlets, glabrous; fruit calyptrae, spatulate,
obtuse, the seed portion as long as the wing. Woods, W. and S. 15—25f.

6 F. platycarpa Mx. Leaflets 5—7, elliptical, acute, obscurely serrate, some downy;
fruits broadly-spatulate, attenuate to the calyptrae base, some of them (especially in
β. tripterca) with 2 angles winged. Va., and S.

7 F. quadrangulata Mx. Blue Ash. Leaflets 7—9, short-petiolulate, lance-ovate,
acuminate, sharply serrate; branchlets square or acutely 4-angled; buds velvety;
fruit oblong, winged to the base. Woods, W. 60—80f.

8 F. sambucifolia Lam. Black Ash. Leaflets 7—11, lance-ovate, sessile, serrulate,
pointed; fruit oblong with equal ends, notched at apex. Swamps, Can. to Pa. and
Ky. 40—70f. Wood used for hoops, baskets, &c.
Cohort 3. APETALÆ,

Or Monochlamydeous Exogens. Plants with no corolla, the calyx or perianth green or colored, consisting of a single series of similar organs, or often wholly wanting.

Order CII. ARISTOLOCHIACEÆ. BIRTHWORTS.

Low herbs or climbing shrubs, with alternate leaves and perfect flowers. Perianth tube adherent to the ovary, brown or dull, valvate in the bud. Stamens 6 to 12, epigynous and adherent to the base of the styles. Ovary 6-celled, becoming a 6-celled, many-seeded capsule or berry. Seed albuminous, embryo minute. Figs. 24, 333.

1. ASÁRUM, Tour. Wild Ginger. Calyx bell-form, regular, 3-cleft. Sta. 12, placed upon the ovary, anth. adnate to the middle or summit of the filaments. Style very short, stigma 6-rayed. Fruit fleshy, 6-celled, crowned with the calyx. 2. Acaulescent, with creeping rhizomes and 1 or 2 leaves on each branch. Flowers solitary.

§ Leaves in pairs. Calyx lobes pointed, reflexed. Ovary wholly adherent... No. 1
§ Leaves solitary. Calyx lobes obtuse, suberect. Ovary partly free...... Nos. 2, 3

1 A. Canadénse L. Lvs. 2, broad-reniform, on long, opposite, radical petioles with the flower between; sepals greenish-purple, pointed, reflexed; filaments extended above the anthers. Rich shades. The root is a popular remedy. May, June.

2 A. Virginicum L. Leaf orbicular-ovate, glabrous, coriaceous, deeply cordate, entire, obtuse; flowers subsessile; calyx short, smooth outside; segments obtuse, dull purple. Rocky soils, Va., Ky., and S. April.


2. ARISTOLOCHIA, Tour. Birthwort. Calyx tubular, tube variously bent and inflected above the ovary, limb irregular. Anth. 6, sub sessile on the style. Stig. 6-lobed. Caps. 6-celled, oo-seeded. 2. Caulescent, with alternate leaves and lateral lurid purple flowers.

§ Stem erect. Calyx tube sigmoid (i.e., twice bent like the letter S)......... Nos. 1, 2
§ Stem climbing, woody. Calyx tube recurved, once bent upward. May, Jun... Nos. 3, 4

1 A. serpétária L. Virginia Snake-root. Stem flexuous; lvs. petiolate, oblong or ovate, thin, cordate, acuminate; ped. radical, many bracted; cal. tube smoothish, contracted in the midst. Thickets, Pa., S. and W. 8—13'. June, July.

β. hastáta. Leaves narrowly oblong, auricled at base, short-stalked. S.

2 A. retículáta N. St. very flexuous; lvs. oval, cordate-clasping, with decussating lobes, strongly reticulated; flowers radical, small (5''). La. 1f.

3 A. Sípho L'Her. Dutchman's Pipe. Lvs. glabrous, ample, round-reniform; ped. 1-flowered, with 1 clasping bract; flowers 1", bent like a siphon or tobacco-pipe, limb spreading. A vigorous climber, 30—40f., in hilly woods, Pa. to Ky., and S. †

4 A. tomentósa Sims. Leaves downy or hairy beneath, round-cordate, very veiny; ped. solitary, 1-flowered, bractless; flowers 20", tube yellowish, limb purple, reflexed, throat nearly closed. Banks, Ill., and S. 30—40f. May.
Order III. Nyctaginaceae. Marvelworts.

Herbs (shrubs or trees) with tumid joints, entire and opposite leaves. Flowers generally surrounded with an involucre (calyx-like when the flower is solitary). Calyx a delicate, colored, funnel-form or tubular perianth; deciduous above the 1-celled, 1-seeded ovary, leaving its persistent base to harden and envelop the fruit (achenium) as a kind of pericarp. Stamens 1 to several, definite, slender, hypogynous, exserted, unequal. Embryo coiled around the copious white albumen. Figs. 143, 207.

1. Mirabilis, L. Marvel of Peru. Four-o’clock. Involucre calyx-like, 5-lobed, 1-flowered, lobes acuminate. Perianth (calyx) tubular-funnel-form, limb spreading. Sta. 5, and style more or less exserted. Fruit (as in all the genera) an achenium invested in the permanent base of the calyx. 2f Cultivated. Leaves ovate, more or less cordate, acuminate.

1 M. Jalapa. Erect, glabrous; flowers 3—6 in each terminal fascicle, short-stalked, opening at about 4 o’clock p. m., and remaining in bloom all night, infinitely various in color. Peru. 2f. Summer.

2 M. dichotoma. Erect, glabrous; flowers sessile, mostly yellow, smaller than in M. Jalapa; limb 6”. Mexico. 2f. Summer.

3 M. Longiflora. Weak, diffuse, viscid-pubescent; lower leaves long-petioled; flowers sessile, tube 6” long, hairy, border 1”, white. Mexico.


1 A. umbellata. St. prostrate; lvs. ovate, long-petioled; umbellate heads compact; fls. rosy-lillac or pink, the lobes obcordate. Sandy sea-coasts, California. 1—2f.

2 A. fragrans. Stem ascending; leaves lance-ovate, long-petioled; umbels loose, fls. and involucre white, tubes near 1”. Dalles, Oregon.


1 O. Nyctaginaceus Sweet. Smoothish, erect, forked; lvs. broad-ovate to lanceolate, subcordate, acute; ped. solitary; involucre 3-5-flowered. Banks, W. June—Aug.

2 O. Augustifolius Sweet. Bushy, with alternate branches; lvs. lanceolate, acute both ways, subsessile, 1—2”; ped. 1—4”, axillary; involucre cup-shaped, hispid, 3 flowered; ovary hispid. Dry soils, S. 2—3f. June—July.

3 O. Albidus Sweet. Stem with strict slender branches, or simple; leaves linear-oblong, petiolate, the upper often bract-like; ped. half as long (6”—1’) as the leaves, involucre hairy, 3-flowered. S. 1—2f. May.

4. Boerhavia, L. Involucre 0, bractlets deciduous. Perianth funnel- or bell-form, colored, 5-lobed, upper half deciduous, lower persist-
ent. Sta. 1—4. Fruit 5-ribbed, truncate at apex, 1-seeded. 1 Leaves petiolar. Flowers very small.


**B. lirsúta**, and **B. viscosa**, grow in S. Fla., according to Dr. Chapman.

**ORDER CIV. POLYGONACEÆ. SORRELWORTS.**

**Herbs** (rarely shrubs) with alternate leaves and mostly sheathing stipules (ochrea) surrounding the stem above each tumid joint. **Flowers** mostly perfect. **Perianth** (or calyx) 3-6-cleft, mostly colored, imbricated in bud and persistent. **Stamens** 4—15. **Ovary** 1-celled, free, with a single, erect ovule. **Styles** or stigmas 2 or 3. **Fruit** a 3-angled achenium enclosed in the calyx. **Seed** erect, albuminous, with a curved embryo. Figs. 147, 151—4, 286, 304, 313, 337, 521.

§ Ochreae, or sheathing stipules, present at each joint... (b)
§ Ochreae none.—a Flowers in involucrate umbels, 6-sepaled........................... ERIOGONUM. 1
   —a Flowers in bracted racemes, 5-sepaled. Stems with tendrils... BRUNNICHIA. 2
   b Sepals 4, equal by pairs. Stamens 9. White Mountains: rare..................... OXYRIA. 3
   b Sepals 6, all similar. Stamens 9. In gardens: common.............................. Rheum. 4
   b Sepals 6, the 3 inner increasing, tuberculate... ERIOGONUM. 9
   b Sepals 5 (in one Polygonum 4 irregular)... (c)
      c Sepals all or the 3 inner flanged. Pedicels solitary............................ THYSANELLA. 6
      c Sepals all entire,—x open, or 3 closed on the fruit. Pedicels solitary... POLYGONELLA. 7
         —x open at base of fruit. Pedicels fascicled.............................. FAGOPYRUM. 8
         —x closed on the angular fruit. Herbs........................................ POLYGONUM. 9
         —x combined with the round fruit. Trees. Fla................................ COCCOLUS.

1. **ERIÓGONUM**, Mx. Fls. many in each common 5-toothed involucre. Cal. deeply 5-cleft. Sta. 9, sty. 3. Ach. 3-angled or 3-lobed.—Herbs clothed with down or wool. Lvs. alternate, extipulate, mostly at the base of the stem, the upper bract-like, often whorled at the forks of the umbellate inflorescence. Very abundant in the Pacific States. June—Aug.

1 **E. tomentósum** Mx. Lower lvs. crowded, oblong-obovate, rusty-white beneath, the upper whorled in 3’s; involucre sessile; calyx colored. 2 Dry soils, S. 2—3f.

2. **BRUNNICHIA**, Banks. Calyx colored, 5-parted, lobes oblong, at length increased and closed on the obscurely 3-angled achenium. Fil. 8, capillary, styles 3, slender, stigmas entire. 2 Tendrils from the ends of the branches. Flowers racemed, greenish.

B. **cirrhósa** Banks.—A smooth, shrubby vine, 10—20f, on river banks, Car. to Fla., and W. Leaves cordate to ovate, entire. Sheaths obsolete. May.

3. **OXÝRIA**, R. Br. **MOUNTAIN SORREL**. Cal. herbaceous, 4-sepalled, the 2 inner sepals erect, larger, the 2 outer reflexed. Ach. lens-shaped, thin, girt with a broad, membranous wing. Sta. 6, equal. Stig. 2, sessile, penicillate. 2 Low, nearly acaulescent, alpine plants.

**O. reniformis** Hook (or digyna Camp.) Root leaves on long stalks, reniform; outer sepals as long as the inner; fruit orbicular. White Mountains, and N. 3—4f. June.
4. RHEUM, L. RHUBARB. Calyx colored, 6-sepalied, persistent. Sta. 9. Sty. 3, very short, spreading, stig. multifid, reflexed. Ach. 3-angled, the angles margined. 2f Flowers fasciculate in racemous panicles.

R. RHAPONTICUM L. Pie-plant. Leaves smooth, cordate-ovate, very large (1—2f), the petioles juicy and pleasantly acid, of equal length; stems hollow, 3—4f, panicles bursting from large white bracts. Siberia.

5. RUMEX, L. Dock. SORREL. Calyx of 6 sepals nearly distinct, the 3 inner (valves) larger, petaloid, connivent over the achenium, 1 or more of them usually bearing a tubercle or grain on the back, the 3 outer green. Sta. 6. Styles 3, short, stigmas penicillate-fringed. Ach. and seed 3-angled, embryo lateral.—Weed-like herbs with small, greenish flowers, often whorled, in racemes or panicles. May—July. (See Addenda.)

§ Docks. Flowers all or mostly perfect. Valves bearing grains on the back....(*)

§ Sorrels. Flowers dioecious. Valves grainless. Leaves acid (hastate)....Nos. 11, 12

* Valves entire, or merely angular... (a)

* Valves conspicuously toothed on each side near the base.... .... Nos. 8—10

a Pedicels in fruit 2—5 times longer than the subcordate valves....Nos. 1—3

a Pedicels in fruit shorter or not longer than the valves... (b)

b Leaves flat, all tapering to both ends................. Nos. 4, 5

b Leaves round-ovate, obtuse, all grain-bearing... Nos. 6, 7

1 R. crispus L. Yellow D. Root fusiform, yellow; lvs. lanceolate, wavy, acute, the lower oblong, subcordate; ped. twice longer than calyx; valves broad-ovate, cordate, each bearing a grain; rac. long, some leafy. 2f Fields. 2—3f. § Europe.

2 R. verticillatus L. Water D. Leaves acute at each end, lance-oblong; rac. leafless, dense; ped. 7—9" long, deflexed; valves broad-ovate, each bearing a large grain. 2f In muddy places. 2f. Whorls 10—30-flowered.

3 R. Hydrolapathum Huds. Great Water D. 5. orbiculatus. Tal. (3—5f); lvs. lance-obl., acute both ways, erose-crenulate, the lower very long; pan. naked, dense: ped. 5—6"; valves round-ovate, obtuse, all grain-bearing. 2f Pools, M. and N.


4 R. altissimus Wood. Peach-leaved D. Tall (3—6f); leaves entire, lance-elliptical, acute both ways; rac. leafless, panicled, slender; valves broadly subcordate, one of them grain-bearing, one obscurely so, and one naked. 2f Wet, M. and W. (R. Britannicus Meisn. nec Linn. who says "valves all grain-bearing.")

5 R. salicifolius Weinn. Dake D. Lvs. lin.-lanceolate, attenuate-acute both ways; pan. leafy at base; ped. very short; valves all grain-bearing. 2f Coast, N-E. 3f.

6 R. conglomeratus Marr. Lvs. oblong to lanceolate, lower subcordate; whorls mostly axillary; valves oblong-ovate, all grain-bearing. 2f Wet. N. 2—3f. §

7 R. sanguineus L. Lvs. as in No. 6, mostly with red veins; pan. leafy at base, whorls distant; valves oblong-ovate, one or two grain-bearing. 2f Fields. §

8 R. obtusifolius L. Lower leaves ovate-cordate, obtuse, upper narrow, acute; panicle leafy, whorls distant; valves hastate-ovate, one chiefly grain-bearing, all with some bristle-shaped lateral teeth. 2f Fields, &c. 2—3f. § Europe.

9 R. maritimus L. Golden D. Low (1f); leaves lance-linear, the lowest cordate, wavy; whorls crowded; valves rhomb-ovate, pointed, each with 4 lateral awns and a large grain, yellowish. (j) Brackish waters, Mass. to Car.

10 R. pulcher L. Lower lvs. cordate, some fiddle-shaped, upper lanceolate; whorls distant, leafy; valves strongly toothed, unequally grain-bearing. S. §

11 R. Acetosella L. Sheep Sorrel. Leaves oblanceolate, the base lobes conspicuous; valves not increasing in fruit. A common weed. 6—1f

12 R. hastulatus Baldw. Leaves with small auricles or none, glaucous; valves increasing to round-cordate in fruit; ped. jointed. Mo. to Ga. 1are.
6. **THYSANÉLLA**, Gray. Fls. 5 ♀ ♀. Cal. colored, 5-parted, lobes all erect, the 2 outer cordate, the 3 inner smaller, pectinate-fringed. Sta. 8. Styles 3. Achenia 3-angled, acuminate.—A smooth, erect herb, with the habit of Polygonella. (Polygonum, Ell.)


7. **POLYGONÉLLA**, Mx. Calyx colored, 5-sepalled, persistent. Sta. 8, included. Styles 3 or almost 0. Ach. 3-corned, naked or enclosed in the 3 inner sepals enlarged and become scarious valves. Embryo straight. —Herbs or delicate shrubs, with very narrow leaves and the small flowers solitary in each ochrea.

§ Fls. dioecious. Pedicel 1''. Filaments all filiform. Stig. nearly sessile... Nos. 1—3
§ Fls. all ♀. Pedicel 2''. The 3 inner filaments dilated. Styles manifest... Nos. 4, 5

1 **P. parvifólla** Mx. Shrubby, branches strict, leafless above; Lvs. linear-cuneate; pedicel oblong; inner sepals equaling the acute achenia. S. 1—2f.

2 **P. gráecie** N. Annual, glaucescent; branches filiform; leaves spatulate; 3 inner sepals exceeding the pointed achenia. Dry sands, S. 2—3f.

3 **P. Croomia** Chapm. Shrubby; branches slender; leaves linear (2—3''); 3 valves unequal, 2 roundish, 1 oblong, exceeding the achenia. Uplands, S.

4 **P. Meisneriàna** Shutt. Shrubby, very leafy, leaves linear, filiform, 6—10'', evergreen, ochrea tipped with a white membrane; 2 outer sepals reflexed. Uplands, Ga., Ala., Fla. 1—2f. A delicate bushy shrub.

5 **P. articulàta** Meisn. Annual, strict, with erect branches, which are soon nearly naked; leaves linear, caducous from the tops of the truncate sheaths; sepals flesh-colored, expanding. Dry. N. J., and W.: rare.

8. **POLYGNÖNUM**, L. **Knot-grass.** Calyx of 5 sepals, rarely fewer, colored or greenish, similar, imbricated in bud, at length all convivnet, persistent. Sta. 8, rarely fewer. Sty. 2 or 3, mostly 3, short filiform. Ach. 3-corned or lens-shaped, enclosed in the dry, withered calyx. Embryo curved, lateral, lying in a groove at one angle of the albumen. Herbs with ochreate-jointed stems and small, white, red, or greenish fls. June—Sept.

§ Stems armed with retrorse prickles. Lvs. cordate-sagit. **ECHINOCAULON**... Nos. 21, 22
§ Stems unarmed, twining. Leaves cordate-hastate. **TINARIÁ**... Nos. 18—20
§ Stems erect or decumbent, unarmed. Leaves hardly ever cordate...(*)

* Calyx unequally 4-cleft. Styles 2, long deflexed. **TÓVARIA**... No. 17
* Calyx equally 5-parted. Styles erect...(*a)
  a Sheaths salver-form. Stamens 7. Style 2-parted. Tall. **AMBLYGNÖNUM**... No. 16
  a Sheaths subcylindrical. Stamens 5, 6, 8. Styles 2 or 3...(*b)
  b Flowers in leafless, terminal, spike-like racemes. **PERSICARIA**...(*c)
  b Flowers axillary, or seldom forming a leafy raceme...(*e)
    c Raceme 1, dense. Stem at base or rhizome decumbent.... Nos. 14, 15
    c Racemes several. Sheaths naked, not fringed... Nos. 12, 13
    c Racemes several. Sheaths bristly, fringe-ciliate...(*d)
  d Style 2-(or 3)-cleft. Achenia flat or lens-shaped... Nos. 9—11
  d Style 3-cleft. Achenia sharply 3-corned... Nos. 5—8
    e Achenium protruding beyond the calyx, 3-angled Nos. 3, 4
    e Achenium included in the calyx, 3-angled... Nos. 1, 2

1 **P. avícùlare** L. **Bird's K. Doorweed.** Procumbent, diffuse; leaves lance-ellip-
tic, acutish, 1'; flowers 2 or 3 together, subsessile, reddish; achenia striate, dull, enclosed; stamens 5-8. ① A common weed, 6-16'. In rich shady soils it arises to  

β. erectum with larger oval leaves and pedicellate flowers.

2  P. tenule Mx. Slender, rigid, erect, with long simple-angular branches; lvs. linear, erect; sheaths bristle-fringed; flowers solitary; achenia shining. Dry.  ② 1-1'.

3  P. maritimum L. Prostrate, diffuse, glaucous, with very short joints and swelling torn sheaths; lvs. flaky, oblong, 1-2'; flowers greenish, pedicellate; fruit ② exserted, olive-green, shining, 1½'. ① Sandy coasts, Mass. to Ga.  ② 1-1'.

4  P. ramosissimum Mx. Erect or ascending, much branched, striate; lvs. linear-oblong; 1-2'; flowers greenish, pedicellate; fruit ② exserted, olive-green, shining, 1½'. ① Sandy shores, R. I. to Mich. and Md.  2-3f.

5  P. hirsutum Walt. Densely hirsute with spreading tawny hairs, erect; lvs. lanceolate; sheaths shining; flowers white, in 2 or 3 slender spikes.  ② S.  2-3f.

6  P. hydropiperoides Mx. *Mild Water-pepper.* Stem smooth, slender, sheaths long, close, fringed and hispid; lvs. linear-lanceolate, not acrid; spikes erect, slender, loose at base; calyx glandless, achenia shining.

β. sciacea the leaves and stem above are more or less hispid. ② Wet. 1-3f.

7  P. acer H. B. K. *Water Smartweed.* Glabrous, virgate, slender; sheath loose, bristle-fringed; lvs. lanceolate, acrid; spikes filiform, erect; flowers reddish-green, dotted like the leaves; fruit shining. ① Wet places. S. and W.  2-5f.


9  P. Hydropiper L. *Water Pepper.* Glabrous; sheaths bristly-ciliate; lvs. lanceolate, very acrid, finely punctate; spikes nodding, loose, slender, greenish; calyx punctate; stamens mostly 6; achenia roughened, black. ① Damp. 1-2f. ⑩

10  P. Careyi Olney. Stem erect, 3-5f, bristly and much branched; leaves lanceolate, some hispid; stipules tubular-truncate, ciliate; spikes dense, purplish, nodding on long hairy peduncles. ① Swamp, N. Eng. to Penn. (See p. 44f.)

11  P. Persicaria L. *Smart-weed.* Glabrous, erect; leaves lanceolate, usually marked with a brown spot; sheaths fringed; spikes dense, erect, oblong; stamens 6; style 2-cleft; achenia shining. ① Waste grounds; common. 1-2f. ⑩

12  P. Pennsylvanicum L. Branches above and pedicels glandular-hispid; leaves lanceolate; spikes erect, oblong, crowded, rose-colored, showy; achenia lens-shaped, with flat sides. ① Margins of waters. 2-4f.

β. densiflorum. Smooth; racemes slender; achenia truly lens-shaped. South.

13  P. incarnatum Ell. Smoothish; leaves lanceolate; branches and ped. glandular-dotted; spikes linear, nodding, becoming long; achenia lens-shaped, with concave sides. ① Ditches and pools, W. and S.  2-3f.

14  P. amphibium Stem prostrate and rooting below, ascending; leaves thick, smooth, lance-oblong, variable; spikes oblong, ovoid or dense; stamens 5; style 2-cleft. Pools and swamps. 3-4f. Spike 1' or more.

β. terrestre. Plant more or less hirsute; spikes elongated.

15  P. viviparum L. Low, simple, erect from a creeping rhizome; leaves lance-linear, with rolled edges; spike 1, linear. ② White Mountains, and N.

16  P. orientale L. *Prince's Feather.* Tall, erect, branched; leaves large, with hairy salver-form sheaths; stamens 7; styles 2; spikes large, red, nodding, showy. ① Fields and gardens. 3-8f. ⑩

17  P. Virginianum L. Stem simple; leaves lance-ovate, acuminate; flowers remote, 1 from each sheath, in a slender raceme, greenish. ② Shades. 3-4f.

18  P. convolvulus L. *Knot Bindweed.* Prostrate or climbing, roughish, sheaths naked; leaves hastate, pointed; flowers in axillary fascicles or in interrupted racemes; fruit exserted, dull, blackish. ① Fields. 2-4f. ⑩

19  P. clinode Mx. Climbing; sheaths ciliate at base; leaves deeply cordate, pointed; racemes paniculate, loose; achenia shining. Hedges. 3-8f.

20  P. dumetorum L. *Hedge Bindweed.* Climbing high; joints not ciliate; leaves
ORDER 106.—CHENOPODIACEÆ.

... cordate-hastate, with acute lobes; outer sepal keeled and winged on the back; fruit smooth, black. Thickets. 3—12f. §.—A native form, 

*P. scandens*, has the raceme panicled and the sepals with very broad wings.

21 *P. sagittatum* L. Scratch-grass. Climbing, 3—5f, rough backwards; leaves lance-sagittate; flowers in small heads, whitish; stamens 8; style 3. 1 Wet.

22 *P. arifolium* L. Rough with reversed prickles, 3—5f; leaves hastate, apex and lobes pointed; flowers racemed; stamens 6; styles 2. Wet.


1 *F. esculentum* Menc. Smoothish; leaves with obtuse lobes; flowers showy, numerous, sought by bees; achenia ovoid-triangular, wingless, black. Fields. 2—4f. §

2 *F. Tartaricum*. India Wheat. Glabrous; leaves broader than long, lobes acuminate; racemes axillary and terminal, scarcely panicled; achenia lance-triangular, angles sinuate-dentate, rather obtuse; calyx minute. Tartary. Cultivated.

ORDER CV. PHYTOLACCACEÆ. Pokeworts

Herbs with alternate, entire leaves and perfect, 5-parted flowers. Calyx free. Stamens 5—30, alternate with the sepals when of the same number. Ovary of 1 to several carpels, each 1-ovuled. Styles and stigmas as many as carpels Fruit baccate or acheniate. Seeds erect, with the embryo coiled around the albumen.

§ Styles and carpels 5—12. Fruit baccate. Leaves exstipulate. Phytolacca. 1

§ Style and carpel 1. Leaves with stipules.—a Berry globular, smooth... Rivina. 2

—a Achenium with 2 hooks. Petiveria. 3


*P. decandra* L. Stem stout, purplish, tall; leaves ovate; flowers with 10 stamens and 10 styles; berries black, full of crimson juice. Hedges. 5—8f. July+.

2. RIVINA, Plum. Calyx 4-parted, 3-bracted. Sta. 4 or 8. Berry at last dry, 1-seeded, embryo a vertical ring. Shrubby, with racemes terminal, soon lateral.

*R. laevis* L. Branching, smooth, 6—8f; lvs. ovate; fls. rose-white, in long racemes; stamens 4. Fla., and W. Herbage bright-green.

3. PETIVERIA ALLIACEA L. Half-shrubby, 2—3f, with obovate-obtuse leaves and spicate flowers. Grows in S. Car. (Michaux), and S. to the tropics.

ORDER CVI. CHENOPODIACEÆ. Chenopods or Goose-foots.

Herbs chiefly weed-like and homely, more or less fleshy, with alternate, exstipulate leaves. Bracts not scarious. Flowers greenish, regular. Calyx imbricated in bud. Stamens as many as, and opposite to the calyx lobes, or fewer. Ovary 2-styled, 1-celled, becoming a 1-seeded, thin utricule or Caryopsis. Embryo coiled or spiral.
1. Flower of Chenopodium album. 2. Calyx, &c., removed, showing the ovary and 2 stamens. 3. Seed cut across, showing the coiled embryo. 4. Branch of Salicornia herbacea. 5. Two joints magnified. 6. Ovary of a flower.

§ Leaves flat, neither fleshy nor spiny. Embryo a ring around copious albumen... (a)
§ Leaves none, or linear and fleshy or spinescent. Embryo a spiral or folio. Albumen 0... (y)


2. BETA, Tourn. Beet. Cal. 5-cleft, persistent. Sta. 5. Ovary half-adherent. Stig. 2. Utricle depressed, corky, enclosed in and consolidated with the ribbed calyx.—Herbs with fleshy roots, furrowed stems, alternate leaves, and greenish, spicate flowers.

3. CYCLOLOMA, Moquin. Calyx 5-cleft, lobes strongly keeled, at length appended outside with a circular membranous border or crown. Sta. 5, styles 3: Utricle depressed, enclosed. 1 With furrowed stems, alternate lobed leaves, and small sessile flowers.

C. platyphyllum Moq.—Banks of the Mississippi, Ill., and W. 1—1½, white-downy above. Leaves lance-oblong, sinuate-toothed or lobed, 2. Flowers at length in small panicles. July—Sept.

4. CHENOPODIUM, Tourn. Pigweed. Goosefoot. Calyx bractless, 5-cleft, lobes often keeled, never appended, more or less enclosing the fruit. Sta. 5, styles 2. Utricle depressed, membranous, seed mostly
horizontal, lenticular. Weeds often glaucous or glandular, with alternate; often rhombic lvs., and the minute fls. in panicked spikes. June—Aug.

§ Plants ill-scented, smooth, never glandular. Embryo a complete ring...(*)

§ Plants glandular-puberulent, green, aromatic. Embryo a half ring...(*b)

* Herbage glaucous or whitish, covered with mealiness.................Nos. 1–3

* Herbage green, rarely purplish, not glaucous or mealy...(*a)

a Leaves entire, ovate-oblong, on slender petioles ......................No. 4

a Leaves toothed or lobed, petiolate...............................Nos. 5–7

b Flowers glomerate, axillary, in spike-like racemes...............Nos. 8, 9

b Flowers cymous, innumerable, in long raceme-like panicles......No. 10

1 C. glaucum L. Prostrate or ascending, branched; leaves ovate to oblong, obtuse, sinuate-angular or -dentate; racemes simple; seed partly enclosed. (1) Mass. to Pa.: rare. 1f. Leaves 1–2', whitish beneath. § Europe.

2 C. album L. Common P. Erect, loosely branched, striate; lvs. rhombic ovate, ovate-toothed to subentire; racemes some panicked; seed wholly enclosed. (1) The commonest of weeds, 2–7f, often striped with purple.

3 C. Boscianum Moq. Erect, branched; lvs. small, lance-linear, entire, canescent beneath; seed partly enclosed. (1) Shades, Pa. (Prof. Porter), and S. 2f.

4 C. polystérmum L. Ascending, branched from base; lvs. ovate to oblong, entire, bright green; racemes spike-like, strict; fruit partly enclosed. Rare. § Eur.

5 C. hybriđum L. Leaves ample, subcordate, deeply sinuate-angled, with pointed lobes; racemes leafless; seed rugous, dull. (1) Common, 2–4f. § Europe.

6 C. murále L. Ascending; leaves ovate-rhombic, acute at base, unequally and acutely toothed; seed acute-edged, dull-rugous. (1) Rare. 12–18'. §

7 C. úrbicum L. Erect; leaves as in No. 6, but slightly mealy; racemes strict, dense, in an erect narrow panicle; seed blunt-edged, shining. (1) 2–4f. §

8 C. ambrosioides L. Mexican Tea. Branched; leaves oblong to lance-linear, attenuate both ways, sinuate-toothed to entire; spikes dense, leafy, seed shining, obtuse-edged; fruit wholly enclosed. (1) 1–2f. § Mexico.

9 C. anthelminticum L. Worm-seed. Subsimple; leaves ovate-oblong, deeply sinuate-serrate or pinnatifid; racemes spike-like, long; styles mostly 5; fruit as in No. 8. 2f Waste grounds. 1–3f. § Mexico.


§ Heads forming a dense terminal spike. Calyx dry..........................No. 1

§ Heads axillary, some spicate above. Calyx thickened....................Nos. 2, 3


2 B. maritínum N. Much branched; leaves lanceolate, attenuate to both ends; stamen 1; seed shinning. Marshes, R. I., N. Y., and N. J. 1–2f. Augst.

7. ÁTRIPLEX, Gært. ♀ Bractless. Calyx 3–5-sepalled. Sta. 3—5. ♀ Ovary 2-styled, with no stam., enclosed between 2 leaf-like bracts, with or without a calyx.—Herbs or shrubs, often mealy or scurfy, with opposite or alternate hastate leaves and glomerate-spiked green flowers.

§ Leaves partly opposite. Bracts triangular-ovate........................................Nos. 1, ♀
§ Leaves all alternate.—♀ Bracts rhombic, canescent, toothed .........................No. 3
—♂ Bracts round-ovate or -cuneate........................................Nos. 4, 5

1. A. hastata L. Slender, weak, green; leaves petiolate, hastate, remotely-toothed; flowers single in the slender spikes, bracts triangular-ovate, denticulate. N. Eng. to S. Car., coastward. 1–3f.—♀ Purshiana is scurfy.

2. A. littoralis L. Erect with many strict branches; leaves short-stalked, lanceolate to linear, subentire; flowers glomerulate, forming interrupted spikes; bracts hispid, triangular-hastate, denticulate. Lake shores, N-W.


S. oleracea. Leaves hastate-lanceolate to arrow-shaped; fruit-calyx solitary, 3-angled, armed with 2 or 4 slender prickles, or unarmed. 1 Gardens., 1–2f.

10. CORISPÉRMUM, Juss. Calyx 1–2-sepalled or 0. Stam. 1–5. Styles 2, short. Pericarp oval, flat and thin, adnate to the seed, vertical. 1 With narrow, sessile leaves, and sessile, solitary, axillary flowers.

G. hyssopifolium L. Hairy or glabrous, much branched; flowers in many bracted spikes, bracts ovate, subulate-pointed; leaves 1' and less; fruit a pellucid disk. Sandy lake-shores, Buffalo, and W. 5

11. SALICÓRNIA, Tourn. SALTWORT. SAMPHIRE. Flowers 2 or 3 together, sunk in the cavities of the jointed stem. Calyx bladder-like, denticulate, enclosing the compressed vertical fruit. Stamens 1 or 2. Styles 2. Embryo folded.—Seaside, jointed, fleshy herbs almost leafless, with opposite branches.

1. S. herbacea L. Suberect; spikes elongated, green; joints truncate and bractless; middle flower largest. 1 Salt marshes. 8–12 Aug.

2. S. Virginica L. Erect; spikes short, soon red; joints short, tipped with 2 acute bracts; flowers all alike. 2 Salt marshes. 6–9 Sept. (S. mucronata C-B.)

3. S. fruticosa L. Prostrate, with ascending branches; spikes slender, joints tipped with 3 obtuse bracts. 1 Sandy beach. (S. ambiguca C-B.)

12. CHENOPodium, Moq. GLASSWORT. Calyx bracteolate, cup-shaped, 5-parted, fleshy in fruit with the seed horizontal. Sta. 5. Stigma sessile. Embryo a flat spiral.—Smooth seaside fleshy plants, with alternate sessile leaves and axillary flowers. (Suæda, Forsk.)
**Order 107.—Amarantaceae**

*C. maritima* Moq. Diffusely branched; lvs. linear, 2' and less, semiterete; flowers minute, green, clustered, sessile; seed black, shining. (3) Marshes. August.


**S. Kali** L. Branches diffuse on the sand, rigid, with crowded subulate leaves, each tipped with a spine; flowers solitary, wings purplish; seed with a thin testa and green embryo coiled like a snail-shell. (1)

**Order CVII. AMARANTACEÆ. AMARANTHUS.**

*Herbs* similar to the last Order, but with an imbricated involucre of 3 dry, scarious bracts added to the flowers. **Sepals** 3—5 (rarely but 1), persistent and often colored, unchanged in fruit. **Stamens** 3—5. **Ovary** compressed, 1-celled, 1—∞-ovuled. **Style** 1. **Fruit** a utricle, Caryopsis or berry. **Seed** vertical, albuminous. **Embryo** annular.

§ Anther 2-celled. Ovary with many ovules. Cultivated. ........ .......... **CELOSIA**. 1
§ Anther 2-celled. Ovary 1-ovuled. Leaves alternate...(*)
§ Anther 1-celled. Ovary 1-ovuled. Leaves opposite... (a)
* Flowers monoecious or polygamous, all with a calyx and stamens. ........ .......... **AMARANTUS**. 2
* Flowers dioecious, the pistillate with neither calyx nor stamens. .......... **ACNIDA**. 3
a Sterile stamens none.—(Flowers white, paniculate). ........ .......... **IRESINE**. 4
a Sterile stamens none.—(Flowers crimson, &c. Capitate. Cultivated). **GOMPHRENA**. 5
a Sterile stamens 5, the 5 fertile in a tube.—<br>a Heads axillary. .......... **TELANTHERA**. 6
—<br>a Spikes terminal and axillary. .......... **FREILICHA**. 7

1. **CELOSIA**, L. **Cockscomb**. Fls. perfect, 3-bracted. Calyx of 5 sepals. Sta. 5, anth. 2-celled. Stig. 2 or 3, recurved. Utricle circumsiccisile, many-seeded, more or less enclosed in the calyx.—*Herbs* or shrubs, smooth, erect, with alternate leaves and brilliant, scarious flowers.

1 **C. cristata**. Leaves lance-ovate; spikes ovoid-pyramidal, varying in cultivation to fantastic shapes, crimson or even white. (1) E. India. 2—4f.

2. **AMARANTUS**, Tour. **AMARANTH**. Fls. 2 or 2, 3-bracted. Cal. of 5 or 3 sepals. Stamens 3—5, rarely 2, anth. 2-celled. Stig. 2 or 3. Fruit a 1-seeded utricle, circumsiccisile, or tearing, or not opening. (1) Coarse weeds, with alternate petioled lvs. and minute fls. in clusters. Aug.

§ **AMARANTUS proper**. Utricle thin, regularly circumsiccisile. Not spiny... (a)
§ **ECULUS**. Utricle somewhat fleshy, indehiscent, or tearing open... (c)
<br>a Flowers 5-parted, in long panicled spikes,—<br>b crimson-tinted. .......... Nos. 1, 2
—<br>b green. .......... Nos. 3, 4
<br>a Flowers 3-parted, in separate, axillary, dense glomerules... .......... Nos. 5, 6
<br>c Spines 2 in each axil. Bracts not longer than the 5 sepals. .......... Nos. 7
<br>c Spines none.—<br>a Bracts longer than the 3—5-sepalied calyx. .......... Nos. 8, 9
—<br>a Bracts shorter than the 5-sepalied calyx... .......... Nos. 10, 11

1 **A. hypochondriacus** L. **Prince's Feather**. Smoothish; leaves lance-oblong, on long stalks, some reddened; spikes very obtuse, the terminal one much the largest; flowers deep purple. Fields and gardens. 3—6f. § Mexico.

2 **A. paniculatus** Moq. **Prince's F**. Pubescent, pale-green; leaves lance-ovate...
spikes slender, acutish, crowded, all nearly equal, reddish-green, or in β. sanguineus, crimson; bracts short-awned. Fields and gardens. 2—3f. § Mexico.

3. A. retrofleus L. Pubescent, erect, stout; leaves ovate or subrhombic, obtuse-pointed; panicle of thick, crowded, dense spikes; bracts awned, longer than calyx. A common weed in gardens and fields. 2—4f. §

4. A. hybridus L. Erect, glabrous, green; leaves ovate, bright green; panicle loose; spikes terete, obtuse; calyx shorter than the awned bracts. §

5. A. albus L. White Pigweed. Whitish, diffusely spreading; leaves long-petioled, rhomb-ovate, very obtuse; glomerules remote, in pairs, 4- or 5-flowered; common. §


β. tricolor. Leaves variegated with purple, green, and yellow.

7. A. spinosus L. Much branched; leaves rhomb-ovate, obtuse, with 2 spines in each axil; spikes panicked, erect, acute; bracts equalling the sepals; utricle falling without opening. Waysides, Penn. to Fla., and W. §

8. A. lividus Moq. Erect, smooth, livid-purplish; lvs. elliptic, obtuse, emarginate; spikes slender, rigid, acute; sepals thrice longer than bracts; fruit rugous. §

9. A. deflexus L. Ascending, ashy-green, branches deflexed; leaves rhomb- lanceolate, obtuse; spikes thick, obtuse; sepals longer than bracts; fruit smooth. §

10. A. viridis L. Erect; livid-purple; leaves long-petioled, ovate; spikes panicked, rather loose and long; sepals twice longer than the bracts. Waste grounds, S.

11. A. pumilus Raf. Diffuse or prostrate; leaves sub sessile, obovate; flowers in axillary, sessile glomerules; fruit twice longer than the calyx. Sandy sea-coasts.


§ ACNIDA proper. Utricle indehiscent, longer than its stigmas. No. 1
§ MONTELIA. Utricle circumcissile, shorter than its stigmas. No. 2

1 A. cannabina L. Leaves lanceolate to linear, pointed, 2–3′; 5 spikes numerous, rather dense, 2–4′; 5 spikes interrupted; panicle leafy; fr. 1′, obovoid, bracts as long. Salt marshes. 3—6f. The two sorts quite dissimilar.

2 A. tamariscia. Leaves lance-oval, 1–5′; spikes interrupted and leafy at base, or throughout; 9 bracts longer than the ovary. Wet shores, E. and W. 1–6f. The 5 plant scarcely differs from § No. 1.

4. IREŠINE, Br. Fls. 5 or 8, 3-bracted. Calyx of 5 erect sepals. Sta. 5, anther 1-celled. Stigmas 2 or 3. Utricle valveless, included in the calyx.—Leaves opposite, petiolate. Flowers minute, scarious, white, in dense spikes or heads. September, October.

I. celosioiides L. Branches opposite, strict; leaves ovate-lanceolate; flowers in numerous delicate panicled spikes. 1 Banks, W. and S-W. 2—4f.

5. GOMPHRÈNA, L. GLOBE AMARANTH. Fls. 3-bracted. Cal. 5-sepalled, erect. Fil. 5, 3-cleft at apex, middle tooth bearing the 1-celled anth. Stig. capitulate. Fr. as in Iresine. Tropical plants. Lvs. opposite. Flowers in heads.

G. globosa. Trichotomously much branched; leaves oblong, entire; flowers fadeless bright purple, in heads 1′ diameter. 1 E. India. 1—2f.

6. TELANTHERÈ, Br. Fls. 3-bracted. Cal. of 5 sepals. Stamens 5,
with 5 intervening sterile filaments, anth. 1-celled. Stig. capitate. Fr. as in Iresine. Leaves opposite. Heads axillary and terminal.

**T. polygonoides** Moq. Procumbent, diffuse, hairy; leaves oval, obtuse, attenuate to a winged petiole; flowers silvery white. 24 Waste grounds, S.


**Order CVIII. LAURACEÆ. Laurels.**

*Trees and shrubs* aromatic, mostly with alternate, simple, punctate leaves. *Flowers* with a colored perianth of 4—6 slightly united, strongly imbricated sepals. *Anthers* 2- or 4-celled, opening upward by as many recurved, lid-like valves. *Ovary* 1-celled, 1-ovuled, free, in fruit a berry or a drupe. *Seed* without albumen.

§ Flowers perfect. Stamens 12, the 3 inner sterile.—α Evergreen trees…………………**Perska.** 1

—α Leafless vines. S. Fla.…………**Cassya.**

§ Flowers dioecious. Stamens 9, all fertile. Leaves deciduous…(*)

* Involucre none. Anthers 4-celled, 4-valved. Leaves lobed…………………**Sassafras.** 2

* Involucre 4-leaved. Anthers 2-celled, 2-valved. Leaves entire…………**Benzoin.** 3

* Involucre 4-leaved. Anthers 4-celled, 4-valved. Leaves entire…………**Tetranthera.** 4

1. **PÉRSEA**, Gært. Red Bay. Bay Galls. Fls. γ, umbellate, with no involucre. Cal. of 6 sepals. Sta. 12, the 3 inner sterile, reduced to mere glands, anth. 4-celled (2 cells above and 2 below). Drupe oval, seated on the persistent calyx, containing 1 large seed. 6

**P. CAROLINÉNIS** Mx. Tree 30—40f, often but a shrub, with lance-oblong, entire, firm leaves, 6'; umbels small, on ped. 1—2'; drupe oval, blue. Swamps, Va. to Fla. Bark deep-furrowed; wood fine, rose-colored. April, May.

2. **SÁSSAFRAS**, Nees. Sassafras. Fls. δ γ. Calyx 6-parted, deciduous. α Sta. 9, the 3 inner with a pair of glands at base, anth. 4-celled. γ Sta. 6, all sterile. Ov., style, and stig. 1. Drupes ovoid, blue, on thick red pedicels. 6 Flowers yellow, appearing before the leaves in Mar.—Jn.

**S. officinâle** Nees. Shrub or small tree, 10—20f; leaves of two forms—ovate and entire, or 3-lobed, cuneate at base; flowers handsome, in racemes or corymbs. Fields and woods. Bark pleasantly aromatic.

3. **BENZOEIN**, Nees. Spice Wood. Flowers δ γ, with 4 involucrate scales. Cal. 5- or 6-parted. δ Sta. 9, the inner 3 glandular at base, anth. 2-celled. γ Sta. 13—18 rudiments. Drupe obovoid, red. 6 Lvs. entire. Fls. yellow, in small lateral clusters before the leaves. (Lindera, Thunb.)

1 **B. ODORIFERUM** Nees. Shrub 6—12f; leaves lance-obovate, acute at base; buds and pedicels smooth. Moist woods: common. May.

2 **B. MELISSÆFOLIUM** Nees. Shrub 2—3f; leaves lance-oblong, abrupt or cordate at base; buds and pedicels villous. Swamps, S. February, March
Order 110.—Santalaceae.

4. Tetranthera, Jacq. Pond Spices. F. as in Benzoin, but the anthers are 4-celled and 4-valved as in Sassafras. Drupe globular (red). _FLOWERS_ yellow, precocious. February, March.

T. geniculata Nees. Shrub 8–15f, with branches and branchlets very crooked and divaricate. Leaves small, oval to oblong. Swamps, S.

Order CIX. Loranthaceae. Loranthus.

_Shrubby plants_, parasitic on trees, with thick, opposite, exstipulate leaves. _Flowers_ mostly diclinous, an adherent _calyx_ of 2–8 lobes, with _stamens_ of the same number, opposite the calyx lobes. _Ovary_ 1-celled, becoming a fleshy fruit with one albuminous seed. (See Addenda.)

Phorodendron, N. Mistletree. F. ₂ ₂, in jointed spikes, mostly 3-lobed. ₂ Anth. sessile on the base of each lobe, the 2 cells divergent. ₂ Stig. sessile (no stamens). F. a pulpy, viscous berry.—Herbage yellowish-green. Stems brittle, woody, firmly engrafted on the limbs of oaks, elms, &c.

P. flavescens N. Stems much branched, 1–1½f; leaves wedge-obovate, thick, entire, as long as the spikes; berry white, pellucid, sticking to the limb which it touches until it takes root.

Order CX. Santalaceae. Sandalworts.

_Trees, shrubs, and herbs_, with alternate, undivided leaves, with the _calyx_ tube adherent to the ovary, limb 4–5-cleft, valvate. _Stamens_ as many as the sepals, and opposite to them. _Ovary_ 1-celled, with a free central placenta bearing at top 2–4 suspended ovules, but in _fruit_ drupaceous, 1-seeded, crowned with the persistent calyx.

₇ Half-shrubby. Anthers connected to the sepals by a tuft of hairs................._Comandra._ 1
₈ Shrubs. Anthers free.—₇ Flowers 4-parted, with 4 petals in the ₂ flowers................._Buckleya._ 2
₈ Flowers 5-parted, all apetalous. Leaves alternate................._Pyrularia._ 3

1. Comandra, N. Bastard Toadflax. Calyx tube adherent, limb 4- or 5-parted. Anth. 4 or 5, connected as above mentioned. Fil. on a 5-lobed perigynous disk.—Smooth plants, with herbaceous branches and whitish flowers in small umbels.

1 C. umbellata N. Flowers perfect; branches strict, corymbed above; leaves oblongate, subsessile; umbels 3-flowered, exceeding the leaves; connecting hairs yellow. Rocky woods. ½f. Leaves scattered, 9f. June.

2 C. Darbya A. DC. Flowers dioecious; branches short, leafy; leaves elliptical, mostly opposite; umbels 5-flowered, shorter than the leaves; connecting hairs white. Woods, S.; rare. 1–2½f. The fertile plant unknown.

2. Buckleya, Torr. F. ₂ ₂, the ₂ with a double calyx, the inner (corolla) caducous, and without stamens. Sty. 4-lobed. ₂ Calyx single, 4-lobed, with 4 stam. Fruit oblong, 10-furrowed, 1-seeded. ₇ Leaves subsessile, entire. Sterile flowers clustered, fertile solitary.
ORDER 112.—ELÆAGNACEÆ.

B. distychothylla Torr.—Mountains of E. Tenn. Shrub 10—20f; leaves ovate, acuminate; fruit 8—9' long, resembling that of Forestiera.

3. PYRULÀRIA, Mx. Oil-nut. Fls. S 2. Calyx 5-cleft, half-adherent by the 5-toothed disk. Style 1, stigmas 2 or 3. Drupe pear-shaped, 1-seeded, with the albumen very oily. 5

P. pübera Mx. Shrub 4—6f, spineless, with oval-oblong leaves and small greenish flowers in terminal racemes; drupe 7—9'. Mountain streams, Pa., and S. May.

ORDER CXI. THYMELACEÆ. DAPHNADS.

Shrubs with a very tough, acrid bark, entire leaves and perfect flowers, with the calyx tubular, colored, the limb 4-(4- or 5-)parted, regular, the tube bearing the stamens, as many or usually twice as many as its lobes, and free from the ovary, which is 1-celled, 1-ovuled, the suspended seed with little or no albumen.

1. DIRCA, L. Leatherwood. Cal. colored, tubular, limb obscurely 4-toothed. Sta. 8, exserted. Style 1. Berry 1-seeded. 5 Fls. opening before the oblong-ovate, alternate leaves, 3 from each bud.

D. palûstris L. Shrub 3—5f, along streams, with very tough bark; flowers 4", yellowish, in April, May; berry oval, small, red.


1 D. MEZÈREUM. Shrub 1—3f, with very smooth lanceolate leaves appearing later than the lateral clusters of rose-purple, sweet-scented flowers.

2 D. ODORA. Shrub 2—3f; leaves lance-oblong, evergreen; clusters terminal, roseate, very fragrant. Greenhouse.

3 D. LAUREOLA. Shrub 1—5f, hardy, with large oblong-lanceolate, shining, evergreen leaves and axillary clusters of greenish flowers.

ORDER CXII. ELÆAGNACEÆ. OLEASTERS.

Shrubs or trees usually with the leaves covered with a silvery scurf, entire. Flowers mostly dioecious, the calyx free, entire, persistent, becoming in fruit pulpy and berry-like, enclosing the 1-celled, 1-seeded achenium. Embryo straight, with little albumen.

* Flowers perfect. Stamens 4. Leaves alternate, petiolate, entire...ELEAGNUS. 1
* Flowers dioecious. Stamens 8. Leaves opposite, after the flowers...SHEPHERDIA. 2
* Flowers dioecious. Stamens 4. Leaves alternate, after the flowers...HIPPOPHÈ. 3

1. ELEAGNUS, L. Oleaster. Cal. 4-cleft, colored within. Sta. 4, alternate with the sepals. Achenium enclosed in the mealy, 8-furrowed calyx tube. 5 With silvery foliage.

1 E. ARGÉNTEA Ph. Silverberry. Shrub 8—12f; leaves broadly or narrowly elliptical, acute, 1—2'; flowers axillary, deflexed, canescent. Dakota, and W.

2 E. HORTÉNSIS. Tree with narrow-lanceolate, acute leaves; flowers axillary, erect.—Also, E. LATIFOLIA, with evergreen leaves, is cultivated.
2. SHEPHERDIA, N. Fls. 6. Cal. 4-cleft. Sta. 8, with 8 glands. Berry globular, fleshy. Spinescent.

1 S. CANADENSIS N. Shrub 6-8 ft; leaves elliptic-ovate, clothed beneath with stellate hairs and rusty scales, nearly smooth above. Banks of streams, N. Clusters subsessile. Berry sweetish.

2 S. ARBORETA N. Buffalo Berry. Tree 12-18 ft; leaves oblong-ovate, obtuse, both surfaces smooth and covered with silvery scales. Fruit the size of a currant, scarlet, well-flavored. Missouri.

3. HIPPOPHAE Rhamnoïdes. Shrub with lance-linear leaves, silvery white beneath, and a crowd of yellow, acid drupes. Europe.

Order CXIII. Euphorbiaceæ. Spurgeworts.

Herbs, shrubs, or trees, usually with a milky, acrid juice. Flowers dichotous, sometimes enclosed in a cup-shaped involucre. Calyx inferior, sometimes wanting. Corolla scale-like or colored, often wanting. Ovary free, sessile or stipitate, 2-, 3- (or more) - carpelled; styles distinct or united. Fruit of 2, 3 (or more) 1-2-seeded carpels (rarely of 1 carpel) united to a common axis, at length separating. Embryo in fleshy albumen. Fig. 142.

Cells of the ovary 1-ovuled; fruit cells or carpels 1-seeded... (c)

Cells of the ovary 2-ovuled; fruit cells or carpels each 2-seeded... (x)

* Flowers in a cup-shaped involucre, the 6 many, each merely a stamen, the 6
  only 1,— an ovary exerted on a pedicel.---------------------Euphorbia.

* Flowers not in an involucre, 6, all apetalous, with a calyx only... (d)


a Stigmas and carpels 3. Fruit dry, capsular... (x)

b Stamens erect in the bud, 2-4 in number... (c)

b Stamens erect in the bud, 8-∞ in number... (d)

b Stamens inflexed in the bud. 6 Flowers usually with small petals... (x)

c Staminate calyx imbricated in bud. Anthers pendulous. Tree. S. Fla... Sebastiana buxifolia.

c Stam. calyx imbricated in bud. Anthers erect. Flowers in spikes... Stillingia.

c Stam. calyx valvate in bud. Flowers in racemes. Plant downy... Trigia.

b Flowers in cymes, with white, imbricated sepals. Stinging... Jatropha.

b Flowers in small spikes with large bracts. Sepals valvate... Acalypha.

b Flowers in long interrupted spikes. Sepals 3, valvate in bud... Mercurialis.

b Flowers in panicles. Leaves palmately lobed, glabrous... Ricinus.

b Leaves oblanceolate. Leaves palmately lobed, glabrous... Ricinus.

b Flowers 3- or 2-celled and -seeded. Plants hairy, downy... Croton.

b Flowers 1-celled and -seeded. Plants silky-scurfy... Crotonopsis.

z Calyx 5-6-parted; stamens 3, united. Flowers axillary, small... Phyllanthus.

z Calyx 4-parted; stamens 4, distinct, large. Flowers in bracted spikes... Pachysandra.

z Calyx 4-parted; stamens 4, distinct. Fls. axillary. Shrub. Lvs. opposite... Buxus.
volucre calyx-like, 4- or 5-lobed, often with 4 or 5 large glands. \( \varphi \) Fls. 9 or more, each a stamen with a bract. \( \varphi \) Flower central, a 3-celled, 3-ovuled ovary on a pedicel. Styles 3, 2-cleft. Caps. 3-lobed, separating into 3 nutlets.—Plants with a milky juice.

§ Shrubs of the greenhouse, with scarlet bracts or involucres. Nos. 33-35
§ Herbs, erect, without stipules. Leaves alternate or opposite. (a)
§ Herbs, mostly prostrate, diffuse. Leaves all opposite, oblique at base, small, furnished with small stipules at base. Glands of the involucre 4, usually white-margined. 1 May—Nov. (c)

a Glands of the involucre 5, bordered with white petaloid appendages. (b)
a Glands of the involucre 4 or 5, crescent-shaped or 2-horned. (c)
a Glands of the involucre 1-5, neither white nor horned. (d)

b Heads pedunculate. Branches regular. Leaves oblong to linear. Nos. 1, 2
b Heads pedunculate. Branches irregular. Leaves oval or ovate. Nos. 3, 4
b Heads nearly sessile. Leaves with broad white margins. No. 5

C Umbel of many rays. Stem leaves narrow, alternate. Seeds smooth. 2\( \ell \)... Nos. 6, 7
C Umbel of 3 rays, and forked. Stem leaves alternate, thin. Nos. 8, 9, 10
C Umbel of 3 or 4 rays, and forked. Stem leaves opposite, thick. No. 11

d Inflorescence a simple terminal cluster. Leaves toothed or lobed. Nos. 12, 13
d Inflorescence a forked cyme, peduncles in the forks. Lvs. entire. Nos. 14, 15
d Inflorescence a compound umbel. Heads terminal. (e)

e Seeds reticulated or wrinkled. Leaves serrulate. Nos. 16, 17
e Seeds smooth and even, -\( k \) in a rough, warty fruit. Nos. 18-20
\(- k \) in a smooth and even fruit. Nos. 21-23

x Leaves serrulate or serrate. Seeds roughened with wrinkles or pits. (y)
y Stems ascending or erect. Plants smooth or smoothish. Nos. 24-26
y Stems flat on the ground, spreading, mostly hairy. Nos. 27, 28

x Leaves entire. Seeds smooth and even. Plant glabrous. Nos. 29-32

1 E. corollata L. Flowering S. Erect, glabrous, or subglabrous; umbel 3-7-rayed, rays 3- and 2-forked; lvs. oblong to oblong-linear, obtuse, those of the umbel whorled or opposite; involucre glands obovate, petaloid. 2\( \ell \) Dry fields. 1-2\( \ell \). July, Aug.

b. angustifolia. Leaves oblong-linear; umbel becoming irregular. S.

2 E. Curtisii Eng. Smooth, slender, branched from base, divisions about 3-forked, then 2-forked; leaves opposite or in 3's, linear-oblong or linear; heads minute; involucre glands narrowly white-bordered. 2\( \ell \) Barrens. S. 1\( \ell \). (E. discoidalis Chapm.)

3 E. pubentissima Mx. Hairy, 2 or 3 times forked; leaves oval or ovate-oblong, petiolate or subsessile, scattered, the floral much smaller; heads minute; involucre glands minutely white-margined, entire. Dry. S. 1\( \ell \). (E. paniculata Ell.)

4 E. mercurialina Mx. Stem naked below, leafy, and 3- or 2-forked above, pubescent; leaves oval or ovate, petiolate, mostly opposite; involucre lobes crenulate, white. Tenn.: rare. 8-10'. Too near to the preceding.

5 E. marginata Ph. Leaves lance-oblong, sessile, the floral crowded, and with a broad white margin; umbel 3-rayed, capitulate. 1\( \ell \) Ky., and W. 19. †

6 E. Cyparisssias L. Lvs. linear, much crowded, the floral broad-cordate, all sessile; umbel of many simple rays; glands lunate. 2\( \ell \) Fields and gardens. 1\( \ell \)

7 E. Esula L. Lvs. lance-linear, the floral broadly cordate; umbel of many forked rays, and scattered branches below; glands 2-horned. Fields; rare. §

8 E. Peplus L. Leaves round-cuneate, the floral ovate; umbel of 3 (rarely 5) forked rays; carpels doubly wing-keeled on the back. Fields, N. Eng.: rare. § Europe.

9 E. Ohiótica Stend. Smooth, erect from a decumbent branching base; lvs. mostly floral, reniform, sessile, the pairs appearing orbicular; carpels not winged; glands 2 horned. 2\( \ell \) Woods, Ohio, W. and S. 1\( \ell \). (E. commutata Eng.)
10 **E. tetraphora** Eng. Leaves linear-spatulate, the floral larger, transversely ovate; umbel 8-rayed; seeds 4-pitted on the inner face. 1 Ga. to La. 10'.

11 **E. Lathyris** L. *Caper S.* Stout, 2 or 3' high; leaves sessile, lance-linear, all opposite; umbel 4-rayed, then forked; glands horned. Gardens, and §.

12 **E. heterophylla** Mx. Stem with scattered branches, 1-3'; leaves ovate, or sinuate-lobed, or panduriform, all petiolate and scattered, the upper stained red on the margins; gland 1, sessile. Iowa to Ga. June, July.

13 **E. dentata** Mx. Stem 8'-2', hairy, with opposite branches; leaves opposite, ovate, *dentate*, petiolate; heads subsessile; seeds tubercled, round and black; gland 1 or more, stalked. 1 Shades, Penn. to Iowa and La.

14 **E. Ipecacuanhae** L. Root long, stems clustered, slender, diffusely forked; lvs. opposite, all oblong to linear, obtuse, sessile; heads on filiform pedicles; seed white, compressed, pitted. 24 Sands, coastward. 8-12'. (E. gracilis Ell.)

15 **E. nudicaulis** Chapm. Slender, forking above; leaves minute (4'), ovobate, the upper opposite; heads minute, glands margined, greenish. 24 Fl. Ga.

16 **E. Helioscopia** L. Stout; umbel 5-rayed, rays trifid, and forked; lvs. cuneate to obovate, whorled above; glands round, stalked. 1 Waysides, N. §

17 **E. dictyosperma** F. & M. Slender; umb. once or twice 3-forked, then 3-forked; floral leaves roundish-ovate, subcordate, cauline oblong-spatulate to obovate; fruit wary, *seeds reticulated*. 1 Ky., and S.W. (E. Arkansana C.B.)

18 **E. Darlingtonii** Gray. Tall (2-3'); umbel 5-8-rayed, rays forked or trifid; leaves entire, oblanceolate, the floral oval. 24 Woods, Penn., and S.

19 **E. platyphylla** L. Erect, 8-16'; umbel 5-rayed; leaves lance-oblong, subcordate, serrulate, the floral triangular-ovate. 1 Lake shores, N. §

20 **E. obtusata** Ph. Erect, 1-2'; umbel 3-rayed, rays trifid or forked; leaves all sessile, serrulate, obtuse, the floral roundish-cordate, the lower oblanceolate; fruit very wary. 1 Woods, Va., and W.

21 **E. inundata** Torr. Smooth, erect; umb 3-rayed, and forked; leaves entire, sessile, lanceolate to oblong-ovate; glands round, entire; seeds globous. 24 Wet barrens, Fl. 6-12'. Heads on slender peduncles. Root woody.

22 **E. sphacelospérmá** Shutt. (E. Floridana Chapm.) Lvs. lance-linear to cordate-ovate; heads green, glands crinate. Otherwise like No. 21. 24 Dry. Fl. 1-2'.

23 **E. telephlioildes** Chapm. Plant some fleshy, 2-5' high; lvs. ovate, large on the stem, small on the umbel. Otherwise like No. 22. 24 West Fl. May, June.

24 **E. hypericifolia** L. St. 1-2'; lvs. 6-12', oval-oblong, serrate all around; eds. oval, obtusely 4-angled, wrinkled and tubercled, black. 1 Fields: common.

25 **E. glyptospérmá** Eng. St. 5-10'; lvs. 4-6', linear-oblong, serrulate toward the apex; stip. fringed; eds. ovoid, obtuse-angled, wrinkled, amber-color. Wis., and S.W.

26 **E. maculata** L. Hairy; leaves oblong, serrulate, often with a brown spot; stip. minute; seeds sharply angled, obscurely wrinkled, reddish. Sandy fields: common.

27 **E. humistrata** Eng. Hairy; lvs. elliptic-ovobovate, serrulate at apex, rarely spotted; stipules fringed; seeds obtuse-angled, oval, roughened, brownish. Banks, W.

28 **E. serpyllifolia** Pers. Smooth; lvs. obovate-oblong, serrulate at apex, seldom spotted; stipules fringed; seeds acutely 4-angled, cross-wrinkled. Banks, W.

29 **E. polygoniifolia** L. Lvs. oblong-linear; glands of invol. not appendaged; seeds large (1' long), ovoid, smooth and wisthish. Sandy sea and lake coasts.

30 **E. Geyeri** Eng. Leaves oblong-ovobovate; glands with narrow appendages; seeds small (1'), ovoid, acute, obtusely 3-angled, ash-colored. Sandy soils, N.W.

31 **E. serpens** H. B. K. Lvs. round-ovate, very small (1-2'); stip. triangular; glands scarcely appendaged; pod acutely keeled, seeds ovoid-3-angled. Ill. to La.

32 **E. cordifolia** Ell. Lvs. 4-6', cordate-oval; glands conspicuous-ly white-appendaged; pods and seeds as in No. 31. Fields, South. Spreading 1f.

33 **E. splendens**. Shrubby and fleshy, thorny; lvs. ovate, acute both ways; ped. axillary; floral leaves in pairs, broader than long, scarlet. Madagascar.
34 E. fulgens. Not spiny; lvs. lanceolate, pointed both ways, floral lvs. soon falling; lobes and appendages of the involucre red and purple. Mexico.
35 E. pulcherrima (or Poinsettia). Floral leaves lanceolate, of a brilliant red, lower leaves wedge-oblong, often fiddle-shaped, all pointed. Mexico.


1 S. sylvática L. Herbaceous; stems clustered; leaves subsessile, lance-linear to lance-oblong, and obtuse to acuminate, crenate-serrulate; spikes yellowish, longer than the leaves; glands cup-shaped. ♀ S. 1–3f.
2 S. aquática Chapm. Shrubby; stem single; lvs. short-stalked, lanceolate, acute, sharply serrulate; spikes shorter than the leaves; glands peltate. Fls. 3–6f.
3 S. ligustrina Mx. Shrubby; leaves lance-ovate, petiolate, entire; stipules ovate; spikes shorter than the leaves; sta. 3. Swamps, S. 6–12f. (Sebastiania, Muller.)
4 S. sebifera L. Tallow Tree. Tree 30–40f; lvs. long-petioled, rhomboidal, acuminate, entire; fruit rough, blackish, seeds white. S. ♀. (Exoeccaria, Mul.)

1 T. macrocarpa Willd. Slender summits of the branches twining; lvs. cordate-ovate, acuminate, serrate; rac. long (3–4); fr. 5–6’. Copses, Ky., and S. 2–4f.
2 T. urticaefolia Mx. Erect, hairy, sparingly branched; leaves deltoid-lanceolate, truncate at base, sharp-serrate; fruit very hairy. Dry. S. 1–2f.
3 T. innóeua Walt. Erect, branched, puberulent; leaves ovate-oblong, varying to linear, coarsely few-toothed or entire. Dry. S. 1f. (T. urceus L., but it does not sting as Linneus supposed.)


J. urceus, β. stimulosa Mul. Low, hispid with bristly stings; leaves half 3-5-lobed, cordate, lobes lanceolate, serrate; sepals white, oval, spreading; corolla 0. Sandy woods, S.: common. Stings white, ♀ long. March—July. (Cnidoeoleus, Pohl.)

5. ACALÝPHA, L. THREE-SEEDED MERCURY. Fls. ♂, in short clusters or little spikes, surrounded by a large cut-toothed bract. Cor. 0. ♂ Calyx 4-parted. Sta. 8–12, monadelphous, with halved anthers. ♀ Calyx 3-parted. Styles 3, each 2–∞-cleft. Fr. 3 nutlets. ① Weeds resembling Nettles, with stalked alternate leaves (and ♀ tropical). Summer.

1 A. Virginica L. Leaves lance-ovate, obtusely pointed, obscurely serrate, equal ling their petioles (1–2); sterile spikes hardly exserted. Dry. 10–20'.
β. gracillenta. Leaves narrower, on shorter stalks; ♀ spikes exserted.
2 A. Caroliniana Walt. Lvs. ovate, cordate, closely and strongly serrate; § spikes axillary, 9 terminal, fruit soft-chelinate, bracts with linear lobes. W. and S.

6. MERCURIÀLIS, Tourn. Fls. 5, apetalous, axillary, in bractless spikes or fascicles. Calyx 3-parted. Sta. 10—20, anth. 2-celled, extrorse. Fruit 2-carpelled, 2-seeded.—Herbs with opposite, petiolate leaves.

M. ãnuua Willd. Lvs. lanceolate, &c., thrice longer than the stalks; branches opposite; 3 spikes long, interrupted, seeds oval, pitted. (1) Waysides, S.: rare. §

7. RÍCINIUS, Tourn. Castor Oil Plant. Fls. 5, apetalous. Calyx 3—5-parted, valvate in the bud. § Sta. ï, with irregularly united filaments. 9 Style short, stigmas 3, 2-parted, plumous, colored. Capsule echinate, 3-lobed, 3-celled, 3-seeded.—Herbs or shrubs.

R. communis L.—A stout 9 herb with peltate, palmioded leaves, 4—12', divided into lance-shaped lobes. Southward it becomes a shrub, or tree 10—20f. Cult. for its seeds, yielding the castor oil, or for the ornament of its splendid foliage. E. India.

8. CROTON, L. Fls. 5. Calyx 4—8-parted. Petals hypogynous, 4—8, mostly minute, often (especially in the 9) wanting. 5 Disk with 4—6 lobes. Sta. 5 or more, anthers inflexed in the bud. 9 Ovary 3-celled, styles 3, 1—3-times forked. Fruit 3-carpelled, 3-seeded.—Plants glandular, clothed with scurf or stellate hairs. Leaves alternate.

§ Downy. Fertile calyx 5-parted, with 2 styles, and pendulous.................No. 1
§ Hairy or scaly. Fertile calyx 5-parted, with 3 styles, each 2 or 3-cleft. . . . .Nos. 2—4
§ Densely woolly. Fertile calyx 8-parted. Styles 3, each twice 2-cleft. . . . .Nos. 5, 6

1 C. monanthygynus Mx. Stellate-downy, di- and tri-chotomously branched; lvs. ovate or subcordate, silvery beneath; fls. in the forks. (1) Prairies, III., and S. 1f.

2 C. glandulósus L. Hiepid, tri-(or 4-)chotomously branched; lvs. clustered at the forks, lance- to linear-oblong, serrate, with 2 concave glands at base; fls. in clusters, the sterile 4-parted, 8-androus. (1) A straggling weed, W. and S. 1—2f.

3 C. argyrânthemus Mx. Clothed with silvery glandular scales, branched at base; lvs. oval to oblong; fls. in a hd. or spike, silvery all over, all 5-parted. 2 Ga., Fls. 1f.


5 C. capítatuS Mx. Lvs. ovate to oblong, long-petioled, obtuse; 9 cal. large (7'), 7—8-cleft; styles 3, each 4-parted to base; seed double-convex. W. and S.

6 C. Ellióttii Chapm. Lvs. lance-oblong, short-petiolate, acnifish; 9 cal. 6' diam., 5—8-cleft; styles 3, each 4-cleft to the middle; seeds plano-convex. (1) S. 2—3f.


C. lineãris Mx.—Sandy swamps, N. J. to Ill., and S. Stems as slender as Flax, repeatedly trifid and forked, 1—2f. Leaves linear-oblong, 6—10". June—Sept.

10. PHYLLÁNTHUS, L. Flowers 5, axillary. Calyx in 5 or 6 segments. Petals 0. Stam. 3, very short. Styles 3, bifid. Ovulies and seeds 2 in each 2-valved carpel.—Leaves alternate, in 2 ranks.

P. Carolinénsis Walt. St. slender, with alternate branches; lvs. oval, 6—10", the ramial much smaller; flowers subsolitary. (1) Pa. to Ill., and S. 6—18". June—Aug

**P. procumbens** Mx. Lvs. ovate to obovate, coarsely toothed, clustered above the spikes, which are all near the base of the stem. Va. to Ky., and S. March—May.


