SYNOPSIS
OF THE GENERA
OF
VASCULAR PLANTS
IN THE
VICINITY OF SAN FRANCISCO,
WITH AN ATTEMPT TO ARRANGE THEM ACCORD-
ING TO EVOLUTIONARY PRINCIPLES.

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P R E F A C E .

My object in writing this book was two-fold : Firstly, to enable the student to identify the generic types of the Flora surrounding our metropolis ; secondly, to develop in his mind the idea of a classification founded on the phases of vegetable evolution.

The territory to which this book applies, extends from Sonoma to Santa Clara, and from Niles to the Pacific Ocean.

The great advantage of a local Flora, is that it permits the author to so simplify and condense the diagnoses, that even the inexperienced is enabled to surmount the difficulties and identify with comparative ease the accessible plants.

By the exercise of his powers he gains not only confidence in his own ability, but strength and experience for the task of identifying the types of a more extended area.

In preparing the synopsis, I have chiefly consulted Endlicher's *Genera Plantarum*, and Dr. Asa Gray's *Flora Californiensis*. The botanical treasures of the California Academy of Sciences were generously placed at my disposal, and active assistance rendered me by our veteran Californian

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botanist Dr. Kellogg, Rev. E. L. Greene, Mrs. Curran, and other members of the Academy, to all of whom I hereby present my best thanks.

A new system of classification appeared desirable for many reasons. In this I do not claim the merit of originality ; the idea has been developed to a greater or less extent in the writings of Endlicher, Griësebach, Baron von Mueller, A. Braun, and Hanstein.

The system of De Candolle, still preferred, has many serious disadvantages. Its logic is at present nearly as much at variance with the leading idea of modern classification, as that of the Linnean system. It is true it is less artificial than that, but it is also more complicated and arbitrary, and less perspicuous, and lacks the stern, persistent principle which so well adapts the Linnean system for use as a key.

There will perhaps be a time when the demonstration of evolutionary affinities will form the grammar of botany ; and old Linné will come into service again, as a lexicon is used in the study of languages.

INTRODUCTION.

In looking from any stand-point, at the variety of organic forms, the theory of evolution will be the most successful in explaining the resemblances and differences of organized life.

Our theories about the creative power or the first impulse, may differ in all other points, but in one all scientists have instinctively agreed, and that is the method of explaining variations by comparing one form of organic life with another, and deriving one from, or out of the other. In the same measure in which our knowledge of living organisms increased and the remains of extinct ones were discovered, the idea of evolutionary progress took more and more hold of the scientific mind and became clearer and better defined.

Evolution from a given point may take place in different lines, and has done so from the very beginning ; the first divergence being the formation of the vegetable and animal kingdoms. We can easily account for this first and fundamental split, by the fact that the animal absorbs exactly the substance secreted by living vegetation, and *vice versa*. Any aquarium will furnish the proof of this, as the water must be constantly renewed if either animals or plants are kept exclusively, but if they are kept

together the water will remain fresh, by each absorbing the exhalations of the other.

The many divergencies or ramifications which, after the primary, took place in each of these lines of development, cannot now, and probably never will be, accounted for.

These divergencies and their ramifications may be compared to the branches of a pedigree. They represent, in fact, ancestral conditions, and are the true history of nature.

It is evident that divergencies cannot be arranged in a straight line. Our ancestors have striven without success to accomplish this feat, and have given it up in despair.

Modern science is content to investigate the different lines in which organic life exhibits itself, and to study the characters common to the members of a given line, as well as those by which they differ, from other lines. This process is called "Classification."

By another process of reasoning, science endeavors to find the point from which several lines diverged. This starting point is called "the connecting link," and the process of arranging the different lines of types around their respective starting points, is called "Systematizing." In some rare cases the "connecting link," or better, the starting point, of two lines of evolution still exists, retaining enough of its original characteristics to coincide with the ideal of the connecting link, if it were evolved by a process of reasoning.

An instance of this kind in the animal kingdom is the sea otter, connecting the seal with the weasel family, and representing by a living animal, the starting point of these two lines of evolution. In the vegetable kingdom, one of the most striking instances of a living link is the *Cycas* family, the most ancient type of the *Gymnosperms*. This curious type connects the line of *Gymnosperms* with that of the vascular *Cryptogams*, and even partakes in a certain measure of some of the peculiarities of the *Monocotyledons*, in characters which are perhaps more than mere analogy, so that it really forms a connection between fern, fir and palm.

In most instances the connecting link is extinct ; in this case two possibilities present themselves. First, the type may be preserved in a fossil state, as the *Hippotherium* connecting the horse and camel, and among plants the singular fossil *Lepidodendron*, a paradoxical type which combines the characters of *Lycopodium* with those of the *Conifers*—classes which to-day are widely separated.

Second, the extinct type may have been entirely lost, not even existing in a fossil state, so that it can only be theoretically reconstructed by combining the characters common to both lines of evolution, and separating them from those peculiar to each. Such an instance is the connecting link between *birds* and *reptiles*, types now separated by a wide interval which is approached but not bridged over by types found in a fossil state. There still yawns a chasm between the most reptile-like bird

(Archæopteryx) and the most bird-like reptile (Compsognathus).

In the vegetable kingdom, no connecting link has been found between the two classes of Vascular Cryptogams; Equisetaceæ and Ferns.

The longer a type is in existence the more it will deviate from the ancestral form ; variations become species ; species develop generic differences, till finally the originally homogeneous type splits into several series of forms, so differentiated by peculiarities developed in the course of ages that they must be considered families and orders. This process takes place by the individuals adapting themselves to external conditions, brought on by gradual geological changes, and it is astonishing what a variety of differences can grow out of the same old stock. All the immense variety of organic life must be ascribed to the repetition, or rather the continuation of this process.

The original type exists after a time, only in modifications caused by adaptation to new circumstances, which modifications from the same cause will also divide, and so indefinitely, because in this world changes are constantly going on. There is neither pause nor return. The Creator never repeats himself.

The ancestral types, the skeletons and other traces of which are known only in the fossil state, are said to be extinct, and in some cases they really are so. They succumbed in the battle for existence, and were destroyed. This has often taken

place in the animal kingdom, but only exceptionally in the vegetable, where they generally survive in their modifications, and the flora of our own age is much more parallel to the fossil flora than the present is to the fossil fauna. At least the fossil flora exhibits comparatively few types, which are without representation to-day, and rarely startles us with those monstrous forms, which constitute to such a great extent the fauna of bygone ages.

The gradual disappearance of the connecting links, explains the reason why fossil types which have survived to our day, never form continuous lines of variations, like those found in modern types, but exhibit a number of well defined forms isolated by the extinction of the intermediate and transitional ones. An example of this state of things is to be found in the class of Vascular Cryptogams ; the chief types of which are separated by wide gaps, only partially filled in by the fossil remains of extinct connecting forms.

The whole class has a fragmentary look, and in fact represents only the fragments of a class, once dominant, but now decimated, partly by the inroads of other lines of evolution, partly by desertion, its own members forming for themselves new lines of evolution.

Quite the reverse is the case with the types predominating at present and not represented in palæozoic ages. Such groups abound in forms in their earliest development ; in types connected

amongst each other in different directions, like the meshes of a net work ; in species which run into each other, and in varieties which aspire to the dignity of species. Examples of this kind are the Compositæ, the Umbelliferæ, the Cruciferæ, the Leguminosæ, the Grasses, etc., which form the delight of the monographist, the despair of the universal botanist. So we find that the fragmentary condition of a type, that is, the small number of species, the well defined character of the genera, and the absence of intermediate forms, is a peculiarity of ancestral types but little changed from the forms preserved in a fossil state. Such a type, disconnected as it is, will show certain general affinities with classes which in their living representatives differ widely from them in the most essential parts of their organization. For instance the Cycadaceæ, easily to be separated from their nearest relatives the Conifers, exhibit analogies with the ferns, among the Vascular Cryptogams, and the palms among Monocotyledons ; classes now entirely different but evidently in times of which we possess no fossil records, more nearly connected, and of common parentage.

The peculiarities of the modern types are the direct opposite, for instance in Compositæ, Umbelliferæ, Cruciferæ, etc., whose sharply defined characters distinguish them clearly, leaving no room for doubt or uncertainty to even the inexperienced observer. The greatest difficulty is found in distinguishing the species and genera, which seem to run into each other in all directions.

Another peculiarity inherent in modern types, is the fact that they are all surrounded by subordinate types, which partake in different degrees of the family character, but are anomalous in other points, and may be likened to islands round a continent. Such subordinate types are Campanulaceæ, and Lobeliaceæ, which must be considered dependencies of the Compositæ; Cornaceæ, and Araliaceæ, tributary to Umbelliferæ; Papaveraceæ, Fumariaceæ, and Capparidaceæ, which group themselves round Cruciferæ.

These groups are fragments of an ancestral condition, through which at some remote period the respective types have passed, when their characters were not yet so firmly established, and when their variability was comprised within wider limits.

They represent forms not entirely ancestral, but more ancient than the bulk of the type, and as such partake to a certain extent of the peculiarities of ancestral types; that is, their species are easily distinguishable, but the types themselves frequently show a tendency to connect with lines of evolution at present distant from their own. For instance, Cornaceæ, and Araliaceæ, dependencies of the Umbelliferæ, approach in *Cornus*, *Viburnum* of the Caprifoliaceæ, a dependency of the Rubiaceæ, and by the Araliaceæ they connect with Saxifragaceæ. The Papaveraceæ, a dependency of Cruciferæ, connects especially in some of our Californian forms with Loasaceæ, and Resedaceæ, which belong to the *Viola-Passiflora* series.

In most of the lines of evolutions it is easy to point out the most developed type of family, for it exhibits a sum of well defined, constant characteristics; but it is very different in regard to the lowest or most ancestral types of a series, for the very reason that it bears the germ of many variations, and even partakes of characters which still connect it with different branches of its own ancestral line, but which have been obliterated in the more specified characters of its modern descendants.

As such ancestral lines usually branch repeatedly, each branch the prototype of a line of evolutions, the difficulty of finding the ancestral starting point of modern well-defined families, may be imagined.

Our own Californian *Calycanthus* may serve as an example of such an ancestral type or starting point. It is intermediate between Rosaceæ and Myrtaceæ, so that with equal plausibility it may be considered the first step to each of these evolutions. At the same time it partakes of the characters of the Monimiaceæ, which are themselves an ancestral type of equal ambiguity, leading on one side through *Myristica* to the Lauraceæ, on the other through *Anona* to Dilleniaceæ, and to Ranunculaceæ, combining by these different relationships the two primary divisions of Dicotyledons; Calycifloræ with the Aphanocyclicæ.

Here we have one of the centres from which modern types have radiated, and there is but little doubt that several such centres sprang from a prev-

ious common centre; but here even the fossil material fails or becomes so scanty, unreliable and ambiguous, that all systematic theorizing is unsafe. Nevertheless we have to construct in imagination the pedigree of the vegetable families, as branching off from a common centre; even where practically the undefined character of the more ancestral types renders it, so to say, very difficult to trace the root of their pedigree.

At the same time we easily recognize the more modernized types, or as we may call them, the higher evolutions, because their characters are sharply defined and well established.

The philosophical plan of classification would be to begin with the ancestral types and follow them through all their ramifications to the most modern. It is a charming idea if it could only be done, but it is about as feasible as to unwind a ball of yarn from the centre.

The following are a few of the rules by which an evolutionary system of botanical classification may be constructed.

1. The beginning of all organic life is in the water.

This axiom holds good equally in the animal and vegetable kingdoms. The lowest or ancestral types of nearly all the evolutionary lines of plants which exist at present, are aquatic. It is, however, difficult to use them in classification, partly on account of their present fragmentary condition, many of the connecting links being extinct; partly by

the great resemblance among them, the natural affinity of the ancestral types being augmented by characters produced by their being subjected to the same surrounding medium. Even the otherwise well defined divisions of Monocotyledons, and Dicotyledons, which both still exhibit fragmentary proofs of their origin in the water, inosculate by their aquatic members. Of the Gymnosperms, the most ancient of Phanerogams, no aquatic forms are known. They probably existed, but so long ago as to have left no trace.

Among the Monocotyledons, *Lemna* leads through *Pistia* to the Aroideæ and the Palms. Its relative *Naias* connects through *Alisma*, with *Commelyna*, and the Glumaceæ, as well as the Coronariæ; and by *Stratiotes* with the epigynous chain of Monocotyledons. Besides this the resemblance of *Alisma* to the Ranunculaceous chain, with its many aquatics, is more than a mere analogy, and furnishes us with a link connecting the aquatic Monocotyledons, and Dicotyledons.

Podostemoneæ, Ceratophylleæ, Callitrichaceæ are ancestral forms of Aphanocyclicæ, and Tetracyclæ. Hippuridæ undeniable Perigynæ, leading through Halorrhagideæ to Onagrariæ, and Myrtaceæ. So we find that the water has preserved a circle of ancestral forms from which have radiated each of the great divisions of Angiosperms.

2. An established numeric law indicates a higher evolution than an indefinite number. For instance, Pentandria and its multiples among Dic-

otyledons, and Triandria and its multiples among Monocotyledons, as compared to the indefinite number of parts occurring in related members of the same classes.

3. A well established and persistent reduction of number in parts, indicates a progress as compared to their correspondence ; for the correspondence must have existed before the exception could establish itself as a rule. For instance Amygdaleæ with one ovary developed into a drupe, as compared with the nearly related Spirææ, with several, usually five, ovaries.

4. A well established morphological law is a progress ; *i. e.* a well-defined difference of calyx, corolla, stamens and seed leaves, is a progress as compared to the spiral development, with its transitional forms intermediate between sepals and petals—petals and stamens, as they are found in Nymphæaceæ, Magnoliaceæ, Ranunculaceæ, etc. Even where the circles are well defined but similar in structure, they indicate a lower stage of evolution than when the structure differs. For instance, the calyx of the Ranunculaceæ, compared to the well defined calyx of the Caryophyllaceæ, or the entirely differentiated and transformed one (Pappus) of the Compositæ.

5. A difference in the proportion of parts, indicates a progress, when the disproportion is well defined and persistent, as in Didynamia, or Tetradynamia, because an established disproportion can only be developed out of an established equality.

6. A consolidation of parts among each other or with another circle, indicates a progress ; because they are originally separate.

7. The more the structure of parts deviates from the original, the more advanced it must be considered. The four circles of the floral parts are a proof of progress in themselves, as petals are more distant from the original structure than sepals, stamens more than petals, etc.

This law becomes most apparent in the ovary, where the single seed leaf can be followed through all its evolutions. The least differentiated, and in consequence lowest form, is the ovule-bearing bract of the Cycadaceæ. In the Angiosperms a long series of evolutions may be traced.

First, the simple Follicle, only to be distinguished from a rolled-in leaf with clasping margins, by its function ; then the Legume, with a second dehiscence splitting the midrib of the seed-leaf ; then the Drupe, where the three layers of the leaf become changed in a peculiar manner. It would occupy too much space to follow the evolutions of the compound ovary from the distinct seed leaves, through the septicidal, to the loculicidal, and septifragal capsule, to berry, pomum, etc.

Besides the line of ovarian evolutions, we have here to consider another which hides its progress under an apparent depauperation or retrogression. The transformation of the seed-leaf takes the course of consolidation. The first step is the Schizocarp, and its varieties Lomentum, and Coc-

cus ; the second, Samara and Akene ; the third, where the consolidation of seed and seed-leaf is the most perfect, Caryopsis ; and even that is surpassed, where bract and stem, or calyx, take part in the formation, and the Syncarpium, is the consolidation of an entire inflorescence.

8. The distribution of organic functions to different individuals, or different parts of the same individual, is often the indication of a degree of evolution. It is a singular fact that since the time of Linné, hermaphrodite flowers have been considered higher in the scale than the diclinic, when in the animal kingdom we justly take an opposite view of the case. The highest position in the line of sexual evolution is found in families like the Grasses and Compositæ, where the sexes occupy regularly and constantly, the same position in an inflorescence, the male, perhaps with the sole exception of a few grasses, and Euphorbiaceæ, showing a centripetal, the female a centrifugal tendency.

The diclinous habit of the Gymnosperms, in every respect the lowest of the Phanerogams, cannot be used as an argument against the high evolution of diclinous plants in general, as their flowers are not yet individualized out of the state of an inflorescence, and partake still in many points of the peculiarities of the Heterosporous Cryptogams.

9. An established inflorescence, persistent in form, indicates evolutionary progress, as compared to variable or ill-defined forms. For instance, the capitulum of the Compositæ, the umbels of

the Umbelliferæ, the corymb elongating into the raceme of the Cruciferæ, the spikelets of the Grasses are all high developments compared to the variable inflorescence in Rubiaceæ, Saxifragaceæ, Rosaceæ, and Liliaceæ, where in most instances can be traced their gradual development out of solitary axillary flowers whose supporting leaves represent bracts, frequently still showing the transitional stages.

I must add here an observation in regard to the geographical distribution of the higher evolutions. Their proportion increases in the Northern Hemisphere, while the greater number of ancestral types have been preserved in the Tropics, and in the Southern Hemisphere, where arborescent ferns, and conifers of otherwise fossil type, are still found. The preservation of such forms can easily be accounted for by the equable warmth and moisture of a tropical climate, but it is more difficult to explain the existence of these types in the Temperate Zone of the Southern Hemisphere. It may be that they owe their preservation under less propitious skies, to the isolation of the continents, and perhaps also to the circumstance that agriculture and civilization entered that part of the globe at a comparatively late period, so that the decimation of ancestral forms by the struggle for existence did not begin so soon as in the Northern Hemisphere with its many centres of civilization.

The arrangement of the genera in this volume is not, I am aware, in strict accordance with the

rules just given. For instance the Julifloræ nearly all belong to the Tetracyclæ, near Malvaceæ, and Anacardiaceæ; the Monochlamydeæ to the Aphanocyclæ; but I did not wish to make such sweeping changes in our hereditary botanical classification.

H. H. BEHR.

VASCULAR PLANTS.

CLASS I. PHANEROGAMÆ.

Sub-CLASS I. ANGIOSPERMÆ.

DIVISION I. DICOTYLEDONES.

SERIES I. TETRACYCLICÆ. (Plants with a tendency to arrangement of the floral parts in four well-defined circles, and with a well-established numeric (quinary) law.)

Sub-SERIES I. GAMOPETALÆ. (Petals consolidated)

SECTION ANISOCARPICÆ. (Number of carpidia less than 5.)

Sub-SECTION EPIGYNÆ. (Ovary inferior.)

ORDER I. SYNANDRÆ. (Stipules 0.)

FAMILY I. Compositæ.

Inflorescence capitulate. Calyx changed into pappus. Anthers syngenetic. Ovary 1-locular. 1-seeded; fruit an akene.

SUB-FAMILY Tubulifloræ.

Flowers, at least of the disk, tubular.

TRIBE I. **Asteroideæ.**

Anthers without tails. Style branches of disk flowers, flat with an appendage. Leaves alternate.

a. *Parts of the pappus of definite number.*

1. **Gutierrezia**, Lag.

Superflua. Heads few-flowered; ray flowers about 3, ligulate; disk flowers about 5. Scales of the involucre coriaceous, imbricate, their tips green, reflexed. Akenes terete; pappus of about 9, paleaceous scales.

4. $\frac{1}{2}$. flowers yellow.

2. **Grindelia**, Willd.

Superflua. *Æqualis*. Head ∞ -flowered; ray flowers ligulate, 1-seriate. Scales of the hemispherical involucre imbricate in several series, their green tips squarrose. Akenes compressed; pappus aristate.

Resinous herbs; flower buds before opening, bearing a drop of milky-looking resin.

4. $\frac{1}{2}$. flowers yellow.

3. **Pentachæta**, Nutt.

Superflua. *Æqualis*. Ray flowers variable, or altogether wanting. Scales of the involucre lanceolate, scarious on the margin and tip, loosely imbricate in about 2 series. Receptacle convex. Pappus about 5, scabrous bristles,

shorter than the disk corolla, sometimes depauperate.

⊙. small vernal herbs; flowers of the ray yellow, white.

b. *Parts of the pappus* ∞.

4. **Lessingia**, Cham.

Æqualis. Superflua. Ray flowers with palmate limb. Receptacle flat, naked. Akenes compressed, silky-villous; pappus 1-seriate; bristles ∞, scabrous, rigid.

⊙. flowers purple, yellow.

5. **Chrysopsis**, Nutt.

Superflua. Æqualis. Head ∞-flowered; ray flowers ligulate. Akenes compressed; pappus 2-seriate, outer row short, paleaceous scales; inner row, long, scabrous bristles.

♂. flowers yellow.

6. **Aplopappus**, Cass.

Superflua. Æqualis. Head ∞-flowered. Ray flowers ligulate. Bristles of the pappus ∞.

♂. ♀. rigid autumnal plants; flowers yellow.

7. **Bigelovia**, D. C.

Æqualis. Superflua, by 1 ray flower. Head few-flowered. Receptacle narrow. Pappus 1-seriate; bristles ∞.

♂. ♀. autumnal plants; flowers yellow.

8. **Solidago**, L.

Superflua. Head ∞ -flowered; ray flowers ligulate, few, distant from each other. Akenes terete, ∞ -costate; pappus of ∞ , capillary bristles.

