GRAY'S

STUDY AND FIELD BOOK

or

BOTANY

CONSISTING OF

'LESSONS IN BOTANY,' AND 'FIELD, FOREST, AND
GARDEN BOTANY,'

BOUND IN ONE VOLUME.

BY ASA GRAY,

FERRIS PROFESSOR OF NATURAL HISTORY IN HARVARD UNIVERSITY

NEW YORK:

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This work consists of the "Lessons in Botany" and the "Field, Forest and Garden Botany," bound together in one complete volume, forming a most popular and comprehensive School Botany, adapted to beginners and advanced classes, to Agricultural Colleges and Schools, as well as to all other grades in which the science is taught; it is also adapted for use as a hand-book to assist in analyzing plants and flowers in field study of botany, either by classes or individuals.

The book is intended to furnish Botanical Classes and beginners with an easier introduction to the Plants of this country, and a much more comprehensive work, than is the Manual.

Beginning with the first principles, it progresses by easy stages until the student, who is at all diligent, is enabled to master the intricacies of the science.

It is a Grammar and Dictionary of Botany, and comprises the common Herbs, Shrubs, and Trees of the Southern as well as the Northern and Middle States, including the commonly cultivated, as well as the native species in fields, gardens, pleasure-grounds, or house culture, and even the conservatory plants ordinarily met with.

This work supplies a great desideratum to the Botanist and Botanical Teacher, there being no similar class-book published in this country.
GRAY'S

LESSONS IN BOTANY

AND

VEGETABLE PHYSIOLOGY,

ILLUSTRATED BY OVER 300 WOOD ENGRAVINGS, FROM ORIGINAL DRAWINGS, BY ISAAC SPERAUN.

TO WHICH IS ADDED A COPIOUS

GLOSSARY,

OR

DICTIONARY OF BOTANICAL TERMS

BY ASA GRAY

FORMER PROFESSOR OF NATURAL HISTORY IN HUDSON UNIVERSITY.

IVISON, BLAKEMAN, TAYLOR & CO.

NEW YORK AND CHICAGO.

1874.
PREFACE.

It is by no means indispensable for students to go through the whole
before commencing with the analysis of plants. When the proper season
for botanizing arrives, and when the first twelve Lessons have been got
over, they may take up Lesson XXVIII. and the following ones, and pr
ceed to study the various wild plants they find in blossom, in the manu
illustrated in Lesson XXX., &c., referring to the Glossary, and then
to the pages of the Lessons, as directed, for explanations of the varie
distinctions and terms they meet with. Their first essays will necessa
be rather tedious, if not difficult; but each successful attempt smooth
the way for the next, and soon those technical terms and distinctions
will become nearly as familiar as those of ordinary language.

Students who, having mastered this elementary work, wish to exten
their acquaintance with Vegetable Anatomy and Physiology, and to con
sider higher questions about the structure and classification of plants, will
be prepared to take up the author's Botanical Text-Book, an Introduction
to Structural Botany, or other more detailed treatises.

No care and expense have been spared upon the illustrations of this
volume; which, with one or two exceptions, are all original. They
were drawn from nature by Mr. Sprague, the most accurate of living
botanical artists, and have been as freely introduced as the size to which
it was needful to restrict the volume would warrant.

To append a set of questions to the foot of each page, although not un-
usual in school-books, seems like a reflection upon the competency or the
faithfulness of teachers, who surely ought to have mastered the lesson be-
fore they undertake to teach it; nor ought facilities to be afforded for
mechanical any more than learning, lessons by rote. A full
analysis of the contents of the Lessons, however, is very convenient and advantageous.
Such an Analysis is here given, in place of the ordinary table of con-
ents. This will direct the teacher and the learner at once to the leading
less and important points of each Lesson, and serve as a basis to ground
proper questions on, if such should be needed.

ASA GRAY.

PREFACE.

Harvard University, Cambridge,
January 1, 1857.

* Revised August, 1866, and alterations made adapting it to the new edition of
Field, Forest, and Garden Botany, to which this work is in the proper
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FIRST LESSONS

IN

BOTANY AND VEGETABLE PHYSIOLOGY.

LESSON I.

BOTANY AS A BRANCH OF NATURAL HISTORY.

1. The subjects of Natural History are, the earth itself and the beings that live upon it.

2. The Inorganic World, or Mineral Kingdom. The earth itself, with the air that surrounds it, and all things naturally belonging to them which are destitute of life, make up the mineral kingdom, or inorganic world. These are called inorganic, or unorganized, because they are not composed of organs, that is, of parts which answer to one another, and make up a whole, such as is a horse, a bird, or a plant. They were formed, but they did not grow, nor proceed from previous bodies like themselves, nor have they the power of producing other similar bodies, that is, of reproducing their kind. On the other hand, the various living things, or those which have possessed life, compose:

3. The Organic World, — the world of organized beings. These consist of organs: of parts which go to make up an individual, a being. And each individual owes its existence to a preceding one like itself, that is, to a parent. It was not merely formed, but produced. At first small and imperfect, it grows and develops by powers of its own; it attains maturity, becomes old, and finally dies. It was formed of inorganic or mineral matter, that is, of earth and air, indeed; but only of this matter under the influence of life; and after life departs, sooner or later, it is decomposed into earth and air again.
4. The organic world consists of two kinds of beings; namely,
1. Plants or Vegetables, which make up what is called the Vegetable
Kingdom; and, 2. Animals, which compose the Animal Kingdom.

5. The differences between Plants and Animals seem at first so
obvious and so great, that it would appear more natural to inquire
how they resemble rather than how they differ from each other.
What likeness does the cow bear to the grass it feeds upon? The
one moves freely from place to place, in obedience to its own will,
so its wants or convenience require: the other is fixed to the spot
of earth where it grows, manifests no will, and makes no movements
that are apparent to ordinary observation. The one takes its food
into an internal cavity (the stomach), from which it is absorbed
into the system: the other absorbs its food directly by its surface,
by its roots, leaves, &c. Both possess organs; but the limbs or
members of the animal do not at all resemble the roots, leaves,
blossoms, &c. of the plant. All these distinctions, however, gradu­
ally disappear, as we come to the lower kinds of plants and the lower
animals. Many animals (such as barnacles, coral-animal, and
polype) are fixed to some support as completely as the plant is to
the soil; while many plants are not fixed, and some move from
place to place by powers of their own. All animals move some of
their parts freely; yet in the extent and rapidity of the motion
many of them are surpassed by the common Sensitive Plant, by
the Venus's Fly-trap, and by some other vegetables; while whole
tribes of aquatic plants are so freely and briskly locomotive, that
they have until lately been taken for animals. It is among these
microscopic tribes that the animal and vegetable kingdoms most
nearly approach each other,— so nearly, that it is still uncertain
where to draw the line between them.

6. Since the difficulty of distinguishing between animals and
plants occurs only, or mainly, in those forms which from their
minuteness are beyond ordinary observation, we need not further
concern ourselves with the question here. One, and probably the
most absolute, difference, however, ought to be mentioned at the
outset, because it enables us to see what plants are made for. It
is this:

7. Vegetables are nourished by the mineral kingdom, that is, by
the ground and the air, which supply all they need, and which they
are adapted to live upon; while animals are entirely nourished by
vegetables. The great use of plants therefore is, to take portions of
earth and air, upon which animals cannot subsist at all, and to convert those into something upon which animals can subsist, that is, into food. All food is produced by plants. How this is done, it is the province of Vegetable Physiology to explain.

8. Botany is the name of the science of the vegetable kingdom in general.

9. Physiology is the study of the way a living being lives, and grows, and performs its various operations. The study of plants in this view is the province of Vegetable Physiology. The study of the form and structure of the organs or parts of the vegetable, by which its operations are performed, is the province of Structural Botany. The two together constitute Physiological Botany. With this department the study of Botany should begin; both because it lies at the foundation of all the rest, and because it gives that kind of knowledge of plants which it is desirable every one should possess; that is, some knowledge of the way in which plants live, grow, and fulfill the purposes of their existence. To this subject, accordingly, a large portion of the following Lessons is devoted.

10. The study of plants as to their kinds is the province of Systematic Botany. An enumeration of the kinds of vegetables, as far as known, classified according to their various degrees of resemblance or difference, constitutes a general System of plants. A similar account of the vegetables of any particular country or district is called a Flora of that country or district.

11. Other departments of Botany come to view when—instead of regarding plants as to what they are in themselves, or as to their relationship with each other—we consider them in their relations to other things. Their relation to the earth, for instance, as regards their distribution over its surface, gives rise to Geographical Botany, or Botanical Geography. The study of the vegetation of former times, in which fossil remains entombed in the crust of the earth, gives rise to Fossil Botany. The study of plants in respect to their uses to man is the province of Agricultural Botany, Medical Botany, and the like.
GROWTH OF THE PLANT FROM THE SEED. [LESSON 2.

LESSON II

THE GROWTH OF THE PLANT FROM THE SEED.

12. The Course of Variation. We see plants growing from the seed in spring-time, and gradually developing their parts; at length they blossom, bear fruit, and produce seeds like those from which they grew. Shall we commence the study of the plant with the fully-grown herb or tree, adorned with flowers or laden with fruit? Or shall we commence with the seedling just rising from the ground? On the whole, we may get a clearer idea of the whole life and structure of plants if we begin at the beginning, that is, with the plantlet springing from the seed, and follow it throughout its course of growth. This also agrees best with the season in which the study of Botany is generally commenced, namely, in the spring of the year, when the growth of plants from the seed can hardly fail to attract attention. Indeed, it is this springing forth of vegetation from seeds and buds, after the rigor of our long winter,—clothing the earth's surface almost at once with a mantle of freshness,—which gives to spring its greatest charm. Even the dullest believer, the least observant of Nature at other seasons, can then hardly fail to ask: What are plants? How do they live and grow? What do they live upon? What is the object and use of vegetation in general, and of its particular and wonderfully various forms? These questions it is the object of the present Lesson to answer, as far as possible, in a simple way.

13. A reflecting as well as observing person, noticing the resemblances between one plant and another, might go on to inquire whether plants, with all their manifold diversities of form and appearance, are not all constructed on one and the same general plan. It will become apparent, as we proceed, that this is the case:—that one common plan may be discerned, which each particular plant, whether herb, shrub, or tree, has followed much more closely than would at first view be supposed. The differences, wide as they are, are merely incidental. What is true in a general way of any ordinary vegetable, will be found to be true of all, only with greater variation in the details. In the same language, though in varied phrase, the hundred thousand kinds of plants repeat the same
story, are the living witnesses and illustrations of one and the
same plan of Creative Wisdom in the vegetable world. So that
the study of any one plant, traced from the seed it springs from round
to the seeds it produces, would illustrate the whole subject of vegeta-
table life and growth. It matters little, therefore, what particular
plant we begin with.

Sugar Maples may be found in abundance in many places, starting
from the seed (i.e. germinating) in early spring, and Red Maples
at the beginning of summer, shortly after the fruits of the season
have ripened and fallen to the ground. A pair of narrow green
leaves raised on a tiny stem make up the whole plant at its first
appearance (Fig. 4). Soon a root appears at the lower end of this
stemlet; then a little bud at its upper end, between the pair of
leaves, which soon grows into a second joint or stem bearing another pair of leaves, resembling
the ordinary leaves of the Red Maple, which
the first did not. Figures 5 and 6 represent
these steps in the growth.

15. Was this plantlet formed in the seed at the
time of germination, something as the chick
is formed in the egg during the process of incu-
bation? Or did it exist before in the seed,
really formed? To decide this question, we
have only to inspect a sound seed, which in this
instance requires no microscope, nor any other
instrument than a sharp knife, by which the
coats of the seed (previously soaked in water, if
dry) may be laid open. We find within the
seed, in this case, the little plantlet really formed,
and nothing else (Fig. 2);—namely, a pair
of leaves like those of the earliest seedling
(Fig. 4), only smaller, borne on a stemlet just
like that of the seedling, only much shorter,
and all snugly coiled up within the protecting
seed-coat. The plant then exists beforehand
in the seed, in miniature. It was not formed, but only deval-

FIG. 1. A wrapped free of Red Maple, with the seed-bearing portion cut off, to show the
seed. 2. This seed cut open to show the embryo plantlet within, enlarged. 3. The embryo
taken out whole, and partly unrolled. 4. The same after it has begun to grow, of the
natural size.
GROWTH OF THE PLANT FROM THE SEED. [LESSON 2.

21. In germination; when it had merely to unfold and grow,—to elongate its rudimentary stem, which takes at the same time an upright position, so as to bring the leaf-bearing end into the light and air, where the two leaves expanded; while from the opposite end, now pushed further downwards into the soil, the root begins to grow. All this is true in the main of all plants that spring from real seeds, although with great diversity in the particulars. At least, there is hardly an exception to the fact, that the plantlet exists really formed in the seed, in some shape or other.

16. The rudimentary plantlet contained in the seed is called an Embryo. Its little stem is named the Radicle, because it was supposed to be the root, when the difference between the root and stem was not so well known as now. It were better to name it the Cotyledle (i.e. little stem); but it is not expedient to change old names. The seed-leaves it bears on its summit (here two in number) are technically called Cotyledons. The little bud of underveloped leaves which is to be found between the cotyledons before germination in many cases (as in the Pea, Bean, Fig. 17, &c.), has been named the Plumule.

17. In the Maple (Fig. 4), as also in the Morning-Glory (Fig. 28), and the like, this bud, or plumule, is not seen for some days after the seed-leaves are expanded. But soon it appears, in the Maple as a pair of minute leaves (Fig. 5), erlong raised on a stalk which carries them up to some distance above the cotyledons. The plantlet (Fig. 6) now consists, above ground, of two pairs of leaves, viz.: 1. the cotyledons or seed-leaves, borne on the summit of the original stemlet (the radicle); and 2. a pair of ordinary leaves, raised on a second joint of stem which has grown from the top of the first. Later, a third pair of leaves is formed, and raised on a third joint of stem, proceeding from the summit of the second (Fig. 7), just as that did from the first; and so on, until the germinating plantlet becomes a tree.

FIG. 5. Germinating Red Maple, which has produced its root beneath, and is developing a second pair of leaves above. 6. Same, further advanced.
LESISION 2. GROWTH OF THE PLANT FROM THE SEED.

18. So the youngest seedling, and even the embryo in the seed, is already an epitome of the herb or tree. It has a stem, from the lower end of which it strikes root; and it has leaves. The tree itself in its whole vegetation has nothing more in kind. To become a tree, the plantlet has only to repeat itself upwardly by producing more similar parts,—that is, new portions of stem, with new and larger leaves, in summer;—while beneath, it pushes its root deeper and deeper into the soil.

19. The Opposite Growth of Root and Stem began at the beginning of germination, and it continues through the whole life of the plant. While yet buried in the soil, and perhaps in total darkness, as soon as it begins to grow, the stem end of the embryo points towards the light,—curving or turning quite round if it happens to lie in some other direction,—and stretches upwards into the free air and sunshine; while the root end as uniformly avoids the light, bends in the opposite direction to do so if necessary, and ever seeks to bury itself more and more in the earth’s bosom. How the plantlet makes these movements we cannot explain. But the object of this instinct is obvious. It places the plant from the first in the proper position, with its roots in the moist soil, from which they are to absorb nourishment, and its leaves in the light and air, where alone they can fulfil their office of digesting what the roots absorb.

20. So the seedling plantlet finds itself provided with all the organs of vegetation that even the oldest plant possesses,—namely, root, stem, and leaves; and has these placed in the situation where each is to act,—the root in the soil, the foliage in the light and air. Thus established, the plantlet has only to set about its proper work.

21. The different Mode of Growth of Root and Stem may also be here mentioned. Each grows, not only in a different direction, but in a different way. The stem grows by producing a set of joints, each from...

the summit of its predecessor; and each joint elongates throughout every part, until it reaches its full length. The root is not composed of joints, and it lengthens only at the end. The stem in the embryo (viz., the radicle) has a certain length to begin with. In the pumpkin-seed, for instance (Fig. 9), it is less than an eighth of an inch long; but it grows in a few days to the length of one or two inches (Fig. 10), or still more, if the seed were deeper covered by the soil. It is by this elongation that the seed-leaves are raised out of the soil, so as to expand in the light and air. The length they acquire varies with the depth of the covering. When large and strong seeds are too deeply buried, the stemlet sometimes grows to the length of several inches in the endeavor to bring the seed-leaves to the surface. The lengthening of the succeeding joints of the stem serves to separate the leaves, or pairs of leaves, from one another, and to expose them more fully to the light.

22. The root, on the other hand, begins by a new formation at the base of the embryo stem; and it continues to increase in length solely by additions to the extremity, the parts once formed scarcely elongating at all afterwards. This mode of growth is well adapted to the circumstances in which roots are placed, leaving every part undisturbed in the soil where it was formed, while the ever-advancing points readily insinuate themselves into the crevices or looser portions of the soil, or pass around the surface of solid obstacles.
LESSON III.

GROWTH OF THE PLANT FROM THE SEED.—Continued.

23. So a plant consists of two parts, growing in a different manner, as well as in opposite directions. One part, the root, grows downwards into the soil; it may, therefore, be called the descendsaying axis. The other grows upwards into the light and air: it may be called the ascending axis. The root grows on continuously from the extremity, and so does not consist of joints, nor does it bear leaves, or anything of the kind. The stem grows by a succession of joints, each bearing one or more leaves on its summit. Root off the one hand, and stem with its foliage on the other, make up the whole plantlet as it springs from the seed; and the full-grown herb, shrub, or tree has nothing more in kind,—only more in size and number. Before we trace the plantlet into the herb or tree, some other cases of the growth of the plantlet from the seed should be studied; that we may observe how the same plan is worked out under a variety of forms, with certain differences in the details. The materials for this study are always at hand. We have only to notice what takes place all around us in spring, or to plant some common seeds in pots, keep them warm and moist, and watch their germination.

24. The Germinating Plantlet needs no Nourishment provided beforehand. The embryo so snugly encased in the seed of the Maple (Fig. 2, 3, 4) has from the first a miniature stem, and a pair of leaves already green, or which become green as soon as brought to the light. It has only to form a root by which to fix itself to the ground, when it becomes a perfect though diminutive vegetable, capable of providing for itself. This root can be formed only out of proper material: neither water nor anything else which the plantlet is inhaling from the earth will answer the purpose. The proper material is nourishing matter, or prepared food, more or less of which is always provided by the parent plant, and stored up in the seed, either in the embryo itself, or around it. In the Maple, this nourishment is stored up in the thickish cotyledons, or seed-leaves. And there is barely enough of it to make the beginning of a root, and to provide for the lengthening of the stemlet so as to bring up the unfolding seed-leaves where they may expand to the light of day. But when this is done,
the tiny plant is already able to shift for itself;—that is, to live and continue its growth on what it now takes from the soil and from the air, and elaborates into nourishment in its two green leaves, under the influence of the light of the sun.

23. In most ordinary plants, a larger portion of nourishment is provided beforehand in the seed; and the plantlet consequently is not so early or so entirely left to its own resources. Let us examine a number of cases, selected from very common plants. Sometimes, as has just been stated, we find this.

26. Deposit of Food in the Embryo itself. And we may observe it in every gradation as to quantity, from the Maple of our first illustration, where there is very little, up to the Pea and the Horse-chestnut, where there is as much as there possibly can be. If we strip off the coats from the large and flat seed of a Squash or Pumpkin, we find nothing but the embryo within (Fig. 29); and almost the whole bulk of this consists of the two seed-leaves. That these contain a good supply of nourishing matter, is evident from their sweet taste and from their thickness, although there is not enough to obscure their leaf-like appearance.

It is by feeding on this supply of nourishment that the germinating Squash or Pumpkin (Fig. 10) grows so rapidly and so vigorously from the seed,—lengthening its stemlet to more than twenty times the length it had in the seed, and thickening it in proportion,—sending out once a number of roots from its lower end, and soon developing the plumule (16) from its upper end into a third leaf: meanwhile the two cotyledons, relieved from the nourishment with which their tissue was gorged, have expanded into useful green leaves.

27. For a stronger instance, take next the seed of a Plum or Peach, or an Almond, or an Appleseed (Fig. 11, 12), which shows
the same thing on a smaller scale. The embryo, which here also makes up the whole bulk of the kernel of the seed, differs from that of the Pumpkin only in having its seedleaves more thickened, by the much larger quantity of nourishment stored up in their tissue, — so large and so pure, in deed, that the almond becomes an article of food. Fed by this abundant supply, the second, and even the third joints of the stem, with their leaves, shoot forth as soon as the seedlet comes to the surface of the soil. The Beech-nut (Fig. 13), with its sweet and estable kernel, consisting mainly of a pair of seed-leaves folded together, and gorged with nourishing matter, offers another instance of the same sort: this ample store to feed upon enables the germinating seedlet to grow with remarkable vigor, and to develop a second joint of stem, with its pair of leaves (Fig. 14), before the first pair has expanded or the root has obtained much foothold in the soil.

28. A Bean affords a similar and more familiar illustration. Here the cotyledons in the seed (Fig. 16) are so thick, that, although they are raised out of ground in the ordinary way in germination (Fig. 17), and turn greenish, yet they never succeed in becoming leaf-like, — never display their real nature of leaves, as they do so plainly in the Maple (Fig. 5), the Pumpkin (Fig. 10), the Morning-Glory (Fig. 8, 26-28), &c. Turned to great account as magazines of food for the germinating seedlet, they fulfill this special office admirably, but

FIG. 11. An Apple-seed cut through lengthwise, showing the embryo with its thickened cotyledons. A. The embryo of the Apple, taken out whole, its cotyledons partly separated.

FIG. 12. A Beech-nut, cut across. 14. Beginning germination of the Beech, showing the cotyledons having opened or the root here nearly formed. 15. The same, a little later, with the second joint lengthened.
they were so gorged and, as it were, misshapen, that they became quite unfitted to perform the office of foliage. This office is accordingly first performed by the succeeding pair of leaves, those of the plumule (Fig. 17, 18), which is put into rapid growth by the abundant nourishment contained in the large and thick seed-leaves. The latter, having fulfilled this office, soon wither and fall away.