**B. sempervirens**. A tree of slow growth, fine-grained wood, in Europe. The dwarfed varieties are planted in gardens for edgings.

**Order CXIV.** URTICACEAE. Nettleworts.

Plants of various habit, with stipules (which are often early deciduous) and with small inconspicuous, mostly diclinous flowers. Calyx regular, free from the 1-celled ovary. *Stamens* as many as the calyx lobes and opposite to them. Fruit a 1-seeded samara, drupe or achenium, separate or aggregated. The following groups have usually been regarded as Orders.

**Order 114.** URTICACEAE.

6. **ULMACEAE**. Trees with colorless innoxious juice. Flowers habitually perfect, not in aments. Fruits separate. No albuminous. (Figs. 181, 256, 295, 316, 332, 509)...

31. **ARTOCARPEAE**. Trees with milky poisonous juice. Flowers diclinous, in aments or heads. Fruits aggregated. Seed albuminous. (Figs. 195-6, 298, 349)...

32. **URTIMEAE**. Herbs. Flowers diclinous, not in aments. Filaments crenate. Fertile calyx 3-5-parted. Embryo straight. (Fig. 503)...

33. **CANNABINEAE**. Herbs. Flowers diclinous. Filaments straight. Fertile calyx of 1 sepal, spathe-like. Embryo curved or coiled. (Fig. 213)...


* Samara fringed with hairs, hanging on slender ped., 2-beaked ..................Nos. 1—3
* Samara not fringed, nearly sessile,—z slightly notched at apex ..................Nos. 4, 5
  —z cleft down to the seed ..................Nos. 6, 7

1. **U. Americana**, L. White Elm. Lvs. oval, acuminate, doubly serrate; flowers in .000, umbel-like clusters; fruit oval, 6", its 2 beaks with points incurved and meeting. A majestic tree, with ascending branches and often long pendulous "weeping" branchlets. Native, and everywhere cultivated.
ORDER 114.—URTICACEÆ.

2. **U. racemosa** Thomas. *Cork Elm.* Smaller tree, with rigid branches; branchlets downy, often with wing-like corky ridges; flowers 2—4 in each fascicle, which are arranged in racemes. N. H. to Wis., and S. 20—30f.

3. **U. Floridana** Chapm. Tree 30—40f, with brittle branches, smooth; lvs. thick, acute; fruit orbicular, 2—3f, its teeth broad and erect. W. Fla.

4. **U. alata** Mx. *Winged Elm.* Whahoo. Tree. With its branchlets here and there winged with 2 corky ridges; leaves lance-oblong, acute, 1—2f; flowers racemed; fruit downy all over, with its 2 beaks slender. Ill. to Va., and S.

5. **U. fulva** L. *Red Elm. Slippery Elm.* Tree 20—40f; buds covered with fulvous down; leaves oblong-ovate, acuminate; flowers reddish, 7-parted, sessile; fruit orbicular. Low grounds. Valued for its very mucilaginous liber.

6. **U. campéstris.** *English Elm.* A stately tree, 50—70f, with rigid branches and dense foliage; leaves small, ovate; stamens 5; fruit nearly orbicular. Europe.

7. **U. montana.** *Scotch Elm. Witch Elm.* Large tree, with ample obovate, cuspidate leaves, rough above, downy beneath; flowers 5-parted; fruit oblong, 1 /. Europe.

2. **PLÁNERA,** Gmel. Fls. 5 3. Cal. lobes and sta. 4 or 5. Stig. 2, oblong, diverging; ova. 1-celled, fruit 1-seeded, wingless, indehiscent. 7

P. *aquática* Gm. Tree 30—40f, elm-like, with small smooth, ovate, acute, serrate leaves and axillary flowers in clusters of 2—5; nut roughened. Swamps, S.

3. **CELTIS,** Tourn. **NETTLE TREE.** *SUGAR-BERRY.* Fls. 5 3. the 5 6-parted and the 3 5-parted. Sty. 2, elongated, spreading. Drupe globular. 5 5 Leaves mostly oblique at base. Flowers subsolitary. Fig. 316.

1. **C. occidentalis** L. Tree 30—70f, with wide-spread branches; lvs. ovate, subcordate, acuminate, serrate, rough-hairy beneath; ped. longer than the petiole; sepals triangular-ovate, erect, white; drupe 3f, dark purple. Woods, &c.

β. *crassifolia.* Leaves cordate, thick, mottled with dark and light green.

γ. *integrifolia.* Leaves smooth, subentire; bark smooth. W. and S.

2. **C. pumila** Ph. A straggling shrub, 3—10f, with broad-ovate, acute, smooth, serrate leaves; calyx of 5 obovate-linear spreading segments, 2f. Woods, S.

4. **FICUS,** Tourn. Fig. **BANIAN.** Fls. 3, minute, fixed upon the inner surface of a hollow receptacle. 3 Calyx 3-parted, sta. 3. 2 Calyx 5-parted, ovary 1, seed 1. Fruit (syconus) composed of the enlarged, fleshy receptacle enclosing the numerous dry, imbedded achenia. Fig. 195.

1. **F. Cárica.** **Common Fig.** Leaves cordate, 3-5-lobed, repand-dentate, rough and downy; fig pear-shaped. From Asia. A shrub in our conservatories, a small tree S.

2. **F. Elástica.** *India-rubber Tree,* in the greenhouse, with a straight, simple trunk, and very large (8—10f), shining, thick, obovate leaves. E. India.

3. **F. repens.** Creeping on walls, &c., with ovate, cordate, acute, serrate lvs. E. India.

4. **F. Indica,** the **BANIAN** (§ 207), with many trunks, may grow South.

5. **MACLÚRA,** N. **OSAGE ORANGE.** Flowers 5 3, the 3 racemose, calyx 4-parted. 2 Flowers in a dense globular head. Calyx 4-sepalled, fleshy, finally embracing the obconic achenium, all ripening into a globular *sorosis,* resembling an orange. Style terminal. 5 Juice milky. Leaves alternate, entire. Branches with sharp spines. Fig. 298.

**M. aurantiaca.** Lvs. shining, ovate-oblong, thickish, pointed; fruit yellow when ripe, lactescent, pendulous. Arkansas. Planted for hedges. May, June.

6. **BROUSSONÈTIA,** L’Hér. **PAPER MULBERRY.** Fls. 5 3, in aments.
the ♂ cylindric, the ♀ globular, style lateral, ovary becoming a fleshy club-shaped 1-seeded fr. protruding from the tubular, 3- or 4-toothed calyx.

**B. paprinera.** Tree with a low bushy head, of rapid growth, with rough and downy leaves, ovate or variously lobed; fruit dark red, hispid. Japan. Fig. 196.

7. **MORUS, Tourn. Mulberry.** Fls. ♂, in aments, the ♂ loose, the ♀ dense and spike-like. Cal. 4-parted, sta. 4, sty. 2. Achenium compressed, enclosed in the fleshy calyx, the whole spike thus constituting a compound berry (sorosis). ♂ Leaves alternate, broad, often palmately lobed. Fig. 196.

1 **M. rubra** L. Tree or shrub, 15–60 ft; roots yellow; leaves rough and downy, subcordate, serrate; fertile spikes cylindric; fruit dark red, very sweet.

2 **M. alba. Common M.** Shrubs (here), with smooth and shining, cordate, unequally serrate leaves; fruit whiteish. Introduced for silkworms.

3 **M. nigra.** Tree for ornament and shade, from Persia, with rough, ovate or lobed leaves; fertile spikes oval; fruit reddish-black, acid.

8. **URTICA, Tourn. Nettle.** Fls. ♂, sometimes ♂ ♂. ♀ Calyx 4-sepalled. Ovary a cup-shaped rudiment. Sta. 4. ♀ Sepals 4, the outer pair minute, the inner at length surrounding the shining, compressed achenium. Stig. 1, sessile.—Herbs with stinging hairs. Leaves opposite. Fls. green, in axillary or subterminal clusters or racemes. Summer. Fig. 508.

§ Clusters compound, longer than the petioles. Perennials........ Nos. 1, 2
§ Clusters simple, shorter, or not longer than the petioles. Annuals........ Nos. 3, 4

1 **U. pròcera** Willd. Stem tall (3–6 ft), slightly hispid, with few stings; leaves lance-ovate, 5-veined, uncinate-serrate; spikes panicked above. Waste places: common.

2 **U. dioica** L. St. 1–3 ft, very hispid and stinging; leaves ovate, deeply serrate, the slender point entire; spikes clustered in the axils. Waste: common. §

3 **U. urens** L. Low (1 ft), hairy; lvs. broadly ovate, coarsely serrate, 5-veined; clusters pedunculate, loose, by pairs in each axil. Waste grounds. E. §

4 **U. chamaedrioides** Ph. St. 1–2 ft, with scattered bristles; leaves ovate, crenate-serrate; clusters capitate, 1 or 2 in each axil, spiked above. Ky., and S.

9. **LAPÓRTEA, Gaudich. Wood Nettle.** Fls. in axillary panicles, the ♀ calyx 5-parted, the ♂ of 4 sepals, the 2 inner larger. Sta. 5. Stig. subulate. Achenium flat, ovate, very oblique. 24 Hairs stinging. Lvs. ample, ovate, petiolate.

**L. Canadénsis** Gand. Leaves 3–5', acuminate, serrate; flowers minute, green, in panicles, 1–2', the lower sterile. Damp woods. 2–6 ft.

10. **PILEA, Lindl. Richweed.** Fls. in dense axillary clusters, the ♂ with 3 or 4 sep. and sta. ♀ Sepals 3, unequal, oblong. Sta. 3 rudiments. Achenia roughened, erect, ovate. 1 Smooth, stingless. Stipules united.


11. **BEHMÈRIA, Jacq. False Nettle.** ♀ Calyx 4-parted, with lanceolate, acute segments. Stamens 4. ♀ Calyx tubular, truncate, or 4-toothed, persistent and closely investing the ovate, pointed achenium.—Herbs or shrubs, stingless. Flowers minute.

**B. cylindrica** Willd. Erect, simple; leaves generally opposite, on long petioles,
Order 116.—Callitrichaceæ.

ovate, acuminate, dentate; upper spikes interrupted, leafy at top, sterile, lower dense, fertile. 2 A coarse weed in swamps. 2–3f. Spikes 1–6'. July, August.

b. lateritiora has narrower leaves, shorter stalks, all alternate.

12. Parietaria, Tourn. Pellitory. Fls. polygamous, in clusters, surrounded by a many-bracted involucre. 2 Cal. 4-sepalled. Sta. 4, at first incurved, elastically expanding. 2 Stigma tufted. Ach. polished, enclosed within the persistent, 4-lobed calyx.—Herbs weed-like, with alternate leaves. Clusters of green flowers axillary.

1 P. Pennsylvánica Muhl. Lvs. oblong-lanceolate, veiny, tapering to an obtuse point, entire; involucre longer than the flowers. 2 Rocky shades. 6–12'.

2 P. Floridâna N. Leaves round-ovate, obtuse, entire, on long petioles; flowers as long as the involucre. 2 Damp sands, 5. 10'. (P. debilis Forst. ?)

13. Humulus, L. Hop. Fls. 2, the 2 with 5 sep. and sta. Anth. with 2 terminal pores. 2 Aments with large imbricated, entire, 1-flowered bracts. Cal. of 1 sepal, investing the achenium. Styles 2. Embryo coiled. 2 Twining with the sun. Leaves opposite. Fig. 213.


14. Cannabis, Tourn. Hemp. Flowers 2, the 2 with 5 sep. and sta., in panicles. 2 In spikes. Cal. a single spathe-like sepal enfolding the 2-valved cariopsis. Embryo curved. 2 Leaves opposite, digitate.

C. sativa L.—Fields, waste grounds. Tall, erect, 4–8f. Leaves petiolate, regularly formed of 5–7 lanceolate-serrate leaflets. Cultivated S-W. June. 2

Order CXV. Saururaceæ. Saururads.

Herbs with jointed stems, alternate, entire leaves furnished with stipules. Flowers in spikes, perfect, naked, having neither corolla nor calyx. Stamen definite. Ovary 3–5, more or less united. Fig. 15.


S. cérnus Wild.—Common in marshes, 1–2f. Leaves 4–6'. Spikes slender, recurved at the more slender top, its flowers whitish. July, August.

Order CXVI. Callitrichaceæ. Starworts.

Herbs aquatic, small, with opposite, simple, entire leaves. Flowers axillary, solitary, very minute, polygamous, achatamydeous, with 2 colored bracts. Stamen 1, rarely 2; filament slender; anther 1-celled, 2-valved, reniform. Ovary 4-celled, 4-lobed; ovules solitary. Styles 2; stigmas simple points. Fruit 1-celled, 4-seeded, indehiscent. Seeds albuminous.

Callítriche, L. Character the same as that of the order. 2 Very delicate.
Order 119.—Empetraceæ.

* Stems short (8"—2"), spreading on moist grounds. Leaves reniform... Nos. 1, 2
* Stems (3—16") growing in water. Fruit sessile.—x Leaves of two kinds... Nos. 3, 4
  —x Leaves all linear. .......... No. 5

1 C. Austini. Eng. Lvs. obovate, 1—2"; fruit depressed, 4-lobed all around, its pedicel and stig. nearly as long, lobes narrowly winged. N. J. (Porter), N. Y., and W.

2 C. peupleoides N. Lvs. elliptical, 1"; fruit roundish, 4-lobed above, sessile, its stigmas twice as long, lobes not winged. Tenn. to La. (Hale). 1—2'.

3 C. verne L. Floating lvs. 3", rosalate, obovate, narrowed below, the submersed leaves 6", oblong-linear; fruit oval, emarginate, longer than its stigmas. Pools.

4 C. heterophylla Ph. Floating leaves spatulate, attenuate below, 4—6", the submersed linear, 6—9"; fruit globose, obcordate, its stigmas rather longer. Pools.

5 C. autumnalis L. Leaves all submersed, 3—5" linear, obtuse at both ends; fruit rounded, its lobes slightly united, winged; styles slender. Lakes and rivers.

Order CXVII. Podostemiaceæ. Threadfoots.

Herbs aquatic, with the habit of seaweeds, with alternate, dissected leaves, with flowers minute, perfect, naked or with 3 sepals. Stamens 1 or many, hypogynous. Ovary compound, 2—3-celled, with as many stigmas, and numerous ovules. Fruit a many-seeded capsule, ribbed and somewhat pedicelled. Albumen none.


P. ceratophyllum Mx. Leaves alternate, repeatedly forking into linear, thread-form segments; stem a few inches long, in running water: common.

Order CXVIII. Ceratophyllaceæ. Hornworts.


Ceratophyllum, l. Hornwort. Character that of the order. »

C. demersum L. Stem floating or prostrate, 8—16', with numerous branches and whorls; leaf-segment filiform, sharply toothed. Pools.

Order CXIX. Empetraceæ. Crowberries.

Heath-like shrubs, with evergreen, linear, exstipulate leaves, and small, imperfect flowers. Calyx of 4—6 hypogynous, imbricated scales, the inner often colored and petal-like. Stamens 2—4, with compound pollen. Ovary free, 2—9-celled, 2—9-ovuled. Fruit fleshy, with as many seeds. In Batis the drupes are consolidated.

* Stamens 4. Stigmas 3 or 4. Style slender. Drupe 3— or 4-seeded. .......... Corema. 2
* Stamens 5. Berry 2-seeded. Shrub erect. .......... Ceratophylla. 3

**E. nigrum** L. A small prostrate shrub, 1-4f; branches closely beset with oblong-linear leaves with rolled edges, 2-3"; berries black, ciliate. High mountains of N. Eng., N. Y. May, June.

2. **CORÈMA**, Don. Perianth of 5 or 6 bractlets, the 3 inner sepaloid. ♂ Sta. 3, exerted. ♀ Ovary 3- or 4-celled. Style filiform, 3- or 4-cleft, with narrow stigmas. Drupe globular, minute, with 3 or 4 seeds. ąż


**C. ericoides** Mx.—Sandy places, Ga., Fla. 3-6f. Leaves whorled, crowded, linear-terete, 5-6". Flowers reddish, followed by yellowish drupes. March, April.


**ORDER CXX. PLATANACEÆ. Sycamores.**

Trees with a watery juice, alternate, palmate leaves, and sheathing, scariosous stipules. Flowers monoeious, in globular aments, destitute of both calyx and corolla. **Sterile.**—Stamens single, with only small scales intermixed. Anthers 2-celled, linear. **Fertile.**—Ovary terminated by a thick style with one side stigmatic. Nut clavate, tipped with the persistent, recurved style. Seed solitary, albuminous. Fig. 288.


**P. occidentális** L. Tree in hard, gravelly soil, 50-80'f. The trunk grows to great size, and hollow; bark whitish; leaves large, angularly lobed and toothed; stipules oblique; balls pendulous, solitary. May.

**ORDER CXXI. JUGLANDACEÆ. Walnuts.**

Trees with alternate, pinnate, exstipulate leaves and monoeious flowers. **Sterile flowers** in aments, with an irregular perianth. **Fertile**, solitary or clustered. ♀ Calyx regular, 3-5-lobed, tube adherent to the partly 2-4-celled ovary. **Fruit** a tryma (§ 157), with a fibrous epicarp (shuck) and a
bony endocarp (shell). Seed large, orthotropous, exalbiminous, with lobed, often sinuous, oily cotyledons.

* Sterile aments solitary, simple. Epicarp persistent on the fruta.........................JUGLANS. 1
* Sterile aments clustered, lateral. Epicarp 4-valved and separating...............CARYA. 2

1. JUGLANS, L. WALNUT. ♀ Fl. a calyx, scale-like, 5- or 6-parted, with about 20 stamens. ♀ Fls. terminal, 4-parted, with 4 greenish petals and 2 fringed stigmas. Tryma with a spongy epicarp closely investing the very rough endocarp. ♀ Leaflets many. Pith in transverse plates.


2 J. nigra L. Black W. Tree 60–90f, with a long, straight trunk; leaflets 15–21, lance-ovate, subcordate; fruit globous, glabrous, uneven, the kernel edible. The wood is dark-purple, used in cabinet-work. April, May.

3 J. regia, from Persia, but called English walnut, has 7–11 leaflets, and a smoothish endocarp (shell) with a rich kernel. Rarely cultivated.

2. CARYA, N. HICKORY. ♀ Calyx scale-like, 3-parted, with 4–6 stamens. ♀ Calyx 4-cleft, no petals. Stig. 2-lobed, lobes bifid. Epicarp 4-valved, disclosing a smooth, even nut. ♀ Timber very strong. Leaves and both kinds of flowers from same bud, in March–May.

♀ Leaflets 13–15, scythe-shaped. Nut oblong, thin-shelled, very sweet............No. 1
♀ Leaflets 7–11. Nut with a tender shell and very bitter kernel.........................Nos. 2, 3
♀ Leaflets 5–9. Nut roundish, hard-shelled, sweet and eatable...(*)
* Valves of the epicarp distinct to the base. Bark with loose plates................Nos. 4, 5
* Valves of the epicarp united below. Bark continuous, firm.........................Nos. 6–8

1 C. oliviformis N. Pecan Nut. Tree 60–90f; leaflets falcate, 5–6'; ♀ aments separate to base; nut with its kernel loose in the thin, oblong shell. River bottoms, Ind., Ill., and S. Bark at length shaggy.

2 C. amara N. Bitter Nut. Tree 20–40f; leaflets about 9, ovate-oblong, sharply serrate; fruit roundish, valves half-united; nut white. Moist.

3 C. aquatica N. Tree 30–40f; leaflets about 11, lanceolate, oblique, subentire; fruit pedunculate, ovate, with a thin, reddish shell. Swamps, S.

4 C. alba N. Shagbark. Tree 40–50f, with a rough, shaggy bark; leaflets 5, the two lower much smaller; fruit and nut roundish, squarish, with a thin shell and very sweet meat: common. Fruit and timber excellent.

5 C. sulcata N. Thick-shelbark. Tree 40–80f, with shaggy bark; leaflets 7 or 9, the odd one subsessile; fruit large, oval, 4-furrowed; nut pointed at each end, 14–2' long, with thick shell. Common West.

6 C. tomentosa N. Mocker Nut. Tree 40–60f; bark rugged, but not shaggy; leaflets 7–9, odd one stalked, all and the petiole rough-downy; aments hairy; nut with a very thick shell and small kernel.

7 C. porcina N. Pignut. Tree 60–100f; leaflets 5 or 7, nearly glabrous; fruit ovate to pyriform, with a bitterish kernel: common. (C. glabra Torr.)

8 C. microcarpa N. Tree 60–80f; leaflets 5 or 7, glabrous; aments glabrous; fruit roundish-ovoid, as small as a nutmeg. Woods, N. Y., and S.

**ORDER CXXII. CUPULIFERÆ.**

**MASTWORTS.**

Trees or shrubs. Leaves alternate, simple, straight-veined, with deciduous stipules. Flowers ♀, the sterile in aments which are racemed or capi-
ORDER 122.—CUPULIFERÆ.

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tate. ♀ Calyx scale-like or regular, with 5—20 stamens inserted at its base. ♂ Calyx adherent to the 2–3-celled, 2–6-ovuled ovary. Fruit a 1-celled, 1-seeded nut, solitary or several together, invested by an involucre which forms a scaly or echinate cupule. Seed destitute of albumen, filled by the embryo with its large cotyledons. Figs. 1–4, 182, 256, 277, 218–22, 338–40, 381, 386, 435, 507, 511.

♀ Sterile flowers in aments, fertile, solitary, or few together...(*)
* Involute of many scales, valveless, cup-like, partly enclosing the nut...Quercus. 1
* Involute of prickly scales, 4-valved, enclosing 2 or 3 nuts...Castanea. 2
* Involute of soft, prickly scales, 4-valved, enclosing 2 nuts...Fagus. 3
* Involute of 2 or 3 large, lacerated, united scales, valveless, with 1–2 nuts...Corylus. 4

♂ Sterile flowers and fertile, both kinds in pendulous aments...(*)
* Involute scales in pairs, with their edges united, inflated...Ostrya. 5
* Involute scales in pairs, distinct, 3-lobed, becoming leaf-like...Carpinus. 6

1. QUERCUS, L. Oak. ♀ Fls. in loose aments. Calyx mostly 5-cleft. Sta. 5—10. ♂ Fls. in clusters or scattered. Ov. 3-celled, 6-ovuled (Fig. 162), with 3 stig., but in fruit a 1-seeded nut (acorn) seated in a scaly cup or involucre. ♀ ♀ A noble genus. In many oaks the fruit is ♀, that is, 2 years in ripening, known by its occupying the old wood below the leaves of the season.

♀ Leaves mostly entire, the ends subequal, petioles very short...(*)
* Peduncle longer than the oblong acorn. Leaves evergreen. Fruit ♀...No 1
* Peduncle shorter than the acorn. Fruit ♂—♂ 2 Lvs. downy beneath...Nos. 2, 3
—♂ 2 Lvs. smooth both sides...No. 4

♀ Leaves 3-lobed and dilated above, awnless when mature. Fruit ♂...Nos. 5, 6
♀ Leaves 3-9-lobed or pinnatifid, broad, lobes setaceous awned. Fruit ♂...(*)
* Lvs. at base cuneate, short-pet., 3- or 5-lobed. Shrubs or small trees...Nos. 7—9
* Leaves at base abrupt or truncate, mostly long-petioled, 7-9-lobed...(*a)
a Nut one-third immersed in the saucer-shaped, fine-scaled cup...Nos. 10, 11
a Nut half near half immersed in the hemispherical, coarse-scaled cup...(*b)
b Leaves cinereous-downy beneath, acorn also downy...No. 12
b Leaves (except when young) glabrous both sides...Nos. 13, 14

♀ Lvs. 5-9-lobed, divisions obtuse, never bristle-awned. Fr. ♀, sessile...Nos. 15—18
♀ Lvs. 9-25-toothed, downy beneath, awnless. Acorn ♀, sweet, eatable...Nos. 19, 20

1 Q. virens Ait. Live Oak. Tree 40–50ft, often much smaller, very valuable for timber; leaves small, firm, elliptic-oblong, obtuse, downy and pale beneath, rarely a few sharp teeth; nut oblong-obovoid; ped. 1'. Va., and S.

2 Q. cinerea Ph. Upland Willow O. Shrub 4—20ft; lvs. as in No. 1, but more downy beneath; nut roundish, in a saucer-shaped cup. Barrens, Va. to Fla.

3 Q. imbricaria Mx. Laurel O. Shingle O. (Fig. 335.) Tree beautiful, 40—50ft, with dense dark-green foliage; lvs. 3—5', lance-oblong, wavy, shining above; nut roundish, in a shallow cup. Common W. and S. Makes poor shingles.

4 Q. Phellos L. Willow O. Tree 30—60ft, with poor timber; lvs. linear-lanceolate, entire, 3—4', glabrous; acorn roundish, 6', in a shallow cup. Borders of swamps, N. J. to Ky. and Fla. Young shoots with toothed leaves.

β. Laurifolia. A large handsome tree; lvs. 3—5', often with a few teeth. S. ♀

5 Q. aquatica Mx. Water O. Tree 20—40ft, of rounded form and dense, shining foliage; leaves wedge-obovate, entire or obscurely 3-lobed above, attuneate to base, short-petioled; nut round-ovoid. Swamps, Md. to Fla., and cultivated.

6 Q. nigra L. Black-Jack. Barren O. Iron O. Tree small and gnarled, with dark massy foliage; leaves short-petioled, wedge-form, mostly with 3 subequal round-ed lobes at apex, subordate at base, rust-downy beneath. N. Y., W. and S.
7 Q. triloba Mx. Downy Black-Jack. Tree of rapid growth, 20—30 ft.; leaves oblong-cuneiform, acute at base, rusty-tomentous beneath; lobes at apex often toothed, bristle-pointed; nut depressed. Barrens, N. J. to Fl. A.

8 Q. Catesbaei Mx. Turkey O. Tree 20—25 ft.; leaves large, very irregular, glabrous, cuneate at base, lobes deep, narrow, with bristle-pointed, divaricate teeth; cup large, half covering the ovoid, mealy nut. Barrens, South.


β. Georgiana, Leaves smaller and smoother, of the same form, on Stone Mt. !

10 Q. rubra L. Red O. Tree 50—70 ft., wide and high; leaves long-stalked, glabrous, sinuses rounded, shallow, lobes 7—9, with bristle-pointed teeth; acorn 1', ellipsoid, ¼ immersed in the shallow cup. Wood reddish, coarse; common.

11 Q. palustris Mx. Pin O. (Figs. 1—4.) Sinuses deep and broad, lobes often 5, petioles long (1'—2'), toothed as in Q. rubra; acorns 7—8", nut ¼ immersed in the cup. Tree 60—80 ft., with a light open foliage, in wet, cool soils.

12 Q. falcata L. Spanish O. Tree 60—70 ft.; lvs. long-stalked, obtuse at base, ashy-tomentous beneath, lobes 5—7, narrow, simple or toothed, more or less falcate: acorn globular, 4—5", in a shallow subeseless cup. Va. to Fl. A.

13 Q. coccinea Wang. Scarlet O. Trees very large (80 ft); lvs. much like Q. rubra, but changing to scarlet in Autumn, while that becomes red-brown; acorn 7—8", nut ¼ immersed in the cup. In young shoots the leaves almost lose their lobes and teeth, but keep their bristles. Not rare.

β. tinctoria, Black O. Leaves often obovate in outline; bark black and bitter.

14 Q. Leana N. Lea's O. Leaves oblong, blunt at base, margin with a few angular, very irregular lobes: acorn roundish, in a hemispherical cup. Rare. Ohio (Clark), Ill. (Wolf). A hybrid? but very constant.

15 Q. alba L. White O. (Fig. 339.) Lvs. short-petioled, acute at base, oblong, sinuate-pinnatifid, lobes subequal, obtuse; acorn sessile; nut oblong-ovoid, ¼ immersed in the tubercled cup. Timber very useful.

16 Q. obtusiloba Mx. Iron O. Post O. Tree middle size, wide-spreading; leaves cuneiform at base, downy beneath, deeply sinuate, the 3 upper lobes dilated, each 2-lobed; nut oval, immersed, sweet. Timber good. A.

17 Q. macrocarpa Mx. Moss-cup O. (Figs. 340, 435.) Leaves deeply and lyrate-sinuate-lobed (most deeply in the middle); cup very deep, fringed with the pointed scales, nut ¼ or more immersed, V. Common. W. and S. A.

18 Q. lyrata Walt. Over-cup O. Tree large; leaves acute at base, whitish beneath, with 7—9 triangular acute lobes; cup rugged with the scales, nearly or quite including the round nut. Swamps, S. A.

19 Q. bicolor Willd. Swamp White O. Tree handsome, 70 ft; leaves obovate, acute and entire at base, white-downy beneath, with 9 or more obtuse teeth or lobes; acorns in pairs on long (1'—2') peduncles. Low woods. A.

20 Q. Prinus L. Swamp Chestnut O. Tree 50—70 ft, with large (1') sweet acorns; leaves 4—7', obovate, crenate-undulate, downy beneath, with straight, strong veins; fruit ped. shorter than the petioles; nut ¼ immersed. (Q. monticola.) A.

β. acuminita. Leaves oblongate, pointed, teeth sharp; fruit subseessile.

γ. prinoides, Shrb 3—4 ft; fruit crowded, sessile; leaves small. A.

2. CASTANEA, Tourn. CHESTNUT. Sterile flowers in long, slender anents, fertile fls. few, 3 together, in an involucre. Cal. 6-lobed or parted. Sta. 8—20. ♀ Ovary 3—6-celled, with as many stigmas. Fr. a prickly involucre (burr), 4-valved, enclosing 1—3 coriaceous 1-seeded nuts. ♀ ♀ Leaves acuminate, expanding before the flowers. Fig. 381.

1 C. vesca L. Tree 50—80 ft, with a large straight trunk. Lvs. 6—9' long, lance-oblong.
ORDER 123.—BETULACEÆ.

serrate, smooth; nuts mostly 2 or 3 together; aments 6—9', yellowish, in July, the brown nuts ripe in October. In woods.

2 C. pumila Mx. Chiniquapin. Shrub 6—12f, much branched; leaves obovate to oblong-ovate, downy beneath; nut solitary. N. J., W. and S.

3. FAGUS, Tourn. Beech. Sterile flowers in capitate aments, suspended by a slender peduncle, fertile 2 within an involucre. Calyx 5- or 6 cleft or lobed. Stam. 5—12. 2 Ovary 3-celled with 3 stigmas. Fruit a pair of 1-seeded, sharply 3-angled nuts in a prickly involucre. Δ Leaves plicate in bud. May. Figs. 182, 256, B.

1 F. ferruginea Ait. Tree 50—80f, with a smoothish ash-colored bark; lvs. ovate to oval, short-petioled, pointed, regularly and remotely toothed, hairy when young. Timber fine-grained. Hardly distinct from

2 F. sylvatica, the European Beech, which has broader leaves, and is occasionally cultivated, especially the variety with purple leaves.


1 C. Americana Walt. Shrub 5—10f; leaves roundish, cordate; involucre bell-form, much wider than the nut, coarsely toothed. Thicket: common.

2 C. rostrata Ait. Shrub 3—6f; leaves ovate to oval; involucre bottle-shaped, longer than the nut, 2-parted, with toothed segments. Thicket.

3 C. avellana. Filbert. Shrub 3—10f; leaves as in No. 1; involucre not larger than the large rounded nut. From Europe, rarely cultivated.

5. OSTRYA, Michl. Lever-wood. Hop Hornbeam. Δ Aments cylindrical, hairy. Calyx a scale, with 8 1-celled bearded anthers. 2 Aments loose, flowers in pairs under each deciduous scale; ovary with 2 stigmas, enclosed in a sac (involucre), which in the hop-like fruit is inflated, ovoid, and much larger than the nut. Δ Wood very hard and strong.

O. Virginica Wildl. Small tree 20—30f; leaves elliptical, acuminate, serrate; buds acute; fertile ament oblong, pendulous, 2'. Woods. April, May.


C. americana L. Tree small, 12—30f; leaves ovate-oblong, acuminate, serrate; bracts of the fertile aments becoming leaf-like, 1' long. In woods.

ORDER CXXIII. BETULACEÆ. Birchworts.

Trees or shrubs with bark in thin layers, leaves alternate, simple, straight-veined, and with deciduous stipules. Flowers 3, together, in the axil of each 3-lobed bract of the ament. Calyx 0. Δ Stamens distinct, definite. Anthers 2-celled. 2 Ovary 2-celled, 2-ovuled, becoming in fruit a thin, 1-celled, 1-seeded nut. Figs. 163–4, 283, 296, 307, 312, 437.

* Trees with a yellowish bark, smoothish leaves, and short, erect, & aments......No. 1
* Trees with a reddish-brown bark and ovate-oblung, suberect, & aments.....Nos. 2, 3
* Trees with a white bark, long-stalked leaves, and drooping & aments......Nos. 4, 5
* Shrubs with brownish bark, roundish leaves, and short, erect, & aments.....Nos. 6, 7

1 B. *lutea* Mx. *f.*. Yellow B. A forest tree 40—80 ft, known at sight by its silver-yellow bark; leaves ovate, deeply and doubly serrate; & aments 2—4', drooping, the & ovoid-oblung, 1', erect. Can. to N. Car. (B. excelsa C.-B. not of Ait.)


3 B. *nigra* Ait. Red B. Tree 30—50 ft, the bark loose and torn; leaves rhomb-ovate, acute both ends, repand and serrulate, small, petioles hairy; & aments 2—3', drooping, & oval, sessile, erect, 6'/'. Swamps, Mass. to Fla. Twigs very slender.

4 B. *populifolia* Ait. White B. Tree 30—40 ft, trunk white, twigs brown; leaves deltoid (Fig. 307), lobed and serrulate, acuminate. Thickets, Me. to Pa.


6 B. *pumila* L. Dwarf B. Shrub 2—7 ft, branches (not glandular) and young leaves downy; lvs. rounded to obovate, serrate, 6—16 '/'. Swamps, Ct. to Pa. (Prof. Porter).

7 B. *glandulosa* Mx. Shrub 1—4 ft, upright, branches glandous, dotted with wart-like glands; leaves round-obovate, glabrous, crenate, 9'/'. Mts. N. N. and N. W.


2. *Alnus*, Tourn. Alder. & Flowers in cylindrical, drooping aments, bracts peltate, with 5 scales and several flowers beneath. *Calyx* 4-parted, sta. 4, anth. 2-celled. & Aments ovoid, bracts cuneate, truncate, thick, 2-flowered. *Calyx* of 4 scales, persistent. 5 Buds peduncled.

* Fls. developed before the lvs. in early Spring. Fruit almost wingless......Nos. 1, 2
* Fls. developed with or after the leaves. Fruit winged, No. 3,......wingless, No. 4

1 A. *incana* Willd. Speckled, or Black A. Stems 8—20 ft; leaves obtuse at base, broad ovate, or ovate, sharp-serrate and some lobed, glaucous-downy beneath; stipules lance-oblong. Thickets by streams, N. Eng. to Wis. and Can.

2 A. *serrulata* Ait. Smooth A. Stems in clumps, straightish, 10—15 ft; lvs. obovate, pointed, doubly serrulate, smooth; stipules elliptical, obtuse. Swamps.

3 A. *viridis* DC. Mountain A. Shrub 3—4 ft; lvs. oval, acute, claymy; stip. broad-ovate; fertile aments on long stalks, oval. Streams in mountains, northward.

4 A. *maritima* Muhl. Tree 30 ft; leaves glabrous, ovate to obovate, cuneate, serrulate; fertile aments ovoid-oblung, 1'. River banks, Del., and S.

Order CXXIV. Myricaceae. Galeworts.

* Shrubs with alternate, resinous-dotted, often fragrant leaves, with the flowrs monoeccious or dioecious, both kinds in scaly aments, and destitute of corolla or calyx. & Stamens 2—8. & Ovary 1-celled, with 1 erect ovule. Stig. filiform. Fr. dry or drupaceous, indehiscent. Seed with no albumen.
1. **MYRICA**, L. CANDLEBERRY MYRTLE. Fls. ♀ ♂, the ♂ in cylindrical aments; anth. 4–10 in each scale, large, 2-celled. ♀ Aments ovoid, ovary 1 to each bract, in a cup of 3–5 scales, stigmas 1–4, spreading. Drupes covered with wax or resinous dots. ♀ Leaves undivided.

* Stigmas 2 or 4. Fruit small (1–3'), ovoid………………………………………Nos. 1–3
* Stigma solitary. Fruit large (6'), oblong. (Leitneria, Chapm.)…………………No. 4

1 **M. cerifera** L. Bayberry. Shrub 3–4f; lvs. 1–2', oblong to oblongate, entire or a few remote teeth above; stam. about 6; amens 6–9''; drupe oval, 2'', covered with white wax (bayberry tallow). Coasts, Can. to Fla.

β. **Carolinensis**. Lvs. large (3–5'), evergreen, tapering to the petiole. M. and S. γ. **pumila**. Leaves linear-oblongate, acute at each end. 1–3f. S.

2 **M. Gale** L. Sweet Gale. Shrub 3–4f; leaves wedge-oblong, obtuse and serrulate at apex, 1–14'; amens 4–8''; nuts crowded, 1', reddish. Shores.

3 **M. inodora** Bartr. Shrub 6–16f, with whitish bark; lvs. thick, evergreen, 1–2', oblong, obtuse, entire, with rolled edges; drupe 3', ovoid, black. Fla.

4 **M. Floridana** (Chapm.) Shrub 2–6f, with brown bark; lvs. oblongate, acute, entire, long-stalked, deciduous; drupe oblong, greenish, 6'. Mid. Fla.


C. **asplenifolia** Ait.—Dry hills, Can. to Va. Shrub 2f, with brown twigs, the very fragrant leaves 3–5' long, with 20–30 wing-like lobes. Stipules pointed.

**ORDER CXXV. SALICACEÆ. WILLOW-WORTS.**

Trees or shrubs with alternate, simple leaves and deciduous or persistent stipules. Flowers ♀ ♂, both kinds in aments, one under each bract of the ament. Calyx none or cup-form and entire. Ovary 1–2-celled, with 2 short styles. Fruit a capsule, 2-valved, oo-seeded. Seeds with a tuft of hairs (coma) and no albumen. Figs. 17–20, 200, 287.


♀ Stamens 3–10. Aments with the leaves, scales green-yellow, caducous ………Nos. 1–3
♀ Stamens 2, the filaments united. Aments precocious, scales black…………………No. 4
♀ Stamens 2, rarely 3 (1 in No. 13), the filaments distinct…(*)
* Scales yellow-green. Am. with the lvs.—a Ov. subessile, glabrous. Trees……5–7
  —a Ovaries stalked. Shrubs……Nos. 8, 9

♀ Scales of the ♀ aments brownish or blackish, persistent…(b)
♂ Ovaries and pods sessile. Shrubs………………………………………Nos. 10, 11
b Ovaries and pods stalked, and glabrous. Aments with the lvs……Nos. 12, 13
♂ Ovaries and pods stalked, and downy or silky…(c)
  c Aments appearing with the leaves. Shrubs……………………………………Nos. 14–16
  c Aments appearing before the subentire hairy leaves……Nos. 17–19
  c Am. before the serrate, smooth or downy long-petioled lvs……Nos. 30, 21
1 S. lúcidá Muhl. **Shining W.** Tree small, handsome, 5—15f; branches green; lvs. smooth and shining, lance-ovate, acuminate with a long point; stip. serrate; stam. mostly 5. Along streams, especially northward and northwest. Often cultivated.

2 S. penzándra. **Bay W.** Tree 20—40f, very elegant, in shrubberies; lvs. lance-ovate, cuspidate-pointed, shining; twigs reddened; aments yellow; sta. 5+. Europe.

3 S. nigrá Marshall. **Black W.** Shrub 10—20f; leaves linear-lanceolate, attenuate to both ends; stip. small, caducous; branches pale yellow; stamens 3—5. Common.

4 S. purpúrea L. Shrub 6—10f, with long, slender, olive-colored twigs; leaves very smooth, oblong-lanceolate; 1 filament with 2 anthers. Low grounds. ♦

5 S. frágílis L. **Crack W.** Bedford W. Trees tall (60—80f), of quick growth, with greenish divergent twigs brittle at base (like many other species); leaves lanceolate; stipules caducous; stamens 2, rarely 3. Often planted in parks. § Europe.

β. deceípens. A smaller tree, with red polished twigs and upper leaves obovate.

γ. Russeliana, has long-pointed, serrate, bright lvs. with conspicuous stipules.

6 S. alba L. **White W.** Yellow W. Large trees, with straight branches and yellowish tough twigs; lvs. lanceolate with a straight point, and silky-whitish, especially be neath; stigmas subsessile, 2-lobed. Common, of rapid growth. §

β. vitellina, has shining, yellow branches, with narrower leaves.

γ. corílea, leaves bluish, nearly or quite smooth beneath. By rivers.

7 S. Babylónica L. **Weeping W.** Tree of large size, with long, slender, pendent branches; lvs. linear-lanceolate, acuminate; stipules roundish; 9 aments 1—2′ long, the 2 unknown in U. S.—β. annuláris, leaves curled into a ring. Not drooping.

8 S. longífolia Muhl. Shrub diffuse, 2—10f, with whitish twigs; lvs. long, linear, pointed both ways, remotely toothed, hairy. River banks, N. Eng., and W.

9 S. myríllóides L. Shrub low, erect, glabrous; lvs. elliptic-oblong, entire, acute or obtuse. Mountain bogs, N. and N-W. (S. pedícéllaris Ph.)

10 S. víminúlis L. **Basket Osier.** Stems long, straight, slender, 10—12f; lvs. lance-linear, long, pointed, silky-canescent beneath; aments precocious. Wet.

11 S. herbáceá L. **Arctic W.** Low, creeping, 1—2′ high; lvs. round-oval, cordate, serrate, glabrous; aments few-flowered, terminal. Summits of White Mountains.

12 S. cordáta Muhl. Shrub 6—8f, with smooth, green branches; lvs. lance-oblong, cordate, acuminate, smooth; stipules large, serrate. Wet grounds.

β. myricóides. Leaves not cordate, with 2 glands at base, glaucons beneath.

γ. angustáta. Leaves lanceolate, acute at base; stipules much smaller.

13 S. Cútleri Tuckm. Low, prostrate; lvs. elliptic to obovate, shining above; stam. men single; aments pedunculate, dense. White Mountains. (S. uva-ursí C-B.)

14 S. vagáns, β. rostráta (Andersson). Shrub 3—12f, with straight, erect, yellowish branches; leaves lanceolate to lance-ovate, acute, subentire, glaucons-downy beneath; stip. toothed; fertile aments becoming long and loose; ovaries long-pointed (rostrata). Dry grounds, Penn., N. and W. (S. livída Wahl.)

15 S. argyrocárpa And. Shrub low, creeping; leaves lance-oblong or -linear, glaucons beneath with appressed silvery hairs; pod short-conical, silvery-silky, style slender. White Mountains. Young plants all silvery. (S. repens C-B.)

16 S. chloróphylla And. Shrub low, spreading; lvs. glabrous, glaucons beneath lanceolate to oblongate, subentire; fruit very short-stalked; style very long, stigma entire; stipules 0. White Mountains, and N. (S. phylícifólia C-B.)

17 S. trístis Alt. **Sage W.** Small downy shrub with a profusion of small naked aments; leaves lance-linear to oblongate; stipules minute, caducous. Dry fields.

18 S. hímílis Marsh. Shrub 4—8f, with brown twigs; lvs. oblongate; stip. lunate, subentate, shorter than the distinct petioles. Dry. (S. Muhlenbergiana Barr.)

19 S. cándida Willd. Shrub 4—8f, handsome, all whitish; leaves linear-lanceolate, very long; stipules lanceolate, as long as the petioles. In damp woods. Common.

20 S. discólor Muhl. Shrub 7—15f; branches greenish-brown; leaves lance-oblong remotely toothed, glaucons beneath; stipules lunate, toothed or entire; ov. conical, densely silky; stigmas long, linear. Swamps. (S. eriöcephalus Mx.)
21 S. petiolâris Sm. Shrub 4–15 ft, twigs long, slender, tough, purplish or yellowish; lvs. linear-lanceolate, smooth, glaucous beneath; stipules lunate, dentate; ovaries ovoid, densely silky, stigmas very short. Sandy banks of streams. 

β. sericea. Lvs. grayish-silky beneath; stigma sessile; stipules deciduous.


§ Buds not viscid. Leaves lobed, always white-downy beneath.......No. 1
§ Buds not viscid. Leaves round-ovate, soon glabrous and green......Nos. 2–4
§ Buds viscid with a resinous varnish. Leaves always glabrous... (x)

2. P. alba. Abele P. Silver-leaf P. Tree rapidly growing, and spreading by the roots; leaves cordate, lobed, dark green above, very white beneath. Europe.


3. P. heterophylla L. Cotton-wood. Tree 40–60 ft, with smooth greenish bark; lvs. roundish, cordate or ovate, serrate, white-downy when young; buds very downy, short, obtuse; stamens very many; seed with much cotton. Wet woods.

4. P. grandidentata Mx. Tree some 40 ft, with smoothish gray bark; lvs. round-ovate, acute, with large unequal sinuate teeth, villous when young; buds subpubescent; petals compressed. Woods. Common northward.

5. P. balsamifera L. Balsam P. Tacmehac. Tree 40–80 ft, with rough bark; lvs. ovate, acuminate, with appressed serratures; buds very fragrant. Wet. N.


7. P. angulata Ait. Western Cotton-wood. Tree 40–80 ft, branches acutely angular or winged; leaves deltoid-ovate, or broad-cordate; buds little viscid. S. and W.


γ. dilatata. Lombardy P. Tree very tall, pyramidal in form; lvs. deltoid. Com.

Class II. Gymnospermæ.

Pistils none, or represented by open scales, with ovules in their axils. Stigma none, but the pollen applied directly to the ovules, which become naked seeds, destitute of a true pericarp. Flowers always diclinous. Cotyledons often more than 2. (§ 510.)

Cohort 4. Conoideæ. Equivalent to the Class. (§ 515.)

Order CXXVI. Cycadaceae. Cycads.

Trees of low stature, simple trunks with their internodes undeveloped and the surface scarred with the fallen leaves. Leaves pinnate, parallel-
veined, circinate. *Flowers* dioecious, naked, in cones, 6 *anther* covering the under surface of the connectile. 6 *Scales* peltate, bearing naked ovules dorsal or marginal.

1. *Cycas revoluta*, from Japan, hardly South, has a short thick trunk, crowned with numerous pinnate leaves, 4–5' long, with innumerable linear 1-veined leaflets rolled at the edges. Fruit in an oblong spadix.


**Order CXXVII. Coniferae. Conifers.**

Trees or shrubs mostly evergreen, abounding with a resinous juice. *Leaves* scattered or fascicled, mostly linear, parallel or fork-veined. *Flowers* 6 or 6, destitute of corolla or calyx, in aments and cones. 6 Stamen 1, or several united. 6 *Ovary, style, and stigma* wanting. *Ovules* 1–∞ at the base of the carpellary scale. *Fruit* a strobile (cone) with the scales woody and distinct, or baccate with the scales fleshy and coherent. Figs. 107, 166, 194, 210, 296, 293, 299, 352–3, 473–4, 491. See Hoopes' *Book of Evergreens.*

§ *Abietineae*. Scales of the cone each with a bract beneath it. Seeds 2, winged...(*)

§§ *Cupressineae*. Scales bractless. Seeds 1–9, mostly with 2 wings...(**)

* Leaves evergreen, linear, 2–5 together in each fascicle...Pinus...1
* Leaves evergreen, linear, solitary, scattered...Abies...2
* Leaves in fascicles of many together, 6 evergreen...Cedrus...3
  6 deciduous...Larix...4
  6 Cones baccate, consisting of the fleshy coherent scales...Juniperus...5
  6 Cones dry, scales imbricated...x Leaves lance-linear...Cunninghamia...6
  6 x Leaves scale-form, opposite, 4-rowed...Thuya...7
  6 Cones dry, scales valvately closed...y Lvs. scale-form, opposite, 4-rowed...Cupressus...8
  6 y Lvs. linear, alternate, deciduous...Taxodium...9
  6 y Lvs. alternate, evergreen...SEQUOYA...10

1. *Pinus*, L. Pine. Fls. 6, the 6 in clustered aments. Stamen 1, with a 2-celled anther. 6 Aments of many open imbricated carpellary scales, each with a bract at the back and 2 inverted ovules at base within. Cone woody, persistent two years, the scales often thickened and aawned at the tip. Seeds nut-like, winged. Cotyledons 3–12. 6 Fascicles of 2–5 linear-filiform leaves, sheathed at base.

§ Leaves in 5's.—x Scales spineless, hardly thickened at end...Nos. 1–3
  6 x Scales ending with a cap and a spine...No 4
§ Leaves in 3's.—y Cones oblong, with small recurved spines...Nos. 5, 6
  6 y Cones ovoid, with weak or strong spines...Nos. 7–9
§ Leaves in 2's.—z Scales tipped with spines or prickles...Nos. 10–13
  6 z Scales spineless.—a Trees native...Nos. 13, 14
  6 a Trees European...Nos. 15, 16


2 *P. excelsa*. Bhotan P. Lvs. glaucous, 5–7'; cones cylindric, 6–9'; nuts winged. Asia
4 P. aristata. Colorado P. Leaves 1—4', crowded; cones oval, 2'. Tree 40—50f.
5 P. australis Mx. Long-leaved P. Tree 60—100f, very resinous; leaves 10—19', crowded; cones lance-oblong, nearly as long as the leaves. Stands in extensive forests, South. Very valuable for turpentine, timber, or fuel.
6 P. taeda L. Lobolly P. Tree 60—90f; leaves 6—10', with long sheaths; cones de-flexed, half as long as the leaves, with small but strong spines. S.
7 P. serotina Mx. Pond P. Tree 30—50f; leaves 5—8', rigid; cones broadly ovoid, polished, nearly spineless, as large as a goose-egg. Wet lands, S.
8 P. rigida Mill. Pitch P. Tree 30—70f, with very rough bark; leaves rigid, 4—6', with short sheaths; cones ovoid-conic, 2—3'. Sandy barrens.
9 P. ponderosa. Tree 50—100f in California, with sturdy trunk, smoothish bark, heavy wood; leaves 9—12'; cones 34', conical, with short strong spines.
10 P. mitis Mx. Yellow P. Spruce P. Tree of slow growth, 30—60f; lvs. covering the branchlets, some of them in 3's, mostly in pairs, 3—5', slender; cones 14—2', ovoid-conic, clustered. In dry lands. Timber very valuable.
11 P. pungens Mx. Tree with crooked branches, 20—30f; leaves stout, crowded, about 2'; cones ovoid, 3', with stout spines 3" long. Mountains, Penn., and S.
13 P. resinosa Ait. Norway P. Red P. Tree 60f, bark smoothish; lvs. slender, 5—6', sheaths 6—12'; cones conic with a rounded base, half as long as the leaves. Dry woods, Penn. to Wis., and N. Timber compact, moderately resinous.
14 P. Hudsonica Poir. (P. Banksiana Lamb.) A straggling pine 5—22f; lvs. rigid, curved, 1', the cones longer (14—2'), recurved, smooth. Rocks, Me., W., and N.
15 P. Lárime. Corsican Pine. A large tree of rapid growth, very handsome in parks; leaves slender, bright green, wavy, 4—6'; cones 2—3'. Branches whorled.
16 P. Austriaca. Austrian P. Leaves more rigid, of a rich dark-green color.
16 P. sylvestris. Scotch P. Tree of rapid growth, perfectly hardy; lvs. 2—4', twisted, rigid, bluish green; cones ovoid-conic, 2—3'. Common in Europe.

2. Ábies, Tourn. Spruce. Fir. Hemlock. & Aments clustered with the old lvs. 9 Am. solitary, cones with thin, flat, spineless scales, per sistent one year. Seeds winged. Cotyledons 3—9. 5 Lvs. solitary, not sheathed, scattered over the branches, linear, short, mostly petioled.

§ Fir. Cones erect, the scales deciduous. Lvs. flat, spreading two ways... (x)
§ Spruce. Cones nodding. Lvs. 4-sided or ensiform, pointing all around...(a)
§ Hemlock. Cones hanging. Leaves flat, mostly spreading two ways..........Nos. 1—3
a Cones oval, 1—2' long, the scales nearly entire. Native. ............................Nos. 4, 5
a Cones obovate, 3—8' long, the scales erose-dentate. Cultivated...........Nos. 6, 7
z Bracts conspicuously exserted, much longer than the scales.........Nos. 8—10
x Bracts shorter than the scales or rarely a little exserted............Nos. 11—13

1 A. canadensis Mx. Common H. Tree 50—80f, very beautiful when young; lvs. short-linear (6—8'), glaucous beneath; cones ovoid, terminal, as long as the leaves, scales concealing the bracts. Rocky woods: common N.
2 A. williamsonii (or Pattoniana). Large tree in Oregon, very fine and hardy here, but rare; leaves yellowish, 6—8", the cones three times longer, bracts concealed.
3 A. douglasii. A huge tree in Oregon, handsome; cones with long, 3-forked bracts.
4 A. nigra Mx. Double S. Tree pyramidal, 60—80f; leaves 6—7", dark green; cones ovoid, 1—2, scales erose-denticulate. Damp mountain woods, northward.
5 A. alba Mx. Single S. Tree 30—80f, subpyramidal; leaves 6—9", glaucous; cones deciduous, cylindrical, 2', with the scales entire. Rocky woods: common.
6 A. Picea (or excelsa). Norway S. A stately tree with dense dark-green foliage; lvs. 9—13"; cones 5—8' long, light brown, scales notched. Very common.
7 A. Menziësi. Tree 50—70' in Oregon; lvs. 4', silvery-paniculate; cones 3—4', many
8 A. bracteàta. Tree 100' in California; leaves 2—3', silvery-paniculate beneath; cones 4', bracts 3-lobed, middle lobe much exceeding the scale, and recurved.
9 A. pectinàta. Tree from Europe, 80'; leaves 9', obtuse, glaucous beneath; cones 1—7', brown when ripe, bracts fringed, the capsulate point spreading.
β. Cephalónica, from Greece, bracts linear-oblong, toothed, reflexed.
γ. Nordmännia, from Crimea, bracts with an entire recurved point.
10 A. Frâseri Ph. Double Balsam F. Tree small (15—30'); bark smooth, blistered as in the next; leaves 8—10', seeming 3-veined beneath; cones 1—2', oblong; bracts dentate, long-pointed, reflexed. White Mountains! and Alleghanies.
11 A. balsânea Marsh. Balsam F. Tree 30—50', with smooth bark filled with blisters (reservoirs) of balsam; leaves 8—10', obtuse, silvery beneath; cones cylindrical, 3—4' x 1', bracts concealed or slightly excised. Damp woods. Cultivated.
12 A. Smíña (or Píchta). Small tree from Asia; leaves 1'; cones ovoid-conic, 3—4'.
13 A. grandis. Tree 200' in Oreg.; lvs. 1'—15', bladv, silvery beneath; cones oblong, 4'.

3. CÉDRUS, Link. 3 Am. solitary, terminal. 2 Cones persistent two or three years; scales persistent, close-pressed; bracts concealed adnate to the scales. 5 Leaves sessile, fascicled as in Larix, rigid, evergreen.

1 C. Libâni. Cedar of Lebanon. Tree with wide-spread branches; leaves 9—15', dark green, acute; cones oval, obtuse, brown, 3 x 2', scales very many.
2 C. Deödàra. Huge tree in the Himalayas; lvs. 1—2', light glaucous; cones ovoid, 4'.

4. LARIX, Tourne Larch. Tamárack. 3 Anthers 2-celled, cells opening lengthwise, with simple pollen grains. 2 Cones erect, oval or rounded, scales colored, persistent. Seeds with a proper wing. 5 Leaves deciduous, acerous, soft, scattered, and in axillary, many-leaved fascicles.

1 L. Americàna Mx. A splendid tree 70—100', with straight axis and horizontal branches; leaves filiform, very slender, 1—2', in bunches of 12—20; cones deep purple, 6—10', scales few, with inflexed edges. Woods northward. Common in cult.
2 L. Européa. Large tree; lvs. flattened, linear-spatulate; cones 1—1½' long.

5. JUNÍPERUS, L. Juniper. Fls. 3 2, aments very small, roundish.
3 Scales peltate, each with 4—7 anther-cells beneath. 2 Scales few, united at base, 1—2-ovuled, forming a sort of berry in fruit. Cotyledons 2. 5 5 Leaves subulate or scale-like, pungent, opposite or whorled.
3 Lvs. scale-form, opp., 4-rowed, and subulate in 3's, not jointed, nerveless...Nos. 1—3 5 Lvs. all subulate and in 3's, divariccate, jointed to the stem, 1-nerved...Nos. 4—7
1 J. Virginiàna L. Red Cedar. Tree of middle size, dark green; early lvs. very slender, 3—4', little divergent, in 3's, later ones 1—2', scale-form, 4-rowed, opposite, appressed; cones or berries small, blue-white, on short branchlets. Rocky soils.
2 J. sabina, β. procumbens Ph. Shrub trailing; lvs. opposite, obtuse, a gland in the middle, imbricated in 4 rows; fruit larger (3'), nodding, dark purple. Rocks, N.
3 J. Bermudàla L. Late branchlets very slender, covered with scale-form pungent lvs. in 4 rows, divergent, 1'; fr. brown, no bloom, 2', sub-ess. Fls. 15—20.
4 J. communis L. Common J. (Fig. 333.) Tree or shrub; leaves in 3's, crowded, pungent-acuminate, 6—8', fruit small (2'), sub-ess, dark-purple, sweetish. Woods.
β. alpína. Shrub trailing; leaves more crowded, less spreading, curved. N.
γ. oblâtã. Branchlets drooping; leaves lance-linear, glaucous; fruit clustered.
6 J. Oxyédrus. Shrub 10—12', from Eur., is known by its red-brown berries 3—4'' long.
7 J. Druéàca. Shrub from Syria, 8—12', with berries dark-purple, as large as a plum.
6. CUNNINGHÀMIA Sinénsis. Tree from China, 30—40f, very unique. Leaves 1—1½', lance-linear, stiff and pungent, in 2 rows. Cones ovoid, 1½', with toothed and pointed scales (or bracts?) each 3-seeded.

7. ÑÔYÀ, Tourn. Arbor Viti. Fls. 2, on different branches, terminal. 5 Anther-cells 4 on each imbricated scale. 2 Scales few, in pairs, opposite, imbricated, each 2—6-ovuled. Seeds winged. 5, 5 Leaves scale-form, opposite, imbricated in 4 rows.

1 T. occidentális L. Tree branched from base to summit; leaves rhombic-ovate, tubercled on the back; cones oblong, scales not reflexed, each 2-seeded. On rocky banks, common N., now very frequent in cultivation. Many varieties.

2 T. (THUYOPSIS) dolaBráta. Tree from Japan, 40—60f, with ovate scale-form lvs., not appressed; cones small, roundish, each scale 5-seeded. Rare.

3 T. (BIOTA) orientális. Shrub light green, or yellowish; ramifications vertical; cones broad, with thick scales and horn-like reflexed points. China.

8. CUPRÉSSUS, Tourn. Aments 2, small, roundish. 2 Scales each with 2—∞ erect ovules. Cone globular, the scales angular, peltate, valvately closed until ripe. 5 Leaves scale-form, flat, imbricated as in Thuya, often with a tubercle on the back. CYPRESS.

1 C. sempérvírens. Cone large, oval, 1', scales ∞-seeded; lvs. minute, ovate, obtuse, very closely imbricated. Cultivated South. Tree strict, conical, 20—40f.

2 C. thyóides L. White Cedar. Tree pyramidal, filiform branchlets square; leaves minute, lance-ovate, close, the tubercle manifest. Swamps. Cones small as peas.

3 C. Lawsonii. Splendid tree from Oregon; branchlets flattened, feather-like, bluish-green; leaves lance-ovate, tubercled; cones 1½'. Becoming common.

9. TAXÒDIUM, Rich. BALD CYPRESS. Fls. 2, sessile, small, roundish, the 5 in spikes, 2 in pairs below. Cone globular, the scales peltate, angular, thick, firmly closed till ripe, with 2 angular seeds at base. Cotyledons 6—9. 5 With deciduous, linear, 2-rowed leaves.

T. distíchum Rich. Tree 100—125f, trunk 6—9f diam.; large conical excrescences grow up from the roots; lvs. light-green, scattered, in 2 rows on the slender branchlets. Swamps, Va., and S. Timber valuable.

10. SEQUÓYA, Endl. RED-WOOD. Cones roundish, with peltate trapezoid, 5-seeded scales, valvately closed. Seeds winged both sides. 5 Immense, Californian. Leaves linear or subulate, alternate.

1 S. sempérvírens. Tree 200f, with a diam. of 10f; bark blackish, with rose-purple wood almost imperishable; cones globular, 1'; leaves of 2 kinds.

2 S. gigántea. Tree 300f, with a diam. of 20f (often larger!); bark cinnamon color, wood dull red, cones oval, near 2'; leaves mostly subulate. Rarely planted.

ORDER CXXVIII. TAXACEÆ. YEWS.

TREES or shrubs, with the general habit of the Pines, but with no cones, nor even the carpellary scale. Flowxers consisting simply of anthers or an ovule involucrate with bracts. Fruit a nut-like seed, naked, or in a cup-form dry or pulpy disk. Cotyledons 2. Fig. 166.
ORDER 129.—PALMACEÆ.


2. TORREYA, Arn. Flowers axillary, the ♂ many in the aments, bracts in 4 rows. Stamens with 4 anther-cells. ♀ Ovule with few bracts, becoming drupe-like, at length a dry ovoid bony nut or seed. ♀ ♀ Leaves rigid, alternate, 2-ranked, pungent, lance-linear.

3. PODOCÁRPUS, L'Her., contains some rare evergreens with remarkably large leaves (2–3' long). As yet very sparingly cultivated.

4. SALISBÚRIA ADIANTIFÓLLA (or Ginkgo biloba). Tree 40–80, from Japan, strict and pyramidal. Lvs. fan-shaped, 2-lobed, fork-veined and petiolate, in structure much like the Maidenhair Fern. The flowers and fruit are seldom seen.

PROVINCE, ENDOGÉNS,

THE MONOCOTYLEDONOUS PLANTS. Stems without the distinction of bark, wood, and pith, endogenous in growth (§ 421). Leaves mostly parallel-veined and alternate. Flowers 3-parted (rarely 4). Embryo with one cotyledon. (Prov. Acrogens, 360.)

CLASS III. PETALIFERÆ. Endogenous plants having flowers either with a whorled perianth or without one, but never glumaceous. (Class IV. GLUMIFERÆ. Page 355.)

COHORT 5. SPADICIFLORÆ. Flowers crowded on a thickened or club-shaped rachis (spadix), mostly naked, rarely with a scale-like perianth. (Cohort 6, p. 322.)

ORDER CXXIX. PALMACEÆ. PALMS.

Trees or shrubs, chiefly with unbranched trunks growing by the terminal bud. Leaves large, plaited, on sheathing petioles, collected in one terminal
Order 130.—Araceæ.

Cluster. Flowers perfect or polygamous, on a branching spadix bursting from a spathe. Perianth double, 3-merous, hexandrous, ovaries (and styles) 3, distinct or commonly united into 1, each 1-ovuled. Fruit fleshy, 1–3-seeded. Fig. 508.

* Flowers all perfect. Ovaries and styles united into 1. Berry single. ............... Sabal 1
* Flowers perfect and staminate. Ovaries and styles distinct. Drupes 3. .......... Chamærops 3


1 S. Palmetto Loddig. Caudex erect, 20–50 ft, usually enlarged above; the majestic lvs. are 6–10 ft long, all from one terminal bud; spadix much shorter than the leaves, spathe double; berry globular. Along the coast, Fla. to S. C.


C. Hystrix Fraser. Caudex low, making offsets at base; leaves 3–4f, the petioles spiny in the axils; drupes ovod, hairy, in masses. Clay soils, Ga., Fla.

Order CXXX. Araceæ. Aroids.

Herbs with a creeping rhizome or corm, an acrid or pungent juice, leaves often veiny, and the flowers mostly clinoious and naked. Inflorescence a spadix, dense-flowered, naked or mostly surrounded with a large spathe. Perianth none, or of 4–6 scales. Anthers extrorse. Ovary free, stigma sessile. Fruit baccate or dry, seeds albuminous. Figs. 432, 436.

* House, or greenhouse plants, growing in water or damp places... (a)
  a Spadix growing to the spathe. 9 Flower solitary. Floating. ............... Pistia 1
  o Spadix free, enveloped in the spathe... (c)
  a Spadix naked, destitute of a spathe.—b Leaves ensiform. ............... Acorus 7
  —b Leaves oval, &c. ............... Oncorhynchus 6
  c Flowers covering only the base of the spadix. Perianth 0. .......... Arisema 2
  d Flowers covering the whole spadix, or all but the base, and... (d)
    d Monocious. Spathe involute. Stamen around a shield. .......... Feltandra 3
    d All perfect.—x Perianth 0. Spathe open, white. Swamps. .......... Calla 4
    —x Perianth regular. Spathe shell-form. ............... Symphloicus 5
  y Spadix naked at the top. Spathe yellowish. Leaves peltate. .......... Colocasia 8
  y Spadix naked at the top. Spathe yellowish. Leaves not peltate. .......... Philodendron 9
  y Spadix covered with flowers. Spathe white.—z Leaves green only. .......... Richardia 10
    —z Leaves variegated. .......... Caladium 11
1. PISTIA, L. Spathe tubular at base, spreading above. Fls. 6, few, the upper 2 in an involucre, of 3-8 anther-cells. Fl. solitary, of a 1-celled ovary and thick style. Berry several-seeded.

P. spatulata Mx. Floating free in still water; leaves 1-2, obovate-spatulate, rosulate, the veins lamellated beneath; spathe white. E. Fla.

2. ARISÉMA, Mart. DRAGON-ROOT. INDIAN TURNIP. Spathe convolute at base. Spadix with a long naked summit, flower-bearing at base. Fls. above the fertile, each merely a cluster of 4 or more stamens. Ovary 1-celled, stig. flat. Berry red, 1- or few-seeded. Root tuberous. Scape sheathed with the petioles.

1 A. triphyllum Torr. Jack-in-the-pulpit. Stem a large corm fiercely acrid; scape round, thick, 8-12; leaves 2, trifoliate; leaflets oval, pointed, sessile; spathe striped, inflected over the club-shaped spadix. Rocky woods. April-+

2 A. quinatum Wood. Leaves 1 or 2, with very long sheaths, one or both quinate; leaflets ovate to lance-oval, acute, or obtuse, cuspidate, narrowed to a petiolule. Ga. to Car., in hilly woods. 1-2f. (A. polymorphum Buckley.)

3 A. Dracéntium Schott. Green Dragon. Leaf mostly 1, pedate, with 7-11 lance-oblong leaflets; spadix subulate, longer than the spathe. Bogs. 2f.


1 P. Virginica Raf. Leaves sagittate-hastate, the base lobes long and turned outward; spathe green, 4-6' long; berries green, 1-3-seeded. Marshes. 9-18'.

2 P. glauca Feay. Leaves sagittate-cordate, lobes rounded; spathe white and open at the top, 3'; berries ∞-seeded, red. Coastward, S. (Xanthosoma, Sch.)

4. CALLA, L. Spathe ovate, spreading, white. Spadix covered with the naked fls. Perianth 0. Fil. 6, slender, with 2-celled anthers. Berry red, depressed, 3-6-seeded. Rhizome creeping. Leaves cordate.

C. palústris L.—Shallow waters, Pa., and N. Scape 4-6'. Leaves 2-3'. July.

5. SYMPLOCÁRPUS, Salisb. SKUNK CABBAGE. Spathe shell-form, thick, close to the ground in early Spring, preceding the leaves, incurved at base and apex. Spadix oval, covered with the dull purple, perfect fls. Perianth 4-parted. Berries 1-seeded. Leaves all radical, very large.

S. foetidus Salisb.—Swamps, meadows: common. Leaves cordate-oval, 12-20'.

6. ORONTIUM, L. GOLDEN CLUB. Spathe 0. Spadix cylindrical, yellow, crowning the naked scape. Perianth 4-6-sepalled. Sta. 4-6. Fr. a dry utricle, 1-seeded. Leaves lanceolate, all radical.

O. aquáticum L.—Pools and brooks. 1f. Very smooth. Scape thickened upward, green at base, white above, the summit (flowers) golden yellow. June.

7. ÁCORUS, L. SWEET FLAG. Spathe 0. Spadix cylindric, sessile, issuing from the side of a leaf-like scape. Perianth 6-sepalled. Sta. 6. Ova and fruit 3-celled, capsular, ∞-seeded. Rhizome thick, aromatic. Lvs. all radical, linear-ensiform like the scape.

3. Colocasia antiquorum, from Egypt, &c., has large (2–3 f) ovate-sagittate, peltate, repand leaves, on petioles longer than the scape. Spathe erect, much longer than the spadix. Cultivated for food, and for ornament.


10. Richardia africana (Kunth, Calla ethiopica L.). Known everywhere as the Egyptian Calla, but native of the Cape of Good Hope: is a grand house-plant, 2–4 f, with large hastate-cordate leaves, round scapes, a large milk-white spathe rolled in at base and back at apex, surrounding a yellow cylindrical spadix.

11. Calladium bicolor. Roots tuberous. Lvs. radical, peltate, hastate-cordate, short-pointed, variegated with crimson or purple at the centre, or pellucid at base, or white-spotted. A splendid leaf-plant. Panama!

Order CXXXI. Lemnaceae. Duckmeats.

Herbs minute, stemless, floating free upon the water, and consisting of a leaf-like frond, or a tuft of leaves, with one or more fibrous roots. Flowers bursting from the substance of the frond, or axillary, enclosed in a spathe, the sterile consisting of 1 or 2 stamens, the fertile of a 1-celled ovary. Fruit a utricle, with 1 or more seeds. Emb. straight, in fleshy albumen. Fig. 516.