24. autumnal, suffrutescent plants, with long rod-like branches; flowers yellow.

c. Ray flowers never yellow.

9. **Aster**, L. (Nees).

Superflua. Head ∞ -flowered; ray flowers 1-seriate, ligulate. Scales of the involucre imbricate. Style appendages triangular-lanceolate to subulate. Pappus of copious, capillary, scabrous bristles.

24. flowers rose color, white, blue.

10. **Corethrogyne**, D. C.

Frustranea. Head ∞ flowered; ray flowers ∞ , 1-seriate. Scales of the involucre imbricate. Style appendages of disk flowers with tuft-like bristles. Pappus of simple, unequal, rigid bristles.

24. flowers blue, purple ; habit of Aster.

11. **Erigeron**, L.

Superflua. Necessaria. Head ∞ -flowered ; ray flowers ∞ -seriate, ligulate. Scales of the involucre imbricate, linear. Pappus scanty, of scabrous, capillary bristles.

24. flowers blue, white ; habit of Aster.

12. **Baccharis**, L.

Diœcious. Head without ray flowers. Scales of the involucre ∞ -seriate, imbricate. δ corolla tubular, with 5-cleft limb. Pappus capillary, 1-seriate. ♀ corolla filiform, truncate; pappus copious, capillary.

$2\text{f. } \frac{1}{2}$.

TRIBE II **Inuleæ**.

Anthers with tails (sagittate). Style branches without appendages.

13. **Pluchea**, Cass.

Superflua. Necessaria. Head ∞ -flowered. ♀ flowers ∞ -seriate, tubular. Scales of the involucre ∞ -striate, ovate, imbricate. Receptacle flat, naked. Pappus 1-seriate, capillary.

2f. flowers rosy. Salt marshes.

14. **Adenocaulon**, Hook.

Necessaria. Head few-flowered, all the flowers tubular. Anthers sagittate, not tailed. Scales of the involucre 5, 1-seriate, herbaceous, at length reflexed. Receptacle flat, naked. Akenes exserted, obovate, glandular near the summit; pappus 0.

$\odot$. flowers pale.

15. **Micropus**, L.

Necessaria. Superflua. Head few-flowered, all flowers tubular. δ 5, ♀ 5, embraced by

the scales of the involucre. Involucre 2-seriate. Receptacle narrow, naked. Akenes falling off with the embracing scales of the involucre; pappus 0.

☉. flowers inconspicuous.

16. **Psilocarphus**, Nutt.

Necessaria. Superflua. Head ∞ -flowered; ♂ flowers few, tubular, 5-dentate. ♀ ∞ -seriate, filiform, each wrapped in a palea. Scales of the involucre few, scarious; receptacle convex, externally paleaceous, naked in the centre; akenes enveloped in the paleæ; pappus 0.

☉. flowers inconspicuous.

17. **Stylocline**, Nutt.

Necessaria. Superflua. Head ∞ -flowered; ♂ flowers tubular, few; ♀ flowers ∞ -seriate, filiform, involucre by paleæ but not enwrapped. Pappus a few caducous bristles.

☉. flowers inconspicuous.

18. **Evax**, Gaertn.

Necessaria. Superflua. Head ∞ -flowered; ♂ flowers tubular, few; ♀ flowers ∞ -seriate, filiform. Scales of the involucre few 1—2-seriate, scarious. Receptacle elongate (like the axis of a spike), paleaceous externally, naked in the centre with the ♂ flowers. Pappus 0.

☉. flowers inconspicuous.

19. **Filago**, L.

Superflua. Head ∞ -flowered ; σ flowers tubular, 4-dentate : φ flowers ∞ seriate, filiform ; external rows hidden between the scales of the involucre and the paleæ. Scales of the involucre imbricate, similar to the paleæ. Receptacle elongate (like the axis of a spike). Pappus of ∞ , capillary bristles, depauperated towards the periphery. External row, φ flowers ; pappus 0.

⊙. flowers inconspicuous.

20. **Anaphalis**, DC.

Necessaria. Superflua. Head ∞ -flowered ; σ tubular, 5-dentate ; style undivided, blunt : φ flowers ∞ -seriate filiform. Scales of the involucre imbricate, ∞ -seriate, radiating ; external rows ovate ; internal longer and narrower ; receptacle flat, naked ; pappus of 1-seriate, distinct, scabrous bristles. 24.

21. **Gnaphalium**, L.

Superflua. Head ∞ -flowered ; σ flowers tubular, 5-dentate ; style 2-cleft : φ filiform, ∞ -seriate ; involucre, ovate ; scales imbricate, ∞ -seriate, scarious, as long as the head ; receptacle flat, naked ; pappus of 1-seriate, capillary bristles.

⊙. 24. flowers pale.

TRIBE III. **Ambrosiæ.**

♂ or ♂ flowers: anthers distinct, not syngentic; style abortive, truncate. ♀ flowers: corolla rudimentary, or wanting; pappus 0.

22 **Iva, L.**

Necessaria. Superflua. Head ∞ -flowered.

♂ or ♂: flowers ∞ , tubular, 5-lobed; style truncate; anthers distinct. ♀: flowers few, 5-dentate; scales of the involucre 3—4, ovate; paleæ of the receptacle, linear; pappus 0. 24.

23. **Ambrosia, DC.**

Monœcious. ♂ head ∞ -flowered; scales of the involucre united into a cup; anthers distinct; style truncate; receptacle flat, naked. ♀ head 1-flowered; scales of the involucre united into a cup; corolla 0; akene enclosed in the persistent involucre. ☉. 24.

24. **Franseria, Cav.**

Monœcious. ♂ head ∞ -flowered; scales of the involucre united into a cup; anthers distinct; style truncate; paleæ of the flat receptacle filiform. ♀ head 1, sometimes, 4-flowered; scales of the involucre united into a cup; if the head be more than 1-flowered, the cup forming as many cells as there are flowers; involucre armed with ∞ rows of spines; akenes inclosed in the persistent involucre. 24.

25. **Xanthium**, Tourn.

Monœcious. ♂ head ∞ -flowered ; scales of the involucre 1-seriate, distinct ; anthers distinct ; receptacle cylindrical, paleaceous. ♀ head 2-flowered ; scales of the involucre united into a cup, armed with hooked spines ; corolla filiform ; akenes inclosed in the persistent involucre. ☉.

TRIBE IV. **Heliantheæ**.

Anthers without tails. Receptacle paleaceous. Pappus not capillary.

a. *Paleæ Persistent*.26. **Balsamorhiza**, Hook. Nutt.

Superflua. Head ∞ -flowered ; ray-flowers lanceolate. Receptacle flat, paleaceous. Pappus 0.

24. flowers yellow.

27. **Wyethia**, Nutt.

Superflua. Head ∞ -flowered ; ray-flowers lanceolate. Scales of the involucre 2—3-seriate ; external ones foliaceous ; internal paleaceous. Receptacle flat, paleaceous. Pappus cup-shaped or aristate, persistent.

24. flowers yellow.

28. **Helianthella**, Torr & Gray.

Frustranea. Head ∞ -flowered. Receptacle

flat, paleaceous. Akenes flattened; pappus 2, marginal, persistent, aristæ; alternating with 2 caducous paleæ.

24. flowers yellow.

29. **Helianthus**, L.

Frustranea. Head ∞ -flowered. Receptacle flat, paleaceous. Akenes slightly compressed (quadrangular); pappus 2, marginal, caducous, paleæ with minute, intermediate ones.

⊙. 24. ray-flowers yellow.

b. *Paleæ deciduous*.

30. **Pugiopappus**, Gray.

Superflua. Head ∞ -flowered; ray-flowers broad, deeply crenate. Involucre 2-seriate. Pappus of the disk 0; of the ray 2 aristæ.

⊙. flowers yellow; leaves alternate.

31. **Leptosyne**, DC.

Superflua. Head ∞ -flowered; rays broad, deeply crenate. Involucre 2-seriate. Pappus 0.

⊙. flowers yellow.

32. **Bidens**, L.

Frustanea. *Æqualis*. Head ∞ -flowered. Involucre 2-seriate. Pappus 2—4, echinate aristæ.

⊙. 24. flowers yellow, white; leaves opposite.

33. **Madia**, Molina.

Superflua. Necessaria. Æqualis. Ray-flowers ligulate, 3-dentate, scarcely longer than the involucre. Involucre 1-seriate, herbaceous; scales carinate, complicate, embracing the ray akenes. Receptacle naked in the centre, with 1—2 rows of paleæ between the disk and ray. Akenes laterally compressed; pappus 0 in the ray; in the disk usually 0.

☉. 24. viscid, resinous, flowers yellow.

34. **Hemizonia**, DC.

Necessaria. Superflua. Ray-flowers ligulate, dentate, scarcely longer than the involucre. Involucre 1-seriate, with concave scales embracing the ray-akenes. Receptacle flat, naked in the centre, with a row of paleæ between disk and ray or sometimes throughout. Akenes of the ray convex externally, flat internally; pappus 0, or plumose in the ray; scaly, aristate, plumose or 0 in the disk.

☉. viscid, resinous, flowers yellow, white.

35. **Holozonia**, Greene.

Necessaria. Superflua. Disk-flowers ∞ ; ray-flowers 5—8, cuneiform, 3-cleft. Scales of the involucre corresponding in number to the ray-flowers, and completely embracing each akene. Receptacle flat, the paleæ united into

a cup enclosing the disk flowers ; pappus of the disk generally 0; of the ray hyaline, spreading.

24. flowers white.

36. **Lagophylla**, Nutt.

Necessaria. Superflua. Ray-flowers 5, cuneiform, 3-lobed. Involucre of 5 scales, acuminate, with scarious margins, each completely enclosing the corresponding ray-akene. Receptacle flat, with 5 paleæ between the disk and ray ; pappus 0.

☉. flowers yellow, whitish.

37. **Layia**, Hook & Arn.

Superflua. Head ∞ -flowered ; ray-flowers cuneiform, 3-dentate. Involucre 1-seriate, herbaceous ; scales acuminate, with scarious margins, completely enclosing the ray-akenes. Receptacle flat, with a row of paleæ between disk and ray, or paleaceous throughout. Ray-akenes linear, attenuate at the base, and with a flat areola at the top ; pappus of the disk various ; of the ray 0.

☉. flowers yellow ; or tipped with white.

38 **Achyrachæna**, Schauer.

Superflua. Ray-flowers short and hidden. Involucre 1-seriate ; scales with scarious margins, embracing the akenes of the ray. Receptacle flat, naked in the centre, palæaceous to-

wards the margin. Akenes clavate, those of the disk truncate, those of the ray with an epigynous disk ; pappus of about 10, shining, silvery scales, in two series ; the outer considerably shorter than the alternate inner ones.

⊙. flowers yellow, or whitish.

TRIBE V. **Helenieæ.**

Receptacle not paleaceous. Scales of the involucre herbaceous. Pappus not capillary.

39. **Coinogyne**, Less. (*Jaumea*, Pers.)

Superflua. Involucre 2-seriate, imbricate : scales rounded. Receptacle conical, naked. Pappus 0.

4. flowers yellow, leaves opposite, fleshy.

40. **Burriellia**, DC.

Superflua. Ray-flowers few and short. Scales of the involucre 5, ovate. Receptacle subulate, naked. Pappus of the ray 2 aristæ (sometimes 0), as long as the corolla ; of the disk 4.

⊙. flowers yellow ; leaves opposite.

41 **Bæria**, Fisch. & Mey.

Superflua. Ray-flowers ovate, exserted. Scales of the involucre 10, ovate. Receptacle conical, naked, rough. Akenes angled or nerved ; pappus paleaceous, or aristate, sometimes wanting.

⊙. flowers yellow ; leaves opposite.

42. **Eriophyllum**, Lag. (*Bahia*, Lag.)

Superflua. Ray-flowers ovate, exserted. Scales of the involucre lanceolate, united at the base. Receptacle naked, alveolate. Pappus 4, 8 or 12, membranaceous scales, costate, (thickened) at the base.

24. $\frac{1}{2}$. flowers yellow.

43. **Monolopia**, DC.

Superflua. Scales of the involucre united into a dentate cup. Receptacle conical, naked, papillate. Pappus 0.

☉. flowers yellow.

44. **Lasthenia**, Cass.

Superflua. Scales of the involucre united into a dentate cup. Receptacle conical, naked, papillose. Akenes linear compressed; pappus 5—10 firm scales, sometimes 0.

☉. flowers yellow.

45. **Rigiopappus**, Gray.

Superflua. Scales of the involucre linear, erect, rigid, half embracing the akene. Receptacle flat, naked; pappus 3—5 aristæ.

☉. flowers pale; leaves alternate.

46. **Chænactis**, DC.

Æqualis. Flowers of the ray tubular, but frequently enlarged. Involucre hemispherical;

its scales narrow. Receptacle flat. Pappus 4—12, obtuse, chaffy scales.

☉. flowers yellow, white, flesh-color.

47. **Helenium**, L.

Superflua. Flowers of the ray palmate. Involucre 2-seriate; external scales ∞ , narrow, foliaceous, spreading, at length reflexed; internal few, paleaceous. Receptacle globular, naked. Pappus 5—12, membranaceous paleæ.

☿. flowers yellow, disk purple, leaves alternate.

48. **Blennosperma**, Less.

Necessaria. Ray-flowers ovate, ligulate, without tube. Scales of the involucre 1-seriate, membranaceous. Receptacle flat, naked. Akenes pyriform, papillate, gelatinous when wetted; pappus 0.

☉. flowers pale yellow; leaves alternate.

TRIBE VI **Anthemideæ**

Receptacle not paleaceous. Scales of the involucre scarious. Pappus not capillary.

49. **Achillea**, L.

Superflua. Head ∞ -flowered; ray-flowers 5—6, ligulate, ovate. Involucre ovate; scales imbricate, those of the receptacle hyaline. Akenes ob-compressed, marginate; pappus 0.

☿. flowers white, red, yellow.

50. **Anthemis**, L.

Superflua. Ray-flowers ligulate. Scales of the involucre imbricate. Receptacle convex or conical, paleaceous. Akenes ribbed; pappus 0.

⊙. 4. flowers white.

51. **Chrysanthemum**, L.

Superflua. Involucre hemispherical, spreading; scales ∞ -seriate, imbricate, appressed. Receptacle not conical, naked. Akenes short, somewhat terete, costate, truncate at the apex; pappus 0.

⊙. 4. flowers white, yellow.

52. **Matricaria**, L.

Superflua. *Æqualis*. Scales of the involucre imbricate. Receptacle conical, naked. Akenes angulate; pappus coroniform or 0.

⊙. flowers white.

53. **Tanacetum**, L.

Æqualis. Superflua. Ray-flowers not ligulate. Receptacle convex, naked. Akenes, angulate, with large epigynous disk; pappus coroniform or 0.

4. flowers yellow.

54. **Artemisia**, L.

Æqualis. Superflua. *Necessaria*. Ray-flowers tubular. Scales of the involucre dry, with

scarious margin. Receptacle naked or villous. Akenes obovate with small epigynous disk; pappus 0.

24. 2. heads small; flowers yellowish.

55. **Cotula**, L.

Superflua. Corolla of ray-flowers wanting. Receptacle flat, naked, papillose. Akenes compressed, winged, those of the ray stipitate; pappus 0.

☉. flowers yellow.

56. **Soliva**, Ruiz. & Pavon

Necessaria. Superflua. Ray-flowers ∞ , without corolla. Style scarcely divided, persistent. Receptacle flat, naked. Akenes ob-compressed, winged, crowned by the style, sessile; pappus 0.

☉. flowers inconspicuous.

TRIBE VII. **Senecionidæ**.

Receptacle paleaceous. Pappus capillary.

57. **Nardosmia**, Cass.

Monœcia. Necessaria. Heads dimorphous. ♂ or ♀ head—♂ flowers ∞ ; ♀ flowers few; ♀ or ♂ head—♀ or ♂ flowers few; ♀ flowers ∞ . Involucre 1-seriate, bracteolate. Receptacle naked. Akenes glabrous, ribbed; pappus of copious, capillary bristles.

24. flowers pale, vernal before the leaves.

58. **Senecio**, L.

Superflua. *Æqualis*. Involucre 1-seriate, bracteolate. Receptacle naked. Pappus capillary.

☉. 2♂. ½. flowers yellow.

59. **Arnica**, L.

Superflua. Ray flowers elongate, with distinct but sterile anthers. Involucre 2-seriate. Pappus capillary.

2♂. flowers yellow.

TRIBE VIII. **Eupatoriaceæ**.

Style branches club-shaped. *Æqualis*.

60. **Bulbostylis**, DC. (*Brickellia*, Ell.)

Scales of the involucre imbricate, 2—3-seriate. Receptacle flat, naked. Margin of the tubular corolla, minutely 5-dentate. Style bulbous at base. Akenes 10-striate; pappus 1-seriate, bristly, scabrous.

2♂. ½. flowers pink or white; leaves opposite.

61. **Adenostyles**, Cass

Scales of the involucre 1-seriate, few. Receptacle flat, naked. Margin of the corolla 5-lobed, campanulate. Akenes 10-striate; pappus ∞-seriate, silky

2♂. flowers pale.

SUB-FAMILY **Ligulifloræ.**TRIBE I. **Cynaroideæ.**

Style branches concreted. Corolla deeply 5-cleft. Receptacle bristly.

62. **Cnicus**, L.

Æqualis. Scales of the involucre ∞ -eriate, imbricate, ending in a spine. Pappus deciduous, ∞ -seriate; bristles plumose, connected at their base into a ring. Filaments syngenetic.

☉. flowers red, white, yellow.

63. **Silybum**, Vaill.

Æqualis. Pappus ∞ -seriate; bristles rigid. Filaments monadelphous.

☉. flowers purple.

64. **Carthamnus**, Tourn.

Æqualis. Pappus none.

☉. flowers yellow.

65. **Centaurea**, L.

Frustranea. Æqualis. Involucre imbricate. Ray-flowers funnel-shaped. Pappus of ∞ , scabrous, filiform, bristles.

☉. 24. flowers blue, red, white, yellow.

TRIBE II. **Cichoriaceæ.**

All flowers ligulate.

66. **Microseris**, Don.

Involucre 2-seriate or imbricate. Receptacle flat, naked. Akenes more than 5-costate, with a callosity at the place of insertion; pappus paleaceous, aristate, bristly, plumose, or sometimes wanting. Inflorescence in a scape.

⊙. 2. flowers yellow.

67. **Stephanomeria**, Nutt.

Head few-flowered. Involucre 1-seriate, calyculate. Receptacle flat, naked. Akenes 5-costate, with a callosity at their place of insertion; pappus 1-seriate, bristly, plumose, white, coalescent.

⊙. flowers pink, whitish.

68. **Rafinesquia**, Nutt.

Head ∞ -flowered. Involucre 1-seriate, calyculate. Receptacle flat, naked. Akenes rostrate with a callosity at base; pappus white, plumose, capillary, coalescent.

⊙. flowers white.

69. **Hypochaeris**, L.

Involucre imbricate. Receptacle paleaceous; paleæ deciduous. Akenes rostrate; pappus plumose.

⊙. 2. flowers yellow.

70. **Malacothrix**, DC.

Receptacle flat, naked. Akenes truncate; pappus 1-seriate; bristles, scabrous silvery, deciduous in a ring.

⊙. flowers yellow, purple, white.

71. **Troximon**, Nutt.

Involucre imbricate. Akenes linear; apex contracted; pappus ∞ -seriate; bristles silky, not deciduous in a ring.

⊙. 24. flowers yellow, purple.

72. **Taraxacum**, Haller.

Involucre imbricate. Akenes contracted into a long beak; pappus ∞ -seriate; bristles white, capillary, nearly persistent.

24. flowers yellow.

74. **Hieracium**, Tourn.

Involucre ∞ -seriate, imbricate. Akenes terete, with a thin, crenulated ring at the apex; pappus 1-seriate, capillary.

24. flowers yellow, orange.

75. **Sonchus**, L.

Involucre ∞ -seriate, imbricate. Akenes compressed, truncate; pappus ∞ -seriate, capillary; hairs in fascicles and soft.

⊙. 24. flowers yellow.

FAMILY II. *Campanulaceæ*.

Calyx superior, 5-cleft. Stamens 5, alternating with the divisions of the gamopetalous corolla, and inserted between the corolla and ovary; anthers introrse. Ovary 2—5-locular; loculi ∞ -ovulate; placentæ central; style 1: stigmas 2—5. Fruit capsular. Leaves alternate.

Lactescent herbs.

1. *Githopsis*, Nutt.

Calyx-tube clavate, 10-costate; with five narrow, persistent lobes. Corolla campanulate, 5-lobed. Filaments 5, membranaceous. Ovary 3-locular; stigmas 3. Capsule club-shaped, 10-costate, enclosed by the calyx, opening by a round hole at the apex. Seeds ∞ .

☉. dwarfish; flowers blue.

2. *Specularia*, Heister.

Calyx-tube elongated; lobes 5, narrow. Corolla rotate, 5-lobed. Filaments 5, membranaceous. Capsule elongated, opening by parietal valves near the apex. Seeds ∞ .

☉. flowers blue.