This is carried a step further in the Pea (Fig. 19, 20), a near relative of the Bean, and in the Oak (Fig. 21, 22), a near relative of the Beech. The difference in these and many other similar cases is this:

The cotyledons, which make up nearly the whole bulk of the seed are excessively thickened, so as to become nearly hemispherical in shape. They have lost all likeness to leaves, and all power of ever fulfilling the office of leaves. Accordingly in germination they remain unchanged within the husk or coats of the seed, never growing themselves, but supplying abundant nourishment to the plumule (the bud for the forming stem) between them. This pushes forth from the seed, shoots upward, and gives rise

FIG. 16. A Bean: the embryo, from which seed-coats have been removed; the small stem is seen above, bent down upon the edge of the thick cotyledons. 17. The same in early germination; the plumule growing forth between the two seed-leaves. 18. The germination more advanced, the two leaves of the plumule unrolled, and arising on a short joint of stem.

FIG. 19. A Pea: the embryo, with the seed-coats taken off. 20. A Pea in germination.
to the first leaves that appear. In most cases of the sort, the radicle, or short original stemlet of the embryo below the cotyledons (which is plainly shown in the Pea, Fig. 19), lengthens very little, or not at all; and as the cotyledons remain underground, if the seed was covered by the soil, as every one knows to be the case with Peas. In these (Fig. 20), as also in the Oak (Fig. 22), the leaves of the first one or two joints are imperfect, and mere small scales; but genuine leaves immediately follow. The Horsechestnut and Buckeye (Fig. 23, 24) furnish another instance of the same sort. These trees are nearly related to the Maple; but while the seed-leaves of the Maple show themselves to be leaves, even in the seed (as we have already seen), and when they germinate fulfill the office of ordinary leaves, those of the Buckeye and of the Horsechestnut (Fig. 23), would never be suspected to be the same organs. Yet they are so, only in another shape—exceedingly thickened by the accumulation of a great quantity of starch and other nourishing matter in their substance; and besides, their contiguous faces stick together more or less firmly, so that they never open. But the stalks of these seed-leaves grow, and, as they lengthen, push the radicle and the plumule out of the seed, when the former develops downwardly the root, the latter upwardly the leafy stem and all it bears (Fig. 24).

30. Deposit of Food outside of the Embryo. Very often the nourishment provided for the seedling plantlet is laid up, not in the embryo itself, but around it. A good instance to begin with is furnished by the common Morning-Glory, or Convolvulus. The embryo, taken out of the seed and straightened, is shown in Fig. 26. It consists of a short stemlet and of a pair of very thin and delicate green leaves, having no stock of nourishment in them for sustaining the

FIG. 26. An arm divided lengthwise. 22. The germinating Oak.
earliest growth. On cutting open the seed, however, we find this embryo (considerably crumpled or folded together, so as to occupy less space, Fig. 29) to be surrounded by a mass of rich, mucilageous matter (becoming rather hard and solid when dry), which forms the principal bulk of the seed. Upon this stock the embryo feeds in germination; the seed-leaves absorbing it into their tissue as it is rendered soluble (through certain chemical changes) and dissolved by the water which the germinating seed imbibles from the moist soil. Having by this aid lengthened its radicle into a stem of considerable length, and formed the beginning of a root at its lower end, already imbedded in the soil (Fig. 27), the cotyledons now disengage themselves from the seed-coats, and expand in the light as the first pair of leaves (Fig. 28). These immediately begin to elaborate, under the sun's influence, what as root imbibles from the soil, and the new nourishment so produced is used partly to create the size of the little stem, root, of leaves already existing, and partly to produce a second joint of stem with its leave (Fig. 29), then a third with its leaf ' (Fig. 30), and so on.

31. This maternal store of food, deposited in the seed along with the embryo (but not in its substance), the old botanists likened to


G. 29. Seed and embryo of Morning-Glory, not open. 30. Embryo of thistles, folded and uncontracted. 31. Germinating Morning-Glory. 32. The same further advanced. 33. This seed leaves expanded.
the *albumen*, or white of the egg, which encloses the yolk, and therefore gave it the same name,—the *albumen* of the seed,—a name which it still retains. Food of this sort for the plant is also food for animals, or for man; and it is this albumen, the floury part of the seed, which forms the principal bulk of such important grains as those of Indian Corn (Fig. 38–40), Wheat, Rice, Buckwheat, and of the seed of Four-o’clock, (Fig. 36, 37), and the like. In all these last-named cases, it may be observed that the embryo is not enclosed in the albumen, but placed on one side of it, yet in close contact with it, so that the embryo may absorb readily from it the nourishment it requires when it begins to grow. Sometimes the embryo is coiled around the outside, in the form of a ring, as in the Purslane and the Four-o’clock (Fig. 36, 37); sometimes it is coiled within the albumen, as in the Potato (Fig. 34, 35); sometimes it is straight in the centre of the albumen, occupying nearly its whole length, as in the Barberry (Fig. 32, 33), or much smaller and near one end, as in the Iris (Fig. 43); or sometimes so minute, in the midst of the albumen, that it needs a magnifying-glass to find it, as in the Buttercup (Fig. 44).

**FIG. 39.** Germination of the Morning Glory more advanced: the upper part only, showing the lobed cotyledons, the second joint of stem with its leaf, and the third with its leaf just developing.

**FIG. 30.** Section of a seed of a Pea; showing a very small embryo in the albumen, near one end. 31. This embryo detached, and more magnified.

**FIG. 31.** Section of a seed of Barberry, showing the straight embryo in the middle of the albumen. 33. Its embryo detached.

**FIG. 32.** Section of a Purslane seed, showing the embryo coiled in the albumen. 35. Its embryo detached.

**FIG. 33.** Section of the seed of Four-o’clock, showing the embryo coiled round the outside of the albumen. 37. Its embryo detached.
GROWTH OF THE PLANT FROM THE SEED. [LESSON 3.

terup or the Columbine, and in the Peony (Fig. 30, 31), where, however, it is large enough to be distinguished by the naked eye. Nothing is more curious than the various shapes and positions of the embryo in the seed, nor more interesting than to watch its development in germination. One point is still to be noticed, since the botanist considers it of much importance, namely:

32. The Kinds of Embryos as to the Number of Cotyledons. In all the figures, it is easy to see that the embryo, however various in shape, is constructed on one and the same plan;—it consists of a radicle or rootlet, with a pair of cotyledons on its summit. Botanists therefore call it dicotyledonous,—an inconveniently long word to express the fact that the embryo has two cotyledons or seed-leaves. In many cases, as in the Butternut, the cotyledons are indeed so minute, that they are discerned only by the sick in the upper end of the little embryo; yet in germination they grow into a pair of seed-leaves, just as in other cases where they are plain to be seen, as leaves, in the seed. But in Indian Corn (Fig. 40), in Wheat, the Onion, the Iris (Fig. 43), &c., it is well known that only one seed-leaf appears at first from the sprouting seed; in these the embryo has only one cotyledon, and is therefore termed by the botanists monocotyledonous,—an extremely long word, like the other, of Greek derivation, which means one-cotyledoned. The rudiments of one or more other leaves are, indeed, commonly present in this sort of embryo, as is plain to see in Indian Corn (Fig. 38–40), but they form a bud situated above or within the cotyledon, and enclosed by it more or less completely; so that they evidently belong to the plumule (10), and these leaves appear in the seedling plantlet, each from within its predecessor, and therefore originating higher up on the forming stem (Fig. 42, 44). This will readily be understood from the accompanying figures, with their explanation, which the student may without difficulty verify for himself.

![Figure 30](image1.png) A grain of Indian Corn, detached, cut away a little, so as to show the embryo, lying on the albumen, which makes the principal bulk of the seed.

![Figure 31](image2.png) Another grain of Corn, cut through the middle in the opposite direction, showing the embryo through its thin cotyledon and its plumule, the latter consisting of two leaves, one enclosing the other.

![Figure 40](image3.png) The embryo of Corn, taken out whole; the thick mass is the cotyledon; the smaller, but partly enclosed by it, is the plumule; the little projection at its base is the very short radicle enclosed in the sheathing base of the first leaf of the plumule.
self, and should do so, by examining grains of Indian Corn, soaked in water, before and also during germination. In the Onion, Lily, and the Iris (Fig. 45), the monocotyledous embryo is simpler, consisting apparently of a simple oblong or cylindrical body, in which no distinction of parts is visible: the lower end is radicle, and from it grows the root; the rest is a cotyledon, which has wrapped up in it a minute plumule, or bud, that shows itself when the seeds sprout in germination. The first leaf which appears above ground in all these cases is not the cotyledon. In all seeds with one cotyledon in the embryo, this remains in the seed, or at least its upper part, while its lengthening base comes out, so as to extricate the plumule, which shows itself, and develops the first leaves of the plantlet. These appear one above or within the other in succession,—as is shown in Fig. 42 and Fig. 44,—the first commonly in the form of a little scale or imperfect leaf; the second or third and the following ones as the real, ordinary leaves of the plant. Meanwhile, from the root end of the embryo, a root (Fig. 41, 44), or soon a whole cluster of roots (Fig. 42), makes its appearance.

33. In Pines, and the like, the embryo consists of a radicle or stemlet, bearing on its summit three or four, or often from five to ten slender cotyledons, arranged in a circle (Fig. 45), and expanding at once into a circle of as many green leaves in germination (Fig. 46). Such embryos are said to be polycotyledonous, that is, as the word denotes, many-cotyledoned.

34. Plan of Vegetation. The student who has understandingly followed the growth of the embryo in the seed into the seedling plantlet,—composed of a root, and a stem of two or three joints, each bearing a"
LESSON IV.

THE GROWTH OF PLANTS FROM BUDS AND BRANCHES.

37. We have seen how the plant grows so as to produce a root, and a single stem with its foliage. Both the root and stem, however, generally branch.

38. The branches of the root arise without any particular order. There is no telling beforehand from what part of a main root they will spring. But the branches of the stem, except in some extraordinary cases, regularly arise from a particular place. Branches or shoots in their undeveloped state are

39. tiny. These regularly appear in the axils of the leaves,—that is, in the angle formed by the leaf with the stem on the upper side; and as leaves are symmetrically arranged on the stem, the buds, and the branches into which the buds grow, necessarily partake of this symmetry.

40. We do not confine the name of bud to the scaly winter-buds which are so conspicuous on most of our shrubs and trees in winter and spring. It belongs as well to the forming branch of any herb, at its first appearance in the axil of a leaf. In growing, buds lengthen into branches, just as the original stem did from the plumule of the embryo (16) when the seed germinated. Only, while the original stem is implanted in the ground by its root, the branch is implanted on the stem. Branches, therefore, are repetitions of the main stem. They consist of the same parts,—namely, joints of stem and leaves,—growing in the same way. And in the axils of these leaves another crop of buds is naturally produced, giving rise to another generation of branches, which may in turn produce still another generation; and so on,—until the tiny and simple seedling develops into a tall and spreading herb or shrub; or into a massive tree, with its hundreds of annually increasing branches, and its thousands, perhaps millions, of leaves.

41. The herb and the tree grow in the same way. The difference is only in size and duration.

An Herb dies altogether, or dies down to the ground, after it has ripened its fruit, or at the approach of winter.
An annual herb flowers in the first year, and dies, root and all, after ripening its seed: Mustard, Peppergrass, Buckwheat, &c., are examples.

A biennial herb — such as the Turnip, Carrot, Beet, and Cabbage — grows the first season without blooming, survives the winter, flowers after that, and dies, root and all, when it has ripened its seed.

A perennial herb lives and blossoms year after year, but dies down to the ground, or near it, annually, — not, however, quite down to the root; for a portion of the stem, with its buds, still survives; and from these buds the shoots of the following year arise.

A Shrub is a perennial plant, with woody stems which continue alive and grow year after year.

A Tree differs from a shrub only in its greater size.

42. The Terminal Bud. There are herbs, shrubs, and trees which do not branch, as we have already seen (35); but whose stems, even when they live for many years, rise as a simple shaft (Fig. 47). These plants grow by the continued evolution of a bud which crowns the summit of the stem, and which is therefore called the terminal bud. This bud is very conspicuous in many branching plants also; as on all the stems or shoots of Maples (Fig. 58), Horsechestnuts (Fig. 48), or Hickories (Fig. 49), of a year old. When they grow, they merely prolong the shoot or stem on which they rest. On these same shoots, however, other buds are to be seen, regularly arranged down their sides.

We find them situated just over broad, flattened places, which are the scars left by the fall of the leaf-stalk the autumn previous. Before the fall of the leaf, they would have been seen to occupy their axils (39); so they are named.

43. Auxiliary Buds. They were formed in these trees early in the summer. Occasionally they grow at the time into branches: at least, some of them are pretty sure to do so, in case the growing terminal bud at the end of the shoot is injured or destroyed. Otherwise they lie dormant until the spring. In many trees or shrubs (such for example as the Sumac and Honey-Locust) these auxiliary buds do not show themselves until spring; but if
searching for, they may be detected, though of small size, hidden under the bark. Sometimes, although early formed, they are concealed all summer long under the base of the leaf-stalk, hollowed out into a sort of inverted cup, like a candle-extinguisher, to cover them; as in the Locust, the Yellow-wood, or more strikingly in the Buttonwood or Plane-tree (Fig. 50).

44. Such large and conspicuous buds as those of the Horsechestnut, Hickory, and the like, are scaly; the scales being a kind of imperfect leaves. The use of the bud-scales is obvious: namely, to protect the tender young parts beneath. To do this more effectually, they are often coated on the outside with a varnish which is imperious to wet, while within they, or the parts they enclose, are thickly clothed with down or wool; not really to keep out the cold of winter, which will of course penetrate the bud in time, but to shield the interior against sudden changes from warm to cold, or from cold to warm, which are equally injurious. Scaly buds commonly belong, as would be expected, to trees and shrubs of northern climates; while naked buds are usual in tropical regions, as well as in herbs everywhere which branch during the summer's growth and do not endure the winter.

45. But naked buds, or nearly naked, also occur in several of our own trees and shrubs; sometimes pretty large ones, as those of Hob

FIG. 50. Annual shoot of the Shagbark Hickory.

FIG. 59. Bud and leaf of the Buttonwood, or American Plane-tree.
bleebush (while those of the nearly-related Snowball or High Bush Cranberry are scaly); but more commonly, when naked buds occur in trees and shrubs of our climate, they are small, and sunk in, the bark, as in the Sumac; or even partly buried in the wood until they begin to grow, as in the Honey Locust.

46. Vigne of Vegetation from Buds. Large and strong buds, like those of the Horsechestnut, Hickory, and the like, on inspection will be found to contain several leaves, or pairs of leaves, ready formed, folded and packed away in small compass, just as the seed-leaves are packed away in the seed; they even contain all the blossoms of the ensuing season, plainly visible as small buds. And the stems upon which these buds rest are filled with abundant nourishment, which was deposited the summer before in the wood or in the bark. Under the surface of the soil, or on it, covered with the fallen leaves of autumn, we may find similar strong buds of our perennial herbs, in great variety; while beneath are thick roots, rootstocks, or tubers, charged with a great store of nourishment for their use. As we regard these, we shall readily perceive how it is that vegetation shoots forth so vigorously in the spring of the year, and clothes the bare and lately frozen surface of the soil, as well as the naked boughs of trees, almost at once with a covering of the freshest green, and often with brilliant blossoms. Everything was prepared, and even formed, beforehand; the short joints of stem in the bud have only to lengthen, and to separate the leaves from each other so that they may unfold and grow. Only a small part of the vegetation of the season comes directly from the seed, and none of the earliest vernal vegetation. This is all from buds which have lived through the winter.

47. This growth from buds, in manifold variety, is as interesting a subject of study as the growth of the plantlet from the seed, and is still easier to observe. We have only room here to sketch the general plan; earnestly recommending the student to examine attentively their mode of growth in all the common trees and shrubs, when they shoot forth in spring. The growth of the terminal bud produces the stem or branch; the growth of axillary buds produces branches.

48. The Arrangement of Branches is accordingly the same as of axillary buds; and the arrangement of these buds is the same as that of the leaves. Now leaves are arranged in two principal ways: they are either opposite or alternate. Leaves are opposite when
57. Latent Buds. Some of the axillary buds grow the following year into branches; but a larger number do not (51). These do not necessarily die. Often they survive in a latent state for some years, visible on the surface of the branch, or are smaller and concealed under the bark, resting on the surface of the wood; and when at any time the other buds or branches happen to be killed, these older latent buds grow to supply their place; as is often seen when the foliage and young shoots of a tree are destroyed by insects. The new shoots seen springing directly out of large stumps may sometimes originate from such latent buds, which have preserved their life for years. But commonly these arise from

58. Adventitious Buds. These are buds which certain shrubs and trees produce anywhere on the surface of the wood, especially where it has been injured. They give rise to the slender twigs which often feather so beautifully the sides of great branches or trunks of our American Elms. They sometimes form on the root, which naturally is destitute of buds; and they are sure to appear on the trunks and roots of Willows, Poplars, and Chestnuts, when these are wounded or mutilated. Indeed Osier-Willows are pollarded, or cut off, from time to time, by the cultivator, for the purpose of producing a crop of slender adventitious twigs, suitable for basket-work. Such branches, being altogether irregular, of course interfere with the natural symmetry of the tree (59). Another cause of irregularity, in certain trees and shrubs, is the formation of what are called

59. Accessory or Supernumerary Buds. There are cases where two, three, or more buds spring from the axil of a leaf, instead of the single one which is ordinarily found there. Sometimes they are placed one over the other, as in the Aristolochia or Pipe-Vine, and in the Tartarian Honeysuckle (Fig. 51); also in the Honey-locust, and in the Walnut and Butternut (Fig. 52), where the upper supernumerary bud is a good way out of the axil and above the others. And this is here stronger.

FIG. 51. Tartarian Honeysuckle, with three accessory buds in one axil.
than the others, and grows into a branch which is considerably out of the axil, while the lower and smaller ones commonly do not grow at all. In other cases the three buds stand side by side in the axil, as in the Hawthorn, and the Red Maple (Fig. 53). If these were all to grow into branches, they would stifle or jostle each other. But some of them are commonly flower-buds: in the Red Maple, only the middle one is a leaf-bud, and it does not grow until after those on each side of it have expanded the blossoms they contain.

69. Sorts of Buds. It may be useful to enumerate the kinds of buds which have now been mentioned, referring back to the paragraphs in which the peculiarities of each are explained. Buds, then, are either terminal or lateral. They are:

- **Terminal** when they rest on the apex of a stem (42). The earliest terminal bud is the *plumule* of the embryo (18).
- **Lateral**, when they appear on the side of a stem;—of which the only regular kind is the *Axillary* (43), namely, those which are situated in the axils of leaves.

**Accessory or Supernumerary** (53), when two or more occur in addition to the ordinary axillary bud.

**Adventitious** (55), when they occur out of the axil and without order, on stems or roots, or even on leaves. Any of these kinds may be, either

- **Naked**, when without coverings; or scaly, when protected by scales (44, 45).
- **Latent**, when they survive long without growing, and commonly without being visible externally (67).
- **Leaf-buds**, when they contain leaves, and develop into a leafy shoot.

**Flower-buds**, when they contain blossoms, and no leaves, as the

**FIG. 20.** Bottommost branch, with accessory buds, the uppermost shows the axil.

**FIG. 21.** Red-Maple branch, with accessory buds placed side by side.
side-buds of the Red-Maple, or when they are underdeveloped blossoms. These we shall have to consider hereafter.

Figure 54 represents a spreading-topped tree (American Elm), the stem dividing off into branches; and some spiny trees (Spruces on the right hand, and two of the Arbor-Vita on the left) with excurrent stems.

LESSON V.
MORPHOLOGY (I. E. VARIOUS SORTS AND FORMS) OF ROOTS.

61. Morphology, as the name (derived from two Greek words) denotes, is the doctrine of forms. In treating of forms in plants, the botanist is not confined to an enumeration or description of the shapes or sorts that occur,—which would be a dull and tedious business,—but he endeavors to bring to view the relations between one form and another; and this is an interesting study.

62. Botanists give particular names to all the parts of plants, and also particular terms to express their principal varieties in form. They use these terms with great precision and advantage in describing the species or kinds of plants. They must therefore be defined and explained in our books. But it would be a great waste of time...
for the young student to learn them by rote. The student should
rather consider the connection between one form and another; and
notice how the one simple plan of the plant, as it has already been
illustrated, is worked out in the greatest variety of ways, through the
manifold diversity of forms which each of its three organs of vegeta-
tion — root, stem, and leaf — is made to assume.
63. This we are now ready to do. That is, having obtained a
vague idea of vegetation, by tracing the plant from the seed and
the bud into the herb, shrub, or tree, we proceed to contemplate the
principal forms under which these three organs occur in different
plants, or in different parts of the same plant; or, in other words, to
study the morphology of the root, stem, and leaves.
64. Of these three organs, the root is the simplest and the least
varied in its modifications. Still it exhibits some widely different
kinds. Going back to the beginning, we commence with
65. The simple Primary Root, which most plants send down from
the root-end of the embryo as it grows from the seed; as we have
seen in the Maple (Fig. 3–7), Morning-Glory (Fig. 8 and 25),
Beech (Fig. 14, 15), Oak and Buckeye (Fig. 22–24), &c. This,
if it goes on to grow, makes a main or top root, from which side-
branches here and there proceed. Some plants keep this main root
throughout their whole life, and send off only small side branches;
as in the Carrot (Fig. 58) and Radish (Fig. 59); and in some trees,
like the Oak, it takes the lead of the side-branches for many years,
unless accidentally injured, as a strong tap-root. But commonly
the main root divides off very soon, and is lost in the branches.
We have already seen, also, that there may be at the beginning
66. Multiple Primary Roots. We have noticed them in the Pump-
kin (Fig. 10), in the Pea (Fig. 20), and in Indian Corn (Fig. 42).
That is, several roots have started all at once, or nearly so, from the
seeding stem, and formed a bundle or cluster (a fascicled root, as
it is called), in place of one main root. The Bean, as we observe
in Fig. 18, begins with a main root, but some of its branches soon
overtake it, and a cluster of roots is formed.
67. Absorption of Moisture by Roots. The branches of roots as they
grow commonly branch again and again, into smaller roots or rootlets;
in this way very much increasing the surface by which the plant
connects itself with the earth, and absorbs moisture from it. The
whole surface of the root absorbs, so long as it is fresh and new;
and the newer the roots and rootlets are, the more freely do they
MORPHOLOGY OF ROOTS. [Lesson 5.