1. Lemna, L. Duckmeat. Fls. from a chink in the edge of the frond, 2 sterile, each a single recurved stamen, with 1 fertile,—an ovary with style and stigma. Ovules and seeds 1–7. § Fronds 1–7" long. Roots hair-like. Flowers rarely seen.

§ Ovule solitary. Frond with a single root. (Lemna proper) No. 1–3
§ Ovules 2. Frond many-rooted. (Spirodela, Schleiden) No. 4

1 L. trisulca L. Fronds oblong, as long (2–3") as their stalks, proliferous from their sides, thin, obtuse. Pools of clear water, in patches.


3 L. minor L. Fronds thick, veinless, obovate or roundish, 1–2", single or in groups of 2–4; style short; seed ovoid, half-erect. Stagnant waters: common.


2. Wolffia, Horkel. Fls. from the centre of the minute frond, 2 only; § flower a stamen with a 1-celled anther. § Ovary with a very short style, ovule and seed 1. (1) Fronds ½–1" rootless, separate.

W. Columbiana Karsten. Frond round-oval. Floating, with Lemna, seeming mere specks of green—the least of all flowering plants. Not rare.

Order CXXXII. Typhaceæ. Typhads.

Herbs growing in marshes and ditches, with rigid, ensiform, sessile leaves. Flowers monoeccious, arranged on a spadix or in heads, with no spathe
Perianth of a few scales, or a tuft of hairs, or 0. Stamens 1—4, with long, slender filaments. Ovary with 1 pendulous ovule. Seed albuminous, with an axial embryo. Fig. 211.

1. *Typha*, L. Cat-tail. Reed-mace. Spadix long, cylindric, dense, sterile above. Ø Sta. 3 together, united into a common filament. ¥ Ova. pedicellate, surrounded at base by a hair-like pappus or calyx. 2 Fls. very numerous, packed solid in the large brown terminal spadix.

1. **T. latifolia** L. Leaves linear, flat, exceeding the stem; spadix cylindric, the sterile and fertile contiguous. Tall and smooth, 3—5f, in swamps.

2. **T. angustifolia** L. Leaves linear, channelled, exceeding the stem; spadix cylindric, the sterile some remote from the fertile. Swamps. 2—4f.

2. *Sparganium*, L. Burr Reed. Spadices or globular heads many, the lower fertile, consisting of sessile pistils, each with 3—6 sepals, and forming 1-seeded nuts. Sterile heads a mass of stamens with scales intermixed. 2 Climate August.

- Stigmas mostly 2. Stems of the inflorescence branching, erect. No, 1
- Stigma always single. Stem subsimple, erect or floating. Nos. 2, 3

1. **S. eurycaurum** Eng. Stout, 1—3f; lvs. very long, carinate beneath; fruit heads 1', nuts large, obpyramidal, truncate, sessile; sterile heads numerous. Borders of rivers and ponds, N. Eng. to Pa., and W. (S. ramosum C-B.)

2. **S. simplex** Huds. Erect, slender, 1—2f; leaves triangular at base, long and narrow; sepals spatulate, denticulate; nuts beaked and stiped; heads 6—8'' broad, the Ø more than the Ø. Ponds and bogs, N. and W.

*β. natans*. Leaves floating, flat; stigma shorter than the style; heads few.

3. **S. minimum** Bauhin. Slender, weak, simple, erect or floating; leaves narrow, flat; heads few, axillary, small (3—4''); fruit scarcely beaked, sessile. Streams, N. Eng., and W. (S. angustifolium C-B.)

**Order CXXXIII. Naiadaceæ. Naiads.**

Water plants with jointed stems, and sheathing stipules, or sheathing petioles. Flowers perfect or diclinous, naked or with a 2—4-parted perianth. Stamens definite. Ovaries free, sessile, 1-ovuled. Stigma simple, often sessile. Fruit indeliscent. Seed without albumen, with a straight or curved embryo.

- Flowers axillary, sessile, the staminate reduced to a single stamen... (a)
  a Fertile flowers reduced to a single pistil, with 2 or 3 stigmas. Leaves opposite... *Najas*. 1
  a Fertile flowers with about 4 pistils in a cup, with as many stigmas... *Zannichellia*. 2
- Flowers spadecous, or 2—20, sessile on a spadix or spike... (b)
  b Flowers monocoesious, seated in 2 rows on the side of a linear, flat spadix... *Zostera*. 3
  b Flowers perfect, naked, 2—5, 4-merous. Fruit raised on slender stipes... *Ruppia*. 4
  b Flowers perfect. Perianth 4-sepalled. Stamens 4. Pistils and achenes... *Potamogeton*. 5


1. **N. major** All. Stem frail and slender, 1—3f; leaves 1' and less, crowded above with conspicuous spinulous teeth; nutlets ovoid. 14'' long. N. Y. (Clinton).
2 **N. Indica** Cham., *N. gracillima*. Stems filiform, forking; leaves opposite and in 3's, very narrowly linear, remotely spinulose-serrate. N. Y. and Pa. (Porter).

3 **N. flexilis** Rostk. Leaves narrowly linear, in 3's, 4's, and 6's, minutely serrulate, as well as their abruptly-widened sheathing base, 3-12'. Ponds: common.

2. **ZANNICHELLIA**, Micheli. *Horn Pondweed*. Fls. & , both kinds together in the same axil. ± Sta. 1, with a slender fil. ♀ Cal. of 1 sepal, cor. 0. Ova. 4 or more, each with a style and stig. Fr. 4 or more oblique achenia. Submersed, with filiform branches, and linear, entire leaves.

**Z. palustris** L. Stems rodd, leafy, 1-2f; leaves opposite, grass-like, 2-3'; anther 4-celled; achenia 4-6, toothed on the back. Pools and ditches: rare.


**Z. marina** L. Rhizome creeping, sending up long simple stems; lvs. alternate, ribbon-like, 1-5f long; spadix 2', in a spathe at base of a leaf. Grows in the sea, along shore, Me. to Ga., and is washed up by the waves.


**R. maritima** L. Stems filiform, branched, 2-5f; leaves linear-setaceous, 2-6', on inflated sheaths; flowers arising to the surface. Seas, and lakes (Hankenson), E.

5. **POTAMOGÈTÔN**, Tomb. *Pond-weed*. Fls. & on a spadix arising from a spathe. Cal. 4-sepalied. Anth. 4, alternate with sepals. Ova. 4. Achi. 4, sessile, flattened on one or two sides. Seeds curved or coiled. Mostly 4', only the spadix with its 3-1o small green fls. arising to the surface of the water. Lvs. stipulate, the upper often opposite. Fr. July, Aug.

§ Leaves of two kinds, the floating oval-elliptical, coriaceous, petiolate; stipules free from the petiole, connate; submerged leaves thin. (§)

* Submersed leaves linear or reduced to mere petioles ............. Nos. 1-4
* Submersed leaves lanceolate, rarely lance-linear ............. Nos. 5-8

§ Leaves all similar, submersed, mostly thin and membranous. (a)

a Leaves lanceolate or lance-oblong, petiolate or merely sessile. .......... Nos. 9, 10
a Leaves oval or oblong, broad and clasping at base. .......... Nos. 11-13
a Leaves linear or setaceous. -x Stipules 0, or adnate to the leaf. .......... Nos. 14, 15
-x Stipules free. -y Stems flat. .......... Nos. 16, 17
-y Stems filiform. .......... Nos. 18-20

1 **P. natans** L. Subsimple; floating lvs. 2-3', lance-oblong, narrowly obtuse, or slender (2-6') petioles; stipules long, linear; lower lvs. few, linear, 2-6'; spikes 1-2', on thick peduncles much longer: fruit turgid, 3-keeled. Ponds and ditches.

2 **P. Claytoni** Tuckm. Simple; floating leaves lance-oblong, about 15-veined, 1-11', longer than their petioles, opposite; lower lvs. linear, 3-veined, 3-6' x 1', spikes and their pedicles near 1'; fruit orbicular, 3-keeled. Streams and ponds: common.

β. **heterophyllus**. Petioles and peduncles longer than the leaves (2-3'). Mass.

3 **P. hýbríduus** Mx. Stems branching, filiform; floating lvs. oval, 5-7-veined, 7-10" their petioles shorter, subopposite; spikes and their stalks 4-6'"; lower lvs. linear setaceous, 1-9', many; fruit minute, dentate. Common.
β. *diversifolius.* Leaves nearly all floating, oval, the lower few and short.

4 **P. Spirillus** Tuckm. Very delicate, branched; floating lvs. oval to lanceolate, 5-9-veined, 7-10" on short broad petioles; lower leaves narrowly linear, obtuse, 1-2', submersed ped. 1-2-flowered; embryo a little spiral. Streams: rare.

5 **P. gramineus** L. Stem much branched, terete; floating lvs. long-stalked, ovate to oblong, acutish, 13-veined; lower leaves lanceolate to lance-linear, pointed, stip. obtuse; fruit small, obtuse-angled. Common, and very variable.

6 **P. florians** Roth. Lvs. long-stalked, the floating thinnish, opposite, elliptic-oblong, the submersed linear-oblong, all acute both ways, 11-21-veined; fruit acutely 3-keeled on the back. In ponds and rivers. (P. lonchitis Tuckm.)

7 **P. pulcher** Tuckm. Stem simple; floating leaves ovate, subcordate, 25-35-veined, 3-5', alternate; upper submersed lvs. lanceolate, long-acuminate, undulate, the lower oval-oblong; fruit 3-keeled. Penn., N. J. (Prof. Porter), N. and W. Rare.

8 **P. amplifolius** Tuckm. Stems simple; floating leaves oval to elliptical, 24-4', 35-45-veined, on long, opposite stalks; submersed lvs. larger than the floating, 5-7', lanceolate, short-stalked, or sessile. Ponds. (P. florians C-B.)

9 **P. lucens** L. Leaves large, often shining, lance-oval, 3-5'x1', pointed and mucronate, on short stalks; spike 2'; fruit roundish, slightly keeled. Rivers and lakes.

10 **P. obtusifolius** Wood. Stem simple: leaves all submersed, narrow-lanceolate, 3', obliquely 7-veined, subsessile, acute; spike 1', the stalk 2'; fruit inflated, acutely keeled, conspicuously umbilicate both sides. Slow waters. No floating leaves.

11 **P. prolóngus** Wulf. St. very long, branched; lvs. lance-ovate to lanceolate, obtuse, half-clasping, often large; peduncle very long (3-5'); fruit sharp-keeled. Rivers.

12 **P. perfollatus** L. Stem branched; lvs. cordate-clasping, roundish to ovate, obtuse; ped. short, few-flowered; fruit not keeled. Ponds and slow waters: common.

13 **P. crispus** L. Branched below; leaves 3-veined, half-clasping, narrow-oblong, obtuse, 1-2', crisp-wavy; fruit acuminate-beaked. Penn., and E. (Prof. Porter).

14 **P. pectinátus** L. Stem flexuous, repeatedly forking; leaves linear-setaceous, 2-3'; spike interrupted, on a long filiform peduncle; fruit large (3'), rough. E. and N.

15 **P. Robbinsiil** Oakes. Stem very branching; leaves lance-linear, crowded, sheathing the stem with their bases; spikes on short peduncles. N. and W.

16 **P. comprésus** L. St. branching, flattened; lvs. linear, 20-veined, 2-4'x1-2"; stip. obtuse; spike 12-15-flowered, much shorter than the peduncle. Ponds.

17 **P. obtusifolius** Mert. and Ktch. St. branching, flattened; lvs. linear, 3-veined; stip. obtuse; spike 6-8-flowered, as long as the peduncle. Pa., and N-W.

18 **P. punctiflorus** Ph. St. slightly flattened, much forked; lvs. linear, 1-3'x4-1"; flowers few (3-12) in the spike; fruit distinctly clefted. Rivers, &c.

19 **P. pusillus** L. Stem filiform, branched; leaves linear, varying to capillary, 1-3-veined; spikes 3-5-flowered, long-stalked; fruit not keeled. Shallow waters.

20 **P. Tuckermāni** Robbins. Very slender and delicate, forked; lvs. capillary and conservoid; spike 6-9-flowered, on a very long peduncle (5'). Ponds, Pa., and N.

**Cohort 6. FLORIDEÆ.**

Endogenous plants with the flowers usually perfect and complete, the perianth double, 3-parted, the outer often, and sometimes both, green.

**Order CXXXIV. ALISMACEÆ. WATER PLANTS.**

Marsh herbs, with parallel-veined, petiolate leaves and branching peduncles. Flowers perfect or monoeocious, with a regular double perianth.
Sepals 3, green. Petals 3, colored or green. Stamens hypogynous. Ovaries 3 or more, separating into as many distinct fruits.


A. *Plantago* L. *A. Americanum*, Lvs. 5-7-veined, ovate or oval, subcordate, pointed; scape many-flowered, ffs. whorled, small, rose-white. Pools. 1-2f. July, Aug.


1. *E. radicans* Eng. Leaves large (5-12'), 7-veined, cordate, ovate, on long petioles; scape prostrate, running and rooting; flowers clustered at the nodes, white; stam. 18-24; ovaries very many. \( \times \) Swamps, Ill. to Ga. June, July.

2. *E. rostratus* Eng. Leaves 1-3', ovate, cordate, on long petioles; scapes erect, sharply angled; stamens 12; carpels ∞, strongly ribbed and beaked. \( 1 \) West.

3. *E. parvulus* Eng. Leaves lance-elliptic, as long as the petioles (1); scapes 3-6 flowered; stamens 9; carpels about 20, beakless; flowers about 3'. \( 1 \) E. and W.

4. *Sagittaria*, L. Arrowhead. Ffs. 5 or 8, in whorls of 3 on the scape, the lower fertile. Petals white, larger than the sepals, imbricated in bud. Sta. ∞. Ovaries very ∞, crowded in a head. Achenia flattened, margined, and beaked. \( \times \) Juice milky. Leaves on long radical stalks, sagittate to linear. Summer.

* Leaves mostly arrow-shaped. Filaments slender, elongated........ Nos. 1, 2
* Leaves lanceolate to linear, very rarely with narrow, base lobes... (a)
  a Filaments as long as the anthers. Pedicels all subequal........ Nos. 3
  a Filaments thick, shorter than anthers.—z Fertile pedicels very short.. Nos. 4
  —z Pedicels subequal........ Nos. 5, 6.

1. *S. variabilis* Eng. Scape 1-2f, 12-angled; sterile pedicels twice longer than the fertile; filaments much longer than the anthers; achenia with a conspicuous averted beak. Waters: common. Flowers about 1' broad. Varies exceedingly
  a Leaves lanceolate, with lance-like lobes of the same length
  β. obliqua. Leaves ample (6-10'), broad-ovate, obtuse. Ffs 4 f. M., W., and S
  γ. latifolia. Leaves ample, ovate, acute, their lobes ovate, pointed.
  δ. gracilis. Leaves and their spreading lobes long, linear, acute.
  ε. pubescens. Plant pubescent all over; leaves and lobes ovate.

2. *S. calycina* Eng. Scape soon procumbent; pedicels all subequal; bracts roundish; calyx closed on the fruit; filaments as long as the anthers. Waters. Leaves as in No. 1, but sometimes all linear and floating.
3. **S. lanceolata** L. Leaves lance-oblong, rarely linear, tapering to the long petiole; scape branched; 2–3'.; achenia obovate-falcate. Swamps, Va. to Fla.

4. **S. heterophylla** Ph. Leaves linear-lanceolate, rarely some of them with 1 or 2 base lobes; scape simple, weak; achenia narrow, long-beaked. Common S. and W.

5. **S. graminea** Mx. Scape erect, slender, 5–30'; leaves lance-ovate to linear, rarely sagittate; pedicels all equally slender; achenia beakless; flowers 8–9' diameter.

* **platyphylla.** Leaves lance-ovate; flowers larger, 1' broad. South.

6. **S. pusilla** N. Scape shorter than the leaves (2–4'); leaves linear, shorter than the petioles; flowers few, the fertile but one, deflexed; stamens about 7. N. J., and S.

7. **S. natans** Mx. Scape mostly erect, 3–6'; leaves oval-lanceolate, floating, obtuse, 3-veined; lower pedicels longest; achenia angular, short-beaked. South.


1. **T. maritimum** L. Fruit ovate-oblong, grooved, of 6 united carpels; scape longer (9–18') than the leaves. Salt marshes and Lake shores, northward.

2. **T. palustre** L. Fruit nearly linear, of 3 united carpels; scape scarcely longer than the numerous and very narrow leaves. Marshes, N. Y., and N. 6–13'.

6. **SCHEEUCHZÈRIA, L.** Sep. and pet. oblong, acute, persistent. Sta. 6, with linear anthers. Ovaries 1–2-ovuled, becoming flattened inflated capsules. 24 Leaves caudine, sheathing at base, linear.


**Order CXXXV. HYDROCHARIDACEÆ. FROGBITS.**

Aquatic herbs, with parallel-veined leaves and diclinous flowers solitary or spicate. Perianth regular, 3–6-parted, the inner segments petaloid. Stamens 3–12. Ovary adherent, 1–9-celled, with 3, 6, or 9 stigmas. Fruit dry or juicy, ♀-seeded, indehiscent.

* Leaves all radical, roundish, floating in stagnant waters. ................................................LIMNOBIUM. 1
* Leaves opposite or verticillate in 3's and 4's on the stems, submersed. ................................ANACHARIS. 2
* Leaves all radical, grass-like, in water. .................................................................VALLISNERIA. 3


L. Spinza Rich.—Lake Ont. (rare), and S. Lvs. 1–14', purplish and spongy beneath


A. Canadensis Planc. Stems filiform, long, forking; very leafy; leaves linear-oblong, serrulate, 5–10'; tube of the dingy-white fls. 2–10' long! Streams and bogs.

V. spiràlis L. Lvs. 1-2' long, obtuse, 6' wide, scapes of the sterile plants short, of the fertile filiform, tortuous, 2-4', bearing the single white fl. at or near the surface.

ORDER CXXXVI. BURMANNIACEÆ.
Small annual herbs, with naked or scaly stems and scale-like tufted leaves. Flowers perfect. Perianth tubular, 6-toothed, adherent. Stamens 3 or 6. Capsule 1- or 3-celled. Seeds oo, minute, in a loose testa.

1. APTÈRIA, N. Perianth tube longer than the slender teeth, which are alternately narrower. Caps. globular, 1-celled. 6 Apparently leafless.

A. setàceæ N. Erect, very slender, 4-6', with remote subulate scales, and bearing above 1 or 2 racemes; flowers 3-4', purplish, distant. Woods, Fla., and W.

2. BURMANNIA, L. Perianth tube scarcely produced above the ovary, often 3-winged below, limb with the 3 inner teeth much shorter. Capsule prismatic, often 3-winged, 3-celled. 6 Leafless.

1 B. bifòra L. Stems capillary, simple, 2-3', with scarcely perceptible bracts, and 1 or 2 (rarely more) light-blue flowers, 2-3' long at top. Swamps, Va., and S. Oct.


ORDER CXXXVII. ORCHIDACEÆ. ORCHIDS.

Herbs perennial with fleshy roots, simple, entire, parallel-veined leaves. Flowers very irregular, with an adherent, ringent perianth of 6 parts. Sepals 3, usually colored. Petals 3, odd one (lowest by the twisting of the ovary), called the lip, diverse in form from the others, sometimes lobed, often spurred. Stamens 3, gynandrous (consolidated with the style), some of them abortive, pollen powdery or waxy. Ovary inferior, 1-celled, capsule 3-valved. Seeds innumerabile. Figs. 71, 105, 240, 247, b. 263, 291, 435.

§ CYPRIPÆDIÆ. Anthers, the 2 lateral fertile, the terminal petaloid. 6

a Lip a large, inflated, spurless sac. Petals and sepals spreading. Cyprípediàm. 1

b Lip the large inflated sac, 2-spurred under the apex. Leaf. 1. Calypso. 7

b Lip produced behind into a spur, which is free from the ovary. 6

b Lip spurless, or the spur adheres to the ovary (except in No. 13). 6

c Anther fixed; pollen-masses 2, club-shaped, in 2 separate cells. 6 Chilànd. 3

c Anther lid-like, on the end of the stigma; pollen-masses 4. Típulária 4

d Plants broad and leafless, rarely with radical leaves. 6

d Plants green and (except No. 16) furnished with leaves. (m)

e Lip hooded, i.e., its margins involute. Perianth spreading. Bletià 1

e Lip concave, sessile, often with an adnate spur. Corallorhiza. 6

e Lip concave, raised on a claw. Plant with 1 late leaf. Apléctrum. 7

m Lip flat. Flowers obscure, in racemes, nearly bractless. 6

m Lip flat, expanded and lobed, tubercled at base. Flowers showy... Oncidium. 5

m Lip channelled, reflexed. Flowers whitish, in bracted spikes. 6

m Lip bearded or 5-lobed. Stamen lid-like. Flowers showy... (a)
1. CYPRIPÉDIUM, L. Lady's Slipper. The 2 lower sepals united into 1 leaf, or rarely distinct. Pet. spreading. Lip inflated, saccate, obtuse. Column terminated by a petaloid lobe (barren stamen), and bearing a 2-celled anther under each wing. Wt. With large plaited leaves and large showy flowers. May, June. Fig. 71.

§ Sepals 3, the two lower entirely distinct. Stem leafy
§ Sepals 2, the lower composed of two united nearly to the lip... (a)
   a Stem a leafless scape, 2-leaved at base. Flower rose-colored... No. 2
   a Stem leafy.—x Flowers solitary or several, white or rose-colored... Nos. 3, 4

1. C. arletinum Ait. Ram's Head. Stems usually clustered, 8–12', each 1- or 2-flwed.; leaves elliptical; upper sep. oblong-ovate, the lateral sep. and pet. lin-lanceolate, lip obconic, as long as the pet. Damp woods, N. Eng. to Wis., and N. Curious.


3. C. spectabile Sw. Stem leafy, 2f', hairy; lvs. lance-oval, acuminate; sep. broad-ovate, obtuse, the lower (double) one smaller; lip 2', white-purple. Swamps. Superb.

4. C. candidum Willd. St. leafy, 1f; lvs. oblong-lanceolate, acute; fl. 1.; sep. subequal; lip 1', compressed, white, shorter than the (2') pet. Woods and prairies.

5. C. parviflorum Salisb. St. very leafy, 8–12'; lvs. lanceolate, acuminate; sepals ovate to lance-oval; lip depressed, shorter than the petals. Low woods and prairies.

6. C. pubescens Sw. Large Yellow L. Stems usually clustered, 1f or more; leaves broadly lanceolate, acuminate; sepals lanceolate; lip compressed laterally, moccasin-shaped, shorter than the linear, twisted petals. Woods, meadows, and prairies.


C. borealis Salisb.—Old mossy woods, Vt., N. Y., W. to Oregon. Scape 6–8'; leaf broad-ovate, 1–2'; flowers purple and yellow, 14'. Rare eastward. May.

3. ORCHIS, L. Sepals and pet. similar, some of them ascending and arching over the column. Lip turned downward, produced at base into a spur which is free from the twisted ovary. Sta. 1, anth. 2-celled, a pollen-mass in each cell.—Fls. racemed on the stem or scape. June—August. (Includes Habenaria, Gymnadenia, and Platanthera.)

* Leaves only 2,—a ovate, nearly as long as scape. Flowers rose-white...... No. 1
   —a roundish, the scape much longer. Flowers greenish... Nos. 5, 3

* Leaf only 1. Flowers greenish-white. Lip entire or 3-lobed ............. Nos. 4, 5

* Leaves several, clothing the stem more or less... (b)
   b Lip undivided,—c entire, white or greenish......................... Nos. 6, 7
Order 137.—Orchidaceæ.

—c crenulate or wavy, white or yellow
—c 3-toothed. Flowers yellowish or greenish
—c fringed. Flowers bright yellow or white

Lip 3-parted,—x segments fringed. Flowers white or greenish
—x segments fringed. Flowers purple
—x segments merely toothed. Flowers violet-purple

1 O. spectabilis L. Lvs. rarely more than 2, 3—6' ; scape 4—6', bearing 1 or 2 lanceolate bracts and 3—5 showy flowers above; spur clavate. Rocky thickets. Pretty.

2 O. orbiculata Ph. Lvs. 2, roundish, 3—6', fleshy; scape bracted, 1—2f; upper sepals round, the lateral ovate, half as long as the lip (9—12'). Woods, E. and W.

3 O. Hooker Wood. Lvs. 2, round-oval, fleshy, 4—5'; scape naked, 8—12'; upper sepals ovate, erect, the lateral deflexed and meeting behind; spur 1'. Woods, N.

4 O. obtusata Ph. Leaf oblong-ovate, obtuse, 2—3', near the base of the stem; lip linear, entire, with 2 tubercles at base, as long as the spur. In mud, N.

5 O. rotundifolia Ph. Leaf round-ovate, radical; scape few-flowered; lip 3-lobed, obcordate, side lobes falcate; spur as long as the lip. Penn., and N.

6 O. hyperborea Willd. Lvs. very erect, lanceolate; spike long: bracts longer than the greenish flowers; petals and lip linear, subequal. Shades, northward. 1—4f.

7 O. dilatata Ph. Slender, 8—2f; lvs. lance-linear and linear; spike virgate; bracts short; flowers white; lip linear, dilated-rhombic at base. Swamps, N.

8 O. nivea Baldw. Very slender, 1—2f; lowest leaf linear, 6—8', the others subulate, bract-like; flowers white, in an oblong spike; lips oblong. South.

9 O. intégra N. Stem leafy, flexuous, 12—15'; lvs. narrow-lanceolate; spike dense, oval; flowers orange-yellow; lip ovate, longer than sepals. Swamps, N. J., and S.

10 O. tridentata Willd. St. slender, 12—18'; lowest leaf linear-ovate, obtuse, 6', the others few, small and bract-like; lvs. few, greenish; lip 3-toothed at end. Woods.

11 O. bracteata Muhl. St. leafy; lvs. oblong, obtuse or acutish; bracts 2—3 times longer than the small green lvs.; lip 3-(or 2-)toothed at end, lin.-cuneate. Shades. 6—9'.

12 O. flavă L. St. leafy; lvs. oblong to lanceolate; bracts longer than the yellowish-brown flowers; lip oblong, obtuse, a tooth each side at base, and a tubercle in the paleate; spur shorter than the ovary. Alluvial soils. (O. virescens Muhl.)

13 O. cristata Mx. Slender, 14—3f; leaves lance-linear to linear; flowers numerous, small, yellow; sep. and pet. roundish, 1—2'; spur 9 as long as ovary. N. J., and S.

14 O. ciliärís L. Yellow Fringed Orchis. Stem 2f; leaves lanceolate; flowers large, numerous, orange-colored; lip 4' long, twice longer than the linear, notched petals; spur Y. Swamps. Delicately beautiful.

15 O. Blephariglótis Willd. White Fringed Orchis. Stem 1—2f; leaves lanceolate; flowers pure white; lip fringed in the middle, 2' long, lanceolate; spur much longer (1'). Swamps. N. to Car., and westward.

16 O. lácera Mx. Ragged O. St. smooth, slender, 1—2f; leaves oblong to linear, bracts longer than the flowers; sepals acute; petals emarginate; flowers CO; lip segments capillaceous-multifid; spur as long as the ovary. Meadows.

17 O. leucophea N. White Prairie O. Lvs. lanceolate, tapering to a narrow obtuse point; bracts shorter than the ovaries; lvs. about 12; spur yellowish, curved, twice longer than the ovary; petals white. Wet prairies.

18 O. Psycode’s L. Purple Fringed O. Leaves lanceolate; lip segments cuneiform, scarcely longer than the ovary, crenulate, slightly fringed petals; spur longer than the ovary. Meadows. 14—2f. Flowers light purple.

19 O. grandiflóra Bw. Large Fringed O. Tall, 2—3f; lvs. oval, oblong, and linear, obtuse; lvs. segments dependent, fan-shaped, twice longer than the fringed petals. Wet meadows, Penn., and N. Superb. (O. fimbrirata.)

20 O. permáena (Gr.) Tall, leafy; leaves lanceolate to lance-linear; sepals round ovate; petals denticulate; lip middle segment 2-lobed, all merely toothed: spur longer than the ovary. Pa. to Ind., and S. Flowers 30—50, large.
21 O. Michauxii (N.) Very leafy; leaves elliptic-ovate, the upper reduced; flowers few, white; petals 2-parted, the lower divisions linear-setaceous, like those of the lip; spur twice as long as the ovary; flowers white. South.

22 O. repens (N.) Stem very leafy from a creeping rhizome; leaves all lance-linear, long; flowers greenish-yellow, dense in the spike, much smaller than in No. 21, but otherwise similar. Pine-barrens, S. August, September.


1 H. aphylia N. Leafless; scape 15–30’, with few bracts; racemes long and loose; flowers purplish and yellowish-brown; lip 3-lobed. Swamps, S. August.

2 H. verecúnda H. K. Leaves all radical, broad-lanceolate; scape 2–3f; flowers purple, large and showy; lip broad and crisp at the end. Ga., Fla. July.

6. CORALLORHÍZA, Br. CORAL-ROOT. Sepals and petals subequal, converging. Lip produced behind into a spur, which is adnate to the ovary or obsolete. Pollinia 4. 4 Plants leafless, brown, arising from coralline roots, sheathed with bracts. Flowers racemed. Fig. 240.

* Spur conspicuously prominent, but adnate. Lip 3-lobed. .......... .......... No. 1
* Spur wholly obliterated. — 2 Lip crenulate, waxy, not at all lobed. .......... No. 2
  — 2 Lip entire, slightly toothed near the base. ....... Nos. 3, 4


7. APLÉCTRUM, N. ADAM-AND-EVE. PUTTY-ROOT. Sepals and petals distinct, subequial, converging. Lip unguiculate, 3-lobed, middle lobe crenulate. Spur 0. Column free, anth. a little below the apex, pollinia 4, lens-shaped. 4 Root a globous corm. Leaf 1, large, biennial. Scape after the leaf, bracted, racemed, and brown, as in Corallorhiza. Fig. 263.


1 O. flexuosum. Scape panicked, arising from the base of a bulb; leaves lanceolate; lip 3-lobed, spotted, much longer than the other petals. Brazil.

2 O. luidium. Scape erect, branched; leaves elliptical; lip reniform, not longer than the wavy, retuse petals; flowers large, olive-colored. From S. America. 2f.

3 O. Paraliso, has one spotted ovate leaf and large yellow-red butterfly-shaped flowers.

9. Microstylis, N. Sepals spreading, petals filiform or linear, lip concave, sessile. Column minute, with 2 teeth or lobes at tip. Polлина 4. 2f Root tuberous, with 1 or 2 leaves and small racemed flowers.

1 M. ophioglossoides N. St. 5-9", with a single ovate (2") leaf near the middle, rac. short (1"), ped. much longer than the minute whitish flowers. Woods, N. June.

2 M. monophyllum Lindl. St. 2-6", 3-angled, with a single ovate leaf; rac. elongated, 20-40-flowered; pedicels about as long as the flowers (2"). Woods, N.: rare. Jl.


1 L. lilifolia Rich. Scape about 6'; leaves 2, radical, lance-ovate, 3-4'; petals filiform, reflexed; lip purple, 6", abruptly cuspitate; pedicels 1'. Damp woods. June.


1 L. cordata Br. Lvs. roundish, subcordate, acute; fls. 10-15, in a short raceme; pedicels length of the ovary; lip-segment linear, length of the sepals. Penn., and N.

2 L. australis Lindl. Lvs. ovate; fls. in a loose raceme; ped. 3-4 times longer than the ovary; lip-segment linear-setaceous, twice the length of the sepals. N. J., and S.

3 L. convallarioides Hook. Lvs. round-oval; fls. few, loose, on slender pedicels; lip twice the length of the sepals (4''), 2-lobed at the dilated apex. Ga., and N.

12. Spiranthus, Rich. Ladiés' Tresses. Spike spiral. Perianth ringent, the 3 upper pieces ascending and connivent, lip oblong, recurved, channelled, the base embracing the column, and with 2 callous processes. Stigma ovate, beaked, 2-toothed at tip. Anthers dorsal, polлина 2, each 2-lobed, powdery. 2f Stem nearly naked, bearing many white flowers, bent to a horizontal position.

* Spike dense, with the flowers on all sides. Lvs. present with the flowers...Nos. 1-3
* Spike slender, flowers all in 1 straight or spiral row.—x Lvs. permanent...Nos. 4-6

1 S. cernua Rich. Leaves lance-linear, the upper bract-like; spike oblong to cylindrical, 2-4'; lip very obtuse, crenulate-wavy, conduplicate and recurved; sepals and petals not connivent, 4-5'. Wet. 9-30'. Aug.—Oct.

2 S. Romanzoviana Cham. Lvs. lance-oblung to linear; spike dense, 1-3'; lip much recurved, ovate-oblong, crenulate-wavy; sepals and petals all connivent above into a galea. Bogé, Me. (Miss Towle) to Lake Superior (Prof. Porter). July, Aug.

3 S. latifolia Torr. Leaves nearly radical, 3-5-veined, lance-oblung; scape bracted, 4-8'; flowers small (2-3'); plant glabrous. Meadows, Penn., and N. June, July.

4 S. odorata N. St. stout, 1-2'; lvs. lance-oblung; fls. yellowish, fragrant, 6", in a spiral row, with leafy bracts; lip 2-toothed at base. Muddy streams, S. October.
S. graminea Lindl. Lvs. below lance-linear to linear, the cauline mere sheaths; spike dense, much twisted; flowers white, 3–5", pubescent, scarcely ringent; lip oblong-ovate, crisped, obtuse. Wet meadows. June–Aug. (S. tortillis C.B.)

6 S. brevifolia Chapm. Lowest leaves elliptical, evanescent, cauline bract-like; flowers 5–15, in a nearly straight row, ringent, 3–4"; lip entire. S.

7 S. gracilis Bigel. Lvs. all radical, ovate to oblong, fugacious; scape very slender, 8–18", with a few bracts; flowers 3–4", in a nearly straight row, pure white; root fasciculate; plant glabrous. Woods: common. July, Aug.

8 S. simplex Gr. Lvs. all radical, fugacious; scape 5–9", flowers very small (1–2") in a thin 1-flowered spike; lip obovate-oblong. Dry, N. J. (Porter), and S.

13. GOODYERA, Br. Rattlesnake Plantain. Spike and perianth as in Spiranes. Lip sessile, concave or sack-like or even spur-like at base, contracted at the end to a reflexed, channelled point. 2r Root-stock creeping, branching. Leaves ovate, on sheathing petioles.

* Leaves radical, generally netted with white veins. Lip not spurred. Nos. 1, 2
* Leaves cauline, uniformly green. Lip spurred at the base behind. Nos. 3

1 G. Menziesii Lindl. Lip concave at base, gradually narrowed and folded at apex; leaves elliptic-ovate; scape 9–12"; spike loose-flowered; flowers pubescent (as are Nos. 2 and 3), sub erect. Woods, N. Y. to Mich. (Dr. Leidy) and Oreg. July, Aug.

2 G. repens Br. Lip saccate-inflated at base; leaves ovate, beautifully netted; scape 6–12"; flowers ovoid, nodding, in 1 row, which is more or less spiral; perianth greenish, about 2" long and nearly as wide. Woods. June, July. (G. pubescens Br.)

3 G. quercicola Lindl. Rooting on the bark of Oaks, &c.; stem leafy; lvs. lance-ovate, thin; spike glabrous, dense, 6–20"; sheaths and bracts membranous; lip ovate at apex, the spur pouch-like, half as long as the ovary. Fl. to La. 6–12".

14. PONTHIÉVA, Br. Lip on the upper or inner side, ovate, spreading, and with the other petals inserted into the middle of the column. Anthers with 4 pollinia. Otherwise like Spiranes.

P. glandulosa Br. Lvs. radical, oblong-oval; root fasciculate; scape lf, bracted, with a spike of many greenish pubescent lvs. Woods, S. Sept., Oct. (Cranichis N.)

15. CALOPÒGON, Br. Grass Pink. Sepals and petals similar, distinct. Lip on the upper (inner) side (the ovary not twisted), unguiculate, bearded. Column free, winged at the summit. 2r Corm bearing a grass-like leaf, and a scape with several showy flowers.

C. pulchéllus Br. Leaf linear, 8–12" by 6", veined; lvs. 3–8, large, purple; lip spathulate, crested with colored hairs, erect over the column. Wet meadows. June, July.

16. POGONIA, Juss. Perianth irregular, its pieces distinct. Lip sessile or unguiculate, hooded, bearded inside. Column wingless, free. Anth. terminal, lid-form, with 2 pollinia. 2r

§ Sepals about equal, and similar to the petals, light purple. Lip scarcely lobed. Nos. 1, 2
§ Sepals much longer than, and unlike the petals, dark brown. Lip 3-lobed. Nos. 3, 4

1 P. ophióglossoides N. Root fibrous; stem 9–16", with an oval-lanceolate leaf near the middle, and a leaf-like bract near the single large pale-purple flower; lip crested and fringed, as long as the sepals and petals. Swamps. June, July.


3 P. divaricata Br. Stem 1–2f, erect, with 2 linear-oblong lvs. and 1 terminal large flower; sepals linear, recurved at apex, 1½" long; petals lanceolate, pink-colored, secominate, 1½, lip a little longer. Swamps, Del. to Fla. April, May.
**Order CXXXVIII. Scitamineæ. Gingerworts.**

Tropical herbs. Leaves parallel-veined, with the veins diverging from the midvein. Flowers irregular and unsymmetrical, with perianth 3-6-parted and adherent to the 3-celled ovary. Stamens 3—6, some of them abortive. Styles united. Fruit dry or fleshy. Seeds albuminous. Here belong the Cinnamons, Gingers, Bananas, and Arrow-roots.

§ **Musaceæ.** Anthers 5, each 2-celled. Fruit many-seeded. Filaments 6... (2)

§ **Zingiberæ.** Anther 1, 2-celled. Filaments 3, not petaloid. Fruit 2-celled... (y)

§ **Marantaceæ.** Anther 1, with 1 cell. Filaments 3, petaloid. Capsules 1-3-seeded... (z)

1. **Musa sapientum.** Banana. Scape 7—20f, sheathed below by the stalks of the majestic leaves, the summit a nodding spike of pink-colored flowers, becoming a huge cluster of delicious fruits in which the seeds are abortive.

2. **Strelitzia reginae.** Scape 5—8f, with sheathing bracts, upper bract spathe-like, horizontal, with a cluster of splendid flowers. Sepals lanceolate, 3—4', yellow. Petals hastate, light blue, enclosing the stamens and style. S. Africa.

3. **Hedychium angustifolium.** Stem 5f, very leafy. Leaves linear-lanceolate. Sepals and pet. linear, the lip oblong, all scarlet, in a dense cluster. H. carnea has similar leaves, with pink-colored flowers in a loose cluster. E. India.

4. **Alpinia magnifica,** from Mauritius, 10f high, has the flowers in a head with many large rose-colored bracts, which are bordered with a white line. A. nutans, still taller, from E. India, has a drooping raceme of pink-colored bracts and flowers, with curled and curved petals. Very splendid.

5. **Marantæ aeflorae,** from Brazil, is cultivated for the large ovate leaves, which are beautifully feather-marked with light-green above and purple beneath.
6. CANNA, L. INDIAN SHOT. Sepals 3, persistent on the tubercled fruit. Petals 6, the innermost 2- or 3-lobed at the end. Stamen petaloid, with a half anther on one edge. Stigma petaloid, flat, obtuse. ½ Handsome evergreen herbs, with tall stems and large smooth leaves.

§ CORYTHIUM. Corolla tube manifest. Petals dilated. Anther wholly adnate...No. 1
§ Canna proper. Cor. tube short or 0. Petals narrow. Anther free above...Nos. 2-4

1 C. flaccida Rosc. Stem 3-4f; lvs. lanceolate, 2f, pointed both ways; sep. erect, not ⅓ the length of the tube of the funnel-form corolla; petals and filaments obovate, thin, flaccid, wavy, yellow, spirally arranged; stig. spatulate. Ponds, South.

2 C. indica. Stem 3-6f, leafy; lvs. ovate, pointed, 1-2f, abrupt at base; sep. green, 6"; 3 outer pet. erect, green-tipped, the 3 inner recurved or reflexed, the 5th double (2-lobed at end), the stamens and style similar (2'), all scarlet. W. Indies.

3 C. discolor. Stem 6-10f; lvs. very large, green and purple; lvs. in pairs, crimson.

4 C. iridiflora. From Peru. Downy; sheaths colored at edge; lvs. drooping, 3', red.

7. THALIA, L. Flowers in a 2-leaved spathe. Cal. 3-sepalled, small. Cor. 6-parted, 3 inner pet. very unequal. Sta. 2-parted, the inner segment slender, bearing the ½ anther. Caps. thin. ½ Scape sheathed at base by the petioles, tall, paniculate above. Flowers small, purple.

1 T. dealbata Rosc. Plant 4f, covered with a white powder; lvs. cordate-ovate, on long petioles; petals dense, erect, the branches as short as the lanceolate bracts. S.

2 T. divaricata Chapm. Plant not powdery, 7f; lvs. lance-ovate, rounded at base; panicle open, divaricate, branches zigzag, much longer than the linear bracts. Fls.

Order CXXXIX. AMARYLLIDACEÆ. AMARYLLIDS.

Herbs perennial, chiefly bulbous, with linear leaves not scurfy nor woolly. Flowers showy, mostly regular and on scapes, with an adherence, 6-parted perianth. Stamens 6, anthers introrse. Ovary 3-celled, with styles united into 1. Fruit a 3-celled capsule or berry. Seeds 1 to ∞, with fleshy albumen. Figs. 58, 86, 486, 495.

§ Perianth crowned with a firm cup containing the stamens (§ 78, 79)......................Narcissus. 1
§ Perianth crowned with a thin membrane connecting the stamens.........................Pancratium. 2
§ Perianth not crowned.—a Segments united into a tube above the ovary...(b)
   —a Segments distinct down to the ovary...(c)
b Flowers in umbels or solitary on the naked scape...(d)
b Flowers in spikes, racemes, or panicles. Scape bracted...(e)
d Tube long and slender, segments narrow, abruptly spreading.........................Crinum. 3
d Tube short or long, gradually expanding. Perianth subirregular.........................Amaryllis. 4
e Tube of the perianth straight. Stamens exerted..............................Agave. 5
e Tube of the perianth curved. Stamens included..............................Polaranthes. 6
x Perianth irregular. Stems leafy, flowers umbelshed..............................Alstroemeria. 7
x Perianth irregular. Scape naked, with 1 large flower..............................Spreekelia. 5
x Perianth regular.—y Sepals all white, larger than the petals..............................Galanthus. 9
   —y Sepals green-tipped, as large as the petals..............................Leucojum. 10
   —y Sepals and petals equal, yellow..............................Hyacinth. 11

1. NARCÍSSUS, L. Perianth regular, 6-parted, bearing a bell- or cup-form crown on the throat. Sta. 6, inserted in the tube, and concealed within the crown. ½ Stems bulbous, scapes bearing a long deciduous spathe with 1 or more yellow or white fragrant flowers. Leaves ensiform.

§ Crown longer than the tube of the perianth. Scape 1-flowered......................Nos. 1, 2
Order 139.—AMARYLLIDACEÆ.

4. AMARYLLIS, L. Perianth tube long or short, expanding upward; limb regular or nearly so. Sta. free, anth. versatile. Style long, declinate.

5. AGAVE, L. AMERICAN ALOE. Perianth funnel-form, 6-parted. Sta.
6. *Polyanthes* (or Polianthes), L. Tube-rose. Perianth funnel-form, with a curved tube. Fil. inserted into the throat, included. Ovary at the bottom of the tube, its summit free. 2 Root an upright rhizome.

P. *tuberosa*. Stem simple, slender, leafy-bracted, 3f, with a spike of rose-white flowers, 1f, subregular, of exquisite fragrance. From Ceylon. Aug., Sept.

7. *Alstroemeria*, L. Perianth funnel-form, some irregular, of 6 leaves distinct to the ovary. Sta. diclinate. Stig. 3-cleft. 2 Root a rhizome, bearing tubers. Stems leafy, umbellate at top.

1 A. *Psittacina*. Erect, 1–2f, with remote, lanceolate, sessile leaves; fls. 6–8, in a leafy cluster, pedicellate, 1f; segments spatulate, red, spotted with green. Brazil.

2 A. *Peleolina*. Lvs. sessile, lance-linear, twisted; fls. 2–6, pink-white, purp.-spotted.

3 A. *Versicolor*. Perianth nearly regular, yellow, with purple spots. Chili.


G. *Nivalis*. Scape 6f, 2-leaved; flower 1, as white as snow, in early Spring. Europe.


1 L. *Vernum*. Lvs. linear; scape 1–2-flwd.; sep. white, tipped with green or yellow, with divergent veins; spathe 1-leaved; seeds straw-color. March, April.

2 L. *Estrivum*. Lvs. linear; scape 4–8-flwd., umbellate, 6–10f; sepals 6–8f, pure white with green tips; spathe 1-leaved; seeds black. May, June. Europe.


1 H. *erecta* L. Hairy; scape about 4-flowered, shorter than the linear leaves, which are 3–5f wide; flowers greenish without, yellow within. June.

2 H. *filifolia* Ell. Smoothish; scape 2-flowered, shorter than the filiform leaves, which are not 4f wide. Dry soils, S. Flowers rather larger (9–11f).
Order 141.—Hæmodoraceæ.  335

Order CXL. Bromeliaceæ. Bromeliads.

Herbs hard, dry, rigid, and often scurfy, with regular double perianths, nearly or quite free from the ovary. Stamens 6, anthers introrse. Ovary 3-celled. Seeds numerous, with mealy albumen. All tropical, and capable of living in air alone.


- Stems rigidly erect. Lvs. linear-filiform. Fls. in bracted spikes, blue. Nos. 2-4

*1 T. usneoides L. Long Moss. Stems filiform, pendulous, branched; lvs. linear-filiform, curled, 1-2'; fls. solitary, green or gray. Low lands, Va., and S. Hangs in gray festoons from the branches of every tree. Used in upholstery.

2 T. Bartrami Ell. Stems slender, 1f; lvs. shorter, smooth; spike branched, 3-4', loose-flowered; pet. spreading at apex, as long as the bracts. Ga., Fla.

3 T. caespitosa Leconte. Stems in dense clusters, 3-6'; leaves scurfy, much longer, erect; spike 3- or 4-flowered, 1-4'; pet. recurved, longer than the bracts. E. Fla.

4 T. recurvata Willd. Scapes filiform, 2-flowered, 6'; lvs. scurfy, recurved. E. Fla.

2. ANANÁSSA SATIVA. Pineapple. Raised in hothouses for its well-known fruit, which consists of a consolidated abortive flower-spike. From S. Am.

Order CXLI. Hæmodoraceæ. Bloodworts.

Herbs perennial, with fibrous roots, equitant or rosulate leaves, and perfect flowers. Perianth regular, 6-parted, scurfy or woolly outside, more or less adherent. Stamens 6 or 3, and opposite the petals, anthers introrse. Ovary 3-celled, 1-styled. Capsule covered with the withered perianth. Seeds with cartilaginous albumen.

- Stamens 3, exserted. Perianth woolly outside. LACNÁNTHES. 1
- Stamens 6, included.—2 Corymbed perianths woolly all over. LOPHIOLA. 2
-2 Racemed perianths rugous-scurfy. ALÉTRIS. 3


L. tinctória Ell.—Swamps, R. I. to Fla. Stem strictly erect, 1½—2½; leaves mostly radical, 3-4½ wide by 9', or more; flowers 4-5½', glabrous and yellow inside.


L. aúrea Ker.—Sandy swamps, N. J. to Fla. Stem 1-2½; leaves mostly radical shorter than the stem; flowers yellowish under the white wool, 2½'. (Conostylis, Ph.)

3. ALÉTRIS, L. Star-grass. Colic-root. Perianths rugous, as if scurfy or mealy, tubular, 6-cleft, arranged in a slender raceme. Styles
scarcely united. Ovary adherent at base only, opening at top, \( \infty \)-seeded. Petals smooth, intensely bitter. Leaves all radical, lim.-lanceolate.  

1. **A. farinósa** L. Lvs. rosulate, very acute, many-veined, 3—6'; scape 2—3f, simple; rac. about 9'; fls. white, 4—5', on very short ped., oblong bell-form. Low grounds.  


**Order CXLII. IRIDACEÆ. IRIDS.**

*Herbs with corms, bulbs, or rhizomes, equitant, 2-ranked leaves andspathaceous bracts. Perianth tube adherent to the ovary. Segments in 2 sets, often unequal and convolute in bud. Stamens 3, alternate with the petals, anthers extrorse. Style 1, stigmas 3, often petaloid. Capsule 3-valved, 3-celled, loculicidal. Seeds many, with hard, fleshy albumen.* Figs. 85, 169, 170, 267—8, 282, 851.

\[ \text{Gladiolus} \]

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Flowers irregular, somewhat bilabiate, nodding.</em></td>
</tr>
<tr>
<td>2</td>
<td><em>Flowers regular and equilateral, mostly erect.</em></td>
</tr>
<tr>
<td>3</td>
<td><em>Sepals similar to the petals in form, size, and position.</em></td>
</tr>
<tr>
<td>4</td>
<td><em>Sepals larger than the petals, and otherwise dissimilar.</em></td>
</tr>
<tr>
<td>5</td>
<td><em>Stems leafy, tall (1—3f). Tube short; sepals beardless and crestless.</em></td>
</tr>
<tr>
<td>6</td>
<td><em>Stems or scapes low (2—6'), nearly leafless. Tube long and slender.</em></td>
</tr>
<tr>
<td>7</td>
<td><em>Species growing wild, all (except Nos. 6, 7) in wet meadows or swamps.</em></td>
</tr>
<tr>
<td>8</td>
<td><em>Species cultivated for ornament, mostly from Europe.</em></td>
</tr>
<tr>
<td>9</td>
<td><em>Stems densely bearded.</em></td>
</tr>
<tr>
<td>10</td>
<td><em>Stems tall, leafy, 1—5-flowered.</em></td>
</tr>
<tr>
<td>11</td>
<td><em>Stems beardless.</em></td>
</tr>
<tr>
<td>12</td>
<td><em>Stems very short, 1-flowered.</em></td>
</tr>
<tr>
<td>13</td>
<td><em>Stems tall, leafy, 1-5-flowered.</em></td>
</tr>
<tr>
<td>14</td>
<td><em>Stems beardless.</em></td>
</tr>
<tr>
<td>15</td>
<td><em>Root a rhizome.</em></td>
</tr>
<tr>
<td>16</td>
<td><em>Stems densely bearded.</em></td>
</tr>
<tr>
<td>17</td>
<td><em>Stems beardless.</em></td>
</tr>
</tbody>
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1. **IRIS, L. FLOWER-DE-LUCE.** Sepals 3, reflexed, larger than the 3 erect petals. Sta. distinct. Style short or 0. Stig. petaloid, covering the stamens. \( \forall \) Mosty from tuberous, horizontal rhizomes, with ensiform leaves and large, showy flowers.

**Species growing wild, all (except Nos. 6, 7) in wet meadows or swamps. Apr.—Jn. (§)**

<table>
<thead>
<tr>
<th>No.</th>
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</tr>
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<tbody>
<tr>
<td>1</td>
<td><em>Leaves linear, grass-like. Ovary and pod 2-grooved on the sides.</em></td>
</tr>
<tr>
<td>2</td>
<td><em>Leaves sword-shaped. Fls. blue. Sepals much larger than the petals.</em></td>
</tr>
<tr>
<td>3</td>
<td><em>Leaves sword-shaped. Fls. tawny or copper-colored. Petals reflexed.</em></td>
</tr>
<tr>
<td>4</td>
<td><em>Stems or scapes low (2—6'), nearly leafless. Tube long and slender.</em></td>
</tr>
<tr>
<td>5</td>
<td><em>Stems beardless and crestless.</em></td>
</tr>
<tr>
<td>6</td>
<td><em>Stems beardless, but crested with 3 longitudinal folds.</em></td>
</tr>
</tbody>
</table>

**Species cultivated for ornament, mostly from Europe.**

<table>
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<th>No.</th>
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<tbody>
<tr>
<td>7</td>
<td><em>Stems beardless.</em></td>
</tr>
<tr>
<td>8</td>
<td><em>Root a rhizome.</em></td>
</tr>
<tr>
<td>9</td>
<td><em>Stems beardless.</em></td>
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<tr>
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<td><em>Stems very short, 1-flowered.</em></td>
</tr>
<tr>
<td>11</td>
<td><em>Stems tall, leafy, 1-5-flowered.</em></td>
</tr>
<tr>
<td>12</td>
<td><em>Stems beardless.</em></td>
</tr>
</tbody>
</table>

1. **I. Virgínica** L. **Boston Iris.** Stem slender, 1—2f, branching; leaves 2—3' wide; fls. 2—6, on slender ped.; sep. narrow, yellow, edged with purple. Mass. to N. J. Jn.  

2. **I. versicolor** L. **Blue Flag.** Stem flexuous, 2—3f; pet. as long as the stigmas; ovary triangular, with concave sides and rounded angles. Common. June.  

3. **I. hexágona** Walt. Lvs. longer than the flexuous stem; tube longer than the 6-sided ovary; sepals larger than the petals, blue-purple, crested. S., coastward.  

4. **I. tripétala** Walt. Lvs. shorter than the slender stem; tube shorter than the 3-sided ovary; sepals many times larger than the petals. S.: rare. Purple.  

5. **I. cùprea** Ph. Tall and flexuous, 2—3f; petals twice longer than the linear stigmas; capsules sharply 6-angled, shorter than the tube. S. and W. April—July
6 1. verna L. Scape 1-flowered, 3–5', shorter than the rigid leaves; tube, sep., and pet. subequal (2'); stigmas deeply 2-cleft; fls. blue, with some yellow. Mar., Apr.
7 1. cristáta Ait. Scape compressed, and, with the lvs., 3–5'; tube longer than the sepals (2'), which are distinctly crested along the middle. Barrens, Va. to Ga. April.
8 1. lacunástris N. Like No. 7, but the sep. are longer than the tube, &c. L. Huron.
9 1. Púmila. Dwarf I. Fls. large, blue-purple; pet. larger than sepals. In Spring. 3'.
10 1. Germánica. Flowers many, deep blue, the spathe also colored. Common.
12 1. Suziána. Flower 1, very large, purple and spotted; petals reflexed.
13 1. Florentína. Orris-root. With broad leaves and large white flowers.
14 1. Gramínea. Linear leaves much longer than the 1f, 2-flowered scape. Blue.
15 1. psúd-ácorus. Flowers yellow; petals smaller than the stigmas, 3f. June.
16 1. Xíphium. Spanish I. Lvs. subulate; 2 fls.; pet. narrow as stig. All colors. 1-2f.
17 1. xíphiódés. English I. Leaves subulate; fls. 2; petals broader than the stigmas.
18 1. Pérsica. Persian I. Lvs. linear; scape very short; petals smaller than the blue sepals.—All the above are hardy, except this, which is a house-plant.

2. NEMÁSTYLIS, N. No tube above the ovary. Sepals spreading, larger than the ascending, cucullate petals. Filam. shorter than the anth. Style enlarged above, and parted into 6 radiating, subulate stigmas. 2f Bulb ovoid. Lvs. lance-linear. St. very slender, with 1 or 2 bright-blue fls.

N. celestína N. Leaves very veiny, 1f; stem 15–20', few-leaved; spathe 2-leaved; sepals obovate. 1', 4 larger than the hooded petals. Swamps, Fla. to La.

3. TÍGRíDIA. L. Tiger-flower. Spathe 2-leaved. Perianth regular, the 3 sepals larger than the 3 petals. Stamens monadelphous, filaments united into a long tube. 2f Bulbous.

T. paívónia. St. simple, flexnous; leaves ensiform, veined; fls. inodorous, 5–6' broad, ephemeral, several in succession, yellow, with crimson spots. Mexico.

4. SCHİZÓSTYLIS coccínea. Stem 3f. Leaves channelled, lance-linear. Flowers concave, regular, 2' broad, in long spikes, crimson to scarlet, the styles slender and nearly distinct. Lately introduced from S. Africa.

5. PÁRDÁNTHUS, Ker. Blackberry Lily. Sepals and pet. subequal, oblanceolate, spreading. Fil. slender. Style clavate, 3-parted, with 3 stigmas. Caps. oblong. Seeds black, attached to the column, and resembling a blackberry after the valves have fallen. 2f Root a rhizome. Stem branching, leafy. July, August. (Ixía, L.)

P. chinénsis Ker.—Leaves ensiform, as in Irls.; flowers 1½' broad, many, orange-yellow, crimson-spotted. Stems 3–4f. Escaped from cultivation.

6. CROCUS, L. Lvs. radical. Fls. nearly sessile on the bulb. Tube very long and slender, bearing the funnel-form perianth above the ground. Stigmas 3-cleft.

1 C. vernus. Spring C. Stigmas short, wedge-shaped; leaves linear. The beautiful flowers are white, blue, and variegated,—the earliest in the garden.
2 C. suziánus, is golden yellow, with the 3 sepals revolute. Turkey.

7. SISYRÍNCHIUM, L. Blue-eyed Grass. Spathe 2-leaved. Segments of the perianth flat, equal. Sta. monadelphous. Stig. 3-cleft. 2f
Grass-like plants, with compressed, winged or ancipital scapes, from fibrous roots. June, July.

8. **Bermudiana** L. In tufts; lvs. linear, erect, about as long as the scapes; spathe 2-5-flowered, valves unequal; flowers small, blue; segments obovate, notched and mucronate; pedicels slender; pods globular, 8–12'.
   a. anomala. Scapes winged, so as to resemble the leaves.
   b. mucronatum. Scapes barely 2-edged, filiform; spathe pointed.


1 G. psittacinus. Spike 8-10-flowered; flowers scarlet and yellow, spotted, the tube as long as the segments. From this is derived many hybrids, as

2 G. cardinalis. Spikes few-flowered, the flowers crimson, with a white stripe in the lower 3 segments; stem branched above, 2f. Not hardy.

3 G. floribundus. Flowers very large, nearly erect, upper segments broader, pink varying to white; spike long and crowded. Very delicate.

**Order CXLIII. Dioscoreaceæ. Yam-roots.**

Plants shrubby, twining, arising from tuberous rhizomes, with broad, net-veined leaves. Flowers dioecious, regular, hexandrous, tube adherent, limb 6-parted. Ovary 3-celled, 3–6-ovuled, 3-styled. Stamens 6, perigynous. Fruit a capsule, 3- or (by abortion) 1-celled, or a berry. Seeds compressed, albuminous.

**Dioscorea**, L. Yam-root. Flowers 2♂. Styles of the fertile 3. Cells of the caps. 2-seeded. Sds. membranaceous, marginated. 2♂ Slender, twining with the sun. Lvs. simple, palmately-veined or divided. Flowers green, inconspicuous, in axillary spikes or panicles.

1 D. villosa L. Wild Yam. Leaves broadly ovate, coriaceous, acuminate, 9-11-veined, the lower opposite or in 4's, upper alternate, petioles long, under surface downy, (never villous); stem slender, climbing 5–15f, over bushes, &c. June, July.

2 D. sativa. Yam. Leaves round-ovate, long-cuspidate, sinuate, cordate, all alternate, smooth; stems sometimes prickly. Root large and sweet. S.

**Order CXLIV. Smilaceæ. Sarsaparillas.**

Herbs or shrubs, often climbing. Leaves reticulate-veined. Flowers dioecious. Perianth free from the ovary, 6-parted, regular. Stamens 6, inserted into the base of the segments. Anthers 1-celled (2-lamellate). Ovary 3-celled, cells 1- or 2-ovuled. Style 1 or none. Stigmas 3. Berry roundish. Seeds orthotropous, albuminous. Fig. 396.

**Smilax**, L. Green-brier. Sarsaparilla. Character nearly as above. 2♂ Lvs. palmately-veined, entire, petiolate, with a pair of stipular (§ 325, Fig. 396) tendrils. Flowers green or yellowish, small, in stalked, axillary umbels.
§ Herbs spineless. Lvs. and foetid umbels long-stalked. Berries bluish...Nos. 12–14
§ Shrubby vines. Leaves short-stalked. Berries 1-3-seeded... (a)
  a Pubescent, prostrate, spineless. Leaves cordate, evergreen. South...No. 11
  a Glabrous, climbing, and more or less prickly (except Nos. 5, 6)... (b)
  b Lvs. acute at the base, 3-5-veined. Ped. shorter than the pet...Nos. 8–10
  b Leaves abrupt or cordate at base, 5-9-veined...(c)
  c Leaves panduriform, or some hastate. Peduncles elongated...Nos. 7
  c Lvs. ovate or oblong, deciduous.—2 Plants spineless...Nos. 5, 6
  —2 Prickly.—2 Leaves glaucous...No. 4
  —2 Leaves green...Nos. 1–3

1 S. rotundifolia L. Common G. Vine green, strong, and thorny, some 4-angled; leaves round-ovate, 5-7-veined, cusp.-pointed; ped. a little longer (6–7") than the petioles; berries glaucous-black. Common in thickets. 10–30 ft. June, July.

2 S. hispida Muhl. Vine terete, hispid below, with weak, slender prickles, nearly unarmed above; leaves thin, deciduous, ovate, cuspidate; ped. twice as long (1") as the petiole; berries black. Thickets, N. J., and N. 8–12 ft. June.

3 S. Walteri Ph. Vine unarmed, or prickly at base; lvs. cordate-ovate, 3-5-veined; ped. as long as the petioles; berries red, 1-3-seeded. N. J., and S. April–June.

4 S. glauca Walt. Vine more or less prickly above, angular; lvs. broad-ovate, glaucous at least beneath; ped. twice longer than the petiole; berries black, with a bloom; flowers yellowish white. Thickets, L. Isl. to Ga., W. to Ky. March–June.

5 S. Pseudo-China L. Root-stock tuberous; vine terete; leaves cordate-ovate to oblong, 5-veined; ped. flat, nearly as long as the lvs.; fr. black. N. J. to Ky., and S. Jun.

6 S. sarsaparilla L. Root-stock creeping, long; branchlets 4-angled; leaves thin, oblong-ovate; ped. flat, a little longer than the petioles; fruit red, 1-seeded. S-W.

7 S. tannoides L. Vine terete; branches 4-angular, aculeate; leaves ovate-cordate to fiddle-form, and hastate. cusp.-pointed, rough-edged. N. J., W. and S.

8 S. auriculata Walt. Vine prickly; branchlets angular, unarmed; leaves lance-auriculate-hastate, thick, small, smooth-edged, evergreen; berries finally black; flowers sweet-scented. S., near the coast. June. (S. maritima C-B.)

9 S. laurifol/a L. Vine prickly; branchlets unarmed, zigzag; leaves thick, evergreen, lance-oblance, obus(a), mucronate, 3-veined; fr. black, 1-seeded. N. J., and S.

10 S. lanceolata L. Like No. 9, but the lvs. are thin and berr. 3-seeded. Va., and S.

11 S. pumila Walt. Lvs. shining above, soft-downy beneath; ped. as long as the petiole (6’); berries red, 1-3-seeded. Shady, rich soils. S. 1–3 ft. October.

12 S. herbacea L. Carrion-flowe(r). Stem erect or reclined, terete; leaves pubescent beneath, or nearly glaucous, ovate-oblance, 7-veined, with or without tendrils; ped. longer than the long petioles (3–4’), 8–20-flowered. Low grounds. 2–8 ft. June.

β. pedunculat/a. Ped. very stout and long (6–8’), 30–50-flowered.

13 S. lastoneurum Hook. Vine climbing, glabrous; lvs. all with tendrils, cordate, ovate-oblance; ped. little longer than the petioles (3–4’). Thickets, W. 10 ft. June.

14 S. tan/mifol/a Mx. Erect or climbing, glabrous; lvs. 5-veined, cordate-hastate, tapering to the obtuse apex; ped. longer than petioles; fr. blue-black. N. J., and S.

Order CXLV. ROXBURGHIAE.

Herbs or shrubby vines, with many-veined netted leaves and perfect flowers. Perianth 4-parted, petaloid, persistent. Stamens 4, hypogynous. Ovary free, 1-celled. Capsule 2-valved. Seeds several, on hairy stalks, albuminous.


**ORDER CXLVI. TRILLIACEÆ. TRILLIADS.**


§ Leaves in one whorl. Sepals green, petals colored................................. **TRILLIUM.** 1
§ Leaves in two whorls. Sepals and petals alike greenish........................... **MEDÉOLA.** 2


§ Flowers sessile. Petals dark purple, erect........................................... Nos. 1, 2
§ Flowers on a peduncle raised above the leaves...(*)
  * Leaves petiolate, ovate, rounded at the base. Petals thin, delicate......... Nos. 3, 4
  * Leaves sessile, rhomboidal, nearly as broad as long. Petals thickish..... Nos. 5, 6
§ Flowers on a peduncle deflexed beneath the leaves................................ Nos. 7, 8

1. **T. sessile** L. Leaves sessile, roundish-ovate to rhomb-ovate, acute, mottled with dark purple; petals sessile, some spreading, dull purple. Pa., W. and S. 6—12".

2. **T. recurvatum** Beck. Lvs. ovate to obovate, narrowed to a petiole; sepals reflexed, green; pet. erect, narrowed at base to a claw, purple, 1'. Woods, W. 8—10'.

3. **T. nivale** Ridley. Stem 2—4'; lvs. oval to ovate, distinctly petiolate; fl. erect, 7—8" long; petals ovate-spatulate, white, half longer than the sepals. Penn. to Wis.

4. **T. erythrocarpum** Mx. *Smiling W*. Lvs. ovate, rounded at base, acuminate; petals lance-ovate, recurved, twice longer than the sepals, wavy, white, beautifully pencilled at base with purple. Woods, Can. to Ga. 8—12'.

5. **T. grandiflorum** Salisb. Lvs. rhomb-ovobate, sessile, conspicuously acuminate; petals spatulate-ovobate, much longer (14—22) than the sepals, white, varying to rose-color. Damp, rocky woods, M., S., and W. 8—12'.

6. **T. eréctum** L. *Bath Flower*. Leaves roundish-rhombo, short-pointed, almost petiolate, about as broad as long; pet. scarcely erect; flower nodding; petals oval-ovate, much broader than the sepals, dark purple, ill-scented. Woods.

β. *album*. Petals white or greenish; pet. inclined. N. Y. (Hankenson), and W.

7. **T. érnnum** L. Leaves nearly as in No. 6; pet. more than half the length of the leaves, twice that of the flower; petals flat, not reflexed, white, little larger than the sepals; stigmas as long as the anthers. Woods, M., S., and W. 1—14f.

8. **T. stylòsum** N. Leaves petiolate, ovate, oval, or elliptic; pet. not longer than the flower, decurved; petals recurved, much longer than the sepals, white; styles united, as long as the stigmas, shorter than the recurved anthers. South. 10—20'.

2. **MEDÉOLA, Gronov. INDIAN CUCUMBER-ROOT.** Perianth deeply parted into 6 petaloid, revolute segments. Sta. 6, with slender filaments. Stigmas 3, divaricate, united at base. Berry 3-celled, cells 3—6-seeded. 2! Stem simple, arising from a white, tuberous rhizome (which is thought to resemble the cucumber in flavor) bearing 2 whorls of lvs. and 1—3 term. fls.

**M. Virginica** L.—Damp woods. Slender, erect, 1—2f, with cottony wool. Lower whorl of 6—8, upper of 2 leaves. Flowers pendulous, yellowish. July. (Fig. 294.)
Order CXLVII. Liliaceæ.  Lilyworts.

Herbs with bulbous or tuberous stems, parallel-veined, sessile leaves, and perfect, regular flowers, with the perianth uniformly colored and free from the ovary. Stamens 6 (4 in Majanthemum), perigynous. Anthers introrse (except in Uvularia). Styles wholly or partly united. Fruit a capsule or berry. Seeds albuminous.

Liliaceæ proper. Style entire. Fruit a dry capsule. Plants with a scaly or coated bulb...§

Antheridiæ. Style entire (or 0). Fr. a dry capsule. With a caudex, root-crown, or this...(**)

Convallarieæ. Style entire. Fr. a colored berry. Plants with a rhiz. or fibrous roots...(***)

Uvulariææ. Style 3-cleft or 3-parted. Fruit a dry capsule. Plants with a rhizome...(*::*).

* Stem leafy above as well as at the base. Bulbs scaly...§
  " Stem (scape) sheathed at base, leafless, many-flowered...§
  " Petals equalling the sepals, with a honey-grove at base...§
  " Petals equalling the sepals, with a roundish nectary at base...§
  " Petals much larger than sepals, nectary in the midst, or 0...§
  c Perianth segments united, forming a tubular flower...§
  c Perianth segments distinct, not forming a tube...§
  d Flowers small, in a panicle of racemes, white...
  d Flowers in a simple raceme, mostly blue...
  d Flowers in a corymb, white, with bracts...
  d Flowers in an umbel, white or roseate, with 2–4 bracts...
  e Limb of the perianth revolute, as long as the tube...
  e Limb of the perianth spreading, much shorter than tube...

** Perianth segments united more or less into a tube...§

** Perianth segments distinct.—n Flowers racemized, small, yellow...
  " Flowers panicked, white...
  m Stamens straight, longer than the tubular, flame-colored perianth...
  m Stamens all curved upward.—o Flowers in an umbel...
  " Flowers cyanic, racemized...
  " Flowers xanthic, terminal...

*** Perianth segments separate, not forming a tube...§

*** Perianth segments united.—Flowers greenish, axillary...
  " Flowers pure white, on a scape...
  s Scape leafless, bearing an umbel. Berry blue, 2-celled...
  s Stem leafy, bearing the flowers solitary or in pairs. Berries red...§ (See p. 447.)
  s Stem leafy, bearing a white cluster.—x Flowers 6-parted...
  " Flowers 4-parted...
  y Stems much branched, with filiform branchlets for leaves...
  y Stem forking, with oval leaves.—z Fls. axillary. Berry 0-seeded...
  " Fls. terminal. Berry 3–6-seeded...