3. *Campanula*, Tourn.

Calyx-tube turbinate. Corolla campanulate. Filaments 5, membranaceous at the base. Capsule turbinate, opening by parietal valves.

☉. 4. flowers blue.

4. *Heterocodon*, Nutt.

Early flowers cleistogamic; later ones expanding. Calyx turbinate. Corolla campanulate. Capsule membranaceous, turbinate, opening irregularly.

☉. flowers blue.

FAMILY III. *Cucurbitaceæ*.

Monœcious or diœcious. ♂ : stamens 5, triadelphous; loculi of anthers contorted, flexuous. ♀ : ovary 2—5-locular, placentæ parietal; style 1, stigmas 3.

1. *Megarrhiza*, Torrey.

Monœcious. ♂ flowers racemose. ♀ flowers single from the axil of the ♂ raceme. Limb of calyx, minutely 5-dentata. Corolla rotate, deeply 5-lobed. Fruit a berry. Seeds large, globose.

4. root large; stem climbing by tendrils; flowers greenish white.

ORDER II. RUBIALES.

Epigynous. Stamens inserted into the corolla, alternate with its lobes. Leaves opposite.

FAMILY IV. *Dipsaceæ*.

Stipules none. Flowers in involucrate heads: single ones protected by a double, involucellate

calyx, tetrandrous. Ovary 1-locular, 1-ovulate. Fruit utricular.

1. **Dipsacus**, Tourn.

Inflorescence capitate. Head oblong. Leaflets of the involucre radiate. External calyx quadrangular; internal cyathiform.

⊙ ⊙. thorny.

FAMILY V. **Valerianaceæ**.

Stipules none. Inflorescence cymose. Calyx pappus-like. Ovary 3-locular, 2 sterile, and the fertile one 1-ovulate. Fruit an akene.

1. **Plectritis**, DC.

Limb of calyx straight, entire, obsolete. Tube of the corolla gibbous; limb 5-cleft, 2-labiate; triandrous. Akene winged by the persistent, sterile loculi.

⊙. flowers rose colored, white.

FAMILY VI. **Caprifoliaceæ**.

Leaves opposite; stipules none.

1. **Lonicera**, L.

Calyx limb small, 4-dentate. Corolla tubular or campanulate; limb irregular 5-cleft. Style filiform. Berry 3-locular; loculi few-seeded.

h. often climbing.

2. *Symphoricarpus*, Cass.

Calyx limb 5—4-dentate, persistent. Corolla funnel-shaped, 5—4-lobed. Ovary 4-locular; two loculi ∞ -seeded but abortive, alternating with two, 1-seeded and fertile; style filiform. Berry 4-locular, 2-seeded.

$\frac{1}{2}$. flowers white, pink.

3. *Sambucus*, Tourn.

Limb of the calyx 5-dentate. Corolla rotate, regular. Ovary 3—5-locular; loculi 1-ovulate; styles, none; stigmas 3—5. Fruit a 3—5-seeded berry.

$\frac{1}{2}$. flowers white.

FAMILY VII. *Rubiaceæ*.

Leaves verticillate or opposite, and stipitate.

1. *Galium*, L.

Limb of the calyx entire, obsolete. Corolla 4—3-cleft, rotate. Ovary 2-locular; loculi 1-ovulate; styles 2, connate at base, capitate at apex. Fruit sometimes fleshy.

☉. 2. $\frac{1}{2}$. stems quadrangular, leaves verticillate; flowers yellow, white.

2. *Asperula*, L.

Limb of calyx 4-dentate, nearly obsolete. Corolla funnel-shaped. Styles 2, connate at the base, capitate at the apex. Fruit 2-coccous.

24. 2. upper leaves opposite, lower verticillate.

3. **Cephalanthus**, L.

Flowers capitate. Limb of the calyx 4-dentate. Corolla tubular, slender, with 4-cleft limb. Stamens 4, inserted in the throat of the corolla. Style 1, exserted; stigma capitate; ovary 2—4-locular; loculi 1-ovulate.

2. leaves opposite or verticillate, stipitate.

ORDER III. GENTIANALES.

FAMILY VIII. *Asclepidiaceæ*.

Monadelphous. Anthers extrorse; their pollen changed into pollinaria. Ovaries 2; styles 2, united into a pentagonous stigma. Fruit a pair of follicles. Lactescent plants.

1. **Asclepias**, L.

Corolla rotate, 5-parted. Staminal tube short, expanding into a corona of five cucullate processes, from the cavity of each of which, rises a corniform process; loculi of anthers separated, each connected to the loculus of the neighboring one by an apical appendage; the pollinia becoming suspended over a gland, five of which protude from the margin of the stigma. Seeds ∞ , with a silky arillus. 24.

FAMILY IX. **Apocynaceæ.**

Stamens not monadelphous; anthers introrse. Corolla contorted in æstivation and its lobes oblique. Lactescent plants.

1. **Apocynum**, Tourn.

Corolla campanulate, 5-cleft, with five scales opposite the lobes and near their base; throat naked. Stamens inserted on the base of the corolla; filaments very short; anthers sagittate, with their connective adhering to the stigma. Ovaries 2, with 5, hypogynous scales. Fruit 2-follicular; seeds with a hairy arillus.

2. flowers white, rose-colored.

FAMILY X. **Gentianaceæ.**

Anthers introrse. Lobes of the corolla not oblique. Ovary 1, with 2 parietal placentæ, septicidal or by the meeting of the placentæ 2-locular, ∞ -ovulate. Plants not lactescent.

1. **Erythræa**, Pers.

Calyx tubular, angulate, 5-cleft. Corolla funnel-shaped, withering but not deciduous. Withering anthers spirally contorted. Style filiform, deciduous. Capsule 1-locular, half divided by the prominent parietal placentæ.

⊙. flowers pink.

2. **Microcala**, Link. (*Cicendia*, Adans.)

Calyx costate, 4-dentate. Corolla salver-shaped. Withering anthers not spirally contorted. Style filiform; stigma peltate, or 2-lobed.

☉. dwarfish herbs; flowers yellow.

3. **Gentiana**, L.

Corolla campanulate, 4—5-lobed, withering but not deciduous. Style short or 0; stigma 2-parted, persistent. Capsule septicidal.

☿. flowers blue, yellow, red.

4. **Menyanthes**, Tourn.

Corolla funnel-shaped, induplicate in æstivation, deciduous; limb 5-lobed, bearded in the inside.

☿. aquatic; flowers white.

ORDER IV. DIANDRÆ.

Corolla regular, gamopetalous; petals 4 or 0. Stamens 2. Ovary 2-locular; ovules 1—3.

Trees or shrubs leaves opposite.

FAMILY XI. Oleaceæ.

Æstivation valvate.

1. **Fraxinus**, Tourn.

Flowers diclinous. Calyx 4—3-parted or

0. Corolla 4—2-parted; petals 4, 2 or 0. Ovary 2-locular; loculi 2-ovulate; stigma sessile, 2-cleft. Fruit a samara. $\frac{1}{2}$.

ORDER V. LAMIALES.

Corolla 2-labiate. Number of stamens less than lobes of the corolla. Ovaries 2—4, or ovary 2—4-locular; loculi 1, 2 or 4-ovulate. Fruit akene, drupe or capsule. Leaves opposite; stipules 0.

FAMILY XII. Labiatae.

Ovary 4-cleft, 4-ovulate, inserted on a hypogynous disk. Style 1. Fruit 4 akenes.

1. *Mentha*, L.

Calyx 5-dentate, Tube of corolla included; limb exserted, 4-lobed; upper lobe the largest. Stamens 4, not didynamous, erect, distant; anthers bilocular; loculi parallel. $\frac{1}{2}$.

2. *Lycopus*, Tourn.

Diandrous. Posterior pair of stamens 0, or sterile. Otherwise as *Mentha*. $\frac{1}{2}$.

3. *Pycnanthemum*, Benth.

Corolla tube as long as the calyx; limb 2-labiate; upper lip nearly entire; lower 3-lobed; lobes obtuse. Stamens 4, straight, divergent; loculi of anthers parallel. $\frac{1}{2}$.

4. **Monardella**, Benth.

Limb of the corolla 2-labiate; upper lip 2-cleft; lower 3-cleft; all the lobes narrow. Stamens 4 straight, divergent, loculi of anthers at last divergent or divaricate.

⊙ 2♂. flowers rose-colored, white.

5. **Micromeria**, Benth.

Calyx tubular, 13-nerved, 5-dentate. Corolla 2-labiate. Stamens didynamous, ascending.

2♂. flowers white, rose-colored.

6. **Pogogyne**, Benth.

Calyx campanulate, 15-nerved, 5-dentate; 2 lower teeth much longer than the 3 upper. Corolla 2-labiate. Stamens didynamous, ascending, convergent in pairs. Style villous.

⊙. flowers blue, purple.

7. **Acanthomintha**, Gray.

Calyx tubular, 13-nerved, naked in the throat; upper lip 3-dentate; lower 2-parted, shorter; teeth spinulose. Corolla-tube exceeding the calyx, naked; upper lip curved, entire or 2-lobed; lower 3-lobed. Upper pair of stamens sterile and shorter; lower ascending; anthers 2-locular; loculi divaricate. Bracts thorny.

⊙. flowers white, rosy.

8. **Sphacele**, Benth.

Calyx campanulate, enlarged in fruit, 10-

nerved, reticulate-veined, 5-dentate. Tube of the corolla wide, with a hairy ring near its base; the five lobes of the limb obtuse; lower lobes the longer. Stamens ascending; loculi of the anthers divergent.

$\frac{1}{2}$. flowers large, pale.

9. **Salvia**, L.

Calyx 2-labiate. Corolla ringent. Stamens 2, parallel; anthers separated by a connective, shaped like a branch of the filament; only the posterior end of it bearing a perfect anther loculus.

☉. $\frac{1}{4}$.

10. **Audibertia**, Benth.

Calyx 2-labiate. Corolla 2-labiate; upper lip 2-cleft, spreading. Stamens ascending; anthers dimidiate, (upper half of the apparent filament showing by an articulation or spur its being originally a connective, between the two loculi of an anther.)

$\frac{1}{4}$. $\frac{1}{2}$.

11. **Lophanthus**, Benth.

Calyx sub-regular, 15-nerved, 5-dentate. Upper pair of stamens longer and declined; lower pair shorter and ascending; anthers 2-locular; loculi parallel.

$\frac{1}{4}$. flowers purplish.

12. **Scutellaria**, L.

Calyx 2-labiate, closed in fruit, at last split-

ting, and the upper lip deciduous. Tube of the corolla exserted; upper lip helmet-shaped with two lateral lobes; lower lip reduced to a single lobe. Stamens didynamous, ascending, parallel; anthers of the lower pair, dimidiate.

⊙. 24.

13. **Prunella**, L.

Calyx 2-labiate, in fruit closed and flattened. Corolla with a scaly or hairy ring near its base; upper lip concave; lower 3-lobed. Stamens didynamous, ascending; anthers approximate in pairs.

24.

12. **Marrubium**, L.

Calyx tubular 5—10-dentate, in fruit the teeth spreading. Tube of the corolla included; limb 2-labiate. Stamens didynamous, included; loculi of the anthers divaricate.

24.

13. **Stachys**, L.

Limb of the corolla 2-labiate; upper lip erect, concave; lower spreading, 3-lobed; middle lobe longest. Stamens ascending, approximate in pairs, parallel, contorted in withering.

⊙. 24. 1/2.

14. **Trichostemma**, L.

Tube of the corolla slender; limb 5-cleft; lobes oblong, declined. Stamens didynamous, long-exserted; filaments spiral in the bud.

⊙. 24.

FAMILY XIII. **Verbenaceæ.**

Didynamous. Ovary undivided. Fruit drupaceous or baccate, or splitting at length into its component parts (nutlets).

1. **Verbena**, L.

Calyx 5-cleft. Corolla salver-shaped. Fruit at length splitting into 4, 1-seeded nutlets.

⊙. 24. ½.

2. **Lippia**, L.

Fruit 2-locular, splitting into 2, 1-seeded nutlets.

⊙. 24. ½. flowers white, pink.

FAMILY XIV. **Plantagineæ.**

Calyx with four sepals, persistent. Corolla gamopetalous, 4-cleft, scarious. Stamens four, alternate with the lobes of the corolla; anthers versatile. Style 1.

1. **Plantago** L.

Flowers bracteate, in spikes. Ovary 2-locular (spuriously 4-lobed). Fruit a capsule, transversely dehiscent.

⊙. 24.

ORDER VI. PERSONALES.

Corolla gamopetalous, irregular, its lobes not corresponding in number to the number of stamens which are inserted into its tube. Ovary

superior, consolidated from 2 seed leaves; ovules ∞ . Fruit a capsule, or berry.

Stipules 0.

FAMILY XVI. **Orobancheæ.**

Ovary 1-locular; placentæ parietal.

Parasites without chlorophyll. Leaves reduced to scales.

1. **Anoplangthus**, Endl.

Flowers without bractlets. Calyx 5-cleft. Corolla tubular, curved; limb 5-cleft. Stamens didynamous; loculi of the anthers separated at the base, mucronate. Ovary 1-locular with four parietal placentæ. Capsule 1-locular with two valves; each valve with a placenta on both margins, convergent to the opposite one. 2f.

2. **Aphyllon**, Mitchell.

Flowers with bractlets. Otherwise nearly as the preceding. 2f.

FAMILY XVI. **Scrophularineæ.**

Ovary 2-locular, placenta central. Capsule 2-locular with 2—4 valves.

TRIBE I. **Rhinanthææ.**

Lower half of the corolla in æstivation covering the upper half. Corolla tubular; limb 2-labiate.

1. *Pedicularis*, Tournef.

Corolla ringent; upper lip laterally compressed. Stamens didynamous; anthers of equal size and insertion. Capsule loculicidous. 4.

2. *Cordylanthus*, Nutt.

Calyx spathaceous; fissures if present lateral. Lips of the corolla short; upper one laterally compressed. Stamens didynamous; anthers 2-locular; loculi separated and of different shape and insertion. Capsule loculicidous. ☉.

3. *Orthocarpus*, Nutt.

Calyx spathaceous, cleft vertically. Corolla personate; upper lip the smaller; lower saccate. Stamens didynamous; loculi separated and of different shape and insertion. Capsule loculicidous. ☉.

4. *Castilleia*, Nutt.

Calyx spathaceous, cleft vertically. Corolla ringent; upper lip the larger. Stamens didynamous; loculi separated, and of different shape and insertion. Capsule loculicidous. ☉. 4.

TRIBE II. *Veronicæ*.

Lower half of the corolla in æstivation covering the upper half, not tubular nor bilabiate.

5. *Veronica*, L.

Calyx 4—5 cleft. Limb of the corolla 4-cleft;

upper lobe the largest. Ovary few seeded. Capsule compressed, emarginate. ☉. 24.

6. *Limosella* L.

Calyx 5-dentate. Limb of the corolla 5-cleft. Stamens didynamous; loculi of anthers confluent; transversely dehiscent. Capsule ∞ -seeded, septifragous. ☉.

TRIBE III. *Gratiolæ*.

Upper lip in æstivation covering the lower. Stigma flat, 2-lobed.

7. *Gratiola*, L.

Calyx 5-parted, with 2 bractlets; corolla 2-labiate. Stamens 4; 2 fertile, 2—0 sterile. Ovary ∞ -ovulate. Capsule loculicidous, at length septifragous. 24.

8. *Mimulus*, L.

Calyx tubular, angulate, 5-dentate; bractlets 0. Corolla 2-labiate. Stamens didynamous; loculi of the anthers, divaricate, at length confluent. Capsule ∞ -ovulate. ☉. 24. ½.

Tribe IV. *Digitaleæ*.

Upper lip in æstivation covering the lower. Stigma minute, not flat. Capsule septicidous.

9. *Pentastemon*. L'Her.

Calyx 5-parted. Limb of the corolla labiate. Stamens didynamous, with a fifth filament sterile. 24.

TRIBE V. **Antirrhineæ.**

Upper lip in æstivation covering the lower. Tube of corolla gibbous or calcarate. Capsule neither loculicidous, nor septicidous.

10. **Collinsia**, Nutt.

Calyx 5 parted. Corolla personate; upper lip erect, lower 3-lobed; middle lobe laterally compressed, hiding the didynamous stamens. Capsule few-seeded, septifragous. ☉.

11. **Antirrhinum**; L.

Calyx 5-cleft. Corolla saccate, 2-labiate, personate. Stamens didynamous. Capsule dehiscent by pores at the apex. ☉. 24.

12. **Linaria**, Tournef

Calyx 5-cleft. Corolla with a spur, 2-labiate; personate. Stamens didynamous. Capsule separating at the apex into 2 valves. ☉. 24.

TRIBE VI. **Verbasceæ.**

Upper lip in æstivation covering the lower. Corolla neither ringent nor personate. Capsule septicidous.

13. **Scrophularia**, Tournef.

Corolla short, globular; limb narrow, 5-lobed; middle lobe of lower lip reflexed. Stamens didynamous (rudiment of a fifth stamen.) Capsule septicidous. 24. ½.

ORDER VII. POLEMONIALES.

Stamens as many as the lobes of the corolla, and more than the loculi of the ovary. Stipules 0.

FAMILY XVII. *Solanaceæ*.

Corolla regular; ovary and capsule or berry, 2—4-locular; ∞ -ovulate.

1. *Solanum*, L.

Calyx persistent in fruit. Corolla rotate, in æstivation valvate, induplicate. Anthers connivent; opening by apical pores. Fruit a berry, ∞ -seeded. $\odot$ 4. $\frac{1}{2}$.

2. *Datura*, L.

Calyx tubular; circumscissile. Corolla funnel shaped, plicate and convolute in æstivation. Anthers often dehiscing longitudinally. Ovary spuriously 4-locular. Capsule ovate; septifragous. Seeds reniform, ∞ . $\odot$. 4. $\frac{1}{2}$.

3. *Nicotiana*, L.

Calyx tubular, persistent. Corolla funnel or salver-shaped. Anthers longitudinally dehiscent. Ovary 2-locular, ∞ -ovulate. Capsule septicidous; seeds ∞ , minute. $\odot$. 4. $\frac{1}{2}$.

FAMILY XVIII. *Borragineæ*.

Ovary 4-locular, 4-lobed; loculi 1-seeded, (nutlets). Style 1.

1. **Amsinckia**, Lehm.

Calyx 5-parted. Corolla salver or funnel-shaped; limb 5-lobed. Ovary 4-lobed; style central. Fruit, 4 nutlets attached to a conical disk above its base.

⊙. Inflorescence circinate; flowers yellow.

2. **Eritrichium**, Schrad.

Corolla salver shaped; limb 5-lobed. Ovary 4-lobed; style central. Fruit 4 nutlets inserted on the base of a conical or cylindrical disk.

⊙. inflorescence circinate; flowers white, blue.

3. **Pectocarya**, DC.

Corolla funnel-shaped; throat closed. Style central, very short. Fruit 4 nutlets, marginate, and in pairs.

⊙. flowers axillary, sessile, white.

4. **Cynoglossum**, L.

Corolla funnel-shaped; throat closed by 5 scales. Ovary 4-lobed; style central. Fruit 4 depressed, echinate nutlets.

2♂ inflorescence paniculate, ebracteate, circinate.

5. **Echinospermum**, Swartz.

Tube of the corolla closed by 5 scales. Ovary 4-lobed; style central. Fruit 4 nutlets, 3-cornered, muriculate on their margins.

⊙⊙. inflorescence ebracteate, circinate.

6. **Heliotropium**, L.

Corolla salver-shaped; limb 5-lobed; sinuses plicate. Ovary 4-locular; loculi 1-seeded; style terminal, short; stigma peltate. Fruit a 4-pyrenous drupe.

☉. 2♂. inflorescence circinate.

FAMILY XIX. **Hydrophyllææ**.

Ovary incompletely 2-locular; style bifid or styles 2. Fruit a capsule.

1. **Eriodictyon**, Benth.

Corolla campanulate. Ovary 2-locular; loculi ∞ -ovulate; styles 2; stigmas clavate. Fruit a capsule, 2-locular, few seeded, at first loculicidal, then septicidal.

♂. inflorescence circinate, arranged in a panicle; flowers blue, white.

2. **Romanzoffia**, Cham.

Corolla salver-shaped. Style entire; stigma capitate; ovary incompletely 2-locular, ∞ -ovulate. Capsule ovate, incompletely 2-locular, loculicidal; seeds ∞ , very small.

2♂. inflorescence loosely circinate.

3 **Emmenanthe**, Benth.

Calyx 5-parted; sinuses naked; lobes equal. Corolla campanulate, persistent. Ovary incompletely 2-locular, ∞ -ovulate; stigma 2-cleft.

2♂. inflorescence circinate; flowers yellow.

4. **Phacelia**, Juss.

Calyx 5-parted; sinuses naked; lobes equal. Corolla campanulate, deciduous. Ovary incompletely 2-locular, or 1-locular with two, parietal placentæ; number of ovules variable; stigma 2-cleft. Capsule 1-locular, or incompletely 2-locular, loculicidal.

⊙. 4. inflorescence circinate, cymose; flowers blue, red, white.

5. **Ellisia**, L.