Accordingly, as long as the plant grows above ground, and expands fresh foliage, from which moisture—much of the time largely escapes into the air, so long it continues to extend and multiply its roots in the soil beneath, renewing and increasing the fresh surface for absorbing moisture, in proportion to the demand from above. And when growth ceases above ground, and the leaves die and fall, or no longer act, then the roots generally stop growing, and their soft and tender tips harden. From this period, therefore, until growth begins anew the next spring, is the best time for transplanting; especially for trees and shrubs, and herbs so large that they cannot well be removed without injuring the roots very much.

We see, on considering a moment, that an herb or a tree consists of two great surfaces, with a narrow part or trunk between them,—one surface spread out in the air, and the other in the soil. These two surfaces bear a certain proportion to each other; and the upper draws largely on the lower for moisture. Now, when the leaves fall from the tree in autumn, the vast surface exposed to the air is reduced to a very small part of what it was before; and the remainder, being covered with a firm bark, cannot lose much by evaporation. In common herbs the whole surface above ground perishes in autumn; and many of the roots die at the same time, or soon afterwards. So that the living vegetable is reduced for the time to the smallest compass,—to the thousandth or hundred-thousandth part of what it was shortly before,—and what remains alive roots in a dormant state, and may now be transplanted without much danger of harm. If any should doubt whether there is so great a difference between the summer and the winter size of plants, let them compare a lily-bulb with the full-grown Lily, or calculate the surface of foliage which

[Fig. 55. Seedling Maple, of the natural size, showing the root-system. 26. A bit of the end of the root magnified.]
69. The absorbing surface of roots is very much greater than it appears to be, on account of the root-hairs, or slender fibrils, which abound on the fresh and new parts of roots. These may be seen with an ordinary magnifying-glass, or even by the naked eye in many cases; as in the root of a seedling Maple (Fig. 53), where the surface is thickly clothed with them. They are not rootlets of a smaller sort; but, when more magnified, are seen to be mere elongations of the surface of the root into slender tubes, which through their very delicate walls imbibe moisture from the soil with great avidity. They are commonly much longer than those shown in Fig. 56, which represents only the very tip of a root moderately magnified. Small as they are individually, yet the whole amount of absorbing surface added to the rootlets by the countless numbers of these tiny tubes is very great.

70. Roots intended mainly for absorbing branch feebly, and are slender or thread-like. When the root is principally of this character it is said to be fibrous, as in Indian Corn (Fig. 42), and other grain, and to some extent in all annual plants (41).

71. The Root as a Storehouse of Food.

In biennial and many perennial herbs (41), the root answers an additional purpose. In the course of the season it becomes a storehouse of nourishment, and enlarges or thickens as it receives the accumulation. Such roots are said to be fleshy; and different names are applied to them according to...
their shapes. We may divide them all into two kinds: 1st, those consisting of one main root, and 2d, those without any main root.

72. The first are merely different shapes of the tap-root; which is

Conical, when it thickens most at the crown, or where it joins the stem, and tapers regularly downwards to a point, as in the Common Beet, the Parsnip, and Carrot (Fig. 58);

Turnip-shaped or apiform, when greatly thickened above; but abruptly becoming slender below; as the Turnip (Fig. 57); and,

Spindle-shaped, or fusiform, when thickest in the middle and tapering to both ends; as the common Radish (Fig. 59).

73. In the second kind, where there is no main root, the store of nourishing matter may be distributed throughout the branches or cluster of roots generally, or it may be accumulated in some of them, as we see in the tuberous roots of the Sweet Potato, the common Peony, and the Dahlia (Fig. 60).

74. All but the last of these illustrations are taken from biennial plants. These grow with a large tuft of leaves next the ground, and accumulate nourishment all the first summer, and store up all they produce beyond what is wanted at the time in their great root, which lives over the winter. We know very well what use man and other animals make of this store of food, in the form of starch, sugar, jelly, and the like. From the second year's growth we may learn what use the plant itself makes of it. The new shoots then feed upon it, and use it to form with great rapidity branches, flower-stalks, blossoms, fruit, and seeds; and, having used it up, the whole plant dies when the seeds have ripened.

75. In the same way the nourishment contained in the separate tuberous roots of the Sweet Potato and the Dahlia (Fig. 60) is fed upon in the spring by the buds of the stem they belong to; and as they are emptied of their contents, they likewise die and decay. But meanwhile similar stores of nourishment, produced by the second year's vegetation, are deposited in new roots, which live through the
next winter, and sustain the third spring's growth, and so on;—
these plants being perennial (41), or lasting year after year, though
each particular root lives little more than one year.

76. Many things which commonly pass for roots are not really
roots at all. Common potatoes are tuberous parts of stems, while
sweet potatoes are roots, like those of the Dublin (Fig. 60). The difference
between them will more plainly appear in the next Lesson.

77. Secondary Roots. So far we have considered only the original
or primary root, — that which proceeded from the lower end of the
first joint of stem in the plantlet springing from the seed,— and its
subdivisions. We may now remark, that any other part of the stem
will produce roots just as well, whenever favorably situated for it;
that is, when covered by the soil, which provides the darkness and
the moisture which is congenial to them. For these secondary roots,
as they may be called, parake of the ordinary disposition of the
organ: they avoid the light, and seek to bury themselves in the
ground. In Indian Corn we see roots early striking from the second
and the succeeding joints of stem under ground, more abundantly
than from the first joint (Fig. 42). And all stems that keep up a
connection with the soil — such as those which creep along on or
beneath its surface — are sure to strike root from almost every joint.
So will most branches when bent to the ground, and covered with
the soil: and even cuttings from the branches of most plants can be
made to do so, if properly managed. Propagation by buds depends
upon this. That is, a piece of a plant which has stem and leaves,
either developed or in the bud, may be made to produce roots, and
so become an independent plant.

78. In many plants the disposition to strike root is so strong, that
they even will spring from the stem above ground. In Indian Corn,
for example, it is well known that roots grow not only from all those
joints round which the earth is heaped in hoeing, but also from those
several inches above the soil: and other plants produce them from
stems or branches high in the air. Such roots are called

79. Aerial Roots. All the most striking examples of these are met
with, as we might expect, in warmer and damper climates than ours,
and especially in deep forests which shut out much of the light; this
being unfavorable to roots. The Mangrove of tropical shores, which
occurs on our own southern borders; the Sugar Cane, from which
roots strike just as in Indian Corn, only from higher up the stem;
the Pandanus, called Screw Pine (not from its resemblance to a
Pine-tree, but because it is like a Pine-apple plant; and the famous Banyan of India, and some other Fig-trees, furnish the most remarkable examples of roots, which strike from the stem or the branches in the open air, and at length reach the ground, and bury themselves, when they act in the same manner as ordinary roots.

80. Some of our own common plants, however, produce small aerial roots: not for absorbing nourishment, but for climbing. By these roots, that shoot out abundantly from the side of the stems and branches, the Trumpet Creeper, the Ivy of Europe, and our Poison Ivy,—here called Poison Ivy,—fasten themselves firmly to walls, or the trunks of trees, often ascending to a great height. Here roots serve the same purpose that tendrils do in the Grape-Vine and Virginia Creeper. Another form, and the most aerial of all roots, since they never reach the ground, are those of

81. Epiphytes, or Air-Plants. These are called by the first name (which means growing on plants), because they are generally found upon the trunks and branches of trees;—not that they draw any nourishment from them, for their roots merely adhere to the bark, and they flourish just as well upon dead wood or any other convenient support. They are called air-plants because they really live altogether upon what they get from the air, as they have no connection with the soil. Hundreds of air-plants grow all around us without attracting any attention, because they are small or humble. Such are the Lichens and Mosses that abound on the trunks or boughs of trees, especially on the shaded side, and on old walls, fences, or rocks, from which they obtain no nourishment. But this name is commonly applied only to the larger, flower-bearing plants which live in this way. These belong to warm and damp parts of the world, where there is always plenty of moisture in the air. The greater part belong to the Orchid family and to the Pine-Apple family; and among them are some of the handsomest flowers known.

We have two or three flowering air-plants in the Southern States, though they are not showy ones. One of them is an Epidendrum growing on the boughs of the Great-flowered Magnolia: another is the Long-Moss, or Black Moss, so called,—although it is no Moss at all,—which hangs from the branches of Oaks and Pines in all the warm parts of the Southern States. (Fig 61 represents both of these. The upper is the Epidendrum conopseum; the lower, the Black Moss, Tillandsia usneoides.)

82. Parasitic Plants exhibit roots under yet another remarkable
aspect. For these are not merely fixed upon other plants, as air-plants are, but strike their roots, or what answers to roots, into them, and feed on their juices. Not only Molds and Fungi (which are plants of very low organization) live in this predecious way, but many flowering herbs, and even shrubs. One of the latter is the Mistletoe, the seed of which germinates on the bough of the tree where it falls or is left by birds; and the forming root penetrates the bark and engrafs itself into the wood, to which it becomes united as firmly as a natural branch to its parent stem; and indeed the parasite lives just as if it were a branch of the tree it grows and feeds on. A most common parasitic herb is the Dandelion; which abounds in low grounds everywhere in summer, and coils its long and slender leafless, yellowish stems — resembling tangled threads of yarn — round and round the stalks of other plants; wherever they touch piercing the bark with minute and very sharp rooths in the form of suckers, which draw out the nourishing juices of the plants half held off. Other parasitic plants, like the Beedle-weeds and Pine-cap, fasten their roots under ground upon the roots of neighboring plants, and rob them of their rich juices.
LESSON VI.

MORPHOLOGY OF STEMS AND BRANCHES.

83. The growth of the stem in length, and the formation of branches, have been considered already. Their growth in thickness we may study to more advantage in a later Lesson. The various forms which they assume will now occupy our attention,—beginning with

84. The Forms of Stems and Branches above ground. The principal differences as regards size and duration have been mentioned before (11); namely, the obvious distinction of plants into herbs, shrubs, and trees, which depends upon the duration and size of the stems.

The stem is accordingly

Herbaceous, when it dies down to the ground every year, or after blossoming.

Suffruticose, when the bottom of the stem above the soil is a little woody, and inclined to live from year to year.

Suffruticosus, when low stems are decidedly woody below, but herbaceous above.

Fruticosus, or shrubby, when woody, living from year to year, and of considerable size,—not, however, more than three or four times the height of a man.

Arborescent, when tree-like in appearance, or approaching a tree in size.

Arboreus, when forming a proper tree trunk.

85. When the stem or branches rise above ground and are apparent to view, the plant is said to be cauliflorous (that is, to have a cauliflorous or true stem). When there is no evident stem above ground, but only leaves or leaf-stalks and flower-stalks, the plant is said to be acanthocarpous, i.e. stamens, as in the Crocus, Bloodroot, common Violets, &c., and in the Beet, Carrot, and Radish (Fig. 50), for the first season. There is a stem, however, in all such cases, only it remains on or beneath the ground, and is sometimes very short.

Of course flowers and flowers do not arise from the root. These concealed sorts of stem we will presently study.

86. The direction taken by stems, &c., or their mode of growth,
gives rise to several terms, which may be briefly mentioned:—
such as

**Diffuse**, when loosely spreading in all directions.

**Decumbent**, when turned or bending over to one side.

**Assurgent or ascending**, when rising obliquely upwards.

**Prostrate or prostrate**, lying flat on the ground from the first.

Creeping, or **repeat**, when prostrate stems on or just beneath the ground strike root as they grow; as does the White Clover, the little Portridge-Jerry, &c.

**Climbing, or scandent**, when stems rise by clinging to other objects for support,—whether by tendrils, as do the Pea, Grape-Vine, and Virginia Creeper (Fig. 62); by their twisting leaf-stalks, as the Virgin’s Bower; or by rosettes, like the Ivy, Purple Ivy, and Trumpet Creeper (80).

**Twining, or eddife**, when stems rise by coiling themselves spirally around other stems or supports; like the Morning-Glory and the Bean.

87. Certain forms of stems have received distinct names. The jointed stem of Grasses and Sedges is called by botanists a **culm**; and the peculiar scaly trunk of Palm and the like (Fig. 47) is sometimes called a **canes**. A few forms of branches the gardener distinguishes by particular names; and they are interesting from their serving for the natural propagation of plants from buds, and for suggesting ways by which we artificially multiply plants that would not propagate themselves without the gardener’s aid. These are **suckers, offsets, stolons, and runners.**

88. **Suckers** are ascending branches rising from stems under ground, such as are produced so abundantly by the Rose, Raspberry, and other plants said to multiply “by the root.” If we uncover them, we see at once the great difference between these subterranean branches and real roots. They are only creeping branches under ground. Remarks by the upright shoots from these branches become separate plants, simply by the dying off of the connecting under-ground stems, the gardener expedites the result by cutting them through with his spade. That is, he propagates the plant “by division.”

89. **Stolons** are trailing or reclining branches above ground, which strike root where they touch the soil, and then send up a vigorous shoot, which has roots of its own, and becomes an independent plant when the connecting part dies, as it does after a while. The Current
and the Gooseberry naturally multiply in this way, as well as by suckers (which we see are just the same thing, only the connecting part is concealed under ground). They must have suggested the operation of layering, or bending down and covering with earth branches which do not naturally make stolons; and after they have taken root, as they almost always will, the gardener cuts through the connecting stem, and so converts a rooting branch into a separate plant.

90. Offsets, like those of the Houseleek, are only short stolons, with a crown of leaves at the end.

91. Runners, of which the Strawberry presents the most familiar example, are a long and slender, tendril-like, leafless form of creeping branches. Each runner, after having grown to its full length, strikes root from the tip, and fixes it to the ground, then forms a bud there, which develops into a tuft of leaves, and so gives rise to a new plant, which sends out new runners to act in the same way. In this manner a single Strawberry plant will spread over a large space, or produce a great number of plants, in the course of the summer; — all connected at first by the slender runners, but these die in the following winter, if not before, and leave the plants as so many separate individuals.

92. Tendrils are branches of a very slender sort, like runners, not destined like them for propagation, and therefore always destitute

of buds or leaves, but intended for climbing. Those of the Grape-Vine, of the Virginia Creeper (Fig. 62), and of the Cucumber and

![Diagram of tendrils and leaves]
Squash tribe are familiar illustrations. The tendril commonly grows straight and outstretched until it reaches some neighboring support, such as a stem, when its apex looks around it to secure a hold; then the whole tendril shortens itself by coiling up spirally, and so draws the shoot of the growing plant nearer to the supporting object.

When the Virginia Creeper climbs the side of a building or the smooth bark of a tree, which the tendril cannot lay hold of in the usual way, their tips expand into a flat disk or sucker (Fig. 62, 63), which adheres very firmly to the wall or bark, enabling the plant to climb over and cover such a surface, as readily as the Ivy does by means of its sucker-like little roots. The same result is effected by different organs, in the one case by branches in the form of tendrils; in the other, by roots.

93. Tendrils, however, are not always branches; some are leaves, or parts of leaves, as those of the Pea (Fig. 20). Their nature in each case is to be learned from their position, whether it be that of a leaf or of a branch. In the same way.

94. Spines or Thorns sometimes represent leaves, as in the Barberry, where their nature is shown by their situation outside of an axillary bud or branch. In other words, here they have a bud in their axil, and are therefore leaves; so we shall have to mention them in another place. Most commonly spines are stunted and hardened branches, arising from the axils of leaves, as in the Hawthorn and Pear. A neglected Pear-tree or Plum-tree shows every gradation between ordinary branches and thorns. Thorns sometimes branch, their branches paraking of the same spiny character: in this way those on the trunks of Honey-Locust trees (produced from adventitious buds, 58) become exceedingly complicated and horrid. The thorns on young shoots of the Honey-Locust may appear somewhat puzzling at first view; for they are situated some distance above the axil of the leaf. Here the thorn comes from the uppermost of several supernumerary buds (59). Prickles, such as those of the Rose and Blackberry, must not be confounded with thorns: these have not the nature of branches, and have no connection with the wood; but are only growths of the bark. When we strip off the bark, the prickles go with it.

95. Still stranger forms of stems and branches than any of these are met with in some tribes of plants, such as Castaneas (Fig. 76). These will be more readily understood after we have considered some of the commoner forms of
96. Subterranean Stems and Branches. These are very numerous and various; but they are commonly overlooked, or else confounded with roots. From their situation they are out of the sight of the superficial observer; but if sought for and examined, they will well repay the student's attention. For the vegetation that is carried on under ground is hardly less varied, and no less interesting and important, than that which meets our view above ground. All their forms may be referred to four principal kinds: namely, the Rhizoma or Rootstock, the Tuber, the Corm, and the Bulb.

97. The Rootstocks, or Rhizoms, in its simplest form, is merely a creeping stem or branch (Fig. 64) growing beneath the surface of the soil, or partly covered by it. Of this kind are the so-called creeping, running, or eady roots, such as those by which the Mint (Fig. 61), the Scotch Rose, the Couch-grass or Quick-grass, and many other plants, spread so rapidly and widely, "by-the-root," as it is said.

That these are really stems, and not roots, is evident from the way in which they grow: from their consisting of a succession of joints; and from the leaves which they bear on each joint (or node, as the botanist calls the place from which leaves arise), in the form of small scales, just like the lowest ones on the upright stem next the ground. Like other stems, they also produce buds in the axils of these scales, showing the scales to be leaves; whereas real roots bear neither leaves nor auxiliary buds. Placed, as they are, in the damp and dark soil, such stems naturally produce roots, just as the creeping stem does where it lies on the surface of the ground; but the whole appearance of these roots, their downward growth, and their mode of branching, are very different from that of the subter-

98. It is easy to see why plants with these running rootstocks take such rapid and wide possession of the soil,—often becoming great pests to farmers,—and why they are so hard to get rid of. They are
always perennials (41); the subterranean shoots live over the first winter, if not longer, and are provided with vigorous buds at every joint. Some of these buds grow in spring into upright stems, bearing foliage, to elaborate the plant's crude food into nourishment, and at length produce blossoms for reproduction by seed; while many others, fed by nourishment supplied from above, form a new generation of subterranean shoots; and this is repeated over and over in the course of the season or in succeeding years. Meanwhile as the subterranean shoots increase in number, the older ones, connecting the series of generations into one body, die off year by year, liberating the already rooted side-branches as so many separate plants; and so on indefinitely. Cutting these running rootstocks into pieces, therefore, by the hoe or the plough, far from destroying the plant, only accelerates the propagation; it converts one many-branched plant into a great number of separate individuals. Even if you divide the shoots into as many pieces as there are joints of stem, each piece (Fig. 55) is already a plantlet, with its roots and with a bud in the axil of its scale-like leaf (either latent or apparent), and having prepared nourishment enough in the bit of stem to develop this bud into a new stem; and so a single plant is all the more speedily converted into a multitude. Such plants as the Quick-grass accordingly realize the fable of the Hydra; as fast as one of its many branches is cut off, twice as many, or more, spring up in its stead. Whereas, when the subterranean parts are only roots, cutting away the stem completely destroys the plant, except in the rather rare cases where the root produces adventitious buds (28).

99. The more nourishment rootstocks contain, the more readily do separate portions, furnished with buds, become independent plants. It is to such underground stems, thickened with a large amount of starchy, or some similar nourishing matter stored up in their tissues, that the name of rhizoma or rootstock is commonly applied;—such, for example, as those of the Sweet Flag or Calamus, of Ginger, of Iris "or Flower-de-luce (Fig. 133), and of the Solomon's Seal (Fig. 66).

100. The rootstocks of the common sorts of Iris of the gardens usually lie on the surface of the ground, partly uncovered; and they bear real leaves (Fig. 135), which closely overlap each other;* 

*Fig. 62. A piece of the running rootstock of the Peperomia, with its node or joint, and an auxiliary bud ready to grow.
the joints (i.e., the internodes, or spaces between each leaf) being very short. As the leaves die, year by year, and decay, a scar left in the form of a ring marks the place where each leaf was attached. Instead of leaves, rootstocks buried under ground commonly bear scales, like those of the Mint (Fig. 64), which are imperfect leaves.

101. Some rootstocks are marked with large round scars of a different sort, like those of the Solomon's Seal (Fig. 66), which gave this name to the plant, from their looking something like the impression of a seal upon wax. Here the rootstock sends up every spring an herbaceous stalk or stem, which bears the foliage and flowers, and dies in autumn; and the seal is the circular scar left by the death and separation of the dead stalk from the living rootstock. As but one of these is formed each year, they mark the limits of a year's growth. The bud at the end of the rootstock in the figure, which was taken in summer, will grow the next spring into the stalk of the season, which, dying in autumn, will leave a similar scar, while another bud will be formed farther on, crowning the ever-advancing summit or growing end of the stem.

102. As each year's growth of stem, in all these cases, makes its own root, it soon becomes independent of the older parts. And after a certain age, a portion dies off behind, every year, about as fast as it increases at the growing end; — death following life with equal and certain step, with only a narrow interval between. In vigorous plants of Solomon's Seal or Iris, the living rootstock is several inches or a foot in length; while in the short rootstock of

**FIG. 66.** Rootstock of Solomon's Seal, with the bottom of the stalk of the season, and the bud for the next year's growth.

**FIG. 67.** The very short rootstock and leaf of a Trillium of New England.
Trillium or Birthroot (Fig. 67) life is reduced to a very narrow span, only an inch or less intervening between death beneath and young life in the strong bud annually renewed at the summit.