**** Stem leafy. Flowers solitary, long, yellowish, drooping...§

1. Erythronium, L. Perianth campanulate. Seg. recurved, the 3 inner ones (petals) usually with a callous tooth attached to each side at base, and a groove in the middle. Style long. Caps. somewhat stipitate, seeds ovate. 2 Fls. 2, subradical. Scape 1–co-flwd. Flowers nodding.

1 E. Americànum Sm. Yellow E. Bulb deep in the ground, sending up a scape which bears 3 unequal, lanceolate, mottled leaves at the surface of the ground, and a handsome drooping yellow flower at top. Woods. 3–5'. April, May.

β. bractéatum. Leaves very unequal; scape with a bract near the flower. Vt.

2 E. albidum N. White E. Scape naked, bearing a white drooping flower; petals without teeth, narrowed to the base. Wet meadows, N. Y. to Wis. May, June.

2. Tulipa, Tourn. Tulip. Perianth campanulate. Sta. short, subu-
late, anth. broad-linear, deeply emarginate at base. Style very short, stigma thick. Caps. oblong, triangular. 2f Herbs acaulescent, with coated bulbs, sessile leaves, and a simple scape bearing a solitary, erect flower.

**T. Gesneriâna.** Plant smooth; leaves ovate-lanceolate, near the ground; segments very obtuse, Ellisely variegated with red, yellow, and white. Persia. May, June.


* Native wild Lilies, with yellow, orange, or red, spotted,—x nodding fls., Nos. 1–3—x erect fls. Nos. 4, 5

* Exotic Lilies, cultivated, mostly hardy. Fls. nodding (except Nos. 6, 14)…(a)
a Stems bearing bulblets in the axis. Flowers orange-colored………………. Nos. 6, 7
a Stems never bulbiferous.—y Fls. white. Lvs. lanceolate, scattered…Nos. 8–10
—y Fls. wh., varieg. and spotted, sweet…Nos. 11–13
—y Fls. yellow or straw-colored…………………Nos. 14–16
—y Fls. red or purple…………………Nos. 17–19

1 **L. Canadénsis** L. Yellow L. Leaves mostly in whorles, lanceolate, the veins beneath hairy; ped. terminal, mostly in 3's; sepals gradually spreading, yellow to orange, with purple spots inside. Meadows, mostly N. 2–5f.

2 **L. supérbum** L. Turk's-cap. Leaves linear-lanceolate, acuminate, the lower whorled, upper scattered; flowers often numerous, orange to red, spotted, the sepals revolute. Wet soils. 4–6f. Flowers 3–30. Plant splendid.

3 **L. Carollínum** Mx. Lvs. 1-veined, ob lanceolate, acuminate, tapering to the base, the upper whorled, the lower scattered; sepals lance-linear, recurved (not revolute), deep yellow spotted with purple. Swamps, S. 1-3f. Flowers 1–3.

4 **L. Philadélpheicu** L. Lvs. lance-linear, the upper whorled, lower scattered; fls. 1–3; sepals erect-spreading, lance-ovate, obtuse or barely acute, clawed, orange-red, spotted at base, 2½' long. Dry pastures and copses. 15–20'.

5 **L. Catesbiá** Walt. Lvs. all scattered, lance-oblong to linear; flower solitary; sepals lanceolate, wavy, 3–4', the long claws yellow, lamina and long, thickened acuminated spatulate, spotted with purple. Damp barrens, Md., and S. 2–3f.

6 **L. bulbíferum**. Fls. erect, rough inside, 2½'; sep. sessile; lvs. 3-veined. 4f. Italy.

7 **L. Tígrínum**. Fls. nodding, spotted; sep. sessile, 3½', rev.; lvs. 5-veined. 6f. China

8 **L. Cándidum**. Fls. campanulate, several, smooth inside. From Persia. 3–4f.

9 **L. Japónicum**. Fl. solitary, campanulate; sep. revolute at apex. Japan. 2–3f.

10 **L. longíflórum**. Fls. solitary, tubular-bell-form; sep. 5–6'. From Japan. 1f

11 **L. gigántéum**. Tall (8f); fls. spicate, trumpet-form, white, with carmine lines

12 **L. spéciósum**. Stem 2–3f; leaves lance-ovate, scattered; fls. 1–3, fragrant; sepals 5', revolute, white to roseate, with purple warty spots inside. Japan. Splendid.

13 **L. Abruánum**. Stem 1–2f; leaves lanceolate, scattered; fls. 1–3, fragrant; sepals 6–7', spreading, white, with a yellow band and purple spots. Japan. "Glorious."

14 **L. cíoccum**. Lvs. some in 3's, linear-falcate; fls. erect, often umbellate, rough inside.

15 **L. testáceum**. Lvs. whorled 3 lanceolate, many; fls. several, large, straw-col. 6f.

16 **L. Cólchicum**. Lvs. crowded, lance-linear; fls. sev., funnel-form; sep. recurved. 2f.

17 **L. Pomònium**. Lvs. lin. to subulate, crowded; fls. small, scarlet; sep. rough, revolut.

18 **L. Mártagon**. Lvs. lance-oblong, whorled; fls. panicked, purple to roseate, revolute, spotted. From Europe. 5f. [not spotted; sepals reflexed. Palestine. 3f.

19 **L. Chalcedónicum**. Lvs. lance-linear, crowded, erect, rough-edged; fls. bright red,

4. **Fritilláriæ**, Tourt. Chequered Lily. Perianth campanu-
late, with a broad base and nectariferous cavity above the claw of each segment. Stamens as long as the petals. Stig. trifid. Caps. coriaceous, 3-celled, septifragal. ꞏ With coated bulbs, simple, leafy stems, bearing 1 or more nodding flowers in Spring.

1 F. imperialis. Crown Imperial. Stem 3f, at base invested with long, narrow lvs., the middle naked, the summit bearing a raceme of large drooping red flowers beneath a crown of bracts. Var. Flava has yellow flowers. Persia.

2 F. Meleagris. Chequered L. Stem 1-flowered, with alternate, linear, channelled leaves; flower large, nodding, chequered with purple and yellow. Europe. ꞏ.

3 F. Persica. Fls. brownish-purple, in a pyramidal, naked raceme. Persia. 3f.

5. calochortus, Ph. Perianth twisted in aestivation. Sepals 3, smaller than the 3 petals, which are bearded within except a central glabrous spot. Style very short, anth. recurved. Seeds 1-rowed in each cell of the capsule. ꞏ Califorainan, bulbous. Leaves narrow. Stem erect.


7. Scilla, L. Squill. Sepals and petals similar, spreading (blue or purple). Filaments 6, slender, style thread-club-shaped. Caps. 3-angled, 3-celled, cells with 1 or several black seeds. ꞏ Bulb coated, bearing several linear leaves and a scape with a raceme.

1 S. esculenta Ker. Quamash. Lvs. keeled, flaccid, shorter than the scape; bracts subulate, longer than the pedicels; filaments filiform; stigmas 3-toothed; sepals widely spreading, pale blue. Bottoms, W. 1-2f. May. (Camassia, Lindl.)

2 S. Peruviana. Leaves ciliate on the edges, longer than the scape; flowers stellate, in a dense conical corymb, violet-blue, rarely white. Spain.


ORDER 147.—LILIACEÆ.

§ Leaves (none at flowering-time) flat, lanceolate. Ovary only 3-ovulèd...........No. 1

§ Leaves present, flat.—a Ovary 6-ovulèd, often with a 6-toothed crest...2

—a Ovary ∞-ovulèd, not crested. Leaves linear...........No. 5

§ Leaves terete and hollow.—x Scape or stem slender, not inflated...........Nos. 8, 9

—x Scape inflated in the midst. Cultivated...Nos. 10, 11

y Wild native species. Leaves linear and very narrow...............Nos. 2—4

y Exotics cultivated. Leaves lance-linear or broadly linear...........Nos. 6, 7

1 A. tricolècum Alit. Lvs. 5—8', fugacious, mostly gone in June, when the scape, with its rounded umbel of 10—12 white fls., appears. Woods, N. Eng. to N. C., and W. 1f.


3 A. Canadénsse Kalm. Scape terete; leaves shorter than the scape; umbel erect, capitèt, consisting of both (white) fls. and bulbèts mixed. Shades. 1f. June.

4 A. mutábile Mx. Lvs. lin.-filiform, thin, shorter than the terete scape; umb. 20—40-flw.d., erect; spathe 3-leaved, purplish; sep. ovate-lanceolate, longer than the sta., white or roseate; capsule 3-lobed, 3-seeded. Woods, S. ½—1½f. March—May.

5 A. striátum Jacq. Lvs. linear, nearly equalling the teretic shape; spathe 2-lvd.; fls. 3—7, sep. lance-ovate, green-striped outside; not garlic-scented. W. and S. 8—19'.


7 A. Porrum. Leek. St. compressed, sheathed at base by the channelled leaves; umb. globous, white; stamens a little longer than the rough-keeled sepals. Europe. July.

8 A. vineále L. Crow Garlic. Stem and few fistulous lvs. very slender; umb. bulb-bearing; stamens alternately 3-cuspidate. Fields, June. It spoils the cows' milk.

9 A. schænoprásum L. Cíces. Scape equalling the terete, filiform, fistulous lvs.; umb. capitèt; sep. longer than the simple stamens, rose-purple. Lakeshores, N. ½

10 A. fistúlósum. Welsh Onion. Scape inflated in the midst, not taller than the fistulous leaves; umbel dense, globular; stamens exerted. Asia. 18'. ½

11 A. Cépa. Common O. Scape inflated near the base, much taller than the fistulous leaves. ½ Universally cultivated, and of many varieties.

β. prolísérum. Top O. Umbel producing bulbèts instead of flowers.


H. orientális. Lvs. thick, lance-linear, half as long as the scape; flowes many, half 6-cleft, tumid at the base, blue, varying to purple, red, white, &c.; stamens deeply included. Levant. March, April. Fine for the bulb-glass.

11. MUSCÁRI, Tour. Grape HYACINTH. Perianth-tube ventricous, ovoid, globular or urceolate, limb of 6 very short blunt teeth. Otherwise as in Hyacinthus.

1 M. botryoídes L. Fls. scentless, globular, nodding, blue (&c.), 2½'; lvs. broad-lin., obtuse, longer than the scapes (10'). Gardens and fields. May. ½ Europe.

2 M. moschátum. Fls. musk-scented, oval, nodding, 3½', greenish-blue; or livid, with a little 6-toothed crown in the throat; leaves lance-linear, erect. Europe. April.

3 M. racemósum. Flowers fragrant, nodding, dense, ovoid-cylindric, blue with a white limb; leaves linear, flaccid, channelled. recurved. Rare in gardens.

4 M. comdéxus occurs in gardens as a monstrosity, with the tall (1½) raceme changed to a sterile, diffuse, feathery panicle of blue filaments. Showy.

12. SCHENOLÍRION, Torr. Stem a tuberous rhizome. Perianth
yellow, &c. Caps. obovoid, obscurely 3-lobed. Flowers racemed. 2
Otherwise as in Ornithogalum, and too near it. April, May.

**S. crôceum** (Mx.) Lvs. narrowly linear, longer than the scape, which is very slender, 15—20'; flowers small, about 15 in the raceme, yellow; sepals ovate, 2'. Damp. S.

13. **YUCCA, L. Bear's-grass. Spanish Daggers.** Perianth persistent and withering, of 6 sepals, the 6 stamens shorter. Stigmas 3, sessile. Caps. oblong, 6-sided, the 3 cells partly divided each into 2 by a false partition. Seeds ∞. 2' Stem subterranean, or arising into a caudex (§ 227), with linear or sword-shaped perennial leaves and a terminal panicle of white, handsome flowers.

1 **Y. filamentôsa** L. Bear's-thread. Acaulescent or nearly so; leaves lance-linear, rigid, sharp-pointed, the margin filamentous, i. e., bearing thread-like fibres; scape 5—8f; flowers numerous, cup-form, 1½'. Sands, S. June. 

2 **Y. glorìosa** L. Acaulescent; caudex some 3f; leaves clustered at top, lanceolate, stiff, margins very entire; flowers cup-form, very ∞. S. June, July.

3 **Y. aloeôfolia** Walt. Spanish Daggers. Caudex some 10f, often branched, naked and scarred; leaves clustered at top, stout and sharp, serrulate; flowers white, with violet spots; sepals oblong. Thickets near the coast, S. June—Aug.


**T. UVÁRIA.** Lvs. in a dense radical crown; scape 3—5f, with a long raceme of innumerable soon-pendent, red, orange, and flame-colored flowers. S. Africa. Aug.—Oct.


**A. umbellátæ.** Scape 2f, with the thick radical leaves as long; flowers many, large, the pedicels equalling the perianth. S. Africa. A fine parlor plant.


1 **F. subcordánta.** White Day Lily. Lvs. large, ovate, subcordate, veins strongly impressed; fil. white, fragrant, horizontal, 5' long, tube longer than the limb. 2f. Aug.

2 **F. ovató Spr.** Blue Day Lily. Lvs. broad-ovate, acuminate; rac. many-flowered; fls. funnel-form, 2', blue or violet, nodding, tube shorter than the limb. Ohio, §. 

8 **Albo-marginánta.** Has its leaves irregularly margined with white.


1 **H. fulva.** Lvs. channelled; pet. obtuse, wavy; veins of sep. branched. An old garden plant, with large tawny flowers, lasting but a day. 3f. § Levant.

2 **H. FLAVA.** Lvs. channelled; sep. acute, bright yellow, veins undivided. Siberia. 1f.
18. POLYGONATUM, Tourn. True Solomon’s Seal. Perianth tubular, limb short, 6-lobed, erect. Stamens 6, inserted near and above the middle of the tube, and with the slender style included. Berry globular, black or blue, 3–6-seeded. 2 Rhizome horizontal, thick. St. leafy above. (Lvs. alternate.) Fls. axillary, pendent, greenish-white. Fig. 258.

P. biflorum Ell. Stem recurved, smooth; lvs. lanceolate to elliptic, sessile, obscurely many-veined, glaucous-pale and more or less pubescent beneath; filaments roughened, inserted near the middle of the tube. Woods. 1–3 ft. April–June.

P. giganteum. Plant all smooth, tall; lvs. clasping; ped. 2–6-flwd. 3–7 ft.

P. latifolium. Plant pubescent above; leaves ovate, some stalked.


1 C. borealis Raf. Lvs. broad-oval-lanceolate; flowers 2–5 in the bractless umbel, cernous; berry-cells many-seeded. Mountainous or hilly woods. June. 8–13’. A smooth and elegant plant. (See Fig. No. 715 in the Class-Book.)


§ Raceme compound. Stamens longer than the perianth. Ovules collateral... No. 1

§ Raceme simple. Stam. shorter than perianth. Ovules one above the other... Nos. 2, 3

1 S. racemosa Desf. Stem recurved; leaves oval, strongly veined, acuminate, subsessile; raceme compound. Copse: common. Berries red-dotted. 2 ft.

2 S. stellata Desf. St. erect; lvs. many, lanceolate, acute, amplexicaul; fls. few, in a simple raceme; berries dark red. Along rivers, N. and W. 10–20’.

3 S. trifoliate Desf. Erect; lvs. 3 or 4, ovate-lanceolate, tapering to both ends, amplexicaul; rac. terminal, simple; berries red. Mountain swamps, N. and W. 3–6’.


M. bifolium DC.—Common in open woods. Stem with 2 (rarely 3) ovate, subcordate leaves and a simple raceme of small white flowers, 3–6’. May.—In Oregon, the same plant becomes stout, 2 ft high, with petiolate, strongly cordate leaves!
23. ASPÁRAGUS, L. Perianth 6-parted, segm. erect, slight-spreading above. Sta. 6, perigynous. Sty. very short, stig. 3. Berry 3-celled, cells 2-seeded. 3 Rts. fibrous, matted. Stems with filiform branchlets for leaves in the axils of scales.
A. officinalis L. Stem herbaceous, very branching, erect; lvs. fasciculate; flowers axillary; berries red. Long cultivated, and § in rocky shores.

1 S. róseus Mx. Lvs. oblong-ovate, clasping, margin finely ciliate; pedicels often merely recurved; anth. short, 2-horned at apex; stigmas trifid. Damp woods, northward. 3–15'. Flowers reddish, spotted, under the leaves.
2 S. amplexífoliús DC. Leaves oblong-ovate, strongly clasping, margin smooth and entire; pedicels abruptly bent in the middle; anthers and stigmas entire at the apex; sepals long-pointed, reflexed. Woods, Penn., and N. 2f.

25. PROSÁRTES, Don. Perianth as in Uvularia. Fil. 6, perigynous, included, much longer than the linear-oblong anth. Style elongated, trifid. Berry red, ovoid or oblong, 3–6-seeded. 3 Rts erect, branched. Flowers few, greenish, terminal, drooping. May.
P. lanúginósa Don. Lvs. ovate-oblong, pointed, clasping, downy beneath; pedicels in pairs; flowers spreading-bell-form; sep. 5–6'' long. Mountains, N. Y. to Car.

§ Leaves perfoliate near the base. Capsule obovoid-triangular, truncate.....Nos. 1–3
§ Leaves sessile or half-clasping. Capsule ovoid or oval-triangular...........Nos. 4–6
1 U. grandíflóra Sm. Sepals acuminate, smooth within and without, greenish yellow, 1/4' long; anthers obtuse (4'). Woods, 1–2f. May.
2 U. perfoliátá L. Mealy B. Sepals acute, 1/4' twisted, covered inside with shining grains, pale yellow; anthers cuspitate. Woods. 10–14'. May.
3 U. fláva Sm. Lvs. obtuse; sepals smooth both sides, yellow. 1'. N. J. to Va.
4 U. sessíllífolia L. Wild Oats. Lvs. lance-oval, glaucous beneath; capsule stipit; style 3-cleft, nearly as long as the (9'') sepals. Glades: common. 6–10'. May.
5 U. Floridána Chapm. Leaves oblong, glaucous beneath; style 3-cleft, half as long as the acuminate (8'') sepals. Woods, Fla. 4–6'. March.
6 U. pubérula Mx. Leaves puberulent, oval, green both sides; capsule sessile (no stipé); style 3-parted to near the base, not exceeding the anthers. Mountains, S

Order CXLVIII. MELANTHACEÆ. MELANTHIS.

Herbs perennial, sometimes bulbous, often poisonous, with parallel-veined leaves. Perianth double, regular, persistent, of 6 consimiliar, green or colored segments. Stamens 6, with extrorse anthers, 3 distinct styles or sessile stigmas, and a free, 3-celled ovary. Capsule 3-celled, 3-partible or septicidal, and seeds few or many, with a thin seed-coat.—Very near the Lilyworts, but the divided pistils afford a practical distinction.
ORDER 148.—MELANTHACEÆ.

§ Perianth 6-parted, tube very long, radical, like the Crocus................. Colchicum. 1

§ Perianth 6-sepalled, wheel-form, on a scape or stem, with leaves...(*)
- Anthers 1-celled, extrorse, cordate, becoming peltate by opening...(a)
- Anthers 2-celled, extrorse. Capsule loculicidal. Flowers racemose...(c)
- Anthers 2-celled, introrse. Capsule septifixed. Flowers racemose...(...d)
  a Inflorescence racemose, with white flowers. Sta. scarce longer than sep. Amianthium. 2
  b Inflorescence spicate, with green flowers. Sta. twice longer than sepals...Schænocaïlon. 3
  c Inflorescence paniculate, or a race with some branches at base...(b)
  d Flowers perfect. Filaments dilated at base. Ovary cells 2-ovuled..... Zerophyllum. 7
  e Flowers perfect. Filaments filiform. Ovary cells 6-ovuled..... Helonias. 8
  f Flowers dioecious, white. Stem leafy........ Chamælium. 9
  g Stamens 6. Flowers greenish or yellowish, 9–10........ Tofieldia. 10
  h Stamens 9–12. Flowers deep yellow, 6–9, mostly 6 .......................... Flæka. 11

1. COLCHICUM Autumnâlé. A plant of curious habit, from Europe. The 1–3 long-(5–8') tubed, lilac-colored, 6-parted flower arises directly from the new tuber in the Autumn, followed in the succeeding Spring by a stem bearing the leaves and fruit.


1 A. muscætòicum Gr. Bulb conspicuous; lvs. broad-linear, obtuse, many; rac. dense; sep. oblone; seeds ovate, red and fleshy. Shades, N. J., W. and S. 1–2f.

2 A. angustifòllum Gr. Tall, slender, scarcely bulbous; lvs. linear, acute; sepals ovate, changing to brown; rac. very dense; seeds linear, dry. Damp woods, S. 2–3f.


S. grâcelle Gr.—Sandy soils, Ga., Fla. Scape 2–3f, lvs. half as long. Fruit unknown.


M. Virginiciùm L.—Wet meadows, N. Y., W. and S. Stem 3–4f, leafy. Lvs. lanceolate to linear, 6″–2′ wide, subclasping. Flowers 8″, in a large panicle.


§ *STENANTHUM*. Sepals at base united and adherent to base of ovary ........No. 1
§ *VERATRUM proper*. Sepals distinct to base and free from the ovary. ....Nos. 2–4

1 *V. angustifolium* Ph. Lvs. long-linear; stem slender, 2–4f; panicle 1½; narrow; segm. green-white, subulate, 2½; flowers sessile, the upper fertile. Pa., W. and S.

2 *V. viride* Alt. Stem stout and very leafy, 2–4f; leaves lance-oval, ample, strongly plaited; flowers innumerable, green; sepals lanceolate, 6½. Wet meadows.

3 *V. parviflorum* Mx. Leaves nearly all radical, oval-elliptic, petiolate, slightly plaited; stem slender, scape-like, long-paniculate; sepals spatulate-unguiculate, 2–3½, half as long as the pedicels, dingy green. S. 2–5f.

4 *V. Wooldii* Robbins. Leaves lance-elliptic to lance-linear, the lower long-petioled, plicate; stem rather stout, 4–6f; panicle long and narrow; sepals oblanceolate to obovate, 4½, almost black, as long as the pedicels. Ind., and W.


*H. bullata* L.—N. J. to Va. Rare. 10–18½. Lvs. nearly as long as the scape. May.


* Glabrous. Pedicels separate, very short. Rac. simple, short, spicate.... Nos. 1, 2
* Glandular. Pedicels in 3's (1½–4½), short. Bracteoles united......... Nos. 3, 4

1 T. glutinosa N. Lvs. glabrous, linear-ensiform, ½ as long as the rough-glabrous stem; rac. short (1–1½), spicate; sep. oblanc., 2½, pod 4½. Woods, O. to Wis. 15½.

2 T. pubens Dryand. Leaves nearly ½ the length of the glandular-puberulent stem; rac. of alternate, remoticate fascicles, slender, 6–8½ long, 30–40-flowered; pod scarcely longer than the perianth. Barrens, Del. to Fla. Slender. 2–3½.

3 T. palustris Huds. Lvs. 3-5-veined, acute; scape filiform; spike ovoid, lengthened in fruit; bractlets only at the base of the pedicels. Shores of L. Sup., and N.

4 T. glabra N. Leaves radical, a few on the stem; rac. 2–5½ long, dense, 20–30-flowered; bractlets united near the flower, as in Nos. 1 and 2. Barrens, S. 1–2½.


P. tenuisôlia Rich.—Bogs, S. 1—2f. Sept., Oct. Leaves perennial, erect, very narrow, 1f, and bracts sheathing. Rac. loose, of few light-yellow, star-like flowers (1').

Order CXLIX. PONTEDERIACEÆ. Pontederiads.

Plants aquatic, with the leaves parallel-veined, mostly dilated at base. Flowers spathaceous. Perianth tubular, colored, 6-parted, often irregular. Stamens 3 or 6, unequal, perigynous. Ovary free, 3-celled. Style 1. Stigma simple. Capsule 3-(sometimes 1-)celled, 3-valved, with loculicidal dehiscence. Seeds numerous (sometimes solitary), attached to a central axis. Albumen mealy.

* Flowers irregular, blue. Stamens 6. Utricle 1-seeded, (2 cells abortive)…………PONTEDERIA. 1
* Flowers regular,—½ cyanic. Anthers 3, of 2 forms. Leaves reniform…………HETERANTHERA. 2
—½ yellow. Anthers 3, of 1 form. Leaves linear…………SCHOLLERA. 3

1. PONTEDÈRIA, L. Pickerel Weed. Perianth bilabiate, under side of the tube split with 3 longitudinal clefts (the 2 lower sepals free), circinate after flowering and persistent. Sta. unequally inserted, 3 near the base and 3 at the summit of the tube. Utricle 1-seeded. ½ Leaves radical, long-petioled. Stem 1-leaved, bearing a spike of blue flowers. Jl.

1 P. cordâta L. Lvs. ovate to oblong-deltoid, cordate, with rounded lobes; petiole shorter than the peduncle; spike cylindrical, pubescent, 2' long. In slow waters: com. A fine, showy plant, its blue spikes and smooth leaves 1—2f above the water.

2 P. lancifôlia Muhl. Lvs. lance-oblong to lance-lin.; fls. as above. S. Apr., May.


1 H. reniformis R. & P. St. prostrate or floating; lvs. roundish, reniform or auriculate at base; spathe acuminate, 3-5-flowered; flowers white. N. Y., Pa., and W.

2 H. limôsa Vahl. Leaves ovate-oblong, both ends obtuse; spathe 1-flowered, long-mucronate; flowers blue. S. and W. (Carruth). Lvs. 1—1½, the stalks thricse longer.

3. SCHOLLERA, Schreber. Tube of the perianth very long and slender, limb 6-parted, equal. Sta. 3, with similar anthers. Caps. 1-celled, ∞-seeded. ½ Leaves sheathing at base, grass-like, submersed. Stem floating, rooting at the lower joints.

S. graminêa Wild.—A grass-like aquatic, in flowing water, N. 1—3f long. Leaves 1—2½ wide. Flower solitary, 2½' long, spathe half as long. July, August.

Order CII. JUNCACEÆ. Rushes.

ORDER 150.—JUNCACEÆ.


* Flowers separate, pedicellate, in umbels or paniculate cymes..................Nos. 1, 2
* Flowers aggregate,—<i>x</i> in pedunculate heads forming an umbel or cyme. Nos. 3, 4 —<i>x</i> in sessile heads forming a nodding black spike .........No. 5

1 L. pliósa Willd. Lvs. lance-linear, fringed with long white hairs; umbel simple, 12–20-flwd.; ped. 5–10", soon deflexed; fls. 1", brownish. Groves, Pa., and N. May.

2 L. parviflóra Desv. Taller; lvs. lance-linear, glabrous; umb. decompound; fls. nodding, small; sep. ¦"; caps. dark brown, a little longer. Mts., N. 12–18'. Jn., Jl.

3 L. campéstris DC. Field Rush. Lvs. linear, flat, with cotton-like hairs; fls. in roundish heads, which are umbelled with very unequal peduncles; sep. rust-colored, longer than the obtuse caps.; seeds appended at base. Meadows. 3–12'. May.

β. bulbósa. Bulbous at base, 3–9'; sep. shorter than the globular caps. Apr.

4 L. arcuátà E. Mayer. Lvs. linear, channelled, glabrous; hds. 3–5-flwd., on filiform, often recurved, unequal ped.; bracts ciliate; seeds not appended. White Mts.

5 L. spicátà DC. Lvs. linear, hairy at base, very short; spike oblong, 8–12"; sep. bristle-pointed, equalling the roundish, black capsule (¦""). White Mts. 9–12'. Jl.

3. JUNCUS, L. Rust. Stamens 6 or 3. Capsule 3-celled, or (by the dissepiments not reaching the centre) 1-celled. Seeds numerous. 2 Stem mostly glabrous. Stems simple, leafless, or with terete or grassy leaves, entire sheaths, and small, 2-bracteolate, green or brown fls. June—Aug.

§ Clusters growing apparently from the side of the simple scape...(*)
§ Clusters terminal on the stem or scape. Leaves never knotted...(**)
§ Clusters terminal. Flowers in heads. Leaves internally knotted...(***)
  * Leaves few, radical, knotless, terete like the scape.........................Nos. 1, 2
  * Leaves none. Flowers separate, not in heads.—<i>a</i> Stamens 3...............No. 3
  —<i>a</i> Stamens 6...............Nos. 4–6
** Flowers separate, not in heads. Stamens 6...(<i>c</i>)
** Flowers capitulate, few or many in each head.—<i>b</i> Stamens 6...............Nos. 7, 8
  —<i>b</i> Stamens 3...............Nos. 9, 10
  <i>c</i> Stems branched. Pod much shorter than the unequal sepals...............No. 11
  <i>c</i> Stems simple.—<i>d</i> Pod globular, not exserted. Flowers green...............Nos. 12, 13
  —<i>d</i> Pod oblong or ovoid, exserted, brown..............Nos. 14–16
*** Seeds tailed. Panicle rather erect, longer than its bract...............Nos. 17–19
*** Seeds acute, not tailed.—<i>x</i> Stamens 6...(<i>y</i>)
  —<i>x</i> Stamens 3, bracts shorter than panicle...(<i>z</i>)
<i>y</i> Heads 2–3-flwd. (or 1-flwd. in No. 20). Bracts shorter than panicle...Nos. 20, 21
<i>y</i> Heads 5–70-flowered. Leaf or bract overtopping the panicle...........Nos. 22, 23
1 J. setaceus Rostk. Scape weak, slender, (not setaceous), 1–2f; lvs. shorter; panicle small, 20–30-flwd., flowers separate; sepals very acute, pod globose. Sca-coast, S.

2 J. Ræmerianus Scheele. Scape stout, rigid, 2–4f, and leaves pungent; panicle compound; flowers capitate; sep. sharp-pointed; pod turgid, a little shorter; heads 5–8-flowered, dark brown. Marshes, Va. to Fla. (J. maritimus C-B.)

3 J. effusus L. Soft R. Scapes straight, not rigid; panicle decompound, often diffuse; flowers green, sep. as long as the obovoid, obtuse pod. Wet. common. 2–3f.

4 J. filiformis L. Scapes very slender, weak, the subsimple panicle near the middle; sepals longer than the obtuse, mucronate pod. Me. to Mich. 1–2f.


6 J. Băltiens Dethard. Scapes in dense rows on the rhizome, rigid, pungent; pan. near the top, brown; sep. erect, very acute, equaling the elliptical, mucronate pod (1 3/4). Sandy shores, Me. to Penn. and Wis. 1–3f.

7 J. trifidus L. Stems tufted, 5–8', wiry, sheathed at base, 3-leaved at top, and with a sessile head of 3 blackish flowers; capsule globular. Mountains, N. H., N. Y.

8 J. Stýgius L. Stems few-leaved at base, leafless at top, 7–12'; heads 1–3, about 3-flowered; sepals shorter than the elliptic pod; seeds large, tailed. Me., N. Y.

9 J. repens Mx. Stems low, tufted, 2–6'; leaves linear, opposite, fascicled; sepals subulate, awn-pointed, 3–4', the slender pod 2'. ① Md. to Fla. May.

10 J. marginatús Rostk. Stem compressed; leaves linear, flat; cyme compound, heads many, 2–9-flowered, chestnut-brown; pod globular. 1–3f.

β. biflorus. Heads very numerous, 2–3-flowered, nearly black. S.

11 J. bufaníus L. Toad R. Slinger, 3–8', tufted; leaves 1–2'; branches 2, flower bearing the whole length; flowers remote, green; the 3 outer sep. longer. Common.

12 J. ténus Willd. Stems wiry, 8–24'; leaves flat-siliform, 3–8'; bracts longer than the loose panicle; sepals green, longer than the roundish pod. Common.

β. secundus. Flowers 1-rowed on the branchlets; bracts shorter than the panicle.

13 J. dichótómus Ell. Stems wiry, 1–2f; lvs. terete-siliform, channelled, on long sheaths; panicle forked or dense; pod roundish, long as sepals. S. Too near No. 12.

14 J. Gerárdi Loisel. Black Grass. Sts. wiry, leafy, 1–2f; lvs. thread-enisiform, 3–8': pan. longer than the bracts; style conspicuous; pod blackish, long as sepals. Marshes.

15 J. Greéñill Oakes & Tuckm. Wiry scapes and siliform lvs. rigid; bract siliform, twice longer (4') than the small panicle; flowers secund, straw-brown; sepals ovate, shorter than the ovulod pod. Coasts of N. Eng. and Mich. 1–2f.

16 J. Vaseyí Engelm. Sepals lanceolate, as long as the oval pod; bract scarcely longer than the panicle. Otherwise like No. 15. Mich. (Prof. Porter).

17 J. asper Engelm. Sts. rigid, 2–3f; lvs. rigid and rough, 3–10'; hds. scattered, 3–5 flwd., sep. 2'/', strongly veined, subequal! shorter than the pointed brown pod. N. J.

18 J. caudátus Chapm. Sts. rigid, 2–3f; lvs. 3, rigid, erect; panicle large, erect; hds. 2–4-flwd.; sep. 2'/', unequal; pod 3'/', finally black; sds. with long white tails. S.

19 J. Canadénsís Gay. Sts. terete, with 2 or 3 erect, smooth lvs.; fts. in Aug. and Sept., 3–50 in a head, paniculate, brownish; sepals lanceolate, 3 outer shorter, none longer than the oblong-triangular pod; stamens 3. Common and very variable.

a. coarctátus. Heads 2–5-flwd., in a contracted panicle; pod brown, exserted.

β. brachycéphalus. Hds. 3–5-flwd., in a spreading panicle; pod brown, exserted.

γ. subcaudátus. Slender; heads 8–20-flwd., remote; seeds with short white tails.

3. longicaudátus. Stout; hds. 8–50-flwd., approximate; sds. slender, long-tailed.

20 J. pelocárpus Meyr. Sts. slender, 2–3-lvd., 10–20'; panicle much branched; fts. in pairs or solitary, scattered, reddish; pod oblong, pointed with the slender style, longer than the oblong sepals. Wis. to Me. and Fla. (J. Conradi Tuckm.)

21 J. articulátus L. Stems 1f, with 1–2 leaves; heads 3–8-flowered, crowded in a spreading panicle: sepals brownish, oblong; pod deep brown, oblong, exserted N.
Order 151.—COMMELYNACEÆ. 353

β. obtusa. Heads 5-flowered; sepals and pod green, obtuse, mucronate. Pha
γ. insignis. Panicle erect, few-flowered; outer sepals cuspidate, inner obtuse.

22 J. militaris Bw. Bayonet F. Stem stout, 2—3f, bearing a single terete leaf near
the middle, which overtops the panicle; heads 5—15-flowered; sepals brownish, acute,
as long as the acuminate capsule. Bogs, coastward, N. Eng. to Del.

23 J. nodosus L. Stem slender. 2- or 3-lvd.; lvs. slender, the upper (bracts) overtop
ping the cluster; heads few (1—9), approximate, 5—50-flowered; sepals brown, lance-
subulate, shorter than the beaked capsule. Wet sands, Can. to Car.

β. megacéphalus. Stout, 3f, upper leaf and bract exceeding the simple cluster;
heads 50—80-flowered, green; outer sepals subulate-awned, as long as the pod.

24 J. acuminatus Mx. Stems 2- or 3-leaved; hds. 3—15-flowered, in a loose spreading
panicle exceeding the bract; sepals lance-subulate, nearly equalling the short-
pointed brown pod; seeds minute, acute at both ends. May, June.

β. debilis. Slender or stout; hds. 3—7-flwd.; pod exserted. N. J., Ky., and S. 9—3f.

γ. legitimus. Heads 8—15-flowered; pods scarcely exserted. (J. Pondii C-B.)

25 J. Elliotii Chapm. Stem, leaves, and panicle very erect, 1—2f; hds. 5—8-flwd., fls.
1"; sepals lanceolate, as the turgid-ovoid, blackish pod; seeds acute. April.

26 J. brachycarpus Eng. Strict, rigid, 14—2f; leaves 2—3; bract short; hds. round,
dense, 50-flwd., pale, few (2—10); 3 outer sepals awned, much longer than pod. W.

β. Wollä. Pan. spreading; pod ovoid, blunt, little shorter than the sep. Ill. (Wolf).

27 J. scirpoides Lam. Rigid, 2f; heads and bract as in the last; style usually ex-
serted; sepals pungent-awned, equalling the taper-pointed pod. N. Y. to Ga.

β. polycéphalus. Stout, 3f; heads 60—90-flwd., brownish, distant; lvs. flattened.

Order CLI. COMMELYNACEÆ. SPIDERWORTS.

Herbs with flat, narrow leaves, sheathing at base. Sepals 3, green, petals
3, colored. Stamens 6, some of them usually deformed or abortive. Styles
and stigmas united into one. Capsule 2- or 3-valved. Seeds 3 or more.

§ Flowers irregular, clustered in a spathe-like, cordate, floral leaf..............COMMELYNACEÆ. 1
§ Flowers regular, clustered. Floral leaves like the rest. Stamens 6............TRADESCANTIA. 2
§ Flowers regular, solitary, axillary. Stamens 3. Moss-like herbs.............MATACA. 3

1. COMMELYNÆA, Dill. Fls. irregular, 3 of the stem's sterile, with
glands for anthers. Caps. 3-celled, one of the cells abortive or 1-seeded.—
Leaves contracted to the sheathing base. Floral leaf or spathe erect in
flower, recurved before and after. Petals blue, open but a few hours.

1 C. communis L. Procumbent and much branched; lvs. lance-ovate, rounded at
base; spathe lateral, 2—6-flowered; odd petal reenform. Wet soils, S. June—Nov.

2 C. Cayennensis Rich. Procumbent, glabrous, with small (11—21) ovate-oblong,
obtuse leaves; spathe lateral, 3—4-flowered; odd petal round-ovate. Banks, Ill. to La.

3 C. Virginica L. Stem weak, ascending; lvs. lanceolate to linear; spathe broad-
cordate when open; odd petal very small, raised on a claw. Dry. M., S., W. Jl., Aug.

4 C. erécta L. Erect, pubescent, sheaths hairy; leaves lanceolate; spathe hawk-bill

2. TRADESCANTIA, L. SPIDERWORT. Fls. regular. Sep. persistent,
pet. large, roundish, spreading. Fil. clothed with jointed hairs, anth. reni-
form. Caps. 3-celled. 2 Fls. in terminal, close umbels. Juice viscid.

1 T. Virginica L. Umbels sessile, terminal and axillary, with leafy bracts; ped. soon
reflexed; flowers ephemeral, of a rich deep blue; leaves linear, channelled; stem
thick, jointed, 2—3f. Damp. M., S., W Cultivated.
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Order 152.—Xyridaceae.

2 T. pilosa Lehm. Umbels sessile, terminal and axillary; leaves lanceolate, linear, both sides; flowers small, bluish purple. Banks, Ill. to O., and S. 2f.

3 T. rosea Mx. Umbels terminal, pedunculate, with subulate bracts; leaves linear; petals rose-colored, twice longer than the smooth calyx. May. 1f.

4 T. cassifolia. From Mexico, a trailing leaf-plant, in vases and baskets, with thick ovate leaves, variegated with purple, green, and white. Flowers roseate.


M. michauxii Schott. & Endl. Ped. longer than the lvs. (which are 2—3”), reflexed in fruit; pod 9—32-seeded; petals white. Shallow waters, Va. to Fla. July.

Order CLII. Xyridaceæ. Xyris.

Herbs sedge-like, with equitant leaves and a scape bearing a head of regular triandrous flowers. Perianth of 3 glumaceous sepals and 3 colored petals. Fertile stamens on the claws of the petals. Style 3-cleft. Capsule 3-valved, oo-seeded.

Xyris, L. Yellow-Eyed Grass. Head of flowers ovoid-cylindrical, invested with an armor of cartilaginous scales. One sepal membranous, involving the yellow corolla in bud, the 2 lateral strongly keeled, persistent. Pet. crenulate, on claws, caducous. 3 sterile sta. alternately with the 3 fertile.

* Lvs. radical, linear, sheathing the base of the slender scape. Jn.—Aug.

1 X. flexuosa Muhl. Common X. Scape 6—15", often bulbous at base; lvs. narrowly linear, 3—9", often twisted; head round-ovoid, 3—4’; sepals minutely bearded at the tip, lance-oblance, quite wingless on the keel. N. Eng. to Ill. and Ga.

2 X. ambigua Beyr. Scape 2—3f; lvs. broad-linear, rough-edged, 6—12’; hd. lance-oblong, 9—15’; sepals lanceolate, slightly winged; petals large (6’). Barrens, S.

3 X. Caroliniana Walt. Scape 1—2f; the broad-linear lvs. more than half as long; hd. yellowish-brown, 6—9’; sep. obscurely fringed; pet. 4—5’5. Swamps, Mass. to Fla.

4 X. Elliottii Chapm. Scape 2-edged throughout, 1—1f; lvs. narrow-linear, 3 as long; hd. obovoid, 4—5”; sep. cut-fringed on the wing; pet. 3’. Wet barrens, S. Car. to Fla.

5 X. platylepis Chapm. Scape 2—3f, twisted, as well as the broad-linear lvs.; hd. 9—15”; pale; sepals fringed at the apex, wing narrow; petals 2—3’. Sands, S. Car. to Fla.

6 X. torta Sm. Bulbous; terete scape and rigid lvs. twisted; hd. oval to oblong, 5—9’; sepal fringe exerted; petals large, roundish, 8’5. Sand, N. J. to Fla. (X. bulbosa K.)

7 X. simbriata Ell. Scape rough, 2—3f, the broad-linear lvs. nearly as long; hd. large, ovoid, 9—12’; sepals much fringed and exerted; petals small (3—4”). N. J. to Fla.

8 X. baldwiniana R. & S. Scape 6—18’, twice longer than the filiform bristle-pointed leaves; head ovate, 2—4’; sep. falcate, keel winged, ciliate. Fla. (X. filifolia Ch.)

9 X. brevifolia Mx. Scape 4—12’; lvs. linear to subulate, 4—2’, spreading two ways; head ovate, 2—3”; sep. wingless; pet. 2’. Wet places, S. (X. flabelliformis Chapm.)
ORDER 154.—ERIOCAULONACEÆ.

ORDER CLIII. ERIOCaulONACEÆ. PIPEWORTS.

*Herbs* perennial, aquatic, with linear, cellular, spongy *leaves* sheathing the base of the slender *scapes*, which bear a dense head of minute imperfect *flowers* at top. *Perianth* 2–6-parted or 0. *Stamens* 6, some of them generally abortive. *Ovary* 2- or 3-celled, cells 1-seeded.


1. E. *decangulare* L. *Scape* tall (2–3′), 10–12-ribbed; *leaves* linear-ensiform, suberect, near 4 as long as the *scapes*; *head* 3–5′; chaff pointed. *Swamps*, Va. to Fla.


3. E. *septangulare* Wth. *Scape* very slender, 7-ribbed, 3–6′, or in water several feet according to its depth; *leaves* linear-setaceous, 1′–3′; *heads* globular. *N. J.* to Mich.


P. *flavidus* Kunth. In tufts; *scapes* 5-ribbed, minutely downy, 6–9′; *leaves* linear-setaceous, 1′–2′; *head* finally globular, bracts obtuse, straw-colored. *Va.* to Fla.

3. **LACHNOCAULON**, Kunth. *Scape* tall (5–8′), clustered, 5-ribbed, villous, 2–5′ (1′, Chapman); *leaves* linear-setaceous-subulate 1–2′; *heads* globular, 1–2″, brownish. *Sands*, Va. to Fla
Class IV. Glumiferæ.

Or Glumaceous Endogens. Plants having their flowers invested with one or more alternate imbricated glumes (chaff or husk) instead of petals and sepals, and collected into spikelets, spikes, or heads. The Class is equivalent to

Cohort 7. Graminoideæ, the Graminoids or grass-like plants.


These are grass-like or rush-like herbs, with fibrous roots and solid culms. Leaves generally 3-ranked, linear, channelled, based on entire or tubular sheaths. Flowers spiked, perfect or imperfect, one in the axil of each glume. Perianth none, or represented by a few hypogynous bristles called setae, or a cup-shaped or bottle-shaped perigonium. Stamens definite, generally 3 (1—12). Anthers fixed by their base, 2-celled. Ovary 1-celled, 1-ovuled. Style 2- or 3-cleft and the achenium 2-sided or 3-sided.

The Sedges abound in marshes, meadows, and swamps.

§ Cyperææ. Glumes distychose (2-rowed). Flowers all perfect...(*)

§ Scirpeæ. Glumes imbricated all around, each (except sometimes the lowest) with a perfect flower. Spikelets all terminal or all lateral...(**)

§ Rhynchosporææ. Glumes imbricated all around or irregularly, the lowest empty. Spikelets both terminal and axillary (except Dichromena and Chetosporæ)....(**)

§ Cariceæ. Glumes imbricated all around, or irregularly. Flowers monoecious or dioecious. Achenium enclosed in a bottle-shaped perigonium....(****)

* Inflorescence axillary. Perigonium or perianth of 6—10 seta............................Dulichium. 1

* Inflorescence terminal. Perigonium none.—a Spikelets 2—6, flowered..................Cyperus. 2

—c Spikelets 1-flowered, capitate..................Kyllingia. 3

** Perianth of 3 ovate clawed petals and (often) of 3 setae. Glumes awned.............Fulena. 4

** Perianth of 2 oblong sessile scales (pales) and no setae. Spikelets..................Lipocarpa. 5

** Perianth of 1 minute double scale and no setae. Spikelets 2, lateral.............Hemicarpha. 6

** Perianth of setae only, 3—15. No scales or petals..................(b)

** Perianth none at all....(d)

b Achenium crowned with a tubercle. Spike solitary, terminal ..................Eleocharis. 7

b Achenium not tuberculate.—Seta 3—6, short, or else tawny. (Chetospora, 18)......Scirpus 8

—Seta (6), long, cottony, white or reddish...Eriophorum. 9

d Style 2-cleft. Spikelets 5—10, terminal (capitate in Gen. 13)..................Fimbristylis. 10

f Style 3-cleft. Achenium 3-angled..........................Trichelostylis. 11

*** Achenia crowned with the persistent style or its bulbous base (a tubercle)....(e)

*** Achenia not tuberculate,—x brown like the scales. Setae none..................Cladium 16

—x white or whitish, crustaceous. Setae none..................Scirpus 17

s Perianth none (no seta).—y Spikelets diffuse and cymous..........................Psilochara. 12

—y Spikelets bracteate. Bracts colored..................Dichromena. 13

s Perianth of setae.—z Achenium tuberculate with the base of the style. Rhynchospora. 14

—z Achenium horned with the entire long style....Ceratoschoenus. 15

**** Spikelets either with g and q flowers, or each wholly g or wholly q..................Carex. 19

1. Dulichium, Rich. Spikes linear-lanceolate, flattened. Glumes sheathing, closely imbricated in two rows. Style long, bifid, the persist-
ent base crowning the flattened achenium. Perianth of 6—9 barbed setae.

Culm leafy. Racemes of spikes 2-rowed, axillary. August.

*D. sphaéceum* Pers.—A sedge of peculiar and striking aspect, in marshes and by streams; common. Culm erect, 1—2 ft, leafy to the top, the leaves linear, in 3 ranks. Spikes 1', alternately arranged on the axillary leafless branchlets.

**2. CYPERUS, L. GALINGALE.**

**SEDGE.** Spikes flattened, distinct, many-flowered. Glumes imbricated in 2 opposite rows, nearly all floriferous. Sete 0. Stamens 3—2. Style 3—(rarely 2)—cleft, deciduous. 4

1. Culms simple, leafy at base, triangular, bearing an involucrate simple or compound head or umbel at top. June to Sept.

§ *Pycreus*. Style 2-cleft, nut flattened

Spikes flattened, 30—50-flowered...(*)

§ *Cyperus*. Style 3-cleft, nut 3-angled. Spk 5—50-flowered...(**)

§ *Manescus*. Style 3-cleft, nut 3-angled:

Spikes 1—5-flowered, deflexed...\(n\)

* Stamens 2 (or partly 3 in No 1)......................Nos. 1—7
  * Stamens always 3.................................Nos. 4.:

** Culm with many joints, teretish, with leafless sheaths at base...No. 6
  ** Culm jointless, triquetrous, leafy below...\(a\) (Invol. of 20 lvs. No. 35)
  a A pair of free persistent scales within each glume. Fls. dense...7
  a Scales adnate to the rachis or wanting...\(b\)
  b Spikes capitate at the top of the peduncle, flattened...\(c\)
  b Spikes racemose or clustered, terete or flattened. Stam. 3...\(m\)
  c Glumes with recurved points. Stam. 1 only...Nos. 8, 9
  c Glumes with erect points or pointless. Sta. 1...Nos. 10, 11.
  c Glumes with erect points. Stamens 3...\(a\)
  d Umbel compound. Spikes flattened, 3—5 in the clusters...Nos. 12—14
  d Umbel simple.—\(2\) Spikes flat, 12—30-flowered...Nos. 15, 16
  —\(2\) Spikes flat, 5—7-flowered. Head solitary...No. 17
  —\(2\) Spikes flattish, 6—12-flwd. Hds. 1—7...Nos. 18—20
  m Spikes flat, 12—24-flowered, 2-rowed in the clusters...Nos. 21—23
  m Spikes flat, 5—12-flwd., many-rowed in the clusters...Nos. 24, 25, 35
  m Spikes terete,—\(y\) few, arranged in 2 rows in the clusters...No. 26
  —\(y\) many, arranged in many rows...Nos. 27—29
  n Spikes 3—5-flowered, with 4—7 glumes...Nos. 30—32
  n Spikes only 1-flowered, with 3 or 4 glumes...Nos. 33, 34

1 **C. diandrus** Torr. (Fig. 1.) Slender, 4—10 ft; umbel of 2—5 very short unequal rays; spikes (Fig. 2) flat, oblong, obtu-'i', 4—8", fascicled; glumes (Fig. 3) 12—24, brown, with a green keel; stamens (Fig. 4) mostly 2; nut dull. 1 August. Pretty.


*y. pauciflorus*. Glumes only 5—9, edged with yellow, 2—3", crowded.

2 **C. Nutallii** Torr. Culm erect, 4—13 ft; rays few and short; spike lance-linear, very acute, \(\infty\)-flwd., crowded; glumes acute, yellowish-brown; stamens 2; ach. dull. 1

3. **C. microdóntus** Torr. Culm and lvs. slender; spk. numerous, crowded, linear, acute; glumes acute, close; stamens 2; achenia oblong, grey, dotted. (1) South.

\[**C. Gataezi.**\] Culm and leaves filiform; spikes fewer, loose in the umbel. S-W.

4. **C. flávescens** L. Culm and leaves 4–10'; rays 2–4, short, the linear obtuse spikes clustered at the end; glumes obtuse, straw-yellow; achenia shining. (1) E.

5. **C. flávico mónum** Muhl. Culm 1–3f; involucr 3-5-leaved, very long; umbel some compound; spikes numerous, linear, 12-30-flowered, spreading; glumes very obtuse, brownish-yellow, 3-veined, white-edged; achenia obovate, blackish. Va., and South.

6. **C. articulátus** L. Culm 2–6f, the joints internal, leaves 0 or mere sheaths; umbel compound, involucr short; spk. subulate; gls. 14–20, scarios, Swamps, S.

7. **C. erythrorhízós** Muhl. Culm 2–3f; umbel compound, each ray with several sessile clusters; spikes very many, 6', teretish; glumes 15–30, yellow-brown; inner scales very narrow; achenia 3-angled, light colored. minute. (1) Pa., S. and W.

8. **C. indífléxus** Muhl. Clums clustered, 1–3', leaves setaceous; hds. 1–3; spk. very short (1–2''), crowded; gls. 8–10, with a recurved bristle-point. (1) Shores. Com.

9. **C. acúminátus** Torr. Culm filiform or slender, 3–12'; hds. 1–7, each of 0 flat obl.-ovate obtuse spikes 2–3’ long; glumes whitish, recurved at tip. (1) Ill. to La.

10. **C. víren** Mx. Culm sharply rough-angled, 1–4f; leaves keeled, 1–3f; heads of 0 ovate 15-1v. spikes; gls. greenish, merely acute; ach. linear. (2) Va., and S. 

\[**C. regitáus**\] has smooth culms and spikes very densely packed. S.


12. **C. Haspán L. β. leptos.** Culm 1–2f, leaves shorter, involucr 2-leaved, shorter than the compound umbel; spikes linear, acute, 6', 3–5 in a cluster; glumes minute, 20–40, mucronate, tawny-brown; achenia very minute, white, tumid. Swamps, S.

13. **C. dentátus** Torr. Much like C. Haspán, but the involucr is 3- or 4-leaved, and longer than the umbel; glumes fewer (7–20), larger, the upper often long-pointed.

14. **C. Lécóníti** Torr. Culm and leaves 1–2f; umbel much compound, with about 3 oblong, obtuse, flat silvery spikes on each peduncle; glumes 20–40, obtuse, very closely imbricated. (2) Sandy coasts, Fla. A handsome sedge.

15. **C. fuscus** L. Culms 3–6', leaves flat; spk. lance-linear, 1–3', dark-red or brown, densely fascicled in many heads; glumes round-ovate, closely imbricate. Phila. §


17. **C. divérge ns** Kunth. Tufts 2–3', leaves longer; spikes lance-ovate, flat, acute, 1', 6-flowered, white, all in a single somewhat compound head. Fla.

18. **C. fílicúlímis** Vahl. Culm tuberous, very slender, 6–12'; leaves very narrow, keeled; spk. lance-lin., in 1–4 dense lds. ; gls. loose, 2–5, ovate; ach. gray. (2) Dry.

19. **C. Grayi** Torr. Differs from No. 18 only in the loose heads of 6–8 linear spikes, the glumes less scarious and less veiny. 22 Mass. to N. J.

20. **C. Schwéinítzli** Torr. Culm rough-3-angled, 1–2f; leaves shorter; umbel simple, rays 4–6, erect; lvs. large, in little spikes arranged close into cylindrical-oblong compound spikes, with setaceous bractlets. 24 Shores, N. Y. to Ark.

21. **C. rotúndus** L. β. **Hydra. Nut Grass.** Culm 6–2f, the leaves shorter; umbel simple, rays 3 or 4, nearly equaling the invol.; spikes in two rows on the rachis; gls. 14–24, veined, purple-brown. (2) Va., and S. A rank and troublesome weed.

22. **C. esculéntus**. Root producing ovoid tubers as large as chestnuts, eatable when roasted (those of No. 23 very small); glumes velvety, yellow-brown. 24 Eur. Cilt.

23. **C. phymatódes** Muhl. Culm 1–2f, with long lvs. and invol.; umbel simple or compound; spk. linear, obtuse; gls. velvety, 12–20, yellowish. 24 Root creeping.

24. **C. strígósus** L. Culm 1–3f; leaves broad-linear; umbel dense, large, some compound; rays 1–5'; spikes crowded, flattened, acute; glumes 8–18, tawny, ovate, veined, much longer than the achenia. 24 Damp. Common.

25. **C. stenólepis** Torr. Culm 14–3f, smooth; leaves stiff, rough; rays 3–8; spikes crowded. 6–7'; glumes 5–8, lance-linear, spreading; seed slender, dull. 4 S.
26 C. dissitiflorus Tor. Culm slender, 1-2', longer than the narrow leaves; invol. 3-leaved; rays 3-5; spike very slender and pointed, 6-9', separate on the rachis; glumes 5-7, lance-oblong, acute; achenia brown, 3-angled. 2 Tenn. to La.

27 C. Michauxianus Schult. Culm sharply 3-angled, 6-20'; umbel 6-10-rayed, simple or compound; spikes crowded in oblong clusters, 3', tawny; glumes 5-10, oblong, overlapping, appressed; achenia ovoid, 3-angled. 2 Swamps, M. and S.

28 C. Engelmanni Steud. Spikes very slender, with the 5-12 glumes remote, and the achenia oblong-linear. Otherwise like No. 27. 2 Sandy swamps, W. and S.

29 C. tetràgonus Ell. Culm acutely rough-3-angled, leaves rough-edged; spike 4-angled, oblong, 2-3'; glumes 5-7, ovate, veiny; rays 6-12, slender. 2 Dry. S.

30 C. echinatus (Ell.) Culm 10'-2', the leaves still longer, involucr 5-6-leaved, very long; umbel simple, rays 8-12, each with a globular cluster; spikes 3', about 3-flowered, subulate, radiate; glumes veiny, oblong, acute; achen. obovoid. 2 Dry. S.

31 C. ovulâris (Vahl.) Culm 6-16', leaves shorter; umbel simple; rays 3'-3', each with a dense oval head; spikes 14', 1-3-flowered, very many. 2 Bogs. M., W., S.

32 C. Lancastriensis Porter. Culm 1-24f; leaves linear, long; heads 5-9, oval, on as many slender rays; spikes subulate, 4-6'; soon deflexed, glumes about 5, veiny, obtuse, tawny, very acute, with about 3 linear achenia. 2 Lancaster Co., Pa.

33 C. retrofrâctus (Vahl.) Culm 2-3f, leaves shorter, broad; rays 1-6', each with 1 obovate, dense head; spikes 3', subulate, 1-flowered, soon deflexed. 2 N. J., and S.


1 K. pûmila Mx. In tufts, 2-12' high, very slender; heads solitary, rarely triple, sessile, oval to oblong; invol. 3-lvd., 1-2'; spk. very CC, 1-fw'd., green. 3 W. and S.

2 K. sesquîifôra Torr. Root creeping; culms 6-12'; heads mostly triple, oval to oblong, the lateral quite small; spk. densely packed, white; invol. deflexed. 2 Fla.

4. FUIRÎNÀ, Rotboll. Clot-grass. Glumes imbricated on all sides into a spike, awned below the apex. Petaloid scales 3, cordate, awned, unguiculate, investing the stipitate achenium. 2 Stems angular, leafy. Spikes solitary or in heads, pedunculate, (brown).

1 F. squarrôsa Mx. Culm 1-2f, with several joints and sheathing flat lvs.; spks. ovoid, squarrous with the long recurved awns, 4-7 together in each head. Bogs.

b. hispîda. Taller, with sheaths and leaves, hispid with white spreading hairs.

2 F. scarîpoidea Mx. Culm slender, 1-2f, leafless but with several sheaths; spikes 1-3, ovoid, 3-5', not squarrous, the short awns erect. Wet, Ga., Fla.

5. ELEÔCHARI, R. Br. SPIKED RUSH. Spikes terete. Glumes imbricated all around. Bristles of the perianth (setae) mostly 6 (3 to 12), rigid, persistent. Style 2-3-cleft, articulated to the ovary. Achenium crowned with a tubercle which is the persistent bulbous base of the style. Mostly 2', 2. Stems leafless. Spike solitary, terminal.

§ Spike terete, cylindrical, not thicker than the tall (2-4f) culm... (a)
§ Spike terete (glumes spirally imbricated), thicker than the culm... (b)
§ Spikes flat, glumes few, in 2 or 3 rows, often proliferous. Culm capillary... (c)
1 E. equisetoides Torr. Culm terete, many jointed, 2–3f, as thick as the spike; sheath at base obtuse; spike 1', acute, glumes very obtuse; seta 6; style 3-cleft; ach. smooth, brown. Bogs, R. I., W. and S.

2 E. quadrangulata Br. Culm 2–4f, jointless, acutely 4-angled with the sides unequal; spike 1–2'; glumes obtuse; ach. dull white, obovoid, tipped with the distinct tubercle; seta 6. Bogs, N. Y., W. and S. Rare.

3 E. cellulosa Torr. Culm 2f, obtusely 3-angled below, jointless; spike 1', glumes round; seta 6; ach. broad-obovoid, deeply pitted. Marshes, Fla. to La.

4 E. Robbinsii Oakes. Culms slender, 9''–2f, sharply 3-angled, many of them abortive and splitting into hair-like fibres in the water; spikes 6–9'', spikelet-form, 5–8-flowered; ach. 1'' long as the 6 seta. Ponds. Rare.

5 E. elongata Chapm. Culms floating, very long and slender, with many hair-like abortive ones; spike 12–20-flowered; ach. and setae as in No. 4. Ponds, S.


7 E. álbida Torr. Culm and whitish spike much like E. capitata, but the glumes become 10–20, the style 3-cleft and achenium tumid, brown. Ga., Fla., La.


9 E. palustris Br. Rhizome creeping; culms 9''–2f, with a long sheath; spike lance-oblong, 3–6''–9''; glumes reddish-brown, very numerous, oblong-ovate; with a broad scarious margin; ach. obovate, yellowish; seta 4. Common.

β. calva. Bristles wanting; culms filiform. Watertown, N. Y.

10 E. compressa Sull. Culms tufted, very erect, narrow-linear, 1–1½f; spike oblong-ovoid, 3–5''; gls. 10–30, ov.-lanceolate, brown; ach. yellow; seta 0. M., W.

11 E. obtusa Schultes. Culm 6–16'; spike ovoid, very obtuse, 2–4''; gls. ovate, very many and close, red-brown, white-edged; seta 6; style often 3-cleft. Common.


13 E. ovata Br. Culms tufted, 6–10', finely striate; spike exactly ovoid, 2–3''; glumes 2½–30, rounded, tawny, with 2 white striae; ach. ivory-white, pyriform-compressed, capped with a brown tubercle; seta 7, long. E. Penn. (H. Jackson.)

14 E. simplex Torr. Culm acute-angled, filiform, 12–18'; spk. 2–3'', ovoid; glumes ovate, white-edged, few; ach. olive-green, much larger than its tubercle. Md., and S.

15 E. rostellata Torr. Culm 12–20', sulcate, rigid, very slender; spike lance-ovate, acute, 3–4''; glumes 12–20; ach. olive-brown, tubercle a mere beak. E. and N.

16 E. intermédia Schultes. Wiry setaceous culms 3–8', spreading, in dense tufts; spk. oblong-ovate, acute, 1–3''; gls. oblong, obtuse, 12–25, with 2 brown lines; ach. smooth, obovate, light-brown, with a distinct conical brown tubercle. In wet banks.

17 E. melanocárpá Torr. Culm flat, striate, wiry, erect. 12–18'; spike lance
6. SCIRPUS, L. CLUB-RUSH. BULLRUSH. Glumes imbricated on all sides. Perianth of 3–6 seteae, persistent. Sty. 2–3-cleft, not tuberculate at base, deciduous. Achenium biconvex or triangular. 2 Stems mostly triquetrous, simple, rarely leafless. Spikes solitary, conglomered, or corymbose, usually rust-colored.

§ TRICYPOPHORUM. Setae 6, not barbed, tawny, tortuous, much longer than the achenium and exserted. Culm leafy. Cyme decompound ........................................Nos. 19, 30

§ SCIRPUS. Setae downwardly barbellate, about equaling the achenium................(§) * Spike single, terminal.—a Involucral bract 0 in No. 1, long (1") in.............No. 5 —a Involucral bract as short as the spike..............Nos. 2–4 * Spikes several or many, clustered—b laterally on the culm............(c) —b terminally, mostly in cymes................(x) c Culms terete, jointless, leafless or with a few short lv's at base....Nos. 6–8 c Culms triangular, jointless.—d Spikes in a single cluster ............Nos. 9–11 —d Spikes in a cyme, bracteate......................No. 12 x Spikes large (6–15''), oblong, with cleft gls. Culm jointed, leafy. Nos. 13,14 x Spikes small (1''), mostly in globular heads. Culm jointed, leafy. Nos.15–17 x Spikes small (2–3''), all separate and pendulous. South..................No. 18

1 S. Paucliflorus Lightfoot. Culm filiform or capillary, erect, 3–8', leafless; involucr 0; spk. oval, 1–2''; gls. brown, 5–9; ach. 3-angled, netted, beaked but not tubercled. Otherwise an Eleocharis. Western N. Y. (Hankerson) to Ill. (Porter).

2 S. Caespitosus L. Culm round, wiry, 3–10', sheathed below with rudiments of leaves; spike ovate, 2–3'', with an involucral bract same length; setae 6, longer than the achenium. High Mountains, N. and S. In tufts. Leaves 3–6''.

3 S. Clintonii Gr. Culm acutely 3-angled, if, very slender, base sheathed, with short bristle-shaped leaves; bract subulate, shorter than the ovate chestnut-brown spike (3–5''); glumes pointless. N. Y. (Clinton. Porter.)

4 S. Plantifolius Muhl. Culms 2, 3-angled, threadform, with several linear flat leaves; bract as long as the oblone (3'') spikes; gls. pointed. N. Eng., N. Y. to Del.

5 S. Subterminulis Torr. Culm 1–3', filiform, with several long capillary floating leaves; bract 1–2', exceeding the oblone (3'') spike, contiguous with the culm. N.

6 S. Debitis Ph. Culm roundish, furrowed, in tufts, 9–16", with a few subulate lv's. at base or 0; spk. 1–7, ovoid, crowded, 3', tawny, the culm-leaf above them 2–4' at length reflexed; bristles 4–6, inversely barbed; ach. smooth. Muddy shs.Ct.to Car.
7 S. Smithii Gr. Culm slender, 3–12′; sheath often with a short blade; spk. 1–3.
ovooid, greenish, 2–3′, sessile about halfway up; setae 0–1; arch. smooth, lenticular;
culm-leaf always erect Shores, Penn. (Porter) Sodun Bay (Hankerson.)

8 S. validus Vahl. Culm cylindric, smooth, 5–8′, its sheath with or without a
short blade; panicle cymous, overtopping the short pungent culm-leaf; spk. ovoid, brown,
2′, numerous; gls. mucronate, ciliate; setae 3 or 6. Our stoutest Bulrush. Shores.

9 S. pungens Vahl. Culm 1–4′, 3-angled, 1–3-leaved; lvs. 3–12′, also 3-angled;
spk. 1–6, crowded, sessile, ovate, obtuse, 3–7′ below the summit; gls. notched and
mucronate; anth. ciliate at apex; style 2-cleft; setae 2–6. Ponds and marshes.

10 S. Törreyi Olney. Culm 2–3′, 3-angled; lvs. 1–3 at base, 1–1′, 3-angled; spk
1–4, oblong, sessile, 2–4′ below the summit; gls. ovate; sty. 3-cleft; ach. triq.
obovate, pointed, shorter than the setæ. Borders of ponds, N. E. to N. J., and W.

11 S. Olneyi Gr. Culms triquetrous-winged, 2–7′, leafless, or with 1 very short leaf
at base; spk. 6–12, in a sessile head an inch or so below the summit; gls. round-
oveate, mucronate; setæ 6; style 2-cleft. Salt marshes. E. and S.

12 S. leptolepis Chapm. Culms 3-angled, 2–5′; leaves 1–3, slender, channelled,
seathing at base; spikes loosely umbelled, single, oblong, 4–6′, Oc-flowered;
invol. of several small bracts besides the long culm-leaf; gls. lance-ovate, acute;
style 3-cleft; setæ 6, equalling the 3-sided ach. Md. (Porter), and S. (Canbyi Gr.)

13 S. maritimus L. Culm acutely 3-angled, leafy, 1–3′; lvs. broad-linear, chan-
nelled, 1–3′; oblong, 6–10 in each cluster; clusters 1–9, sessile and on
short rays; invol. of 2 or 3 very long leaves; setæ 1–4, deciduous, short; achenium
plano-convex. Salt marshes.

14 S. fluviallulus Gr. Culm triquetrous-winged, leafy, 2–4′; lvs. as in No. 13; spk
6–10′, oblong, 1–5 in a cluster; clusters sessile and on rays; setæ 6; ach. 3-angled
Shores, Eastern, Middle, and Western States.

15 S. atrovirens Muhl. Culm obtusely 3-angled, leafy, 2′; invol. of 3 long leaves,
spk. ovate, 1′, 10–20 in the round dense heads; hds. 4′ in a compound cyme; dark
olive-green; setæ 6, as long as the smooth white ach. Com. in swales. N., M., & W.

16 S. sylvaticus L. Culm 3′, leafy; invol. of 3 leaves, hardly equalling the thrice
compounded cyme; spk. 1′, olive-gren, 1–3–9 in the small heads; hds. on slender
pedicels; gls. acute; setæ 6, straight, as long as the pale 3-angled ach. Ms. N. H., & N

17 S. polyphyllus Vahl. Culm 2–3′, leafy; invol. of 3 leaves; cyme decompound
spk. yellow-ferruginous, 1′, 3–6 in the clusters; gls. obtuse; ach. yellowish-white
3-angled, twice shorter than the 4–5 tortuous setæ. Margins of waters. Rare. North

18 S. divaricatus Ell. Culm 3–4′, very leafy; cyme large, loose, decompound,
spk. all separate, 2–3′, oblong, pendulous, ferruginous; setæ tortuous. Wet barrens. S.

19 S. Erióphorum Mx. Culm teretish, 3–5′, lvs. 2′; invol. 4–5-lvd., longer than
the large loose decompound cyme; spk. very numerous, 1–3′, pedicellate; setæ 6,
hair-like, curled, sconcious, 5 or 6 times longer than the white ach. Swamps. Com.

20 S. Ilucarls Mx. Culm 3-angled, 2–3′, very leafy; cymes term. and axillary, de
compound, at length nodding; invol. 1–3-bracted, much shorter than the cyme; setæ
as long as the glumes, hardly at maturity exserted. Swamps. Common. S.

7. ERIÓPHORUM; L. COTTON GRASS. Glumes imbricated all
around into a spike. Ach. invested with many (rarely but 6) very long,
woolly or cottony hairs. 4′. Culms with or without leaves. Spikes showy
after the long setæ have grown. June—August.
1 E. alpinum L. Culms jointless, slender, 8–16', form a creeping rhizome; lvs. radical, short, subulate; spk. 3", the white hairs at length 7–9" long. Bogs, N., M.

2 E. vagina tum L. Rigid, tufted, 1–2', culm with 1 or 2 inflated sheaths; leaves radical, filiform; spk. 6–8', blackish, hairs 1', white, glossy, 30–40 in each flower. N. Eng. to Mich., and N. Pocono Mt. in Penn. (Proef. Porter.)