Calyx 5-parted; sinuses naked. Corolla campanulate. Stamens included. Ovary 1-locular, with 2 parietal placentæ; stigma 2-cleft. Capsule membranaceous, loculicidal; the placentæ separating from the capsular valves, simulating a second, internal capsule.

⊙. flowers pale.

6. **Nemophila**, Nutt.

Calyx with reflexed appendiculate sinuses. Corolla campanulate. Stamens included. Ovary 1-locular, with 2 parietal placentæ; stigma 2-cleft. Capsule membranaceous, loculicidal, the placentæ separating from the capsular valves, simulating a second, internal, capsule.

⊙. flowers blue, violet, pale.

7. **Hydrophyllum**, Tournef.

Corolla tubular. Stamens exserted. Ovary 2-locular, 4-ovulate, on 2 parietal placentæ;

stigma 2-cleft. Capsules membranaceous, loculicidal.

2. flowers violet, white.

FAMILY XX. **Polemoniaceæ**

Æstivation imbricate. Ovary 3-locular; style 3-cleft. Embryo straight; cotyledons foliaceous.

1. **Polemonium**, Tournef.

Corolla rotate. Stamens ascending, filaments dilated at the base. Seeds ∞ .

⊙. 2. flowers blue, white.

2. **Gilia**, Ruiz & Pavon.

Corolla funnel or salver-shaped. Stamens straight, equally inserted. ⊙. 2.

3. **Collomia**, Nutt.

Corolla salver-shaped, with long tube. Stamens unequally inserted. ⊙.

FAMILY XXI. **Convolvulaceæ**.

Æstivation contorted. Ovary 2, 3 or 4-locular. Embryo curved. Cotyledons foliaceous, conduplicate, corrugate.

1. **Convolvulus**, L.

Calyx 5-cleft, persistent. Corolla funnel-form, 5-angulate, 5-plicate. Loculi of the capsule 2-ovulate. 2.

2. **Cressa**, L.

Corolla funnel-form, 5-parted, not plicate. Styles 2; loculi of the ovary 2-ovulate. Fruit a 1-seeded, capsule. 24.

3. **Cuscuta**, Tournef.

Aphyllous. Destitute of chlorophyl. Corolla urceolate; limb 5—4-lobed. Ovary 2-locular; loculi 2-ovulate. Capsule indehiscent, sometimes circumscissile. Embryo spiral. Cotyledons 0. ☉. 24.

SECTION II. ISOCARPÆ.

Parts of the ovary as many as divisions of the corolla.

ORDER VIII. PRIMULALES.

Stamens opposite to the lobes of the corolla. Ovary 1-locular; placenta central.

FAMILY XXII. **Plumbagineæ**.

All parts in fives, except the ovule which is single.

1. **Armeria**, Willd.

Flowers in an involucrate head. Corolla 5-parted or 5 distinct petals. Styles 5. 24.

2. *Statice*, L.

Flowers bracteate, in 1-sided spikes. 2f.

FAMILY XXIII. *Primulaceæ*.

Placenta central, ∞ -ovulate.

1. *Dodecatheon*, L

Flowers umbellate. Stamens shorter than the anthers, connivent in a cone.

2f. acaulescent, flowers purple, pink, white.

2. *Glaux*, L.

Calyx campanulate, 5-cleft, colored. Corolla 0. Stamens 5, alternate with the lobes of the calyx. Capsule 5-valved, few-seeded.

☉. leaves decussate; flowers white.

3. *Trientalis*, L

Flowers several, terminal. Floral parts 7—

5. Capsule few-seeded, longitudinally dehiscent. 2f.

4. *Anagallis*, Tournef.

Flowers axillary. Lobes of the corolla broad. Capsule transversely dehiscent.

2f. leaves opposite.

5. *Samolus*, Tournef.

Calyx half-superior. Corolla campanulate. Stamens 10; the 5 fertile, opposite to the lobes of the corolla; the 5 sterile, alternate. Capsule 5-valved, ∞ -seeded.

2f. leaves alternate; flowers white.

ORDER IX. ERICALES.

Stamens alternate with the lobes of the corolla or twice as many. Loculi of the ovary as many as lobes of the corolla; placentæ axillary.

FAMILY XXIV. *Pyrolaceæ*.

Petals distinct. Hypogynous disk 0. Seeds minute.

1. *Pyrola*, Tournef.

Calyx 5-parted. Corolla 5-petalous. Stamens 10. Style filiform.

2. In forest shades.

FAMILY XXV. *Rhodoraceæ*.

Ovary free. Fruit a capsule, septicidal.

1. *Rhododendron*, L.

Corolla funnelform, 5-lobed. Stamens ascending; loculi of anthers dehiscent by an apical pore. Seeds ∞ , minute. $\frac{1}{2}$.

FAMILY XXVI. *Ericaceæ*.

Gamopetalous. Fruit either baccate, or a loculicidal capsule.

1. *Gaultheria*, L.

Calyx 5-cleft, petaloid. Corolla urceolate. Stamens 10; loculi of anthers dehiscent by an apical pore. Fruit a spurious berry, *i. e.* a cap-

sule 5-locular, umbilicate, ∞ -seeded, enclosed by the enlarged and fleshy calyx.

½. leaves evergreen; flowers white, rosy.

2. **Arctostaphylos**, Adanson.

Corolla urceolate. Stamens 10. Disk hypogynous. Loculi of ovary 1-ovulate. Fruit a berry; loculi 1-seeded; seeds sometimes coherent.

½. leaves evergreen; flowers white, rosy.

3. **Arbutus**, Tournef.

Corolla urceolate. Stamens 10. Disk hypogynous. Loculi of ovary ∞ -ovulate. Fruit a berry; loculi several-seeded.

½. leaves evergreen; flowers white.

FAMILY XXVII. **Vaccinieæ.**

Ovary inferior.

1. **Vaccinium**, L.

Loculi of anthers separate, elongated at the apex into a tube. Fruit a berry, ∞ -seeded, covered by the persistent calyx.

Sub-SERIES II. **POLYPETALÆ.**

Petals distinct.

SECTION III. **DISCOPHORÆ.**

Ovary inserted into a well developed disk.

ORDER X. UMBELLALES.

Ovary inferior; loculi 1-ovulate. Stamens alternate.

FAMILY XXVIII. Umbelliferae.

Stamens 5, alternate with the petals. Ovary 2-locular; styles 2. Fruit a schizocarp (Cremocarp).

1. *Caucalis*, L.

Umbels regularly compound. Secondary ribs of the cremocarp more prominent than the primary. Margins of the mericarp inflexed.

⊙. flowers white.

2. *Daucus*, Tournef.

Umbels regularly compound. Secondary ribs of the cremocarp more prominent than the primary; intervals 1-vittate. Face of the mericarp flat.

⊙. ⊙ ⊙. flowers white.

3. *Ferula*, Tournef.

Umbels regularly compound. Cremocarp dorsally compressed; marginal ribs winged; wings coherent; dorsal ribs filiform; vittæ ∞.

24. flowers yellow.

4. *Heracleum*, L.

Umbels regularly compound. Cremocarp dorsally compressed; marginal ribs winged;

wings coherent; vittæ shorter than the mericarp.
24. flowers white.

5. **Peucedanum**, L.

Umbels regularly compound. Cremocarp dorsally compressed, marginal ribs winged; wings coherent; vittæ as long as the mericarp.
24. flowers yellow, purple.

6. **Angelica**, L.

Umbels regularly compound. Cremocarp dorsally compressed; marginal ribs winged; wings distinct; intervals 1-vittate.
24. flowers white.

7. **Selinum**, L.

Umbels regularly compound. Cremocarp dorsally compressed, 4-winged, by very distinct marginal ribs, and only coherent by a carinate commissure.

24. flowers white.

8. **Ligusticum**, L.

Umbels regularly compound. Cremocarp dorsally compressed, 4-winged, by the very distinct lateral ribs. Mericarps coherent by a convex commissure.

24.

9. **Ænanthe**, L.

Umbels regularly compound. Cremocarp terete, ovate; ribs obtuse; intervals 1-vittate.

24. aquatic; flowers white.

10. **Osmorrhiza** Rafin.

Umbels regularly compound. Cremocarp terete, elongate, angulate, sulcate, hispid; vittæ 0.

24. flowers white.

11. **Sium**, L.

Umbels regularly compound. Cremocarp laterally compressed, oblong. Mericarp dorsally convex, plane on the face, 5-ribbed; ribs filiform; intervals more than 1-vittate.

24. flowers white.

12. **Cicuta**, L.

Umbels regularly compound. Cremocarp laterally contracted; ribs flattened; intervals 1-vittate. Mericarp terete.

24. aquatic; flowers white.

13. **Berula**, Koch.

Umbels regularly compound. Cremocarp laterally contracted, ovate. Mericarp terete 5-ribbed; lateral ribs not contiguous; epicarp thick, corky; ribs filiform; intervals ∞ -vittate.

24. aquatic; flowers white.

14. **Pimpinella**, L.

Umbels regularly compound. Cremocarp laterally contracted, ovate. Mericarp convex dorsally, plane on the face, 5-ribbed; ribs fili-

form; lateral ones contiguous; intervals ∞ -vittate. 24.

15. **Carum**, L.

Umbels regularly compound. Cremocarp laterally compressed, oblong. Mericarp equally 5-ribbed; ribs filiform, lateral ones contiguous; commissure plane; intervals 1-vittate.

⊙ ⊙. flowers white.

16. **Apiastrum**, Nutt.

Umbels regularly compound. Cremocarp very much contracted at the commissure, cordate. Mericarp incurved at base and apex, 5-ribbed, ribs little elevated; intervals 1-vittate.

⊙. flowers white.

17. **Conium**, L.

Umbels regularly compound. Cremocarp laterally compressed. Mericarp deeply sulcate on the face; 5-ribbed; ribs undulate-crenate; intervals 0-vittate.

⊙ ⊙. flowers white.

18. **Deweya**, Torr. & Gray.

Umbels regularly compound. Cremocarp laterally compressed. Mericarp reniform in transverse section, 5-ribbed; intervals more than 1-vittate.

24. flowers yellow.

19. **Sanicula**, Tournef.

Umbels not regularly compound. Lobes of calyx-limb foliaceous. Flowers polygamous. Cremocarp, sub-globose, aculeate; ribs 0; vittæ ∞ .
 24.

20. **Eryngium**, Tournef.

Umbels not regularly compound. Lobes of the calyx-limb rigid. Cremocarp tuberculate; ribs 0; vittæ 0.

⊙. 24. spinous.

21. **Bowlesia**, Ruiz & Pavon.

Umbels simple. Cremocarp ovate, much contracted at the commissure, plane on the dorsum; vittæ 0.
 ⊙.

22. **Hydrocotyle**, Tournef.

Umbels simple. Cremocarp laterally compressed, carinate; vittæ 0.

24. aquatic.

FAMILY XXIX. **Araliaceæ**.

Fruit a berry or drupe. Leaves alternate.

1. **Panax**, L. (*Fatsia*.)

Polygamous. Petals 5. Stamens 5. Ovary 2-locular; styles 2. Fruit a 2-locular berry.

24. $\frac{1}{2}$.

2. **Aralia**, L.

Ovary 5-locular; styles 5. Fruit a drupe with
5 pyrenæ. 24. ½.

FAMILY XXX. **Cornaceæ**.

Stamens 4. Leaves opposite.

1. **Cornus**, L.

Flowers ♂. Petals 4. Ovary 2-locular; style
1. Fruit a drupe with 2 pyrenæ. ½.

2. **Garrya**, Dougl.

Dioecious. Flowers amentaceous, ternate,
between decussate bracts. Petals 0. Ovary
1 locular; styles 2, persistent; ovules 2. Fruit
a berry. ½.

ORDER XI. **CORNICULATÆ**.

Calyx gamosepalous. Stamens equaling or
double the number of the petals; always corres-
pondent. Ovaries compound of several seed
leaves, each ∞ -ovulate.

FAMILY XXXI. **Saxifragaceæ**.

Number of seed leaves less than the petals.

1. **Saxifraga**, L.

Stamens 10. Pistils 2. Ovary 2-locular.
Fruit a loculicidous capsule. 24.

2. **Boykinia**, Nutt.

Stamens 5. Pistils 2. Ovary 2-locular.
Fruit a 2-locular capsule. 2.

3. **Tellima**, R. Brown.

Stamens 10. Pistils 2—3. Petals lobed.
Ovary 1-locular; styles short; stigmas capitate.
Capsule valvularly dehiscent near the apex.
2. flowers white, pink.

4. **Tiarella**, L.

Stamens 10. Pistils 2. Petals entire. Ovary
1-locular; styles long; stigmas simple. Capsule
valvularly dehiscent to the base; valves unequal;
placentæ parietal.

2. flowers white.

5. **Heuchera**, L.

Stamens 5. Pistils 2. Petals entire. Ovary
2-locular; styles long. Capsule valvularly de-
hiscent; valves equal.

2. flowers greenish white, rosy.

FAMILY XXXII. **Ribesiaceæ**.

Stamens 5. Pistils 2. Fruit a berry. Leaves
alternate.

1. **Ribes**, L.

Ovary inferior, 1-locular, with 2 parietal,
 ∞ -ovulate placentæ. 2.

FAMILY XXXIII. **Philadelphææ.**

Ovary inferior or half inferior. Number of carpidia disposed to correspond with calyx-lobes. Fruit a capsule. Leaves opposite.

1. **Whipplea**, Torr.

Stamens 5. Pistils 3—5. Ovary 3—5-locular; loculi 1-ovulate. Fruit a septicidal capsule.
 $\frac{1}{2}$. flowers white.

FAMILY XXXIV. **Crassulaceæ.**

Calyx, corolla and stamens alternating; if the stamens form 2 circles, the inner opposite to the petals. Ovaries opposite the petals. Fruit follicles, centrally dehiscent.

1. **Cotyledon**, L. (*Echeveria*, DC.)

Calyx 5-parted. Petals 5, coherent by their claws. Stamens 10.

$\frac{1}{2}$. fleshy, flowers yellow, red.

2. **Sedum**, L.

Petals 5, entirely free. Stamens 10.

$\frac{1}{4}$. fleshy.

3. **Tillaea**, L.

Stamens as many as the petals. ⊙.

FAMILY XXXV. **Ficoideæ.** (*Of doubtful affinity.*)

Calyx inferior. Petals ∞ . Stamens ∞ ,

∞ -seriate, inserted with the petals. Ovary 4—20-locular, ∞ -ovulate. Fruit a capsule ∞ -seeded. Stipules 0.

1. **Mesembryanthemum**, L.

Characters of the order. $\odot$. 24.

ORDER XII. CARYOPHYLLALES.

Flowers regular. Calyx inferior. Sepals as many as the petals. Stamens as many or twice as many. Ovary 1-locular; placentæ central.

FAMILY. XXXVI. **Sileneæ**.

Calyx gamosepalous. Petals and stamens inserted into a carpophore. Stamens if equaling the petals, alternate with them. Ovary ∞ ovulate; styles several. Fruit a capsule. Leaves opposite; stipules 0.

1. **Silene**, L.

Calyx 5-dentate without scales at the base. Petals unguiculate. Stamens 10. Styles 3. Capsule dehiscent by teeth; seed reniform.

$\odot$. 24.

FAMILY XXXVII. **Alsineæ**.

Sepals distinct to the base. Carpophore 0. Stamens, if equaling the petals, alternate with them. Ovary ∞ -ovulate; styles several. Fruit a capsule. Leaves opposite; stipules 0.

1. *Cerastium*, L.

Sepals 5. Petals 5, emarginate. Stamens 10. Stigmas 5. Capsule cylindrical, dehiscent by 10 teeth.

☉. 24. flowers white.

2. *Stellaria*, L.

Petals 2-lobed. Stamens 10. Stigmas 3—2. Capsule globose, dehiscent by 6—4 valves.

☉. 24. flowers white.

3. *Alsine*, Wahl.

Sepals unchanged in fruit. Petals entire. Stamens 10—5. Stigmas 3. Capsule ovoid, dehiscent by three valves.

☉. 24. flowers white.

4. *Sagina*, L.

Sepals 5—4. Petals 5—4. Stamens 5—10. Stigmas 5—4, alternate with the sepals. Capsule dehiscent in 5—5, valves opposite to the sepals. ☉.

FAMILY XXXVIII. *Paronychieæ*.

Like *Alsineæ*, but the parts frequently defective or reduced in numbers, and with scarious stipules.

1. *Spergula*, L.

Stamens 5 or 10. Ovary ∞ -ovulate; styles 5, alternate with the sepals. Capsule 5-valved; valves opposite to the sepals. ☉.

2. **Spergularia**, Pers.

Ovary ∞ -ovulate; style 3 or 5-cleft. Capsule 3 or 5-valved.

☉. 4. flowers white, rosy.

3. **Pentacæna**, Bart.

Divisions of the calyx unequal, persistent in fruit; the 3 external with cucullate apex, ending in a spine; 2 internal mucronate. Petals 5, minute. Stamens 5 or 3. Ovary 1-ovulate; style 2-cleft. Fruit a utricle. ☉.

FAMILY XXXIX. **Portulacaceæ**.

Flowers regular, but parts not correspondent in numbers.

1. **Portulaca**, Tournef.

Calyx tube connate with ovary; limb 2-parted, free and circumscissile. Petals 4 or 6. Stamens 8 or ∞ . Capsule circumscissile.

☉. 4.

2. **Calandrinia**, HBK.

Sepals 2, persistent. Petals 5 or ∞ , equal. Stamens opposite to the petals, variable in number. Ovary ∞ -ovulate; style 3-cleft. Capsule 3-valved, ∞ -seeded.

☉. 4. flowers rosy, pink, purple.

3. **Claytonia**, L.

Sepals 2, persistent. Petals 5, equal. Sta-

mens 5, opposite to the petals. Ovary 3 or 6-ovulate; style 3-cleft. Capsule 3-valved, 3-seeded.

⊙. 2. flowers white, rosy.

4. **Montia**, Michel.

Sepals 2, persistent. External petals 3; internal 2, connate. Stamens 3 or 5. Ovary 3-ovulate; style 3-cleft. Capsule 3-valved, 3 seeded.

⊙. flowers white.

ORDER XIII. CHENOPODIALES.

Corolla 0. Perigonium inferior. Stamens opposite to the sepals. Ovary 1-locular, centrospermous. Stipules 0.

FAMILY XL. **Amarantaceæ**.

Perigonium without a tube, 3-bracteate; anterior bract longer than the 2 lateral ones. Style simple.

1. **Amarantus**, L.

Polygamous. Monoëcious. Stamens distinct. Style short; stigmas 2 or 3. Fruit a circumscissile utricle. ⊙.

FAMILY XL. **Chenopodeæ**.

Perigonium without a tube, not more than 1-bracteate.

1. **Chenopodium**, L.

Bracts 0. Perigonium 5-cleft; lobes dorsally circinate. Stamens 5. Ovary 1-locular, 1-ovulate; stigmas 2. Fruit a depressed utricle enclosed in the persistent perigonium. ☉. 24

2. **Atriplex**, L.

Bracts 0. Flowers polygamous. ♂ and ♀ perigonium 3 or 5-parted. ♀ 2-parted. Stigmas 2. Fruit a compound utricle. ☉. 24.

3. **Salicornia**, Tournef.

Bracts 0. Flowers in threes, immersed in a rhachis, decussately arranged, and forming a spike. Perigonium gamophyllous, utriculate-peltate. Stamens 1 or 2. Stigmas 2. Fruit a compound utricle.

24. ½. fleshy, articulate, aphyllous, saline plants.

4. **Suaeda**, Forsk.

Flowers axillary, with minute, scale-like bracts. Perigonium urceolate, 5-cleft. Stamens 5. Fruit a utricle enclosed in the inflexed perigonium.

☉. 24. leaves terete, fleshy.

FAMILY XLI. **Nyctagineæ.**

Flowers involucrate. Perigonium gamophyllous corolla-like, its persistent tube enclosing the akene.

1. **Abronia**, Juss.

Involucre five-leaved, ∞ -flowered, persistent. Perigonium salver-shaped. Stamens 5, included. Stigma clavate.

⊙. 24. leaves opposite.

SECTION IV. EUCYCLICÆ.

Floral parts distinct in well-defined circles.

ORDER XIV. TRICOCCEÆ.

Flowers diclinous. Ovary superior. Ovules 1—2, collateral, pendulous from the summit of loculi, which separate at last from a central axis.

FAMILY XLII. **Euphorbiaceæ**.

Loculi 1-ovulate.

1. **Eremocarpus**, Benth.

Monœcious. Flowers cymose. ♂ : perigonium 5-parted; stamens 7, central, inflexed in æstivation. ♀ : perigonium 0; ovary with 5 glands at the base, 1-locular, 1-ovulate; style simple; capsule 2-valved. ⊙.

2. **Hendecandra**, Esch. (*Croton*.)

Dioecious. ♂ : flowers in racemes; perigonium 5-cleft, with 5 glands opposite to the lobes; stamens more than 5. ♀ : flowers, solitary;

perigonium 3-cleft; glands 0; ovary 3-locular; styles 3, each 4-parted; capsule 3-cocccous, each 2-valved. 24.

3. *Euphorbia*. L.