104. A tuber is a thickened portion of a rootstock. When slender subterranean branches, like those of the Quick-grass or Mint (Fig. 64), become enlarged at the growing end by the accumulation there of an abundance of solid nourishing matter, tubers are produced, like those of the Nut-grass of the Southern States (which accordingly becomes a greater pest even than the Quick-grass), and of the Jerusalem Artichoke, and the Potato. The whole formation may be seen at a glance in Figure 68, which represents the subterranean growth of a Potato-plant, and shows the tubers in all their stages, from shoots just beginning to enlarge at the tip, up to fully-formed potatoes. And Fig. 69,—one of the forming tubers moderately magnified,—plainly shows the leaves of this thickening shoot, in the form of little scales. It is under these scales that the eyes appear (Fig. 70): and these are evidently axillary buds (43).
MORPHOLOGY OF STEMS AND BRANCHES. [LESSON 6

Phology of the branches, — that is, in the different forms they appear under, and the purposes they serve. The Potato-plant has three principal forms of branches: — 1. Those that bear ordinary leaves, expanded in the air, to digest what they gather from it and what the roots gather from the soil, and convert it into nourishment. 2. After a while a second set of branches at the summit of the plant bear flowers, which form fruit and seed out of a portion of the nourishment which the leaves have prepared. 3. But a larger part of this nourishment, while in a liquid state, is carried down the stem, into a third sort of branches under ground, and accumulated in the form of starch at their extremities, which become tubers, or depositories of prepared solid food; — just as in the Turnip, Carrot, Dahlias, &c. (Fig. 57—60), it is deposited in the root. The use of the store of food is obvious enough. In the autumn the whole plant dies, except the seeds (if it formed them) and the tubers; and the latter are left disconnected in the ground. Just as that small portion of nourishing matter which is deposited in the seed (3, and Fig. 34) feeds the embryo when it germinates, so the much larger portion deposited in the tuber nourishes its buds, or eyes, when they likewise grow, the next spring, into new plants. And the great supply enables them to shoot with a greater vigor at the beginning, and to produce a greater amount of vegetation than the seedling plant could do in the same space of time; which vegetation in turn may prepare and store up, in the course of a few weeks or months, the largest quantity of solid nourishing material, in a form most available for food. Taking advantage of this, man has transported the Potato from the cool Andes of South America to other cool climates, and makes it yield him a copious supply of food, especially in countries where the season is too short, or the summer's heat too little, for profitably cultivating the principal grain-plants.

105. All the sorts of subterranean stems or branches distinguished by botanists pass into one another by gradations. We have seen how nearly related the tuber is to the rootstock, and there are many cases in which it is difficult to say which is the proper name to use. So likewise,

106. The Turnip, or Solid Bulb, like that of the Indian Turnip and the Crocus (Fig. 71), is just a very short and thick rootstock; as will be seen by comparing Fig. 71 with Fig. 67. Indeed, it grows so very little in length, that it is often much broader than long, as in the Indian Turnip, and the Cycamens of our greenhouses.
are usually upright, producing buds on their upper surface and roots from the lower. But (as we see in the Crocus here figured) buds may shoot from just above any of the faint cross lines or rings, which are the scars left by the death and decay of the sheathing bases of former leaves. That is, these are axillary buds. In these extraordinary (just as in ordinary) stems, the buds are either axillary or terminal. The whole mode of growth is just the same, only the corn does not increase in length faster than it does in thickness. After a few years some of the buds grow into new corns at the expense of the old one; the young ones taking the nourishment from the parent, and storing up a large part of it in their own tissue. When exhausted in this way, as well as by flowering, the old corn dies, and its shrivelled and decaying remains may be found at the side or beneath the present generation, as we see in the Crocus (Fig. 71).

107. The corn of a Crocus is commonly covered with a thin and dry, scaly or fibrous husk, consisting of the dead remains of the bases of former leaves. When this husk consists of many scales, there is scarcely any distinction left between the corn and

108. The Bulb. This is an extremely short subterranean stem, usually much broader than high, producing roots from underneath, and covered with leaves or the bases of leaves, in the form of thickened scales. It is, therefore, the same as a corn, or solid bulb, only it bears an abundance of leaves or scales, which make up the greater part of its bulk. Or we may regard it as a bud, with thick and fleshy scales. Compare a Lily-bulb (Fig. 73) with the strong scaly buds of the Hickory and Horsechestnut (Fig. 48 and 49), and the resemblance will be apparent enough.

109. Bulbs serve the same purpose as tubers, rootstocks, or corns. The main difference is, that in these the store of food for future growth is deposited in the stem; while in the bulb, the greater part is deposited in the bases of the leaves, changing them into thick scales, which closely overlap or enclose one another, because the stem does not elongate enough to separate them. That the scales
of the bulb are the bases of leaves may be seen at once by following any of the ground-leaves (root-leaves as they are incorrectly called) down to their origin in the bulb. Fig. 75 represents one of them from the White Lily; the thickened base, which makes a scale, being cut off below, to show its thickness. After having lasted its time and served its purpose as foliage, the green leaf dies down to the thickened base, which remains as a scale of the bulb. And year after year, as the bulb grows from the centre, to produce the vegetation and the flowers of the season, the outer scales yield up their store of nourishment for the purpose, and perish.

110. Each scale, being a leaf, may have a bud in its axil. Some of these buds grow into leafy and flowering stems above ground: others grow into new bulbs, feeding on the parent, and at length destroying it, in the same way that corns do, as just described (106).

111. When the scales are broad and enwrap all that is within so as to form a succession of coats, one over another, the bulb is said to be 

Firstly, the scales are narrow and separate, as in the Lily (Fig. 73), the bulb is said to be 

112. Bulbils are small bulbs formed above ground on some plants, as in the axil of the leaves of the common bulbiferous Lily of the gardens, and often in the flower-clusters of the Leek and Onion. They are plainly nothing but bulbs with thickened scales. They never grow into branches, but detach themselves when full grown, and fall to the ground, to take root there and form new plants.

113. From the few illustrations already given, attentive students
can hardly fail to obtain a good idea of what is meant by morphology in Botany; and they will be able to apply its simple principles for themselves to all forms of vegetation. They will find it very interesting to identify all these various subterranean forms with the common plan of vegetation above ground. There is the same structure, and the same mode of growth in reality, however different in appearance, and however changed the form, to suit particular conditions, or to accomplish particular ends. It is plain to see, already, that the plant is constructed according to a plan,—a very simple one,—which is exhibited by all vegetation, by the extraordinary no less than by the ordinary kinds; and that the same organ may appear under a great many different shapes, and fulfil very different offices.

114. These extraordinary shapes are not confined to subterranean vegetation. They are all repeated in various sorts of fleshy plants; in the Houseleek, Aloe, Agave (Fig. 82), and in the many and strange shapes which the Cactus family exhibit (Fig. 76); shapes which imitate rootstocks, tubers, cones, &c. above ground. All these we may regard as

115. Consolidated Forms of Vegetation. While ordinary plants are constructed on the plan of great spread of surface (131), these are formed on the plan of the least possible amount of surface in proportion to their bulk. The Cereus genus of Cactuses, for example, consisting of solid columnar trunks (Fig. 76, b), may be likened to rootstocks. A green thiol serves the purpose of foliage; but the surface is as nothing compared with an ordinary leafy plant of the same bulk. Compare, for instance, the largest Cactus known, the Giant Cereus of the Gila River (Fig. 76, in the background), which rises to the height of fifty or sixty feet, with a common leafy tree of the same height, such as that in Fig. 54, and estimate how vastly greater, even without the foliage, the surface of the latter is than that of the former. Compare, in the same view, an Opuntia or Prickly-Pear Cactus, western and branches formed of a succession of thick and flattened joints (Fig. 76, a), which may be likened as tubers, or an Epiphyllum (d), with shorter and flatter joints, with an ordinary leafy shrub or herb of equal size. And finally, in Mollus-Cactuses or Echinocactus (e), with their globular or bulb-like shapes, we have plants in the most compact shape; their spherical figure being such as to expose the least possible amount of its bulk to the air.

116. These consolidated plants are evidently adapted and designed
for very dry regions; and in such only are they found. Similarly, 
bulbous and corm-bearing plants, and the like, are examples of a 
form of vegetation which in the growing season may expand a large 
surface to the air and light, while during the period of rest the 
living vegetable is reduced to a globe, or solid form of the least 
possible surface; and this is protected by its outer coats of dead 
and dry scales, as well as by its situation under ground. Such 
plants exhibit another and very similar adaptation to a season of 
drought. And they mainly belong to countries (such as Southern 
Africa, and parts of the interior of Oregon and California) which 
have a long hot season during which little or no rain falls, when 
their stalks and foliage above and their roots beneath being early cut 
off by drought, the plants rest securely in their compact bulbs, filled 
with nourishment, and retaining their moisture with great tenacity, 
until the rainy season comes round. Then they shoot forth leaves 
and flowers with wonderful rapidity, and what was perhaps a desert 
of arid sand becomes green with foliage and gay with blossoms, 
almost in a day. This will be more perfectly understood when the 
nature and use of bulbs have been more fully considered. (Fig. 76 
represents several forms of Cactus vegetation.)
In describing the subterranean forms of the stem, we have been led to notice already some of the remarkable forms under which leaves occur; namely, as scaly, sometimes small and thin, as those of the rootstocks of the Quick-grass, or the Mint (Fig. 64), sometimes large and thick, as those of bulbs (Fig. 74–75), where they are commonly larger than the stem they belong to. We have seen, too, in the second Lesson, the seed-leaves (or cotyledons) in forms as unlike foliage as possible; and in the third Lesson we have spoken of bud-scales as a sort of leaves. So that the botanist recognizes the leaf under other forms than that of foliage.

118. We may call foliage the natural form of leaves, and look upon the other sorts as special forms,—as transformed leaves; by this term meaning only that what would have been ordinary leaves under other circumstances (as, for instance, those on shoots of Mint, Fig. 64, had these grown upright in the air, instead of creeping under ground) are developed in special forms to serve some particular purpose. For the Great Author of Nature, having designed plants upon one simple plan, just adapts this plan to all cases. So, whenever any special purpose is to be accomplished, no new instruments or organs are created for it, but one of the three general organs of the vegetable, root, stem, or leaf, is made to serve the purpose, and is adapted to it by taking some peculiar form.

119. It is the study of the varied forms under this view that constitutes Morphology (61), and gives to this part of Botany such great interest. We have already seen stems and roots under a great variety of forms. But leaves appear under more various and widely different forms, and answer a greater variety of purposes, than do' all the other organs of the plant put together. We have to consider, then, leaves as foliage, and leaves as something else than foliage. As we have just been noticing cases of leaves that are not foliage, we may consider these first, and enumerate the principal kinds.

120. Leaves as Depositories of Food. Of these we have had plenty of instances in the seed-leaves, such as those of the Almond, Apple-
seed (Fig. 11), Beech (Fig. 13–15), the Bean and Pea (Fig. 16–20), the Oak (Fig. 21, 22), and Horsechestnut (Fig. 23, 24); where the food upon which the plantlet feeds when it springs from the seed is stored up in its cotyledons or first leaves. And we have noticed how very unlike foliage such leaves are. Yet in some cases, as in the Pumpkin (Fig. 10), they actually grow into green leaves as they get rid of their burden.

121. **Bulb-Scales** (Fig. 73–75) offer another instance, which we were considering at the close of the last Lesson. Here a part of the nourishment prepared in the foliage of one year is stored up in the scales, or subterranean thickened leaves, for the early growth and flowering of the next year; and this enables the flowers to appear before the leaves, or as soon as they do; as in Hyacinths, Snowdrops, and many bulbous plants.

122. **Leaves as Bulb-scales, etc.** True to its nature, the stem produces leaves even under ground, where they cannot serve as foliage, and where often, as on rootstocks and tubers (87–103), they are not of any use that we know of. In such cases they usually appear as thin scales. So the first leaves of the stems of herbs, as they sprout from the ground, are generally mere scales, such as those of an Asparagus shoot; and such are the first leaves on the stem of the seedling Oak (Fig. 22) and the Pea (Fig. 20). Similar scales, however, often serve an important purpose; as when they form the covering of buds, where they protect the tender parts within (44). That bulb-scales are

**FIG. 77.** Leaves of a developing bud of the Low Sweet Chestnut (Carya ovata var. lucrana), showing a nearly complete set of gradations from a scale to a compound leaf of five leaflets.
leaves is plainly shown, in many cases, by the gradual transition between them and the first foliage of the shoot. The Common Lilac and the Shell-bark Hickory are good instances of the sort. But the best illustration is furnished by the Low Sweet Buckeye of the Southern States, which is often cultivated as an ornamental shrub. From one and the same growing bud we may often find all the gradations which are shown in Fig. 77.

123. LEAVES AS SPINES occur in several plants. The most familiar instance is that of the Common Barberry. In almost any summer shoot, most of the gradations may be seen between the ordinary leaves, with sharp bristly teeth, and leaves which are reduced to a branching spine or thorn, as shown in Fig. 78. The fact that the spines of the Barberry produce a leaf-bud in their axil also proves them to be leaves.

124. LEAVES AS TENDRILS are to be seen in the Pea and the Vetch (Fig. 20, 127), where the upper part of each leaf becomes a tendril, which the plant uses to climb by; and in one kind of Vetch the whole leaf is such a tendril.

125. LEAVES AS PITCHERS, or hollow tubes, are familiar to us in the common Pitcher-plant or Side-saddle Flower (Sarracenia, Fig. 79) of our bogs. Those pitchers are generally half-full of water, in which flies and other insects are drowned, often in such numbers as to make a rich manure for the plant, no doubt; though we can hardly imagine this to be the design of the pitcher. Nor do we perceive here any need of a contrivance to hold water, since the roots of these plants are always well supplied by the wet bogs where they grow.
LESSON VIII

morphology of leaves as foliage.

130. Having in the last Lesson glanced at some of the special or extraordinary forms and uses of leaves, we now return to leaves in their ordinary condition, namely, as foliage. We regard this as the natural state of leaves. For although they may be turned to account in other and very various ways, as we have just seen, still their proper office in vegetation is to serve as foliage. In this view we may regard

131. Leaves as a Contrivance for Increasing the Surface of that large part of the plant which is exposed to the light and the air. This is shown by their expanded form, and ordinarily slight thickness in comparison with their length and breadth. While a Melon-Cucum (11a, Fig. 76) is a striking example of a plant with the least possible amount of surface for its bulk, a repeatedly branching leafy herb or tree presents the largest possible extent of surface to the air. The actual amount of surface presented by a tree in full leaf is much larger than one would be apt to suppose. Thus, the Washington Elm at Cambridge—a tree of no extraordinary size—was some years ago estimated to produce a crop of seven millions of leaves, exposing a surface of 200,000 square feet, or about five acres, of foliage.

132. What is done by the foliage we shall have to explain in another place. Under the present head we are to consider ordinary leaves as to their parts and their shapes.

133. The Parts of the Leaf. The principal part of a leaf is the blade, or expanded portion, one face of which naturally looks toward the sky, the other towards the earth. The blade is often raised on a stalk of its own, and on each side of the stalk at its base there is sometimes an appendage called a stipule. A complete leaf, therefore consists of a blade (Fig. 83, b), a foot-stalk or leaf-stalk, called the petiole (p), and a pair of stipules (s). See also Fig. 186.

134. It is the blade which we are now to describe. This, as being the essential and conspicuous part, we generally regard as the leaf; and it is only when we have to particularize, that we speak of the blade, or lamina, of the leaf.
135. Without here entering upon the subject of the anatomy of the leaf, we may remark, that leaves consist of two sorts of material, viz.: 1. the green pulp, or parenchyma; and 2. the fibrous framework, or skeleton, which extends throughout the soft green pulp and supports it, giving the leaf a strength and firmness which it would not otherwise possess. Besides, the whole surface is covered with a transparent skin, called the epidermis, like that which covers the surface of the shoots, &c.

136. The framework consists of wood,—a fibrous and tough material which runs from the stem through the leaf-stalk, when there is one, in the form of parallel threads or bundles of fibres; and in the blade these spread out in a horizontal direction, to form the ribs and veins of the leaf. The stout main branches of the framework (like those in Fig. 50) are called the ribs. When there is only one, as in Fig. 83, &c., or a middle one decidedly larger than the rest, it is called the midrib. The smaller divisions are termed veins; and their still smaller subdivisions, venules.

137. The latter subdivide again and again, until they become so fine that they are invisible to the naked eye. The fibres of which they are composed are hollow; forming tubes by which the sap is brought into the leaves and carried to every part. The arrangement of the framework in the blade is termed the venation, or mode of veining. This corresponds so completely with the general shape of the leaf, and with the kind of division when the blade is divided or lobed, that the readiest way to study and arrange the forms of leaves is first to consider their veining.

138. Various as it appears in different leaves, the veining is all reducible to two principal kinds; namely, the parallel-veined and the netted-veined.

139. In netted-veined (also called reticulated) leaves, the veins branch off from the main rib or ribs, divide into finer and finer

FIG. 50. Leaf of the Quince. 1, blade; p, petiole; m, stipulae.
MORPHOLOGY OF LEAVES AS FOLIAGE. [LESSON 8.

veinlets, and the branches unite with each other to form meshes of network. That is, they *aquasemus*, as anatomists say of the veins and arteries of the body. The *Quercus*, in Fig. 83, shows this kind of veining in a leaf with a single rib. The Maple, Basswood, and Butternut (Fig. 50) show it in leaves of several ribs.

141. In parallel-veined leaves, the whole framework consists of slender ribs or veins, which run parallel with each other, or nearly so, from the base to the point of the leaf, not dividing and subdividing, nor forming meshes, except by very minute cross-veinlets. The leaf of any grass, or that of the Lily of the Valley (Fig. 84) will furnish a good illustration.

142. Such simple, parallel veins Linnéus, to distinguish them, called *nerves*, and parallel-veined leaves, are still commonly called *nerved leaves*, while those of the other kind are said to be *veined*; — terms which it is convenient to use, although these "nerves" and "veins" are all the same thing, and have no likeness to the nerves of animals.

143. Netted-veined leaves belong to plants which have a pair of seed-leaves or cotyledons, such as the Maple (Fig. 1), Beech (Fig. 15), or Pal and Bear (Fig. 18, 20), and most of the illustrations in the first and second Lessons. While parallel-veined or nerved leaves belong to plants with one cotyledon or true seed-leaf; such as the Iris (Fig. 184) and Indian Corn (Fig. 42). So that a mere glance at the leaves of the tree or herb enables one to tell what the structure of the embryo is, and to refer the plant to one or the other of these two grand classes, — which is a great convenience. For generally when plants differ from each other in some one important respect, they differ correspondingly in other respects as well.

144. Parallel-veined leaves are of two sorts: one kind, and the commonest, having the ribs or nerves all running from the base to the point of the leaf, as in the examples already given; while in another kind they run from a midrib to the margin; as in the com.

FIG. 84. A (parallel-veined) leaf of the Lily of the Valley.
mon Pickerel-weed of our ponds, in the Banana (Fig. 47), and many similar plants of warm climates.

145. Netted-veined leaves are also of two sorts, as is shown in the examples already referred to. In one case the veins all rise from a single rib (the midrib), as in Fig. 83. Such leaves are called *feather-veined* or *pinnately-veined*; both terms meaning the same thing, namely, that the veins are arranged on the sides of the rib like the plumage of a feather on each side of the shaft.

146. In the other case (as in the Buttonwood, Fig. 50, Maple, &c.), the veins branch off from three, five, seven, or nine ribs, which spread from the top of the leaf-stalk, and run through the blade like the toes of a web-footed bird. Hence these are said to be *palmately* or *digitally* veined, or (since the ribs diverge like rays from a centre) *radiate-veined*.

147. Since the general outline of leaves accords with the framework or skeleton, it is plain that *feather-veined* leaves will incline to elongated shapes, or at least will be longer than broad; while in *radiate-veined* leaves more rounded forms are to be expected. A glance at the following figures shows this. Whether we consider the veins of the leaf to be adapted to the shape of the blade, or the green pulp to be moulded to the framework, it is not very material. Either way, the outline of each leaf corresponds with the mode of spreading, the extent, and the relative length of the veins. Thus, in oblong or elliptical leaves of the feather-veined sort (Fig. 87, 88), the principal veins are nearly equal in length; while in ovate and heart-shaped leaves (Fig. 89, 90), those below the middle are longest; and in leaves which widen upwards (Fig. 91–94), the veins above the middle are longer than the others.

148. Let us pass on, without particular reference to the kind of veining, to enumerate the principal forms of leaves as to General Outline. It is necessary to give names to the principal shapes, and to define them rather precisely, since they afford the easiest marks for distinguishing species. The same terms are used for all other flattened parts as well, such as the petals of the flowers; so that they make up a great part of the descriptive language of Botany. We do not mention the names of common plants which exhibit these various shapes. It will be a good exercise for young students to look them up and apply them.

149. Forms of Leaves as to General Outline. It is necessary to give names to the principal shapes, and to define them rather precisely, since they afford the easiest marks for distinguishing species. The same terms are used for all other flattened parts as well, such as the petals of the flowers; so that they make up a great part of the descriptive language of Botany. We do not mention the names of common plants which exhibit these various shapes. It will be a good exercise for young students to look them up and apply them.

150. Beginning with the narrower and proceeding to the broadest forms, a leaf is said to be
**Lesson 8.**

**Linear** (Fig. 85), when narrow, several times longer than wide, and of the same breadth throughout.

**Lanceolate**, or lance-shaped, when several times longer than wide, and tapering upwards (Fig. 86), or both upwards and downwards.