3 E. virginicum L. Culm strictum, slender, 2–3', lvs. shorter, narrowly linear; invol. 2–4-lvd.; spk. ovoid, 3", many, glomerate with very short ped. forming a capitulate cluster; setæ 70–200, pale-cinnamon, 6–8' long. Bogs.


4 E. polystachon L. Culms 1–2', with 2 or 3 cauline broad linear lvs.; invol. 2-leaved; spk. about 10, on long drooping peduncles; setæ 30–40 to each flower, 6–8', white. Very conspicuous in meadows and swamps.

5 E. gracile Koch. Culm 1–2'; lvs. triquetrous, channelled above, scarce 1' wide; spk. 3–8, on ronghish ped. which are 1'–1'–4' long; setæ white, 5–10'...

8. HEMICÁRPHA, Nees. Spike many-flowered. Glumes imbricated all around. Interior scale 1, embracing the flower and fruit; setæ 0. Sta. 1. Style 2-cleft, not bulbous at base, deciduous. Aeh. compressed, sublong, subterete. 1 Low, tufted, with setaceous culms and leaves.

H. subsquarrosa Nees. Culms 2–3', curved, the lvs. shorter; spk. 2 or 3, nearly 2', ovoid, sessile together; invol. 2-lvd., 1 continuing the stem; gls. subsquarrosa. Sandy shores.—β. Drummondii. Sta. 1–2', spk. only 1. Fulton Co. Ill. (J. Wolf.)

9. LIFOCÁRPHA, Brown. Spikes many-flowered; glumes spathulate, imbricated all around; interior scales 2, thin, subequal, involving the flower and coating the fruit. Perianth none. Sta. 1. Style 2- or 3-fid; achenium coated with the scales. 1 Culms leafy at base. Spikes numerous, collected into an involucral, terminal head.

L. maculata Torr. Culm 3–8', the linear-filiform lvs. shorter; invol. of 2 long lvs. and 1 short; spk. 3–4. ovoid; glumes very ⅛, scarious, marked with red dots and a green midvein; aeh. oblong. Wet grounds, Phila. (Leidy), and S.

10. FIMBRISTYLIS, Vahl. Glumes imbricated on all sides; bristles 3. Style compressed, 2-cleft, bulbous at base, deciduous, ciliate-fringed (as the name indicates)—With the habit of Scirpus. Lvs. mostly radical.

1 F. spadicea Vahl. Culms 1–3f, hard and rigid; lvs. semiterete, rigid, channelled; rays few, exceeding the 2 or 3 invol. bracts; spk. ovate-oblong, 3–6' by 2', rust-colored to brown; sta. 2–3: aeh. whitish, minutely netted. 2 Salt marshes.

2 F. laxa Vahl. Culm 3–12', lax, flattened, striate; lvs. flat, linear, glaucons, rough-edged; rays few, shorter than 1 of the invol. bracts; spk. ovoid, 3", brown; sta. 1; aeh. whitish, with 6–8 prominent ribs. 1 Clay soils, Pa. to Ill., and S.

3 F. argentea Vahl. Glaucons, tufted; culms 2–6', setaceous, flattish, like the leaves; spk. straw-colored, 6–9 in a dense head; invol. lvs. 4, longer than the culm; gls. lance-ovate, pointed; sta. 1. 1 Philad. (A. H. Smith), and S. (F. congesta Torr.)

11. TRICHELOSTY LIS, Lestib. Glumes in 4 to 8 ranks, carinate; bristles none; style 3-cleft, deciduous below the bulb (if any) at the base; achenium triangular. 1 2'. Sts. leafy at the base, tufted. Spikes in a terminal head, or umbel, or solitary.

§ Spikes rusty-brown, in a cymous umbel, the glumes 6–15, in 4 rows....Nos. 1–3

§ Spikes greenish—⅔ both capitate and umbellate, with linear lvs. and bracts, Nos. 4

—⅔ all capitate in a single head; bracts dilated at base...Nos. 5, 6

—⅔ one only on each culm, or rarely 2 or 3, bracted....Nos. 7, 8
1 T. autumnalis (L.) (Fig. 5.) Culm flattened, 2-edged, very slender, 3—10'; lvs., narrow-linear, flat, much shorter; spikes (Fig. 6) lance-oblong, very acute, 4-rowed, 2", 1—3 together, many in the cyme; glumes sharp-pointed, brown; stamens 2; achenium (Fig. 7) white smooth. (i) Wet banks, &c.

2 T. ciliatifolia (Ell.) Culm setaceous, angular, 3—12'; leaves setaceous, with long brown hairs on the sheaths; cyme 5-9-rayed, often overtopped by 1 bract; spike 1—2", mostly single; glumes acute, 4-rowed, 6—12; stamens 2; achenium white. (i) Dry, S.

β. coarctata. Cyme contracted; spks 2—3', often 2—3 clustered together.

3 T. capillaris (L.) Culm capillary, angular, 3—8'; leaves setaceous, much shorter, entirely smooth; spk. 2—4 in the simple cyme; gls. 8—12, strongly keeled, 4-rowed; stamens 2; ach. white, equally 3-sided. (i) Sandy fields. (Fig. 8, a flower.)

4 T. boréllis Wood. Culm filiform, angular, 2—4'; lvs. linear, flat, 4—2'; bracts similar, as long as the leaves; spikes capitulate and in cymes, 1—5 together, ovoid, green, 1"; glumes pointed; sta. 1; ach. white.

3-angled; sty. bulbous at base. (i) Ill. Banks of the Miss. R., Ill. (J. Wolf.) Shores of Lake Sup., Mich. (Mr. Perkins.)

5 T. stenophylla (Ell.) Culm setaceous, grooved, 2—4'; leaves setaceous, 2—3'; bracts many, 3—4 times longer than the dense head; ach. (Fig. 9) blackish. S.

6 T. Wàre (Torr.) Culm filiform, 1f, 3-angled; lvs. and bracts setaceous, silky-fringed at the base, the latter twice longer than the head of 8—12 ovate spikes. Fla.

7 T. carluàta (Hook. and Arn.) Culm flattened-setaceous, 3—6', with 1 short setaceous leaf at base; spk. ovoid, near the top; gls. 5—8, broad-ovate, acuminate. S—W.

8 T. leptálea (Schultes?) Culms filiform, bright green, flaccid, 6—12", sheathed at base, with a short setaceous leaf or 0; spk. ovate, whitish, as long as its bract (3'); sta. 3; ach. 3-angled, shilung. Cult. in conservatories. From S. Eur.

12. PSILOCÁRYA, Torr. Fls. 2. Gls. 6, imbricated all around, all fertile. Setæ 0. Stam. 2, long, persistent. Style 2-cleft, dilated or tuberculate at base. Ach. biconvex, crowned with the persistent style. (i) Culms leafy. Spikes lateral and terminal, cymous, brown.

1 P. scirpoides Torr. Culm 3-sided, slender, 5—9'; lvs. linear, 3—5', about 2 on the culm, a cyme in each axil; spike ovoid, 2—3"; ach. 20—30, smoothish (slightly rugous), tipped with the long 2-cleft style. Ponds, R. I., and N.

2 P. nitens (Vahl.) Culm 1 —2f, flattened, with several long linear leaves; cymes loose, spike lance-ovoid, 2", all pedicellate; ach. 8—10, conspicuously rugous, tipped with the entire-part of the style, blackish when ripe. S.


1 D. leucocephala Mx. Culm 3-angled, 1—2f; leaves narrow-linear; invol. of 6—8 narrow leaves, which are whitened at base as well as the spikes; ach. nigulous, truncated, the tubercle not decurrent. Barreus, N. J., and S.
14. **RHYNCHOSPORA** Vahl. Fls. ♀ or ♂ ♀ ♂, few in each spike. Glumes flattish, loosely imbricated, the lowest small and empty. Perianth of 6—12 setae. Sta. 3 to 12. Style bifid. Achenium lens-shaped or globular, crowned with a tubercle—the distinct, bulbous base of the style. 2 Stems leafy, 3-sided. Inflo. terminal and axillary, mostly tawny to brown.

§ Setae densely plumose. Achenium roundish-ovoid (not flattened). Nos. 1—3
§ Setae naked, denticulate or hispid. Achenium more or less flattened...(*)
   * Ach. transversely wrinkled. Setae upwardly bearded.(a)
   * Achenium smooth and even... (c)
      a Setae shorter than the achenium.........Nos. 4—7
      a Setae equaling or exceeding the achenium...b)

b Spikes in drooping panicles. Ach. oblong or obovate. Nos. 8, 9
b Spikes in erect or spreading panicles. Ach. roundish...10—12
b Spikes corymboid or fascicled.—x Ach. round-obovate...13, 14
   —x Achenium oval. Nos. 15, 16
   c Setae retrorsely hispid, or barbed (under a magnifier). (d)
   c Setae upwardly hispid (or almost none in No. 29)...(e)
   c Setae none. Culm and leaves setaceous or filiform.

South .................................................Nos. 17, 18
d Culm and leaves very slender, setaceous or filiform......Nos. 19—21
d Culm wiry and firm, leaves linear. Spikes dark-brown...Nos. 22, 23
e Culms stout, 2—3f. Setae and stamens 6—12.....................Nos. 24, 25
e Culms wiry and firm, 1—2f. Stamens 3. Setae 6, 3, or 0...Nos. 26—29
e Culm and leaves very slender, setaceous or filiform......Nos. 30, 31

1 **R. plumosa** Ell. Culm and leaves filiform-wiry, erect, 10—18'; spikelets 1-flw., 1'/, in small fascicles forming a loose spike at top, often another below it shorter than the bracts: setae 6, as long as the tumid, rugous ach. Dry, N. J. to Fla. β. minor. Every way smaller, 5—10'; fascicles 2 or 3; setae featherly below. S.

2 **R. semiplumosa** Gr. Culm and leaves rigid, wiry, erect; spike 1—2'/, in a capitate corymb at top, often a smaller one below; ach. solitary, tumid, rugous with a broad tubercle; setae 6, featherly below. Barrens, S. 1—2f.

3 **R. oligantha** Gr. Culm and leaves filiform-capillary, erect, 8—14'; spikes 1—3 only, fusiiform, 3'/, with 1 long bract; ach. obovoid; setae 6, densely featherly. S.

4 **R. cymosa** N. Culm acutely 3-angled, 1—2f; leaves linear; spike fascicled, in several crowded cymes; ach. broad-obovate, twice longer than the 6 setae, 4 times longer than the depressed-conical tubercle. N. J., Pa., and S.

5 **R. Torreyana** Gr. Culm teretish, 14—2f; leaves setaceous; cymes small, several, the lateral on capillary peduncles; ach. oblong-obovate, twice longer than the setae, thrice longer than the broad tubercle. N. J., and S.

6 **R. rariflora** Ell. Culms tufted, 6—16', filiform, the setaceous leaves much shorter; spikes 2'/, scattered in very loose paniculate cymes; ach. round-obovate, strongly rugous, tubercle very short. Barrens, S.

8 **R. inexpansa** Vahl. Culm slender, erect 1—3f; leaves narrow-linear, flat; spikes lanceolate, 2—4-flowered, 3'/, in several rather large recurved-drooping panicles; ach. oblong, half as long as the setae; tubercle short. Wet barrens, S.
9 R. decurrens Chapm. Culm, leaves, and cymes as in the last; spike 1"; ach. obovate, as long as the setae, the tubercle decurrent on its 2 edges. Marshes, Fla.

10 R. militacea (Lam.) Culm slender, 3-angled, 2–4f; leaves linear, flat, 6–9' by 3–4''; spikes obovate, little pedicellate, in diffusely spreading cymous panicles; ach. round-obovate, little shorter than the setae. Wet barrens, S.

11 R. caduca Ell. Culm acutely 3-angled, 1–2f; leaves linear, 2–3'' broad; spikes ovate, large, 4–5'', sessile or stalked, in several rather close erect cymous panicles; glumes caducous; ach. roundish, 1 as long as the setae. Wet, S.

12 R. schœnoides (Ell.) Culm 3-angled, 2–3f; leaves linear, 2' wide; spikes (2'/) small and numerous, subsessile, clustered, in several paniculate cymes; setae twice as long as the obovate flat achenium and small tubercle. Bogs, S.

13 R. pátula Gr. Culm 3-angled, thick and stout at base, 2–3f; leaves linear, short; spikes oovate, 2", in several spreading loose panicles; ach. strongly rugous, with a large tubercle, some shorter than the setae. Ga., Fla.

14 R. Eliôttii Gr. Culm solitary, 2–3f; leaves shining, rigid; corymbs 3 or 4, few-flowered, subsimple; spikes large; ach. minutely rugous, with a very short tubercle, little shorter than the setae. Pine barrens, S. (R. distans Ell.)

15 R. punctáta Ell. Culm 3-angled, 1–2f; leaves lance-linear; corymbs of fascicles; ach. rugous-netted, with rows of impressed dots. Marshes, Ga., Fla.

16 R. microcárpa Baldw. Culm 2f, teretish; leaves narrowly-linear, setaceous at end; spike turgid-ovate, 1–2''; ach. ovate, flat, minute. Wet, S.

17 R. pusílla Chapm. Corymbs 2–3, distant, of minute, scattered ovate, 3-flowered spikes; ach. lens-shaped. oblong-ovate, white. Woods, S. Car. to Fla. 1f.

18 R. Chapmánii Curtis. Corymb capitate, terminal, dense; spikes with 3 scales and 1 flower; ach. oval, polished; stamens 1 or 2. S. Car. to Fla. 1f.

19 R. albá Vahl. (Fig. 10.) Culm 10–20', very slender; leaves linear-setaceous; spikes (Fig. 11) whitish, lanceolate, in stalked, corymbose fascicles; setae 9–12, as long as the ach. (Fig. 12) and tubercle. Common in wet shady grounds. July–Sep.

20 R. Kuneskérnii Carey. In tufts 6–16', filiform; spikes 1'', brown, in 3–5 dense, sessile, remote fascicles; setae 6, as long as the ach. Iron soils, N. J.: rare.

21 R. capilláceae Torr. In tufts, 6–10', setaceous, 3-angled; clusters of brown spikes mostly 2, few-flowered; setae 6, much longer than the ach. Swamps, M., W.

22 R. glomeráta Vahl. Culms 1f, leaves linear; fascicles brown, remote, in several pairs; spikes lanceolate, 2''; ach. obovate, as long as its tubercle, which equals the 6 setae. In bogs, Can. to Fla. July, Aug.

23 R. cephalántha Torr. Culms 2–3f, stout; leaves linear; heads globular, dense, remote, sessile, solitary in the axil or terminal, dark-brown; ach. round-obovate, obtuse, half as long as the 6 setae. Barrens, N. J.


25 R. dodecáandra Baldw. Culms rigid, stout, 1–3f; leaves rigid, linear, erect; spikes 4''; ovate, in 4 or 5 loose, stalked cymes; stamens 12; setae 6–12, as long as the large (1''), roundish, smooth achenium. Bogs, S. (R. megalocarpa.)

26 R. fascicularis Nutt. Culm teretish, wiry, 1–2f; leaves short, narrowly linear; spikes small (1'') in several dense fascicles mostly terminal; setae 4–6, shorter or longer than the obovate brown ach. Wet, S.

27 R. distans N. Like No. 26, but every way smaller; spikes 1' long, in a dense terminal and often a distant lateral fascicle; setae about equaling the ach. S.

28 R. ciliátá Vahl. Glanconis, 8''–2f; leaves short, linear, obtuse, ciliate on the edges; spikes all in a dense terminal fascicle; setae 6, half the length of the ach. S.

29 R. pállida M. A. Curtis. Culm firmly erect, 1–2f, 3-angled; spikes pale-tawny, (like R. albá in a dense terminal head with often a lateral head on a long peduncle; ach. roundish, tubercle minute, setae 0–3, minute. Bogs, N. J. to N. C.

30 R. fusca R. & S. Culm (6–12) and leaves setaceous; spikes ovate-oblung, 2'
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31 R. gracillēnta Gr. Tufts 1—2f; culm and leaves threadform, curved; spikes 1", brown, in 2—5 fascicles; ach. oval, as long as its awl-shaped, serrulate tubercle, shorter than the 6 sete. Low grounds, N. Y. to Fla. (R. filifolia Torr.)

15. CERATOSCHÈNUS, Nees. Spikelets 2—5-flowed, one flower  않은, the rest onen. Glumes loosely imbricated, somewhat in 2 rows, lower ones empty. Perianth of 5 or 6 rigid, hispid, or scabrous setae. Stamens 3. Style simple, very long, persistent as a beak on the smooth, compressed achenium. 2 Stems leafy, 3-angled, 2—4f. Cymes compound, brown.

C. longrōstris (Ell.) 3—5f; leaves flat, 4—6"; spikes in loose fascicles, 9"; ach. 2", beak 7", sete 5"; cymes diffuse, terminal and axillary. Penn., W. and S.


C. capitātus Chapm. Spikelets densely clustered in a few heads; beak only 2", ach. 1", sete 2", culm teretish, 2—3f, leaves 2—4" wide. W. Fla.


C. mariscoide (Muhl.) Bog Rush. Culm terete, rigid, 20—30"; leaves narrowly linear, much shorter than culm; spikes 3", in pedunculate or sessile heads, forming small cymes; ach. ovoid, scarcely beaked. Bogs, N. Eng., and West.

C. effūsum (Switz.) Saw Grass. Culm obtusely 3-angled, 6—10f, leaves 3—10f sharply serrate-barbed on the edges; cymes diffuse, decompound, forming a large panicule. A coarse, rank Sedge in ponds, N. Car. to La.


Scleria. Achenium ovoid or globose, base invested with a short perigynium…(*)

* Achenium smooth, ovoid. Perianth annular, subentire. Stamens 3..Nos. 1, 2
* Achenium rugous-warty, globular. Perianth 6- or 3-lobed……………Nos. 3, 4
* Achenium reticulated or hispid-rugous, globular. Perianth 3-lobed…Nos. 5, 6

S. Hippoproporum. Achenium ovoid-triangular, base fluted. Perigynium none…(a)

a Fascicles 4 to 7, interruptedly spiked. Achenium smooth or rugous…Nos. 7, 8

a Fascicles single, terminal. Achenium ribbed or smooth……………Nos. 9, 10

S. trigiomeràta Mx. Whip Grass. Culm erect, rough, 3—4f; leaves broad-linear, rough-edged; fascicles few, composed of triple clusters of green-brown (2") spikes; ach. white and polished, more than 1" in diameter. Common.

S. leptocūlīnus W. Culm very slender, 2f, nearly naked; lvs. smooth, narrowly linear; compound spikes loose, the lateral on a long filiform peduncle; spikes 3—4"; ach. pol shed, ovoid, minutely corrugated. S. (S. oligantha Ell.?)

S. ciliātum Mx. Culm scabrous above, 2f; leaves 2, pubescent, bracts ciliate-fringed; ach. beset with unequal warts, disk 3-lobed. Pine barrens, S.

S. panciﬂōra Muhl. Smoothish or hairy; leaves and bracts exceeding the culm;
fascicles few-flowered, the lateral, if any, pedunculate; ach. small, rough, the disk 6-lobed. Rare northward, common South. 10–16".

6. glabra. Smoothish, slender, 1f; lateral fascicles 1-flowered, or 0. Ms. to Ohio.

7. Caroliniana. Scabrous-hirsute, slender; leaves much exceeding the culm. S.

S. reticulata MX. Slender, 1f, leaves shorter than culm; fascicles 2–5, distant, subsessile; ach. dead-white, 1" long, conspicuously netted and pitted. R. I. to Fla.

8. laxa Torr. Slender, weak, diffuse, 1–2f; lvs. flat, 3" wide; fascicles very remote, spks. distant, in pairs; ach. 1", with transverse ridges and brown pits. N. J. to Fla.

9. verticillata Muhl. Glabrous, 6–12", slender; fascicles 4–6, smooth, purple, sessile, 1" apart; ach. globular, about 1", rugous. N. Y. to Ohio, and South.

10. interrupta MX. Sparingly hisurate, 12–30"; leaves 2" wide; fascicles 5–7, rusty-brown, sessile, ciliate, 4–9" apart; ach. smooth, 1" diameter. South.

11. gracillis Ell. Filiform, smooth, 1–2f; spikes few (1–5 pairs), 3", in a terminal fascicle; bract erect; ach. ovoid-triangular, ribbed lengthwise. South.

12. Baldwini (Torr.) Culm scape-like, 2–3f, leaves all radical, long; spikes 5" long, 3–5 pairs in a terminal fascicle, brown-purple, with 3 bracts, middle bract erect; ach. dull-white, 2" long, even. In Georgia and Florida.


2. Culm leafy only at base. Fls. capitate, chestnut-brown.

C. nigricans K. Culm 1f, erect, teretish, longer than the narrow erect leaves; spikes 4" long, in one fascicle, bract erect, 1–3"; achenium 1" diameter, white. Fls. to Ohio, Florida, South.

14. CAREX, L. Flowers diclinous. Spks. 1 or more, either with both stamine and pistillate flowers (androgynous), or with the two kinds in separate spikes on the same plant (monoecious), or rarely on separate plants (dioecious). Glumes single, imbricated, each 1-flowered. Stamens 3. Stigmas 2 or 3. Nut (achene) 2-edged or 3-angled, enclosed in a sac (perigynium) composed of 2 united glumes. Culms triangular, in tufts, with grass-like leaves and usually with axillary as well as terminal spikes.

The following enumeration of our Carices is reduced from the excellent monograph by the lamented Prof. C. Dewey, contained in the Class-book of Botany, and revised with the assistance of friends before mentioned, and whose names appear below.

Fig. 13, C. flava. 14, One of its perigynia (magnified): 15, a glume. Fig. 16, C. rosea. 17, A perigynium: 18, a glume.
§ I. Spike solitary, one (rarely more) borne on each culm... (§)
§ II. Spikes two or more. Stigmas 2. Achenium lens-shaped... (§§)
§ III. Spikes two or more. Stigmas 3. Achenium triangular... (§§§)
§ Stigmas 2. Achenium lens-shaped or flattened... (a)
§ Stigmas 3. Achenium triquetrous or 3-angled... (b)
  a Spike androgynous, stamineate at the summit.................... No. 1
  b Leaves very narrow, shorter than the culm. Glumes colored... Nos. 4—6
  b Leaves linear, longer than the culms.—Glumes colored........... No. 7
          —Glumes green........... Nos. 8—10
  b Leaves very broad, flat, with no midvein. Glumes scarious .... No. 11

§§ Staminate and pistillate flowers in the same (androgy nous) spike... (c)

§§ Staminate and pistillate flowers in different spikes—on the same culm... (i)

  —on different culms........ No. 12
  c § Flowers variously situated in the approximate spikes ...Nos. (12 and) 13—15
  c § Flowers at the summit of the spikes... (d)
  c § Flowers at the base of the spikes... (f)
  d Spikes ∞, paniculate, brown; perigynia corky, not rostrate ...Nos. 16, 17
  d Spikes (or spikelets) 8—12, approximate in a compound spike... (e)
  e Perigynium rostrate, scarcely longer than the glume............ Nos. 18—21
  e Perigynium long-rostrate, 2 or 3 times longer than the gl... Nos. 22, 23
  d Spikes 3—6, approximate into one—ovoid spike... .............. Nos. 24—26
          —cylindric spike a little loose... Nos. 27, 28
  d Spikes 3—8, remote. Perigynia erect in No. 32, radiating in... Nos. 29—31
  f Perigynium radiating in the 3—6 separated spikes. Glumes green... Nos. 33, 34
  f Perig. suberect, few (2—20) in each spikelet. Glumes hyaline white... (g)
  f Perig. suberect, winged, 30—60 in each oblong to obovoid spikelet...(h)
  g Spkl. separate or remote, 2—3-flowered in No. 35, 5—20-flw.d. in Nos. 36—39
  g Spikelets closely contiguous, 2—12-flowered....................... Nos. 40, 41
  h Perigynium lance-linear, long-beaked, 3—4”. Spikelets close, Nos. 42—44
  h Perigynium lanceolate, short-beaked. Spikelets 8—20, club-ovoid, No. 45
  h Perigynium ovate, spreading. Spikelets round-ovoid, close... Nos. 46, 47
  h Perigynium round-ovate, short-beaked, broadly-winged. Five
          nominal species closely related and intermixed........ Nos. 48—52

I Stamineate spike single. Pistillate spikes sessile.............. Nos. 53—56
i Stamineate spike single. Pistillate spikes pedunculate........ Nos. 57, 58
i Stamineate spikes 1 or more, and the 2 spikes often § at the apex...(k)
  k Glumes obtuse, not exceeding the perigynia. Spikes sessile... Nos. 59, 60
  k Gl. acute, little longer or shorter than perig. Lower spikes stalked... 61—64
  k Gl. long-awned, much exceeding the perig. Spikes all stalked. Nos. 65—67

§§§ Spikes androgynous, both kinds of fls. in each,—§ at the apex... Nos. 68, 69
          —§ at the base................ No. 70

§§§§ Spikes—the terminal § at top, the rest all pistillate...(l)

§§§§ Spikes—the terminal one wholly §, the rest all pistillate...(*)

§§§§ Staminate spikes habitually more than one... (***)
  l Spikes erect or nearly so, green, hairy in Nos. 71, 72, glabrous in... Nos. 73—74
  l Spikes erect, pedunculate, tawny in maturity, glabrous... Nos. 75, 76
  l Spikes erect (some nodding in No. 79) with black-purple glumes... Nos. 77—79
  l Spikes drooping on filiform stalks, green or some rusty........ Nos. 80—83

* Pistillate spikes sessile, or solitary on radical peduncles. Perig. with
  a short abrupt beak, not inflated, pubescent. Culm slender... (m)
* Pistillate spikes with enclosed or nearly enclosed peduncles. Perig.
  inflated, beaked, glabrous, bicuspitate at apex. Spikes turgid,
  often quite large, their leafy bracts longer...(n)
* Pistillate spikes on exerted peduncles (exserted from the sheaths of
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the bracts). Perigynia 3-angled, scarce inflated, not much beaked, and (as well as the glumes) more or less colored... (p)

* Pistillate spikes with peduncles (long or short) scarcely sheathed at all, or only the lowest bract on a short sheath... (2)

m Pistillate spikes oblong, brown or hairy, the lowest scarcely sessile. Nos. 84—87

m Pistillate spikes ovoid,—all or mostly solitary on radical peduncles. Nos. 88, 89

— all sessile and crowded on the culm. Nos. 90, 91

— all sessile and remote on the culm. Nos. 92, 93

n o Spikes small (2—6”), yellowish; perig. with a short recurved beak. Nos. 94, 95

n o Spikes large; perigynium much inflated, with a long straight beak... (o)

o Spikes very short. — Perigynia 3—4″ long. Nos. 96—98

— Perigynia 6—8″ long. Nos. 99—102

o Spikes oblong-cylindric. — Perigynia ascending. Nos. 103, 104

— Perigynia spreading. Nos. 105, 106

p Leaves radical, very broad (6—10″),—triple-veined. δ Spikes clavate. Nos. 107—109

— one-veined. δ Spikes linear. Nos. 110, 8, γ.

p Leaves linear or setaceous, 1—2″, rarely 3—4″ wide... (r)

r Perigynia smooth and not rostrate... (o)

r Perigynia smooth (scabrous in No. 130) and rostrate... (v)

r Perigynia hairy, veined, conical-beaked. South. Nos. 137—139

α Bracts leaf-like, exceeding the spikes or culm... (l)

α Bracts shorter than the spikes or culm... (u)

t Perigynia triangular, oblique at the point. Nos. 110—112

t Perigynia subterete, straight. — δ Spikes pedunculate. Nos. 113, 114

— δ Spike sessile. Nos. 115—118

v Fertile spikes white in No. 119, tawny in... Nos. 120

w Fertile spikes green, the sterile pedunculate. Nos. 121—123

v Bracts leaf-like, exceeding the spikes or culm. Nos. 125—127

v Bracts not exceeding the spikes or culm... (w)

w Spikes linear, slender, very loose-flowered Nos. 128, 129

w Spikes cylindric, suberect, rather dense. Nos. 130, 131

w Spikes oblong,—about 6-flowered, dense. Nos. 132, 133

— many-flowered, rather dense. Nos. 134—136

x Perigynia beakless or nearly so. — Spikes suberect, short-ped. Nos. 140—142

— Spikes drooping on slender ped. Nos. 143—145

x Perigynia evidently beaked,—diverging in the spike. Nos. 146—148

— deflexed in the spike. Nos. 149, 150

** Perigynium clothed with wool, hairs, or mealliness... (y)

** Perigynium glabrous, short-beaked, or evidently longer than its beak... (z)

** Perigynium glabrous, long-beaked, or not longer than its beak... (zz)

y Perigynia long-beaked, hispid-pubescent, green... Nos. 151

y Perigynia short-beaked,—mealy-glaucescent, chocolate color. Nos. 152

— densely woolly, greenish. Nos. 153, 154

— hispid-pubescent, brown. Nos. 155, 156

z Spikes, or at least the glumes, dark-purple or brown. Nos. 157—159

z Spikes green or straw-colored. — Bracts shorter than the culm. Nos. 160

— Bracts exceeding the culm... (yy)

yy δ Spikes long, densely very many (150+)—flowered. Nos. 161

yy δ Spikes not dense. Perigynium much inflated,—30 to 50... Nos. 162—164

— 3 to 12... Nos. 165

zz Perigynia 3-nerved or nerveless, in drooping spikes. Nos. 166

zz Perigynia many-nerved,—ascending. Peduncles very short. Nos. 167—170

— horizontal or deflexed. Nos. 171, 172

1 C. capitata L. Spike capitate or nearly globous; perigynium roundish-ovate, convex-concave, glabrous, pointed, longer than the ovate obtuse glume. 6—10′. Wh., Mt. A.
2 C. gynocrates Wormsk. 2 Spike oblong, rather loose-flowered; perigynium oblong, short-beaked, longer than the ovate, acute, colored glume. N. Y., Mich.

3 C. exilis Dew. Spk. cylindrical, 1', dense, 2 below, or wholly 2 or 3; perig. serrulate on the margin, some longer than the ovate-lanceolate glume. Culm and leaves filiform, stiffly erect, 12–20'. Ms. to N. Y. and N. J.

β. andrógyna. One or more small 2 spikes below the terminal. N. Y.


5 C. polytrichoides Muhl. Spk. oblong, small (3'); perig. 3–8, erect, smooth, twice longer than the ovate obtuse glume. Setaceous, 4–20'. Ms. to Wis.

6 C. pacificflora Ltt. Spk. with about 4 slender reflexed 2 fls. and 1 or 2 2 above twice longer than the lanceolate glume. Erect, 3–8'. N. England, New York.

7 C. Boottiana Benth. Culm 6–12'; spk. oblong-cylindric, dioecious; perig. hairy, obovate, smaller than the dark-purple glume. Ala. to La.

8 C. Willdenowii Schk. Peduncles radical, filiform, 2–6'; spk. small, 2 gls. above, 4–8, 3 perig. 5–9, scabrous, pointed, the glumes longer and more bract-like, Leaves 1–2f, grassy. Dry grounds: common.

9 C. Steudelii K. Peduncle radical, 1–8'; spk. with 10–15 2 glumes above and 2 or 3 inflated pointed perigynia with long leafy glumes. N. Y., Pa., and W.

10 C. Bächkii Boott. Ped. radical, 1–3f, stiff; 2 fls. about 3, above, 2 perig. 2–4, glabrous, round ovate, enclosed in the long leafy glumes. N. Y., O., and N.

11 C. Fraséri Sims. Culm 4–10', lvs. 6–12' by 1', flat and thick; spk. oblong, 2-flowered, perig. ovoid, longer than the hyaline, obtuse glume. Wytheville, Va. (Shriver) and Mts. of N. C. A curious and peculiar Carex. Leaves very large.

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12 C. stérillis Willd. Culm (and lvs.) slender, erect, 1–2f; often perigynium dioecious; spks. 3–6, roundish, approximate, 2 spikes oblong; perig. radiating, ovate, subrostrate, 2-toothed, about equaling the ovate acuminate glume. Common in wet places.

13 C. bromoides Schk. Slender, weak, 1–2f; spikes 4–6, distinct, lanceolate; perig. lanceolate, erect, acuminate, longer than the lanceolate gls. Boga: common.

14 C. sicca ta Dew. Erect, 1–2f; spks. 3–7, oval to oblong, 2 above, or the middle all 2; perig. lance-ovate, beaked, as long as the brownish gls. Sands, N. Eng., to III.

15 C. disticha Huds. (C. Sartwelli Dew.) Erect, 2–3f; spks. 12–20, the lower some remote, all ovoid and compact, stam. mostly above; perig. ovate, lanceolate, pointed, equaling the ovate pointed glume. Seneca Co., N. Y. (Sartwell), and W.

16 C. decomposita Muhl. Culm erect, 18–30'; spikes very many, in a large crowded panicle; perig. round-obovate with a very short beak, biconvex, about equaling the ovate glume. N. Y. to Mich., and S.

17 C. prairea Dew. Culm 2–3f; spikes many, in a dense short (3–4') panicle; perig. erect, lance-ovate, smaller than the glume. N. Eng., and W.


19 C. vulpinoides Mx. Spikelets very many, dense, ovoid, in a large (2–3') compound spike; perig. yellowish, very small (1/2'), ovate, acuminate, diverging, scarcely as long as the pointed glume; culms stout, 2–3f. Common.

β. setacea. Perig. narrower, erect, in a more slender compound spike.

γ. scabrrior (Sartwell). Spikelets distinct or remote, glume strongly serrulate.

20 C. conjuncta Boott. Spikelets in a long (3') subsimple spike; perig. 1' or 2', subrostrate and coriaceous at base, short-beaked; style bulbous at base; nut oblanceolate; culm weak, 1–2f, flattened. Ohio, and westward. (C. vulpina C-B.)

21 C. alopecoidea Tuckm. Spikelets 8–12, in an oblong 1–2' spike; perig. ovate, nerveless, brown, 1', subrostrate; culm 3-angled, 2–3f. N. Y., Pa., and W.

22 C. stipata Muhl. Spike often compound, 2–3', spikelets ∞, oblong; perig.
lance-ovate, 1½", twice longer than the glume; culm acutely 3-angled with concave sides, leaves nearly as long (2-3f). Marshes: common.

23 C. Crus-Corvi Shuttl. Spike decomposed or sub-panicled, 3—6'; perig. short-ovate, very long-beaked (3"), spreading; glume 1"; culm 2—3f; 1vs. linear, flat, many and long. River swamps, Wis. to O., and Fla.

24 C.cephalophora Wild. Head 6—13" long, dense; perig. broad-ovate, short-beaked, scarcely exceeding the ovate-acuminate glume; style very short, bulbous at the base; 1vs. copious, equaling the slender culm (1f). (C. Leavenworthii Dew.)

25 C. Muhlenbergii Schk. Head ovoid-oblong, 1'; perig. broad-ovate, short-beaked, strongly nerved, twice larger (1½") than in No. 34; nut orbicular, style short, bulbous; culm 1—2f, 1vs. shorter, bracts setaceous. In fields, not abundant.

26 C. chordorrhiza Ehrh. Head ovoid, 9—15", perig. ovate, nerved, turgescent, at length brown, few and large (2½"), beakless but minutely pointed; rhizome creeping; leaves short and narrow, culms 9—15'. Marshes, N. Y. to Wis., and N.

27 C. cephaloidea Dew. Spikelets very short, spike 1—1½'; perig. brown (at maturity), acuminate, nerveless, ovate, shorter than the thin cuspidate glume. Culm 2—4f. Leaves elongated. Fields, hedges, N. Y. (Penn Yan, Sartwell), and W.

28 C. muriçata L. Spikelets ovoid, often a little remote; perig. ovate-lanceolate, nerveless, wingless, some longer than the ovate-lanceolate gl. Ms. to N. J., and W. §

29 C. sparganioides Muhl. Spikelets 7—10, ovate; perig. ovate-acuminate, nearly twice longer than the glumes, all green. Culm and leaves 2f. In fields; common. §

β.  ramea, is a luxuriant form, with the spike large (3—4"), panicled.

γ. minor, is a small and delicate form, with the spike 1—2" long.

30 C. rosea Schk. (Fig. 16) Spkl. 5—8, remote, 8—10-flwd.; perig. (Fig. 17) lance-oblong, diverging or reflexed, twice as long as the ovate obtuse glume (Fig. 15). 8—16'. Com. §

31 C. retrofléxa Muhl. Spkl. 3—5, bracteate, stellate at maturity; perig. 3—6, ovate, acutish, spreading or reflexed, about equaling the acute glume. Woods. 1f.

32 C. tenellá Schk. Spkl. 3 or 4, near, erect; perig. 1—3, mostly 2, ovate-obtuse, minutely pointed, brown, smooth, little exceeding the hyaline, ovate, acute gl. In tufts, very slender and flexible, 5—12'. Woods, N. Eng. to Pa., and W. (C.disperma Dew.)

33 C. stellulata L. Culm stiffly erect, 8—24'; spikelets 4—6, ovate, sessile, the spike nearly 2", turning brown; perig. broad-ovate, short-beaked, a little longer than the ovate, obtuse glume. Wet places, N.

34 C. scirpoides Schk. Culm very slender, 6—12'; spkl. 3—4, contiguous, spk. 1", light green; perig. ovate-lanceolate, near twice longer than the ovate-lanceolate, acute glume. Wet. Common. Stam, mostly below the upper spikelet.

35 C. trispérma Dew. Very slender, 1f; spikelets 1—3, with long setaceous bracts, about 3-flwd.; perig. rounded, pointed, little longer than the glume. Pa., N. and W.

36 C. Déweyi Schk. Slender, leaffy, 1—2f; spikelets 3—5, 3—9-flwd., the upper approximate; perig. oblong-lanceolate, rostrate, 2-toothed, mostly longer than the ovate-lanceolate awned hyaline glume. Woods, N. Eng. to Wis., and Canada.

37 C. canescens L. Erect, 2f, glaucous; spkl. 5—7, ovate-oblong, remote below, 12—20-flwd.; perig. round-ovate, toothless, eq. the glume. Wet. Com. (C. curta Good.)

38 C. vitilis Fries. Slender, flexuous, 1—3f; spkl. 3—5, separate, short-ovoid, 5—10-flwd.; perig. lance-ovate, pointed, longer than the glume. N. Eng., W. and N.

39 C. Norvégica Schk. Yellowish, 6—12" erect; spkl. about 3, 5—12-flwd., the upper often all ½; perig. ovial, biconvex, veiny, brown, eq. the obtuse glume. Me. (Blake.)

40 C. Liddóni Boott. Spike 1—2", of 5—7 oblong spikelets; perig. and gl. lance-ovate, brownish, equal, the latter white-edged; culm strict, 1—2f. Mich. (Cooley), & N.

41 C. tenulifóra Wahl. Spike capitulate, ½ of 2 or 3 roundish, about 5—6flwd. spkls; perig. oblong-ovate, plano-convex, acute, equaling the oblong glume. Swamps, N.

42 C. sychnocéphala Carey. Spkl. ovoid, in a dense head with long leafy bracte; perig. 2½", lance-linear, gradually long-beaked, the gl. nearly as long. N. Y.: rare.
43 C. árida Schw. and Torr. Spkl. oblong-oval, large, close and dense, dry and chaff-like in aspect; perig. lance-linear, 4’; clearly bidentate, gl. 4 as long. W. com.

44 C. scopária Schk. Spkl. 5–8, ovate, approximate, or often crowded in a head; perig. 3’, lanceolate, longer than the lanceolate glume; culm 18–24’ high, leafy below. A very common sedge, in meadows everywhere.

45 C. lagopodioides Schk. Spkl. 8–30, ovoid-clavate or globular with a club-shaped base, approximate or crowded; perig. lanceolate, nearly twice as long as the ovate-lanceolate glume. Plant 2f, light green. Common.

46 C. cristáta Schw. Spkl. 6–12, ovoid-globular, crowded into an oblong head; perig. spreading, lance-ovate, pointed both ways, twice longer than the small lanceolate glume. Culm 2–3f, stout. Fields and meadows; common.


48 C. straminea Schk. Spkl. about 6 (3–12), ovoid to oval or clavate-ovate, remote or contiguous; perig. oval or round-ovate, very flat, broadly winged, abruptly beaked, equaling or exceeding the much narrower glume. Common and variable.

a. týpica. Spkl. 3–6, roundish; perig. spreading, brownish; gl. much smaller.

b. tinerá. Slender, with 3–6 ovate brownish remote spikes attenuate below.

γ. aperá. Spkl. 4–8, tawny, drooping; perig. long-beaked, thrice longer than gl.

δ. festucácea. Spkl. 5–8, club-ovobate, longer beaked, prominent, brownish.

ε. hyalína. Spkl. about 6, large, pale; perig. twice longer than the glume. W. μonilíformís. Slender; spkl. about 4, remote, whitish, acute at both ends. E.

49 C. silícea Olney. Spkl. 2–10, pale or silvery-yellow, distant, ovate; perig. orbicular, broadly winged all around, short-beaked, usually longer and broader than the lanceolate glume. Lvs. involute. 8–20’. Sea shore, Maine to Delaware (Candy).

50 C. adústa Boott. Spkl. globular with an acute base, large, silvery-green, close or remote; perig. ovate to oval, veined, narrowly winged, acuminate, equaling the glume in length and breadth. N. J., Penn. and N. (C. argyrantha, more delicate.)

51 C. fëna Willd. Spkl. 4–8, pale, oval-lobong, acute, approximate; perig. oval to obovate, appressed, broadly-winged, short-beaked, a little longer than the ovate-lanceolate glume. Plant glaucous, 2–3f. Marshes, R. I. to Pa.

52 C. aláta Torr. Spkl. 4–8, ovate, large, close; perig. roundish or obovate, close, abruptly short-beaked, 3-veined on the back, broad-winged, some longer than the lanceolate white glume. Pale green, 3–4f. N. Y. to Fla.

53 C. Washingtonína Dew. Culm 6–18’; lvs. flat; 3 spk. 1–4, oblong-cylindric, 6’–1’, the lowest stalked; gls. black, oval, covering the oval apiculate nerved perig.; lower bract often elongated. White Mts., and N. (C. rigida β. Bigelowii Gr.)

54 C. rotundáta Wahl. Culm 1f, slender; lvs. channeled; 3 spk. 1–2, oval or roundish; perig. ovate, acuminate, equaling the lanceolate brownish gl.; bracts surpassing the culm; 3 spk. very slender, 1f. Moosehead L, Me. (Smith).

55 C. Floridána Schw. Culms 2–10’, slender, lvs. often longer; 3 spk. short, sessile, 3 spk. ovoid, 1–3, crowded; glumes oval, acute, edged with brown, covering the obovate, short-beaked perig. Often with solitary 3 spikes on radical ped. S.

56 C. lentículáris Mx. Culm 8–18’; lvs. flat; 3 spk. 1’, 3 spk. 2–5, 1–1’, with long bracts; perig. ovate-oval, yellowish, nerved, longer than the obtuse glume. Spikes cylindric. Gravelly shores, Me., N. H., N. Y., and northward.

57 C. aureá Nutt. 3 Spk. short (6’), 3 spk. 3 or 4, 1–1’, loose-flowered, spreading; perig. oval, obtuse, yellow-brown, separate, exceeding the hyaline gl. Culm slender, 8–16’; leaves flat, bracts exerted, leafy. Wet. N. Eng., and W.

58 C. Mitchellína Curtis. 3 Spk. often 2 in the middle; 3 spk. 2–3, cylindric, slender, loose; perig. ovate, acute, short-beaked, eq. the gl. 15–20’. Wet. N. Car.

59 C. torta Boott. Spikes cylindric, slender, 2–5; spikelets 2 or 3, loose below, recurved; perig. lanceolate, the beak recurved or contorted, equaling the black-banded obtuse lanceolate glume. Very smooth, 2–3f. Wet places.
60 **C. vulgâris** Fries. ± Spikes cylindric, 1–2', ± cylind.-oblung, 1', ± at top; gls. black, ovate, obtuse, shorter than the oval, obtuse perig.; culm slender, 6–14'; lvs. flat, bract equaling the culm. Wet, N. Eng., W. and N. (C. esquifîsus C-B.)

61 **C. strictâ** Lam. Spk. cylindric, 1½–2', erect; glumes lanceolate, acutish, striped, some longer than the ovate-acute perigynia. 2f. Bogs; common.  
\[β. strictior.\] Glumes, especially the upper, a little shorter than the perigynia.

62 **C. xerocárpâ** S. H. Wright. Differs from C. strictâ in its extremely lânder habit; lvs. rolled and rush-like; ± spk. almost alliform; gl. shorter than perig. N. Y.

63 **C. apértâ** Booth. Spk. cylindric, erect, 12–15'; perig. brown, round-ovate, shorter than the lance-acuminate glume; culm 1–2f, rough-edged above; lvs. channelled, bracts leafy. Wet meadows, N. Eng., W. and N.

64 **C. aquâtâlis** Wahl. Spk. 2–3', dense, erect, acute, subclavate, the ± 2 or 3, ± 3–5, with bracts exceeding the culm; gl. lanceolate, usually longer than the roundish, nerveless, reddish, apiculate perigynia. 2–3f. Shores, N.

65 **C. crînîta** Lam. Spk. pedunculate, long (2–4), nodding, ± mostly but 1, ± about 4; perig. round-ovate, apiculate, glume with its long serrulateawn thîre longer—all light brown. Wet meadows: common. 2–3f. Leafy. 
\[β. gyânndí\] Spk. shorter (1–2'), ± about 3, perig. inflated, awns spreading, ±c.

66 **C. marítîma** Vahl. Spk. 1–2' long, pendulous or spreading, on peduncles, the ± 3–5; perig. orbicular, much shorter than the long-awned green glume; culm 10–30', erect, with broad, flat, smooth leaves. Salt marshes, Mass., and N.

67 **C. salîna** Wahl. Spk. cylindric, erect on included stalks, the ± 2–4; braets long; perig. elliptical, apiculate, little shorter than the dark-brown, short-awned glume; culm 8–16', rough above. Salt marshes, Mass., and N.

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68 **C. pedunculâta** Muhl. Spk. 3–7, remote, on filiform stalks; perig. obovate, triquetrous, recurved at tip, few, equaling the brown, oblong, obovate glume. Culm 4–12', leaves longer, glabrous. Woods. Flowers in early spring.

69 **C. Baltzéllîi** Chapm. Spk. cylindric, 1–2', ± 1–4, ± at top, on long cauline or subradical peduncles; perig. and gl. obovate-oblung, subequal, the perig. veiny and puberalent. Culm 6–10', leaves flat, thrice longer. Florida.

70 **C. squârrósa** L. Spk. 2–4, cylindric-oblung, thick (1' by 6') straw-color, stalked, *squârrous* with the long beaks of the globose perig. which conceal the short glumes. Wet places: common. Large and fine, spike showy.

71 **C. viréscens** Muhl. Spk. 2–4, erect, 6–12'; perig. ovate, pubescent, ribbed, longer than the ovate pointed glume or about equal to it. Culm slender, 1–2f, bracts exceeding the culm. Whole plant pubescent and light green. Copes.

72 **C. hîrsâta** Willd. Spk. oval-oblung. 4–9', erect, near, dense; perig. ovoid-triquetrous. downy, at length only scabrous, longer than the glumes. Culm 1–2f, braets exceeding it, all pubescent or scabrous. Upland Meadows. (C. Tricépse Mx.)

73 **C. Smithii** Porter. Spikelets 3, oval and oblong, near; perig. glabrous; achenia broadly obovate with reflexed styles; culm slender; whole plant glabrous, bright green, 2f. Del. Co., Penn. (A. H. Smith.) Also in N. J. (See Olney's Carices Am.)

74 **C. astîváîls** Curtis. Spk. 3–5, slender, 1–2', loose, suberect on short stalks; perig. elliptical, pointed both ways, longer than the glume. Tufs 16–24' high, with flat downy leaves, and braets exceeding the culm. Mts., Mass. to N. Car.

75 **C. Shortíâna** Dew. Spk. 4 or 5, cylindric, dense, 1', erect on naked stalks, tawny in maturity; perig. round-oblung, scarce longer than the ovate glume. Erect, 12–30' leafy, smooth, handsome. Wet grounds, Penn. to Ill., and S.

76 **C. oxýléplîs** Torr. Spk. 3–6, cylindric, 1–2', erect on naked ped.; perig. oblung, pointed both ways, little longer than the cuspidate white-edged glume. Fla. to La.

77 **C. Buxbaâmîi** Wahl. Spk. 4, ovoid, sessile, near; lower bract equaling the culm; perig. elliptic, nerveless, rounded on the back, shorter than the pointed black-banded glume. Culm 10–18'. Common in wet places.
ORDER 154.—CYPERACEÆ.

C. alpina Swtz. Spk. 3 or 4, small, oval, close; bract longer than the culm; perig. round-ovobate, longer than the black glume. Leaves radical. L. Superior.

C. atrata L. Spk. 3—6, oblong-ovate, nodding, the lower stalked; perig. round-ovate, shorter than the dark oval glume. Bract long. White Mountains.


C. formosa Dew. Spk. 3—4, oblong, 8—12', on long, distant recurved peduncles; perig. oblong, inflated, twice longer than the ovate acute glume. Culm 2—3f, bract shorter than the culm. Wet meadows.

C. glabra Boott. § Spk. short-cylindric (1'), spreading on capillary peduncles; perig. elliptic-oblung, acute at both ends, nerved, twice longer (2') than the ovate brown-awned glume. Very slender, erect, 18'. N. J., N. Y., Penn.

C. Davisii Torr. Spk. 4, 10—15' long, rather loose, long-stalked, drooping when ripe; bracts much longer; perig. oblong-ovate, nerved, acute, scarce equaling the awned glume. Mass. to Wis., and S.

C. precox Jacq. § Spk. clavate, erect; § spk. about 2, ovate-oblong, 6—9'; perig. 6—12, round-ovate, downy, nearly equal to the ovate colored glume (which is brown, edged with white). Culm 3—6', leafy at base. Rocky hills, E. Mass.

C. Richardssonii R. Br. § Spk. clavate-oblung, erect; § about 2, oblong, near subsessile; glumes wholly brown; perig. ovoid-triquetrous, obtuse, nearly beakless, shorter than the green-midveined glume. 4—10'. Woods, N. Y. to Ill., and N.


C. pubescens Muhl. Spk. oblong, 8—12", rather loose, the lowest on a short stalk; perig. lance-ovate, beaked, hairy, exceeding the carinate, mucronate glume. Culm 10—20': leaves downy, flat, 5—10'. Meadows.

C. nigro-marginata Schw. is probably a mere variety of No. 55, having the glumes more extensively colored and the stigmas oftener 3. Hills, Pa., and S.

C. umbellata Schk. Dwarf; § spk. erect, 2—3', § ovold, 2—4, each on a sub-radical peduncle, green; perig. 5—8, round-ovate, beaked, nearly equaling the lance-accuminate glume. Leaves 3—5', far longer than the spike, North.


C. Pennsylvanica Lam. Spikes tawny-red, § 1' long, pedunculate, the § small, round, sessile, crowded, about 2; perig. round-ovoid, 5—7, downy, short-beaked, equaling the acuminate glume. Culm 4—12', erect, leaves long.Copse.

C. Novæ-Anglicæ Schw. Spk. purplish, sessile, § 3—4', § 2—1, small, near (except the lowest), with bracts exceeding the culm; perig. 3—7, pyriform, short-beaked, larger than the ovate glume. Slender, 4—12'. Open woods.

C. varia Muhl. Spikes rusty-green, sessile, oval, 1—3, separated, the § slender, (10') and stalked, bracts very short; perig. about 7, round-oval, abruptly beaked, about equaling the pointed rusty-edged glume. Erect, 8—18, leafy at base. Dry woods.


C. Ederi Ehrh. § Spk. 3—5, oblong, small (3—5'), close, nearly sessile; perig. globous, diverging with a short abrupt beak; plant yellowish, 8—16', leaves and bracts erect. Shores, N. Eng., and West. (C. viridula Mx.)

C. folliculata L. § Spk. 2—4, capitate, dense, distant, the lower peduncle exerted; perigynia 4', lanceolate, nerved, tapering into a long beak, diverging, twice longer than the long-awned glumes; leaves lance-linear. Wet.
97 C. rostrata Mx.  § Spikes 1–3, capitate, near; perigynia 3", suberect, lanceolate, long-rostrate, twice longer than the acutish glume; leaves few, rolled, subulate; culm 1f. Mountain bogs, N. Y., N. H., and North.

98 C. Elliotii Schw.  § Spike slender, 1'; 2 or 3, globous to oval, distant; perigynia 10–20, ovoid, veined, rostrate, 3"; glume ovate, 1"; culm slender, rigid, 1–2f, the narrow leaves longer. N. Car. to Fla.

99 C. subulata Mx.  § Spike short, subsessile; 3 spikes 3–5, capitate, distant, 3–5-flowered; perigynia subulate, 6", long-rostrate, divericate and with 2 divericate teeth. Slender, smooth, light-green, 1–2f. Can. to N. J.

100 C. turgescens Torr.  § Spike slender, 1f'; 2 spikes 2 to 3, capitate to oval, loose, the lowest pedunculate, exserted; perigynia 9–12, inflated, striate, conico-rostrate, 6'; glume ovate, acute, 3". Culm 2–3f, slender; leaves long. Swamps, S.

101 C. intumescens Rudge.  § Spike long-stalked, slender; 1–3, on very short stalks, capitate; perigynia 5–8, very large (6–7'), acuminate-beaked; glume ovate-cuspidate, 2f; culm 1f; bracts very long. Wet.

102 C. Grayi Carey.  § Spikes 1 or 2, large, capitate, dense; perigynia 15–30, radiating, very large (7–8''), with a long, slender, smooth beak; glume inconspicuous. River bottoms, N. Y., and West.

103 C. lupulina Muhl.  § Spikes 2–4, large, 1–9' by 9–12'', the lower on exserted stalks; perigynia ascending, 6'–7'', ovoid and long-beaked, bicuspidate; glume 3'', lance-acuminate. Plant stout, leafy, 2–3f. Wet grounds.

β. pedunculata.  § Spikes all on long peduncles.  § Glumes linear-awned as in α.

γ. androgynna.  § Spikes staminate at apex Approaching No. 172.

104 C. lupulinformis Sartwell.  § Spikes 4–5, very large (2–3'); perigynia ascending, 7–8'', the long beak ronghish, bicuspidate; glumes long-awned, ovate, 3''; nut as broad as long, the angles knobbed. Swamps: common.

105 C. tentaculata Muhl.  § Spikes 2 or 3, dense, 1'–2' by 7 or 8'', near, on short peduncles; perigynia 4', ovate, long-beaked, diverging, orifice obliquely 2-toothed; glumes linear-awned, 2'. Stout, leafy, 1–2f. Bogs: common.

β. altern.  § Spikes 3–4, larger (10'' thick), beak subequally toothed. 2f.

106 C. stenolepis Torr.  § Spike small (1') rarely 0; 1–5, very dense, 1–1', often 3 at base; perigynia globous, abruptly beaked, recurved, shorter than the long slender-awned glumes. Related to C. squarrösa. Penn. to Ill., and South.

107 C. plantaginea Lam.  § Spike clavate, glumes acute; 3 spikes 3–5, erect, remote, loose; perigynium 5–10, the point recurved, twice longer than the glume; bracts purple, shorter than the spikes; leaves 6–10'' broad. Woods. March–May.

108 C. Careyana Torr.  § Spike oblong, erect, glumes obtuse; 3 spikes 2–3, remote, loose; perigynium 3–7, large (2½''), the point oblique, twice longer than the glume; bracts green, much longer than the spikelets; leaves 6–12'' wide. Woods, N. Y., Pa., and W.

109 C. platyphyllyla Carey.  § Spike clavate, glume acute; 2 spikes 2–3, very remote, small; perigynia 3–6, small (1½''); glume cuspidate, 1'; bracts as in C. Careyana; leaves 6–10'' wide, mostly shorter than the culms. Shades, N. States.

110 C. laxiflora Lam.  § Spike linear, glumes lance-oblong, acute; 3 spikes 3, slender, 1', loose, remote; perigynia 10–15, elliptic-triqu., 2', the point oblique; gl. oblong, mucronate, 1½'; leaves 1-veined, 2–4'' wide, bracts long. Shades: common.

β. patulifolia.  Root leaves 6–12'' wide, bracts also wide. Otherwise as in α.

γ. laitifolia.  Leaves and bracts very broad; perigynia broad, point conspicuous.

δ. blanda.  Bracts very long, 2 spikes small; 2 spikes dense; perigynia obvoid.

ε. internodica.  Leaves narrow, § spike on a slender stalk; perigynia as in α.

ζ. stylotella.  Slender, 1–2f, spike small, on long filiform peduncles, 4–6-flowered.

111 C. retrocurva Dew.  Spikes small (5–8''), all on long capillary peduncles, the 3, loose; perigynia broad-ovate-triquetrous, carcey oblique-printed; glumes awned; culms weak, 1f, leaves radical, wide (4''), flat, glaucous. Open woods: rare.

112 C. digitallis Willd.  § Spike slender, 1', stalked; 3 spikes 3, loose, 6–12'', re
mote, recurved; perigynia. 4—10, ovoid-triquetrous, obtuse, longer than the lance-ovate glume; leaves and bracts 1—2" wide, exceeding the 4—12' culm. Open woods.

113 C. xanthospéruma Dew. ♀ Spike small, sessile; ♂ spikes 4, distant, cylindric, 1', dense, on long slender peduncles; perigynia oval-oblong, obtuse, 2', sistrate, yellowish when ripe; glumes 1', pointed. Yellowish, 1f. N. J., and South.

114 C. conoides Schk. Spikes all short-peduncled, ♀ 2 or 3, oblong, dense, erect, 6—10'; perigynia oblong-conic, obtusish; glumes ovate, awned. 1f. Uplands: com.

115 C. grísea Wahl. ♀ Spike sessile; ♂ spikes 4, oblong, remote, 6'; perigynia oblong, some longer than the ovate, awned glumes (2", glumes 2''); leaves light-green, 2—3" broad. Calm 1f. Woods and meadows.


117 C. granuláris Muhl. ♀ Spike linear, sessile, 1'; ♀ 2—4, cylindric, 4—14', the lower peduncle long; perigynia close, round-ovate, the point oblique, much longer than the ovate-acuminate glumes. Glaucescent, 8—20'. Moist soils: common.

♂. recisa, has the perigynia ovoid, and with a straight point. Ill. to La.

118 C. jánnea Willd. Spikes slender, on filiform stalks, glumes obtuse; ♀ short; ♀ spikes 2—3, loose; perigynia lanceolate, longer than the glumes; culm 1—1½', slender, longer than the slender rush-like leaves. Roan Mt., N. C.

119 C. ebúrneá Boot. Delicate, erect, 4—10', the setaceous leaves much shorter; spikes 2—3, very small (2—3"), with white, leafless sheaths, the ♀ higher than the ♂; perigynia 3—6, obovoid, beaked, nerveless, 3'-. Rocks, Vt., and West.

120 C. paniçea L. Spikes 2—4, 1', oblong-cylindric, stalked, tawny; perigynia turgid-ovoid, the very short point oblique, longer than the obtuse glume. Light green, 1f; bracts short. Mass. (Oakes). Wis. (Lapham). Pa. (Porter).

121 C. ívída Willd. Spikes 2—4, oblong-cylindric, pale, 8—10', the ♀ and lower ♀ stalked; bracts short; perigynia oval, straight at the obtuse end, longer than the obtuse glumes. Glaucescent. 6—16'. Swamps, N. Y., N. J., and North.

122 C. tetánica Schk. Spikes 2—4, oblong-cylindric, loose, 1', the ♀ and lower ♀ long-pedunculate; perigynia ovoid to obovoid, apex oblique, longer than the submucronate glumes. Light green, 3—16'; bracts rather short. Wet uplands: rare.

♀. Woodi, ♀ spikes about 2, very loose; glumes with broad scarious margins.

123 C. Méndii Dew. ♀ Spike slender, 1', ♀ oblong-cylindric, loose, 8—10', all pedunculate; perigynia oval, scarce equaling the tawny-edged, ovate-acuminate glumes. Pale, erect, 8—10', the leaves and bracts short. Wet, O. to Ill., and North.

124 C. Cráwei Dew. Spikes dense, 8—10', erect, ♀ stalked, compound at base, ♂ 2—5, remote, the lowest often long-stalked; perigynia ovoid, acute, twice longer than the ovate glumes. Erect, 6—15'. Spikes dusky green. N. Y., and West. Rare.

125 C. oligocárpa Schk. ♀ Spike erect, 9', linear, stalked; ♀ 3, remote, short-stalked, 3- or 4-flowered; perigynium obvoid, short-beaked, brown, equaling the awn of the pale glume. Pale, 6—12', bracts long. Open woods and hedges: rare.

126 C. Hitchecockiana Dew. ♀ Spike erect, linear, stalked; ♀ 3, remote, short-stalked, 5-10-flowered; perigynia oval, brown, acute below, the beak bent back, scarce equaling the awn of the whitish glume. Subpubescent, 1—2f. N. Eng., and West.

127 C. exténsa Good. ♀ Spike subsessile, 6—9"; ♀ 3, oval to oblong, very dense, the lower remote, stalked; perigynia spreading, the short stalk, bent short, the stalk, 2-toothed, gl. much shorter. Rush-like, 1—2f; leaves and bracts rolled. Sands, L. I., Staten I.

128 C. débilis Mx. Spikes about 2', very slender; ♀ 3—5, nodding; perigynia 12—20, lance-linear. acuminate-beaked, twice longer than the oblong slivery glumes. Bright green, 1—2f; bracts equal the culm. Moist woods and meadows: common.

♂. pubere. Perig. pubescent, strongly eified, slightly bent. Pa. (Porter), and S.

129 C. arctáta Boott. Like C. débilis, but with shorter bracts, longer stalks, the perigynium ovoid, taper-beaked, ♀ longer than the ovate-pointed glume. Common.

130 C. Sulliánúttii Boott. Spikes cylindric, 9—15', erect, 4 approximato, or a 5th,
if any, remote; perigynium elliptic, rough-hairy, scarcely longer than the ovate-cuspidate glume. Borders of woods, Columbus, Ohio. 2f.


132 C. vaginata Tausch. a Spike nodding in flower, stalked; a 2 or 3, remote, loose; bracts short with long sheaths; perig. 5—10, brown-black, globular-ovate, the beak terete, short, bent, exceeding the obtuse glume. Weak, 1—2f. N. Y. (rare), L. Sup.

133 C. capillaris L. Spikes minute, 3—4, oblong, tawny, peduncle capillary; perigynia 4—6, oval, nerveless, the short beak exceeding the obtuse rusty glume. Pale, delicate, 4—7', leaves long, bracts short. White Mts., N. H.

134 C. fléxilis Rudge. Spikes 3—5, a clavate, a oblong, on flexile nodding peduncles; bracts bristle- or scale-form; perigynia ovoid-lanceolate, 2-toothed, scarce longer than the obtusish rusty glumes. Soft-hairy. 1—1½f. Ct., N. Y.: rare.

135 C. levigata Sm. Like C. fléxilis, but with perigynia nervet, bicuspitate, the glumes awn-pointed, and the whole plant smooth. Near Boston. §

136 C. fulva Good. Culm 1½f, rough; spikes 3—4, all erect, a ovoid-obovoid; perig. ovoid, twice longer than the dark-brown acutish glumes. Near Boston. §

137 C. venusta Dew. Spikes 8 or 4, a linear, 1½—1½', rusty, stalked; a loose, 6—16', brown-green; perigynia lance-oblong, 2½', conic-beaked, nervet, rough-hairy, twice longer than the glumes; leaves 1½f, culm 2—3½f. S. Car. to Fla.

138 C. tenax Chapm. Spikes 2—4, a slender, a oblong, i—1½', dense, sub sessile; bracts longer; perigynia oval, short-beaked, finely-veined, pubescent, twice longer than the ovate glumes; culm 1½f; leaves rolled. Ga., Fla.

139 C. dasycaarpa Muhl. Spikes 3—4, sub sessile, 6—10', a linear, a oblong, hoary, bracts exserted; perigynia oblong-ovate, tomentose, short-beaked, longer than the ovate-acuminate glumes. 1½f. Dry fields, South.

140 C. Térrreyi Tuckm. Spikes sub sessile, erect, the a oblong, the a ovoid, 2 or 3; perigynia obovoid, very obtuse, scarcely beaked, strongly nervet, longer than the ovate glumes; culm, leaves, and short bracts downy. Penn., and North. Rare.

141 C. Barrattii Schw. & Torr. Spikes cylindric, 6—12½', dark-purple, short pedunculate, the a 2 or 3; perigynium ovoid, little exceeding the ovate glume; culm 1—2½f, sharp-angled, leaves much shorter, bracts short. Marshes, N. J. to Car.

142 C. palléscens L. Spikes approximate, 3 or 4, short-stalked, pale, a oblong, 6½; a ovoid, 4—5½', bract a little exserted; perigynia ovoid, nerveless, scarce longer than the glumes. Plant pale, 6—15', leaves as long. Dry meadows.

β. undulata. Lower bracts wavy-rugous at base; leaves longer.

143 C. limösa L. Spikes pedunculate, with dark-purple glumes. a linear, erect; a 1—2, oblong, drooping; bracts shorter than the culm; perigynia ovate, scarce equaling the broad, muriatite glumes. Glaucescent, 8—16'. Marshes: common.

144 C. rariföra Sm. Like C. limösa, but smaller (4—10'), a spikes 1—2½, linear, loosely 5—10-fld.; perig. involuted in the glume. Mountains, N. II., Me., and N.

145 C. irrigua Sm. a Spk. 2—4, ovoid-oblong; bract exceeding the culm; perig. oval, much shorter than the long-pointed dark-purple glume, 8—20'. Leaves linear, flat. Spikes drooping as in C. limösa. Bogs, Pa. to Wls., and N.

146 C. millæcea Muhl. Spikes cylindric, slender, 1½—2', a erect, a nodding, loose below; perig. ovoid-triquetrous, short-beaked, as long as the white-edged awned glume. Culm 1—2½f, leaves rather broad. Wet meadows: common.

147 C. scabrata Schw. Spikes 3—6, cylindric, 1½—2½', sub erect, dense, the lower on long peduncles; bracts long; perig. ovoid-triquetrous, rough, the slender beak equaling the acuminate glume. Culm 1—2½f, leaves broad. Swamps, Can. to Car.

148 C. histricina Wild. a Spk. linear, stalked, 1½', a 3, oblong-cylindric, dense, 12—18½', near, nodding; perig. ovoid, inflated, nervet, diverging, the long slender beak bifid, longer than the awned glume. 1—2½f, very leafy. Swamps: common.

β. Cooleyti. Slender; a spikes ovoid, the lowest long pedunculate.
149 C. pseudo-cypérus L. 2 Spk. linear, 141, 2 3-5, cylindrical, thick, 1-2', pedunculate, recurved; perig. horizontal or deflexed, lanceolate, with 2 suberect teeth, equaling the lance-astigate glume. Ponds and ditches. Can. to Pa.

150 C. comòsa Boott. 2 Spike lin.-cylindric, 2-3'; 2 3, long (2-3'), cylindrical, thick, dense-curved, on recurved ped.; perig. lance-linear, deflexed, the slender beak with 2 long spreading cneups. Stont, 2-3f. Wet.

151 C. trichocárpa Muhl. Spikes erect, 2 about 3, clustered, 2 3, oblong-cylindric, thick but rather loose, 14-2'; perig. conic-ovoid, 4', ascending, veined, the beak slender, forked, exceeding the hyaline gl. Puberulent, 15-30'. Marshes: common. β. turbináta. Spk. 2 ovoid-oblong, dense; perig. more diverging.

152 C. verrúcósa Ell. 2 Spk. 2, often 1, erect, 2 3-7, remote, all cylindric, dense, heavy, 2-3', bracts long, on long sheaths; perig. ovate-triquetrous, shorter than the awn of the oblong glume. Culm and leaves 2-3f. Wet grounds, S. β. glaucéscens. 2 Single, 2 sterile at apex; perig. broader or obovoid. South.

153 C. lanuginósa Mx. 2 Spk. 1-3, linear, 1-2', the upper stalked, 2 mostly 2, nearly sessile, oblong-cylindric, 9-15'; leaves and bracts flat; perig. ovoid, with 2 sharp teeth, equaling the lanceolate awned glume. 1-2f. Wet places; common.

154 C. filífórns L. Much like the last, but the leaves and bracts are convolute and rush-like, and the 2 glumes ovate, acute. Pale. Marshes: common.

155 C. striáta Mx. 2 Spk. 1-4, erect, the lower sessile; 2 1-2, remote, cylindric, erect, dense; perigynia ovoid, acuminate, 2-toothed, twice longer than the ovate acute glumes. Stiffly erect, 1-1½f, leaves and bracts rolled at the ends. Pa., and S.

156 C. Houghtónil Torr. 2 Spikes 1-3, 2 2-3, cylindrical, thick (12-15' x 4'), near, sub sessile, erect; perigynia ovoid-inflated, bifurcate, much longer than the ovate cuspidate glume. Stout, 2-3f, leaves and bracts flat. Me. to Wis.

157 C. polymórpha Muhl. Spikes oblong, erect; glume obtuse; 2 1-2, 1', the lower remote, exsert-pedunculate; bracts and leaves short; perigynia oval-ovate, beak short, purple, exceeding the ovate purplish gl. Erect, 5-30'. Sands, Pa., and N.


159 C. ripária Curtis. Spikes erect, cylindric, 2-3', 2 2-5, 2 2-3, nearly sessile; bracts and leaves long; perigynia conic-lanceolate, with 2 slender teeth, some longer than the narrow-awned glumes. Stout, 2-1½f. Shores. (C. lacustris.)

160 C. Cherokeénísis Schw. 2 Spikes lance-linear, 6-12', 2 cylindric, 1-1½', 2-7, the lower nodding, on exserted peduncles; perigynia lance-ovate, much longer than the ovate glume. Slender, 2½, light green. Ga., Fla., and West.