Monœcious. Androgynous. Flowers umbellate. Involucre campanulate. ♂ flowers, perigonium 0; monandrous, stipitate, bracteate. ♀ flower a single one, central in the umbel; perigonium dentate or 0; ovary 3-locular; styles 3, each 2-cleft. ☉. 24. ½.

FAMILY XLIII. *Callitrichaceæ*, (*Of doubtful affinity.*)

Flowers axillary, 2-bracteolate. Perigonium 0. Monandrous. Ovary 4-locular; loculi 1-ovulate; ovule pendulous from the summit of the loculus; styles 2, central. Fruit 4-lobed, 4-locular, 4-seeded. Capsule dehiscent. Leaves opposite; stipules 0.

1. *Callitriche*, L.

24. aquatic herbs. Only genus.

ORDER XIV. MALVALES.

Flowers regular. Calyx free, 5-parted, valvate in æstivation. Corolla 5-parted, contorted in æstivation. Stamens often monadelphous. Carpidia several, free, or connate with the central axis into an ∞ -locular ovary. Leaves alternate, stipulate.

FAMILY XLV. **Malvaceæ.**

Claws of the petals united with each other, and with the column of ∞ , monadelphous stamens. Anthers reniform, 1-locular.

1. **Lavatera**, L.

Involucre 3—6-cleft. Ovaries ∞ , verticillate; 1-ovulate; style 1, springing from the receptacle; stigmas ∞ , filiform. Fruit a schizocarp. Seed ascending. $\text{2f. } \frac{1}{2}$.

2. **Malva**, L.

Involucre 3-leaved. Ovary ∞ -locular; loculi 1-ovulate; styles as many as loculi, united at base; stigmas obtuse. Fruit a depressed capsule. Seed ascending. $\odot$. 2f.

3 **Sidalcea**, Gray.

Involucre 0. Ovary ∞ -locular; loculi 1-ovulate; styles as many as loculi, united at base. Fruit ∞ , corneous schizocarps. Seed ascending.

$\odot$. 2f. flowers purple.

4. **Sphæralcea**, St. Hil.

Ovary ∞ -locular; loculi 1-ovulate; styles as many as loculi, united at base; stigmas capitate. Fruit a loculicidous capsule, at length also septicidous. $\text{2f. } \frac{1}{2}$.

5. **Sida**, Kunth.

Ovary ∞ -locular; loculi 1-ovulate; styles as many as loculi, united at base; stigmas capitate. Fruit an ∞ -seeded capsule. Seeds pendulous from the apex.

2. flowers yellow or whitish.

ORDER XV. GERANIALES.

Calyx free, imbricated in æstivation. Petals 5, contorted or convolute in æstivation. Stamens hypogynous, definite. Ovary the compound of a definite number of carpidia.

FAMILY XLVI. Geraniaceæ.

Sepals 5. Petals 5, hypogynous, alternate with the sepals. Stamens 10. Carpidia 5, verticillate round a columnar axis, (gynophore). Styles distinct at base, connate towards their apex. Carpidia 5, 2-ovulate, 1-seeded, ventrally dehiscent. Leaves stipulate.

1. **Geranium**, L.

Stamens 10, monadelphous, all fertile. Styles persistent.

⊙. 2. 2.

2. **Erodium**, L'Her.

Stamens 10, monadelphous, the alternate ones sterile and depauperate. Styles persistent.

⊙. 2.

FAMILY XLVII. **Oxalideæ.**

Sepals 5. Petals hypogynous. Ovary 5-carpidia opposite the petals, attached to the axis by their central angle, 2— ∞ -seeded; ovules vertically arranged; styles 5, persistent. Leaves alternate; stipules 0.

1. **Oxalis**, L.

Petals 5. Stamens 10, monadelphous, the 5 opposite the petals shorter. Capsule oblong.

☉. 4.

FAMILY XLVIII. **Lineæ.**

Calyx persistent. Petals hypogynous, unguiculate. Perfect stamens 5, sometimes 4. Ovary 5, sometimes 4, 3 or 2-locular; loculi 2-ovulate; ovules collateral, more or less separated by a spurious septum; styles equalling the loculi in number. Capsule globose.

1. **Linum**, L.

Sepals 5. Petals 5.

☉. 4.

FAMILY XLIX. **Limnantheæ.**

Calyx persistent, valvate in æstivation. Petals alternating with calyx lobes, inserted into a perigynous disk. Stamens twice as many as petals. Carpidia verticillate, free, 1-ovulate; style central on the apex, 5, sometimes 3-cleft. Fruit 5, sometimes 3 akenes. Stipules 0.

1. **Limnanthes**, R. Br.

Calyx 5-parted. Petals 5, cuneiform. Ovaries

5. Fruit 5, rugose akenes.

⊙. flowers yellow, white, rose.

ORDER XVI. TEREBINTHINALES.

Flowers regular. Calyx free. Petals 5, imbricate or valvate in æstivation, not contorted, nor truly convolute, inserted into a disk. Stamens 5, or a multiple. Ovary 1—5 carpidia, syncarpous, or apocarpous; carpidia 1—2-ovulate.

FAMILY L. Rutaceæ.

Stamens inserted on the external margin of the disk. Carpidia more than 1-ovulate. Stipules 0.

1. **Ptelea**, L.

Polygamous. Calyx 4 or 5-parted. Petals 4 or 5. Stamens 4 or 5, alternate with the petals. Ovary on a convex disk, 2 locular; loculi 2-ovulate; style 1. Fruit a 2-seeded samara.

½. flowers white.

FAMILY LI. Terebinthaceæ.

Stamens inserted on the inner margin of the disk. Ovary 1, or if more, only 1 fertile; 1-ovulate. Fruit indehiscent.

1. **Rhus**, L.

Polygamous. Calyx 5-parted, persistent. Stamens 5. Ovary 1, 1-locular, 1-ovulate; styles 3. Fruit, a dry drupe. $\frac{1}{2}$.

FAMILY LII. **Juglandæ**. (*Of doubtful affinity.*)

Flowers diclinous. ♂ : amentaceous; perigonium adnate to the bract, and imbricate; petals 3, or its multiple. ♀ : aggregate or racemose; perianth connate with the imperfectly 2—4-locular, 1-ovulate ovary. Fruit a pyrenous drupe. Leaves imparipinnate; stipules 0.

1. **Juglans**, L.

♂ : stamens more than 6. ♀ : few, terminal; calyx 4-parted; petals 4; styles 2. $\frac{1}{2}$.

ORDER XVII. **SAPINDALES**.

Parts of the andrœcium not symmetrical. Calyx free, imbricate in æstivation. Petals inserted into a hypogynous disk. Stamens as many as the petals, or their multiple. Carpidia 3, sometimes 2, connate into an ovary. Ovules of definite number.

FAMILY LIII. **Polygalaceæ**.

Flowers irregular, often imitating *Papilionaceæ*. Sepals 5, the two lateral petaloid (wings). Petals 5, sometimes 3, connate with the staminal tube; anterior petal concave (carina).

Stamens 8, sometimes 4 or less, usually monadelphous. Ovary 2-locular; style 1. Stipules 0.

1. **Polygala**, L.

Calyx persistent. Stamens 8, ascending; filaments united at the base into an anteriorly cleft tube. Ovary 2-locular; loculi 1-ovulate. Capsule loculicidal. $\odot \odot$. 4. $\frac{1}{2}$.

FAMILY LIV. **Sapindaceæ**.

Sepals 5, often irregular and more or less connate. Disk fleshy. Petals alternate with sepals and appendiculate at their claws, sometimes one or all of them wanting. Stamens twice as many as sepals, 1-seriate, sometimes reduced in number. Ovary 3-locular; loculi 1—2-ovulate.

1. **Æsculus**, L.

Polygamous. Calyx irregular, gamosepalous. Petals unguiculate, 5, or by abortion of the anterior one, 4. Stamens 6—8; filaments ascending. Loculi of ovary 2-ovulate. Fruit a loculicidous capsule, generally by abortion, 1-locular, 1-seeded.

$\frac{1}{2}$. leaves palmate, deciduous.

2. **Acer**, Mœnch.

Polygamous. Petals as many as sepals, inserted into the margin of the lobate, hypogynous disk. Stamens 8, inserted with the petals.

Ovary 2-locular, 2-lobed; loculi 2-ovulate. Fruit a 2-seeded samara.

♂. leaves opposite, palmately lobed, deciduous.

3. **Negundo**, Moench.

Polygamous. Petals 0. ♂ : stamens 4, sometimes 5, opposite to the calyx teeth. ♀ : ovary 2-locular, 2-lobed; loculi 2-ovulate. Fruit a 2-seeded samara.

♂. leaves opposite, imparipinnate, deciduous.

ORDER XVIII. CELASTRALES.

Parts of the flower correspondent in number. Disk tumid, adnate to the base of the calyx. Stamens inserted with the petals on the margin of the disk. Ovules definite.

FAMILY LV. **Rhamnaceæ**.

Calyx conspicuous, gamosepalous, valvate in æstivation. Stamens inserted with the petals, and alternate with the calyx-lobes. Ovary 3—2-locular; loculi 1-ovulate; styles 3—2, more or less connate.

1. **Rhamnus**, Juss.

Calyx-tube urceolate, margin 5—4-cleft. Petals emarginate, or wanting. Ovary free. Fruit a 3—2-pyrenous drupe.

♂. leaves alternate, stipulate.

2. **Ceanothus**, L.

Calyx-tube hemispherical, concave; margin petaloid. Petals unguiculate; margin cucullate. Ovary half immersed into the disk; style 3-cleft. Fruit a 3-seeded capsule with base embraced by the calyx tube, dehiscent at the inner angle.

$\frac{1}{2}$. leaves simple, flowers blue, purple, white.

FAMILY LVI. **Ampelipideæ**.

Calyx inconspicuous. Stamens inserted with the petals, opposite and of equal number. Ovary 3-locular; loculi 2-ovulate; ovules collateral. Fruit a berry. Lower leaves opposite; upper by the transformation of one of the pair into a tendril, apparently alternate.

1. **Vitis**, Tournef.

Petals coherent at their apex, caducous.

$\frac{1}{2}$. leaves simple, palmately-nerved.

ORDER XIX. **GUTTIFERÆ**.

Flowers regular, calyx free, sepals 5—4, imbricate in æstivation. Petals convolute in æstivation, sometimes 0. Stamens ∞ , polyadelphous, sometimes reduced in number. Carpidia several, connate into an ovary.

FAMILY LVII. **Hypericineæ**.

Sepals 2-seriate. Petals as many and alter-

nate with them. Stamens ∞ . Carpidia 3 or 5; ovules ∞ , 2-seriate in each; styles 3 or 5, more or less united. Fruit a septicidous capsule. Leaves opposite. Stipules 0.

1. **Hypericum**, L.

Stamens polyadelphous. Stigmas capitate.
 $\frac{2}{4}$. flowers yellow.

FAMILY LVIII. **Salicineæ**.

Dioecious, amentaceous. δ : perigonium 0; stamens central. ♀ : perigonium 0; ovary 2 carpidia, connate into a capsule; ovules ∞ ; styles 2. Capsule 1-locular, 2-valved, ∞ -seeded; seeds with hairy arillus. Leaves deciduous, alternate, stipulate.

1. **Salix**, Tournet.

Bracts entire. $\frac{1}{2}$.

2. **Populus**, Tournef.

Bracts fimbriate, lacimate. $\frac{1}{2}$.

ORDER XX. **PARIETALES**.

Ovary 1-locular; placentation parietal; ovules ∞ .

FAMILY LIX. **Cistineæ**.

Calyx 2-seriate; 2 external sepals smaller than the 3 internal, contorted to the left in æstiva-

tion, sometimes 0. Petals 5, caducous, contorted to the right in æstivation. Stamens ∞ . Ovary free, formed by several connate carpidia; style 1. Fruit a capsule; placentation sometimes apparently axillary, by placentiferous septa protruding toward the centre.

1. **Helianthemum**, Tournef.

Ovary 3-valved. Placentæ in the middle of the valves, each valve more than 2-seeded.

⊙. 4. ½. flowers yellow.

FAMILY LX. **Loasaceæ**.

Calyx-tube more or less connate with the ovary, costate; margin 5—4 parted. Petals 5—4, and their multiples. Stamens numerous, some of the outer occasionally petaloid. Ovary inferior, 1-locular; ovules ∞ ; styles 1. Fruit a capsule immersed into the calyx-tube.

1. **Mentzelia**, L.

Calyx limb 5-parted, persistent. Petals not cucullate. Stamens ∞ , inserted into the throat of the calyx below the petals. Style 3-cleft. Capsule dehiscent near the apex.

⊙. ⊙⊙. flowers yellow, orange.

FAMILY LXI. **Datisceæ**.

Calyx-tube connate with ovary. Petals 0. Ovary 1-locular; placentæ on the middle nerve of the carpidia; ovules ∞ ; styles on the margins

of the carpidia, 2 for each placenta, sometimes united with the contiguous style. Fruit a capsule crowned by the calyx margin and styles.

1. **Tricerastes**, Presl

Flowers ♂. Calyx-tube 3-angled; margin 3-dentate. Stamens 3, alternate with the lobes of the calyx; anthers extrorse. Ovary with 3 placentæ; styles 3, 2-parted, opposite the calyx-teeth. 24.

FAMILY LXII. **Frankeniaceæ**.

Flowers regular. Calyx gamophyllous, free, tubular, costate, persistent. Petals alternate with lobes of the calyx, unguiculate. Stamens not correspondent in number to petals; anthers extrorse. Ovary free, regular; style 1. Fruit a capsule 1-locular, 3—4-valved, included in the persistent calyx-tube.

1. **Frankenia**, L.

Characters of the order.

24. leaves opposite; stipules 0.

FAMILY LXIII. **Violaceæ**.

Sepals 5, persistent. Petals 5, unguiculate. Stamens inserted into a hypogynous disk: filaments flat; anthers short, introrse, pressed against the ovary, the connective elongated beyond the anthers. Ovary free, 1-locular, formed by 3 carpidia; ovules ∞ , bi-seriate; style 1,

persistent. Fruit a 1-locular 3-valved capsule. Valves bearing seeds on the middle nerve. Leaves stipulate.

1. *Viola*, L.

Sepals unequal appendiculate at the base. Petals unequal, the inferior longest and calcarate. Stamens 5; anthers cohering into a tube, the 2 inferior ones appendiculate at the base.

⊙. 24.

SERIES II. APHANOCYCLICEÆ.

Floral parts showing a tendency to spiral arrangement, and generally distinct. Parts of the gynæceum only, occasionally connate. Calyx and corolla often of similar structure. Numerical law not yet established. Stamens generally more numerous than sepals or petals.

ORDER XXI. CRUCIFLORÆ.

Calyx and corolla formed from 2 and its multiple. Circles of stamens more than 1. Carpidia 2, and its multiple.

FAMILY LXIV. Cruciferæ.

Sepals 2 pairs. Petals 4. Stamens tetradynamous. Ovary free, compound of 2 lateral carpidia; placentæ parietal, on the margin of

the carpidia; style 1. Fruit a siliqua, silicula or lomentum. Leaves alternate, without stipules.

1. **Raphanus**, Tournei.

Indehiscent siliqua (lomentum) irregularly moniliform, several seeded.

⊙. ⊙⊙. flowers purple, white, yellow.

2. **Thysanocarpus**, Hook.

Indehiscent silicula (samara) orbicular, winged, 1-seeded.

⊙. vernal; flowers white, rose.

3. **Senebiera**, Poir.

Indehiscent silicula (schizocarp) 2-seeded. Seeds globose, rugose.

⊙. ⊙⊙. flowers minute, white.

4. **Lepidium**, R. Br.

Silicula dorsally compressed, ovate, with carinate valves, and narrow replum. Seeds solitary in each locule, penulous from the apex of the replum.

⊙. ⊙⊙. 24. flowers minute, white, yellow.

5. **Capsella**, Vent.

Silicula dorsally compressed, with carinate, 1-nerved, valves, and narrow replum. Seeds ∞.

⊙. flowers white.

6. **Tropidocarpum**, Hook.

Siliquea dorsally compressed, linear, with 1-nerved, carinate valves, and very narrow replum. Seeds ∞ .

⊙. flowers yellow.

7. **Nasturtium**, R. Br.

Siliquea linear, with concave valves, and only rudimentary nerve. Seeds ∞ , 2-seriate in each valve.

⊙. ⊙ ⊙. 2f. aquatic; flowers white, yellow.

8. **Sisymbrium**, L.

Siliquea linear, with concave, 3-nerved valves. Seeds ∞ , 1-seriate in each valve.

⊙. ⊙ ⊙. 2f. flowers yellow, white.

9. **Barbarea**, R. Br.

Siliquea linear, 4-angular with concave, 1-nerved valves. Seeds ∞ , compressed, 1-seriate in each valve.

⊙ ⊙. 2f. flowers yellow.

10. **Brassica**, L.

Siliquea linear, with concave, more than 1-nerved valves. Seeds ∞ , globose, 1-seriate in each valve.

⊙. ⊙ ⊙. 2f. flowers yellow.

11. **Erysimum**, L.

Siliquea linear, 4-angular, with carinate, 1-

nerved valves. Seeds ∞ , globose, 1-seriate in each valve.

⊙ ⊙. 2♂. flowers yellow.

12. **Caulanthus**, Watson.

Sepals equally saccate. Petals undulate. Siliqua elongated, terete, sessile; valves 1-nerved. Seeds ∞ , oblong, 1-seriate in each valve.

⊙ ⊙. flowers purple, whitish.

13. **Cheiranthus**, L.

Lateral sepals saccate. Petals unguiculate. Siliqua laterally compressed; replum broad; valves 1-nerved. Seeds compressed, 1-seriate in each valve.

⊙. ⊙ ⊙. flowers yellow, orange, purple.

14. **Streptanthus**, Nutt.

Sepals colored, and equal. Petals undulate. Siliqua laterally compressed; valves flattened, 1-nerved. Seeds ∞ , 1-seriate, marginate, compressed.

⊙. ⊙ ⊙. flowers purplish, or yellowish.

15. **Arabis**, L.

Petals not undulate. Siliqua laterally compressed, linear; valves flattened, with prominent nerve. Seeds ∞ , 1-seriate, compressed, marginate.

⊙. ⊙ ⊙. 2♂. flowers purple, white.

16. **Cardamine**, L.

Siliqua laterally compressed, linear; valves flat, without nerve. Seeds ∞ , 1-seriate; funicle filiform.

⊙⊙. 2♂. flowers purplish, white.

17. **Alyssum**, L.

Silicula laterally compressed, orbicular; valves concave; replum broad. Seeds 1—2 in each valve.

⊙. ⊙⊙. 2♂. flowers white, yellow.

FAMILY LXV. **Fumariaceæ**.

Sepals 1 pair. Corolla irregular. Petals more or less connate. Stamens 6, diadelphous.

1. **Dicentra**, Borkh.

Sepals small; 2 lateral petals flat, anterior and posterior ones calcarate. Ovary 1-locular, with 2 parietal placentæ; ∞ -ovulate. Fruit a 2-valved capsule.

2♂. flowers white, red, yellow.

FAMILY LXVI. **Papaveraceæ**.

Sepals 2—3 caducous. Corolla regular; petals 2 pairs, sometimes 3. Stamens not connate. Ovary free.

1. **Platystemon**, Benth.

Sepals 3, very caducous. Petals 6, imbricate. Stamens ∞ ; filaments flattened their whole

length. Carpidia several, ∞ -seeded, at first syncarpous; stigmas free, sessile, linear. Fruit apocarpous, of several distinct, ∞ -seeded, indehiscent carpidia.

☉. villous, flowers cream color.

2. **Platystigma**, Benth.

Sepals 3, very caducous. Petals 4—6 imbricate. Stamens ∞ ; filaments flattened only at the base. Ovary 3-angular, 1 locular; placentæ 3; stigmas 3. Fruit a capsule, 3-angular, 3-valved, ∞ -seeded.

☉. external petals yellow, internal paler.

3. **Dendromecon**, Benth.

Sepals 2. Petals 4. Stamens ∞ . Ovary terete, linear with 2 placentæ; ovules ∞ . Stigma sessile, 2-lobed. Fruit a capsule 1-locular, 2-valved; seeds on the margins of the valves.

½. flowers yellow; leaves rigid entire.

4. **Eschscholtzia**, Cham.

Calyx and corolla inserted into a turbinate thalamus. Calyx gamosepalous, soon circumcissile at the base. Petals 4. Stamens ∞ , adhering to the base of the petals; filaments very short; anthers extrorse. Ovary free, terete, 1-locular, with 2 placentæ; ovules ∞ ; stigmas 4, unequal. Fruit a capsule, terete,

10-nerved, 1-locular, 2-valved; seeds on the margins of the valves.

☉. 24. flowers orange, yellow.

5 **Meconopsis**, Viguier.

Sepals 2, caducous. Petals 4. Stamens ∞ ; anthers laterally dehiscent. Ovary obovate, 1-locular, with more than 2 placentæ; style short, persistent; stigmas several, radiating. Fruit a 1-locular capsule, dehiscing by several valves near the apex.

☉. 24. flowers red, orange.

6. **Argemone**, Tournef.