**Oblong** (Fig. 87), when nearly twice or three times long as broad.

**Elliptical** (Fig. 88) is oblong with a flowing outline, the two ends alike in width.

**Oval** is the same as broadly elliptical, or elliptical with the breadth considerably more than half the length.

**Ovate** (Fig. 89), when the outline is like a section of a hen's-egg lengthwise, the broader end downward.

**Obovate**, or rounded (Fig. 90), circular in outline, or nearly so.

251. When the leaf tapers towards the base, instead of upwards, it may be

- **Oblanceolate** (Fig. 91), which is lance-shaped, with the more tapering end downward;

- **Spatulate** (Fig. 92), rounded above and long and narrow below, like a spatula;

- **Obovate** (Fig. 93), or inversely ovate, that is, ovate with the narrower end down;

- **Cuneate**, or cuneiform, that is, wedge-shaped (Fig. 94), broad above and tapering by straight lines to an acute angle at the base.

252. As to the Base, its shape characterizes several forms, such as

- **Coriaceous, or heart-shaped** (Fig. 90, 99, 8), when a leaf of an ovate form, or something like it, has the outline of its rounded base turned in (forming a notch or cleft) where the stalk is attached.

- **Reniform, or kidney-shaped** (Fig. 100), like the last, only rounder and broader than long.

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*Fig. 85-86. Various forms of feather-revealed leaves.*

*Fig. 87. Oblanceolate, 30, spatulate, 31, obovate, 34, wedge-shaped, feather-revealed leaves.*
Auriculate, or curred, having a pair of small and blunt projections, or ears, at the base, as in the species of Marsdenia (Fig. 96).

Sagittate, or arrow-shaped, where such ears are pointed and turned downwards, while the main body of the blade tapers upwards to a point, as in the common Sagittaria or Arrow-head, and in the Arrow-leaved Polygala (Fig. 95).

Bastaile, or basterle-shaped, when such lores at the base point downwards, giving the leaf the shape of the basterl of the olden time, as in another Polygala (Fig. 97).

Peltate, or shield-shaped (Fig. 102), is the name applied to a certain modification of the leaf, consisting of a rounded form, where the footstall is attached to the lower surface, instead of the base, and therefore is naturally likened to a shield borne by the unstratched arm. The common Watershield, the Nellum-bun, and the White Water-lily, and also the Mandrake, exhibit this sort of leaf. On comparing the shield-shaped leaf of the common Marsh Pennywort (Fig. 102) with that of another common species (Fig. 101), we see at once what this peculiarity means. A shield-shaped leaf is like a...
kidney-shaped (Fig. 109) or other rounded leaf, with the margins at the base brought together and united.

153. As to the leaf, the following terms express the principal variations.

*Acuminata, pointed, or taper-pointed*, when the summit is more or less prolonged into a narrowed or tapering point, as in Fig. 97.

*Acute*, when ending in an acute angle or not prolonged point, as in Fig. 104, 98, 95, &c.

*Obtuse*, when with a blunt or rounded point, as in Fig. 105, 89, &c.

*Truncate*, with the end as if cut off square, as in Fig. 106, 94.

*Retuse*, with the rounded summit slightly indented, forming a very shallow notch, as in Fig. 107.

*Emarginite, or notched*, indented at the end more decidedly, as in Fig. 108.

*Obovate*, that is, inversely heart-shaped, where an oblong leaf is more deeply notched at the end (Fig. 109), as in White Clover and Wood-sorrel; so as to resemble a cordate leaf (Fig. 99) inverted.

*Capitulate*, tipped with a sharp and rigid point; as in Fig. 110.

*Microdonate*, abruptly tipped with a small and short point, like a projection of the midrib; as in Fig. 111.

*Acutu, coronate, and bracteate-pointed*, are terms used when this microme point is extended into a longer bristle-form or other slender appendage.

The first six of these terms can be applied to the lower as well as to the upper end of a leaf or other organ. The others belong to the apex only.
LESSON IX.

MORPHOLOGY OF LEAVES AS FOLIAGE.—SIMPLE AND COMPOUND LEAVES, STIPULES, ETC.

154. In the foregoing lessons leaves have been treated of in their simplest form, namely, as consisting of a single blade. But in many cases the leaf is divided into a number of separate blades. That is, leaves are either Simple or Compound. They are said to be simple, when the blade is all of one piece; they are compound, when the blade consists of two or more separate pieces, borne upon a common leaf-stalk. And between these two kinds every intermediate gradation is to be met with. This will appear as we proceed to notice the principal forms of leaves as to particular outline or degree of division.

155. Forms of Leaves as to particular outline or degree of division. In this respect, leaves are said to be

Entire, when their general outline is completely filled out, so that the margin is an even line, without any teeth or notches; as in Fig. 83, 84, 108, &c.

Serrate, or saw-toothed, when the margin only is cut into sharp teeth, like those of a saw, and pointing forwards; as in Fig. 112; also 90, &c.

Dentate, or toothed, when such teeth point outwards, instead of forwards; as in Fig. 115.

FIG. 128-137. Kinds of margin of leaves.
Sugar-Maple and the Butternut (Fig. 50) have *pinnately five-lobed leaves*; the Soft White-Maple *pinnately five-parted leaves*; and so on. And in the other sort, the Post-Oak has *pinnately seven-to nine-lobed leaves*; the Red-Oak commonly has *pinnately seven-to nine-chief leaves*, &c., &c.

162. The divisions, lobes, &c. may themselves be *entire* (without teeth or notches, 156), as in Fig. 118, 122, &c.; or *serrate* (Fig. 124), or otherwise toothed or incised (Fig. 121); or else lobed, cleft, parted, &c.; in the latter cases making twice pinnatifid, twice pinnately or pinnately lobed, parted, or divided leaves, &c. From these illustrations, the student will perceive the plan by which the botanist, in two or three words, may describe any one of the almost endlessly diversified shapes of leaves, so as to convey a perfectly clear and definite idea of it.

163. **Compound Leaves.** These, as already stated (155), do not differ in any absolute way from the divided form of simple leaves. A compound leaf is one which has its blade in two or more entirely separate parts, each usually with a stalklet of its own; and the stalklet is often *jointed (or articulated)* with the main leaf-stalk, just as this is jointed with the stem. When this is the case, there is no doubt that the leaf is compound. But when the pieces have no stalklets, and are not jointed with the main leaf-stalk, the leaf may be considered either as simple and divided, or compound, according to the circumstances.

LESSON 9. | • COMPOUND LEAVES.

164. The separate pieces or little blades of a compound leaf are called leaflets.

165. Compound leaves are of two principal kinds, namely, the pinnate and the palmate; answering to the two modes of veining in re względ leaves (145—147), and to the two sorts of lobed or divided leaves (158, 159).

166. Pinnate leaves are those in which the leaflets are arranged on the sides of a main leaf-stalk; as in Fig. 126—128. They answer to the feather-reined (i.e., pinnately-reined) simple leaf; as will be seen at once, on comparing Fig. 126 with the figures 118 to 121. The leaflets of the former answer to the bases or divisions of the latter; and the continuation of the petiole, along which the leaflets are arranged, answers to the midrib of the simple leaf.

167. Three sorts of pinnate leaves are here given. Fig. 126 is pinnate with an odd or end leaflet, as in the Common Locust and the Ash. Fig. 127 is pinnate with a toothed at the end, in place of the old leaflet, as in the Vetches and the Pea. Fig. 128 is pinnately pinnate, having a pair of leaflets at the end, like the rest of the leaflets; as in the Horse-Locust.

168. Palmate (also named digitate) leaves are those in which the leaflets are all borne on the very tip of the leaf-stalk; as in the Lupine, the Common Clover (Fig. 136), the Virginia Creeper (Fig. 62), and the Horsechestnut and Beecheye (Fig. 129). They answer to the radiate-reined or palmately-reined simple leaf; as is seen by comparing Fig. 135 with the figures 122 to 125. That is, the Clover-leaf of three leaflets is the same as a palmately three-ribbed leaf cut into three separate leaflets. And such a simple five-lobed leaf as that of the Sugar-Maple, if more cut, so as to separate the parts, would produce a palmate leaf of five leaflets, like that of the Horsechestnut or Beecheye (Fig. 129).

* 169. Either sort of compound leaf may have any number of leaflets; though palmate leaves cannot well have a great many, since they are all crowded together on the end of the main leaf-stalk.

FIG. 128. Palmate leaf of five leaflets, of the Common Beecheye.
Some Lupines have nine or eleven; the Horsechestnut has seven, the Sweet Hickory more commonly five, the Clover three. A pine-
nate leaf often has only seven to five leaflets, as in the Wild Bean
or Groundnut; and in the Common Bean it has only three; in
some rarer cases only two; in the Orange and Lemon only
one! The joint at the place
where the leaflet is united with
the petiole alone distinguishes
this last case from a single
leaf.*

170. The leaflets of a com-
 pound leaf may be either entire
(as in Fig. 126 - 128), or sep-
crate, or lobed, cleft, parted,
&c.; in fact, they may pre-
sent all the variations of simple
leaves, and the same terms
equally apply to them.

171. When this division is
carried so far as to separate
what would be one leaflet into
two, three, or several, the leaf
becomes doubly or twice com-
 pound, either pinnately or poli-
nately, as the case may be.

For example, while some of the leaves of the Horse-Beam are
simply pinnate, that is, mere pinnate, as in Fig. 128, the greater part

* When the botanist, in describing leaves, wishes to express the number of
leaflets, he may use terms like these:—

Pinnatifid, for a compound leaf of a single leaflet; from the Latin pinna, "fan, and fidare, "leaflet.

Pinnatifid, of two leaflets, from the Latin bis, twice, and fendere, "leaflet.

Pinnatifid (or ternary), of three leaflets, as the Clover; and so on.

When he would express in one phrase both the number of leaflets and the way
the leaf is compound, he writes:

Pinnately pinnatifid, pinnatifid, pinnatifid (of several leaflets), &c., or the
Pinnately bis, tri, quadra, or pinnatifid (that is, of two, three, four, or
several leaflets), as the case may be.

Fig. 126. A twice-pinnate (simply) leaf of the Horse-Beam.
are 

are bipinnate, i.e. twice pinnate, as in Fig. 130. If these leaflets were again divided in the same way, the leaf would become thrice pinnate, or tripinnate, as in many Acacias. The first divisions are called pinnae; the others, pinnales; and the last, or little blades, leaflets.

172. So the palmate leaf, if again compounded in the same way, becomes twice palmate, or, as we say when the divisions are in threes, twice ternate (in Latin form biteminate); if a third time compounded, thrice ternate or triternate. But if the division goes still further, or if the degree is variable, we simply say that the leaf is decompound: either palmately or palmately so, as the case may be. Thus, Fig. 138 represents a four times ternately compounded, in other words a ternately decompound, leaf of our common Meadow Rue.

173. So exceedingly various are the kinds and shapes of leaves, that we have not yet exhausted the subject. We have, however, mentioned the principal terms used in describing them. Many others will be found in the glossary at the end of the volume. Some peculiar sorts of leaves remain to be noticed, which the student might not well understand without some explanation; such as

174. Perfoliate Leaves. A common and simple case of this sort is found in two species of Uvularia or Bellwort, where the stem appears to run through the blade of the leaf; near one end. If we look at this plant in summer, after all the leaves are formed, we may see the meaning of this at a glance. For then we often find upon the same stem such a series of leaves as is given in Fig. 131: the lower leaves are perfoliate, those next above less so; then some (the fourth and fifth) with merely a heart-shaped clasping base, and finally one that is merely sessile. The leaf, we perceive, becomes perfoliate by the union of the edges of the base with each other around the stem: just as the shield-shaped leaf, Fig. 102, comes from the union of the edges of the base of such a leaf as Fig. 101. Of the same sort are the upper leaves of most of

FIG. 132. Leaves of Uvularia (Bellwort); the lower ones perfoliate, the others merely "clasping, or the uppermost only sessile."
the true Honeysuckle (Fig. 152); but here it is a pair of opposite leaves, with their contiguous broad bases grown together, which makes what seems to be one round leaf, with the stem running through its centre. This is seen to be the case, by comparing together the upper and the lowest leaves of the same branch. Leaves of this sort are said to be \textit{contra-rotundifoliate}.

175. \textit{Equitant Leaves}. While ordinary leaves spread horizontally, and present one face to the sky and the other to the earth, there are some that present their tip to the sky and their bases right and left to the horizon. Among these are the \textit{equitant} leaves of the Iris or Flower-de-Luce. On careful inspection we shall find that each leaf was formed \textit{folded together lengthwise}, so that what would be the upper surface is within, and all grown together, except next the bottom, where each leaf covers the next younger one. It was from their \textit{straddling} over each other, like a man on horseback (as is seen in the cross-section, Fig. 134), that Linnaeus, with his lively fancy, called these \textit{equitant leaves}.

176. \textit{Leaves with no distinction of Primae and Blades}. The leaves of Iris just mentioned show one form of this. The flat but narrow leaves of Jessupella, Daffodil, and the like, are other instances. \textit{Needle-shaped leaves}, like those of the Pine (Fig. 140), Larch (Fig. 139), and Spruce, and the \textit{scale-shaped} as well as the \textit{scale-shaped leaves of Junipers, Red Cen-
Lessons 9.

Philodia, Stipules, Etc.

The last are leaves serving for foliage, but having as little spread of surface as possible. They make up for this, however, by their immense numbers.

177. Sometimes the petiole expands and flattens, and takes the place of the blade; as in numerous New Holland Acacias, some of which are now common in greenhouses. Such counterfeit blades are called phyllodia,—meaning leaf-like bodies. They may be known from true blades by their standing edgewise, their margins being directed upwards and downwards; while in true blades the faces look upwards and downwards; excepting in excurrent leaves, as already explained, and in those which are turned edgewise by a twist, such as those of the Callistemon or Bottle-brush Flower of our greenhouses, and other Dry Myrtles of New Holland, &c.

178. Stipules, the pair of appendages which is found at the base of the petiole in many leaves (135), should also be considered in respect to their very varied forms and appearances. More commonly they appear like little blades, on each side of the leaf-stalk, as in the Quince (Fig. 63), and more strikingly in the Hawthorn and in the Pea. Here they remain as long as the rest of the leaf, and serve for the same purpose as the blade. Very commonly they serve for bud-scales, and fall off when the leaves expand, as in the Fig-tree, and the Magnolia (where they are large and conspicuous), or soon

FIG. 135. Twig of Arbutus, with its two sorts of leaves: viz., some round-shaped, the others scale-like; the latter on the branches, a.

FIG. 136. Leaf of Red Cherry; a, stipule, adhering to the base of the petiole; b, blade of true leaflets.

FIG. 137. Part of stem and leaf of Pilow's-Fuchsia (Polygona elongata) with the united stipular appendages, surface of leaf.
afterwards, as in the Tulip-tree. In the Pea the stipules make a very conspicuous part of the leaf; while in the Bean they are quite small; and in the Locust they are reduced to bristles or prickles. Sometimes the stipules are separate and distinct (Fig. 83); often they are united with the base of the leaf-stalk, as in the Rose and the Clover (Fig. 150); and sometimes they grow together by both margins, so as to form a sheath around the stem, above the leaf, as in the Butternut, the Dock, and almost all the plants of the Polygona Family (Fig. 137).

173. The sheaths of Grasses bear the blade on their summit, and therefore represent a form of the petiole. The small and thin appendage which is commonly found at the top of the sheath (called a ligule) here answers to the stipules.

Fig. 138. Tendrily-procercous leaf of Madonna Rue (Thalictrum Carolin).
LESSON X.

THE ARRANGEMENT OF LEAVES.

180. Under this head we may consider,—1. the arrangement of leaves on the stem, or what is sometimes called phyllotaxy (from two Greek words meaning leaf, order), and 2. the ways in which they are packed together in the bud, or their variation (the word meaning their spring state).

181. Phyllotaxy. As already explained (48, 49), leaves are arranged on the stem in two principal ways. They are either

Alternate (Fig. 131, 143), that is, one after another, only a single leaf arising from each node or joint of the stem; or

Opposite (Fig. 147), when there is a pair of leaves on each joint of the stem; one of the two leaves being in this case always situated exactly on the opposite side of the stem from the other. A third, but uncommon arrangement, may be added; namely, the

Whorled, or verticilliate (Fig. 148), when there are three or more leaves in a circle (wheel or verticle) on one joint of stem. But this is only a variation of the opposite mode; or rather the latter arrangement is the same as the whorled, with the number of the leaves reduced to two in each wheel.

182. Only one leaf is ever produced from the same point. When two are borne on the same joint, they are always on opposite sides of the stem, that is, are separated by half the circumference; when in whorls of three, four, five, or any other number, they are equally distributed around the joint of stem, at a distance of one third, one fourth, or one fifth of the circumference from each other, according to their number. So they always have the greatest possible divergence from each other. Two or more leaves belonging to the same joint of stem never stand side by side, or one above the other, in a cluster.

183. What are called clustered or fascicled leaves, and which
afterward to be so, are always the leaves of a whole branch which very, very much or very short that they are all crowded together in a small or loose; as in the spring leaves of the Barberry and of

Some Larch (Fig. 139). In these cases an examination shows them to be nothing else than alternate leaves, very much crowded on a short spur; and some of these spurs are seen in the course of the season to lengthen into ordinary shoots with scattered alternate leaves. So, likewise, each cluster of two or three needle-shaped leaves in Pitch Pines (as in Fig. 140), or of five leaves in White Pines, answers to a similar, extremely short branch, springing from the axil of a thin and slender scale, which represents a leaf of the main shoot. For Pines produce two kinds of leaves; — 1. primary, the proper leaves of the shoots, not as foliage, but in the shape of delicate scales in spring, which soon fall away, and 2. secondary, the furnished leaves, from buds in the axils of the former, and these form the actual foliage.

141. Spiral Arrangement of Leaves. If we examine any alternate-leaved stem, we shall find that the leaves are placed upon it in symmetrical order, and in a way perfectly uniform for each species, but different in different plants. If we draw a line from the insertion (i.e. the point of attachment) of one leaf to that of the next, and so on, this line will wind spirally around the stem as it rises, and in the same species will always have just the same number of leaves upon it for each turn round the stem. That is, any two successive leaves will always be separated from each other by just an equal portion of the circumference of the stem. The distance in height between any two leaves may vary greatly, even on the same shoot, for that depends upon the length of the internodes or spaces between each leaf; but the distance as measured around the circumference (in other words, the angular divergence, or angle formed by any two successive leaves) is uniformly the same.

145. The greatest possible divergence is, of course, where the second leaf stands on exactly the opposite side of the stem from the first, the third on the side opposite the second, and therefore over the
first, and the fourth over the second. This brings all the leaves into two ranks, one on one side of the stem and one on the other; and is therefore called the two-ranked arrangement. It occurs in all Gramineae.—In Indian Corn, for instance; also in the Spiderwort, the Hellebore (Fig. 131) and Iris (Fig. 132), in the Basswood or Lime-tree, &c. This is the simplest of all arrangements.

186. Next to this is the three-ranked arrangement, such as we see in Sedges, and in the Veratum or White Hellebore. The plan of it is shown on a Sedge in Fig. 141, and in a diagram or cross-section underneath, in Fig. 142. Here the second leaf is placed one third of the way round the stem, the third leaf two thirds of the way round, the fourth leaf accordingly directly over the first, the fifth over the second, and so on. Thus, three leaves occur in each turn round the stem, and they are separated from each other by one third of the circumference.

187. The next and one of the most common is the five-ranked arrangement; which is seen in the Apple (Fig. 145), Cherry, Poplar, and the greater part of our trees and shrubs. In this case the line traced from leaf to leaf will pass twice round the stem before it reaches a leaf situated directly over any below (Fig. 144). Here the sixth leaf is over the first; the leaves stand in five perpendicular ranks, equally distant from each other; and the distance between any two successive leaves is just two fifths of the circumference of the stem.

188. The five-ranked arrangement is expressed by the fraction \( \frac{5}{3} \). This fraction indicates the divergence of the successive leaves, i.e. the angle they form with each other; the numerator also expresses the number of turns made round the stem by the spiral line in completing one cycle or set of leaves, namely 5; and the denominator gives the number of leaves in each cycle, or the number of perpendicular

![Diagram](image-url)
by the midrib so that the two halves are placed face to face, it is _conaduplicate_ (Fig. 149), as in the Magnolia, the Cherry, and the Oak; when folded back and forth like the plait of a fan, it is _pliante_ or _plaited_ (Fig. 150), as in the Maple and Currant. If rolled, it may be so either from the tip downwards, as in Ferns and the Sandew (Fig. 154), when in unrolling it resembles the head of a croissant; or it may be rolled up parallel with the axis, either from one edge into a coil, when it is _convolute_ (Fig. 151), as in the Apricot and Plum, or rolled from both edges towards the midrib; sometimes inwards, when it is _involute_ (Fig. 152), as in the Violets and Water-lily; sometimes outwards, when it is _evolute_ (Fig. 153), in the Rosemary and Anemone. The figures are diagrams, representing sections through the leaf, in the way they were represented by Linnaeus.

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**LESSON XI.**

**THE ARRANGEMENT OF FLOWERS ON THE STEM, OR INFLORESCENCE.**

195. Thus far we have been considering the vegetation of the plant, and studying those parts, viz. root, stem, and leaves, by which it increases in size and extent, and serves the purpose of its individual life. But after a time each plant produces a different set of organs, viz. flowers, fruit, and seed, — subservient to a different purpose, that is, the increase in numbers, or the continuance of the
Lesson 11.

Indefinite Inflorescence.

Species. The plant reproduces itself in new individuals by seed. Therefore the seed, and the fruit in which the seed is formed, and the flower, from which the fruit results, are named the Organs of Reproduction or Fructification. These we may examine in succession. We begin, of course, with the flower. And the first thing to consider is the

196. Inflorescence, or the mode of flowering, that is, the situation and arrangement of blossoms on the plant. Varieties as this arrangement may seem to be, all is governed by a simple law, which is easily understood. As the position of every leaf is fixed beforehand by a mathematical law which prescribes where it shall stand (197), so is that of every blossom;—and by the same law in both cases. For flowers are buds, developed in a particular way; and flower-buds occupy the position of leaf-buds, and no other. As leaf-buds are either terminal (at the summit of a stem or branch, 42), or axillary (in the axil of a leaf, 45), so likewise.