161 C. ampuliacea Good. 2 Spikes often bracted, linear; 2 3-4, cylindric, thick, 2-3' by ½', very dense, near, suberect; perigynia ovoid, more or less abruptly beaked, bifurcate, larger than the pointed glumes. Stout, 2-3½f, the flat leaves longer. Swamps, N. Eng. to Pa., and West. (C. utriculátà, Bt.)

162 C. moníle Tuckm. 2 Spikes slender, 2-4; 2 2, rarely 1 or 3, cly., 1-2', rather loose, suberect, short ped.; perig. ovoid, polished, 2-3', the short slender beak bifurcate, twice longer than the lance-oblung glume. Bright green, 2½. N. Eng. to Ill. (C. Vasey? Déw. is the same plant, as shown by specimens from Dr. S. H. Wright.)

163 C. Tuckermáni Boott. 2 Spikes very remote, short-stalked, cylindrical-oblong, thick, 6-15' by 6-10'; perigynia very large (5' by 4½'), globose-ovoid, shining; beak short, slender; glumes much shorter. 2½f. Wet: common.

164 C. Olneyi Boott. 2 Spikes 2-3, like those of C. bullátà; 2 spk. ofterer but 1, 1-1½' by 5½'; ped. short; perig. 50-80, 4½-3½' long, 10-veined, turbid-ovoid, the short beak and 2 cusps rough-serrulate; ach. like C. utriculátà. Culm 1-1½f; lvs. taller, 1½ wide. Wet grounds, R. I.

165 C. oligospérma Mx. 2 Spikes 1-2, slender; 2 1-2. Globular or oblong, sub sessile; perigynia 4-12, turbid-ovoid, 2½', beak short, 2 lobed, scarce exceeding the ovate glumes. Slender, 2½; leaves and bracts rolled. Pa., and North.
166 C. longirostris Torr. 2 spikes mostly 3; 4 mostly 3, cylindric, 1', loose, stalks filiform, recurved; perigynia roundish, the very slender beak 2'-toothed, longer than the scarious glumes. 2f. Rocky woods, North.

167 C. aristata R. Br. 2 spikes 2, very slender, remote; 4 2'-4, cylindric, 1'-2', erect; perigynia lanceolate, conspicuously nervèd, glabrous, 2-awned; glumes awned, much shorter. 2f. Shores, N. Y., West and North. Akin to No. 151.

168 C. Schwenzoffii Zoll. & Mor. 2 spikes 2-4, near, ascending, cylindric, 1'-2', more or less dense, straw-yellow; perigynia 50-150, ovold, the long beak 2-toothed, much exceeding the subulate glumes. Very leafy. 1f. N. J., N. Y., and N. Eng.

169 C. bullata Schkuhr. 2 spikes 1-3, linear, with lance-oblong, close glumes; 4 spikes 1-2, oblong, 1' by 8", short-stalked; perigynia turgid-ovoid, 5', beak 2-awned, thrice longer than the obtusish glumes. 1-2f. Swamps, N. E., and S.: com. 170 C. physesma Dew. 2. Resembles the last, but has very long leafy bracts, 4 spk. 3 with loose glumes, and the single large oblong 4 spike loose-flowered; perigynia radiating, brownish. A variety? Newark, N. Y. (Hankenson).

171 C. gigantea Rudge. 2 spikes 1-3, glumes pointed; 4 2'-4, 18-30', loose, pedunculate, suberect, brownish; perigynium ovoid-acuminate, many-(18)-nerved, the very long beak forked, two or three times longer than the lanceolate-awned glume. Stout, 2-3f; leaves 6' broad. Del. to Ky., and South. Allied to No. 103.

172 C. retrorsa Schw. 2 spikes 1-3, often partly fertile; 4 4-6, cylindric, thick, near, 1'-2' by 7", spreading; perigynium ovoid, inflated, few(10)-nerved, the long beak forked, deflexed, far exceeding the glume. Bright green, 2f. Pools: common.

β. Harts. 2 spikes loose, distant, the lower long-stalked. N. Y. (S. H. Wright).

γ. lupinus. 2 spikes 2; 4 very large, short-stalked, straw-yellow; perigynia horizontal, much inflated, 10-nerved; glumes pointed. A fine Carex; 2-3f; allied both to Nos. 103, 111, and 172. N. Y. (E. L. Hankenson, H. B. Lord).

ORDER CLV. GRAMINEÆ. THE GRASSES.

Herbs (the Canes and Bamboos are woody and tree-like) with culms mostly hollow and jointed. The leaves are alternate, 2-ranked, on tubular sheaths split down to the base, and bearing a membranous ligule (of the nature of stipules) where the sheath and blade meet. Flowers in little spikelets of 1 or several, with the glumes in 2 rows, collected into spikes, racemes, or panicles. Glumes (the lower pair of scales in the spikelet) alternate, enclosing the flowers. Pales (or pææ, the outer pair of scales of each particular flower) alternate and unequal. Perianth 0 or represented by 2 minute hypogynous scales. Stamens 1-6, commonly 3, anthers versatile, 2-celled, bifid at both ends. Ovary simple, 1-ovuled, 1-styled, with 2 feathery stigmas. Fruit a Caryopsis, with mealy albumen.

A vast and important Order, contributing largely to the sustenance of man and beast. Both herbage and seed are rich in sweet and nutritious matter. In temperate regions, the Grasses form a turf, soft, green, and compact, clothing the hills and plains, pastures and meadows. But in tropical regions this beautiful turf-carpet is unknown, the Grasses becoming larger, even trees (as the stately Bamboo), and stand more isolated, with broader leaves and larger panicles. To this Order belong the Cereal Grains, as the Indian-Corn, Wheat, Rye, Oats, Barley, Rice, &c., as well as the Hay-grasses—Timothy, Red top, Blue-grass, Spear-grass, &c. Also the Sugar-Cane, and various kinds of Sorghum.

§ Spikelet 1-flowered with no apparent rudiment of a second flower... (2)
§ Spikelet 2-flowered, one of the flowers sterile or rudimentary... (7)
§ Spikelet 3-flowered, the two lower (lateral) flowers sterile or rudimentary... (5)............ Tribe e
§ Spikelet 2. "0- flowered, two or more of the flowers perfect, or all imperfect (9)
3. Inflorescence paniculate...(3)
2. Inflorescence strictly spike, spikes equilateral...(5)
3. Inflorescence strictly spike, spikes unilateral...(6)

3. Glumes none (or minute and the stamens)....(6) Tribe 1
3. Glumes present, at least 1 conspicuous...(4)
  i. Pales of the flower thin and soft, often awned...(b) Tribe 2
  ii. Pales of the flower coriaceous, —* tipped with awns...(f) Tribe 4
  — awnless...(g) Tribe 5
3. Spikes cylindric, the spikelets condensed all around...(e) Tribe 3
3. Spikes prismatic, spikelets sessile in rows...(e) Tribe 9
3. Spikelets rounded on the back, appressed to the rachis...(g) Tribe 5
3. Spikelets acutely keeled on the back, imbricated on each other...(x) Tribe 10
7. Upper fls. of the spikelet abortive.—* Fls. in unilateral spikes...(c) Tribe 7
  —* Flowers paniculate...(b) Tribe 7

7. Lower flower of the spikelet abortive...(8)
8. Pales coriaceous, firmer in texture than the glumes. Paniculate...(g) Tribe 5
8. Pales membranous, thinner than the glumes. Spicate...(b) Tribe 11
9. Flowers in 2- or 4-rowed, —* equilateral spikes...(c) Tribe 9
  — unilateral spikes...(c) Tribe 10
9. Flowers in panicles more or less diffuse...(d) Tribe 8
10. Pales awned at the tip or awnless...(a) Tribe 7
10. Pales awned on the back or below the tip...(b) Tribe 7

1. ORYZEAE. (Spikelets 1-flowered, panicled. Glumes obsolete. Stamens 1-6.)
   a. Flowers perfect, flattened laterally, awnless.—Glumes 0. Stam. 2 or 3. Cut Grass...Eleusia. 1
      —Glumes minute. Stamens 6. Rice...Oryza. 2
   a. Flowers monocious, both kinds in the same panicle. Stamens 6. Indian Rice...Zizania. 3
   a. Flowers monocious, each kind in separate panicles. Stamens 5-12. S...Luziola. 4

2. AGROSTIDEAE. (Spikelets 1-flowered, panicled. Glumes and pales thin. Grain free.)
   b. Flowers surrounded at base with a tuft of long, silky hairs...Calamagrostis. 10
   b. Flowers naked or thinly bearded at base...(c)
      i. Glumes both long-awned and longer than the awned pales...Polygigon. 9
      ii. Glumes both awn-pointed (or minute and the pale awned)...Muhlenbergia. 8
      iii. Glumes awnless, conspicuous...(d)
         d. Pale stalked in the glumes, awned on the back, monandrous. Sweet Reed...Cinna. 7
         d. Pale sess. in the glumes, 3-androus, acute, awnless. Glumes shorter...Sporobolus. 6
            —obtuse, often awned on back. Bent G...Agrostis. 5

3. PHLEOIDEAE.—e. Glumes united at base, awnless. Pale 1, awned...Alopecurus. 11
   e. Glumes distinct, mucronate. Pales 2, awnless. Timothy...Phleum. 12
      e. Glumes distinct, pointless. Pales 2, awnless...Crypsis. 13

4. STIPACEAE.—f. Awn of the flower simple, straight, deciduous...Oryzopsis. 16
   f. Awn of the flower simple, twisted, very long...Stipa. 15
   f. Awn of the flower triple or 3-parted. Poverty Grass...Aristida. 14

5. PANICEAE. (Spikelets 2-flowered, lower flower abortive. Glumes very unequal. g. Pale coriaceous.)
   g. Spikelet apparently 1-flowered, the lower glume wanting and the single abortive pale
      supplying its place.—Flowers spikelet, unilateral...Paspalum. 17
      —Flowers diffusely paniculate, all alike. Millet Grass...Milius. 18
         —Flowers paniculate, 2 sorts, one under ground...Amphicarpum. 19
   g. Spikelet evidently 2-flowered, both glumes present, abortive flower neutral or g...(h)
      h. Flowers paniculate,—without awns or spines. Pale cartilaginous. Panic...Panicum. 20
         —without awns or spines. Pale herbaceous...Penicillaria. 21
         —with the glumes and pale coryne awned. Cock-spur...Opismenus. 22
      h. Flowers spike-panicled,—each with an invol. of awned pedicles. Fox-tail...Setaria. 23
         —each with a hardened, burr-like invol. Burr Grass...Cenchrus. 24
   g. PHALARIDEAE.—i. Sterile flowers 2 minute rudiments. Panicle spikeate...Phalaris. 25
      i. Sterile flowers 2 awned pales. Panicle spikeate...Antirrhinum. 26
      —i. Sterile flowers both 2-valved. ? Panicle open...Hierocheloa. 27

1. AVENAE. (Spikelets 2—co-flowered, panicled. Glumes large. Pale awned below the tip.)
   k. Spikelet with 1 perfect flower and 1 awned staminate flower—above. Soft Grass...Holcus. 28
      —below...§ Arrhenatherum. 31
   k. Spikelet with definitely 2 perfect flowers. Pale subentire, awn dorsal...Aira. 2
   k. Spikelet with 2 or more perfect flowers. Pale 2-toothed at apex...(m)
ORDER 155.—GRAMINEÆ.

m Awn between the two teeth, twisted; glumes very large ................................................................. DANthonia. 26
m Awn dorsal below the middle (except in the cultivated Oat). Oat ........................................... Avena. 31
m Awn dorsal above the middle. Flowers 2—5. Teeth cuspidate ......................................................... Trisetum. 32

—Flowers 5 — CO. Teeth acutish. Bromex ......................................................... Bromus. 33

8. FESTUCACEÆ. (Spikelets 2 — CO; flowered, panicled, awnless, or the lower pale tipped
with a straight blade or awn. Glumes.)

Glumes definitely 2, all the lower flowers of the spikelet perfect... (o)
Glumes several, indefinite, the lower flowers abortive and glumelike... (p)
Flowers fringed-bearded at the base. Pales 3-cuspidate or entire... (q)
Flowers beardless. Lower pale mucronate or awn-pointed (except in one Festuca)... (r)
Flowers beardless. Lower pale obtuse or acute, not at all awned... (s)
Lower pale 2 or 3-cuspidate and 1—2-awned. Upper pale entire ................................................................. Tricopsis. 34
Lower pale 2-cuspidate and 1-awned. Upper pale entire. 8—12f......................................................... Arundo. 35
Lower and upper pale both entire and pointless at apex. ................................................................. Cenchrus. 36
Spikelets 2—3-flowered, with some abortive terminal flowers. Pale papyry, not keeled... (t)
Upper glume broad-obovate, shorter than the flower ................. Etonia. 42
Upper glume oblong, 7—9-veined, longer than the flowers ........ Melle. ......................................................... Mellea. 43
Spikelets 2—5-flowered, all perfect. Pales usually thin... (u)
Lower pale keeled, 3-veined, membranous like the glumes .......... Eragrostis. 44
Lower pale keeled, 5-veined, usually cobwebbed at base. Spear Grass ......................................................... Poa. 45
Lower pale convex-keeled, obscurely 9-veined. Panicle spiked ......................................................... Brotzmannia. 46
Lower pale convex, 7—(—5)-veined, never webbed at base. Mannara ......................................................... Glyceria. 47
Lower pale convex-ventricous, coriaceous, obscurely veined. Quack .......................... Bizoia. 48
Herbaeous. —Flowers glabrous, awnless, falcate-pointed............ Uvilia. 49
—Flowers silky-villous at base. Tall, stout. Reed ......................................................... Phragmites. 50
* Woody, tall (the flowering branches low). Flowers short-awned ...... Arundinaria. 51

9. HORDEACEÆ. (Spikelets 1—10-flowered, sessile, alternate in an spike. Rachts joined.)

Spikelets several. Spikelet solitary at each joint, 1-flowered ................................................................. Lepidium. 52
Spikelet single. Spikelets 1-flowered, 3 at each joint. Barley ................................................................. Hordeum. 53
—Spikelets 2 — CO-flowered,—several at each joint. Hedgehog ......................................................... Elymus. 54
Glume 1, in front of the spikelet which is witchwise to the rachis. Darnel ......................................................... Lolium. 55
Glumes 2, opposite. Spikelet 3 — CO-flowered. Witch G. Wheat ......................................................... Triticum. 56
—Spikelet 2-flowered. Rye ......................................................... Secale. 57

10. CHLORIDEÆ. (Spikelets in 1-flowered joints, 1 — CO-flowered. Upper flower abortive.)

Spikelets very slender, many, in an equilateral raceme... (g)
Spikelets raceme-like. Spikelets with several perfect flowers ................................................................. Leptochloa. 58
Spikelets with sessile, 2-flowered spikelets, one flower a rudiment ................................................................. Gymnopogon. 59
Spikelets slender, several, digitately arranged above, or, in No. 60, axillary... (c)
Spikelets with 1 perfect flower,—awnless, globular, no rudiment. ................................................................. Manisurus. 60
—awnless, oblong, with a rudiment ......................................................... Cynodon. 61
—awned, glume 3-lobed ......................................................... Eustachys. 62
—awned, glume acute ......................................................... Chloris. 63
Spikelets with several perfect flowers. —Flowers awnless ......................................................... Eleusine. 64
—Flowers awned ......................................................... Dactyloctenium. 65
Spikelets thick and dense, 1 — CO. Spikelets with 1 perfect flower... (oa)
Spikelets several or many. Flower with no rudiment ......................................................... Spartina. 66
Spikelets 1, few, or many. Flower with a terminal rudiment ......................................................... Bouteloua. 67
Spike solitary, recurved. Awns terminal and dorsal ......................................................... Cyrtium. 68

11. BACCHARIDEÆ. (Spikelets in pairs or 3’s, 2-flowered. The lower flower abortive. Fertile pales
thinner than the glumes, except in No. 72.)

Flowers (the fertile) imbedded in the cavities of glabrous, jointed spikelets... (cc)
Spikelets monocious, 8 abortive, 9 below, both naked. Sesame ......................................................... Tripsacum. 69
Spikelets monocious 8 above panicled, 9 below enveloped in husks. Maize ......................................................... Zea. 70
Spikelets uniform,—terete. The pedunculate spikelet abortive ......................................................... Rottbella. 71
—compressed. Both spikelets fertile ......................................................... Stenotaphrum. 72

* Panicle compound, large, diffuse. Spikelets nearly 3" long. Nos. 1, 2
* Panicle simple or nearly so. Spikelets scarce more than 1" Nos. 3, 4

1 *L. oryzoides* Swtz. (a) Spikelets narrowly elliptic, spreading, white, close (b); stamens 3; culm 3-5f, retrorsely rough, lvs. broad. By streams. Aug.

2 *L. lenticularis* Mx. **Catch-fly Grass.** Skpl. round-oval (c) when closed, closely imbricated; stom. 2 (d); ovary ovate (e); plant smooth-leafed. Ponds and low grounds, Ill. to Va., and S.: rare. Fls. said to close on flies.

3 *L. Virginica* Willd. Skpl. small, closely appressed to the branchlet; stom. 2, pales white, with green veins, slightly ciliate. Wet shades. Aug.


*O. sativa.* Culm 2-4f, lvs. broadly linear, the ligule 1' long. A most important cereal, cultivated South in meadows and inundated grounds.

3. **ZIZÁNIA**, Gron. **INDIAN RICE.** Stout water-grasses, with large monoeious panicles. Glumes 0. Pales 2, thin, narrow, the lower one with a straight awn in the 2. Stam. 6 in the 2 (b).

1 *Z. aquática* L. Panicle ample, 1-2f, the lower branches spreading, sterile (a), upper fertile; awns (d) long (14); grain slender, 6-8', very caduceous, farinaceous. Marshes. Aug. Culm 5-8f. Lvs. broad.

2 *Z. miliácea* Mx. Sterile and fertile fls. intermixed in the ample panicle; pales with short (1-3") awns. Culm 6-10f. Leaves narrow. Ohio, and S.

4. **LUZIOLA,** Juss. Spikelets and fls. as in Zizânia, but the 2 and 2 in separate panicles on the same root. Sta. 5-11, auth. very long. Grain ovoid. 2f Aquatic, with long narrow leaves.

*L. Alabaméndis* Chapm. Culms 4-6', 1-vld., the leaf 1-2f long, its purple sheath enclosing the bract and peduncle; panicle few-flowered; spikelet lance-obvate, on erect jointed pedicels. Alabama: rare.
5. **AGRÓSTIS**, L. BENT GRASS. Spikelets 1-flwd. Glumes 2, subequal, awnless, usually longer than the flower. Pales 2, thin, pointless, naked, the lower 3–5-veined, sometimes awned on the back, the upper often minute or wanting. Grain free. Mostly 2f, cespitose, with slender culms and open panicles.

§ **Agróstis.** Upper pale conspicuous. Panicle rather dense .................. Nos. 1, 2

§ **Trichôdium.** Upper pale minute or wanting. Panicle thin, capillary...(*)

* Lower palea with a long exserted awn on the back ................... Nos. 3, 4
* Lower palea awnless, or bearing a very short awn ................... Nos. 5, 6

1 **A. vulgàris** With. Red-top (a). Culm erect, 1–2f; pan. purple, oblong, with short branches; ligules very short; lower pale (b) 3-veined, twice longer than the upper, nearly awnless. A valuable grass: common.

2 **A. alba** L. Florin G. Culm decumbent and rooting at the lower joints, then ascending 1–2f, stoloniferous; ligules long (3–4"); pan. greenish-white, or purplish, contracted; pale 5-veined, awned or not. Common.

3 **A. canina** L. Dog’s or Brown B. Decumbent and rooting at base, 1–2f; leaves setaceous-rolled; pan. brownish; lower pale and awn exserted. Wet meadows. E. §

4 **A. arachnoïdes** Ell. Erect, 5–8’, pan. 1/3 its length; lvs. linear-setaceous; lower pale, 1", its awn as fine as a gossamer, twisted, 3–4" long. S. C., Ga., and W. Apr.

5 **A. scâbra** Willd. Rough Hair G. Erect from a decumbent base, 1–2f, very slender, all scabrous-hispid; pan. large, capillary, epikl. purplish, (c) glumes, d, flower. The thin, airy panicles are at length driven before the wind. Fields and pastures, June–Aug.

β. **perennans.** Panicle pale-green, the branches shorter. In damp shades.


6 **A. clàta** Trin. Culms stoutish, simple, erect, 2–3f; lvs. broadly linear; pan. purple, with long suberect whorled branches dense-flowered half their length; gls. 14' long, lower pale 5-veined, 1'. Swamps, N. J. to Ky., and S. Sept., Oct.

6. **SPOROBÔLUS**, Br. DROP-SEED GRASS. Spikelets 1-flwd. Gls. 2, the lower smaller. Fls. sessile. Pales 2, awnless, usually longer than the glumes. Sta. 2 or 3. Grain deciduous, free. 2f Tough, wiry, with rolled rigid leaves and contracted panicles often half-enclosed in the sheath.

§ **Vilfa.** Grain (caryopsis) linear. Glumes and pales all sub-equal. Panicle contracted ................... Nos. 1–3

§ **Sporobôlus.** Grain oval or globous, its pericarp often loose on the seed ... (a)

a Glumes very unequal, one of them as long as the purplish pales .......... Nos. 4–6

a Glumes equal or unequal, both shorter than the pales. Sheaths beardless ...(b)

b Panicle contracted, spikeform, sheathed or exserted. Lvs. involute ... Nos. 7, 8

b Panicle capillary, open. Often a 2d flower or rudiment. Lvs. flat ... Nos. 9, 10

1 **S. vaginæfolius** Torr. (a.) Culms in tufts, simple, ascending, 6–12"; lvs 2–4’; panicles lateral and terminal, mostly concealed in the tumid sheaths; grain 1 shorter than the 2’ pales. (1) Dry gravel. More common W. and S.
2 **S. Virginicum** (L.) Like No. 1, but the root is 2", the culms branched, often decumbent, and the spikelets very small (1") and many. Coast, S. Sept., Oct.

3 **S. cuspidata** (Torr.) Glumes very acute, the lower pale cuspidate; pan. terminal, slender, few-flowered; spikelet nearly 2". 24 Maine, and Canada.

4 **S. cryptandrus** (Torr.) Culm 2–3f; sheaths strongly bearded at the throat; terminal panicle pyramidal, exerted, the lateral concealed; pales equaling the upper glume (1"), twice longer than the lower. 2 Sandy coasts and shores. Aug.

5 **S. juncensis** (Mx.) Glaucous, erect, 1–2f; leaves erect, 2–6" by 1/"; pan. open, stalked, narrow, loose; glumes ovate, obtuse, the upper 1½", lower 1/", anth. and stig. white. 2 Common in dry barrens, Penn., W., and S. No lateral pan. Aug.–Oct.

6 **S. heterolepis** (Gr.) Lowest lvs. as long as the culm, 1–2f; upper gl. 3", subulate, longer, lower cuspidate, shorter than the pales; panicle very thin, stalked, open; grain globular, 1". Dry places, Conn. to Wis. Aug.

7 **S. asper** Kunth. (c) Lowest lvs. very long (1–3f), involute-filiform; culms 1–2f; panicle contracted, partly or wholly enclosed; glumes unequal, white, much shorter than the oblong obtuse pales (3½'); grain oval. Sands. Sept.

8 **S. Indicus** Br. Erect, 2–3f; pan. long (1f), very narrow, its short branches appressed; glumes unequal; grain oval. Dry grounds, S.: common. May–Sept.

9 **S. compressus** Kunth. Culm erect, 1–2f, leafy, much compressed, branched at base; pan. thin, 6–10'; gl. acute, 1'/'; pales 1'/', obtuse. Sandy bogs, N. J. Sept.

10 **S. scótilus** (Torr.) Culm filiform, compressed, 10–18', few-lvd.; pan. capitillary, diffuse; glumes 1'/', ovate, obtuse; pales 1'/'. Wet sands, Maine to N. J. Sept.

7. **CINNA, L.** Sweet Reed-grass. Spkl. 1-flwd., flat. Gl. 2, subequal, awnless, the upper a little longer than the subequal pales, which are short-stipled. Lower pale with a short awn on the back. Sta. 1. Grain oblong, free. 2 Erect, tall and simple, with a large panicle, green or slightly purplish. July, Aug.

1 **C. péndula** Trin. (a) Culm 3–5f; lvs. broad-linear, with conspicuous ligules; pan. pale-green, 1f, nodding, with its drooping branches in whorls of 4's or 5's; awn exerted. A fine grass in damp woods, much sought by cattle.

2 **C. arundinácea** Willd. Bright green, 3–6f; pan. erect, green-purple, 10'; lower pale obtuse, its awn not exceeding its obtuse point. Handsomer than No. 1, its spikelets twice larger (1'/'). Shady woods.

3. **MUHLENBÉRGIA, Echr.** Drop-seed Grass. Spkl. 1-flwd. Glumes persistent, bristle-pointed or acute, rarely obtuse. Pales sessile, usually hairy at base, deciduous with the enclosed grain, green, the lower awned or mucronate at apex. Sta. 2–3. Culms often branched. July—Sept.

§ **Brathylítrum.** Glumes minute, the lower obsolete. Panicle narrow..............Nos. 1, 2

§ **Trichóchloa.** Glumes small. Lower pale 3-veined. Panicle capitillary........Nos. 3, 4

§ **Muhlenbér gia.** Gl. manifest. Pale 3-veined. Pan. terminal and axillary...(a)

a Glumes awned and twice longer than the awnless pale....................No. 5

a Glumes pointed, not longer than—the mucronate pale....................Nos. 6, 7

—the long-awned pale..............Nos. 8, 9

1 **M. aristáta** Pers. Erect, simple, 1–2f; lvs. broad-linear: pan. terminal, simple,
3–4'; spkl. large, few; lower pale 6' (12–18' with its awn), 5-veined; upper pale, with an abortive pedicel in the groove of its back; sta. 2. θ Rocky hills.

2 M. diffusa Schr. (a) Decumbent, diffuse, branching, 8–18, lvs. 2–3'; panicles very slender, terminal and lateral; spikelets 2' (4' with its awn), white with green spots; glumes (θ) extremely minute, white. Shady places: frequent.

3 M. capillaris Kunth. Hair G. Erect, very slender, 14–3f., simple; pan. purple, large, diffuse, branches 1–4', as fine as hairs; pales long-awned. Dry soils.

4 M. trichopodes (Ell.) Panicle erect, oblong, not diffuse, green; lower pale tipped with a short awn. Culms 3f., leaves flat. Fine harrenss, S. (Agrostis, Ell.)


6 M. Mexicana Trin. (a) Culms much branched, ascending 2–3–5f.; leaves lance-linear; pan. many, the lateral half-sheathed, dense, and narrow; glumes and pales subequal (1') or one glume longer. Damp shades: common.

β. purpurea. Culms wiry, branched only at base; panicle purple. Ill. J. Welf.

7 M. sobolifera (Muhl.) (b) Like the last, but the panicles are more slender, or filiform, and the glumes shorter than the pales. Hardly distinct. Woods.

8 M. sylvatica T. & G. (a) Culms ascending, branched, diffuse, 2–3f.; pan. slender, rather dense; glumes subequal, scarcely shorter than the lower pale (1'), whose awn is 2–4'. Rocky shades, N. England to N. J., and W. (Agrostis, Muhl.)

β. culpina. Very glaucescent; pan. very dense, raceme-like; glumes abruptly short-awned; pale about as long as its awn. N. Y. H. B. Lord.

9 M. Willdenovii Trin. (a) Culm and leaves as in the last; pan. very slender, loose-flowered; glume bristle-pointed, shorter than the pale, whose awn is 3–4 times as long as the spikelet. Rocky woods: com.


P. Monspellïensis Desf. (a) Culm simple, 1f or more; lvs. lance-linear, 2–5'; pan. spike-like, 2–3', pale; gl. (b) 1', their awns 2'. N. England, and S.

10. CALAMAGRÓSTIS, Adans. Spkl. 1-flwd. Glumes subequal, acute or pointed. Pales bearded at the base, lower one mucronate, mostly awned below the tip, upper often with an abortive rudiment of a second flower. θ Culms simple, tall, paniculate, from creeping rhizomes.

§ Calamagrostis. No rudiment. Panicle expanding, loose. Pales awnless. ... Nos. 1, 2

§ Detœxia. Rudiment a hairy pedicel. Lower pale awned. Spikelet 2–3''... (a)

§ Ammophila. Rudiment plumons. Panicle spike-form. Spikelet 6... ... Nos. 10

a Beard nearly equaling the pales. Panicle rather open ... Nos. 3, 4

a Beard nearly equaling the pales. Pan. contracted ... Nos. 5–7

a Beard much shorter than the pales. Awn from near the base ... Nos. 8, 9

I. C. brevìpills (Torr.) Slender, 3–4f.; leaves broad-linear, flat; pan. purple, with
capillary branches; gl. unequal, shorter than the pales; beard very short, not half the length of the pales. Sandy swamps, N. J.; rare. Sept.

2 C. longifolia Hook. Stout, 2-4f; lvs. rigid, involute, long-filiform-pointed; upper glume as long as the pales; hairs half as long. Shores of the great lakes. Aug.

3 C. Canadensis Beauv. (c) Blue-joint. Rigidly erect, 3-5f; leaves flat; panicle oblong, its branches in 4's and 5's; gl. longer (1½") than the pales, purplish; awn from the middle of the pale, as fine as the long beard. A good grass: common N. July.


5 C. confinis Nutt. (a) Lvs. flat, panicle narrow, dense, reddish; gl. ovate, 2½", equaling the flower (b); beard shorter than the pales; awn from below the middle, not exserted. Culm 2-5½. Penn. (Jackson), Penn Yan, N. Y. (Sartwell.) July.

6 C. stricta Trin. Differs from No. 5 only in its rigid leaves rolled at the point, its awn from below the middle, its beard as long as the pales. Lakes, N. Aug.

7 C. Nuttalliana Steud. Lvs. flat; pan. dense; glumes 3½", long-pointed, longer than the pales; awn from near the tip of the pale; beard some shorter than the pale. Swamps, Mass. to N. Car. (C. coarctata Torr.) Aug.

8 C. purpuraseens Br. Culm 1-1½f; pan. spike-like, 3-7½', purplish; gls. rather obtuse, less than 2½"; beard scanty, short as the rudiment, as long as the pales; awn short, straight. White Mountains, N. H., Mt. Marcy, N. Y. (Peck.)

9 C. Porteri Gr. Slender, 2-4½f; lvs. flat; pan. very narrow, 4-6'; glumes fully 2¼, exceeding the pales; hairs few, short, almost none at the base of the lower pale; awn contorted. Huntington Co., Penn. (Porter.) July.

10 C. arenaria Roth. Sand Reed. Rhizomes creeping extensively, culms stout, erect, 2-4f; lvs. rolled and rush-like; pan. spike-form, with erect appressed branches 6-10'; spk. very flat. Sandy beaches, northward. August.

11. ALOPECURUS, L. FOX-TAIL. G. Spikelets 1-flwd. Gl. flat-keeled, connate at base, subequal. Upper pale 0, lower flat-keeled, awned on the back below the middle. Sta. 3. Panicle contracted into a cylindric dense spike.

1 A. aristulatus Mx. Wild F. Ascending from a bent base, 1-2½f, glaucous; spike slender, 1-2' by 2½", grayish; glumes (a) and pale oblique, equal; awn (b) scarcely exserted (c. ovary and stigmas). In wet places. June-August.

2 A. geniculatus L. Bent F. Ascending from a bent base, 1-2½f; spike 2-4½'; upper leaf scarce longer than its sheath; glumes pubescent, obtuse; awn geniculate, far surpassing the culm. Wet meadows, East. §

3 A. pratense L. Meadow F. Erect, stout, 1½-2½f; spike about 2'; upper leaf shorter than its sheath; gl. ciliate; awn twisted, nearly thrice longer than its pale. Fields and pastures, Northern States. A good grass. §

12. PHLEUM, L. CAT-TAIL. G. Glumes equal, flat-keeled, mucronate or rostrate, longer than the truncate awnless pales. Compound spike cylindric and very dense. June, July.

1 P. pratense L. Timothy. Herd's G. (a) Erect, rigid, 2-4½f; lvs. broad-linear, flat; glumes alike cuspidate, in a long dense terete green spike. A grass of the highest value for hay in the North, but will not flourish South.

2 P. alpinum L. Erect, 1½f; lvs. shorter than the sheaths; spike oblong-ovoid, 4-5½' long; awns as long as their glumes. White Mountains, and Arctic Am.

13. CRÝPSIS, Ait. Compound spk. oblong, many-bracted and sheathed
at base. Glumes and pales awnless, subequal, of similar texture. Grain glabrous, free. Turfy grasses, none native.

**C. schenoides** Lam. Tufted, glaucous, 3—12'; lvs. 2—3', long-pnd.; spk. oblong. Waste ground, E. Penn., Del., etc. § Eur.

14. **ORYZOPSIS**, Mx. Mountain Rice. Spkl. 1-flw'd. in a slender spicate panicle. Gl. membranous at edge, subequal, about equaling the oblong, terete, short-stiped flower. Lower pale coriaceous, involute, enclosing the grain, and tipped with a simple, jointed awn. 2f

1. **O. melanocarpa** Muhl. Culm leafy to the top, 1—1½; leaves lance-linear; rachis flexuous; few-flw'd.; gl. 5—6''; awn thrice longer (1') than its blackish pale. Rocky woods and hills, Middle States, and northward. Aug.

2. **O. aspereròlla** Mx. (a) Culm 10—20', its sheaths leafless; lvs. 1 or 2, subradical, erect, rigid, pungent, 1'; the simple pan. 2—4' long; gl. (b) whitish, 3''; awn crooked, 6'' long, its pale and grain whitish. Woods, N. States and Canada. May.

3. **O. Canadënsis** (Poir.) Culm slender, 9—18', naked above; lower sheaths bearing rigid, involute-filiform leaves; pan. 1—2'; awn short or 0. Rocks, N. May.

15. **STIPA**, L. Feather G. The flower deciduous from the glumes with its sharp and bearded stipe. Pales coriaceous, short, the lower embracing the upper and the slender grain, and bearing a long twisted or bent awn. 2f Leaves narrow. Pan. loose. (See Addenda.)

1. **S. avenâca** L. Black Gat-G. (c) Culm naked above, 2—3½; lvs. mostly radical, setaceous; pan. 4—6' long, the capillary branches at length diffuse; gl. (a) equaling the blackish fruit; awn (b) 2—3' long, twisted below, bent: common. July.

2. **S. júnea** Pursh. Weather G. Culm 2—3½; leaves rolled-threadform, long; glume slender-pointed, twice longer than the fruit; awn contorted. bent, 4—6' long. The pungent stipe adheres like tick-seed. Prairies, Ill., Mo., and N. May—July.

3. **S. penniata**. Feather G. From Europe. Culm 2½; lvs. rolled threadform at apex; gl. awn-pointed, 1'; awn 8—16' long, twisted below, softly plumous above, and "worn (says Gerard) by sundry ladies instead of feathers." Cultivated.


§ Awns twisted and united below, jointed to the pale, very long .....................No. 1

§ Awns distinct to the base and not jointed to the pale... (a)

   a Awns very unequal, the 2 lateral 4 times shorter (2") and erect ..................Nos. 2, 3

   b Awns unequal, the 2 lateral twice shorter (6") and suberect..........................No. 4
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c. Awns about equal, spreading.—Lower gl. longer than the upper…….Nos. 5—7
—Glumes equal, or the lower shorter…….Nos. 8, 9

1 A. tuberculosa N. Culm rigid, 8—20', with tubercles in the axils of the numerous branches; pan. large and loose; glume linear, awned, 1'; triple awn (d) 2', united half-way up, thence involved and spreading. ① Mountains, N. J., and W.

2 A. dichotoma Mx. (a) Culm 8—12', dichotomously branched; gl. 3—4'; lateral awns erect, minute, the middle awn (b) as long as the pale (3'), twice bent to the form of a bayonet. ① Dry sandy fields: common.

3 A. ramosissima Engl. Culms diffusely branched; gl. 9—10', awn-pointed; lateral awns 2', middle awn 1', spreading. ① Sands, Ill., Ky.

4 A. gracilis E1. Very slender, 1—4f; pan. virgate, 4—8'; glume and flower equal, (24—3'); middle awn 9—10', horizontal, the lateral erect. ① Sandy places.

β. virgata. Taller (2—3f), pan. 1f; gl. and fl. shorter (2'). S. (Chapman).

5 A. lanata Poir. Culms 2—4f, stout, branched from base; lvs. flat, with woolly sheaths; pan. 1—2f, woolly in its axils; upper glume, lower (purplish) pale and lateral awns each 4—5', middle awn some longer. ② Sandy soils, S.

6 A. spiciflorus Ell. Culms 1—3f, rigid, simple; lvs. rolled, rigid, smooth; pan. spike-form, dense; flower 1' long, awns as long, gl. much shorter. ② Wet sands, S.

7 A. purpurascens Poir. (c) Culms slender, 2—3f; lvs. scarcely rolled; pan. 1f long, loosely spicate; glume and fl. 4—5', purplish; awns 1', spreading. ② Sandy.

8 A. stricta Mx. Culms 2—3f, strictly erect, with long rigid rolled lvs.; panu. loosely racemose, 1f; gl. 6—7', fl. 6'', lateral awns 7—9'', central 9—15''. ② Va., and S.

9 A. oligantha Mx. Culms 1—4f, in tufts; raceme few-flowered; glume and fl. 9'', very slender, awns capillary, divaricate, 18—30'' long. Prairies, W. and S.

17. Paspalum, L. Spikelets plano-convex, in one-sided spikes. Glumes (apparently) 2, membranous, equal, ovate or orbicular, closely applied to the fertile flower. Grain coated with the smooth coriaceous paleae. (But theoretically, the lower glume is obsolete, and its place supplied by the empty pale of an abortive flower. In Nos. 15—17 the lower glume appears, under a lens, as a mere rudiment.)—Spikelets linear, the flowers in 2—4 rows.

§ Paspalum. Spikelets round or round-oval, obtuse. Spikes alternate…(*)

§ Digitaria. Spikelets ovate to lanceolate, acute. Spikes often digitated…(**)

* Terminal spike mostly solitary, rarely 2, 1'' wide, long-stalked……………….No. 1
* Terminal spikes mostly 3 or 4, 2'' wide. Spikelets in 2 rows……………….Nos. 2, 3
* Terminal spikes mostly 4 or 5.—Spikelets close, in 3 or 4 rows………...Nos. 4—6
—Spikelets in remote pairs…………………...No. 7

** Rachis leaf-like, broader than the spikelets. Spikes alternate………...Nos. 8, 9

** Rachis narrower than the spikelets. Spikelets digitated…(a)

a Glns. (gl. and pale) about equal, as long as the flower…(b)

a Gls. (both conspicuous) one or both very short. Spks. 4—9…….Nos. 16, 17

b Spikelets spreading; always two in Nos. 10, 11; two—six in……...No. 12

b Spikelets erect.—Rachis flat, spikelets by 1's or 2's, close……...Nos. 13, 14

—Rachis filiform, spikelets by 3's, loose…………………...No. 15

1 P. setaceum Mx. Culm slender, ascending, 1—2f, naked above; lvs. linear, flat, 2—3'' wide, soft, hairy; spike very slender, 2—4', 1 or 2 on the long peduncle, often
a sheathed axillary one below; spikelets small, ½", in pairs, but seeming 2-rowed, very smooth. 2. Dry or wet. Mass. to Ill., and S. Aug.

2. P. laeve Mx. (p) Culm erect, 1½—3½; lvs. broad-linear, hairy at base or smooth; spikelets 3—5; spikelets (a, b) single, contiguous, in 2 rows on the narrow straightish rachis, round and smooth, 1½". 2. Grassly banks. Ct. to Ind., and S. Aug.

b. altissimum. Strict, tall; sheaths flattened close on the spikes.

3. P. angustiflóllum Le Cont. Culm. wiry, 2—3½; lvs. linear-filiform, compressed-carinate; spikelets 2 or 3, 1—2½; rachis narrow, flexuous; spikelets round-oval, brown, 1½", in 2 rows. Whole plant glabrous. 2. Wet places. Ga., Fla., La. [and S.]

β. tenue. Spikelets 4 or 5, very slender, 3-rowed; lvs. and sheaths ciliate. N. J.,

4. P. praecox Walt. Culm erect, 3—4½; lvs. long, narrow, smooth; sheaths purple, smooth or hairy; spikes 3—6, bearded at base, dense; rachis straight and flat; spkls. orbicular, in 3 rows, often brown. 2. Swamps. S. to May, Aug.

5. P. dasyphýllum Ell. Culm rigid, erect, 2—3½; lvs. linear, and with the sheaths hairy all over; spikes 2—5, large, 2—4½; spkls. orbicular-oval, near 2½", in 2 or 3 rows under the very flexuous rachis. 2. Dry fields. S. July—Oct.

β. Floriánum. Culms long and narrow; spikelets in 3 rows. Damp, S.

6. P. virgátum L. Culm 1½—3½; lvs. broad-linear, ciliate near the base; spikes 2—12, 3—4½; rachis broad, but narrower than the 3—4 rows of small (1½") roundish spikelets; glume 3-veined. (1) Moist soils. S. July—Oct.

γ. latifóllum. Upper glume (pale) undulate-rugose at edge.


8. P. fluitans K. Culms floating or ascending, 12—20; lvs. lance-linear, on open sheaths; spikes 20—30, 1½" wide, flat, pointed, out-running the minute white spikelets beneath them. (1) River swamps. Ill. to Va., and S. Oct.


10. P. Digitária Poir. Assurgent, 1—2½; lvs. broad-linear, flat, on long sheaths; spikes slender, 3—5½, a pair at top of the long ped. and some axillary sheathed below; spkls. lanceolate, rachis flattened vertically. 2. Woods, Va., and S. Jl.—Sept.

11. P. conjugátum Berg. Erect, 1—2½; lvs. short (2—4½); spikes a pair at top, (rarely axillary), very slender, 3½; spikelets minute, white, ovate. (1) N. Orl. §


3. P. distichum L. Culms assurgent, 12—18'; lvs. broad-linear; spikes 2 or 3, erect, near the top, 1½—2½'; rachis linear, narrower than the 2 or 3 rows of whitish ovate 1½" spikelets. 2. Wet grounds, S. States. Plant smoothish. July, Aug.

14. P. tristichum Le C. Culm ascending, 1—2½; peduncles from the upper joint, 1—3, filiform, each bearing 3 filiform suberect spikes; spkls. whitish, lance-ovate, minute; rachis flexuous. Wet places. 2. Ga., Fla., to La. Aug.

15. P. filiforme Swtz. Culm filiform, erect, 1—1½; lvs. short; spikes 2—6, filiform, erect; rachis filiform; spkls. oblong, ½", in 3's; lower glume obsolete, upper as long as the flower. Dry soils. (1) Ms. to Ky., and S.


17. P. sanguínale Lam. Crab or Finger G. (d) Erect, 1—2½; lvs. a dr sheaths often hairy; spikes 5—9, digitate, spreading, 4—6½; rachis flexuous; spkls. (c) oblong-lanceolate, 1½", upper gl. (c) as long as the flower, (c) lower one minute. (1) Waste grounds. Aug.—Oct. §
18. **MİLLİUM**, L. Millet G. Spikelets awnless, consisting of 2 coriaceous pales enclosed in apparently 2 glumes, which are longer. (But theoretically the glumes are as in Paspalum.) Sta. 3. Grain coated by the pales. Panicle open.

**M. effusum** L. (a) Culm erect, 3–8f; lvs. flat, smooth; pan. diffuse, 6–9’ long; spkl. oblong, (c) scattered, acute, 1”. Woods, Can. to Ill. and Pa. Summer.

19. **AMPHİCÁRPUM**, Kunth. Spikelets apparently 1-flwd., and perfect as in Millium, but of two kinds; the terminal deciduous and sterile, the radical under ground, and fertile. Gl. and pales sub-equal, lanceolate, acute. Panicle strict, erect. Radical fls. larger, solitary.

A. **Púrshii** K. (f) Culm 1f, erect; lvs. erect, hairy; sheaths hairy, the upper leafless; pan. on a long exerted ped.; spkle.ets 14” long, the radical, 24”, the grain terete, same length. Barrens, N. J., and S. Aug.

20. **PÁNİCUM**, L. Panic G. Glumes 2, unequal, awnless, the lower much smaller. Fls. 2, dissimilar, the lower of 1 or 2 pales, neutral or \( \varnothing \); the upper \( \varnothing \) of 2 equal cartilaginous polished, concave, awnless pales coating the grain. Sta. 3. Stig. 2, plumous, purple. Spikelets in simple or compound panicles.

§ Spikelets acute, or acuminate, very numerous, racem in large panicles...(*)

§ Spikelets obtuse, or barely acute, solitary, pedicillate, not numerous...(**)

* Abortive fl. neutral, consisting of one pale...(a)

* Abortive flower neutral, of 2 pales...(b)

* Abortive flower \( \varnothing \) of 2 pales. Culms erect, terete, with one panicle.........Nos. 10, 11

a Panicle ample, capillary, spikelets single on capillary pedicels.........Nos. 1, 2

b Lower glume as long as the upper, 2”; both 3-veined.................No. 4

b Lower gl. very short, the upper 3-5-veined, 1” or less.........Nos. 5, 6

b Lower gl. very short,—upper 7-9-veined, not tumid.........Nos. 7, 8

—upper 11-veined, tumid at base, 2”........No. 9

** Abortive flower neutral, consisting of a single pale.................Nos. 12, 13

** Abortive flower of 2 pales, the upper small and scarious...(c)

c Leaves narrow (1–5” wide), obscurely veined...(d)

c Leaves broad, 5–20” wide, conspicuously veined...(x)

d Spikelets silky-fringed. Lower glume obsolete. \( \varnothing \) Fl. colored.......No. 14

d Spikelets glabrous, or merely pubescent. Lower glume small...(e)

e Spikelets less than 1” long, round-oval. Glume 5-veined...Nos. 15, 16

e Spikelets 1–1½” long, oval. Glume 9-veined........... Nos. 17, 18
ORDER 155.—GRAMINEÆ.

x Abjective fl. usually stamineate. Spikelets obovate, 1", .......... Nos. 19, 20
x Abjective flower neutral, never with stamens... (y)
y Plant stout, soft-downy, except the smooth noder............ No. 21
y Plant smoothish, or rough-hairy, branched or simple........ Nos. 22, 24
Exotic, cultivated........ No. 24

1 P. capillare L. Culms thick at base, 1—2f; lvs. broad-linear, and with the sheaths bristy-hairy; panicle ample, pyramidal, capillary, loose; spkl. lance-ovate, acuminate, 1", purple. ① Fields and waysides. Aug.

2 P. autumnale Bosc. Culm slender, 10—20'; lvs. short, soon rolled, and with the long sheaths glabrous; pan. diffuse, bearded in the axils; ped. long (2—4'), capillary; spkl. lance-oblone; lower gl. minute. Ill. to Car.

3 P. proliferum Lam. Glabrous, 2—3f; lvs. broad-linear, cn tumid sheaths; pan. terminal and lateral, pyramidal, ped. sheathed; spkl. elliptic, 1"; lower gl. 1/4 or 1/3 as long as the upper; ⑦ fl. pointed. Rich shady soils. Aug., Sept.

β. geniculatum. Culm thin, geniculate below; pan. dense. Marshes.

4 P. gymnocarpum Ell. Culms 2—3f, stout, erect; lvs. lanceolate, 1' wide; pan. large, expanding; spkl. lanceolate, 2", in clusters of 3—5; glumes and neutral pales twice longer than the naked fertile fl. Banks, Ga., Fla., and W.

5 P. hiensis Ell. Slender, glabrous, decumbent at base, 2f; lvs. narrow; pan. of slender racemes; spkl. 1/2", lower gl. 1/4—1/2 as long as the upper; both fls. coriaceous, divergent or gaping at apex. Damp barrens, S. Aug.—Oct.

6 P. agrostoides Muhl. (a) Culm 1—3f, compressed; lvs. long, rough-edged; pan. term. and lateral, pyramidal, purplish, of dense racemes; spkl. (b) 1", lance ovate; upper gl. 3-veined, 1 longer than the lower; neutral pales sub-equal. Jl.

7 P. anceps Mx. Culm and lvs. as in No. 6. Pan. very large and open; spkl. 1", forked when ripe; upper gl. 5-veined. twice longer than the lower, shorter than the lower neutral pales, which is twice longer than the other pales. N. J., and S. Aug.+

8 P. vilifórmis Wood. Very glabrous; pan. at each joint, and term. of loose racemes; spkl. lance-ovate; up. gl. 9-veined, 1", lower neutral pale a little longer, the other 3 pales a little shorter, lower 1/2 as long. Meadows, E. Tenn. Aug.

9 P. gibbum Ell. Culm 2—3f, assurgent; lvs. broad-linear, glabrous; pan. 5—6', dense, spindle-form; spkl. tumid, near 2"; lower gl. very small, upper very large, 11-veined, gibbos at base; sterile fl. (q. Chapm.) neutral. Wet. S. Jl.—Sept.

10 P. amárum Ell. Culm terete, strict, 2—3f; lvs. rolled and rigid (bitter to taste), pan. 6—10', contracted, its smooth branches appressed-erect; spkl. lance-ovate; glumes pointed, the lower 1", upper nearly 2", sterile fl. 1", anth. orange. Sands.

11 P. virgatum L. Culm 3—5f, lvs. flat; pan. large, thin, at length diffuse, 10—30' long; spkl. scattered, ovate, pointed, purplish; upper gl. 2", sterile fl. 1", fertile fl. and lower gl. 1", all divergent when ripe; anth. purple. N. Y., S., and W. Aug.

β. obtusum. Panicle contracted; spikelets smaller, not pointed, obtusish. N. J.

12 P. verrucósum Muhl. Slender, weak, decumbent below, 10—20'; lvs. lance-linear, short; pan. few-flowered; spikelets obovate, bluish, 1", beset with fine warty (verrucous) points. ① Thickets and swamps, not rare. Aug.

13 P. villósum Ell. Villous with soft white hares throughout, 10—20'; lvs. flat, short; pan. small (2—3' long), oblong, loose; spkl. oval, 1", green; upper gl. and 2 fls. equal, lower glume 1/2 as long. Evergreen, dian. S. Apr., May.

14 P. eiliatifórme Wood. Fringed G. Erect, strict, 2—3f; lvs. narrow, rigid, flat, ciliate; pan. slender, strict, 3—4'; spkl. 1", oblong, silky-villous glume solitary, equaling the lower stamineate pale, 5-veined. Barrens, S. Sept.

β. rustum. Lvs. glabrous, erect; sterile fl. neutral, hairs purple.

15 P. dichétomum L. Culm at first simple with one panicle, soon branched, slender, 8—20'; lvs. lance-linear, short, 1—4' by 2—4'; terminal pan. oval, small (1—2'), stalked; spkl. few and small, 1", round-oval; lower gl. 1—4 as long as the upper. Common in fields. June—Sept.
16 **P. depauperatum** Muhl. Culm simple, strict, tufted, 6–12"; lvs. linear erect, the upper elongated; pan. simple, sessile or becoming long-stalked; spkl. oval, 1"; lower gl. as long as the upper 7-veined one. Hills and woods, common. June. Varies with lvs. hairy or smoothish, and

17 **P. pauciflorum** Ell. (c) Culm assurgent, 1–2 ft; lvs. lanceolate, 3–5' by 5–7' hirsute below as well as the sheaths, faintly 9-veined; pan. open; spkl. (d, e) few, large (1–1½"), oval; lower gl. as long as the upper. (x, neutral fl.) Damp shades.

18 **P. pubescens** Lam. Culm slender, branched, 2–3 ft; lvs. lance-linear, 3–6' by 3–5', 9-veined, retrorsely hirsute as well as the open sheaths; spkl. oval, 1½", pubescent, outer glume lanceolate, 1", inner 9-veined. Dry fields. June.

19 **P. latifolium** L. Erect, 1–2 ft; lvs. lanceolate, dilated and cordate-clasping at base, 3–5' by 1', smoothish, 11-13-veined; pan. exserted, 3' long; spkl. obovate, 1½'; lower gl. ovate, ½', upper gl. 9-veined; neutral pales sub-equal, usually with 3 stamens. In moist shady places; common. June, July.

20 **P. xanthophyllum** Gr. Culm simple or branched below, 9–15'; lvs. lanceolate, 3–6' by 5–7", not dilated at the clinate clasping base; pan. long-stalked, raceme-like; spkl. few, round-obovate, 1½'; lower gl. ovate, ½ as long as the upper 9-nerved one; sterile fl. often ½. Dry. N. Eng. to Wis. June.

21 **P. viscidum** Ell. Hoary with a dense viscid pubescence, 2–4 ft. stout; joints with a smooth brown ring; lvs. lance-linear, 3–6' by 6–16"; pan. 4–6', loose; spkl. pale, oval, 1½'; lower gl. and upper pale minute. Wet. N. J., and S. Aug.

22 **P. clandestinum** L. Culm rigid, leafy, 2–3 ft; lvs. 3–6' by 1', dilated and corneate at base; sheaths scabrous or rough-hairy, enclosing the lateral and often the terminal dense panicle; spkl. elliptical, 1½'. Moist woods. July, Aug.

23 **P. microcarpon** Muhl. Erect, simple, glabrous; lvs. lanceolate, broad and clasping at base, veiny, 6–10' wide; pan. long-stalked, diffuse; spkl. small (½), oval, numerous, purple; lower gl. minute. Pa., W., and S. July–Sept.

24 **P. milleceum** Mill. Lvs. lance-linear and sheaths hairy; pan. large, open, nodding; spkl. ovate, solitary; glumes pointed, sub-equal. Turkey.

21. **PENICILLÀRIA** spicàta. Erect, 4f, branching, with broad, flat leaves. Panicle cylindric-oblong, 1f in length, compact, consisting of innumerable simple branches, each with 2 or 1 spikelets at the end, and clothed with spreading hairs. Each spikelet bears at length a white ripened grain. (†) E. India.


10. **crus-galli** L. (a) Culm terete, 3–4 ft; lvs. lance-linear, rough-edged, ligule none; pan. with its spike-form branches alternate or in pairs; rachis rough-hairy; glumes bristly, scarcely awned; awn of the pale (b) 6–18' long, very rough. Sheaths generally smooth. Waste grounds; com. Aug., Sept. § [merely pointed.

β. muticus, (c) Awns very short, or the hispid pale

γ. hispidus. Sheaths very bristly; awns very long. A very coarse variety.
2. O. Walteri (Ell.). Culms slender, 2f.; lvs. narrow and sheaths glabrous; spikes one-sided, 4-1' long, alternate; glumes hispid, pointed; the fls. somewhat pointed, the sterile with 3 stamens. Low grounds, Car. to Fl., and La. July.


§ Bristles rough backward, in pairs, short.............No. 1
§ Bristles rough upward,.............(a)
   a 4-10 in each involucre. .............Nos. 2-4
   a 1-3 in each involucre.............Nos. 5-7

1 S. verticillata Beauv. Spikelet pan. 2-3', composed of short divided branchlets seeming in many verticils; bristles little longer than the spikelets; fruit-pales rough-punctate. Culm 2f. 1 N. Eng. to Car., and W. §

2 S. glauca Beauv. Bottle G. Spike cylindric, yellowish, 2-4', nearly simple; invol. of 6-10 bristles much longer than the spikelets; fruit rugous crosswise, somewhat trigonous, blackish. Culm 2-3f. 1 Fields, gardens; common. §

3 S. viridis Beauv. Wild Timothy. (a) Spike cylindric, 1-3', compound, green; invol. of 4-10 bristles much longer than the spikelets (b, c); fruit-pales striate lengthwise and dotted (under a lens). Culm 1-2f. 1 Cultivated grounds, N. §

4 S. Germánica Beauv. Millet. Bengal G. Spike flattened, oblong-cylindric, compound, 3-5' by 9'; rachis bristly; invol. of 4-8 bristles, little longer than the spikelets, yellowish; 6 pales dull-rugous. Culm 3-4f. 1 Fields. §

5 S. Itálica K. Spikelet pan. 6-18' long by 1-2' thick; invol. yellowish, of 2 or 3 bristles 8-10 times longer than the spikelets and half-concealing them; 6 pales smooth, polished, shining. Culm 4-6f. 1 Swamps, S.

6 S. corrugata Schul. Spikelet pan. 3-6', cylindric, dense above; bristles 1 to each spikelet and thrace as long; 6 pales strongly corrugated. Fl., Ga.

7 S. compésta K. Spikelet pan. loose, its lower clusters separated; bristles 1 or 2 under each spkl. and 5 times longer; 6 flower acute, smoothish. Fl.

24. CENCHRUS L. Burr G. Fls. racemed or spicate. Involute a burr (a) beset with spines, becoming hard and pungent in fruit, and enclosing several (1-3) spikelets (b). Glumes and flowers as in Panicum, the sterile flower 6. Culms branched. Aug.

C. tribuloides L. Culms 1-2f, tufted, decumbent, spreading; lvs. as short as their open compressed sheaths; spikes several, 1-2' long; burrs adhering by their rough spines to everything passing. Sandy shores, N. J. to I1., and N. (See Addenda)

25. PHÁLARIS, L. Canary G. Spikelets 1-(theoretically 3)-flowered. Gl. 2, subequal, carinate, longer than the two shining pales of the 6 fl., all awnless. Neutral rudiments at base of the 6 fl. merely 2 single pales or hairy pedicels (b, c). Grain coated. Handsome flat-leaved grasses.

1 P. arundinácea L. Ribbon G. A showy but not valuable grass, 2-5f; lvs. lance-linear; pan. contracted, dense, 3-6' long; glumes (a) 3', pointed; rudiments


2. *P. Canariensis*. L. Canary G. Bird-seed. Culm terete, erect; lvs. lance-linear; pan. spicate, ovoid, 1-2'; gl. winged on the keel (c); rudiments smooth. Introduced into fields and gardens from the Isle of Tynemouth.

26. *Anthoxanthum*, L. Sweet Vernal G. Spikelets (d) 3-flowered, the central fl. ♀, the two lateral neuter, each of 1 bearded pale. Gl. 2, unequal. Pales 2, short, awnless. Sta. 2.

A. *odoratum*. L. Slender, erect, 10-18'; lvs. short; panicle spicate, ovate; pan. open, few-flwd., 2-3'; skpl. (g) broad, subcordate, colored, awnless. Introduced in fields and gardens from the Isle of Tynemouth.


1. *H. borealis* R. & S. (f) Very smooth; simple, erect, 15-30'; root lvs. as long as the culm, caulin lvs. lanceolate, short; pan. open, few-flwd., 2-3'; skpl. (g) broad, subcordate, colored, awnless. Wet meadows, Va., and North. May.

2. *H. alpina* R. & S. Smooth; culm erect, 6-8', stout; lvs. lance-linear; pan. ovoid, 1-2'; skpl. purple, longer than their branches; lower fl. with an awn on the back as long as the pales. High Mts., N. Eng., N. Y. June.


H. *lanatus* L. (h) Hoary-pubescent, 11-2'; lvs. lance-linear; pan. oblong, dense, purplish-white; fls. (i) shorter than the glumes (k); awn of the sterile fl. curved, included. Wet meadows. A beautiful grass.

29. *Aira*, L. Spkl. 2-flwd. without abortive or sterile ones. Gl. 2, thin, shining, subequal. One of the fls. pedicellate. Pales subequal, hairy at base, the lower truncate at apex, and awned on the back. Fls. in an open pan, silvery-purplish.

§ Glumes longer than the fls. Pale entire. . . . . No. 1

§ Gl. about equaling the fls. Pale lacerated. Nos. 2 4
396 ORDER 155.—GRAMINEÆ.

1 A. atropurpurea Wahl. In tufts, 1f; very slender; lvs. flat; pan. thin; awn stout, twice as long as the pale. 
2 A. flexuosa L. (2) In large tufts, smooth, 1–2f; lvs. setaceous, mostly radical; pan. loose, with long flexuous spreading branches; awn geniculate, twice longer than the pale (m). 
3 A. caespitosa L. (n) Tufted, glabrous, 18–30; lvs. narrow-linear, flat; pan. oblong, finally diffuse; awn straight, as long as the pale, which is longer than the bluish glumes. (a, spikelet, p, fl.) 

30. DANTHONIA, DC. Spkl. 2–7-flwd. Gl. 2, subequal, cuspidate, longer than the whole spikelet of fls. Pales hairy at base, lower one bidentate and awned at apex, upper obtuse, entire. Awn flattened and twisted at base. Fls. racemose.

1 D. spicata R. & S. (a) Lvs. narrowly-linear, shorter than the internodes; culm 1–2f; slender; spkl. few (about 6); in a subsimple raceme; gl. 4–5'; fls. (b) about 7, pubescent. Lvs. mostly radical, in little tufts. Dry hills: com. June–Aug. 
2 D. sericea Nutt. Taller (2–2.5f); lvs. and sheaths silky-hirsute; spkl. 9–17, evidently paniculate; gl. 8–9'; fls. about 7, densely clothed with silvery-silky hairs; awns brown at base (as in No. 1), very long. Rare N., common S. June.

31. AVENA, L. OAT. OAT G. Spkl. 2–5-flwd. Gl. 2, loose, thin, awnless, large. Pales 2, becoming coriaceous, the lower bifid, bearing (mostly) a bent or twisted awn on the back; upper pale coating the oblong grain. Fls. paniculate.

§ ARRHENATHERUM. Glumes unequal, 2-flowered, with a rudiment of a third; lower flower staminate and awned. Tall. No. 1
§ ANIMOSIS. Gl. subequal, 2-flwd., both flowers 5', no rudiment. Dwarf. Nos. 2, 3
§ AVENA. Gl. equal, longer than the 2 perfect flowers, strongly striate. Nos. 4, 5

1 A. elatior L. (a, f) Culm erect, 2–4f; lvs. lance-linear; pan. narrow, 7–10', nodding; upper gl. (g) and pales 4', lower gl. 2'; awn bent, twice longer than the pale. A tall handsome grass. § Eur. (Arrhenatherum avenaceum Br.) May–July.
2 A. praecox Beauv. (d) Culms tufted, erect, 2–5'; lvs. setaceous; pan. dense, oblong, 1–1'; gl. (b) equaling the fls. (c); awns bent, twice longer. N. Y. to Va. Jn.
3 A. carophylla L. Culms 5–10'; lvs. very narrow; pan. loose, open; glumes silvery-purple, scarce 1', pales shorter, awns exerted. Dry fields, M. § Eur.
4 A. sativa. Common Oat. Culm terete, erect, 2–4f; lvs. lance-linear; pan. loose, pyramidal; spkl. large, pendulous; both fls. c, 7', the lower mostly awned; both pales coating the nutritious grain. Cultivated, common. June.

5 A. nigra. Black Oats. Pales dark brown, almost black, without awns.

γ. secunda. Horse-mane Oat. Panicle one-sided, nodding; awns short.

5 A. sterili. Animated O. Spkl. 5-flwd., 2 lower fls. each with hairy pales and a long bent awn which is so sensitive to moisture as to be kept in motion by the ordinary changes in the air. From Europe. Cult. as a curiosity. 4f. July, August.
32. TRISETUM, L. Spkl. 2-5-flwd. Glumes 2, shorter than the fls. Lower pale with two bristles at the apex and a soft flexuous awn from above the middle of the back. Grain coated, furrowed. 2 Fls. paniculate.

1 **T. purpurascens** Torr. Spkl. (p) about 4-flwd., 6–8″, few (6–9) in the very simple purple panicle; fls. (d) separate, bearded at base; gl. (g) unequal; lvs. narrow-linear; culm erect, 2–3″. Mountain bogs, N. June.

2 **T. palistre** (Mx.) Spkl. (a, b) 3-flwd. 2 1/2″, the upper fl. abortive; middle fl. with a bent awn its own length; pan. narrow, 4–6″; lvs. very short (2–3″); culm slender, 2f. Plant smooth. Wet meadows. May–July. (c, pale.)

3 **T. molle** (Mx.) Spikelets 2-flwd., 3″; upper fl. with a bent awn its own length; gl. lance-linear; panicle as in No. 2; lvs. broader and longer; plant 2f, minutely downy. Rocky hills, N. July.

33. BROMUS, L. BROME G. Spikelets 5–∞-flwd. Gl. unequally veined. Lower pale 5–9-veined, awned from below the mostly bifid tip. Upper pale ciliate on its 2 keels, adhering to the linear grain. Coarse grasses, with flat leaves, and large, nodding, panicled spikelets. June, July.

§ Glumes narrow, the lower 1-veined, upper 3-veined. Lower pale keeled... (b)

§ Glumes veiny, the lower 3–5, upper 5–7-veined. Lower pale convex... (a)

a Awn much shorter than its pale. Panicle spreading.................Nos. 1, 2

b Awn as long as its pale. Panicle erect, contracted in fruit........No. 4

b Lower pale compressed-carinate, awn very short..................No. 5

b Lower pale rounded on the back, the awn conspicuous............No. 6, 7

1 **B. Kâlmni Gr.** Wild Chess. More or less hairy, 1½–3½; spkl. drooping, closely 7–12-flwd., densely silky; lower pale much larger; pan. small. 2½ Dry.

2 **B. secalinus** L. Cheat or Chess. (c) Nearly glabrous, 2–4½; spkl. ovate, turgid, glabrous, 7–10-flwd., fls. (a) soon diverging, blunt, awned or not; panicle nearly simple. 4–8½ long, spikelets 8–10″ long, drooping. 1½ Fields. § Eur.

3 **B. racemösus** L. Erect Chess. Spkl. ovate-oblong, glabrous; closely 8–12-flwd., awns straight, 4″; pan. simple; plant slender, some hairy. 1½ Fields. § Eur.

4 **B. mollis** L. Downy Chess. Plant downy, with spreading hairs; spkl. ovate, about 6-flwd., fls. closely imbricated; awns straight, 3–4″. 1½ Fields. § Eur.

5 **B. unioloides** H. & K. Rescue G. Culm erect, 1½–3½, smoothish; pan. narrow, 6–10″, nodding; spkl. lance-oblong, compressed, 1½, 8–12-flwd. 1½ Cult. South.

6 **B. ciliátus** L. Pan. compound, 5–8½, soon nodding; spkl. at first lance-fusiform (b), 7½-11½-flwd., the fls. soon separating; pale (c) compressed-carinate above, silky-haired at edge, twice longer than its straight awn; culm 2–4½; lvs. some hairy. 2½ Shady banks: common. July, August.

**b. purgans**. Plant finely and closely pubescent all over.

7 **B. stérilis** L. Pan. compound, soon 1-sided and nodding; ped. capillary; spkl. linear-oblong, about 5-flwd., puberulent; fls. linear-subulate, scarcely as long as the awn. 1½ Banks, Pa., and N. Rare. §

8 **B. ariizoides**. Culm 1½ erect; lvs. narrow, conduplicate, rigid; pan. erect, with a few large, hanging, ovate, awned spikelets; pale dilated, ear-shaped above. Cult.
34. **TRICÚSPIS**, Beauv. Spkl. terete, or tumid, 3-9-flwd. Glumes unequal, awnless. Lower pale \((n, c)\) conspicuously fringe-bearded on the 3 strong veins, tipped with 2 or 3 teeth, and 1 or 3 short awns or cusps; upper pale much shorter, 2-toothed \((n)\). Fls. paniculate. Sheaths hairy at throat. Aug., Sept.

§ **WINDSÒRIA.** Culm erect, simple. Lower pale 3-cusped. Nos. 1, 2

§ **URÁLEPIS.** Culm spreading, branched. Lower pale 1-cusped. Nos. 3, 4

1 **T. seslerioides** (Mx). *False Red-top.* \((s, a, n, m)\) Culm 3-5\'; lvs. linear, involute when dry; pan. open, loose, 8-12\', the slender branches at length spreading; spkl. \((a)\) oblong, 3\', 5- or 6-flwd., purple, shining. \(\sharp\) Beautiful.

\(\beta. \textit{flexuosa}.\) Branches of the panicle flexuous; spkl. 3-5-flwd., 2\'. Pa.

2 **T. ambiguа** (Ell.) Culm 2-3\', wiry; lvs. narrow and rolled; pan. small (3-5'), few-flwd.; spkl. ovate, the 5-7 fls. divaricate. \(\sharp\) Pine-barrens, S.

3 **T. purpürea** (Walt.) \((b)\) Culm bearded at the nodes, 10-18\'; lvs. enulate, short; panicles more or less sheathed; spkl. \((b)\) 3-flwd., awn scarcely exceeding the eroded segments of its base. \(\checkmark\) Coast sands, Mass. to Fla. (c, lower pale.)

4 **T. cornuta** (Ell.) Culm 2\'; lvs. and sheaths hairy; awn of the lower pale plumons, much longer than the lateral teeth, recurved. Dry sands, S.

35. **ARÚNDO** DONAX. A gigantic ornamental grass from Italy; where it is cult. for vine-poles, fence-wood, fishing-rods, etc. Culm 10-15\' high; lvs. broad, flat, smooth, and shining; pan. diffusely branched; gl. as long as the 3 fls.; rachis beect with long hairs; lower pale with a short awn in the cleft at apex. \(\checkmark\)


**G. melicoides** Beauv. Culm slender, 1-2\', with 2 or 3 short erect linear lvs.; pan. loose, 3-4\' long; spkl. 2-3-flwd., 3-4\' long. Upper Mich. (C. E. and A. H. Smith).


37. **GYNÈRIUM** ARGÉNTEUM. Pampas Grass. A magnificent reed from S. Am., becoming common. \(\checkmark\) Leaves in a dense, radical cluster, recurved, narrow, channeled. Culms 10-18\', clustered, bearing dense, hairy panicles, which are 11-3\', silvery white, with innumerable flowers and their long, silky hairs. Some of the panicles are fruitful \((\checkmark)\), others barren \((\checkmark)\).