Sepals 2—3. Petals 4—6. Stamens ∞ ; anthers extrorse. Ovary ovate, 1-locular with more than 2 placentæ; stigmas nearly sessile, radiating. Fruit a capsule dehiscing by several valves near the apex.

☉. prickly, flowers large, white, yellow.

ORDER XXII. POLYCARPICÆ.

Floral parts with a tendency to arrange themselves spirally, and gradually merge into each other.

FAMILY LXVII. **Laurineæ**.

Perigonium 6-parted; lobes 2-seriate, imbricate in æstivation. Disk adnate to the base of

the perigonium. Stamens inserted on the margin of the disk, 6 or its multiple; anthers dehiscent by valves. Ovary 1-locular, compound of 3 carpidia but only one ovule developed; style 1. Fruit baccate or drupaceous. Leaves alternate; stipules 0.

1. **Oreodaphne**, Nees.

Margin of the perigonium deciduous. Stamens 9—12, in 3 rows; anthers of the 2 external rows introrse, of the 3d extrorse and introrse, inner row sterile. Fruit a drupe resting on the enlarged thalamus. $\frac{1}{2}$.

FAMILY LXVIII. **Berberidaceæ**.

Sepals, petals and stamens 2—3-seriate, opposite each other. Anthers extrorse, dehiscing by uplifted valves. Ovary 1-locular with ventral placenta, 8-ovulate. Fruit baccate capsular or follicular, 1—several-seeded. Leaves alternate; stipules 0.

1. **Vancouveria**, Decaisne.

Sepals 2×3 . Petals 2×3 . Stamens 6. Fruit a follicle, several-seeded.

$\frac{1}{2}$. flowers white.

2. **Berberis**, L.

Sepals 2×3 , protected by bracts. Petals 2×3 . Stamens 6. Fruit baccate, few-seeded.

$\frac{1}{2}$. flowers yellow.

FAMILY LXIX. **Ranunculaceæ.**

Petals alternate with sepals, and imbricate in æstivation. Stamens ∞ ; anthers extrorse (lateral), longitudinally dehiscent. Ovaries several, sometimes reduced to 1, syncarpous and baccate; styles distinct. Fruit akene, follicle, berry. Stipules 0.

1. **Pæonia**, Tournef.

Sepals 5, unequal, persistent. Petals 5—(2×5), equal. Stamens ∞ ; anthers introrse. Ovaries few, seated on a fleshy disk, distinct, ∞ -ovulate; stigmas sessile. Fruit of few follicles, ∞ -seeded, coriaceous.

24. $\frac{1}{2}$. flowers red, white.

2. **Actæa**, L.

Sepals 4, equal, caducous. Petals 4. Anthers introrse. Ovary 1, 1-locular with ventral placenta; ovules 2-seriate; stigma sessile. Fruit baccate, ∞ -seeded.

24. flowers white.

3. **Delphinium**, Tournef.

Sepals 5, petaloid; upper one calcarate. Corolla irregular; upper petal wanting; 2 lateral petals projecting by their appendices into the calyx-spur. Ovaries not more than 5, with ventral placenta, ∞ -ovulate. Fruit several distinct follicles.

⊙. 24. flowers white, blue, purple, red.

4. **Aquilegia**, Tournef.

Sepals 5, petaloid, equal. Petals 5, bilabiate, prolonged backward into a spur. Fruit 5 follicles.

24. flowers red, blue, yellow.

5. **Ranunculus**, L.

Sepals 5. Petals 5 or a multiple, with a scale at the base. Ovaries ∞ , 1-ovulate. Fruit ∞ akenes.

⊙. 24. flowers yellow, white.

6. **Myosurus**, Dillen.

Sepals 5, calcarate. Petals 5, on filiform claws. Fruit ∞ akenes, crowded on an elongated, spike-like receptacle.

⊙. dwarf plants with radical leaves.

7. **Thalictrum**, Tournef.

Involucre 0. Sepals 5—4, very caducous. Petals 0. Ovaries ∞ , 1-ovulate. Fruit capitate, akenes.

24. leaves ternately compound.

8. **Anemone**, Hall.

Involucre 3-foliate. Sepals petaloid, 5 or a multiple. Petals 0. Ovaries ∞ , 1-ovulate. Fruit akenes, capitate. 24.

9. *Clematis*, L.

Sepals 4, petaloid, *not* imbricate in æstivation. Petals 0. Ovaries 1-ovulate. Fruit ∞ akenes, caudate by the persistent style. $2\frac{1}{2}$, $\frac{1}{2}$.

ORDER XXIII. RANALES.

Floral parts having a tendency to merge gradually into each other.

FAMILY LXX. *Nymphæaceæ*.

Sepals and petals inserted into a fleshy, cup-shaped thalamus. Stamens ∞ , ∞ -seriate, inserted with the petals; filaments flat, petaloid; anthers introrse, adnate. Carpidia several, immersed in the thalamus, and forming an ∞ -locular ovary; ovules ∞ , inserted on the partitions; styles united, and forming a radiate, peltate stigma, projecting beyond the thalamus and persistent.

1. *Nuphar*, Smith.

Sepals 5, petaloid. Petals ∞ , in several series, at length recurving, persistent. Stigma stipitate. Fruit baccate.

$2\frac{1}{2}$. aquatic. flowers yellow.

SERIES III. PERIGYNÆ.

Thalamus cup-shaped, bearing sepals, petals, and stamens; and enveloping and including the carpidia.

SECTION I. CALYCIFLORÆ.

Petals present and distinct, 5—4. Stamens equaling them or a multiple.

ORDER XXIV. MYRTALES.

Calyx-lobes valvate in æstivation. Petals as many. Stamens as many, or a multiple, sometimes a divisor. Carpidia united into a single ovary.

FAMILY LXXI. Halorrhagideæ.

Calyx-tube adnate to the ovary; limb 4-parted. Petals alternate with calyx-lobes. Stamens not more than twice as many as petals; if equal, opposite to them. Placentæ central, 1-ovulate. Styles as many as locules.

1. *Hippuris*, L.

Flowers ♂ or sometimes polygamous. Stamen 1; filament subulate. Ovary 1-locular, 1-ovulate; style filiform. Fruit nut-like.

2℥. aquatic; leaves verticillate; flowers minute, solitary in the axils.

2. *Myriophyllum*, L.

Monœcious. ♂ : petals very caducous; stamens 8. ♀ : calyx-limb, and petals minute; stigma villous; ovary 4-locular, 4-ovulate.

2℥. aquatic.

FAMILY LXXII. **Onagraceæ.**

Calyx-tube adnate to the ovary. Petals alternate with them, not valvate in æstivation. Stamens inserted with petals, as many or a multiple; anthers introrse. Placentæ central, ∞ -ovulate. Style 1. Stipules 0.

1. **Jussiaea**, L.

Calyx-tube not prolonged beyond the ovary, but forming an epigynous disk; lobes 4—6 persistent. Petals as many. Stamens twice as many. Loculi of the ovary as many as the calyx-lobes; stigma capitate. Fruit a septicidal capsule.

2. aquatic; flowers yellow; leaves alternate.

2. **Zauschneria**, Presl.

Calyx-tube prolonged considerably above the ovary, funnel-shaped, colored, with 4-lobed, deciduous limb. Petals not exceeding the calyx-lobes, 2-cleft, erect. Stamens 8, included. Ovary 4-locular, 4-valved. Seeds with a hairy crown. Fruit a capsule, linear. 1-locular, ∞ -seeded.

2. flowers scarlet; upper leaves alternate.

3. **Epilobium**, L.

Calyx-tube prolonged but little beyond the ovary; limb 4-parted soon deciduous. Petals as many, obovate, or obcordate, inserted into an annular disk on the summit of the calyx-tube.

Stamens 8. Ovary 4-locular. Fruit a 4-angular, 4-locular, loculicidal capsule. Seeds with a crown of long hair.

⊙. 4. flowers red or pale.

4. **Gayophytum**, Juss.

Calyx-tube not prolonged beyond the ovary limb, 4-parted, reflexed, deciduous. Petals as many. Stamens 8, versatile; those opposite the petals smaller and usually sterile. Ovary 2-locular; style short; stigma capitate or clavate. Fruit a capsule, 2-locular, unequally 4-valved. Seeds smooth.

⊙. slender; flowers red or pale.

5. **Ænothera**, L.

Calyx-tube more or less prolonged above the ovary; lobes reflexed. Petals 4. Stamens 8, versatile. Ovary 4-locular; ovules ∞ ; style filiform. Fruit a 4-locular capsule, loculicidal. Seeds ∞ , smooth.

⊙. 4. leaves alternate; flowers yellow, white.

6. **Godetia**, Spach.

Calyx-tube prolonged beyond the ovary, funnel-form, the lobes reflexed. Petals 4. Stamens 8, unequal; anthers basifixed. Capsule ovate to linear. Seeds smooth ∞ .

⊙. flowers purple to white, often spotted.

7. **Clarkia**, Pursh.

Calyx-tube prolonged above the ovary, obconical, deciduous, the lobes reflexed. Petals 4, unguiculate. Stamens 8, alternate ones depauperate; anthers basifixed. Capsule linear. Seeds ∞ , smooth. ☉.

8. **Eucharidium**, Fisch. & Mey.

Calyx-tube linear-elongated above the ovary; its lobes reflexed, deciduous. Petals 4, unguiculate. Stamens 4, alternate with the petals; anthers basifixed. Seeds ∞ , smooth.

☉. flowers red.

9. **Boisduvalia**, Spach.

Calyx-tube prolonged beyond the ovary, funnel-form, deciduous; the lobes erect. Petals 4, sessile, 2-lobed. Stamens 8, those opposite the petals shorter; anthers basifixed. Capsule 4-locular. Seeds ∞ , smooth.

☉. flowers purple.

FAMILY LXXIII. **Lythrarix**.

Calyx-tube not adnate to the ovary. Stamens inserted with the petals, and of definite number; anthers introrse. Ovary free, with central placentæ, compound of carpidia; ovules ∞ ; style 1.

1. **Lythrum**, L.

Calyx tubular, 8—12-costate; limb 8—12-den-

tate; dentations alternating in size. Petals 4—6, opposite the smaller dentations of the calyx; Stamens 8—12. Ovary 2-locular. Capsule 2-locular, covered by the persistent calyx.

☉. 2. flowers purple.

ORDER XXV. ROSIFLORÆ.

Calyx-lobes imbricate in æstivation, as many as the perigynous petals. Ovaries several, in different degrees of consolidation, in rare instances reduced to a single one; the eccentric position of which indicates the abortion of its fellows.

FAMILY LXXIV. *Amygdalaceæ*.

Calyx free, 5-cleft, deciduous. Petals 5, convolute in æstivation. Ovaries generally reduced to 1, 1-locular, 2-ovulate. Fruit a drupe, by abortion generally 1-seeded. Leaves alternate, stipulate; stipules caducous.

1. *Prunus*, L.

Drupe fleshy; endocarp not rugose. $\frac{1}{2}$.

2. *Nuttallia*, Torrey & Gray.

Flowers polygamous. Ovaries 5. Fruit several 1-seeded drupes.

$\frac{1}{2}$. flowers white.

FAMILY LXXV. **Spirææ.**

Ovaries verticillate, rarely reduced to 1. Fruit follicular.

1. **Spiræa**, L.

Seeds small, exalbuminous, with membranaceous testa.

24. $\frac{1}{2}$. flowers white, rose.

2. **Neillia**, Don.

Seeds albuminous, with a shining crustaceous testa.

$\frac{1}{2}$. flowers white.

FAMILY LXXVI. **Dryadaceæ.**

Ovaries collected around a convex receptacle, rarely reduced to one, 1-ovulate. Fruit indehiscent, frequently drupaceous.

1. **Rubus**, L.

Calyx persistent, concave or flattened; limb 5-parted. Stamens ∞ . Ovaries on a convex receptacle. Fruit drupes ∞ , on a conical receptacle.

24. $\frac{1}{2}$. flowers white.

2. **Fragaria**, L.

Calyx concave or flattened, persistent, 5-lobed, augmented by 5 bractlets. Petals 5. Stamens

a multiple of 5. Ovaries ∞ , on a convex receptacle; styles lateral. Fruit ∞ -akenes on an enlarged fleshy receptacle.

24. flowers white.

3. **Potentilla**, L.

Calyx concave or flattened, 5-lobed, augmented by 5 bractlets. Petals 5. Stamens a multiple of 5. Ovaries ∞ on a slightly conical receptacle. Styles lateral. Fruit ∞ , akenes.

24. 1/2. flowers yellow.

4. **Horkelia**, Cham. & Schlect.

Calyx campanulate; limb 5-parted, augmented by 5 bractlets. Petals 5. Stamens a multiple. Ovaries inserted on a conical receptacle; styles sub-terminal. Fruit akenes.

24. flowers yellowish, pink, white.

FAMILY LXXVII. **Sanguisorbaceæ**.

Calyx-tube contracted near its apex, including the ovaries. Petals often wanting. Stamens and ovaries often reduced in number. Ovaries 1-ovulate.

1. **Adenostoma**, Hook & Arn.

Calyx funnel-shaped; tube 10-costate; limb 5-parted. Petals 5. Stamens a multiple. Ovary 1, with truncate, pubescent apex. Fruit an akene, included in the peristent calyx-tube.

1/2. flowers white.

2. **Alchemilla**, Tournef.

Calyx-tube urceolate, peristent, limb 4-parted, with as many minute deciduous bractlets. Petals 0. Stamens reduced, 1 to 4. Ovaries 1—4; styles basilar. Fruit 1—4 akenes. 2f.

3. **Acæna**, Vahl.

Calyx-tube contracted at the throat, oblong, angular, the angles armed with glochidiate prickles; limb persistent. Petals 0. Stamens reduced, 1—5. Ovaries 1—2; styles terminal; stigmas penicillate. Fruit an akene inclosed in the persistent calyx. 2f.

4. **Cercocarpus**, HBK

Calyx-tube cylindrical, persistent; limb turbinate, 5-lobed, deciduous. Petals 0. Stamens multiples of 5. Ovary 1; style terminal, long exserted. Fruit an akene linear, terete, caudate by the elongated, plumose, twisted style. ½.

FAMILY LXXVIII. **Rosaceæ**.

Carpidia ∞ , 1-ovulate, indehiscent, included in the fleshy tube of the calyx. Stamens ∞ .

1. **Rosa**, Tournef.

Calyx-tube urceolate, constricted at the throat; limb 5-parted. Petals 5. Styles lateral, exserted. Fruit ∞ -akenes, included in the fleshy calyx-tube. ½.

FAMILY LXXIX. **Calycantheæ.**

Calyx fleshy; tube obconical; limb divided into ∞ -seriate lobes. Pétals 0. Stamens ∞ ; anthers extrorse. Ovaries ∞ , 1-ovulate, inserted on the whole inner surface of the calyx-tube; styles ∞ , terminal, exserted. Fruit ∞ akenes, enclosed in the fleshy calyx-tube. Leaves opposite; stipules 0.

1. **Calycanthus**, Lind.

Inner lobes of the ∞ -seriate calyx-limb smaller than the external. Outer series of stamens fertile; inner, sterile.

$\frac{1}{2}$. flowers purple or brownish.

FAMILY LXXX. **Pomaceæ.**

Calyx-tube adnate to the ovary; limb 5-parted. Carpidia 2—5, 2-ovulate. Styles 2—5. Fruit baccate.

1. **Photinia**, Lind.

Carpidia 2, imperfectly united and only half immersed in the calyx-tube; styles 2. Calyx-limb growing fleshy in fruit and covering the upper half of the carpidia, which are 1-seeded by abortion.

$\frac{1}{2}$. flowers in corymbose panicles.

2. **Amelanchier**, Medik.

Ovules of the carpidion separated by an in-

complete septum; 1 ovule becoming abortive in the ripe fruit.

♂. flowers in racemes.

ORDER XXVI. LEGUMINOSÆ.

Ovary 1, 1-locular. Fruit a legume. Leaves alternate, stipulate.

FAMILY LXXXI. Papilionaceæ.

Corolla papilionaceous. Stamens 10.

1. *Pickeringia*, Nutt.

Petals of the carina not connate. Stamens not diadelphous. Legume linear, compressed.

♂. flowers purple; leaves palmately trifoliate, evergreen; stipules evanescent.

2. *Thermopsis*, R. Brown.

Petals of the carina partly connate. Stamens not diadelphous. Legumes linear, compressed.

♂. flowers yellow; leaves palmately 3-foliate; stipules persistent, foliaceous.

3. *Lupinus*, L.

Stamens monadelphous; anthers alternately oblong and reniform.

⊙. ⊙⊙. ♂. ♀. leaves palmate; stipules adnate.

4. **Medicago**, L.

Diadelphous. Legume falcate or spirally coiled.

⊙. 24. ½. leaves pinnately trifoliolate; stipules adnate.

5. **Melilotus**, Tournef.

Diadelphous. Petals free from the column of stamens and deciduous. Legume globose.

⊙. ⊙⊙. flowers racemose: leaves pinnately trifoliolate; stipules adnate.

6. **Trifolium**, Tournef.

Diadelphous. Petals persistent, and adnate to the staminal tube. Legumes utriculate, irregularly dehiscent.

⊙. 24. leaves palmately compound; stipules adnate.

7. **Hosackia**, Doug.

Diadelphous. Petals unguiculate. Legumes cylindrical, sessile. Flowers umbellate.

⊙. 24. leaves impari (2—several)-pinnate; stipules often minute.

8. **Psoralea**, L.

Diadelphous. Wings united to the carina. Ovary sessile, 1-ovulate. Legume included in the calyx, indehiscent.

24. ½. glandular; leaves imparipinnate, 3—5-foliolate; stipules not adnate.

9. **Amorpha**, L.

Monadelphous. Vexillum unguiculate. Wings and carina 0. Ovary sessile, 2-ovulate. Legumes dehiscent very late.

♂. glandular; leaves imparipinnate.

10. **Glycyrrhiza**, L.

Diadelphous. Calyx ebracteolate. Vexillum wings and carina straight. Anthers confluent. Legumes ovate, compressed, few-seeded, echinate.

♂. glandular; leaves imparipinnate.

11. **Astragalus**, L.

Diadelphous. Carina blunt. Legume usually more or less divided by the intrusion of the dorsal suture. Seeds reniform.

⊙. ♂. leaves imparipinnate.

12. **Vicia**, L.

Diadelphous. Style filiform; apex pilose.

⊙. ⊙. ⊙. ♂. leaves paripinnate, terminating in branched tendrils.

13. **Lathyrus**, L.

Style dorsally flattened towards the apex, concave, pilose along the inner side.

♂. leaves paripinnate, ending in branched tendrils.

14. **Cercis**, L.

Stamens not diadelphous; anterior longer than the posterior ones; anthers versatile. Petals unguiculate, those forming the carina, separate, and larger than the rest. Legume flat, stipitate, ∞ -seeded; ventral suture winged.

$\frac{1}{2}$. flowers purple in axillary fascicles; leaves simple, appearing after the flowers.

ORDER XXVII. DAPHNALES.

Petals 0. Perigonium and stamens inserted on a perigynous disk. Stamens 2 or its multiple. Carpidion 1; ovules never basilar. Stipules 0.

FAMILY LXXXII. Thymeleaceæ.

Ovary 1-locular, 1-ovular; ovule lateral, attached near the apex; style lateral.

1. **Dirca**, L.

Flowers $\varnothing$. Perigonium corolline, campanulate; limb obliquely truncate. Stamens 8 exserted, the alternate ones shorter. Hypogynous scales 0. Style filiform, sub-terminal. Fruit a drupe. $\frac{1}{2}$.

FAMILY LXXXIII. Loranthaceæ. (Of doubtful affinity.)

Evergreen, dichotomous, parasitic perennials. Branches articulate. Leaves opposite; stipules

0. Flowers epigynous. Stamens inserted on the perigonium, opposite its lobes, and of the same number. Ovary 1-locular, 1-ovular. Fruit baccate. Seed often containing several embryos.

1. **Phoradendron**, Nutt.

Flowers diclinous; ♂ and ♀, on separate spikes. Anthers 2-locular. Stigma sessile. Fruit crowned by the persistent perigonium.

24. on oaks, conifers, mimosæ, etc.

2. **Arceuthobium**, Bieb.

Diœcious. ♂ flowers sessile. Lobes of the perigonium ovate, spreading. Anthers sessile; inserted on the middle of the perigonium lobes, 1-locular, transversely dehiscent. ♀ flowers shortly pedicellate, compressed, with 2-dentate limb. Stigma sessile. Berry transversely dehiscent at the base.

24. on conifers.

SERIES IV. MONOCHLAMYDEÆ.

Flowers incomplete. Number of seed leaves correspondent to floral parts.

ORDER XXVIII. SERPENTARIÆ.

Leafy plants containing chlorophyll, as dis-

tinguished from the other Asaral group, the Schizanthæ, which are destitute of leaves and chlorophyll.

FAMILY LXXXIV. **Aristolochiæ.**

Perigonium gamosepalous. Stamens 6, or a multiple. Ovary 6-locular.

1. **Asarum**, Tournef.

Stamens 12, free. Perigonium entirely epigynous; limb regular.

ꝛ. rhizome dichotomous.

2. **Aristolochia**, Tournef.