197. Flowers are either terminal or axillary. In blossoming as in vegetation we have only buds terminating (i.e. on the summit of) stems or branches, and buds from the axil of leaves. But while the same plant commonly produces both kinds of leaf-buds, it rarely bears flowers in both situations. These are usually either all axillary or all terminal,—giving rise to two classes of inflorescence, viz. the determinate and the indeterminate.

198. Indeterminate Inflorescence is that where the flowers all arise from axillary buds: as in Fig. 155, 156, 157, &c.; and the reason why it is called indeterminate (or indefinite) is, that while the axillary buds give rise to flowers, the terminal buds go on to grow, and continues the stem indefinitely.

199. Where the flowers arise, as in Fig. 155, singly from the axils of the ordinary leaves of the plant, they do not form flower-clusters, but are axillary and solitary. But when several or many flowers are produced near each other, the accompanying leaves are usually of smaller size, and often of a different shape or character; then they are called bracts; and the flowers thus brought together

* * *

Fig. 155. Moneywort (Leontichus nummularius) of the garden, with axillary flowers.
form one cluster or inflorescence. The sorts of inflorescence of the
indeterminate class which have received separate names are chiefly
the following: viz. the Raceme, the Corymb, the Umbel, the Spike,
the Head, the Spadix, the Oakin, and the Panicle.

201. Before illustrating these, one or two terms, of common occurrence, may be defined. A flower (or other body) which has no
stalk to support it, but which sits directly on the stem or axis it proceeds from, is said to be sessile. If it has a stalk, this is called its
peduncle. If the whole flower-cluster is raised on a stalk, this is
called the peduncle, or the common peduncle (Fig. 156, p); and the
stalk of each particular flower, if it have any, is called the
pedicel or partial peduncle (p). The portion
of the general stalk along which flowers are dis-
posed is called the axis of inflorescence, or, when
covered with sessile flowers, the chorkis (back-bone), and
sometimes the receptacle. The leaves of a flower-
cluster generally are termed bracts. But when we
wish particularly to distinguish them, those on the
peduncle, or main axis, and which have a flower in
their axil, take the name of bracts (Fig. 156, b) and
those on the pedicels or partial flower-stalks, if any,
than of bracteals (Fig. 156, b).

201. A Raceme (Fig. 156, 157) is that form of flower-
cluster in which the flowers, each on their own foot-
stalk or pedicel, are arranged along a common stalk
or axis of inflorescence; as in the Lily of the Valley,
Currant, Choke-Cherry, Barberry, &c. Each flower
comes from the axil of a small leaf, or bract, which, how-
ever, is often so small that it might escape notice,
and which sometimes (as in the Mustard Family) disappears
altogether. The lowest blossoms of a raceme are of course the oldest,
and therefore open first, and the order of blossoming is ascending,
from the bottom to the top. The summit, never being stopped by
a terminal flower, may go on to grow, and often does so (as in the
common Shepherd's Purse), producing lateral flowers one after an-
other the whole summer long.

202. All the various kinds of flower-clusters pass one into another
by intermediate gradations of every sort. For instance, if we
lengthen the lower pedicels of a raceme, and keep the main axis
rather short, it is converted into

203. A Corymb (Fig. 158). This is the same as a raceme, except
that it is flat and broad, either convex, or level-topped, as in the
Hawthorn, owing to the lengthening of the lower pedicels while the
uppermost remain shorter.

204. The main axis of a corymb is short, at least in comparison
with the lower pedicels. Only suppose it to be so much contracted
that the bracts are all brought into a cluster or circle, and the
corymb becomes

205. An Umbel (Fig. 159). — as in the Milkweed and Primrose,
— a sort of flower-cluster where the pedicels all spring apparently
from the same point, from the top of the peduncle, so as to resemble,
when spreading, the rays of an umbrella, whence the name. Here
the pedicels are sometimes called the rays of the umbel. And the
bracts, when brought in this way into a cluster or circle, form what
is called an involucre.

206. For the same reason that the order of blossoming in a ra-
ceme is ascending (201), in the corymb and umbel it is centripetal,
that is, it proceeds from the margin or circumference regularly to-
ward the centre; the lower flowers of the former answering to the
outer ones of the latter. Indeterminate inflorescence, therefore, is
said to be centripetal in evolution. And by having this order of
blossoming, all the sorts may be distinguished from those of the
other, or the determinate class. In all the foregoing cases the
flowers are raised on pedicels. These, however, are very short in
many instances, or are wanting altogether; when the flowers are
arranged (200). They are so in
207. The Spike. This is a flower-cluster with a more or less
lengthened axis, along which the flowers are sessile or
nearly so, as in the Mullein and the Plantain (Fig. 169).
It is just the same as a raceme, therefore, without any
pedicels to the flowers.

208. The Head is a round or roundish cluster of flowers,
which are sessile on a very short axis or receptacle, as in
the Button-ball, Button-daisy (Fig. 161), and Red Clover.
It is just what a spike would become if its axis were
shortened, or as much, if its pedicels were all shortened
until the flowers became sessile or apparently so. The
head of the Button-ball (Fig. 161) is naked, but that of
the Thistle, of the Dandelion, the Cichory (Fig. 221),
and the like, is surrounded by empty bracts, which form
an involucre. Two particular forms of the spike and the
head have received particular names, namely, the Spadix
and the Oakia.

209. A Spadix is nothing but a flaccid spike or head, with small
and often imperfect flowers, as in the Calla, the Indian Turnip

(Fig. 162), Sweet Flag, &c. It is commonly covered by a peculiar
enveloping leaf, called a spathe.

FIG. 160. Spike of the common Phlox or Sweet Violet.
FIG. 161. Head of the Button-ball (Crepis amara).
FIG. 162. Spadix and spathe of the Indian Turnip; the latter cut through below.
210. A **Corymb or Inflorescence** is the name given to the scaly sort of spike of the Birch and Alder, the Willow and Poplar, and one sort of flower-clusters of the Oak, Hickory, and the like; — on which account there are called **Amentaceous** trees.

211. Sometimes these forms of flower-clusters become **compound.** For example, the stamens, which, in the simple umbel such as has been described (Fig. 159), are the pedicels of single flowers, may themselves branch in the same way at the top and so each become the support of a smaller umbel; as is the case in the Parsnip, Caraway, and almost the whole of the great family of what are called **Umbelliferous** (i. e. umbel-bearing) plants. Here the whole is termed a **compound umbel;** and the smaller or partial umbels take the name in English of _umbels._ The general compound, at the base of the main umbel, keeps that name; while that at the base of each umbel is termed a **partial umbel,** or an _umbel._

212. So a corymb (Fig. 158) with its separate stalks branching again, and bearing smaller clusters of the same sort, is a **compound corymb;** of which the Mountain Ash is a good example. A raceme where what would be the pedicels of single flowers become stalks, along which flowers are disposed on their own pedicels, forms a **compound raceme,** as in the Goat's-beard and the False Spikenard. But when what would have been a raceme or a corymb branches irregularly into an open and more or less compound flower-cluster, we have what is called

213. A **Panicle (Fig. 163)**; as in the Oak and in most common Grasses. Such a raceme as that of the diagram, Fig. 156, would be changed into a panicle like Fig. 163, by the production of a flower from the exit of each of the bractlets k.

214. A **Thyrus** is a compact panicle of a pyramidal or oblong shape; such as a bunch of grapes, or the cluster of the Liliac or Horsechestnut.

215. **Determinate Inflorescence** is that in which the flowers are from terminal buds. The simplest case is where a stem bears a solitary, terminal flower, as in Fig. 163. This stops the growth of
the stem; for its terminal bud, being changed into a blossom, can no more lengthen in the manner of a leaf-bud. Any further growth must be from axillary buds developing into branches. If such branches are leafy shoots, at length terminated by single blossoms, the inflorescence still consists of solitary flowers at the summit of the stem and branches. But if the flowering branches bear only bracts in place of ordinary leaves, the result is the kind of flower-cluster called

216. A Cyme. This is commonly a flat-topped or convex flower-cluster, like a corymb, only the blossoms are from terminal buds. Fig. 164 illustrates the simplest cyme in a plant with opposite leaves, namely, with three flowers. The middle flower, \( a \), terminates the stem; the two others, \( b-b \), terminate short branches, one from the axil of each of the uppermost leaves; and being later than the middle one, the flowering proceeds from the centre outwards, or is *centrifugal*; — just the opposite of the indeterminate mode, or that where all the flower-buds are axillary. If flowering branches appear from the axils below, the lower ones are the later, so that the order of blossoming continues *centrifugal* or *descending* (which is the same thing), as in Fig. 166, making a sort of reversed raceme; — a kind of cluster which is to the true raceme just what the flat cyme is to the corymb.

217. Wherever there are bracts or leaves, buds may be produced from their axils and appear as flowers. Fig. 165 represents the case where the branches, \( b-b \), of Fig. 164, each with a pair of small

![Diagram](https://via.placeholder.com/150)
Lesson II.

SORTS OF FLOWER-CLUSTERS.

Leaves or bracts about their middle, have branched again, and produced the branchlets and flowers e e, on each side. It is the continued repetition of this which forms the full or compound cyme, such as that of the Lavandulas, Dobleda, Dagwood, and Hydrangeas (Fig. 167).

218. A Paricle, like that of the Sweet-William and Lythium of the garden, is only a cyme with the flowers much crowded, as it were, into a bundle.

219. A Globular is a cyme still more compacted, so as to form a sort of head. It may be known from a true head by the flowers not expanding centrifugally, that is, not from the circumference toward the centre, or from the bottom to the top.

220. The illustrations of determinate or cymose inflorescence have been taken from plants with opposite leaves, which give rise to the most regular cymes. But the Rose, Cinquefoil, Buttercup, and the like, with alternate leaves, furnish equally good examples of this class of flower-clusters.

221. It may be useful to the student to exhibit the principal sorts of inflorescence in one view, in the manner of the following

Analysis of Flower-Clusters.

I. **Indeterminate or Centriccal** (179)

- Simple, and with the
  - Leaves borne on pedicel,
    - Along the sides of a lengthened axis, EACAE, 200,
    - Along a short axis; heavy pedicles lengthened, CURVE, 201
    - Clustered on an extremely short axis, CURV, 205
  - Flowers sessile, without pedicel (206),
    - Along an obtuse axis, SPPX, 207.
    - On a very short axis, with their vatis, the Sparaxis, 208, and Capsis, 210.
- Branching irregularly,
  - With its variety, the

II. **Determinate or Centriccal** (214)

- Open, merely flattened or convex,
  - Contrasted into a bundle, CYBE, 216.
  - Contracted into a sort of head, GLOMERIC, 218.

* 222. The numbers refer to the paragraphs of this Lesson. The various sorts run together by endless gradations in different plants. The botanist merely designates the leading kinds by particular names. Even the two classes of inflorescence are often found combined in the same plant. For instance, in the whole Mint Family,
the flower-clusters are centrifugal, that is, are cymes or fascicles; but they are themselves commonly disposed in spikes or racemes, which are centripetal, or develop in succession from below upwards.

LESSON XII

THE FLOWER: ITS PARTS OR ORGANS.

223. Having considered, in the last Lesson, the arrangement of flowers on the stem or the places from which they arise, we now direct our attention to the flower itself.

224. Nature and Use of the Flower. The object of the flower is the production of seed. The flower consists of all those parts, or organs, which are subservient to this end. Some of these parts are necessary to the production of seed. Others serve merely to protect or support the more essential parts.

FIG. 107. Cyme of the Wistia Hydrangea (with central flowers in the bud).
225. The parts of the flower are therefore of two kinds; namely, first, the protecting organs, or leaves of the flower,—also called the floral envelopes,—and, second, the essential organs. The latter are situated within or a little above the former, and are enclosed by them in the bud.

226. The floral envelopes in a complete flower are double; that is, they consist of two wheels (181), or circles of leaves, one above or within the other. The outer set forms the calyx; this more commonly consists of green or greenish leaves, but not always. The inner set, usually of a delicate texture, and of some other color than green, and in most cases forming the most showy part of the blossom, is the corolla.

227. The floral envelopes, taken together, are sometimes called the perianth. This name is not much used, however, except in cases where they form only one set, at least in appearance, as in the Lily, or where, for some other reason, the limits between the calyx and the corolla are not easily made out.

228. Each leaf or separate piece of the corolla is called a petal; each leaf of the calyx is called a sepul. The sepals and the petals—or, in other words, the leaves of the blossom—serve to protect, support, or nourish the parts within. They do not themselves make a perfect flower.

229. Some plants, however, naturally produce, besides their perfect flowers, others which consist only of calyx and corolla (one or both), that is, of leaves. These, desitute as they are of the essential organs, and incapable of producing seed, are called neutral flowers. We have an example in the flowers round the margin of the cyme of the Hydrangea (Fig. 157), and of the Cranberry-Tree, or Snowball, in their wild state. By long cultivation in gardens the whole cluster has been changed into showy, but useless, neutral flowers, in place and some other cases. What are called double flowers, such as full Roses (Fig. 153), Buttercups, and Camellias, are blossoms which, under the gardener's care, have developed with all their essential organs changed into petals. But such flowers are always in an unnatural or monstrous condition, and are incapable of maturing seed, for want of...

230. The essential organs. These are likewise of two kinds, placed one above or within the other; namely, first, the stamens or fertilizing organs, and, second, the pistils, which are to be fertilized and bear the seeds.
231. Taking them in succession, therefore, beginning from below, or at the outside, we have (Fig. 168, 169). first, the edge or outer circle of leaves, which are individually termed sepals (a); secondly, the corolla or inner circle of delicate leaves, called petals (b); then a set of stamens (c); and in the centre one or more pistils (d).

The end of the flower-stalk, or the short axis, upon which all these parts stand, is called the **Torsion** or **Torsor**.  

232. We use here for illustration the flower of a species of *Solanum* (Solanum teretifolium),—which is a common plant wild in the Middle States, and in gardens almost everywhere,—because, although small, it exhibits all the parts in a perfectly simple and separate state, and so answers for a sort of pattern flower, better than any larger one that is common and well known.

233. A **Stamen** consists of two parts, namely, the **Filament** or stalk (Fig. 170, a), and the **Anther** (b). The latter is the only essential part. It is a case, commonly with two lobes or cells, each opening lengthwise by a slit, at the proper time, and discharging a powder or dust-like substance, usually of a yellow color. This powder is the **Pollen**, or fertilizing matter, to produce which is the sole office of the stamen.

234. A **Pistil** is distinguished into three parts; namely,—beginning from below,—the **Ovary**, the **Style**, and the **Stigma**. The **Ovary** is the hollow case or young pod (Fig. 171, a), containing rudimentary seeds, called **Ovula** (d). Fig. 172, representing a pistil like that of...
Fig. 169, d, but on a larger scale, and with the ovary cut across, shows the ovules as they appear in a transverse section. The style (Fig. 171, b) is the tapering part above, sometimes long and slender, sometimes short, and not rarely altogether wanting, for it is not an essential part like the two others. The stigma (c) is the tip or some other portion of the style (or of the top of the ovary when there is no distinct style), consisting of loose tissue, not covered, like the rest of the plant, by a skin or epidermis. It is upon the stigma that the pollen falls; and the result is, that the ovules contained in the ovary are fertilized, and become seeds, by having an embryo (16) formed in them. To the pistil, therefore, all the other organs of the blossom are in some way or other subservient: the stamens furnish pollen to fertilize its ovules; the calyx and the corolla form coverings which protect the whole.

231. These are all the parts which belong to any flower. But these parts appear under a variety of forms and combinations, some of them greatly disguising their natural appearance. To understand the flower, therefore, under whatever guise it may assume, we must study its plan.
Lesson XIII.

The Plan of the Flower.

235. The flower, like every other part of the plant, is formed upon a plan, which is essentially the same in all blossoms; and the student should early get a clear idea of the plan of the flower. Then the almost endless varieties which different blossoms present will be at once understood whenever they occur, and will be regarded with a higher interest than their most beautiful forms and richest colors are able to inspire.

236. We have already become familiar with the plan of the vegetation;—with the stem, consisting of jointed tissues united, each bearing a leaf or a pair of leaves; with the leaves arranged in symmetrical order, every leaf governed by a simple arithmetical law, which fixes beforehand the precise place it is to occupy on the stem; and we have lately learned (in Lesson 11) how the position of each blossom is determined beforehand by that of the leaves; so that the shape of every flower-cluster in a bouquet is given by the same simple mathematical law which arranges the foliage. Let us now contemplate the flower in a similar way. Having just learned what parts it consists of, let us consider the plan upon which it is made, and endeavor to trace this plan through some of the various forms which blossoms exhibit to our view.

237. In order to give at the outset a correct idea of the blossom, we took, in the last Lesson, for the purpose of explaining its parts, a perfect, complete, regular, and symmetrical flower, and one nearly as simple as such a flower could well be. Such a blossom the botanist regards as

238. A Typical Flower, that is, a pattern flower, because it well exemplifies the plan upon which all flowers are made, and serves as what is called a type, or standard of comparison.

239. Another equally good typical flower (except in a single respect, which will hereafter be mentioned), and one readily to be obtained in the summer, is that of the Flax (Fig. 174). The parts differ in shape from those of the Stonecrop; but the whole plan is evidently just the same in both. Only, while the Stonecrop has ten stamens, or in many flowers eight stamens,—in all cases just twice
as many as there are petals.—the Flax has only five stamens, or just as many as the petals. Such flowers as these are said to be

Perfect, because they are provided with both kinds of essential organs (230), namely, stamens and pistils;

Complete, because they have all the sorts of organs which any flower has, namely, both calyx and corolla, as well as stamens and pistils;

Regular, because all the parts of each set are alike in shape and size; and

Symmetrical, because they have an equal number of parts of each sort, or in each set or circle of organs. That is, there are five sepals, five petals, five stamens, or in the Staminate flower (namely, two sets of five each), and five pistils.

230. On the other hand, many flowers do not present this perfect symmetry and regularity, or this completeness of parts. Accordingly, we may have

231. Imperfect, or Separated Flowers; which are those where the stamens and pistils are in separate blossoms: that is, one sort of flowers has stamens and no pistils, and another has pistils and no stamens, or only imperfect ones. The blossom which has stamens but no pistils is called a staminate or sterile flower (Fig. 176); and the corresponding one with pistils but no stamens is called a pistillate or fertile flower (Fig. 177). The two sorts may grow on distinct plants, from different roots, as they do in the Willow and Poplar, the Hemp, and the Moonseed
when the flowers are said to be **dioecious** (from two Greek words meaning in two households). Or the two may occur on the same plant or the same stem, as in the Oak, Walnut, Nettle, and the Castor-oil Plant (Fig. 178); when the flowers are said to be **monocious** (that is, in one household). A flower may, however, be **perfect**, that is, have both stamens and pistils, and yet be **incomplete**.

242. **Incomplete Flowers** are those in which one or both sorts of the floral envelopes, or leaves of the blossom, are wanting. Sometimes only one sort is wanting, as in the Castor-oil Plant (Fig. 178) and in the Arrow-

one (Fig. 179). In this case the missing sort is always supposed to be the inner, that is, the corolla; and accordingly such flowers are said to be **epipetalous** (meaning without petals). Occasionally both the corolla and the calyx are wanting; when the flower has no proper coverings or floral envelopes at all. It is then said to be **naked**, as in the Lizard's-tail (Fig. 180), and in the Willow.

243. Our two pattern flowers (Fig. 168, 174) are regular and symmetrical (239). We commonly expect this to be the case in living things.

The corresponding parts of plants, like the limbs or members of animals, are generally alike, and the whole arrangement is symmetrical. This symmetry pervades the blossom, especially. But the student may often fail to perceive

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**Fig. 178.** Monocious flowers, i.e. one staminate (s) and one pistillate (p) flowers, of the Castor-oil Plant, growing on the same stem.

**Fig. 179.** Aplanous (incomplete) flower of **Anemone Pennsylvania**.

**Fig. 180.** A naked (but perfect) flower of the Lizard's-tail.
it, at first view, at least in cases where the plan is more or less obscure by the leaving out (obliteration) of one or more of the members of the same set, or by some inequality in their size and shape. The latter circumstance gives rise to

244. Irregular Flowers. This name is given to blossoms in which the different members of the same sort, as, for example, the petals or the stamens, are unlike in size or in form. We have familiar cases of the sort in the Larkspur (Fig. 183, 184), and Monkshood (Fig. 185, 186); also in the Violet (Fig. 181, 182). In the latter it is the corolla principally which is irregular, one of the petals being larger than the rest, and extended at the base into a hollow protuberance or spur. In the Larkspur (Fig. 183), both the calyx and the corolla partake of the irregularity. This and the Monkshood are likewise good examples of

245. Unsymmetrical Flowers. We call them unsymmetrical, when the different sets of organs do not agree in the number of their parts. The irregular calyx of Larkspur (Fig. 183, 184) consists of five sepals, one of which, larger than the rest, is prolonged behind into a large spur; but the corolla is made of only four petals (of two shapes);

FIG. 181. Flower of a Violet. 185. Its calyx and corolla displayed; the five smaller pieces are the sepals; the five intervening larger ones are the petals.

FIG. 183. Flower of a Larkspur. 184. Its calyx and corolla displayed; the five larger pieces are the sepals; the four smaller, the petals.
the fifth, needed to complete the symmetry, being left out. And
the Monkshood (Fig. 188, 186) has five very dissimilar sepals,
and a corolla of only two, very small, variously-shaped petals; the three needed
were made by the symmetry being left out. For a flower which is unsymmet-
rical but regular, we may take the common Pardaline, which has a calyx of
only two sepals, but a corolla of five petals, from seven to twelve stamens,
and about six styles. The Mustard,
and all flowers of that family, are uni-
symmetrical as to the stamens, these
being six in number (Fig. 188, while
the leaves of the blossom (sepals and petals) are each only four
(Fig. 187). Here the
stamens are irregular, two of them being shorter
than the other four.