**D. glomerâtа** L. Culm 2-4\' high; lvs. broad, glancous; stipules lacerate; spkl. loose-flwd.; gl. very unequal. \(\checkmark\) Shady fields. A good grass for hay or pasture.

39. **KÈLÈRIA**, Pers. Spkl. 2-7-flwd., compressed; gl. subequal acute, scarcely shorter than the fls.; upper fl. pedicellate; lower pale
(and gl.) carinate, often bristle-pointed. 24 Culms tufted, erect, simple, with dense, narrow panicles.

K. cristàta Sm. Culm 20-30', leafy below; Ivs. flat, erect, pubescent, narrow, 2-3' by 1-2''; pan. spike-like, 3-5'; spkl. (a) 2'', silvery, about 2-flwd., with an abortive pedicel. (b, a flower.) Mid., W., and N.

β. gráellis. Slender and delicate, with a simple pan. (K. nitida, N.)

40. DIARRHÉNA, Raf. Panicle simple, racemous. Glumes 2, very unequal, rigid, acuminate-mucronate, 2-5-flwd. (d) Pales (e) cartilaginous, lower cuspidate, 3'', upper much smaller, emarginate. Grain large, lose in its pericarp. Stam. 2. 24 Culm rigidly erect, 15-20'. Lvs. mostly radical, broad-linear.

D. Americáñæa Beauv.—Woods and river-banks, O. to Ill. Aug. (Festuca, Mx.)

41. FESTÚCA, L. Fescue G. Spkl. 3-∞-flwd. Glumes unequal, mostly carinate. Pales firm, the lower rounded (not carinate) on the back, obscurely veined, awned from the tip, or awnless. Sta. 1-3. Grain mostly adhering to the upper palce. Spkl. panicled or racemed, the fls. remote, not webbed at base.

§ Flowers lanceolate to oblong, awnless. Culms tall, leaves flat. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . ..

1 F. Myârns L. Culm 5-12'; Ivs. subulate, 2-3'; glumes minute, equal, 4-6-flwd.; awn 6'', twice longer than the pale; pancele slender. M., S. §

2 F. tenélía Willd. Slender F. (a, b) Culm wiry-filiform, often in tufts, 6-12'; Ivs. linear-ciliate; pan. simple, narrow, 2-3'; spkl. 6-9-flwd., 4-6'' long; flowers puberulent, brown; awn about as long (2''). Sandy. June, July.

3 F. ovína. L. Sheep's F. Culm erect, 6-10'; Ivs. numerous below, very narrow, 2-4'; pan. simple, narrow, 2-4'; spkl. ovate, 3-5-flwd.; fls. lance-oblong, 1½'', the awn 1½ as long. 24 Pastures and fields. A valuable grass. June, Europe.

β. vivipara. Spikelets transformed to leafy tufts. Mountains, N.

4 F. duriláscula L. Hard F. Culm erect, 12-18'; Ivs. linear, flatish; pan. oblong, spreading, 3-5'; spkl. 5-8-flwd., teretish before flowering; fls. lance-subulate, 2½'', the awn 1½ or less; pales equal. 24 Valuable. Common. June, July.

β. rubra. Spikelets 7-9-flwd., fls. pubescent; the herbage reddish. N.

5 F. práténís L. Huds. Meadow F. Culm erect, 2-3f; Ivs. lance-linear; pan. 4-6'' long, narrow, with short branches; spkl. few (10-25) and large, teretish before flowering, 6-9'' long, 6-9-flwd.; pales 3'', barely pointed. 24 A fine grass. June.

6 F. elátior L. Culm 2-4f, erect; Ivs. lance-linear; pan. diffuse, nodding, compound, branches branched, and floriferous above, naked below; spkl. numerous, 3-5-flwd., 2-3'' long; fls. oblong, 1¼'', acute; lower gl. 3-veined. 24 Fields. §

7 F. nutâns Willd. Nodding F. (c, d) Culm slender, 2-4f, about 2-jointed; Ivs. linear; pan. very open, with few long drooping branches floriferous at the end; spkl. 3½'' lance-ovate (c) 4-6-flwd.; fls. (d) smooth, nearly veinless. 24 Rocks.

β. paéstris. Panicle less diffuse, spkl. 3-5-flwd. Between Nos. 6 and 7.
42. EATÒNIA, Raf. Spkl. mostly 2-flowered, numerous, panicked, silvery. Glumes unlike, the lower linear, 1-veined, the upper broadly obovate, rounded and 3-veined on the back. Pales obtuse, chartaceous, awnless. Grain oblong. 2+ Delicate grasses with simple culms.

1 E. obtusàta (Mx.) Panicle narrow, dense, 3–5' by 1–1'; branches short, appressed; spkl. (a, b) 14'' long, 2-flwdd., tumid; pales (c) scarious at tip, a little longer than the very obtuse upper glume. Dry. Penn. to Wis., and S. June, July. 2f.

2 E. Pennsylvànica (DC.) Panicle 5–10', slender, open and loose; spkl. 14''; upper gl. abruptly short-pointed, or obtuse; upper flower exserted half its length. Shady rocks and meadows. Elegant. Summer. 2f.

43. MÉLICA, L. MELIC G. Glumes unequal, obtuse, 2–5-flowered. Fls. exerted, the upper incomplete. Pales truncate, veiny as well as the glumes. Grain free. 2+ Lvs. flat; spkl. pedicellate, in a subsimple panicle.

M. mùtica Walt. Culm 3–4f; lvs. linear, flat; pan. few-flwdd., inclined to one side; spkl. (e) 4–6" long, with 2 fertile fls., and the third upper one contorted; pales (f) unequal, veinless. Penn. to Wis., and S.

44. ERAGRÓSTIS, Beav. Spkl. 2–∞-flwdd., membranous. Lower pale carinate, 3-veined, never webby at base, upper pale persistent on the flexuous rachis after the free grain and lower pale have fallen. Culm simple or branched. Leaves often rolled, bearded at the throat. Panicle with hairy axils.

§ Culms branched, prostrate; spikelets sub-sessile .... No. 1
§ Culms branched, ascending; panicles 1–5 ...... Nos. 2–7
§ Culms simple, erect, shorter than its loose pan... Nos. 8–11

1 E. reptans Nees. Culms creeping and rooting, 6–12'; lvs. subulate, 1–2'; panicles many, small, dense; spkl. lance-linear; fls. 10–30, very acute. 1 Banks. August.

2 E. powoides Beav. (a) Culms ascending, 1–2f; lvs. linear, flat; panicles oblong, dense, 2–6', compound; spkl. (b) ovate-oblong, 3–5', 8–50-flwdd., turning white; fls. (c) obtuse, 3-veined; (d, grain). 1 Handsome, but ill-scented. Fields. §

3 E. pilòsa L. Culms in tufts, ascending, 4–12'; lvs. linear, flat, tender; panicles oblong, loose; spkl. linear, binitish, about as long (2–4") as their pedicels; flowers 4–12, obtuse, with only the midvein apparent. 2 Dry, sandy places. July. §

4 E. Pàrshil Schr. Culms ascending, 6–12–20'; lvs. 1–3', very narrow; panicles long and loose; ped. capillary; spkl. linear-oblong, 2–4"; fls. 5–12, acute or acutish, 3-veined, purplish. 1 Dry fields, N. J., Penn., and S. Common. July, August. §

5 E. crythrágona Nees. (E. Frankii Meyer.) Culms in tufts, much branched, ascending, 6–18', johns red; pan. narrow, beardless, 2–4'; spkl. about 1", their ped. much longer; gls. and pales very acute, obscurely 3-veined. 1 Dry. Pa. to Ill., and S.

6 E. cilíaris (L.) Culms decumbent and ascending, 6–12'; pan. cylindrical, branches appressed. covered with the minute (4") ovate spikelets; fls. 5–7, mucronate, upper pale ciliat-fringed. 1 Waste grounds, South.

7 E. contérita Trin. Culm stout, erect, 2–3f; lvs. broad-linear; pan. long (5–12"), narrow. branches erect, covered with innumerable small (1–1½") spikelets; fls. 7–11, hyaline, obtuse, 3-veined, whitish. 1 River banks, S. Aug., Sept.
8. E. tenuis (Ell. Poa trichodes N.) Plant 1–3' high; pan. long (3–24'), loose, capillary, bearded in the lower axis; spikelets 3(2–6)-flw.d. (sometimes 7–9-flw.d. Gray); pales and glumes lanceolate, hyaline, 3-veined, 1'/ long. 2 Ill., and S.

9. E. capillaris (L.) Like E. tenuis, but the spikelets are minute (1–1½'), the fls. 2–4', acute, scabrous, with only the midvein apparent. 2 Sandy fields. Aug.

10. E. nitida (Ell.) Plant 2–4', glabrous and polished (except the bearded throat of the long, rolled lvs.); pan. 1½–3' long, narrow, branches some whorled; spkl. lance-linear, 3–4', 5–12-flw.d., on capillary divaricate pedicels; gl. and pales acute, 3-veined, often purplish, 1' long. 2 Marshes, Ill. (J. Wolt), and South.

11. E. pectinacea (Mx.) Gr. (E. hirsuta [Ell. etc.]). Culm 1–3', rigid; sheaths some hairy; pan. very large, branches rigid, the lower deflexed in fruit; spkl. (c, f) oblong, purple, 2–3' ; fls. 5–15, oval, acutish, strongly 3-veined. 2 Sandy fields. July, Aug. (Poa spectabilis Ph.) A showy grass, sport of the winds when dry.


§ Branches of the panicle in 2's, 3's, or often single. (*)
§ Branches of the panicle in about 5's, half-whorled . (**)
* Fls. not webbed, merely pubescent on the back . (a)
* Flowers webbed together at the base with gossamer-like wool . (f)

1 P. annua L. Low (3–8'), tender, spreading; culms flattened; lvs. 2–4' by 1–2'; pan. 2–3', dense; spikelets ovate-oblong, nearly sessile, loosely 5–7-flw.d., 2–2½'; fls. lanceolate, acutish. ①② Fields and lawns, forming a soft, dense turf. Com. Enr.

2 P. flexuosa Mühl. Culms erect, 12–20'; lvs. linear, 2–5'; pan. very thin and open; branches filiform, often flexuous, long (2–3'), bearing the spikelets near the end; fls. 3–6, lance-linear, 2½', 3-veined, remote. ① Woods, Va., Ky., and S.

3 P. hexantha Wood. Weakly erect, 1½–2', leafy to the top; branches of the thin panicle filiform, suberect, straight, 2–4'; spkl. few, terminal, oblong, 3–4'; fls. six (3–7), oblong, 1½', 5-veined, very obtuse. ② Meadows, Atlanta, Ga.

4 P. brevifolia Mühl. Culm compressed, 1–2', its lvs. generally short (4–2'), abruptly cuspidate, root lvs. long, pointed; pan. loose, branches filiform, spreading; spikelet ovate, purplish; fls. 3 or 4, 2½', lanceolate, 5-veined, webbed. ① Pa. to Ill.

5 P. débilis Torr. (d) Culms terete, weak, 1½–2'; pan. loose, some spreading, branches capillary, in 2's and 3's; spkl. (e) few, ovate; fls. (f) 3(2–4), broadly oblong, very obtuse, 1½', the glumes ovate, 1½'; ligule oblong, acute. ② Woods, R.I., and W.

6 P. dinantha Wood. (a) Culm compressed, very slender, 1½–2'; lvs. long, 1½' white; ligule short, truncate; pan. slender, branches in 1's and 2's, suberect; spkl. (b) ovate; fls. (c) 2(1–3), linear-oblong, acute, 1½'; gl. ① as long. ② Fields, Ala. May.

7 P. laxa Hœnke. Culms tufted, 6–8'; lvs. erect, 1–3', very narrow; pan. open, 1–2' long; spkl. few, 2½' long; glumes acuminate, as long as the (3) purplish fls. (1½'); lower pale villous on the keel. ② Mountains, N.
8 P. alpina L. Culms erect, 6–12”; lvs. broad-linear, 1–2’ by 2–3’; panicle equal, ovoid-oblong, loose, with rather large (3’) ovate spikelets; flowers about 5(4–9), ovate. 2i Isle Royal, L. Superior (Porter), C. W., and North.

9 P. compressa L. Blue G. Plant bluish green; culm compressed, decumbent at base, rigid, 12–18’; pan. contracted, 3’ by 1’, or less; spikelets glomerate, ovato oblong; fls. 3–7, 1’ long. 2i Pastures, etc.: common. May, June.

10 P. sylvéstris Gr. Culm compressed, erect, 1–2f; lvs. linear, soft; pan. oblong pyramidal, thin; branches flexuous, the middle longest; spkl. oval, 1 1/4’; fls. about 3, lance-oblong, 1’ obtuse. 2i Woods, meadows, N. Y. to Va., and W.

11 P. casia Sm. (P. memorialis Torr. P. alsodes Gr. P. Guadini K.) Culm compressed, 18–30’, sheathed to near the top; pan. large (6–12’ long), loose, roughish; spkl. lance-ovate, 2–2 1/2’; fls. 2 or 3, lance-linear, acute, as long as the very acute glumes (1–1 1/4’); pales obscenely veined. 2i Woods, N. H. to Penn., and Wis.

12 P. serétina Ehrh. Foul Meadow. False Red-top. Culms erect, weak, 2–3f; lvs. narrow, flat, long; ligules elongated, torn; pan. large, open, capillary; spkl. 2- or 3-flwd., 1 1/2” long, often tawny; gis. and fls. acute, narrow. 2i Wet, N. July.

13 P. trivális L. Rough Meadow G. Culms roughish backward, 20–30”; lvs. rough-edged, the lower elongated; ligules long, pointed; pan. dense, lance-shaped, 3–5’; spkl. subsessile, 2-3-flwd., fls. oblong, acute, strongly 5-veined. 2i N. Jn., Jl.

14 P. praténsis L. Spear G. June G. Smooth; culm 1–2f, terete; ligules short, truncate; pan. open, egg-shaped, 3–10”; spkl. ovate, subsessile, 2’, about 4-flowered; fls. acute, close. 2i Abundant and valuable. April, May.


B. spicátum Hook. (a) Culm rigid, erect, 10–20’, branched at base, beset with many bayonet-shaped lvs., 1–3’, the highest exceeding the short, spike-like panicle (a); spkl. (b, c) 7-9-flwd. (a, pistillate flower, e, a stamen.) Salt marshes, Conn. to Car. July.

47. GLYCÉRIA, Br. Manna G. Spikelets ∞-flwd., teretish or turgid, racish jointed. Glume subequal, pointless. Pales awnless, webbless, herbaceous, the lower mostly 7-veined, rounded on the back, not carinate. Grain free. 2i Smooth grasses in wet places, with creeping rhizomes and simple panicles. Sheaths mostly fistular (not split).

§ Salt marsh grasses. Lower pale 5-veined.
   Stigmas sessile, simply plumed ..........Nos. 1, 2

§ In fresh swamps, etc. Lower pale 7-veined.
   Stigmas doubly plumose ..(a)
   a Spikelets linear-lanceolate, in a very simple panicle .................Nos. 3, 4

   a Spikelets linear-oblong, in compound, spreading panicles .................Nos. 5, 6

   a Spikelets ovate, short, turgid ..(b)
   b In slender appressed panicles ..........Nos. 7, 8
   b In an open, recurved panicle ...........Nos. 9, 10
1 G. maritima Wahl. Culm 1–4"f, terete; lvs. rolled; pan. erect, dense, the branches in pairs; spkl. terete, about 5-flw.d., fls. obtuse. 2 Mass. June.

2 G. distans Wahl. Culm 1–2", terete, firm; lvs. flat; pan. spreading, the branches fascicled in 3's—5's; spkl. oblong, sessile, 3(3-6)-flowered. 2 N. Y.

3 G. fluitans (L.) Culm flattened, 3–5f; lvs. broad-linear; ligule very large; pan. second, virgate; spkl. linear, 8–10", obtuse. Wet. June.

4 G. acutiflora Torr. Culm flattened, 1–2f; lvs. narrow; pan. long, raceme-like; spkl. linear, 9–12", flat; fls. 4–6, distant, acute. 2 Wet places, Penn., and N. June.

5 G. aquatica (L.) (g) Stout, leafy, 3–5f; lvs. broad, soft; pan. diffuse, with spreading, flexuous branches in 3's—5's; spikelts (b) purple, 2–3", with 6–8 ovate, obtuse flowers (c). 2 Wet places, Pa., and N. A handsome grass.

6 G. pallida Trin. Weak, ascending, 1–2"f; lvs. flat, with long ligules; pan. capillaries, spreading; spkl. few, "f; fls. 5–9; lower pale 5-toothed at apex, upper 2-toothed; the veins conspicuous. 2 Wet, Penn., and N. June.

7 G. nervata Trin. Culm 3–4"f; lvs. broad-linear, ligules torn; pan. large, diffuse, branches in 2's and 3's, capillary, pendulous in fruit; fls. about 5, in the ovate-oblong spikelet, conspicuously veined. 2 Wet, N. June.

8 G. elongata Trin. Culm terete, erect, 3f; lvs. narrow, ligule very short; pan. raceme-like, nodding, 8–10'; branches solitary or in 2's, appressed; spkl. subterranean, of about 2 obtuse, 3-veined fls. Meadows, N., M., and W. July.

9 G. obtusa (Muhl.) Pan. dense, oblong, erect, 2–4'; spkl. ovate, acute, thick, of 5–7 ovate, obtuse fls.; lower pale obscurely 7-veined; culm 2–3f, lvs. often longer, dark green. 2 Swamps, Penn., and N. Aug., Sept.

10 G. Canadensis Trin. (m) Panicule large, 6–8' long, branches flexuous, in half-whorls, spreading or recurved; spkl. (n) broad-ovate, 6–8-flw.d.; upper pale (o) very obtuse, lower acute and longer. 2 3–4f. Shady, N. July.


1 B. media L. Pan. erect, spreading; spkl. soon cordate, of 5–9 flowers; gl. smaller than the greenish-purple veinless flowers. 2 Meadows, coastward, N. Eng. to Penn. May, (b, c)

2 B. maxima. Pan. nodding at top; spikelets oblong-cordate, of 13–17 flowers. 1 Gardens. Cultivated for the curious spikes, which are light-brown, hyaline, 1' in length. From Europe.

3 B. minor. Pan. erect, diffuse; spkl. triangular, 5–7-flw.d.; glumes larger than the flowers. 1 From Europe. Small and pretty.

49. UNIOLA, L. Union G. Spkl. compressed, and two-edged, 3–20-flw.d. Lower fl. or fls. neutral, of 1 pale, similar to the 2 carinate gls. Pales awnless, the lower wing-keeled, upper doubly so. Sta. 1 or 3. Grain free. 2 Smooth, erect, often branching.

§ Spikelets 6–16" long, in large open panicles, drooping. ........................................ Nos. 1, 2

§ Spikelets 2–6" long, subsessile, in slender, spikelike panicles ........................................ Nos. 3, 4

1 U. latifolia Mx. (a) Culm 2–4f; lvs. very broad, 1–1' wide; spikelets oblong-ovate, 9–12", flat, 9–13-flowered, drooping on slender pedicles; glumes (c) unequal, much smaller than the fls. (b) Sta. 1. 2 Dry woods, M., W. Elegant. August.


4. **U. gracilis** Mx. (d) Slender, 3–4 ft; lvs. broad-linear, flat; pan. long, simple, branches solitary, appressed; spkl. (e) 2", 3–4-flwd. Sea-coast, N. Y., and South.

50. **PHRÁGMITES**, Trin. *Reed*. Fls. 3–6, the lowest sterile and monandrous; rachis beset with long silky hairs. Gl. acute, keeled, very unequal. Lower pale subulate, silky villous at base. Sta. 3. Grain free. ± Tall; lvs. broad and flat; panicle diffuse.

**P. communis** Trin. Culm erect, 6–12 ft, near 1" thick; lvs. 1–2" broad; pan. effuse, spkl. (a) 4–5-flwd., erect; ffs. (b) colored, as long as the white hairs. Ponds. July.


**A. macrospérmá** Mx. (a) Culm woody, from strong running root-stocks, 10–25 ft high, with fascicled branches; lvs. lanceolate, 15 and less; spkl. 1–2' long, subes-sile on leafless axillary or radical branches (from the rhizome). Swamps, Va. to Ky., and S., forming the brakes.

**β. tecta.** Culm 2–10 ft; lvs. lance-linear; spikes mostly radical.

52. **LEPTÚRUS**, Br. Spikelet 1 on each joint of the filiform rachis impressed into a cavity, 1–or 2-flwd. Gl. coriaceous, acute, subulate. Pales acute, subequal. Stam. 3. Grain linear, free. 1 Culm branching, leaves very narrow. Spikes solitary or panicked.

**L. paniculátus** N. (c) Culm ascending, 10–18'; lvs. near the base, filiform-subulate, short; rachis ± of the culm, the slender spikes ±, alternate, remote; spkl. 2", gls. lateral, shorter than the pales. Illinois to Louisiana.

53. **HÓRDEUM**, L. *Barley*. Spkl. 3 at each joint of the rachis, 2-flowered, the lateral imperfect or abortive. Gl. 2, subulate, awned, collateral, all 6 in front of the cluster. Lower pale long-awned, both adhering to grain.

1. **H. jubátum** L. *Squirrel-tail* G. (a) Culm terete, 2 ft; lvs. broad-linear; spike 2–3' long; spkl. (b) with the lateral ffs. neuter, the 7 awns 6 times (c') as long as the flowers. 2 Marshes, N. Eng. to Mo., and N. June.
2 H. pusillum N. Culm ascending, 4-12; lateral fls. awnless; central fl. v, with 3 subequal awns (7'); spike linear, 1-2' long. ③ Ohio, and W. May.

3 H. vulgare. Four-rowed B. Culm 2-4f; lvs. broad, auricled at base; spike thick, 2-1'; fls. all fertile, fruit in 4 rows. ① Cultivated. May.


54. ÉLYMUS, L. LYME G. WILD RYE. Spikelets 2-4 at each joint of the rachis, 2-6-flw. Gl. 2, subulate, placed on the outer side of their spikelet, forming an involucre to the group, sometimes minute, or obsolete. Pales coriaceous, involving the grain, the lower acute or awned. (See Addenda.)

§ Élymus proper. Involucre present, consisting of the conspicuous glumes... (a)

§ Gymnostichum. Invol. glumes small or minute, or obsolete... No. 6

a Spikelets 5-8-flowered, soft-pubescent, without awns... No. 5

a Spikelets 1-5-flowered, hard, rough, with conspicuous awns... (b)
b Spikelets glabrous, merely rough, 2- or 5-flowered... Nos. 1, 2

b Spikelets hispid with hairs, 1-3- or 2-5-flowered... Nos. 3, 4

1 E. Virginicus L. Culm erect, 3-4f, smooth; lvs. broad, flat, scabrous; spike 3-5' long, thick, erect, often sheathed at base; gl. lance-linear, strongly veined, tipped (as well as the 2 or 3 fls.) with short (6-10') awns. ② Banks. August.

β. arenicola. (a) Glumes thickened and connate-aracute at the base. ① S.

2 E. Europaeus L. Culm erect, 3-5f; lvs. broad, flat, scabrous; spike suberect, 6-8', exerted; spk'l. in 3's, 2-flowered, scabrous, each with 4 long (1-2') straight awns; glumes linear, 5-veined. ② River banks, South.

3 E. Canadensis L. (b) Spikes 4-8' long, rather loose, nodding, hairy; spikelets in 2's and 3's, 3-4-flw'd.; awns of the flowers (c) usually curved, longer than (7-13') those of the lance-linear glumes; culm 3-5f. ② Banks. August.

4 E. striatus Wild. Spike 3-4' long, dense, suberect; spikelets in pairs, 1-3-flw'd., hispid-pubescent; awns subequal, 3 or 4 times longer than the flowers. ② Banks and rocky woods. Culm slender, 2-3f. August.

β. tiliaceus. Culm 3-4f, sheaths villous, and the glumes very hairy.

5 E. mollis Trin. Culm 2-4f, stout, soft-pubescent above, as well as the erect 5-8 spike; spikelets in pairs, about 7-flw'd.; leaves and sheaths smooth. Shores, N-W.

6 E. Histrix L. Hedgehog G. Glabrous, tall (3-4f); spike erect, 4-6'; spikelets remote on the flexuous rachis, widely divergent, 2- or 3-flw'd.; fls. subulate, 1/2' long, their awns straight, 1' or more; glumes commonly rudimentary. Mr. J. Wolf sends specimen from Illinois with awn-like glumes 4-8' long. ① Woods. July.

55. LÖLIUM, L. DARNEL G. Spkl. ① flw'd., sessile, remote, placed edgewise to the axis, the terminal one with 2 glumes, the lateral with but 1. Pales herbaceous, the lower awned or mucronate.

* L. perenne L. Ray Darnel. (a) Smooth, simple, 1-2f; spike 5-8'; spk'l. 15-20, oblong, 5-6', awwless, 1-13-flowered, flowers exceeding the glume. ② Fields. May, June. §
2 L. temulentum L. Poisonous D. Smooth, 2f; lvs. rough-edged; spkl.
5-7-flwd., remote on the scabrous rachis, shorter or not longer than their glume; fls.
twice shorter than their awn. ① Fields. Pa., and N. Grain poison. (b, c)

β. CANADIANE (Nx.) Fls. awnless! or some of them short-awned; glume 1'long,
much exceeding the flowers. Wayne Co., N. Y. E. L. Hankenson.

56. TRITICUM, L. Wheat. Spikelets sessile in 2 rows on the teeth of the rachis, and sideewise to it, its upper
fls. abortive. Gl. 2, equal, opposite, mucronate. Pales 2, the
lower awned or mucronate. Spike simple, rarely branched.

§ AGROTRITUM. Glumae lanceolate, acute or awn-pointed .Nos. 1, 2
§ TRITICUM. Glumae ovate-oval, obtuse or truncate………Nos. 3, 4

1 T. repens L. Couch G. Quick G. (a) Culms trailing at base,
then erect, 1—2f, from long creeping rhizomes (Fig. 257, p. 78);
spike (a) erect, 3—5'; spikelet remote, lance-oblong, 5-7-flowered;
awn short or 0. 2f A vile weed, in gardens, etc. June, July. (b, a flower.)

β. DASYPACHYUM. Glauces; spikelets hoary-pubescent. Lake shores. N-W.

2 T. violaceum Hornm. Erect, 2—3f; root fibrous; spike slender, dense, 2—4f;
spkl. closely imbricated, 3-5-flwd.; awns 1—3'' long, straight. Mts., Pa. (Porter), & N.

3 T. caninum L. Dog's Couch G. Ascending, 2—3f; rt. fibrous; sp. dense; spkl.
5-7-flwd.; awns (6') twice longer than the pale, some recurved. 2 Fields, Del. to Wis.

4 T. vulgare. Common Wheat. Culm firm, 3—5f; leaves broad-linear; spike some-
what 4-sided; spkl. crowded, broad, 4-flwd.; gl. blunt, round-convex; flowers often
awned; grain free. ① ③ Varies as Summer Wheat, with awns, and sown in spring;
and Winter Wheat, without awns, sown in autumn.

57. SECALÉ, L. Rye. Spikelets single on the teeth of the rachis
2—3-flwd., the 2 lower fls. fertile, sessile opposite, the upper one abortive.
Gl. 2, opposite, subulate. Pales 2, herbaceous, the lower awned.

S. CEREÁLE. Culm firm, 4—6f high; lvs. glauces; spike linear, flattened, 3—6', nod-
ding; lower pale and its long straight awn ciliate-scabrous. ① ② Said to be native
in the steppes of Caucasus. Cultivated from earliest times.

58. LEPTÓCHLÓA, Beauv. Spkl. 3—∞-flwd., subsessile, in one-
sided, slender spikes. Gl. 2, keeled, awnless. Pales membranous, awn-
less or awned, the lower keeled, 3-veined. Lvs. flat and soft. Pan.

§ Spikelets 2-4-flowered. Lower pale simply
acute…………………………………………………Nos. 1, 2
§ Spikelets 6-10-flowered. Lower pale mu-
cronate and notched…………………………Nos. 3, 4

1 L. mucronáta K. Culm ascending, 2—3f; leaves
broad-linear; pan. 1f or more; spikes filiform, 3—4',
floriferous from base; spikelet of fls. minute, shorter
than the mucronate glumes. ① Fields, Va. to Ill., & S.

2 L. filíformis R. & S. (b) Tall, stout; pan. 1—2f;
spikes filiform, straight, suberect, 5—8', very many;
•pk. of fls. (d) exceeding the acute glumes. ① ⑤ W.

3 L. fascíularis (Lam.) (d) Tall, stout; pan. ob-
long, dense, 9—15'; spikes 2—3'; spkl. (c) lance-oblong, 2—3", short pedicelled; lower
pale strongly 3-veined, the veins excurrent into 2 teeth and a cusp between.
Marshes, N. Y. S and W.
Order 155.—Gramineae.

4 L. Domingensis Link. Culms simple, slender; lvs. linear-filiform; spikes few (6–12), distant; spikellets nearly as in No. 3. S. Fla. (Chapman). Oct.


1 G. racemosum B. (a) Culm ascending, 14–24; lvs. lanceolate from a broad base, short; spikes erect but soon spreading, thread-form, 5–8', floriferous from base; gl. (b) pungent; fertile flower and abortive rudiment (c), both long-awned. Sands, N. J., and S.

2 G. brevifolium Trin. (d) Culm 8–16'; lvs. 1–2'; spikes bristle-form, 4–6', flower-bearing only above the middle; fertile fl. awned (e), rudiment not. Md., and S.

60. Manisurus, L. Lizard-tail G. Spikes terminal and lateral, their short stalks involved in sheaths. Spkl. in pairs, 1-flw., the lower 2, the upper neutral, consisting merely of 2 empty subequal glumes. 2 Glumes coriaceous, the lower rounded, concave. Pales hyaline, thin. 1

M. granulatus Swtz. Culm 2–3', branching; sheaths hairy; leaves flat; spikes 1–1', colored; spkl. minute, the perfect globular, its gl. tesselated. Waysides, S. §


C. dactylon Pers. (a) Diffusely creeping, sending up short branches; narrow lvs. and sheaths hairy; spikes (b) 4 or 5, 2–3' long, spreading. 2 Waste grounds. Evergreen. Pa., and S. §

62. Chloris, Swtz. (Eustachys, Desv.) Spikes digitate-fasciculate, rarely few. Spkl. sessile along one side of the rachis, 2–8-flw., the lower 1 or 2 fls. 2, the rest neutral or 2. Gl. 2, persistent, acute or short-awned. Lower pale keeled, mucronate or awned below the tip. Culms flattened, often branched. Leaves obtuse.

1 C. petraea (Thunb.) Culms 1–2'; lvs. linear, 2–1', flat, on carinate sheaths; spikes 3–6, straight, erect; spkl. 2-flw., brown, ciliate, bearded at base. 2 Brackish. S.

2 C. glauca (Chapm.) Glauccous, stout, 3–5'; leaves 18–24' by 2'; spikes about 20; spkl. roundish, upper flower obovate; pales brown. 2 Marshes, Fla. Ang. +

3 C. Floridana (Chapm.) Slender, 2'; lvs. glaucous, 2–4'; spikes 1 or 2; spkl. 3-flw., light brown, middle flower 2, upper neutral, both smooth. Barrens, Fla., J!. +

4 C. radiata. From E. Ind. Cultivated for ornament. Culms leafy at base, scapo-like, bearing at top numerous long, slender, radiating spikes; spikellets 2-flowered, with 2 long awns, the fertile flower bearded at base, the sterile club-shaped.

awnless, lower carinate, upper bicarinate. Grain ovate-triquetrous, free, loose in its pericarp. Lvs. flat.

**E. Índica** L. Culms clustered, ascending, 3—6—12'; leaves linear; spikes (a) 2—4, rarely 1, linear, straight, spreading, 2—4' by 2'; spkl. (b) closely imbricated on the under side of the rachis, smooth; fruit brown. (1) Waysides: common M., S-W. August.


**D. Egypticum** Willd. Culms creeping and ascending, 1—14'; lvs. ciliate at base; spikes commonly 4 (cruciate), pointed; spkl. 3-flwd. (1) Fields: com. Va. to Fla. §


* Upper glume decidedly awned. Lower pale rough-hispid on the keel No. 1
* Glumes merely pointed... (a)
  a Lower pale rough-hispid on the keel... Nos. 2, 3
  a Lower pale smooth. Spikes 1—12...Nos. 4, 5

1 **S. cynosuroides** Willd. Culm 2—4f, slender but firm; lvs. long, narrow, involute-filiform above; spikes 5—15, in a raceme-like panicle, each 2—4' long; upper glume with its awn 8—10', lower glume and subequal pales 4—5'. Brackish soils. August.

2 **S. polystàchia** Willl. Culm 4—8f, §—1' in diameter; leaves broadly linear, flat; spikes 20—50, in a dense panicle, and 3—4'; upper pointed gl. 6", lower gl. 2—3", half as long as the equal pales. Salt marshes, chiefly southward. Aug., + (a,b,c)

3 **S. gràcelis** Hook. Culm 1—2f; lvs. rolled, rigid, rush-like; spikes 15—30, very short (§'), closely imbricated into a spike-like panicle. Swamps, Fla. July, August.

4 **S. jùncea** Willd. Culm 1—2f, slender; leaves rolled and rush-like or setaceous; spikes 1—6, subsessile, 1—14' long; upper glume 4'', lower 14', pales 34''; whole plant glabrous except the rough-keeled upper glume. Marshes along the coast.

5 **S. alternìflòra** Lois. Soft Marsh G. Culm 3—5f, juicy; leaves channelled, long; spikes 3—12, sessile, appressed, their rachis produced and pointed; upper gl. lin., obtuse, smooth as well as the entire plant; lower § as long. Salt marshes. August.

66. **BOUTELOÚA**, Lagasca. **MUSKET G.** Spkl. sessile in two rows on one side of the rachis, forming dense spikes. Glumes keeled, the lower larger. Flowers several, the lowest §, the rest abortive. § Lower pale 3-toothed, upper 2-toothed. Abortive flowers awned.

§ **ATHIROPÒGON**. Spikes numerous and short, forming an erect, virgate, one-sided raceme; spkletes 4—8...No. 1
§ **CHONDROSIUM**. Spikes 1 or few, dense; spkl. ∞... Nos. 2, 3
1 **B. curtipédula** (Mx.) (c) Culm ascending, 1—2f; leaves lance-linear; spikes 20—40, near 1 long, deflexed; spkl. (a) 2-flwd., abortive fl. 1-awned. 2 M., W. Jl.

2 **B. hirsuta** Lag. Culms tufted, 1f; leaves at base lance-linear, flat; spikes 1—3; glumes (b) glandular-hispid, shorter than the 3 awns of the smooth (d) sterile flower. 1 Sandy soils, Wis., and S.

3 **B. ollgostáchya** (N.) Culm filiform, 6—12'; lvs. at base subulate-setaceous; gl. and lower pale downy, equaling the 3 awns of the villous ster. fl. 2 Wis., and W.

67. **CTÉNIUM**, Panner. **TOOTH-ACNE** G. Spkl. (b) 4—5-flwd., closely imbricated on one side of a flat rachis, middle fl. 3, the upper and lower sterile. Upper gl. exterior, with an awned tubercle on the back. Lower 2 pale awned near the apex, silky-fringed below. Spike solitary, recurved.

C. **aromátícum** (Ell.) Culm rigidly erect, 3—5f; leaves involute-setaceous above; scorpoid spike (a) 4—6', very dense. the short, stout, dil-var. awns arranged in 3 rows. 2 Sandy swamps, Va., and S. Curious. Herb. pung.

68. **TRIPSACUM**, L. **SESAME** G. Spikes 3 above, 5 below. Gl. coriaceous. 3 Spkl. 2-flwd., inner fl. neuter. 2 Spkl. 2-flwd., the lower abortive. Outer gl. covering the fls. in a cavity of the thick-jointed rachis, with an aperture each side at base.

T. **dactyloídes** L. Culm solid with pith, 4—6f, stout; lvs. broad and flat; spikes (5—8') 2 or 3 together at top, and solitary in the sheaths, sometimes, in

β. **monostáchyon**, solitary at the top also. 2 Banks and shores, Penn. to Ill.

69. **ZEA**, L. **INDIAN CORN**. 2 Fls. awnless. 3 Fls. in a terminal panicle of racemes; spkl. (a) 2-flwd. 2 Fls. embedded in the thick axillary spadix (cob), which is enveloped in many bracts (husks); spikelets (b) 2-flowered, 1 fertile. Glumes roundish. Pistil thread-form (silk), very long, green. 1 Culm solid.

Z. **Mays** L. Culm stout, erect, 5—15f, smooth, with many ample lin.-lanceolate lvs. Native of S. Am. Cultivated in many varieties. Grain always in even 8—24 rows in the ear, golden yellow. varying to br.-purple or pearl-wh.

β. **JAPÓNICA**. Leaves variegated with stripes of white and green. Gardens.

70. **ROTTBÖLLIA**, Br. **RAT-TAIL** G. Spkl. in pairs at each joint of a terete spike, one sessile in a cavity of the rachis, 2 fl. the, other pedicelled, abortive. Lower fl. of the sessile spkl. abortive. Gl. 2, subequal, the outer concave, coriaceous. Pales hyaline. 2 Spikes pedunculate. Culm solid.

1 **B. cylíndrica** (Mx.) Pedicellate spkl. a minute rudiment; 3 glume ovate acute, obscurely impressed-dotted in lines; spikes cylíndric, slender, single:
culm terete, slender, 2–4f, with very narrow involute-setaceous leaves. Dry barrens, Fla. to La. July. + (R. campéstris N.)

2 R. rugósá (N.) Pedicellate spkls. neutral; v gl. lanceolate, transversely rugous; spikes 2–3′, terminal and axillary; culm compressed, 2–4f. Swamps, S. Sept. +

3 R. corrigátá Baldw. (a) Pedicellate spkls. (d) staminate; v gl. (c) ovate, deeply reticulately pitted; spikes 3–6′, colored; culm compressed, 2–4f. Low lands. S.

71. STENOTÁPHRUM, Trin. Spike flattened. Spkls. 2-flwd., in pairs at each joint, embedded, one pedicelled and sterile, the other sessile and constructed like Panicum (p. 391). 2f Culm branched.

S. dimidiátum (Thunb.) (a) Smooth, leafy, decumbent, 2–3f; leaves (b) lance-linear, flat; spikes single, lateral and terminal, 3′ by 3′, joints not separating. Low lands. S. June. +

72. ERIÁNTHUS, Rich. Plume G. Spkls. all fertile, 2-flwd., in pairs at each joint of the slender rachis, one sessile, the other pedicelled, both involucrate at base with a tuft of hairs. Gl. subequal, exceeding the fls. Lower fl. neutral, of 1 hyaline spike, upper of 2, 1-awned. 2f Stout, erect grasses, with flat leaves and tawny silky panicles.

§ Hairs of the invol. much longer than the spkls., Nos. 1, 2
§ Hairs of the involucre short or none ............. Nos. 3, 4

1 E. alopecúroides Ell. Culm (6–10f!) and broad lvs. silky-hirsute; panicle dense, oblong, 12–20′; hairs of the invol. twice longer than the (24′) spkls., thrice shorter than the straight awn which is terminal on its pale. Wet pine-barrens, N. J., W. and S. (a, b)

2 E. contórtus Ell. Culm (1–6f), and broad-linear leaves glabrous; panicle oblong, 6–10′; hairs of the invol. thrice longer than the (3′) spkls., twice shorter than the contorted awn issuing from the base of the 2-cleft pale. Wet grounds, S.

3 E. brevíbárabis Mx. Culm and leaves as in the last; panicle dense, 8–14′; hairs shorter than the (4′) spkls.; awn some twisted, 8–10′, pale bluf. Low grounds. S. (c)

4 E. strictus Bald. Culm (4–7f) and long, narrow (3–5′) leaves glabrous; panicle strict, spike-form, 10–20′, reddish brown; awn straight; invol. almost 0. Banks, S.

73. SACCHÁRUM, L. Sugar-cane. Spkls. all fertile, awnless, in pairs, one sessile, the other pedicellate, 2-flwd., lower fl. neuter, of a single pale, upper fl. of 2 pales. Gl. 2, subequal. Pales 2, hyaline. Sta. 1–3. 2f Gigantic tropical grasses with branching panicles. Spikelets cinctured at base with long silky hairs.

S. officínárum. Culm solid, short-jointed, erect, 8–20f; lvs. many, broad and flat; pan. 1–2f, of numerous racemes, richly clothed with the long, white, silky, involucreate hairs. Native of S. Asia. Cultivated far South.

74. ANDROPÓGON, L. Beard G. Spkls. in pairs at each joint of a slender rachis (a), one on a plumous-bearded pedicel (d) imperfect, the other (c) sessile, 2-flwd. Lower flower of 1 empty pale, upper flower of 2 hyaline pales, the lower tipped with an awn. Sta. 1–3. 2f Culms erect, branched, coarse. Flowers spiked.
1 A. macrocarus Mx. Culm erect, 2–3f, much branched; spkl. very delicate, in pairs, with a spathe, very many, forming a dense leafy, silky panicle; sterile spikelet only a pedicel; ə awn a straight bristle, 8", hairs 4'. Wet grounds, N. Y., and S. Sept. +

2 A. Virginicus L. Culm triangular, tall (3–5f), the upper leaf loosely panicle and nodding; spikes (like No. 1, light and feathery, 1', two from each spathe) scattered; sterile spikelet a mere pedicel; awns 9'; spathe 2'. Dry soils. Sept., Oct.

3 A. argenteus Ell. Culm purplish, slender, 1–3f; branches 1 or 2 at each upper node, each with a pair of spikes 12–15" long at top; fls. concealed by the silvery-white hairs; awn 7–8". No spathe. Dry soils, Va., and S. Sept.; Oct.

4 A. tetraspathicus Ell. Culm erect, 2–3f; leaves and sheaths very hairy; branches 1 or 2 at each node, each with 4 (rarely 2) spikes at top; sterile spikelet an awnlike glume only; glume serratulate; awn 4 times its length. Low lands, S. Sept.

5 A. fuscatus Muhl. Forked spike. Culm erect, 4–7f; lvs. and sheaths glabrous; spikes purplish, digitate, in 2's–5's, 3–5' long; spkl. appressed, the stalked one ə; awn of the ə flower bent, 8–10' long. Meadows and prairies: common. August.

6 A. tener (Nees). Culms 2–3f, slender, rigid; leaves narrow, rigid; spikes erect, 2, slender; spkl. appressed; pedicellate fl. nenter; ə awn bent. 4–6'. Dry barrens.

7 A. eiliata (Nutt.) Culms 3–4f, with long linear lvs.; spikes 3–6', on long pedicels; hairs close-pressed, white; spkl. awnless, the stalked one ə. Damp, S.

8 A. scoparius Mx. Broom G. (a) Culm 3f, erect, with erect, often fascicled branches; lvs. more or less hairy; spikes single on the fliform pedicels, loose, 6–12-flowered, hairs spreading nearly as long as the fls.; ə awn 6" long, twisted; stalked flower (b) neuter, or (in B. Halei) (d) staminate. In dry fields, forming tufts.

9 A. melanocarpus (Muhl.) Culms 4–8f; lvs. glabrous; spikes-numerous, clustered; spkl. many, large, each from a subtune spathe, the 2 lower spathes longest, glume-like ə awn 3–4' long, twisted. Fields, Ga., Fl. Sept. +

75. SORGHUM, Pers. Broom Corn. Spkl. in 2's and 3's, panicled, the middle spkl. complete, 2-flwd., lower fl. abortive. Lateral or lower spkl. sterile. Glumes coriaceous, pales membranous. Sta. 3. Otherwise like Andropogon. Culms simple.

1 S. nutans (L.) Indian G. Wood G. Culm 2–4f; pan. elongated, 10–20', narrow, nodding; spkl. all tawny, the sterile reduced to mere pedicels in contact with the ə, all bristly ciliate; awn contorted, longer than the flower. ə Dry; common.

2 S. saccharatum. Broom Corn. Culm thick, solid, 6–10f; leaves broad, downy at base; panicle large, diffuse, with the slender branches whorled; ə glumes hairy, persistent. ə E. Indies.

3 S. vulgare. Indian Millet. Culm erect, 6–12f, round. solid; leaves broad, keeled pan. compact, erect, oval; glumes and pales caduceous, fruit naked. ə E. Ind.—The Sugar Sorghum is regarded as a variety of this species.

76. COIX LACRIMA. Job’s Tears. Culm 1–2f, solid, with erect, slender branches clustered in the upper sheaths; leaves lanceolate. Spikelets few in the short spikes, awnless, the lowest enclosed in an involucre which becomes ovoid, bony, polished, and bluish-white, likened to a falling tear. ə Gardens. From E. Indies.
ORDER 156.—MARSILEACEÆ.

SUBKINGDOM, CRYPTOGAMIA,

Or Flowerless Plants. Vegetables destitute of true stamens and pistils, gradually descending to a mere cellular structure, with reproductive organs of 1 or 2 kinds, producing, instead of seeds, minute, dust-like bodies (spores) having neither integuments nor embryo.

Province, Acrogens. Flowerless plants, having a regular stem or axis which grows by the extension of the apex only, without increasing in diameter, generally with leaves, and composed of cellular tissue and scalariform ducts. (Ferns, Mosses, Club-mosses, Horsetails, &c.)

ORDER CLVI. MARSILIACEÆ. Pepperworts.

Herbs creeping or floating, with the leaves petiolate or sessile, circinate in vernation. Fruit (sporocarps) situated at the base of the leaves or leafstalks, containing the capsular sporanges of one kind with 2 kinds of spores, or of 2 kinds with the different spores separated.

* Leaves compound, on slender petioles, with 4 leaflets. Stems creeping .......... Marsilia. 1
* Leaves simple, grass-like, radical. Stem a corn ............................................. Isoetes. 3
* Leaves minute, lobed, imbriicated. Stem filiform, floating free ...................... Azolla. 3

1. MARSILIA, L. Sporocarps at the base of the leaf-stalks, of one kind, 2-celled, cells transversely many-celled, separating into two lobes at maturity. Sporangia inserted on each horizontal partition, of 2 kinds, some 1-spored, others oc-spored. 2 Stems creeping and rooting. Leaves petiolate, apparently radical, of 4 whorled leaflets, resembling clover.

1 M. quadrifolia L. Lfs. round-cuneiform, as broad as long, glabrous; sporocarps oblong, smoothish, 1, 2, or 3 on each short peduncle, as large as a peppercorn. 2 Petioles 3–5' high. Margin of pond, Litchfield, Conn. (Prof. Eaton). Leaves floating.

2 M. vestita Hook & Grev. Lfs. cuneiform-ovate, longer than broad, glab.; sporocarps glob.-oval, 2', hisp., 1 only on each short (5') peduncle, 2-toothed on back. S-W.

3 M. uncinata Braun. Lfs. cuneiform-ovate, hispid, petioles 1–2' high; sporocarps 2", subsessile at the base of the petioles, clothed with rust-colored wool. Iowa.

2. ISOETES, L. Quillwort. Sporocarps oval, 1-celled, of 2 kinds, sessile in the axils of the radica, &c. and adhering to them. Spores in the outer sporangia larger, globular; in the inner minute, powdery. 2 Leaves linear, grass-like, clustered on the short corn.

* Species growing under water, generally wholly submersed, in ponds, &c. Nos. 1–3
* Species growing in shallow water, or in damp grounds, emersed .......... Nos. 4–7

1 I. lacustris L. Lvs. 2–6', subulate, rigid, erect-spread'g'g; sporocarps round-ovate, unspotted, the larger spores with crested ridges. Varies with the leaves acetacolosubulate and recurved, the sporocarps rarely a little spotted. N.
Order 157.—LYCOPODIACEÆ.

2 I. echinéspora Dur.  Lvs. subulate, 3—10’, red at base, 15—30 in number; sporocarps round-ovate, spotted, larger spores echinate with minute points.  N. J., Pa., & N.

3 I. flácçida Shutt.  Lvs. flaccid, 1—2’ long, almost filiform, yellowish green; sporocarps oblong-ovate; spores not netted, minutely roughened.  Ponds and lakes.  Fla.

4 I. ripária Eng.  Lvs. 10—30 in number, 4—8’, lin.; sporocarps oblong, spotted; spores with a band of crested ridges, ash-colored; leaves emersed.  Del. R. (Porter), and N.

5 I. saccharata Eng.  Leaves few (7—15), subulate-filiform, 2—3’, recurved; sporocarps ovate, spotless; spores minutely tubercled.  Wicomico R., Md. (Canby, Porter).

6 I. melanópoda J. Gay.  Leaves very slender, 8—10’, carinate on the back, brown at base; sporocarps brown; spores smooth, smaller than in No. 5.  Ill. (Prof. Porter).

7 I. Engelmánni Braun.  Leaves 25—100, 10—20’ long, filiform-linear, weak; sporocarps oblong, spotless; spores honeycombed all over.  Shallow waters, E. and W.

β. gracilis.  Leaves about 10, very flaccid, 1f.  N. E. to Ill. (J. Wolf).

γ. rálida.  Lvs. very numerous, 2f, from a stock 6”—1” thick.  Del. & Pa. (Porter).

3. AZOLLA, Lam.  Small floating plants, with filiform stems and minute imbricated leaves or fronds.  Sporocarps of 2 kinds, sessile on the under side of the branches, the smaller sterile, filled with antheridia, the larger fertile, thin, containing sporangia on stalks, each with several spores.

A. Caroliniana Willd.  Lvs. ovate-oblong, obtuse, fleshy, 1’, reddish beneath; sterile fruits 1 or 2 at the base of the fertile, and many times smaller.  Still waters, N. & W.

Order CLVII. LYCOPODIÀCEÆ.  Club Mosses.

These are interesting evergreen creepers or runners, rarely erect, branching, abounding in ducts, with the leaves small, numerous, crowded, entire, lanceolate or subulate, 1-nerved.  Fruits sessile, axillary or crowded into a spike, 2-valved, containing few rather large spores, or numerous minute ones appearing like powder.

551. Lycopodium dendroides.  552, A single spike.  553, A scale with its axillary sporangia bursting.  554, Spores.

1. LYCOPÓDIUM, L. Club Moss.  Spore-cases all of one kind, 1-celled, reniform, opening transversely, 2-valved; spores numerous, minute, sulphur-yellow.—Leaves in 4, 8, or 16 ranks.

§ Fruit in pedunculated spikes (the fertile branches nearly leafless)…(c)
§ Fruit in sessile spikes (the branches leafy throughout)…(b)
§ Fruit scattered, axillary, forming no distinct spike……………………………………NOS. 1, 2
  b Leaves of the spike bract-like, discolored………………………………………NOS. 3, 4
  b Leaves of the spikes and stems all alike………………………………………NOS. 5, 6
  c Spikes several (2—6) on each peduncle………………………………………NOS. 7, 8
  c Spike solitary on each peduncle…………………………………………………NOS. 9, 10

1 L. Selágo L.  For Club Moss.  Erect, 2—6’, fastigially branched; lvs. covering the branches, all alike, entire, acute and pungent, awnless.  Tops of high mountains, N.
2 L. lucidulum Mx. Shining C. Ascending, forking, 8-16'; lvs. 1.8 rows, linear-lanceolate, denticulate, shining, spreading or reflexed, pointed, large for the genus (3-4'), the fruitful ones like the rest, as in No. 1. Damp woods.

3 L. inundatum L. Marsh C. Stem creeping, often submersed, the simple solitary ped. 1-3' (Conn., Mr. Bowles) or 4-7' (Mass., Dr. Ricard); leaves soft and fine, curving upward; spike solitary, 1-1½' long, leafy. Swamps, Can. to Car.

4 L. alopecuroides L. Sterile branches decumbent, shorter than the tall (7-20') erect fertile ones; leaves crowded, subulate, awned; spikes leafy, 2-3' long. Swamps in pine-barrens, N. J. to Fla. and La.

5 L. annotinum L. Creeping, branches twice forked, ascending 6-8'; leaves in 5 rows, lance-linear, spreading, denticulate; spikes solitary. Woods, N.

6 L. dendroides Mx. Tree C. Ground Pine. Erect, about 8', with its erect branches spirally arranged, forked and crowded; lvs. lance-linear, in 6 equal rows; spikes several but solitary, 1½', yellow-brown. Woods. Very elegant.

β. obscurum. Branches spreading; spikes 1 or 2, greenish brown.

7 L. Carollinianum L. Stem and branches creeping and rooting; lvs. appearing 2-ranked, the lateral spreading while the others are appressed, lanceolate; peduncles simple, 2-4', bearing each a single spike. Barrens, N. J., and S.

8 L. sabinæfolium Willd. Ground Fir. Long, creeping; branches erect, short, with fastigate branchlets; lvs. terete-subulate; ped. short. White Mts., and N.

9 L. complanatum L. Fesston Ground Pine. Long, trailing; branches repeatedly forking, fan-shaped, spreading; leaves 4-ranked, the marginal connate, diverging, the others distinct, appressed; peduncles long, with 4-6 spikes. Woods.

10 L. clavatum L. Common C. Extensively creeping, branches ascending; leaves scattered, incurved, bristly-acuminate; peduncles erect, remotely bracted, 3-5', bearing a pair of straight spikes 2' long. In shades: common.

2. SELAGINELLA, Spr. Dwarf Club Moss. Fruits of two kinds, viz., antheridia, which are 1-celled, opening at apex; and oöphoridia, larger, containing 1-4 (rarely 6) globous-angular grains.—A large genus. The species are cultivated in every greenhouse. Spikes quadrangular, bracts in 4 rows. (Lycopodium L.)

§ Leaves all alike and similarly imbricated all around. Native………………Nos. 1, 2

§ Leaves of 2 kinds, in 4 rows, those of the 2 lateral rows larger and spreading, of the 2 intermediate rows superficial, small, appressed (a)

a Slender rootlets produced along the stems.—x Leaves unequal-sided. Nos. 3-5

—x Leaves equal-sided. Nos. 6-8

No rootlets, &c.—y Stems erect, frond-like, simple, stalk-like below. Nos. 9-11

—y Stems diffuse, branched from the base.……………Nos. 12, 13

1 S. rupéstræ (L). Sts. ascending, 2-4', divided into numerous tufted, mossy branches; leaves crowded, fine, blue-green, ciliate; spike indistinct, 6½'. Rocks.

2 S. selaginoides (L). Stem filiform, creeping, branches suberect, 3-6', the fertile simple, 1-spiked; leaves lanceolate, yellow-green, ciliate. Woods, N.

3 S. apus Spr. Stem weak, loosely branched, with hair-like rootlets near the base; leaves ovate, slightly oblique, acutish, the smaller ones pointet. Damp. †

4 S. stolonífera. Sts. producing long threadform rootlets below, 3-4-pinnately branched; branchlets 2-4½' broad; lvs. imbricated, ovate, entire, obtuse, the smaller ones with a filiform straight point. The older stems become zigzag. 6½-10'. Com. (S. Mertensii.)

5 S. denticulàtæ (or Kraussliana). Prostrate, delicate, remotely and somewhat 3-pinnately branched; leaves 1½', oblong-ovate, minutely denticulate, acute, distant on the stem, crowded on the branchlets; smaller leaves with reflexed points. Very common.

β. variegátæ. Ends of the branchlets with their leaves white. Rootlets hair-like.

6 S. uncinátæ (or casia). Long creeping, with hair-like rootlets, 2-3-pinnately branched.
ORDER 158.—EQUISETACEÆ. 415

branchlets crowded, short, 2” wide; leaves crowded, oblong, entire, obtuse, the smaller ones with an uncinate (reflexed) slender point.

7 S. SERPENS. Stems prostrate, with hair-like rootlets, 2-3-pinnate; branchlets short and crowded, 1” wide; Ivs. crowded, round-ovate, cordate, obtuse, entire, the smaller acute.

8 S. DELICATISSIMA. Sts. creeping, 5-8’, rooting, filiform, loosely 2-3-pinnate, 1” wide; leaves ovate, obtuse, ciliate, not crowded, the middle ones scarcely smaller, acute.

9 S. CAULESCENS. Glabrous, suberect, 12-18’, 3-4-pinnately branched, fern-like, and lanceolate in outline; branchlets close, 1½” wide; leaves close, ovate, entire, very acute, the points turned upward; smaller leaves mucronate; stem straw-colored.

10 S. WILLENÖVII. Like the last as to stems and branches, but they are finely pubescent, and the leaves are less crowded, ovate, and obtuse. 6-12’, ovate in outline.

11 S. ERYTHROPUS. Stems red, with scattered, appressed leaves; frond wide-spread, somewhat palmate, with crowded branchlets and leaves, branchlets 1½” wide; leaves ovate-oblong, oblique, obtuse, ciliate, the smaller with long straight points.

12 S. CUSPIDATA. Stem or frond 3-6’, densely and somewhat dichotomously branched; branchlets 1” wide; leaves closely imbricated, all nearly alike, elliptical, ciliate, bristle-pointed, with the point inclined upward.—A variety (perhaps the fertile stems) are lanceolate in outline, 2-3-pinnately branched.

13 S. LEPIDOPHYLLA, Resurrection Moss, is a roundish ball when dry. In a cup of water it soon expands into a dense circle of dark-green, densely 2-3-pinnate fronds, with innumerable oval, obtuse, entire leaves. From Lower California.

3. PSILÒTUM, R. Br. Sporangia sessile, 3-celled, imperfectly 3-valved by terminal chinks, filled with farinaceous spores.—Stem fork-branched, with alternate, minute leaves, as if leafless.

P. trîquetrum Swtz. Stem erect, 8-10’, many times forked, and, with the branches, 3-angled; leaves remote, 1½”; fruit 3-lobed, sessile along the branches. E. Fla

ORDER CLVIII. EQUISETACEÆ. HORSETAILS.

Plants leafless simple stems, or with whorled branches. Stems striate-sulcate, jointed, fistular between, and separable at, the joints. Sheaths dentate, crowning each internode. Fructification a dense, oblong-cylindrical, terminal, and cone-like spike, composed of 6-sided, peltate scales, arranged spirally, bearing beneath 4-7 spore-cases, which open laterally. Spores globular, each with 4 elaters attached, involving them spirally, or open when discharged. (See Figures.)

EQUISÈTUM, L. SCOURING Rush. Character the same as that of the order.—The sheaths may be regarded as a whorl of united Ivs. The cuticle abounds in silex.

555, Equisetum arvense. 556, E. sylvaticum. 557, Section of the spike, enlarged. 558, A peltate scale with 7 sporanges beneath (or one compound sporangium), magnified. 559, A spore with its elaters highly magnified.

§ Species fruiting in Spring and decaying before the following Winter…(a)
§ Species fruiting in Summer and lasting through the following Winter…(b)
Order 159.—Filices. Ferns.

1 E. arvense L. Fertile stems erect, 6–8', simple; sterile 12-14-furrowed, with simple, ascending, 4-angled branches; sheath cut into long dark-brown teeth; spike 6–12', oblong. Can. to Va. and Ky. The sterile stems appear after the fertile.

β. serotinum. Sterile plant also producing a late spike of fruit. Pa. (Porter).

2 E. Telmateia Ehr. *Eryngium* H. Sterile stem 2–5', white, about 30-furrowed, its 30 branches 4-angled; fertile stems simple; sheaths with subulate teeth. L. Superior.

3 E. sylvaticum L. Stems 12- or 13-furrowed, both kinds with compound, deflexed, angular branches, 9–10'. Woods and low grounds. North.

4 E. pratense Ehr. Stems 10-12-furrowed, both kinds soon producing simple, straight branches, in several whorls; branches 3-angled. N. W.

5 E. limosum L. Pipes. Stems 2–3', smooth, erect, 15–20-striate, mostly with a few irregular, simple, 5-sided branches near the middle; sheaths white above, with 15–20 teeth, tipped with black. Shores and swamps.

6 E. palustre L. Sts. 1–14', erect, with 6–8 prominent striae; branches few, sheaths with as many pointed teeth as striae. Marshes, N. Rare in the United States.

7 E. lavigatum Braun. Stems 2–3', erect, simple or some branched; sheaths long (6–7'), close, green, with 20–25 black teeth; branch sheaths 8-toothed. Miss. River.

8 E. robustum Braun. Sts. 2–4', very stout, some branched above; sheaths short (3–4'), close, with 40 (in the branches 11) deciduous teeth, and a black band near the base, rarely with another above. River banks, W. States to California!

9 E. hyemale L. Scouring Rush. Stems all simple, erect, 2', very rough with sili- cious points; sheaths ashy-white, black at base and summit, short (2–3'), with about 20 subulate, awned, deciduous teeth. Conspicuous in wet shades.

10 E. variegatum Schleicher. Simple (branched from base), slender, straight, 6–12', 5–9-furrowed; sheaths very short, with brown bristle-tipped teeth. N. Rare.

11 E. scorpiones Mx. Sts. tufted, filiform, 4–8', recurved, 3–4-furrowed; sheaths black, teeth 3 or 4, scarios and bristle-tipped. Woods, Penn., and N.

Order CLIX. Filices. Ferns.

Stem a perennial, creeping, horizontal rhizome, or sometimes erect and tree-like. Fronds (fruit-bearing leaves) variously divided, rarely entire, with mostly forked veins and circinate vernation. Fruit occupying the back or margin of the fronds arising from the veins. Sporangia (spore-cases) of one kind, scattered, or clustered in sorii, 1-celled, containing numerous minute spores.
A large and interesting Order, distinguished for their elegant, plumelike foliage. They are usually a few inches to a few feet high, but some of the Tropical species, as the Cyathæ, are 15 to 25 feet, vicing with the palms in size and beauty.

The stipe is the stalk of the frond, and the rachis its continuation through it. The pinnae (or pn.) are the first divisions of a divided frond (often called leaflets). Pinnule (or pml.) are the first divisions of the pinnae when further divided. Segments (seg.) are the final divisions, and the partial divisions of the segments are lobes, &c. The sort (fruit-dots) are either naked, or covered with an indusium (see cut).

§ POLYPODIACEÆ. The True Ferns, with fronds mostly radical, circinate in bud. Sporangia in sori, pedicellate, with a vertical, elastic ring, opening transversely...(/)

§ CYATHACEÆ. The Tree Ferns, with fronds on an erect trunk. Sporangia as in § 1...(c)

§ HYMENOPHYLLACEÆ. Pellucid Ferns; sporangia in a cup and on a thread...(d)

§ SCHIZACEÆ. Very slender vines or fronds. Sporangia with a ring-crown at apex...(c)

§ OSMANDIACEÆ. Fronds stout, radical. Sporangia with no ring, 2-valved...(b)

§ OPHIOGLOSSACEÆ. Frond single (in our species), on an erect stem. Sporangia with no ring...(a)

a Fruit in a spike. Frond entire, reticulate-veined. 1. Ophioglossum. (sori)

b Fruit in a panicle. Frond divided, fork-veined. Botrychium. 2

c Fronds pinnate or bipinnate, with straight, forked veins. Osmunda. 3

d Fronds palmately lobed. Stems climbing, 3-4 ft. Lycodium. 4

e Fronds linear-filiform, undivided, a few inches high. 5. Schizaea. 5

f Fronds 3-parted, middle division sterile, the lateral pinnulate. Anemia. 6

g Fronds pellucid or opaque. Sporangia with a transverse ring. Trichomanes. 7

h Fruit-dots in little round caps. Trunk and leaves smooth. 8. Cyathæ. 8

i Fruit-dots becoming entirely naked. Fronds prickly or hairy. Alsophila. 9

j Fruit-dots enclosed in the reflexed tip of the lobe, with two valves. 9. Balantium. 22

k Sporangia scattered singly all over the surface (not in sori), naked...(g)

l Sporangia collected in dots (sori) growing from the veins...(b)

m Fronds simple or pinnate. Pinnae on short petioles. Acrostichum. 10

n Fronds forked at the summit, entire below, the sterile different. 11. Platycerium. 11

1 Sori (fruit-dots) naked, having no covering of any kind...(k)

2 Sori involved (at first) in the rolled segments of the pinched fertile frond...(m)

3 Sori not involved, but invested with special coverings (called indusia)...(n)

4 Fronds smooth or scaly, never powdery. Sori distinct, roundish. Polypodium. 12

k Fronds covered with powder on the back. Sori in many dorsal lines. Gymnogramma. 13

h Fronds powdery or scaly on the back (bipinnate). Sori in a marginal line. Notoholena. 14

k Fronds linear, simple. Sori in a continuous line on the split margin. Flavia...Vittaria lineata.

m Fertile frond bipinnate, segments berry-like. Veins reticulated. Onoclea. 15

n Fertile frond pinnate, pinnae moniliform. Veinsforking. Struthiopteris. 16

o Fertile fronds bipinnate, segments oblong, soon opening. Allosorus. 17

p Sori marginal, indusium only the reflexed altered margin of the frond...(o)

q Sori marginal, indusium double—a scale combined with the margin...(p)

r Sori dorsal, oblong or linear, Indusium attached to the side of a vein...(q)

s Sori dorsal, round or roundish, indusium on the back or the tip of a vein...(c)

o Fronds of 2 kinds, the fertile contracted. Sori continuous to apex...Lomaria. 18

p Fronds all similar, smooth. Indusium continuous all around. Stipe green or brown...Pteris. 19

q Fronds woolly, &c. Sori separate or continuous. Stipe brown, hairy...Cheilanthes. 20

r Fronds smooth. Sori separate. Stipe black and polished...Adiantum. 21

s Indusium a 2-lipped cup at the edge of the segments. Dicksonia. 22

t Indusium an entire cup or goblet at the edge of the segments...Davallia. 23

u Sori parallel to the mid-vein, the indusia opening toward it...Woodwar’dia. 24

v Sori oblique to the mid-vein, borne laterally on the veins...3

w Sori nearly continuous, in 2 rows, sunk in the frond...Woodwar’dia. 24

x Sori oblong, remote, in two rows and superficial. Stipes black...Doodia. 25

y Sori linear, in 1 double row, the whole length of the segment. Blechnum. 26

z Sori oblong, in 1 short double central row. Frond finely cleft...Onychium. 27

& Indusia single, regularly arranged, in 2 rows...Asplenium. 23

^ Indusia single, scattered irregularly. Frond simple or lobed...Campylosorus. 29

_ Indusia double, regularly arranged, Frond simple...Scolopendrium...
1. OPHICLOGLOSSUM, L. Adder’s Tongue. Sporangia roundish, naked, opening transversely, arranged in two rows along the margins of the fertile, contracted, spike-like frond. Veins reticulated.


3. OSMUNDA, L. Flowering Fern. Sporangia globular, half 2-valved, roughened on the surface somewhat in lines, pedicellate and clustered on the lower surface of the frond or a portion of it, which is more or less contracted into the form of a panicle. Spores green. Tall, handsome Ferns. Veins forked, straight. June.

4. LYGODIUM, Swartz. Climbing Fern. Sporangia sessile, arranged in 2-ranked spikelets issuing from the margin of the contracted frond, open-
ing on the inner side from the base to the summit. Indusium a scale-like veil covering each sporange. (Fig. 310.)

**L. palmatatum** Swtz. Smooth throughout; stem flexuous, thread-like or wire-like, climbing 3–5f; fronds palmately 5–7-lobed, on each short stipe, lobes entire, obtuse; upper fronds contracted, fertile, each a cluster of spikelets. Abundant in a swamp in Windsor, Conn. (Dr. Wm. Wood); also rarely found in N. J., Ky., and S.

5. **SCHIZEEA**, Sm. Sporangia oval, crowned with a ring at top, sessile, opening laterally. Indusium continuous, formed of the inflexed margins of the lips, which are contracted, spike-like, crowded at the top of the frond.

**S. pusilla** Ph. Fronds clustered, simple, linear-filiform, tortuous, 3–6', the fertile bearing a few little spikelets at top in two rows. Barrens, Quaker Bridge, N. J. Aug.


1. **A. adiantifolia** Sw. Fronds 6–12', on a slender stipe, 3-parted, the middle division sterile, 2- or 3-pinnate, the lateral ones fertile panicles on long stalks. S. Fla. *†*

2. **A. Mandioccana.** Fronds 12–15', long-stiped, 3-parted like the other, but the sterile division simply pinnate with lance-oblong serrulate pinnae. S. America.

7. **TRICHOMANES, L.** Sporangia with a transverse complete ring, and arranged on the base of a thread-like receptacle, which is in and exserted from a cup at the edge of the pellucid frond.

1. **T. radicans** Sw. Fronds thin and delicate, 6', lance-ovate, bipinnatifid, pinnae triangular, obtuse, very oblique at base; receptacle exserted. South. Rare.

2. **T. elegans.** Sterile frond pinnate, fertile, long-linear, edged and fringed all around with the thread-like receptacles and their cups. From S. America.

8. **CYATHEA, Sm.** Sori globular, on the veins, wholly enclosed in an indusium, which soon opens and remains cupform. Sporangia subsessile on an elevated receptacle. With cylindrical trunks.

C. **Anebroëa.** Trunk 10–20f, unarmed, simple, crowned with a spreading tuft of bipinnate fronds 6–8f long, gracefully arched; pinnule again pinnatifid or lobed, cups in 2 rows, smooth, round, entire. Grows near Panama! *

9. **ALSOPHILA ASPERA.** Another Tree Fern, from W. Indies, cult. by Mr. Buchanan, at Astoria, N. Y., under the name of *Hematella horrida*. Trunk 6–10f, bearing a splendid crown of fronds 4–5f long, arched and spreading, tripinnate. Palm deeply lobed, lobes obtuse, each with a double row of fruit-dots, which at first are covered with jagged scales, but finally naked. Stipe and rachis prickly.—**A. Phuinata**, very elegant, with a trunk near 1f, clothed with light-brown woolly hairs, and a crown of light-green bipinnate fronds, 3f long, is growing with the other.

10. **ACROSTICHUM, L.** Fronds simple or pinnate. Sporangia scattered (not in soroi), occupying the under surface of the whole or a part of the frond. Veins netted.