Stamens 6, gynandrous. Limb of perigonium oblique, irregularly cleft.

ꝛ. ½. twining.

SERIES V. JULIFLORÆ.

Inflorescence dense; flowers apetalous. Leaves never compound.

ORDER XXIX. AMENTACEÆ.

Flowers diclinous: ♂ flowers amentaceous. Fruit 1-seeded, indehiscent. Stipules deciduous.

FAMILY LXXXV. **Cupuliferæ.**

Epigynous. Style 1; stigmas several. Fruit

a nut (akene), the base of which is surrounded by a cupula (persistent involucre).

1. **Quercus**, L.

Monœcious. Aments slender. ♂ perigonium 4—8-parted: ♀ 6-dentate. Style short; stigmas 3. Ovary 3-locular, 6-ovulate, surrounded by a scaly, bud-like involucre, which in fruit enlarges into a cup surrounding the base of the nut. $\frac{1}{2}$.

2. **Castanopsis**, Spach.

Monœcious. Aments slender, paniced on the young shoots. ♂ perigonium 5-lobed; stamens 10. ♀ flowers 1—3, in a scaly involucre, sessile at the base of the ament; perigonium 6-lobed, 2-seriate; fruit 1—3 nuts entirely enclosed in a prickly, irregularly rupturing involucre. $\frac{1}{2}$.

3. **Corylus**, Tournef.

Monœcious. Aments slender. Scales (bracts) imbricated. ♂ flowers, besides the scales, 2-bracteolate. Stamens 8; anthers 1-locular. ♀ flowers immersed into a bud; uppermost scales containing flowers, the rest empty. Ovary 2-bracteolate, crowned by a minute perigonium, 2-locular; stigmas 2. Fruit a nut surrounded by a large incised involucre, formed by the growth of the 2-bractlets. $\frac{1}{2}$.

FAMILY LXXXVI **Betulaceæ.**

Hypogynous. ♂ ament: bracts shield-shaped, each enclosing 3 flowers with minute perigonium and 4 stamens. ♀ aments: bracts 3-lobed, each enclosing 3 naked flowers. Ovary 2-locular; loculi 1-ovulate; style 0; stigmas 2. Fruit an akene (nutlet) affixed to the lignescent bract, and collected into a strobilaceous inflorescence.

1. **Alnus**, Tournef.

Fruit lignescent; nutlets attached to lignescent bracts, on a lignescent axis. ½.

FAMILY LXXXVII. **Myriceæ.** (*Of uncertain affinities.*)

Flowers diclinous, amentaceous, each bract containing a single, naked, sessile flower. ♂ aments filiform; ♀ ovate. Ovary connate with some hypogynous scales, 1-locular, 1-ovulate; style very short; stigmas 2. Fruit a nutlet; drupaceous by the incrassate, hypogynous bracts.

1. **Myrica**, L.

Only genus. Characters of the order. ½.

ORDER XXX. URTICALES.

Flowers diclinous. Stamens opposite to the lobes of the perigonium. Ovary superior. Fruit 1-seeded. Leaves stipulate.

FAMILY LXXXVIII. *Platanææ*.

Monœcious. Flowers naked, capitulate on globose receptacles. ♂ head: stamens ∞ , irregularly mingled with the scales. ♀ head: ovaries ∞ , placed irregularly among scales. Fruit a coriaceous nutlet. Leaves alternate, palmately lobed.

1. *Platanus*, L.

Only genus. Characters of the order.

FAMILY LXXXIX. *Urticaceæ*.

♂ perigonium 5-lobed. Stamens 5; filaments inflexed in æstivation; anthers introrse, 2-locular. Ovary rudimentary. ♀ perigonium 2—5-lobed. Ovary 1-locular, 1-ovulate. Fruit an akene, sometimes baccate by the persistent and succulent perigonium. Stipules generally persistent.

1. *Urtica*, Tournef.

♂ perigonium regular and spreading.
♀ perigonium 2-parted, with sessile, penicillate stigma.

⊙. 4. covered with stinging hairs.

2. *Hesperocnide*, Torrey.

♀ perigonium gamophyllous, urceolate, compressed, minutely dentate.

⊙. weak and slender.

FAMILY XC. **Polygonaceæ.** (*Of uncertain affinity.*)

Perigonium imbricate in æstivation. Stamens definite, inserted on the base of the perigonium. Ovary superior, originally compound of 2-3 carpidia; by abortion, 1-loculate, 1-ovulate; but showing the 2-3 styles of the original carpidia; ovule basilar. Fruit indehiscent. Stems articulate. Leaves alternate, sheathing.

1. **Rumex**, L.

Perigonium 6-phyllous, 2-seriate; 3 inner segments larger and more petaloid. Stamens 6, in pairs opposite the outer sepals. Styles 3 with penicillate stigmas. Fruit a 3-cornered akene enclosed in the 3 inner sepals, forming a spurious capsule.

☉. 4. flowers racemose.

2. **Polygonum**, L.

Perigonium 5, sometimes 4-phyllous. Stamens 3—8, single or in pairs opposite to the sepals. Styles 3, sometimes 2; stigmas capitulate. Fruit a 3-cornered or lenticular akene enclosed in the persistent perigonium.

☉. 4. $\frac{1}{2}$. flowers often colored.

3. **Eriogonum**, Michx.

Involucre ∞ -flowered, campanulate, slightly angulate, 6-dentate. Flowers $\varnothing$ pedicillate, exserted, seated on a receptacle with scarious

bracts. Perigonium 6-parted, 2-seriate. Stamens 9, in pairs opposite to the external lobes; singly to the internal ones. Styles 3; stigmas capitate. Fruit a 3-angled, rarely a lenticular, akene.

⊙. 4. ½. peduncles 2—3-chotomous.

4. **Chorizanthe**, R. Br.

Involucre 1—3-flowered, tubular, 3-angular, 6-dentate, mucronate or aristate. Flowers ♂, scarcely exserted. Perigonium 6-parted, 2-seriate. Stamens typically 9, in pairs opposite to the external lobes; singly to the internal ones, occasionally by abortion 6 or 3. Styles 3; stigmas capitate. Fruit a 3-angular akene.

⊙. 4. peduncles dichotomous.

5. **Lastarriæa**, Remy.

Involucre 0. Perigonium coriaceous, tubular, 6-dentate; the dentations uncinately aristate. Stamens 3, inserted on the throat. Fruit a 3-angled akene.

⊙. diffusely branched.

6. **Pterostegia**, Fisch. & Mey.

Involucre a single 2-lobed bract, sub-tending a single ♂ flower. Perigonium 6-parted, persistent. Stamens 6, (rarely fewer). Fruit a 3-angular akene, loosely enveloped by the enlarged involucre.

⊙. prostrate, diffusely dichotomous; leaves opposite.

ORDER XXXI. PIPERALES.

Flowers sessile, in dense spikes or racemes, bracteate, without perigonium. Stem articulate.

FAMILY XCI. Saururæ.

Ovary central, compound of several follicular carpidia; stigmas several.

1. *Anemopsis*, Nutt.

Flowers in a dense, conical spadix; with a several-leaved, persistent, colored involucre; each flower subtended by a colored bract. Stamens adnate to the base of the ovary. Ovary immersed into the rhachis, 1-locular, with parietal placentæ. Fruit a capsule dehiscent from the apex.

24. leaves mostly radical.

FAMILY XCII. *Ceratophylleæ*. (*Of doubtful affinity*)

Monœcious. Involucre 12-cleft; lobes linear, truncate. ♂ flowers: anthers ∞ , sessile. ♀ flowers: ovary 1-locular, 1-ovulate; style terminal. Fruit a nutlet, with persistent style and involucre.

24. submersed aquatics; stems articulate; leaves verticillate, sessile, dichotomous.

1. **Ceratophyllum**, L.

Only genus. Characters of the order.

DIVISION II. MONOCOTYLEDONEÆ.**SERIES I. COROLLIFLORÆ.**

Perigonium 2×3 parted. Ovary 3 carpidia, syncarpous in different degrees.

ORDER XXXII. GYNANDRÆ.**FAMILY XCIII. Orchideæ.**

Placentæ parietal.

1. **Epipactis**, Haller.

Anther 1, persistent, not connate with the column; pollinia 2, attached to the common gland. Perigonium spreading; labellum geniculate, inferior part concave. Ovary contorted only at the base; column short, terete.

♂. caulescent; flowers in a loose few-flowered raceme.

2. **Spiranthes**, Richard.

Anther 1, persistent, not connate with the column; pollinia 2, attached to the common gland. Perigonium oblique; labellum enclosed, canaliculate, embracing with its base the short column.

♂. flowers forming a spiral spike.

3. **Habenaria**, Willd.

Anther 1, persistent, entirely connate with the column; pollinia 2, divergent at the lower end. Perigonium ringent, galeate; labellum elongate, spreading, calcarate. Column short.
24. caulescent.

4. **Corallorhiza**, Haller.

Anther 1, terminal, caducous, not adnate to the column; pollinia 4, globose. Perigonium ringent. Labellum adnate to the column, serrate at base, 3-lobed; lateral lobes very small. Column semi-terete.

24. aphyllous and without chlorophyll; flowers in spikes.

ORDER XXXIII. EPIGYNÆ.

Stamens free, 3, or its multiple. Ovary inferior.

FAMILY XCIV. Iridaceæ.

Stamens 3, opposite to the external segments of the perigonium; anthers extrorse.

1. **Sisyrinchium**, L.

Divisions of the perigonium equal. Stamens monadelphous. Style short; stigmas 3, filiform, involute, alternate with the stamens. Fruit a capsule, obovate.

2. flowers developing from spathes; leaves distichous, sheathing; stems winged.

2. *Iris*, L.

Perigonium tubular at the base; segments equal, but differing in shape; the 3 external reflexed; 3 internal everted. Stigma 3-parted, petaloid.

2. flowers from spathes.

ORDER XXXIV. CORONARIÆ.

Perigonium 6-parted in different degrees. Stamens 3 or a multiple. Ovary superior.

FAMILY XCV. *Smilacææ*.

Anthers not extrorse. Ovary 3-locular, with central placentæ. Fruit a berry. Testa of the seed not crustaceous.

1. *Smilacina*, Desf.

Divisions of the perigonium equal. Stamens inserted at the base of the segments. Loculi of the ovary 2-ovulate. Loculi of the fruit 1-seeded.

2. leaves sessile and amplexicaul.

2. *Maianthemum*, Mœnch.

Perigonium 4-parted. Stamens 4.

2. leaves petiolate.

3. *Prosartes*, Don.

Perigonium 6-phyllous, campanulate; segments saccate at the base. Stamens 6, attached at the base of the segments, and deciduous with them. Anthers adnate, dehiscing laterally. Ovary 3-locular; loculi 2-ovulate; style deciduous. Loculi of the berry 1—2-seeded.

2f. leaves alternate, sessile, amplexicaul.

4. *Trillium*, L.

Perigonium 6-phyllous; 3-external segments herbaceous, persistent; 3 internal petaloid, marcescent. Stamens 6; anthers linear, lateral; connective broad. Ovary 3-locular, ∞ -ovulate; styles 3. Berry ∞ -seeded.

2f. leaves 3, verticillate, reticulate.

FAMILY XCVI. *Liliaceæ*.

Anthers introrse. Ovary 3-locular. Testa of the seed crustaceous.

1. *Clintonia*, Raf.

Perigonium 6-phyllous, campanulate, deciduous. Stamens 6, inserted on the base of the segments; anthers versatile. Style slender, deciduous. Fruit a berry.

2f. flowers on a scape.

2. *Chlorogalum*, Kunth.

Perigonium 6-phyllous; segments linear, per-

sistent, marcescent. Stamens 6, adnate to the base of the segments; anthers versatile. Loculi of the ovary 2-ovular; style filiform, deciduous. Fruit a membranaceous, 3-lobed, loculicidal capsule.

24. bulbous; inflorescence racemose-paniculate.

3. *Allium*, L.

Perigonium persistent. Stamens 6, adnate to the base of the segments; filaments naked with dilated base; anthers versatile. Ovary 3-lobed; loculi 2-ovular; style filiform, persistent; stigma simple. Fruit a loculicidal capsule.

24. bulbous; scapigerous; inflorescence umbellate.

4. *Cyanotris*, Raf. (*Camassia* Lindl.)

Perigonium 6-phyllous, persistent; 5 superior segments ascending; inferior one deflexed. Filaments filiform, ascending; anthers versatile. Ovary ovate, 3-locular; loculi ∞ -ovulate; style filiform, declinate; stigma slightly 3-cleft. Fruit a loculicidal, 3-angled capsule; loculi ∞ -seeded.

24. bulbous; scapigerous; flowers in a simple raceme.

5. *Brodiaea*, Smith.

Perigonium funnel-form, angulate, persistent. Stamens 3, alternating with as many stamino-

diæ. Hypogynous disk 3-lobed. Ovules ∞ . Style persistent; stigma 3-lobed, Capsule loculicidal.

24. scapigerous; umbellate.

6. **Triteleia**, Hook.

Perigonium salver-shaped, persistent. Fertile stamens 6; filaments short, 3 inserted on the throat, and 3 half-way down the tube. Ovary stipitate; ovules ∞ . Capsule loculicidal.

24. scapigerous; umbellate; capitate.

7. **Muilla**, Watson.

Perigonium subrotate, persistent. Stamens 6, inserted near the base; anthers versatile. Ovary sessile, ∞ -ovulate; style persistent, clavate, at length splitting. Capsule globose, loculicidal.

24. scapigerous; umbellate.

8. **Lilium**, L.

Perigonium 6-phyllous; segments equal, spreading, with a nectariferous groove near the base, deciduous. Ovary ∞ -ovulate; style undivided; stigma 3-angular.

24. bulbous; pedicels ebracteate.

9. **Fritillaria**, L.

Perigonium 6-phyllous, campanulate, with a smooth nectariferous pit near the base, deciduous. Ovary ∞ -ovulate. Style 3-parted.

24. bulbous; flowers bracteate.

10. **Calochortus**, Pursh.

Perigonium 6-phyllous, deciduous; 3 external segments smaller and lanceolate; 3 internal, broad, with a conspicuous nectariferous gland near the base. Ovary ∞ -ovulate; style 0; stigmas 3, reflexed, persistent.

24. bulbous.

FAMILY XCVII. **Melanthaceæ.**

Anthers extrorse. Ovary 3-locular; styles 3, Capsule septicidous. Testa of the seed not crustaceous.

I. **Scoliopus**, Torr.

Perigonium 6-phyllous, spreading, deciduous; 3 external segments lanceolate; 3 internal linear. Stamens 3, inserted at the base of the external segments; anthers 2-locular, attached above the base. Ovary 3-quetrous, 1-locular, with 3 parietal placentæ; ovules 2-seriate on each; styles 3, linear, persistent, recurved, canaliculate. Capsule irregularly dehiscent.

24. leaves 2; peduncles long, 1-flowered, arranged in an umbel.

2. **Zygadenus**, Michx.

Perigonium 6-phyllous; segments unguiculate, 2-glandular at the base, persistent. Stamens 6, inserted on the claw; anthers reniform. Ovary 3-locular, ∞ -ovulate; styles 3, divergent. Capsule septicidal.

24. bulbous; leaves lanceolate; inflorescence, racemose.

3. **Xerophyllum**, Rich.

Perigonium 6-phyllous; segments sessile, persistent; 3 internal ones smaller. Stamens inserted on the base of the segments; anthers laterally dehiscent. Ovary 3-locular; loculi few-ovulate; styles 3, recurved, persistent. Capsule septicidal.

24. rhizomatous; leaves linear, elongate; inflorescence racemose.

FAMILY XCVIII. **Juncaceæ**.

Perigonium glumaceous. Anthers introrse.

1. **Juncus**, L.

Perigonium 6-phyllous; 3 external segments carinate. Ovary 3-locular; locules ∞ -ovulate. Capsule 3-valved, with central placentæ, ∞ -seeded.

⊙. 24. aquatic.

2. **Luzula**, D C.

Perigonium 6-phyllous; all the segments flat. Ovary 1-locular, 3-ovulate. Capsule 3-valved, 3-seeded.

24. terrestrial.

SERIES II. MICRANTHÆ.

Flowers inconspicuous. Inflorescence ∞ -flowered.

ORDER XXXV. GLUMACEÆ.

Flowers in the axils of bracts, and arranged in spikelets. Spathes 0. Perigonium depauperate. Ovary 4-locular; 1-seeded. Fruit a *caryopsis*, with endosperm.

FAMILY XCIX. Gramineæ,

Stem articulate. Leaves distichous, alternate, sheathing, with ligule (stipule) at the base. Flowers protected by an anterior and a posterior bractlet, (palet). Spikelet generally protected by 1—2 bracts, (glumes). Stamens usually 3. Pistils 2.

1. *Panicum*, L.

Spikelets 2-flowered; upper one ♂, with two unequal, navicular glumes, without aristæ; embraced by the incomplete lower one.

⊙. 24. leaves flattened.

2. *Phleum*, L.

Spikelets 1-flowered, ♂. Glumes 2; aristate; the upper palet sometimes bearing at its base the rudiment of a second flower.

⊙. 24. leaves flattened; panicles [spike-like.

3. **Alopecurus**, L.

Spikelet 1-flowered, ♀. Glumes 2, navicular, connate at their base; lower palet carinate; upper wanting.

℥. leaves flattened; panicles spike like.

4. **Beckmannia**, Host.

Spikelets 1—2-flowered; flowers ♀, sessile. Glumes 2, navicular; lower palet ovate, 3-nerved, embracing the upper 2-cleft, 2-nerved, one.

℥. leaves flattened; spike sessile; spikelets alternate, sessile, 1-sided, 2-seriate.

5. **Phalaris**, L.

Spikelets 3-flowered, upper ♀; 2 lower neutral, depauperate. Glumes 2, carinate. Palets 2, navicular; the lower larger and embracing the upper.

℥. spikelets pedicillate; leaves flattened.

6. **Hierochloa**, Gmelin.

Spikelets 3-flowered: flowers sessile. Glumes equal; carinate. Upper flower ♀: lower palet carinate; upper 1-nerved. 2-lower flowers ♂: lower palet carinate; upper 2-carinate.

℥. spikelets pedicillate; leaves flattened.

7. **Anthoxanthum**, L.

Spikelets 3-flowered. Glumes 2, carinate: lower glume shorter, 1-nerved; upper 3-nerved.

Upper flower ♂, with 2 navicular palets without aristæ; lower palet wrapped round the upper. Stamens 2. Lower 2 flowers, neutral with 1, aristate, canaliculate palet.

2♂. leaves flattened; panicle contracted.

8. **Polypogon**, Desf.

Spikelets 1-flowered. Glumes 2, carinate, aristate, much longer than the flower. Palets 2; upper 2-carinate, lower truncate at the apex.

⊙. leaves flattened.

9. **Agrostis**, L.

Spikelets 1-flowered. Glumes 2, carinate, awnless, larger than the flowers. Palets 2: lower sometimes aristate; upper 2-carinate, sometimes wanting.

⊙. 2♂. tufted; leaves sometimes involute; panicles generally diffuse with verticillate branches.

10. **Gastridium**, Pal.

Spikelets 1-flowered. Glumes 2, ventricose at the base, much larger than the flower and closed. Palets 2; the inferior sometimes aristate, embracing the superior, 2-carinate one.

⊙. leaves flattened; panicles contracted, spike-like.

11. **Deyeuxia**, Clar. (*Calamagrostis*.)

Spikelets 1-flowered; flowers sessile with a

bearded base, and the rudiment of a superior flower reduced to a plumose pedicel. Glumes 2, canaliculate, awnless. Palets 2: inferior aristate; superior 2-carinate.

24. leaves flattened; panicles branched.

12. *Stipa*, L.

Spikelets 1-flowered; flowers stipitate. Glumes 2, membranaceous, larger than the flower. Palets 2, involute; superior shorter, 2-nerved; inferior aristate with a simple, twisted awn. Ovary stipitate; caryopsis terete, and closely wrapped in the palets.

24. spikelets pedicillate, paniculate.

13. *Spartina*, Schreb.

Spikelets 1-sided, sessile, 1-flowered: flowers naked, sessile. Glumes 2, carinate, awnless; the upper embracing the lower which is much smaller. Palets 2, awnless; the lower compressed; the upper larger, navicular. Ovary sessile.

24. with creeping rhizome, rigid, and with involute leaves. Salt marshes.

14. *Cynodon*, Rich.

Spikelets 1-sided, sessile, 1-flowered, often with rudiment of a superior flower. Glumes 2, carinate, awnless, the upper embracing the lower. Palets 2; the lower carinate, acute. Ovary sessile.

24. rhizome creeping; leaves flattened; spikes in our species digitate.

15. **Danthonia**, DC.

Spikelets 2— ∞ -flowered; rhachis hairy. Flowers distichous, the uppermost depauperate. Glumes 2, awnless, somewhat longer than the flower. Palets 2: upper 2-carinate; lower concave, ∞ -nerved, 2-cleft, aristate. Ovary stipitate; caryopsis compressed, free.

24. turfy; leaves flattened; spikelets pedicellate, paniculate.

16. **Avena**, L.