246. Numerical Plan of
the Flower. Although not
easy to make out in all
cases, yet generally it is
plain to see that each
blossom is based upon a particular number, which
runs through all or most of its parts. And a prin-
cipal thing which a botanist notices when examin-
ing a flower is its numerical plan. It is upon this
that the symmetry of the blossom depends. Our two
pattern flowers, the Stonecrop (Fig. 186) and the
Flax (Fig. 174), are based upon the number five,
which is exhibited in all their parts. Some flowers of this same
Stonecrop have their parts in fours, and then that number runs
throughout; namely, there are four sepals, four petals, eight stamens
(two sets), and four pistils. The Mustard (Fig. 187, 188), Radish,
... also have their flowers constructed on the plan of four as to the calyx and corolla, but this number is interfered with in the stamens, either by the leaving out of two stamens (which would complete two sets), or in some other way. Next to five, the most common number in flowers is four. On this number the flowers of Lily, Crocus, Iris, Spiderwort, and Trillium (Fig. 189) are constructed. In the Lily and Crocus the leaves of the flower at first view appear to be six in one set; but the bud or just-opening blossom plainly shows these to consist of an outer and an inner circle, each of three parts, namely, of calyx and corolla, both of the same bright color and delicate texture. In the Spiderwort and Trillium (Fig. 189) the three outer leaves, or sepals, are green, and different in texture from the three inner, or the petals; the stamens are six (namely, two sets of three each), and the pistils three, though partly grown together into one mass.

247. Alternation of Parts. The symmetry of the flower is likewise shown in the arrangement or relative position of successive parts. The rule is, that the parts of successive circles alternate with one another. Thus, the petals stand over the intervals between the sepals; the stamens, when of the same number, stand over the intervals between the petals; or when twice as many, as in the Trillium, the outer set alternates with the petals, and the inner set, alternating with the other, of course stand between the petals; and the pistils alternate with these. This is shown in Fig. 188, and in the diagram, or cross-section of the same in the bud, Fig. 190.

And Fig. 191 is a similar diagram or ground-plan (in the form of a

Fig. 190. Flower of Trillium erectum, or Birthroot, spread out a little, and viewed from above.

FIG. 190. Diagram or ground-plan of the same, as it would appear in a cross-section of the bud, the parts all in the same relative position.

Fig. 191. Diagram, or ground-plan, of the Flux flower, Fig. 274.
section made across the bud) of the Flax blossom, the example of a pattern symmetrical flower taken at the beginning of this Lesson, with its parts all in fives.

248. Knowing in this way just the position which each organ should occupy in the flower, it is readily understood that flowers often become unsymmetrical through the loss of some parts, which belong to the plan, but are obliterated or left out in the execution. For example, in the Larkspur (Fig. 183, 184), as there are five sepals, there should be five petals likewise. We find only four; but the vacant place where the fifth belongs is plainly recognized at the lower side of the flower. Also the similar plan of the Monkshood (Fig. 185) equally calls for five petals; but three of them are entirely obliterated, and the two that remain are reduced to slender bodies, which look as unlike ordinary petals as can well be imagined. Yet their position, answering to the intervals between the upper sepals and the side ones, reveals their true nature. All this may perhaps be more plainly shown by corresponding diagrams of the calyx and corolla of the Larkspur and Monkshood (Fig. 192, 193), in which the places of the missing petals are indicated by faint dotted lines. The obliteration of stamens is a still more common case. For example, the Snapdragon, Foxglove, Geranium, and almost all flowers of the large Figwort family they belong to, have the parts of the calyx and corolla five each, but only four stamens (Fig. 191); the place on the upper side of the flower where the fifth stamen belongs is vacant. That there is in such cases a real obliteration of the missing part is shown by the

249. Aberrant Organs, or vestiges, which are sometimes met with; — bodies which stand in the place of an organ, and represent it, although wholly incapable of fulfilling its office. Thus, in the Figwort family, the fifth stamen, which is altogether missing in Geranium (Fig. 194) and most others, appears in the Figwort as a little scale, and in Penetemon (Fig. 195) and Turtlehead as a sort of filament without any anther; — a thing of no use whatever to the plant, but

FIG. 190. Diagram of the calyx and corolla of a Larkspur. 189. Similar diagram of Monkshood. The dotted lines show where the petals are wanting; one in the former, three
very interesting to the botanist, since it completes the symmetry of the blossom. And to show that this really is the last stamen, it now and then bears an anther, or the rudiment of one. So the flower of Catalpa should likewise have five stamens; but we seldom find more than two good ones. Still we may generally discern the three others, as vestiges of half-abolished stamens (Fig. 196). In separated flowers the rudiments of pistils are often found in the sterile blossom, and rudimentary stamens in the fertile blossom, as in Moss-seed (Fig. 197).

258. Multiplication of Parts. Quite in the opposite way, the simple plan of the flower is often more or less obscured by an increase in the number of parts. In the White Water-Lily, and in many Camas-flowers (Fig. 197), all the parts are very numerous, so that it is hard to say upon what number the blossom is constructed. But more commonly some of the sets are few and definite in the number of their parts. The Buttercup, for instance, has five sepals and five petals, but many stamens and pistils; so it is built upon the plan of five. The flowers of Magnolia have indefinitely numerous stamens and pistils, and rather numerous floral envelopes; but these latter are plainly distinguishable into sets of three; namely, there are three sepals, and six petals in two circles, or nine in three circles, showing that these blossoms are constructed on the number three.

FIG. 194. Corolla of a purple Geranium laid open, showing the four stamens; the cross shown where the fifth stamen would be, if present.
FIG. 195. Corolla, laid open, and stamens of Pentstemon pseudocultus of Iowa, &c., with a sterile stamen in the place of the fifth stamen, and represented by a sterile vestige of stamens.
FIG. 196. Corolla of Catalpa laid open, displaying two good stamens and two abortive vestiges of stamens.
LESSON XIV.

MORPHOLOGY OF THE FLOWER.

251. In all the plant till we come to the blossom we found nothing but root, stem, and leaves (23, 118). However various or strange their shapes, and whenever their use, everything belongs to one of these three organs, and everything above ground (excepting the rare case of aerial roots) is either stem or leaf. We discern the plant equally in the stalk of a herb, the trunk and branches of a tree, the trailing or twining Vine, the straw of Wheat or other Grasses, the columnar trunk of Palms (Fig. 47), in the flattened joints of the Prickly-Pear Cactus, and the rounded body of the Melon Cactus (Fig. 76). Also in the slender runners of the Strawberry, the tendrils of the Grape-vine and Virginia Creeper, the creeping subterranean shoots of the Mint and Couch-grass, the tubers of the Potato and Artichoke, the solid bulbs of the Cactus, and the solid part or base of scaly bulblets as is fully shown in Lesson 6. And in Lesson 7 and elsewhere we have learned to recognize the leaf alike in the thick seed-leaves of the Almond, Benn, Horsechestnut, and the Eke (Fig. 9-24), in the scales of buds (Fig. 77), and the thickened
scales of half (Fig. 73—75), in the spines of the Barberry and the
vendrils of the Pen, in the fleshy rosettes of the Houseleek, the
strange fly-crap of Drosera (Fig. 81), and the various pitcher
of Sarracenia (Fig. 79).

292. Now the student who understands these varied forms or
metamorphoses of the stem and leaf, and knows how to detect the
real nature of any part of the plant under any of its disguises,
may readily trace the leaf into the blossom also, and perceive that,
as to their morphology.

293. Flowers are altered Branches, and their parts, therefore, altered
leaves. That is, certain buds, which might have grown and length-
ened into a leafy branch, do, under other circumstances and to ac-
complish other purposes, develop into blossoms. In these the axis
remains short, nearly as it is in the bud; the leaves therefore remain
close together in sets or circles; the outer sets, those of the calyx,
generally partake more or less of the character of foliage; the next
set are more delicate, and form the corolla, while the rest, the stam-
nons and pistils, appear under forms very different from those of
ordinary leaves, and are concerned in the production of seed. This
is the way the scientific botanist views a flower; and this view gives
Botany an interest which one who merely notices the shape and
counts the parts of blossoms, without understanding their plan, has
no conception of.

294. That flowers answer to branches may be shown first from
their position. As explained in the Lesson on Inflorescence, flowers
arise from the same places as branches, and from no other; flower-
buds, like leaf-buds, appear either on the summit of a stem, that is,
as a terminal bud, or in the axil of a leaf, as an axillary bud (106).
And at an early stage it is often impossible to foretell whether the
bud is to give rise to a blossom or to a branch.

295. That the sepals and petals are of the nature of leaves is
evident from their appearance; persons who are not botanists com-
monly call them the leaves of the flower. The calyx is most gen-
ernally green in color, and foliaceous (leaf-like) in texture. And
though the corolla is rarely green, yet neither are proper leaves
always green. In our wild Painted-Cup, and in some scarlet Sages,
common in gardens, the leaves just under the flowers are of the
brightest red or scarlet, often much brighter-colored than the corolla
itself. And sometimes (as in many Cactiues, and in Carolina All-
spice) there is such a regular gradation from the last leaves of the

LESSON 14. ARRANGEMENT OF LEAVES IN THE BUD. 97
together takes place in two ways: either parts of the same kind, or parts of different kinds, may be united. The first we may call simply the union, the second the consolidation, of parts.

252. Union or Cohesion with one another of parts of the same sort. We very commonly find that the calyx or the corolla is a cup or tube, instead of a set of leaves. Take, for example, the flower of the Stramonium or Thorn-Apple, where both the calyx and the corolla are so (Fig. 199); likewise the common Morning-Glory, and the figures 204 to 206, where the leaves of the corolla are united into one piece, but those of the calyx are separate. Now there are numerous cases of real leaves growing together much in the same way, — those of the common Thoroughwort and the upper pairs in Woodlilies or Honey-wort, for example (Fig. 192); so that we might expect it to occur in the leaves of the blossom also. And that this is the right view to take of it plainly appears from the transitions everywhere met with in different plants, between a calyx or a corolla of separate pieces and one forming a perfect tube or cup. Figures 209 to 203 show one complete set of such gradations in the corolla, and Fig. 204 to 206 another, in short and open corollas. How many leaves or petals each corolla is formed of may be seen by the number of points or tips, or of the notches (called sinuses) which answer to the intervals between them.

253. When the parts are united in this way, whether much or little, the corolla is said to be monocarpalous, and the calyx monocarpalous. These terms mean "of one petal," or "of one sepal"; that is, of one piece. Wherefore, taking the corolla or the calyx as a whole, we say that it is parted when the parts are separate almost to the base, as in Fig. 204; cleft or lobed when the notches do not extend below the middle or thereabouts, as in Fig. 205;
LESSON 15.

UNION OF PARTS.

Toothed or dentate, when only the tips are separate as short points.

Entire, when the border is even, without points or notches, as in the

common Morning-Glory, and very nearly so in Fig. 205; and so on:—the terms being just the same as those applied to leaves and all other flat bodies, and illustrated in Lessons 8 and 9.

264. There is a set of terms applied particularly to calyces, corollas, or other such bodies of one piece, to express their general shape, which we see in very various. The following are some of the principal:

Wheel-shaped, or rotate: when spreading out at once, without a tube or with a very short one, something in the shape of a wheel or of its diverging spokes, as in the corolla of the Potato and Bitter-

sweet (Fig. 204, 205).

Sulph-shaped, or sulpher-form: when a flat-spread border is raised on a narrow tube, from which it diverges at right angles,

like the sulph represented in old pictures, with a slender handle beneath. The corolla of the Pheas (Fig. 208) and of the Cypress-

Vine (Fig. 202) are of this sort.

FIG. 200. Corolla of Pheas (the same as Pheas, &c.), of 3-angled, long-tubed petals.

FIG. 201. Flower of Azalea or Rhododendron corymbosus: the petals spreading in the curve of the petals of the last figure here all united into a tube.

FIG. 202. Flower of the Cypr. Vine, the petals a little further united into a five-leaved spreading border.

FIG. 203. Flower of the small white Morning-Glory, the five petals in a group of perfectly united into a triangle-shaped tube, with the spreading border nearly even (perpend.)

FIG. 204. Wheel-shaped and five-parted corolla of Bitter-sweet (Solanum Dulcamara).

FIG. 205. Wheel-shaped and five-chiff corolla of the common Potato.

FIG. 206. Almost entire and very open bell-shaped corolla of a Grand Cherry (Prunus).
Bell-shaped, or campanulate: where a short and broad tube widens upward, in the shape of a bell, as in Fig. 217.

Funnel-shaped, or funniform: gradually spreading at the summit of a tube which is narrow below, in the shape of a funnel or tunnel, as in the corolla of the common Morning-Glory, and of the Symonion (Fig. 199).

Tubular: when prolonged into a tube, without much spreading at the border, as in the corolla of the Trumpet Honeysuckle, the calyx of Symonion (Fig. 199). &c.

265. In most of these cases we may distinguish two parts; namely, the tube, or the portion all in one piece and with its sides upright or nearly so; and the border or limb, the spreading portion or summit. The limb may be entire, as in Fig. 203, but it is more commonly divided, as in Fig. 202, or parted down nearly to the top of the tube, as in Fig. 208. &c.

266. So, likewise, a separate petal is sometimes distinguishable into two parts; namely, into a narrowed base or stalk-like part (as in Fig. 209, where this part is peculiarly long), called the claw, and a spreading and enlarged summit, or body of the petal, called the lamina or blade.

267. When parts of the same set are not united (as in the Flax, Cherry, &c., Fig. 212–215), we call them distinct. Thus the sepals or the petals are distinct when not at all united with each other. As a calyx with sepals united into one body is called monosepalous (266, that is, one-sepalled), or sometimes monopetalous, that is, one-leaved; so, on the other hand, when the sepals are distinct, it is said to be monosepalous, or monopetalous.
Lesson 15. Consolidation of Parts.

284. Polygamous, that is, composed of several or many sepals. And a corolla with distinct petals is said to be polygamous.

285. Consolidation, the growing together of the parts of two or more different sets. In the most natural or pattern flower (as explained in Lessons 13 and 14), the several parts rise from the receptacle or axis in succession, like leaves upon a very short stem; the petals just above or within the sepals, the stamens just above or within these, and then the pistils near the summit or centre. Now when contiguous parts of different sorts, one within the other, unite at their base or origin, it obscures more or less the plan of the flower; by consolidating organs which in the pattern flower are entirely separate.

286. The nature of this consolidation will be at once understood on comparing the following series of illustrations. Fig. 212 represents a flower of the common Flax, cut through lengthwise, so as to show the attachment (or what the botanist calls the inseritus) of all the parts. Here they are all inserted on, that is, grow out of, the receptacle or axis of the blossom. In other words, there is no union at all of the parts of contiguous circles. So the parts are said to be free.

And the sepals, petals, and stamens, all springing of course from beneath the pistils, which are on the very summit of the axis, are said to be hypogynous (a term composed of two Greek words, meaning "under the pistil").

Fig. 212. A Flax-flower, cut through lengthwise.
Fig. 213. Flower of a Cabbage, divided in the same way.
Fig. 214. Flower of the common Pansy, divided lengthwise.
270. Fig. 213 is a flower of a Cherry, cut through lengthwise in the same way. Here the petals and the stamens grow out of, that is, are inserted on, the calyx; in other words they cohere or are consolidated with the base of the calyx up to a certain height. In such cases they are said to be perigynous (from two Greek words, meaning around the pistil). The consolidation in the Cherry is confined to the calyx, corolla, and stamens; the calyx is still free from the pistil. One step more we have in

271. Fig. 214, which is a similar section of a flower of a Purslane. Here the lower part of the calyx (carrying with it of course the petals and stamens) is coherent with the surface of the whole lower half of the ovary. Therefore the calyx, seeming to rise from the middle of the ovary, is said to be half superior, instead of being superior, as it is when entirely free. It is better to say, however, calyx half-coherent to the ovary.

Every gradation occurs between such a case and that of a calyx altogether free or inferior, as we see in different Purslanes and Saxifrages. The consolidation goes farther,

272. In the Apple, Quince, Hawthorn (Fig. 215), &c. Here the tube of the calyx is consolidated with the whole surface of the ovary; and its limb, or free part, therefore appears to spring from its top, instead of underneath it, as it naturally should. So the calyx is said to be superior, or (more properly) adherent to, or coherent with, the ovary. In most cases (and very strikingly in the Evening Primrose), the tube of the calyx is continued on more or less beyond the ovary, and has the petals and stamens consolidated with it for some distance; these last, therefore, being borne on the calyx, are said to be perigynous, as before (270).
273. But if the tube of the calyx ends immediately at the summit of the ovary, and its lobes as well as the corolla and stamens are as if it were inserted directly on the ovary, they are said to be epigynous (meaning on the pistil), as in Cornel, the Hackleberry, and the Cranberry (Fig. 216).

274. Irregularity of parts in the calyx and corolla has already been noticed (214) as sometimes obstructing one's view of the real plan of a flower. There is infinite variety in this respect; but what has already been said will enable the student to understand these irregularities when they occur. We have only room to mention one or two cases which have given rise to particular names. A very common kind, among polypetalous (267) flowers, is

275. The *Papilionaceous* flower of the Pea, Bean, and nearly all that family. In this we have an irregular corolla of a peculiar shape, which Linnæus likened to a butterfly (whereas the term, *papilio* being the Latin name for a butterfly); but the resemblance is not very obvious. The five petals of a papilionaceous corolla (Fig. 217) have received different names taken from widely different objects. The upper and larger petal (Fig. 218, s), which is generally wrapped round all the rest in the bud, is called the standard or banner. The two side petals (w) are called the wings. And the two anterior ones (l), the blades of which commonly stick together a little, and which enclose the stamens and pistil in the flower, from their forming a body-shaped somewhat like the keel, or rather the prow, of an ancient boat, are together named the keel or Carina.

276. The *Labiate* or bilabiata (that is, two-lipped) flower is a very common form of the monopetalous corolla, as in the *Scrophularia*.
(Fig. 210). Toad-Flax (Fig. 211), Dead-Nettle (Fig. 209), Catnip, Horsemint, &c.; and in the Sage, the Catalpa, &c., the calyx also is two-lipped. This is owing to unequal union of the different parts of the same sort, as well as to diversity of shape. In the corolla two of the petals grow together higher than the rest, sometimes to the very top, and form the upper lip, and the three remaining ones join on the other side of the flower to form the lower lip, which therefore is more or less three-lobed, while the upper lip is at most only two-lobed. And if the calyx is also two-lipped, as in the Sage,— since the parts of the calyx always alternate with those of the corolla (247),—then the upper lip has three lobes or teeth, namely, is composed of three sepals united, while the lower has only two; which is the reverse of the arrangement in the corolla. So that all these flowers are really constructed on the plan of five, and not on that of two, as one would at first be apt to suppose. In Gerania, &c. (Fig. 194, 195), the number five is evident in the calyx and corolla, but is more or less obscured in the stamens (249). In Catalpa this number is masked in the calyx by irregular union, and in the stamens by abortion. A different kind of irregular flower is seen in

![Diagram](image)

277. The Ligulate or strap-shaped corolla of most compound flowers. What was called the compound flower of a Dandelion, Scorzey (Fig. 221), Thistle, Sunflower, Aster, Whiteweed, &c., consists of many distinct blossoms, closely crowded together into a head, and surrounded by an involucre (238). People who are not botanists commonly take the whole for one flower, the involucre for a calyx, and corollas of the outer or of all the flowers as petals. And this is a very natural mistake when the flowers around the edge have flat and open or strap-shaped corollas, while the rest are regular and tubular, but small, as in the Whiteweed, Sunflower, &c. Fig. 219 represents such a case in a Coreopsis, with the head, or so-called compound flower, cut through; and in Fig. 229 we see one of the perfect flowers of the centre or disk, with a regular tubular corolla (a), and with the slender bract (b) from whose...
axil it grew; and also one belonging to the margin, or ray, with a strap-shaped corolla (c), borne in the axil of a leaf or bract of

the involucre (d). Here the ray-flower consists merely of a strap-shaped corolla, raised on the small rudiment of an ovary; it is therefore a neutral flower, like those of the ray or margin of the cluster in Hydrangea (229, Fig. 167), only of a different shape.

More commonly the flowers with a strap-shaped corolla are pistillate, that is, have a pistil only, and produce seed like the others, as in Whiteweed. But in the Dandelion, Sow-cress (Fig. 221, 222),

and all of that tribe, those flowers are perfect, that is, bear both stamens and pistils. And moreover all the flowers of the head are strap-shaped and alike.

Puzzling as these strap-shaped corollas appear at first view, an attentive inspection will generally reveal the plan upon which they are constructed. We can make out pretty plainly, that each one consists of five petals (the tips of which commonly appear as five teeth at the extremity), united by their contiguous edges, except on

FIG. 220. A slice of Fig. 219, more enlarged, with one similar perfect flower (a) and its and stem of one (b) and base of another; in in its base of another; in

FIG. 221. Head of flowers of Sow-cress, cut through lengthwise and enlarged.
one side, and spread out flat. To prove that this is the case, we have only to compare such a corolla (that of Coreopsis, Fig. 220, c, or one from the Succory, for instance) with that of the Cardinal-flower, or of any other Lobelia, which is equally split down along one side; and this again with the less irregular corolla of the Woodbine, partially split down on one side.

LESSON XVI.

**1270.** _Illustration_, or _Performation_, relates to the way in which the leaves of the flower, or the lobes of the calyx or corolla, are placed with respect to each other in the bud. This is of some importance in distinguishing different families or tribes of plants, being generally very uniform in each. The _Illustration_ is best seen

**FIG. 221.** Compound flowers, i. e. heads of flowers, of Succory.
by making a horizontal slice of the flower-bud when just ready to open; and it may be expressed in diagrams, as in Fig. 223, 224.