**A. aureum** L. A noble Fern, 3–6f high, coriaceous, evergreen, pinnate, with alternate, lance-oblong, entire pinnae. Swamps, Fla., and in conservatories.

11. **PLATYCÉRIUM, Desv. STAG-HORN FERN.** Fronds coriaceous, net-veined, forking at the summit. Sporangia in large patches on the under surface of the frond. From Africa, &c.
12. **POLYPÔDIUM**, L. **POLYPODY.** Sori roundish, scattered on various parts of the under surface of the frond, with no indusium (cover or involucre).—Ferns of various habit.

* Fronds simple and entire, pinni-veined, with cross veinlets...........Nos. 1, 2
* Fronds pinnatifid or pinnate, with forking veinlets..........................Nos. 3-6
* Fronds bipinnatifid, the veinlets forked (**PHLEGOPTERIS**)................Nos. 7-9

1 **P. Phyllitidis** L. Fronds lance-linear, 1-2f, pointed, thin and papery, with the fruit-dots arranged in a double row between the veinlets. Fla., and W. Indies. †

2 **P. Língua** L. Fronds lance-ovate, 6-12', obtuse, smooth above, rusty-downy beneath, and there covered with the innumerable sori, in rows. China.

3 **P. Incànium** Ph. Fronds deeply pinnatifid, 3-6', thick, clothed with whitish scales beneath; pinna oblong-linear, the upper fruitful; sori distinct and separate; veins invisible. Grows on the mossy bark of trees, W. and S.

4 **P. vulgâræ** L. Fronds deeply pinnatifid, smooth, 6-12', pinnae-linear-oblong, alternate, sori large, in 2 rows, distinct, yellow-brown. On shady rocks.

5 **P. Plúmlula** Willd. Fronds lance-linear, 1½×1½'; pinnae-linear-oblong, very numerous, attached to the hairy rachis by a broad base. Fla., and cultivated.

6 **P. Ángustifólia** L. Fronds ln.- lanceolate, 18'×2', bright green; pn. oblong, attached to the chaffy rachis by the mid-vein only, the base auricled on the upper side.

7 **P. Phlegóptéris** L. **Beech P.** Frond bipinnatifid, longer than wide (3-6'), the lower pinna curved, but scarcely larger than the middle ones; sori all marginal, about four on each segment; stipe hairy. Woods. Can. to Penn., and W.

8 **P. hexagonóptérum** Mx. Frond bipinnatifid, broader than long, rachis peculiarly winged; lower panicle much enlarged, deflexed; sori partly marginal, many on each segment; stipe smooth. Woods. Rather common.

9 **P. Dryóptéris** L. **Ternate P.** Frond ternate, the divisions stalked and bipinnate, light green, thin and delicate; sori marginal. Woods, Penn., and N.  

β. **calcáreum**. Divisions of the frond more rigid, erect. Northward.


* Golden Ferns,—the fronds yellow-powdery beneath......................Nos. 1-3
* Silver Ferns,—the fronds white-powdery beneath, 2-pinnate..............No. 4

1 **G. TRIANGULÁRIS**. Stipes clustered, slender, 2-3', polished, ebony-brown; frond 5-angled, 1-5', pedately pinnate; pinnae triangular-oblong, finally the fertile covered with the russet sori beneath. Common in California. Very fine.

2 **G. sulphúreas**. Stipe and rachis brown, at first powdery; frond 6-10', lanceolate, bipinnate; pinnae lanceolate; segments cut-crenate, cut-lobed, crenate at the obtuse apex. From Jamaica (Rev. E. Wilson), and cultivated. Very delicate.

3 **G. CHrysophýlla**. Frond triangular-lanceolate, bipinnate; pinnae lanceolate, nearly contiguous; pinnae cut-crenate-lobed. Golden yellow beneath.

β. **Mérténsii**. Pinnae rather remote, narrow lanceolate, long-pointed.

4 **G. Calómelános**. Frond 2-3', lance-ovate, stipe and rachis brown, polished; segments entire or with a single tooth, cream-white beneath.

β. **Péruviána** has the lower segment hasteate-lobed and very rich green.

ORDER 159.—FILICES.

1 N. Nivea. Very delicate, 6–12', bright green above, covered with a dense white powder beneath; frond bipinnate; pinnae roundish, top one lobed; stipe black. Mex.

2 N. Eckloniana. Rare and beautiful, clothed in white wool-like scales, bipinnate, pinnae ovate, remote, pinnae pinnatifid, oblong, segments roundish. South Africa.

15. ONOCLEA, L. Sensitive Fern. Fronds scattered, net-veined, the sterile broad, the fertile contracted and panicled, its convolute segments berry-like, enclosing the sorii, which are otherwise nearly naked.

O. sensibilis L. Fronds 1–2', common in low grounds, very sensitive to frost. The fertile dark-brown in color. Sterile fronds deeply pinnatifid, with few oblong entire or lobed pinnae, the upper confluent. July.

β. obtusiloba. Fertile frond partially metamorphosed, the segments partly revolute on the frond. Wendell, Mass. (Mrs. Piper), to N. Y. and Penn.

16. STRUTHIOPTERIS, Willd. Ostrich Fern. Fronds clustered, the sterile bipinnatifid, fork-veined, fertile much contracted, brown, with the pinnae revolute into a necklace form, enclosing the sorii, which are otherwise destitute of an indusium.

S. Germánica Willd. Sterile fronds in a circular clump, 3–5'; pinnae numerous, long and crowded, with numerous oblong segments; fertile fronds much smaller, their crowded pinnae 1–2' long, appearing later in the season.

17. ALLOSORUS, Bernh. Fronds small, 2–3-pinnate, fork-veined; the fertile some contracted, margins of the leaflets reflexed and meeting over the confluent sorii, but soon opening.

A. acrostichoides Spr. Fronds in tufts, bipinnate, 3–6', pale green with whitish stipules; seg. oblong, the sterile crenate, the fertile entire, petiolulate, 2–3' long. Isle Royal, in L. Superior (Prof. Porter), W. to Washington Terr. (Rev. Mr. Gray).

18. LOMÀRIA, Willd. Fronds clustered, of 2 forms, the fruitful contracted. Sori marginal, linear, continuous; indusium linear, scarious, the reflexed edge of the frond, opening toward the mid-vein.

1 L. spicant. Fronds pinnate, long, and narrow, the fertile nearly solitary in the midst of the numerous sterile ones, and twice as tall (2–5f) as they; stipe purple, polished. Europe, Oregon. Very elegant. (Blechnum boreale.)

2 L. gibba. Fronds oblong-lanceolate, pinnate, pinnae linear-falcate, 1–3', their broad bases almost confluent.

3 L. ciliatella. Fronds oval to oblong; pinnae oblong, slightly lobed, truncate at apex, ciliolate-spiculent with the projecting veins.

19. PTÈRIS, L. Brake. Sori borne on the ends of the veins forming a marginal line or band, covered with the membranous, reflected edge of the frond. Fronds once to thrice pinnate, or decompound.

§ PTÈRIS proper. Sori a mere line. Stipes greenish or pale... (x)

§ PELLÆA. Sori forming a broad band. Stipes purple or brown... (y)

x Frond triangular, twice or thrice pinnate, lowest pinnae long-stalked. No. 1
x Frond pedately pinnate, the pinnae few and long. Nos. 2, 3
x Frond pedately bipinnatifid, the pinnae numerous. No. 4
x Frond simply pinnate, with numerous long pinnae. No. 5
y Frond pedate and pinnatifid, as broad as long, 5-angled. + No. 6
y Fronds pinnate, pinnae few, the lower again divided. Native... Nos. 7, 8
y Fronds simply pinnate, or completely tripinnate. Cultivated... Nos. 9–11
1 P. aquilina L. Common Brake. Frond 3-parted, branches bipinnate, segments oblong, obtuse, the terminal often elongated. Abundant everywhere. 2-6 ft.
β. caudata. The terminal segment linear-oblong. Common South.

2 P. Críteca L. Pale-bright-green, 1-1½ ft, smooth; pinnae lin-lanceolate, the lower ones 2-parted and petiolulate, serrulate; fertile longer, linear. Fla. Cultivated.
β. albi-lineata. Pinnae white-banded in the midst along the mid-vein.

3 P. sckrulatá. Bright green, 1-1½ ft; pinnae long-linear, decurrent on the rachis, except the lowest pair, which are 2- or 3-parted and short-stalked. China.
β. cristatá. Each segment expanded at apex into a fan-shaped blade.

4 P. quadriaurita. Frond ample, ovate, 1-2½ ft smooth; pinnae distinct, pinnatifid, lobes contiguous, oblong, obtusely, with the forked veins conspicuous. Jamaica.
β. arrowa. Pinnae whitened in the midst along the mid-vein.

5 P. longifólia L. Tall, 2-5 ft. ½-1 ft; pinnae lance-linear petiolulate, obliquely truncate at base; stipe, rachis, and veins chaffy-hairy. Fla., and cultivated.

6 P. pedáta. Bright green, 4-6'. Frond 3-parted, as broad as long; lateral pinnae 2-parted, all deeply lobed, ½-in a broad band all around. From the W. Indies.

7 P. grácilis Mx. Delices ovate and shining, 4-6'; pinnae lanceate, the sterile bipinnatifid, fertile bipinnatifid with narrow segments. Rocks, Vt., and W.

8 P. atropurpuráea L. Rock Brake. Coriaceous; rachis hairy; lower pn. sterile or pinnate; segments of posite, oblong, margins conspicuously revolute, with edges often meeting behind, as in Allosorus, 3-6-12'. On lime rocks, N. and S.
β. Alabaménus (Buccley). Taller (10-20'), bipinnatifid, some pinnate, S.

9 P. rotundifólia. Stipe, rachis, and chaffy hairs purple, 1-1½ ft; frond narrow, simply pinnate; segments small, round or oval, alternate. From New Zealand.

10 P. trúmula. Bright green, 2-3½ ft, tripinnate; pinnate segments linear-oblong, obtuse, serrulate, the lower ones again pinnatifid. From N. S. Wales.

11 P. hastáta. Frond bipinnate, 12-18'; pinnae cordate-hastate; segments ovate, the terminal ones much larger, oblong or hastate, or 3-lobed. Varies much. From S. Afr.

20. CHEILÁNTHES, Switz. Lip Fern. Fronds small, mostly 2-3-pinnate, chaffy or hairy, mid-vein central. Sori on the ends of the veins, distinct, or some confluent, covered by an interrupted or continuous indusium from the edge of the frond. Stipes brown.—Hardly distinct from the preceding genus.

1 C. vestitá Sw. Indusia separate,—the reflexed, unchanged tips of the ovate segment; fronds 5-12', bipinnate, lin.-oblong, hairy; pn. crenately lobed. Rocks, M. and S., rare.

2 C. tomentósa Link. Indusia continuous,—the membranous margin of the small, obtuse segment; fronds bipinnate, lance-oblong, rusty, 12-18'. N. C., and W.

21. ADIÁNTUM, L. MAIDEN-HAIR Fern. Sori oblong or roundish, marginal. Indusia membranaceous, formed from the reflexed margins of distinct portions of the frond, and opening inwardly. Stipe ebony-black, polished. Ultimate segments often dimidiate, the mid-vein on the lower margin.—A large and beautiful genus, much cultivated.

* Fronds pedately divided, the divisions 1-3-pinnate; segments oblique... Nos. 1-4
* Fronds pinnately divided 2-4 times; segments subequilateral........... Nos. 5-8
* Fronds simply pinnate, with very large opposite oblique segments.......... No. 9

1 A. pedátum L. Very smooth; branches of the regularly pedate frond pinnate; segments rhombic-oblong, 1', toothed on the upper side, obtuse at apex; sori oblong-lunulate, 8-14'. Damp, rocky woods. Our most elegant nat.-ve Fern.

2 A. purésceus. Stipe rough-pubescent; pn. 5-7, irregularly pedate, hispid beneath, 6-9' long; segments oblong, 6-8', contiguous; sori round, crowded. N. Hol. 16.
3. **A. TRAPEZIOFORME.** Frond ample, decompound, glabrous, 2f; segments light green, large (12–18' x 6–10'), trapezoidal, some of them fan-shaped; sori luminate on 2 of the 4 margins; stipe jet-black. Superb! Jamaica (Rev. S. B. Wilson).

4. **A. SANTA-KATRINA,** has large obliquely fan-shaped segments cut-lobed and toothed, with the veins uncommonly distinct. Cultivated in Bridgman's Garden, Astoria.

5. **A. CAPILLUS-VENTER.** Delicate, bright green, 6–18', smooth, thrice pinnate at base; segments round-cuneate, lobed, or the sterile toothed; sori reniform, one on each lobe; stipe and branches capillary. Lime-rocks, S.: rare. Eur. Cultivated.

6. **A. CUNÉÀTUM.** Very delicate, 1f, 4 times pinnate at base, bright green; segm. very numerous, sharply cuneate, 2-4-cnt-lobed, 4–6'; sori round-reniform. Brazil.

7. **A. ÂETHIOPICUM, TINCTUM and CALLUNODES,** are greenhouse species or varieties, with roundish segments more or less oblique and lobed, 4–7', with rounded sori, 6–12'.

8. **A. ALÂTUM,** has the rachis narrowly winged, segm. sessile, obovate-long-wedge-shaped at base, coarsely toothed at apex. (Greenhouse of Bridgman & Wiegand.)

9. **A. MACROPHYLLUM.** Stipe jet-black, simple, bearing about 3 pairs of large, opposite, thick leaflets, and an odd one; leaflets triang.-hastate, oblique; sori linear. Jamaica.

**22. DICKSONIA, L'Her. Dickson's Fern.** Sori marginal, roundish, distinct, terminating a vein. Indusium double, the proper one cup-shaped, opening outward, the other formed of a reflected lobule of the margin, and opening inward.

1. **D. pilosiàscula** Willd. Frond bipinnate, lanceolate, 2–3f, with minute glandular hairs; pn. sessile, lanceolate; segm. finely pinnatifid, lobes toothed, each with a minute round sorus. Rocky pastures. Stipe yellowish.

2. **D. (BALANTIMUM) ANTÁRTICA.** A beautiful tree-fern from New Zealand, 3–20f, crowned with many long, heavy, dark-green, tripinnate fronds; pn. and pnf. sessile; segm. oval, 6-crenate; sori globular, with 2 distinct valves. (Buchanan's Conserv.)

**23. DAVÁLLIA, Smith.** Sori globose, marginal, on the end of a vein, in a gobot or pyxis, half of which is formed by the scarious indusium opening outward. Root-stock creeping above ground, chaffy.

1. **D. TENUIFÓLIA.** Fronds delicate, 6–10', tripinnate with few pinæ, triangular-lanceolate; rachis narrowly winged; segments spatulate, toothed. China.

2. **D. CANARIÆNSIS.** *Hare's foot.* Fronds 3 parted, decompound, ultimate segments oblique, decurrent, bearing 1 pyxis. 1–2f. Canaries.

3. **D. DISSECTA.** is very different, irregularly pinnatifid, or almost entire.

**24. WOODWÁRDIA, Sm.** Sori straight, linear-oblong, on transverse veinlets, parallel to the mid-vein, in 2 rows. Indusium from the same veinlet, opening inwardly.

§ LORINSELA. Fronds of 2 forms, net-veined throughout..........................No. 1

§ ANCHISTEA. Fronds all similar, netted only close to mid-vein..............Nos. 2, 3

1. **W. angustifólia** Sm. Fertile fronds pinnate, with distant linear pinæ covered with the fruit beneath; sterile lance-oblong in outline, deeply pinnatifid; segm. oblong, 2–3f. Resembles Onoclea. Mass. (Dr. S. Bowles), and S.

2. **W. Virgínicà Sm.** Fronds glabrous, lanceolate, pinnate; pinæ remote, pinnatifid, lance-linear; segments oblong, obtuse, 2–3f. Swamps, E. and S.

3. **W. Japónica.** Rachis chaffy; frond triangular, as broad as long; pinæ lanceolate, pinnatifid, with ovate segments. Bright green. 1–2f.

**25. DOÐIDA ÁSPERA.** Fronds rough, lanceolate, pinnate, 1f, in clumps, the caudex a few inches above ground. Pinæ oblong-linear, contiguous, with spinose teeth. Sori in 1 or 2 rows each side.—**D. CADÁTÁ** has linear-lanceolate, pinnate fronds, with remote serrate segments, the terminal one elongated. Both from Australia.
26. BLECHNUM, L. Sori continuous on the cross veinlets, close to and parallel with the mid-vein. Indusia opening inward. B. serrulatum Mx. Fronds pinnate, lanceolate, erect; pinnae sharply serrulate, those of the fertile fronds contracted. Florida.

27. ONÝCHIUM LUCIDUM (or JAPÓNICUM). Delicately beautiful, from K. Ind., and of the easiest culture. Fronds 1-2f, alternately pinnate 3 or 4 times into innumerable linear-acute segments 2 or 3' long. Few of the segments fertile with an oblong bivalved sorus on the mid-vein half its length.

28. ASPŁÈNIUM, L. SPLEENWORT. Sori linear or oblong, straight (curved in No. 9), separate, regularly arranged, oblique to the mid-vein, each arising with its indusium from the forward side of a lateral vein and opening forward. Veins forked or pinnate.

* Fronds simple and entire, with regular linear fruit-dots..........................No. 1
* Fronds simply pinnate.—a Pinnae roundish, nearly as broad as long: ....Nos. 2, 3 —a Pinnae long,—much longer than wide ..................Nos. 4, 5
* Fronds partly bipinnate, with few divisions. Ferns small, 2—8' high ....Nos. 6, 7
* Fronds twice pinnate, with very many divisions. Large native Ferns ....Nos. 8, 9
* Fronds twice or thrice pinnate. Exotic Ferns cult. in conservatories ....Nos. 10—12

1 A. Nidus. Bird's-Nest. Fronds thick and rigid, polished green, tongue-shaped, obsolete, 2—4f, clustered in a circle, forming as it were a nest. Oahu, &c. A noble Fern.

2 A. Flabellaflóium. Fronds very delicate, long and narrow (12—10'); rachis pro longed some 5' beyond the pn., and rooting at the end; pn. broad-cuneate, lobed and toothed, remote and alternate on the rachis. Australia. Suitable for baskets.

3 A. Trichómanes L. Dwarf S. Frond 3—6', lance-linear, in tufts; pn. roundish, small, suboblong, bearing several sori each; stipe and rachis polished-black. Rocks.

4 A. ebénum Wid. Ebony S. Fronds 8—14', erect, lance-linear; pn. lance-oblong, 1', some curved, serrate, auriculate on the upper side; stalk polished-brown. Dry.

5 A. angustifólium Mx. Fronds 2—2½f, in tufts, the inner fertile; pn. lance-linear, alternate, short-stalked, 2—3', of a thin texture; stalks green. Woods, E. and S.

6 A. Ruta-murràlà L. Wall-rue, V. Very small and delicate, 2—3', 2-pinnate at base, pinnae above; pn. petiolulate, cuneate, erose-dentate, few, 3—4'. Dry rocks.

7 A. montánüm Willd. Glabrous, 2-pinnate; tufts 4—8'; pn. oblong-ovate, parted into a few (5 or 6) 2- or 3-toothed segm.; rachis green, winged. On cliffs, Penn., & S.

8 A. thelýterroides Mx. Silver S. Fronds ample, ovate-acuminate, 14—3'; stipe pale; pinnae lance-linear, pointed, distinct, suboblong; segments oblong, obtuse, serrate, sessile on the winged rachis with 2 rows of linear distinct sori. Shady banks.

9 A. Filix-fémina Bernh. Lady Fern. Fronds ample, 1-2f, lance-oblong; pn. lanceolate-acuminate, rachis not winged; pn. lance-linear, cut-pinnatifid; segments minute, sharply 2-toothed; sori oblong, curved, finally confluent. Moist woods.

10 A. Gowingiánà. Slender and weak (in conservatories), 1f, lanceolate-acuminate; pn. lanceolate, long-pointed, stalked; rach. winged; seg. acute, sharp-serrat.; sori oblong.

11 A. Belàngeri. Fronds lance-linear, 1—2½f 2—3', pinnate with deeply pinnatifid pinnae, segments linear, small, and very numerous, each with a sors. From Java. Stipe stout, green. The upper base (or axillary) segments are 2-parted.

12 A. Bulbiferum. Frond lanceolate, bipinnate, 1—3½; pn. lanceolate from a broad base, deeply pinnatifid; seg. oblong, cut-lobed and toothed, bearing 1—6 bold sori,—1 to a lobe. Often produces young plants from bulblets on the upper surface. N. Hol.

29. CAMPTOSÒRUS, Link. Walking Fern. Frond lanceolate, entire, or pinnatifid, with the apex prolonged and inclined to root. Veins more or less netted. Sori oblong, irregularly scattered, with the indusia lateral on the veinlets. (Antigrama, C-B.)
Order 150.—FILICES.

1. **C. rhizophyllus** Lk. Frond 6—12', subentire, at base stipitate, cordate, or truncate, or somewhat auriculate, the apex attenuated in a long thread-like acumination, arched, and rooting at the point. Rocky woods. Not common.


30. **SCOLOPÉNDRIUM,** Smith. **Hart's-tongue.** Sori linear, transverse, scattered; indusium double (arising from 2 contiguous parallel veins), occupying both sides of the sorus, opening lengthwise along the middle.

**S. officinarum** Willd. Frond simple, ligulate, acute, entire. cordate at base, 8—13'; stipe chaffy, 3—5'. Shady rocks, Chittenango, N. Y. (Sartweil).

31. **WOÓDSIA,** Brown. **Rock Polypod.** Sori roundish, scattered; indusium fixed beneath the sorus, early opening above it, with a multifid or fringed margin, including the pedicellate spore-cases, like a calyx. Small, tufted ferns, with pinnated fronds.

§ Indusium closed over the sori at first, toothed when open. No. 1
§ Indusium concealed under the sori, fringed with cilia. Nos. 2—4

1. **W. obtusa** Torr. Fronds 6—12', lance-oblong, smoothish, almost tripinnate; pin. distant, sessile; segments pinnatifid, lobes rounded, toothed, each bearing a round fruit-dot, which dots at length almost meet. Rocks and cliffs. Vt. to Car., and W.

2. **W. livénsis** Br. Frond 4—7', lanceolate, *bipinnate,* the stipe, rachis, mid-veins and their bristly chaff rust-colored; pin. oblong-obtuse, sessile, with 13—17 obtuse, subentire segments. Dry or rocky woods, in tufts. Stipe as long as the frond.

3. **W. glabéla** Br. Frond glabrous, lance-linear, 2—5', *pinnae*; pin. ovate, very obtuse, 2—4', 3—7-lobed, the upper only crenate. Cliffs, N. Y., Vt., and N. No chaff.

4. **W. Oregana** Eaton. Frond glabrous, lance-elliptic, 2—8', *pinnae*; pin. pinnatifid, obtuse; segments ovate, obtuse, denticulate; indusia with very short cilia. L. Sup.

32. **CISTÓPTERIS,** Bernh. **Bladder Fern.** Sori roundish. Indusium hood-shaped, vaulted, fixed by the broad base (or by the base and sides), soon opening toward the forward end of the frond and thrown off.

—Delicate Ferns, 2—3-pinnae.

1. **C. frágilis** Bernh. Frond lance-oblong, 6—10', on a slender stipe of the same length, with open divisions; pin. lance-ovate; segments pinnatifid below, only serrate above, oblong, with prominent veins and 4—10 sori. Shady rocks. Common.

2. **C. bulbífera** Bernh. Frond long-lanceolate, 12—18', the stipe shorter; pin. triangular-ovate, the lowest pair longest; segments oblong, obtuse, *pinnae* below, toothed above, 1 sorus to each lobe. Bears some bulbules. Shades.

33. **ASPIDIUM,** L. **Shield Fern.** Sori orbicular, scattered, terminal or lateral on the pinnae veins. Indusium orbicular, peltate or reniform with a deep sinus, covering the sorus, opening all around.

§ **ASPIDIUM.** Indusium round, entire, centrally peltate. Pinnae mostly auricled on the upper side at base.—2 Fronds simply pinnae. Nos. 1—4

—2 Fronds bipinnate. Nos. 5, 6

§ **NEPHIRODIUM.** Indusium roundish, with a sinus on one side (subreniform)...

(a) a Frond simply pinnae, with a few large pinnae. Cultivated. No. 7

a Frond once-and-a-half pinnae.—y Segments thin, quite entire... Nos. 8—11

—y Segments thick, finely serrate... Nos. 12, 13

a Frond twice pinnae.—2 Segments bluntly lobed, or crenate or entire... Nos. 14, 15

—2 Segments sharply serrate, or lobed or toothed... Nos. 16, 17
1. A. acrostichoides Swtz. Frond narrow-lanceolate, 15–18″; stipe chaffy; pn. t alcate-lanceolate, ciliate-serrulate, 1–2″, auriculate on the upper side at base, the upper covered with fruit, smaller than the sterile. Rocky shades. Common. 
   β. incisum. Segments incised and sharp-toothed, most of them fertile. N. Y., &c.

2. A. Lonicoris Sw. Frond linear-lanceolate, rigidly erect, 8–19″; pn. triangular-ovate, auricled on the upper side at base, longest (1′) in the middle, gradually lessened to apex and base, all densely fertile. Lake Superior, and N.

3. A. musitum. A splendid Fern from California, growing in clumps, 3–5′, smooth, rigid, evergreen, lance-linear; segm. oblong-falcate, spinulose-serrate; sori 2-rowed.

4. A. Falcatum. Frond thick, rich green, lanceolate, pinnate, 2–3′ high, with ample, lance-acuminated pinnae. A noble, hardy Fern from Japan.

5. A. Floridánum (Hook). Rigidly erect, lance-oblong, pinnate and barren below, blppinnate, fertile, and contracted above; lower pinsae cut-pinnatifid; indusia large, round, peltate, as in No. 1. Ga., Fla., La. (A. Ludoviciána C.B.)


7. A. Podophyllum (or Siebólldi). Fronds of two forms, thick, smooth, pinnate, with a few large oblong pinnae, in the fertile contracted and covered with sori. China.

8. A. Thélýpteris Sw. Lady Fern. Frond lance-ovate, 10–16″; pn. narrow, distant, deeply pinnatifid, the lowest pair as long as any; margins reflexed in fruit.


10. A. patens Sw. Frond soft and thin, downy with rusty hairs, lance., 12–18″; pn. linear-oblong, pinnatifid; segm. oblong, obtuse, entire; sori scattered. Dry, Fla.

11. A. molle, from S. Afr. and S. Am., is divided just like A. patens, and equally hairy, but is larger, finer, with straw-colored stipules, and the sori in regular marginal rows.

12. A. Cristánum Sw. Frond narrowly lanceolate, some 2′6″; pn. deeply pinnatifid, triangular-oblong or -ovate, acute; segm. toothed, bearing a single row of large sori each side from the mid-vein. A beautiful dark-green Fern, common in woods.

13. A. Goldiánnum Hook. Frond oval or ovate, about 15×10″, stipe same length; pn. broad (4–2″), deeply pinnatifid; segm. subfalcate, crenate. Woods, E. and W.

14. A. Fragrans Sw. Fronds linear-lanceolate, 6–13″, tapering both ways, bipinnate; stipe short, chaffy; pn. ovate-oblance, 1–10″; segm. lin.-oblance, with a dozen roundish crenatures or lobes; sori confluent. Rocks, Northern Mich. and Wis.

15. A. margínale Sw. Frond ovate to lance-ovate, thick, glabrons, 1–2′, bipinnate, stipe very chaffy at base; pn. lanceolate; segm. oblong-falcate, obtuse and entire at apex, the lower crenate-lobed; sori round, at or near the margin. Rocky woods.

16. A. Filix-mas. Fern lanceolate, 1–3′; stipe very chaffy; pn. triangular-lance.; segm. oblong, obtuse, serrate at apex; sori near the mid-vein. N. J. to Va.? N. W.

17. A. Spinulósus Wildl. Stipe elongated, soon smooth, the chaff deciduous; frond 1–3′, ovate, acuminate, nearly or quite tripinнатe; pinnae lanceolate, acuminate, the lower longest; pn. oblong, acutish, segm. mucronate-serrate. Woods and pastures. 
   β. dilatátum. Stipe permanently chaffy; frond triangular-ovate; pn. obtuse 
Abelmoschus, 22. From the Arabic; a grain.
Abies, 313. The ancient name. [of mask.
Abronias, 379. Greek, delicate.
Abrotanum, 184. Abisninthium, 184.
Abutilon, 61. Name of obscure origin.
Acacia, 99. Gr., to sharpen; sc. the spines.
Acalypha, 296. Gr. word for the Nettle.
Acanthaceae, 293.
Acanthus, 233. Classic for spine or thorn.
Acer, 74. The ancient name, sharp or strong.
Acerates, 273. Gr., without horns.
Acheta, 178. Gr., without chaff.
Achillea, 183. Named for Achilles.
Achimenes, 169. Mean unknown.
Acmeila, 180. Gr., a point; sense doubtful.
Acnida, 389. Gr., negative of stinging.
Aconitum, 22. The ancient Greek name.
Acors, 318. Gr., a remedy for sore eyes.
Acorus, 412. See.
Acroctethum, 419. Gr., a row at the top?
Actaea, 28. Gr., resembling the Elder.
Actimeris, 178. Altered from the next.
Actinomeris, 182. Gr., seed pappus radi-
Adiantum, 422. Gr., not wetted by rain.
Adonis, 19. Sacred to Adonis.
Aeschynomene, 87. Gr., a modest, or sensitive.
Aesculus, 74. Name ancient and obscure.
Aethusa, 140. Gr., to burn; poisonous.
Aguanathus, 343. Gr., a lovely flower.
Agaeneus, 160. Gr., good, or excellent.
Agave, 333. Gr., admirable.
Ageratum, 156. Gr., careless; long in flower.
Agrimonia, 108. Gr., prize of the field?
Agrostemma, 54. Gr., crown of the field.
Agrostis, 884. Gr., of the field, &c.
Allanthus, 72. Chinese; tree of Heaven.
Alba, 356. Gr., a weapon; misapplied.
Albizia, 82. For an Italian botanist.
Achillea, 168. Arabic, 'aklewela.
Aletris, 353. Gr., a miller's wife; sc. mealy.
Alisma, 323. Celtic, alis, water.
Allium, 343. Celt, cell, or burning.
Alloclorous, 421. Gr., changing sorts, or sor.
Aloe, 318. Celt, al lan, near the river.
Alonsea, 329. To Zanoni Alouso.
Alopeconus, 387. Gr., fox-tail.
Alophila, 419. [Spain.
Althaea, 60. Gr., to cure; sc. medicinal.
Althaeum, 40. Gr., alloying; anger.

AMARANTACEAE, 288.
Amaranthus, 288. Gr., unfading.
AMARYLLIDACEAE, 332.
Amaryllis, 333. Dedicated to that nymph.
Amblygonum, 322. Gr., around the joints; sc. ochrace.
Ambrosia, 174. Gr., food of the gods.
Ameianthus, 110. The French name.
Amianthum, 348. Lat., flowers pure, or white.
Ammannia, 124. To John Ammann, a Russian.
Ammobium, 186. Gr., living in sand.
Amorpha, 93. Gr., formless or deformed.
Ampelopsis, 78. Gr., resembling the Vine.
Amblycarpus, 813. Gr., flowers of two forms.
Amblycarpus, 391. Gr., fruit of two forms.
Amsonia, 270. To Chas. Amson, of S. C.
Amygdalus, 102. The ancient name.
Amyris, 72. Gr., myrrh; perfumed gum.
ANACARDIACEAE, 72.
Anacharis, 324. Gr., incomely.
Anagallis, 213. Gr., laughing, cheering.
Ananassa, 335. The name in Guiana is anas.
Aphanantheris, 273. Gr., heartless.
Anchusa, 252. A name of obscure origin.
Andromeda, 201. Like Andromeda of old, bound by the waters' edge.
Andropogon, 410. Gr., a man's beard.
Androsace, 211. Gr., a man's buckler. [ance.
Anemoea, 419. Gr., naked; sc. the ito-
Anemone, 17. Gr., wind; or Wind-flower.
Anethum, 136, 139. Gr., burning, stimulating.
Angelica, 137. Name of excellence.
ANGIOSPERMAE, 16.
APONACEAE, 26. [the bristles of the papus.
Antennaria, 183. Lat., antenna; alluding to
Anthemis, 83. Flowering abundantly.
Anthoxanthum, 395. Gr., yellow flower.
Antirrhinum, 424. Gr., like writing.
Antirrhinum, 223. Gr., like the nose.
Aphelion, 57. Altered from Paronychia.
APETALAE, 278.
Aphyllon, 217. Gr., without leaves.
Aphrum, 110. Celt., upon, water.
Apsilinum, 328. Gr., without a spur.
APOCYNACEAE, 269.
Apopoum, 270. Gr., repelling dogs.
Apopo, 160. Gr., without heard; no papus.
Asteria, 325. Gr., without wings.
AQUIFOLIACEAE, 307. 'Eagles' talons.
Aquilegia, 22. Lat., an eagle; petals like
Arabis, 37. Originally from Arabia.
ARACEAE, 312.
Achiras, 35. Gr., without branches.
Arabia, 142. Of unknown meaning.
ARALIACEAE, 142.
[Latin Index continued]

Blitum, 286. **Gr.,** billet, = insipid. 
M. D. 
Bocconia, 32. **Gr.,** Paonia, a Sicilian name. 
Boccon, 300. To G. R. Buehner, German. 
Boerhaavia, 270. To Boerhaave, of Holland. 
Boltonia, 166. To J. B. Bolton, an English bot. 
BORKAGNACEE, 230. 
Borrago, 251. Altered from *cor ago* = nourish- 
Borger, 174. To J. W. Borger, F. L. S. 
Borrichia, 313. To Olaf Borrich, Danish. 
Botrychium, 418. **Gr.,** a cluster of grapes. 
Boussingaultia, 328. To J. B. Boussingault, a 
Bouteloua, 403. **Gr.,** short hair; sc. pappus. 
Brassic, 29. 
Brassica, 40. **Brassica** was the Celtic name. 
Brandell, 158. To Dr. Brackell, of Savannat. 
Brizu, 403. **Gr.,** to nod; sc. the epiketes. 
Brezovk, 302. **Briza** and *pyros* (wheat). 
BROMELIACEE, 335. (the Wild Oat. 
Bromus, 327. **Gr.,** food; anciently applied to 
Brouardels, 260. To P. V. Bronson, of 
Brownwilla, 231. To J. Brownwallis, of Abo. 
Brunella, 246. **German,** a throat-disease. 
Brunfelsia, 221. To Otho Brunfels, of Mentz. 
Brumichia, 290. To F. Brunnich, Danish. 
Bryonia, 130. **Gr.,** to grow (sc. rapidly. 
Bryophylhum, 119. **Gr.,** growing from the leaf 
Buchner, 171. To J. G. Buchner, German. 
Buckley, 291. To S. B. Buckley, Texas. 
Bunella, 210. Greek name of the Ash. 
Buprenum, 328. **Gr.,** ox-rib. 
Burmanla, 325. To one Burmann, German 
BURMANNACEE, 525. 
Busch, 215. To Joachim Busch, Naples. 
Bursearea, 72. 
BUTTONIEE, 323. 
Buixs, 298. **Gr.,** dense? sc. the wood. 
CABOBMAE, 28. Cabomba, 29. 
Cacalia, 186. **Gr.,** exceedingly pernicious. 
CACTACEE, 132. 
Cakile, 40. The Arabian name. 
Caladium, 319. Altered from Calia. 
Calamagrostis, 386. Calamus-Agrostis. 
Calamint, 243. **Gr.,** beautiful Mint. 
Calampos, 219. **Gr.,** pretty vine. 
Calandra, 291. To J. L. Calandrin, Italian. 
Calicolaria, 223. **Lat.,** a little slipper. 
Calendula, 189. **Lat.,** kalenda, the first of the 
Calis, 318. (319). **Gr.,** beautiful. 
Callicastrum, 161. **Gr.,** beautiful flower. 
Callicarpa, 236. **Gr.,** beautiful fruit. 
Callirrhoe, 60, 61. A Greek name. 
Callistachys, 100. **Gr.,** beautiful spike. 
Callistemom, 122. **Gr.,** beautiful stems. 
Callistephus, 105. **Gr.,** beautiful crown. 
CALLITRICHACEE, 301. 
Callitriche, 301. **Gr.,** beautiful hair. 
Caluna, 200. **Gr.,** to sweep; sc. a broom. 
Calochorons, 343. **Gr.,** beautiful grass. 
Calonyction, 290. **Gr.,** "good-night." 
Calopogon, 234. **Gr.,** appearing beautiful 
Calypso, 320. **Gr.,** calyx covered. 
Calphina, 21. Synecope for calathos, a goblet. 
CALYCALLITACEE, 25. 
Calycanthus, 23. **Gr.,** calyx flower. 
Calycocarpum, 27. **Gr.,** calyx fruit. 
Calypso, 326. Dedicated to that nymph. 
Calyptranthes, 121. **Gr.,** calyptra flower. 
Camellia, 43. **Gr.,** calyx covered. 
Camassia, 403. **Indian,** Quamass. 
Camelina, 42. **Gr.,** d'ar Flax.
Coptis, 21. Gr., to eat; sc. the cleft leaves.
Corallorhiza, 328. Gr., coral-root.
Corchusus, 64. Gr., to purge; laxative.
Cordia, 20. To E. Cordius, a Germ. botanist.
Corema, 303. Lat., a broom; sc. the habit.
Coreopsis, 178. Gr., bug-like; sc. the seeds.
Coriandrum, 141. Gr., bug; from the odor.
Coriopsis, 287. Gr., bug-seed.
CORNACEEAE, 142. [of the wood.
Cornus, 143. Lat., a horn; from the hardness
Coronilla, 87. Lat., a little crown.
Corydalis, 33. Greek name for Fumitory.
Corylus, 307. Gr., a helmet; the involucrate fr.
Corythum, 332. Gr., a helmet; sc. the flower.
Cousm from, 235. Gr., elegant flower.
Cotula, 172. The old Latin name.
Cranechoe, 330. Derivation uncertain.
Crantz, 135. To Prof. Crantz, Eng.
Crassula, 119. Lat., thick; leaves fleshy.
CRASSULACEAE, 117. [mes of the wood.
Cratagus, 110. Gr., strength; from the hard-
Crinum, 333. The Greek name of the Lilly.
Cruithne, 178. The Irish name.
Croomia, 339. To H. B. Croom, of Florida.
Crotalaria, 90. Gr., a rattle; sc. the seeds in pod.
Croton, 297. Gr., a tick; sc. the seeds.
Crotonopsis, 297. Croton-like.
CRUCIFEREE, 34. [are in the sheaths.
Crepidula, 187. Gr., concealed; as the flowers
CRYPTOGAMIA, 412. [the calyx).
Cryptopetala, 138. Gr., concealed border of
Ctenium, 409. Gr., a comb; sc. the beard.
Cucumis, 131. Lat., crooked? (fruit).
Cucurbita, 130. Lat., crookedness; the fruit.
CUCURBITACEAE, 123.
Cunila, 240. Gr., to feed.
Cuphea, 123. Gr., curved; sc. the capsule.
Cupressus, 315. Gr., equal growth; referring
CUPULIFEREE, 314. [to the reg. branches.
Cuscuta, 260. Name from the Arabic.
Cyath, 419. Gr., little cup; sc. indusium.
CYCADACEAE, 311.
Cycas, 312. A name in Greek for a Palm.
Cyclus, 313. Gr., circular; sc. the leaves.
Cycloloma, 285. Gr., circle, border of (the caly.
Cydonia, 112. From Cydon, in Crete.
Cynara, 138. Gr., a dog; involucre spiny.
Cynodon, 407. Gr., dog tooth; sc. the spikelets.
Cynoglossum, 261. Gr., dog tongue; sc. the lvs.
Cynifh, 191. A name of Diana.
CYPERACEAE, 330.
Cyperus, 337. A name of Venns.
Cypripedium, 336. Gr., Venns' slipper.
Cyrilla, 305. To Dom. Cyrillo, M. D., Naples.
Cyrtanthus, 235. Gr., curved flower.
Cytisus, 100. First found in Is. Cytirus.
Dactylis, 296. Gr., a finger; spikes digitate.
Dactylorchis, 268. Gr., finger comb; the
spikes digitate-pectinate.
Dahlia, 166. For A. Dahl, a Swedish botanist.
Dalea, 98. For Thos. Dale, an English botanist.
Daliabara, 105. To Dalibard, a Fr. botanist.
Danthoonia, 236. To M. Danthoone, a Fr. bot.
Daphne, 282. A myrrh transformed by Apollo.
Daucus, 299. Gr., hairy mouth; sc. the cor.
Datura, 265. From the Arabic, Tolorah.
Daucas, 139. The Greek name.
Davallia, 422. M. Davall, a Swiss botanist.
Decumaria, 116. Lat., decoem; ten; f. la.10-parted.
Delphinium, 22. Gr., a dolphin.
Dentaria, 37. Lat., a tooth; the root toothed.
Desmanthus, 82. Gr., bundle (of) flowers.
Desmosodium, 88. Gr., a bond; sc. the oment.

Dentzia, 116. For Deutz, a Dutch botanist.
DIALYPETALAE, 15. [the pod.
Diamorphia, 119. Gr., peculiarly formed; sc.
Dianthera, 234. Gr., two anthers.
Dianthus, 52. Gr., the flower of Jove.
Diapensia, 258. Gr., flowers by 5's; 5-cleft.
Diarhena, 359. Gr., two rough (keels in the
Dicerandra, 243. Gr., anthers two-horned.
Dichondra, 269. Gr., two grains (carpels).
Dichromena, 394. Gr., two-colored; [amist.
Dicksonia, 423. To Jas. Dickson, cryptog.
Dicentra, 234. Gr., double-valved (capsule).
Dietamus, 70. Greek name of the Ash.
Didiplis, 124. Gr., twice double.
Dicytrea, 23. Gr., two wings.
Diervilla, 146. To M. Dierville, M. D., French.
Digitalis, 228. Lat., finger of a glove.
Digiaria, 39. Lat., a finger; sc. the spikes.
Diodia, 149. Gr., roots (wayside plant).
Dionea, 51. A name of Vennes.
Dioscorea, 52. To Pedacei, Dioscorides, a
DIOSCOREACEAE, 68. [Greek physician.
Diospyros, 209. Gr., the pear of Jove.
Dipholis, 210. Gr., two scales (bet. the petals).
Diphylla, 23. Gr., two-leaved.
Diplopappus, 164. Gr., double pappus.
DIPSACEAE, 151. [hold water.
Dipsacum, 151. Gr., to thirst; the leaf-axis
Dipsacus, 234. Gr., 2-winged Acanthus.
Dirca, 232. Gr., a fountain.
Discopeltrea, 141. Gr., disk. ribs (united).
Dodecatheon, 211. Gr., two-leaved delties (flowers)
Dodonaea, 74. To R. Dodonaeus, M. D.
Dolichos, 98. Gr., long; sc. the twining stems.
Dolwinga, 191. To J. Dowling, florist, &c.
Draba, 41. Gr., acrid or biting; sc. the leaves.
Dracocephalum, 246. Gr., dragon head.
Dracopiss, 176. Gr., dragon-like.
Dracunculus, 184. Gr., little dragon.
Drosen, 51. Gr., dew (drops on leaves).
DROSEREEAE, 51.
Drynaria, 33. A clack nymph; sc. its leaves.
Dulichium, 336. First found on that island.
Duranta, 225. To Castor Durant, 1580.
Ecta, 400. To Prof. Amos Eaton, the well-
ECCEMONACEAE, 209. [known botanist.
Ecorremocarpus, 213. Gr., pendent fruit.
Echeveria, 119. To M. Echeveur, botanic artist.
Echinacea, 175. Gr., hedgehog; sc. the spines.
Echinocactus, 132. Gr., hedgehog cactus.
Echinocystis, 123. Gr., hedgehog bladder; fr.
Echinologists, 283. Gr., hedgehog sac; carpus.
Echinopernum, 251. Hedgehog seed.
Echites, 271. Gr., a viper; the smooth shoots.
Echium, 251. Gr., a viper; sc. the seeds.
Eclipta, 172. Gr., deficient; sc. no pappus.
Echbertia, 350. To D. G. Ehret, German artist.
ELAEAGNACEAE, 392.
Eleagnus, 292. Gr., the olive; resemblance.
ELATINACEAE, 51.
Elatia, 29. Gr., the fr.; resemblance.
Eclechis, 338. Gr., marsh delight.
Elephantopus, 156. Gr., elephant's foot.
Eleusine, 407. A name of Ceres.
Elliotia, 265. To Stephen Elliott, S. Car.
Ellisia, 254. To Joseph Ellis, F. R. S.
Elodea, 59. Gr., a marsh. [in the ealth.
Elymus, 443. Gr., enveloped; sc. the spike
Eltraria, 232. Gr., enveloped; the fls.in bracts.
EMPETRACEAE, 302.
Emetrium. 363. Gr., on a rock.
ENODYNE. 316.
Enslia. 273. To Aloysius Enslen.
Epidendrum. 331. Gr., on a tree.
Epinax. 200. Gr., on the earth; trailing.
Epiphilum. 154. Gr., on the pod (sc. the fls.).
Epiphrenus. 217. Gr., on the beech (roots).
Epiphyllum. 132. Gr., on a leaf (sc. the fls.).
EQUISETACE. 145.
Equisetum. 415. Lat., horse-hair.
Eragrostis. 400. Gr., lovely grass.
Erectites. 156. Gr., to tronchic.
Erycina. 491. Lat., the old name.
ERICACE. 197.
Eriogonum. 117. PC.
Eriocaulaceae. 255.
Eriogonum. 280. Gr., woolly joint.
Eriophorum. 238. Gr., wool-bearing.
Eriolis. 147. Gr., to grow green.
Ernolopia. 147. Gr., branched; much branched.
Erodium. 68. Gr., a hero's (bill).
Eruphila. 41. Gr., lover of Spring.
Eryngium. 155. Gr., to becoth; a remedy.
Erysimum. 39. Gr., to draw (blisters).
Erysimum. 141. Gr., red; sc. the flowers.
Erythrina. 97. Same as the last.
Erythronium. 311. Ditto.
Eschallion. 116. To Eschallion, Spanish.
Eschscholtzia. 32. To Eschscholtz, German.
Eucalyptus. 121. Gr., well covered; sc. the cal.
Engenia. 12. To Prince Eugene, of Savoy.
Engenia. 113. Gr., red; sc. the flowers.
Enonymus. 75. Gr., well named.
Eqworaphus. 159. Named for Enatorp.
Euphorbic. 293. To Euphorbus, of Manetria.
EUPHORBIA. 283. .
Euphrasia. 232. To the Muse Euphrasynes.
Eustoma. 407. Gr., handsome spike.
Eustoma. 367. Gr., hand-some mouth.
Evodia. 225. Gr., fruitful.
Eucous. 2-8. Gr., well closed.
Evolvulus. 390. Lat., to roll out, to trail.
Eucocoria. 298. Lat., to blind; the poisonous.
EXOGENE. 15. [Juice destroys the sight.
Exostemma. 147. Gr., stamens exserted? Fueaux.
Fagopsis. 267. Gr., to to Gr., to Fagop.
HAILO\RAGE.E, 120.
HAMAMELACE.E, 120.
Hamamelis, 120. Gr., (flower) with the fruit.
Hamelita, 147. To H. L. Dunham, [bfrg.
Hardenberghia, 90. To the Countess of Harden-
Hesperanthia, 241. The Greek name for Mint.
Hedera, 142. Cell., a cord.
Hedychium, 331. Gr., sweet snow (white fls.)
Hedysarum, 87. An old Greek name.
Helenium, 181. Dedicated to Helen.
Heltantha, 177. Diminutive of Helianthus.
Helianthum-mum, 47. Gr., Sun-flower.
Helianthus, 175. Bis., the evening.
Helianthus, 256. Gr., golden sun.
Helianthum, 231. Gr., Sun-plant.
Heliosia, 175. Gr., sun-like.
Heliotropium, 250. Gr., turning (with) the sun.
Helichium, 21. Gr., killing (poisonous) food.
Helonias, 249. Gr., a marsh.
Helosciadium, 140. Gr., marsh umbel.
Henelia, 410.
Hemercocallis, 315. Gr., beauty of a day.
Hemiscarpha, 303. Gr., (half) of the staff.
Hepatica, 18. Gr., of or resembling the liver.
HEPATICAE, 14.
Herculeum, 196. Sacred to Hercules.
Herpestis, 231. Gr., a creeper.
Hesperis, 185. Gr., the evening.
Hesperanthia, 330. Gr., other (two kinds of)
Heterotheca, 170. Gr., other (2 kinds of) fruits.
Helenium, 115. To Dr. H. Huncher, Wittenberg.
Hibiscus, 62. From ibis, the stork.
Hieracium, 191. Gr., hierax, the hawk.
Hierochilea, 315. Gr., holy Grass.
HIBISCUS, 175.
Hippomane, 239. Gr., horse madness.
Hippophae, 239. Gr., horse destroyer.
Hippurus, 121. Gr., mare's tail.
Holcus, 345. Gr., to extract (thorns).
Holostemon, 54. Gr., all bone (by antithesis).
Honka-nya, 56. A personal name.
Hordeum, 126. Gr., barley (sc. bread).
Hottonia, 211. To Prof. F. Hotten, of Leyden.
Houtsonia, 140. To Wm. Houston, M. D., Eng.
Hoya, 275. To Thos. Hoy, F. L. S.
Hudsonia, 48. To Wm. Hudson, F. R. S.
Humea, 194. To Lady Hume, of Wormleybury.
Humulus, 301. Lat., on the ground, = trailing.
Hyacinthus, 314. A boy killed by Zephyrus.
Hydrangea, 116. Gr., a water-veoss.
Hydranthemum, 228. Gr., a little water-flower.
Hydrastis, 23. In or near water.
HYDROCHARITACE.E, 324.
Hydrocleis, 323. Gr., enclosed in water.
Hydrocotyle, 135. Gr., a water-veoss.
Hydroclon, 235. Gr., water, oil, sc. an oily
HYDROPHYLLACE.E, 325. [water-plant.
Hydrophyllum, 254. Gr., water leaf.
Hydrophila, 324. Gr., loving moisture.
Hymenopappus, 181. Gr., membranous pap-
Ipecacua, 74. Unexplained.
IPERICAEAE, 48.
Hypericum, 49. Not satisfactorily explained.
Hyperodachysis, 124. [the pod.
Hyposis, 334. Gr., sharp under ; (the base of
Hyptis, 239. Gr., reseminate; sc the cor. upper
Hypopus, 241. The old Hebrew name. [lip.
Iberis, 42. From Iberia, now Spain.
Ilaezus, 257. The plant name.
Illicium, 24. Lat., alluring ; sc. the perfume.
Ilysanthes, 227. Gr., mud-flower. [touched.
Impatiens, 69. Lat., impatient; not to be
Indigofera, 95. Lat., indigo-bearing.
Inula, 171. A corruption of Helenium.
Iodanthus, 36. Gr., violet-flower.
Ipomea, 239 (260). Gr., like bindweed.
Ipomopsis, 237. Gr., like Ipomea.
Iresine, 253. Gr., eireos, wool.
IRIDACE.E, 336.
Irish, 336. From its varied colors.
Isanthus, 239. Gr., equal (regular) flower.
Isatis, 43. Gr., to smooth (the skin); a cos
Isoëter, 412. Gr., equal (all the year). [met.
Isoappus, 170. Gr., equal pappus.
Isopyrum, 243. Gr., equal wheel.
Itaca, 115. Greek name of the Willow.
Iva, 174. Leaves resembling the Greek Iva.
Ixia, 337. Lat., bird-like; sc. sticky.
Jacquemontia, 258. To Victor Jacquemont.
Jasminum, 275. Gr., violet smell; sc fragrant.
Jatropha, 286. Gr., physician, food; sc. medi-
JUGLANDACE.E, 303. [walnut.
Juglans, 304. Gr., the nut of Jove; sc. the
JUNCAE,E, 330.
JUNCAEINAE, 323. [of these rushes.
Juncus, 351. Lat., to join; ropes were made
Juncus, 273. Cell., rough or rude.
Jussieu, 125. To Antoine Jussieu, the elder.
Justicia, 235. To J. Justice, a Scotch botanist.
Kalium, 67. A personal name.
Kalium, 200. To Prof. Peter Kalm, of Abo.
Kennedy, 99. To Mr. Kennedy, of Ham-
Kerria, 294. To Mr. Kerr, botanist, Ceylon.
Kerzler, 378. To Prof. Kerzler, of Mayence.
Kellerenta, 75. To J. G. Kellerenta, German.
Kosteleczyka, 62. A personal name, [botanist.
Krameria, 80. To J. G. and W. H. Kramer, Ger.
Kriga, 191. To Dr. David Krieg, German.
Kuhnia, 158. To Adam Kuhn, of Pennsylvania.
Kuhnia, 302. From Kuhnia.
Kyllinga, 329. To P. Kylling, Danish, 1690.
LABIATE, 237. LABIATIFLORE, 153, 155
Labiatur, 91. The old Latin name.
Lachnanthes, 335. Gr., wool-flower.
Lactua, 193. Lat., lac, = milk; sc. milk-weed.
Lagarumaria, 193. Lat., a bottle; sc the gourd.
Lagerstroemia, 125. To Marcus Lagerstrom.
Laguncularia, 135. Lat., a small bottle. [Ger.
Laimum, 248. Gr., throat; sc. gaping-flowers.
Lampasana, 190. A personal name.
Lana, 237. Old Latin name for Laburnum.
Lapithaes, 260.
Laporte, 199. To M. Laporte, French.
Lappa, 190. Old Latin name of Bardock.
Larix, 314. Celt., fat or resinous; from lar.
Lathyrus, 85. Gr., stimulating.
LAURACE.E, 230. [made of lavender
Lavandula, 239. Lat., to wash; from the use
Lavatera, 60. To the two Lavaters, of Zurich.
Leavenworthia, 32. To Dr. Leavenworth, U.S.A.
Lechea, 47. To G. Lechea, Sweden, 1760.
Ledum, 204. An old Greek name. [nist.
Leersia, 383. To J. D. Leers, a German bota-
LEGUMINOSAE, 30.
Legophyllum, 204. Gr., smooth leaf. [Florida.
Leitheria, 309. To Dr. Leitner, collector in
Leontodon, The Greek name of some water-
LEMNAEAE, 319.
Lens, 100. The seeds are shaped like lens.
LENTIBULACE.E, 215.
Leucouthis, 249. Gr., lion’s ear; sc. the flowers
L eontodon, 191. Gr., lion's-tooth; sc. the lvs.
L eonurus, 219. Gr., lion's-tail; sc. the spike of flowers.
L ephas, 176. From lepis, Gr. word for scale.
L epidium, 214. Gr., a little scale; sc. the sili.
L eptocaulis, 140. Gr., slender stem. [cl.
L epptoa, 406. Gr., slender grass.
L eytropo da, 182. Gr., slender foot or stem.
L eytropylon, 257. Gr., slender tube; sc. the flowers.
L ephtura, 404. Gr., slender tail; sc. the spikes.
L epyromelon, 115. Gr., husk petal. [fida.
L espedezia, 5.9. To M. Lespedez, Gov. of Flor.
L encantheum, 183. Gr., white flower.
L eucas, 235. Gr., whiteness; sc. of the flowers.
L euchnum, 341. Gr., white violet.
L latris, 157. A name unexplained.
L ICHENES, 14.
L IGTHIPORE, 152, 155.
L igusticum, 14(). Originally found in Liguria.
L igustrum, 375. Lat., ligare, to tie; sc. its
L ILLIACE?.E, 341. [flexible branches.
L ilium, 312. Celt., tribe, whiteness.
L immantheum, 363. Gr., marsh-flower.
L immanti his, 65. Ditto.
L ifonine, 22. Gr., marsh-life.
L immochasia, 323. Gr., marsh-foo.
L imosella, 228. Gr., little mud (plant).
L INACE?.E, 66. [resemblos.
L iurna, 222. From Linum, flax; which it
L indora, 290. Name unexplained.
L innae, 14(). To the great naturalist, Carl von
L innaeus, 1914. To W. Linn., Gr., a thread. [Linnaeus.
L lipari, 329. Gr., liparos, mounta.
L ipocarpha, 393. Gr., oil chaff; why?
Lippia, 236. To Aug. Lippi, French traveller.
L iquidambar, 120. Lat., liquid amber.
L ifiodendron, 235. Gr., lily-tree; sc. tulip-tree.
L istera, 329. To Dr. Martin Lister, English.
L ithopermum, 232. Gr., stone-seed.
L obsa, 128. Name unexplained.
L OASA?E, 123. [to James I.
L lobelia, 191. To Matthew Lobel, physician
L OBELIACE?.E, 191. [nlst.]
L OGANIACE?.E, 229. (Jas. Logan, Eng. bota.
L loselugia, 203. A mythological name.
L ochantlia, 241. Gr., the edge; position of the
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ADDENDA.

Page 42. After V. (Vesicària) Shôrtii, add,

2 V. Lescârlí Gray. Pubescent; stems many, ascending 6–10'; lvs. o±long, cüssing, with a sagittate base; flowers yellow, in lengthening terminal racemes; silicile roundish, hispid, twice longer than its style; seeds 1–4 in each cell. Meadows, Tenn. (Mr. Hamlin.)

Page 63. After S. (Stercùlia) platanifòlia, add,

2. MAHERNIA VERTICILLATA. A shrubby perennial from S. Africa, cultivated in conservatories. It has slender, vine-like branches, small pinnatifid leaves and stipules forming verticils. The flowers are small, yellow, bell-form, very sweet-scented, with 5 petals, stamens, and styles.

Page 68. After O. (Oxalis) versicolor, add,

7 O. cérnua. Leaflets 3, obcordate; scapes bearing umbels of many large, yellow, drooping flowers; styles very short. S. Afr.

Page 69. After T. (Tropéculum) perigrinum, add,

5 T. (CHYMCÁRPUSS) PENTEPHYLLUS. Climbing high; lvs. digitate, of 5 small lfts.; fls. curious, green and red, the spur 1' long; sepals valvate; petals 2, small; carpels 3 round berries. From Buenos Ayres.

Page 74. After A. (Acer) macrophylíllum, add,

9 A. PLATANOIDES. Norway Maple. Tree 40–50f; leaves bright green both sides, is broad as long, 5-lobed, lobes toothed and short-acuminate; corymbs nearly erect; fruit smooth, 2' long, wings very diverging.

Page 106. After G. (Geum) album, add,

β. luteum, a variety with yellow flowers, rarely occurs in Pennsylvania.

Page 111. After C. (Cratèregus) spatulàta, insert,

9a C. Pyracáñtha Pers. Shrub 10f, thorny; lvs. evergreen, lance-ovate or oblong, crenulate-serrate, smooth and shining. § Near Philadelphia, and southward.

Page 146. After D. (Dierviilla) sessílifòlia, add,

4 D. JAPÓNICA, β. ROSEA. Wiegela. Shrub from Japan, 4–6f. with straight branches; lvs. oblòrg-ovate, acuminate, large; flowers funnel-form, rose-colored, 1' broad, covering the plant in Spring; ovaries and pods linear. Common in cultivation.

Page 150. After Bouvardia, add,

11. GARDÈNIA FLORIDA. Cape Jessamine. From China. Much cultivated South. Shrubby evergreen, 2–4f. Lvs. elliptical, acute both ways, very smooth. Flowers white, corolla 5-lobed or often many-lobed and double, salverform, 2' broad.

On page 175, after E. (Echinàcea) atròrubens, add,

4 E. Pórteri (Gray). Leaves lanceolate to lance-linear, remotely toothed, the highest entire; heads corymbed, 1' broad; scales about 9, lance-linear; rays 6–8, ovate-lanceolate, yellow; chaff spínescent. Stone Mountain, Ga. (Prof. Porter). Has the habit of Rudbeckia, but its chaff is plainly that of Echinàcea.
ADDENDA.

On page 190, before Lappa, may be inserted,


Page 208. After P. (Prinos) laevigátus, add,

3a P. púbescens Mx. Shrubs 6–8½, with smooth, virgate branches; lvs. large, ovate, acuminate, serrulate, soft pubescent beneath; clusters umbellate, axillary, shorter than the petals; berries dark red, 2–3½ in diameter. Alleghanies, Pa.

Page 281. Next before R. (Rumex) crispus, insert,

1 R. patiéntia L. Patience Dock. Stem 3–5½, stout; leaves lance-oblong, 6½–2½; valves large (2–3½), broad-cordate, one of them bearing a small grain or all naked. Grows at New Baltimore, N. Y. (Dr. Howr.) § Eur.

Page 388. Next before S. (Stipa) avenacea, insert,

1 S. Richardsdónti Link. Clnm 15–20½, very erect and slender; lvs. shorter. filiform; pan. loose, 3–4½; glumes near 2½, acutish; pales not bearded at the blunt base, the crooked awn about 6½ in length. Mt. Marcy, N. Y. (C. H. Peck.)

Page 394. After C. (Cenchrus) tribuloides, add,

2 C. echiniátus L. Differs from No. 1, in the globular, purplish, downy involucres, beset above with rough, stiff bristles, and cleft into 8–10 segments inclosing 3–5 flowers; grain brown. South.

Page 44. After C. (Cèdème) pungens, add,

2 C. integrífolia (Nutt.) Smooth, glanclus, 1–2½; lvs. 3-foliolate, lfts. lance-oblong, entire, mucronate; rac. dense; calyx 5-toothed; petals rose-color, subsessile, 4½; stam. 6, equal; pod much longer than its stipe. Banks of the Mississippi R., N Illinois. (Mr. V. Frisse.) and Westward.

Page 340. After T. (Trillium) cérnum, add,

β. atròrubens. Petals brownish purple, ovate-lanceolate, acuminate. Hanover, Indiana. (Mr. A. H. Young.)

Page 291. After Phorodendron, insert,

2. ARCEUTHOBIUM, Bieb. Differs from Phorodendron in having its anthers 1-celled, the 2 perianth 2-toothed, the herbage yellowish and leafless.


Page 183. Under Sesuvium, insert,

2 S. pentándrum Ell. Lvs. spatulate-obovate; fls. sessile; stamens 5. (1') Seacoast, E. Hampton, L. I. (J. S. Merriam), Cape May (C. F. Parker), Cape Henlopen (Dr. Leidy), to Fla. Hitherto mistaken for S. Portulacastrum.

Page 164. After 45 A. (Aster) ericoides, insert,

β. cilióssus (Mx.) Stem, branches, and often the leaves villous-hirsute.

Page 167. After 8 S. (Solidago) latifolia, β. pubens, insert,

β. cilióta (DC.) Upper racemes elongated and spreading. Ill. (Mr. Wolf.)
ADDENDA.

Page 168. After 30 S. (Solidago) Canadensis, insert,  
\[\beta. \text{scabra} \text{.} \text{Stem and leaves scabrous;} \text{leaves narrow, rigid, subentire.}\]

Page 173. After 6 S. (Silphium) scaberrimum, insert,  
\[\beta. \text{sessile} \text{.} \text{Leaves nearly all sessile, lance-oblong to ovate. (S. Radula N.) III.}\]

Page 180. After 5 B. (Bidens) connata, insert,  
\[\beta. \text{petiolaris} \text{.} \text{Leaves more or less petiolar.} \text{(B. petiolaris N.) III. (Mr. Wolf.)}\]

Page 283. After 10 P. (Polygonum) Careyi, insert,  
10a P. persicarioiides K. Glabrous, 2–4f: stip. ciliate; lvs. lin.-lanceolate, sub-sessile, spotted, not acrid; spikes linear, erect, pale-purple; sta. 6–8; styles 3-cleft; ach. 3-angled, shining. Low ground. III. (Mr. Wolf.) New to our flora.

Page 346. At bottom insert,  
22a MYRSIPHYLLUM ASPARAGOIDES. A delicate vine, twining and climbing, from S. Africa. Cult. Branches very slender and smooth. Lvs. 1' or more, ovate, pointed, thin, and polished. Ped. in pairs, with an empty bract-like one. Fls. similar to those of Asparagus, 6-parted, white. Filaments flattened. Popularly called Similaz.

Page 405. After E. (Elymus) Virginicus, \[\beta. \text{arecatus, add,}\]
\[\gamma. \text{villoso-s.} \text{Flowers villous-pubescent.} \text{(E. villosus Muhl.) III. (Mr. Wolf.)}\]

ORDER LXXX. OLACACEÆ.

Trees or shrubs chiefly tropical, with alternate, ex-stipulate, petiolar, entire leaves, regular, hypogynous flowers, and drupe-like fruit; represented in our limits by the following genus only.

XIMÉNIA, Plum. Calyx small, 4-toothed. Petals 4, woolly within, barely united at the base. Stam. 8. Style 1, Ovary 4-celled, with several ovules, but forming a 1 seeded drupe. \(\ne \ne\) Thorny. Flowers axillary, single or in small corymbs.

X. Americana L. Leaves smooth, coriaceous, oval or oblong, obtuse; peduncles several-flowered, shorter than the leaves; petals oblongate, thick, spreading above, 4–5'' long.—Fla. from Picolata (Mr. Fry) and S. Fls. yellow, fragrant. Drupe as large as a plum, yellow, well-flavored. Thorns \(\frac{1}{2}\) an inch.

Page 76, under Celastraceae, insert,

3. PACHYSTIMA, Raf. Petals and stam. 4, inserted on the throat of the 4-lobed calyx. Style very short, expanded at base into the disk which covers the ovary and lines the calyx tube. Caps. oval, 2-celled, seeds 2–4, inclosed in a white dissected aril.—Low shrubs, with opposite, crowded, short-petioled, evergreen leaves, and minute axillary flowers.

P. myrsinites Raf. \(\beta\) Canbyl (Gray). Stems and branches creeping, ascending, bark blackish; lvs. oblong and linear-oblong, obtuse, with a few minute teeth; caps. obtuse.—Mountain bogs, Wytheville, Va. (H. Shreve.) Stems 8–15'. Lvs. 6–9', margins revolute.

Page 234, after R. (Ruellia) strepens L., insert,  
\[\beta. \text{micrantha} \text{(Eng. and Gr.).} \text{Flowers crowded in the axils, with corolla reduced to a slender tube with an obsolete lip-shaped border, or quite apetalous, fertilized in the bud.—In ponds, Mount Carmel, Ill. (Dr. Schneck.)}\]
ADDENDA.

Page 258, under Lithospermum, insert,

8 L. lutéscens Coleman. Minute; strigose; lvs. lanceolate, pointed, roughish above, about 5-veined; sepals subulate, shorter than the conspicuous yellow corolla.—Grand Rapids, Mich. (N. Coleman.) Allied to L. latifolium.

9 L. tuberosum Rugel. Hairy-bristly, erect, branching; lvs. obovate-oblong, dotted above with white glands, the upper lance-oblong; calyx lobes linear, as long as the yellowish corolla, twice as long as the polished nutlet.—Fls. to Lx. (Dr. Joor.)

Page 256, under Hydrophyllaceae, insert,


N. Jamaicénis L. Pubescent, prostrate, branched; stems angular; lvs. obovate, obtuse; fls. 1-3 in the axis; calyx lobes linear, as long (5') as the corolla; caps. 2-, then 4-valved and the placenta free.—Ditches, etc., Baton Rouge, Lx. (Dr. Joor.)

Page 263, under Solanum, insert,

14 S. verbascifólium L. Shrubby, hoary-tomentous; lvs. large, ovate-oblong, entire; cymes dense-flowered, on a long stout forking peduncle; flowers in bud obovate, cor. lobes obtuse; anthers lin.-oblong; ovary woolly.—Picolata, Fls. (Mr. Fry) and southward.

Page 140, after 3 A. (Apium) nodiflorum, read,

3a A. angustífolium Wood. Weakly erect 8-20'; lvs. pinnate, elongated; lfts. toothed, cut, or pinnatifid, oblong in outline; ped. as long as the rays; invol. and involucels 5-7-bracted; fr. round-oval, ribs and vittae obscured by the thick pericarp. —Wet places, Peoria, Ill., (Dr. Stewart) and W. Used as celery. (Sium, L. Berula, Kotch.)

Page 173, after Silphium, insert,

41a. ACANTHOSPÉRMUM, Schrank. Heads radiate, rays (small) 2 fertile, disk 2 sterile. Invol. herbaceous, inner scales closely investing the ray cypsela. Recept. chaffy. Cyp. few, oblong, without pappus, each enclosed in the hardened prickly scale.—③ Diffusely branching. Lvs. opposite, toothed or incised. Fls. yellow.

A. xanthóides DC. Stems creeping, rooting at base; scabros-pubescent; lvs. ovate or obovate, the lower petiolate; heads stalked; rays about 5; cyp. 5, spreading, 6' long, the saccate urceolate.—Atlanta, Ga. (T. B. Goulding.) § S. Am. Mar. Apr.

Page 237, after Vitex, may be inserted,

7. CLERODÉNDRUM, L. Corolla salverform, limb some unequal, 5-cleft. Drupe baccate, of 4 (or fewer) 1-celled, 1-seeded drupes.—Shrubs or trees. Lvs. simple, entire, opposite or ternate. Cymes axillary, or terminal, trichotomous.

C. Siphonánthus R. Br. Glabrous, virgate, erect 4-8f.; lvs. whorled in 3s and 4s, long-lanceolate, pointed at both ends; cymes once or twice trichotomous; cor. white, tube 4' long, limb 1' broad; stam. long-extended.—Macon, Ga., naturalized in fields, waysides. (Dr. G. M. Green.)

Page 358, after 17 C. (Cyperus) divergens, read,

17a C. Wolffii Wood. Glabrous, slender, erect 2-3f.; lvs. at base, narrowly linear, 3f, of the invol. 2f.; rays about 5, very unequal, each bearing a dense globular head; spikes many, 4-5-flowered, oblong, scales imbricated, obtuse, 9-11-veined; rachis broadly winged.—Anna, Ill. (J. Wolf.)