Spikelets 3-flowered, the uppermost depauperate. Glumes 2, awnless. Palets 2: lower 2-cleft aristate; upper 2-carinate awnless. Ovary sessile, hirsute at the apex; caryopsis terete, adherent to the upper palet. ☉.

17. **Trisetum**, Kunth.

Spikelets 2—4-flowered, the uppermost depauperate. Glumes 2, carinate, awnless, shorter than the flower. Palets 2; lower 2-dentate, aristate. Ovary sessile; caryopsis compressed, free.

24. leaves flattened.

18. **ira**, L.

Spikelets 2-flowered, often with the rudiment

of a superior one; flowers sessile. Glumes 2, carinate, awnless, larger than the flower. Palets 2; the lower 2-cleft, dorsally aristate. Ovary sessile; caryopsis free.

⊙. 24.

19. *Arrhenatherum*, Beauv.

Spikelets 3-flowered: lower ♂; middle ♀; upper neutral. Glumes 2, concave, awnless; the upper larger than the lower. Palets of ♂ flower 2: lower dorsally aristate near the base; upper 2-carinate, awnless. Palets of ♀ flower 2: lower dorsally aristate near the apex; upper adnate to the caryopsis.

24. leaves flattened; panicles with verticillate branches; spikelets pedicillate.

20. *Holcus*, L.

Spikelets 2-flowered; flowers pedicillate; lower ♀; upper ♂. Glumes 2, navicular. Palets of the ♀ flower 2; lower navicular awnless; upper 2-carinate. Ovary sessile, pyriform; caryopsis free. Palets of the ♂ flower 2; upper 2-carinate; lower aristate near the apex.

⊙. 24. leaves flattened; panicles branched; spikelets pedicillate.

21. *Phragmites*, Trin.

Spikelets 3—6-flowered; flowers distichous, somewhat remote; the lower one ♂, the rest ♀.

Glumes 2, carinate, acute; the upper larger. Palets 2; lower elongate, subulate; upper 2-carinate. Ovary sessile; caryopsis free.

24. aquatic; leaves broad, flattened; panicles diffused.

22. **Dactylis**, L.

Spikelets 1-sided, 2—7-flowered. Glumes 2, carinate, mucronately aristate. Palets 2; upper 2-carinate; lower 5-nerved, mucronately aristate; carina ciliate. Ovary sessile; caryopsis free.

24. leaves carinate; panicles glomerate, 1-sided.

23. **Kœleria**, Pers.

Spikelets 2—7-flowered; flowers distichous. Glumes 2; carinate, awnless, unequal. Palets 2; lower enlarged; upper 2-carinate, 2-cleft. Caryopsis terete free.

⊙. leaves flattened; panicles contracted, spike-like; spikelets pedicillate.

24. **Melica**, L.

Spikelets 3—5-flowered; 2 inferior flowers ♂, the rest depauperate. Glumes 2, concave, awnless, unequal. Palets 2, sessile, smooth. Caryopsis terete free.

24. leaves flattened; spikelets pedicillate.

25. **Brizopyrum**, Link.

Dicecious. Spikelets compressed, ∞-flower-

ed. Glumes 2, narrow, carinate. Palets 2; lower coriaceous, ∞ -nerved, not carinate; upper carinate with involute margins. Ovary stipitate; caryopsis obovoid, free.

24. creeping; leaves rigid, distichous, spreading; panicle spicate-racemose.

26. **Lophochlæna**, Nees.

Spikelets ∞ -flowered: flowers $\varnothing$. Rhachis articulate, deciduous. Glumes 2, shorter than the flowers; upper 3-nerved; lower smaller, 1-nerved. Palets 2: lower chartaceous ∞ -nerved, membranaceous at the apex, 2-lobed, aristate from the cleft; upper complicate, chartaceous, margin and apex membranaceous, 2-nerved, 2-carinate, margin dentate; apex emarginate. Caryopsis compressed, 2-horned.

○. leaves short; panicle secund, simply racemose.

27. **Glyceria**, R. Br.

Spikelets ∞ -flowered. Glumes 2, obtuse; the lower shorter. Palets 2; upper 2-carinate; lower concave, ovate, rotund, 7-nerved. Caryopsis free.

24. aquatic; leaves flattened; branches of the panicle semi-verticillate.

28. **Poa**, L.

Spikelets 2— ∞ -flowered. Glumes 2, blunt.

Palets 2; lower carinate; upper 2-carinate, Ovary sessile.

⊙. 2. leaves flattened; spikelets pendicillate. paniculate.

29. **Briza**, L.

Spikelets ∞ -flowered; flowers umbricate, distichous. Glumes 2, concave, rounded, ventricose. Palets 2; lower rotund, concave, with cordate base; upper much smaller, 2-carinate. Caryopsis compressed.

2. leaves flattened; spikelets pedicillate, paniculate.

30. **Festuca**, L.

Spikelets 2— ∞ -flowered; flowers distichous. Glumes 2, carinate, unequal. Palets 2; lower not carinate, mucronate, sometimes aristate; upper 2-carinate. Ovary sessile, smooth.

⊙. 2.

31. **Bromus**, L.

Spikelets 3— ∞ -flowered; flowers distichous. Glumes 2, unequal. Palets 2; lower rotund, convex, sometimes aristate; upper 2-carinate, the carina ciliate. Ovary sessile, hirsute at the apex.

⊙. leaves flattened; spikelets pedicillate, paniculate.

32. **Lepturus**, R. Br.

Spikelets 1-flowered, with rudiment of a su-

perior flower. Glumes 2, rigid, subulate, in the terminal spikelet, opposite; in the collateral ones usually lateral; lower one sometimes wanting. Palets shorter than the glumes; the lower inclosing the upper.

⊙. leaves narrow and flattened; spikelets solitary, immersed into the alternate excavations of the rhachis; the inflorescence representing a slender spike.

33. *Lolium*, L.

Spikelets ∞ -flowered; flowers imbricate distichous. Glumes 2, blunt; the posterior often wanting. Palets 2: the lower concave, sometimes aristate; upper, 2-carinate with the caryopsis adhering.

⊙. 4. leaves flattened; Spikelets solitary, immersed into alternate excavations of the rhachis, placed edgewise with it, and representing a single spike.

34. *Triticum*, L.

Spikelets 3— ∞ -flowered; flowers distichous, placed with their flat sides to the rhachis. Glumes 2; lower sometimes wanting. Palets 2; lower rounded; upper 2-carinate; the carinae ciliate.

⊙. 4. leaves flattened; spikelets solitary, immersed into the excavations of the rhachis, representing a single spike.

35. *Hordeum*, L.

Spikelets 1-flowered, with the rudiment of a superior flower, ternate; the central spikelet ♂; the lateral ones depauperate. Glumes 2, linear-lanceolate, aristate, all anterior. Palets 2; lower concave, aristate.

⊙. 2ℓ. leaves flattened; spikelets representing a single spike.

36. *Elymus*. L.

Spikelets 1— ∞ -flowered, all ♂; flowers distichous, the uppermost rudimentary. Glumes 2, equal, anterior. Palets 2, lower concave. Ovary hirsute.

2ℓ. leaves flattened; spikelets representing a single spike.

37. *Gymnostichum*, Schreb.

Spikelets 1—4-flowered; flowers remote, the uppermost rudimentary. Glumes rudimentary, often wanting. Palets 2; lower aristate, embracing the upper.

2ℓ. Leaves flattened; spikelets representing a spike.

FAMILY C. *Cyperaceæ*.

Stem a calamus. Leaves all radical, sheathing but not split at the base; lamina parallel-veined. Anthers basifixed.

1. *Carex*, L.

Flowers diclinic. ♂ spikelets 1-flowered; glume 1, external. ♀ spikelets 1-flowered with 2 glumes; the external like the ♂; internal transformed into a utricle including the ovary.

℥. leaves flattened; stem triquetrous; spikelets collected in diclinous, or androgynous spikes.

2. *Fimbristylis*, Vahl.

Spikelets ♂, ∞-flowered. Palets closely imbricate all round, the lowermost empty. Perigonium 0. Style incrassate at the base, persistent.

℥. leaves narrow; spikelets, if solitary, bracteate; if capitate or umbellate, involucrate.

3. *Isolepis*, L.

Spikelets ♂, ∞-flowered. Palets imbricate all round, the lowermost empty. Perigonium 0. Base of the style deciduous.

℥. caespitose, slender.

4. *Scirpus*, L.

Spikelets ♂, ∞-flowered. Palets imbricate all round, the lowermost empty. Perigonium 6-setous. Style articulate with its base.

⊙. ℥.

5. *Eriophorum*, L.

Spikelets ♂, ∞-flowered. Palets imbricate

all round, the lowermost ones empty. Perigonium ∞ -setous; in fruit exserted and silky. $2\frac{1}{2}$.

6. *Cyperus*, L.

Spikelets $\varnothing$. Palets imbricate, distichous, the lowermost empty. Perigonium 0.

⊙. $2\frac{1}{2}$. inflorescence involucrate.

ORDER XXXVI. SPADICIFLORÆ.

Inflorescence, a spadix surrounded by a spathe. Bracts depauperate. Ovary superior, 1— ∞ -loculate; loculi 1-ovulate. Leaves alternate with sheathing base.

FAMILY CI. Typhaceæ.

Flowers diclinous, in a sometimes interrupted club-shaped spadix; each division of which is often protected by foliaceous spathes. Upper part of spalix δ : perigonium 0; anthers basifixed, irregularly mixed with scales. Lower portion of spadix occupied by $\varnothing$ flowers. Ovaries surrounded at the base by ∞ bristles, sometimes 3 scales; style simple; stigma 1, lateral. Fruit a utricle; endocarp copious. Leaves linear, straight-nerved. Aquatic perennials.

1. *Sparganium*, Tournef.

Flowers in crowded, glomerulate heads. Fil-

aments of δ flowers very short. Perigonium surrounded by 3 scales. Pericarp indehiscent.

2f.

2. **Typha**, Tournef.

Flowers in a club-shaped, continuous spike. δ flowers: filaments filiform. ♀ flowers: ovaries surrounded by bristles. Pericarp dehiscent.

2f

SERIES III. HELOBIÆ.

Aquatics. Types generally not ternary. Seed nearly without endosperm. Embryo with very pronounced radicle.

ORDER XXXVII. POLYCARPICÆ.

Ovaries 3— ∞ . Endosperm 0.

FAMILY CII. Alismaceæ.

Calyx 3-sepalous. Corolla 3-petalous. Stamens 6— ∞ . Ovaries 3— ∞ , with terminal styles, and ventral placentation. Carpidia dry, indehiscent. Lamina of leaves nervose.

1. **Alisma**, L.

Flowers ♀ . Calyx herbaceous. Corolla petaloid. Ovaries ∞ , 1-ovulate. Akenes ∞ , verticillate.

2f. aquatic, scapigerous; inflorescence verticillate, paniculate.

FAMILY CIII. *Juncagineæ*.

Calyx not differing from corolla. Lamina of leaves abortive.

1. *Triglochin*, L.

Perigonium deciduous, 3 inner segments sometimes wanting. Ovary 6-locular; ovules in each locule solitary, basal. Styles 3—6; stigmas plumose. Capsule separating into carpidia; nut finally opening neutrally.

♂. scapigerous; inflorescence spicate.

FAMILY CIV. *Potameæ*.

Perigonium if present, 4-cleft. Stamens 1, 2 or 4. Ovaries 4— ∞ , 1-ovulate. Carpidia indehiscent. Leaves stipulate.

1. *Potamogeton*, Tournef.

Flowers ♂. Perigonium 4-cleft. Anthers 4, sessile, inserted on the base of the segments. Ovaries 4; styles 0.

♂. jointed aquatics; inflorescence pedunculate; spikes axillary.

2. *Zannichellia*, Michel.

Flowers monœcious. ♂ and ♀ in the same axil. Perigonium of ♂ 0; stamens 1. Perigonium of ♀ flower cup-shaped; style 1, persistent; stigma peltate; ovaries 4.

♂. submerged aquatics; leaves filiform; flowers axillary.

ORDER XXXVIII. CENTROSPERMÆ.

Perigonium 0. Ovules basilar.

FAMILY CV. Naidaceæ.

Flowers diclinous. Ovary 1; 1-locular, 1-ovulate; fruit a nutlet.

1. Lilæa, HBK.

Flowers monœcious: ♂ spicate, 1-bracteate, monandrous, sometimes mingled with ♀ flowers, which are partly spicate and 1-bracteate; partly solitary, axillary and ebracteate. Styles of the upper flowers short, of lower, elongate; stigmas capitate.

⊙. aquatic; leaves radical, terete sheathing at base.

2. Zostera, L.

Flowers monœcious. Spathe elongated into a lamina. Spadix flattened, naked dorsally, covered by alternate stamens and ovaries arranged in 2 rows. Anther 1-locular, sessile. Ovary rostrate; style persistent.

2. stems rooting, submerged.

FAMILY CVI. Lemnaceæ.

Aquatic plants without axis. Flowers enclosed in a thin, membranaceous spathe. Stamens 1—2; anthers 2-locular. Ovary sessile,

1-locular; ovules 1—6; style short. Fruit an indehiscent utricle, 1—6-seeded.

1. **Lemna**, L

Stamens 2. Ovary 1-locular.

2. floating.

SUB-CLASS I. GYMNOSPERMÆ.

Phanerogams without ovary.

ORDER XXXIX. CONIFERÆ.

Flowers diclinous. ♂ flowers on an axis, bearing bracts at the lower and stamens at the upper end.

FAMILY CVII. Taxineæ.

♀ flowers solitary. Ovule in the centre of a fleshy axillus, simulating a drupe.

1. **Torreya**, Arn.

Flowers from scale-buds. ♂ consisting of bracts on the base of the axis, imbricated in 4 rows. Stamens ∞ ; connective peltate; anthers 4. ♀ : ovule immersed into an urceolate arillus.

2. branches opposite; leaves linear, decurrent, rigid, mucronate.

FAMILY CVIII Abietineæ.

♀ flowers ∞ , inserted spirally round an axis on lignescent scales. Bracts distinct from the fertile scales. Micropyle directed backwards.

1. **Pinus**, Tournef.

♂ flowers on elongated axes; the different axes crowded into an inflorescence round the base of a new shoot. ♀ flowers with fertile scales protected by bracts, which are much smaller than the scales. Scales of the cone, persistent and elevated into a tumor (umbo).

♂. leaves 1—5, from a squamous sheath.

2. **Tsuga**, Carrière.

♂ flowers on an elongated axis. Axes from axils of last year's leaves, crowded. ♀ : scales scarcely larger than the bracts. Scales of the cone persistent not thickened toward the apex.

♂. leaves distichous, articulated on a persistent, woody base.

3. **Pseudotsuga**, Carrière.

Flowers from the axils of last year's leaves, crowded; ♂ on elongated axes; scales of ♀ flower considerably smaller than the bracts, persistent. Cones pendulous.

♂. leaves distichous, base 0.

FAMILY CIX. **Cupressineæ**.

♀ flowers in whorls round an axis. No distinction between scales and bracts. Micropyle directed upwards.

1. **Sequoia**, Endl.

Cones ovate; scales ∞ , cuneiform, spreading

at maturity, decussately arranged. Micropyle directed backwards.

½. leaves alternate, decurrent, carinate.

2. **Libocedrus**, Endl.

Cones oblong; scales 4—6, coriaceous, valvate, 2-seeded, the lower pair sterile. Seeds laterally winged; wings unequal.

½. leaves opposite, adnate, imbricate, 4-stichous.

3. **Thuya**, Tournef.

Cones oblong; scales 8—12, imbricate, 2-seeded, lower pair sterile. Seeds laterally winged; wings nearly equal.

½. leaves opposite, adnate, imbricate, 4-stichous.

4. **Cupressus**, Tournef.

Cone globose; scales 6—10, thick, peltate, valvate, ∞-ovulate. Seeds angulate, narrowly winged.

½. leaves decussate, adnate, squamate, imbricate, not distichous.

5. **Juniperus**, L.

Fruit a galbulus. Scales succulent, uniting in fruit. Seeds osseous.

½. leaves opposite not distichous.

CLASS II. VASCULAR CRYPTOGRAMS.

ORDER XL. DICHOTOMÆ.

Ramification dichotomous. Each leaf producing only 1 sporangium, borne on the upper surface of the leaf and axils.

FAMILY CX. *Selaginelleæ*.

Macrosporangia and microsporangia.

1. *Selaginella*, Beauv.

Sporangia axillary, globose, transversely dehiscent.

2. leaves 4—8-ranked.

SECTION FILICINÆ.

Ramification not dichotomous. Leaves developed, frondose. Sporangia not single and never on the upper surface of a leaf.

ORDER XLI. RHIZOCARPÆ.

Sporangia in sporocarps; heterosporous: microsporangia ∞ -spored; macrosporangia generally 1-spored.

FAMILY CXI. *Marsilæaceæ*.

Sporocarps 2—4 locular, 2—4 valved, containing macro- and microsporangia. Sporangia

parietal: macrosporangia always 1-spored. Vernation circinate.

1. **Marsilæa**, L.

Macro- and microsporangia in the same sporocarp.

24. fronds petiolate, 4-foliolate.

FAMILY CXII. **Salviniaceæ**.

Sporocarps 2— ∞ , on the same petiole (transformed half of leaf). Macro- and microsporangia in distinct sporocarps. Vernation not circinate.

1. **Azolla**, Lam.

Sporocarps in pairs. Macrosporangia 1-spored. Aquatics, moss-like, floating, green or purplish.

ORDER XL.II **FILICES**.

Isosporous. Sporangia formed from the epidermis, bursting by an elastic ring. Fronds without stipules. Vernation circinate.

FAMILY CXIII. **Polypodiaceæ**.

Sporangia hypophyllous, somewhat globular. Ring vertical.

1. **Gymnogramme**, Desf.

Sori linear, placed on branching primary veins. Indusium 0.

24.

2 **Nothochlæna**, R. Br.

Sporangia collected into a marginal, somewhat interrupted line, covered with hairs. Indusium 0.

24. fronds hirsute.

3. **Cheilanthes**, Swartz.

Sori placed separately at the end of veinlets. Spurious indusium rudimentary, formed by the reflexed margin of the frond. 24.

4. **Allosurus**, Benth. (*Pellæa*, Link.)

Sporangia on veins oblique to the midrib. Spurious indusium continuous, formed by the reflexed margin of the frond.

24. glabrous, cæspitose; fertile fronds contracted; petioles not green.

5 **Polypodium**, L.

Sori round, placed on the veins. Indusium. 0. 24.

6. **Pteris**, L

Sporangia at the end of the veinlets, connected into a vein-like receptacle which surrounds the frond without interruption. Indusium continuous, membranaceous; attached at its marginal, free on its inner side. 24.

7. **Adiantum**, L.

Sporangia at the ends of distinct veins. Sori covered by the semi-lunar reflexed margins. Indusium continuous with the margin, free on its inner side

24. petioles not green.

8. **Blechnum**, L. (*Lomaria*, Willd.)

Sporangia forming a linear sorus on each side of the midrib and parallel to it. Indusium membranaceous, attached to the receptacle and free on the inner side.

24.

9. **Woodwardia**, L.

Sporangia placed on reticulate veinlets, forming oblong sori on each side of the midrib. Indusium coriaceous, attached to the receptacle, and opening at the inner side.

24.

10. **Asplenium**, L.

Sori linear, placed on veinlets. Indusium membranaceous, attached laterally to the veinlet and opening towards the midrib.

24.

11. **Aspidium**, Swartz.

Sori round, placed at the end of the veinlets. Indusium umbilicate, free on all sides and affixed by a column.

24.

12. **Cystopteris**, Bernh. & C.

Sori round, placed on the middle of the vein-

let, solitary in the disk of the laciniaë. Indusium hyaline, laterally affixed, free towards the margin of the frond. 24.

ORDER XLIII. STIPULATEÆ.

Isosporous. Leaves stipulate.

FAMILY CXIV. Ophioglosseæ.

Sporangia capsular, developed in the parenchyma of half the frond. Vernation not circinate.

1. *Botrychium*, Swartz.

Fertile segment of the frond a compound spike. Sporangia distinct, glabrous, distichous, nearly 2-valved. 24.

ORDER XLIV. EQUISETACEÆ.

Isosporous. Stem articulate; internodes surrounded by sheathing whorls of scarious leaves. Sporangia on the under side of verticillate-peltate receptacles, forming a terminal spike. Spores ∞ , each furnished with 2 elaters.

1. *Equisetum*, L.

Only genus. Characters of the order.

ADDITIONS AND CORRECTIONS.

The following Linnean expressions may be unfamiliar to the student.

ÆQUALIS: All the flowers hermaphrodite.

SUPERFLUA: Flowers of the disk hermaphrodite, of the ray female.

FRUSTRANEA: Flowers of the disk hermaphrodite, of the ray neutral.

NECESSARIA: Flowers of the disk male

Page 45.—2: **Asperula**. This was included on the statement that a species which is occasionally cultivated, had become naturalized in the vicinity. It has, however, since been found to be a mistake.

Page 76.—3: after **Alsine**, insert (*Arenaria*, L.)

Page 92.—After **Tricerastes**, insert (*Datisca*, L.)

Page 100.—After **Oreodaphne**, insert (*Umbellularia*, Nutt.)

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