280. The pieces of the calyx or the corolla either overlap each other in the bud, or they do not. When they do not, the revolute is commonly

Revolute, as it is called when the pieces meet each other by their abrupt edges without any inrolling or overlapping; as the calyx of the Linden or Basswood (Fig. 221) and the Mallow, and the corolla of the Grape, Virginia Creeper, &c. Or it may be

Induplicate, which is revolute with the margins of each piece projecting inwards, or involute (like the leaf in Fig. 152) as in the calyx of Virgin's-Bower and the corolla of the Poinas, or else

Reduplicate, like the bud, but the margins projecting outwards instead of inwards; these last being mere variations of the revolute form.

281. When the pieces overlap in the bud, it is in one of two ways: either every piece has one edge in and one edge out; or some pieces are wholly outside and others wholly inside.

In the first case the revolute is

Concave or twisted, as in the corolla of Geranium (most commonly, Fig. 224), Flax (Fig. 191), and of the Mallow Family.

Here one edge of every petal covers the next before it, while its other edge is covered by the next behind it. In the second case it is

Incurved or incursive, or breaking joints, like shingles on a roof, as in the calyx of Geranium (Fig. 224) and of Flax (Fig. 191), and the corolla of the Linden (Fig. 223). In these cases the parts are five in number; and the regular way then is (as in the calyx of the figures above cited) to have two pieces entirely external (1 and 2), one (3) with one edge covered by the first, while the other edge covers that of the adjacent one on the other side, and two (4 and 5) wholly within, their margins at least being covered by the rest. That is, they just represent a circle of five leaves spirally arranged on the five-ranked or 5 plan (187, 188, and, Fig. 143–145), only with the stem shortened so as to bring the parts close together. The spiral arrangement of the parts of

FIG. 222. Section across the flower-bud of Linden.

FIG. 223. Section across the flower-bud of Geranium: the sepals marked in their order.
the blossom is the same as that of the foliage,—an additional evidence that the flower is a sort of branch. The petals of the Linden, with only one outside and one inside, as shown in Fig. 223, exhibit a gradation between the imbricated and the convolute modes. When the parts are four in number, generally two opposite ones overlap the other two by both edges. When three in number, then one is outermost, the next has one edge out and the other covered, and the third is within, being covered by the other two; as in Fig. 190. This is just the three-ranked (3) spiral arrangement of leaves (186, and Fig. 171).

282. In the Mignonette, and some other flowers, the division is open; that is, the calyx and corolla are not closed at all over the other parts of the flower, even in the young bud.

283. When the calyx or the corolla is tubular, the shape of the tube in the bud has sometimes to be considered, as well as the way the lobes are arranged. For example, it may be

Plaited or plicate, that is, folded lengthwise; and the plait may either be turned outwards, forming projecting edges, as in the corolla of Campanula; or turned inwards, as in the corolla of the Galiun, &c. When the plaits are wrapped round all in one direction, so as to cover one another in a convolute manner, the division is said to be

Superconvolute, as in the corolla of Strumenium (Fig. 225) and the Morning-Glory; and in the Morning-Glory it is twisted besides.

FIG. 225. Upper part of the corolla of a Strumenium (Datura innoxia), in the bud. Underneath is a cross-section of the same.
LESSON XVII.

MORPHOLOGY OF THE STAMENS

284. The stamens exhibit nearly the same kinds of variation in different species that the calyx and corolla do. They may be distinct (that is, separate from each other, 267) or united. They may be free (269), or else coherent with other parts: this concerns

285. Their insertion, or place of attachment, which is most commonly the same as that of the corolla. So, stamens are

Hypogynous (269), when they are borne on the receptacle, or axis of the flower, under the pistil, as they naturally should be, and as is shown in Fig. 212.

Perigynous, when borne on (that is coherent below with) the calyx; as in the Cherry, Fig. 213.

Epigynous, when borne on the ovary, apparently, as in Fig. 216. To these we may add

Gynandrous (from two Greek words, answering to ”stamens and pistil united”), when the stamens are consolidated with the style, so as to be borne by it, as in the Lady's Slipper (Fig. 226) and all the Orchid Family. Also

Epipetalous (meaning on the petals), when they are borne by the corolla; as in Fig. 194, and in most monocotyledons blossoms. As to

286. Their union with each other, the stamens may be united by their filaments or by their anthers. In the former case they are

Monadelphous (from two Greek words, meaning ”in one brotherhood”), when united by their filaments into one set, usually into a ring or cup below, or into a tube, as in the Mallow Family, the Passion-flower, and the Lupine (Fig. 226).

Diadelphous (in two brotherhoods), when so united in two sets, as in the Pea and almost all papilionaceous flowers (275); here the stamens are nine in one set, and one in the other (Fig. 227).

FIG. 226. Style of a Lady's Slipper (Cypripedium), and stamens united with it; a, a, the anthers of the two great stamens; b, an abortive stamen, what should be its anther changed into a petal-like body; d, d, the stigmas.
295. To discharge the pollen, the anther opens (or is dehiscence) at maturity, commonly by a line along the whole length of each cell, and which answers to the margin of the leaf (as in Fig. 231); but when the anthers are extrose, this line is often on the outer face, and when introse, on the inner face of each cell. Sometimes the anther opens only by a chink, hole, or pore at the top, as in the Azalea, Pyrola or False Wintergreen (Fig. 233), &c.; and sometimes a part of the face separates as a sort of trap-door (or valve), hinged at the top, and opening to allow the escape of the pollen, as in the Sassafras, Spice-bush, and Barberry (Fig. 230).

Most anthers are really four-celled when young; a slender partition running lengthwise through each cell and dividing it into two compartments, one answering to the upper, and the other to the lower, layer of the green pulp of the leaf. Occasionally the anther becomes one-celled. This takes place mostly by confluence, that is, the two cells running together into one, as they do slightly in Penstemon (Fig. 237) and thoroughly in the Mallow Family (Fig. 238). But sometimes it occurs by the obliteration or disappearance of one half of the anther, as in the Globe Amaranth of the garden (Fig. 239).

296. The way in which a stamen is supposed to be constructed out of a leaf, or rather on the plan of a leaf, is shown in Fig. 240, an ideal figure, the lower part representing a stamen with the top of its anther cut away; the upper, the corresponding upper part of a leaf.—The use of the anther is to produce

297. Pollen. This is the powder, or fine dust, commonly of a yellow color, which fills the cells of the anther, and is discharged during blossoming, after which the stamen generally fall off or wither away.
Under the microscope it is found to consist of grains, usually round or oval, and all alike in the same species, but very different in different plants. So that the plant may sometimes be recognized from the pollen alone.

208. A grain of pollen is made up of two coats; the outer coat thickish, but weak, and frequently adorned with lines or bands, or studded with points; the inner coat is extremely thin and delicate, but extensible, and its cavity is filled with a thickish fluid, often rendered turbid by an immense number of minute grains that float in it. When wet, the grains absorb the water and swell so much that many kinds soon burst and discharge their contents.

209. Figures 241–250 represent some common sorts of pollen, magnified one or two hundred diameters, viz.:—A pollen-grain of the Musk Plant, spirally grooved. One of Sicyos, or One-seeded Cucumber, beset with bristly points and marked by smooth bands. One of the Wild Bahamas-Apple (Rhinocystis), grooved lengthwise. One of Hibiscus or Rose-Mallow, studded with prickly points. One of Scutellaria, many-sided, and dotted with fine points. A grain of the curious compound pollen of Pine. One from the Lily, smooth and oval. One from Enchanter’s Nightshade, with three small lobes on the angles. Pollen of Kalmia, composed of four grains united, as in all the Heath family. A grain from an Evening Primrose, with a central body and three large lobes. The figures number from left to right, beginning at the top.
cavity of the ovary, and bears the ovules, is called the Placenta. Obviously a simple pistil can have but one placenta; but this is in its nature double, one half answering to each margin of the leaf. And if the ovules or seeds are at all numerous, they will be found to occupy two rows, one for each margin, as we see in Fig. 252, 172, in the Marsh-Marigold, in a Pea-pod, and the like.

309. A simple pistil obviously can have but one cavity or cell; except from some condition out of the natural order of things. But the converse does not hold true: all pistils of a single cell are not simple. Many compound pistils are one-celled.

310. A simple pistil necessarily has but one style. Its stigma, however, may be double, like the placenta, and for the same reason (205); and it often exhibits two lines or crests, as in Fig. 252, or it may even be split into two lobes.

311. The Compound Pistil consists of two, three, or any greater number of pistil-leaves, or carpels (305), in a circle, united into one body, at least by their ovaries. The Cultivated Flax, for example (Fig. 212), has a compound pistil composed of five simple ones with their ovaries united, while the five styles are separate. But in one of our wild species of Flax, the styles are united into one also, for about half their length. So the Common St. John's-wort of the fields has a compound ovary, of three united carpels, but the three styles are separate (Fig. 255), while some of our wild, shabby species have the styles also combined into one (Fig. 256), although in the fruit they often split into three again. Even the ovaries may only partially combine with each other, as we see in different species of Saxifrages, some having their two pistils nearly separate, while in others they...
are joined at the base only, or else below the middle (as in Fig. 254), and in some they are united quite to the top.

312. Even when the styles are all consolidated into one, the stigmas are often separate, or enough so to show by the number of their lobes how many simple pistils are combined to make the compound one. In the common Lily, for instance, the three lobes of the stigma, as well as the three grooves down the ovary, plainly tell us that the pistil is made of three combined. But in the Day-Lily the three lobes of the stigma are barely discernible by the naked eye, and in the Spiderwort (Fig. 257) they are as perfectly united into one as the ovaries and styles are. Here the number of cells in the ovary shows that the pistil is compound. These are all cases of

313. **Compound Pistils with two or more Units**, namely, with as many cells as there are simple pistils, or carpels, that have united to compose the organ. They are just what would be formed if the simple pistil (two, three, or five in a circle, as the case may be), like those of a Fawny or Stonecrop, all pressed together in the centre of the flower, were to cohere by their contiguous parts.

314. As each simple ovary has its placentae, or seed-bearing line (308), at the inner angle, so the resulting compound ovary has as many axile placentae (that is, as many placentae in the axis or centre) as there are pistil-leaves in its composition, but all more or less consolidated into one. This is shown in the cross-sections, Fig. 254 - 256, &c.

315. The partitions (or Dissepiments, as they are technically named) of a compound ovary are accordingly part of the walls or the sides of the carpels which compose it. Of course they are double, one layer belonging to each carpel; and in ripe pods they often split into the two layers.

316. We have described only one, though the commonest, kind of compound pistil. There are besides

317. **One-celled Compound Pistils**. These are of two sorts, those with axile, and those with parietal placentae. That is, first, where the ovules or seeds are borne in the axis or centre of the ovary, and, secondly, where they are borne on its walls. The first of these cases, or that
218. With a Free Central Placentation, is what we find in Purslane (Fig. 214), and in most Chickweeds (Fig. 256, 259) and Pink. The difference between this and the preceding case is only that the deline partitions have very early vanished; and traces of them may often be detected. Or sometimes this is a variation of the mode:

219. With Parietal Placentation, namely, with the ovaries and seeds borne on the sides or wall (parietes) of the ovary. The placent of the Prickly Poppy, Bloodroot, Violet, Frostcock (Fig. 261), Gooseberry, and of many Hyperbromos, are of this sort. To understand it perfectly, we have only to imagine two, three, or any number of carpel-leaves (like that of Fig. 251), arranged in a circle, to unite by their contiguous edges, and so form one ovary or pod (as we have endeavored to show in Fig. 289); very much as in the Strenuum (Fig. 190) the five petals unite by their edges to compose a monopetalous corolla, and the five squamae to form a tubular calyx. Here each carpel is an open leaf, or partly open, bearing ovaries along its margins; and each placenta consists of the contiguous margins of two posterior-leaves grown together.

220. All degrees occur between this and the several-celled ovary with the placenta in the axis. Compare, for illustration, the common St. John’s-wort, Fig. 235 and 252, with Fig. 262, a cross-section of the ovary of a different species, in which the three large placenta meet in the axis, but scarcely more, and with Fig. 263, a similar section of the ripe pod of the same plant, showing three parietal placenta borne on inspecting partitions projecting a little way into the general cell. Fig. 261 is the same in plan, but with hardly any trace of partitions; that is, the united edges of the leaves only slightly project into the cell.

**FIG. 251.** Portion of a Frostcock, with the ovary divided longitudinally; and 252, the same divided transversely, to show the five central placenta.

**FIG. 252.** Portion of a so-called ovary of three carpel-leaves, with parietal placenta, cut across breadth, where it is complete; the upper part showing the top of the inner leaves it is composed of, approaching, but not united.

**FIG. 253.** Cross-section of the ovary of Frostcock (Hyperbromus), with three parietal placenta, bearing ovaries.
321. The ovary, especially when compound, is often covered by
and united with the tube of the calyx, as has already been explained
(270). We describe this by saying either "ovary adherent," or "calyx adherent," &c. Or we say "ovary inferior," when the tube of
the calyx is adherent throughout to the surface of the ovary, so that its
lobes, and all the rest of the flower, appear to be borne on its summit, as
in Fig. 210 and Fig. 216; or "half inferior," as in the Parthenium (Fig. 214),
where the calyx is adherent part way up; or "superior," where the
calyx and the ovary are not combined, as in the Cherry (Fig. 215)
and the like, that is, where these parts are free. The term "ovary
superior," therefore, means just the same as "calyx inferior"; and
"ovary inferior," the same as "calyx superior."

322. Open or Gymnospermous Pistil. This is what we have in the
whole Pine family, the most peculiar, and yet the simplest,
of all pistils. While the ordinary simple pistil in the eye
of the botanist represents a leaf rolled together into a
closed pod (305), those of the Pine, Larch (Fig. 264),
Cedar, and Arbor-Vita (Fig. 265, 266) are plainly open leaves, in the form of
scales, each bearing two or more ovules on the
inner face, next the base. At the time of
blooming, these scale-leaves of the young
cone-diverge, and the pollen, so abundantly
shed from the staminate blossoms, falls di-
rectly upon the exposed ovules. Afterwards
the scales close over each other until the
seeds are ripe. Then they separate again,
that the seeds may be shed. As their ovules and seeds are not
enclosed in a pod, all such plants are said to be Gymnospermous,
that is, naked-seeded.

Fig. 262. Cameron's of the ovary of Hypericum percustrum. Fig. 263. puppy pod of the same.
Fig. 264. A pod, that is, a scale of the cone, of a Larch, at the time of flowering;
inside view, showing its pair of naked ovules.
Fig. 265. Branchlet of the American Arbor-Vita, considerably larger than in nature,
immatured by its pistillate flowers, each consisting of a single scale (an open pod), together
forming a small cone.
Fig. 266. One of the scales or pods of the last, removed and more enlarged, the inside
exposed to view, showing a pair of ovules on its base.
Ovules (234). These are the bodies which are to become seeds. They are either sessile, that is, stalkless, or else borne on a stalk, called the Filiculus. They may be produced along the whole length of the cell, or only at some part of it, generally either at the top or the bottom. In the former case they are apt to be numerous; in the latter, they may be few or single (solitary, Fig. 267 - 269). As to their direction, ovules are said to be:

- **Horizontal**, when they are neither turned upwards nor downwards, as in Fig. 262, 264;
- **Ascending**, when rising obliquely upwards, usually from the side of the cell, not from its very base, as in the Buttercup (Fig. 267), and the Purslane (Fig. 214);
- **Erect**, when rising upright from the base of the cell, as in the Buckwheat (Fig. 268);
- **Pendulous**, when hanging from towards the top, as in the Flax (Fig. 212); and
- **Suspended**, when hanging perpendicularly from the very summit of the cell, as in the Anemone (Fig. 269), Dogwood, &c. All these terms equally apply to seeds.

321. An ovule consists of a pulpy mass of tissue, the Nucleus or kernel, and usually of one or two coats. In the nucleus the embryo is formed, and the coats become the skin or coverings of the seed. There is a hole (Orifice or Foramen) through the coats, at the place which answers to the apex of the ovule. The part by which the ovule is attached is its base; the point of attachment, where the ripe seed breaks away and leaves a scar, is named the Hilum. The place where the coats blend, and cohere with each other and with the nucleus, is named the Chaetae. We will point out these parts in illustrating the four principal kinds of ovules. These are not difficult to understand, although ovules are usually so small that a good magnifying-glass is needed for their examination. Moreover, their names, all taken from the Greek, are unfortunately rather formidable.

322. The simplest sort, although the least common, is what is called the

**Orthotropic**, or straight ovule. The *Buckwheat* affords a good
instance of it: it is shown in its place in the ovary in Fig. 268, also detached in Fig. 270, and a much more magnified diagram of it in Fig. 274. In this kind, the orifice (f) is at the top, the chalaza and the hilum (c) are blended at the base or point of attachment, which is at the opposite end; and the axis of the ovule is straight.

If such an ovule were to grow on one side more than on the other, and double up, or have its top pushed round as it enlarges, it would become a

_Camptotheca_ or cored ovule, as in Croos and Chickweed (Fig. 271). Here the base remains as in the straight kind, but its apex with the orifice is brought round close to it. — Much the most common form of all is the

_Anatropous_ or inverted ovule. This is shown in Fig. 267, and 273; also a much enlarged section lengthwise, or diagram, in Fig. 275. To understand it, we have only to suppose the first sort (Fig. 270) to be inverted on its stalk, or rather to have its stalk bent round, applied to one side of the ovule lengthwise, and to grow fast to the coat down to near the orifice (f); the hilum, therefore, where the seed-stalk is to break away (b), is close to the orifice; but the chalaza (c) is here at the top of the ovule; between it and the hilum runs a ridge or cord, called the _Rhaphe_ (e), which is simply that part of the stalk which, as the ovule grew and turned over, adhered to its surface. — Lastly, the

_Ampithetric_ or half-anatropous ovule (Fig. 272) differs from the last only in having a shorter rhaphe, ending about half-way between the chalaza and the orifice. So the hilum or attachment is not far from the middle of one side, while the chalaza is at one end and the orifice at the other.

326. The internal structure of the ovule is sufficiently displayed in the subjoined diagrams, representing a longitudinal slice of two

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*Fig. 270.* Orthotropous ovule of Buckwheat: a, hilum and chalaza; f, orifice.

*Fig. 271.* Camptotheca ovule of a Chickweed: c, chalaza; b, hilum; e, rhaphe; f, orifice.

*Fig. 272.* Amphithetric ovule of Milkweed: f, orifice; b, hilum; e, rhaphe; c, chalaza.

*Fig. 273.* Anatropous ovule of a Stadium: c, orifice; c, chalaza; b, hilum; e, rhaphe.
ovules; Fig. 274, an orthotropous, Fig. 275, an anatropous ovule.
The letters correspond in the two; e, the chalaza; f, the notch; r, raphe (of which there is of course none in Fig. 274); p, the outer coat, called primina; s, inner coat, called secundina; n, nucleus or kernel.

LESSON XIX.

MORPHOLOGY OF THE RECEPTACLE.

327. The receptacle (also called the base or stem, which the leaves and other parts of the blossom are attached to (231)). It is commonly small and short (as in Fig. 169), but it sometimes occurs in more copious and remarkable forms.

328. Occasionally it is elongated, as in some plants of the Caper family (Fig. 276), making the flower really look like a branch, having its circles of leaves, stamens, &c., separated by long spaces or internodes.

329. The Wild Geranium or Cranebill has the receptacle prolonged above and between the insertion of the pistils, in the form of a slender beak. In the blossom, and until the fruit is ripe, it is concealed by the five petals united around it, and their flat styles covering its whole surface (Fig. 277). But at maturity, the five nect and one-seeded fruits separate, and so do their styles, from the stalk, and hang suspended from the summit. They split off shortly.
cally from the receptacle, curving upwards with a sudden jerk, which
scatters the seed, often throwing it to a considerable distance.

389. When a flower
bears a great many pis-
tils, its receptacle is gen-
ernly enlarged so as to
give them room; some-
times becoming broad
and flat, as in the Flow-
ering Raspberry, some-
times elongated, as in
the Blackberry, the Mag-
nolia, &c. It is the re-
ceptacle in the Straw-
berry (Fig. 279), much
enlarged and pulpy when ripe, which forms the edible part of the
fruit, and bears the small seed-like pistils on its
surface. In the Rose (Fig. 280), instead of being
convex or conical, the receptacle is deeply con-
cave, or urn-shaped. Indeed, a Rose-hip may be
likened to a strawberry turned inside out, like
the finger of a glove reversed, and the whole
covered by the adherent tube of the calyx, which
remains beneath the strawberry.

351. A disk is a part of the
receptacle, or a growth from it, en-
larged under or around the pistil.
It is hypogynous (269), when free
from all union either with the pistil
or the calyx, as in the Rue and the
Orange (Fig. 281). It is perigyn-
ous (270), when it adheres to the
base of the calyx, as in the Bladder-cup and Backbush (Fig. 282,

![Diagram of floral parts](image-url)

**FIG. 276.** Flower of Gynandraea, the receptacle enlarged and detined where a base
the sepals and petals, then elongated into a slender culk, becoming the ovary in appearance.
It is tertinal (296), above the middle, and a chamber or cavity on its summit.
**FIG. 277.** Young first of the common Wild Currant.
**FIG. 278.** The same pipe, with the few petals splitting away near the base of
the sepals, and bringing down the top by their styles.
**FIG. 279.** Longitudinal section of a young raspberry, enlarged.
**FIG. 280.** Similar section of a young Rose-hip.
**FIG. 281.** Petal of the Orange, with a large hypogynous disk at its base.
Often it adheres both to the calyx and to the ovary, as in New Jersey Tea, the Apple, &c., consolidating the whole together. In such cases it is sometimes carried up and expanded on the top of the ovary, as in the Parsley and the Ginseng families, when it is said to be epigynous (273). 332. In Nelumbium,—a large Water-Lily, abounding in the waters of our Western States,—the singular and greatly enlarged receptacle is shaped like a top, and bears the small pistils immersed in separate cavities of its flat upper surface (Fig. 284).

LESSON XX.

THE FRUIT.

333. The ripened ovary, with its contents, becomes the Fruit. When the tube of the calyx adheres to the ovary, it also becomes a part of the fruit: sometimes it even forms the principal bulk of it, as in the apple and pear.

334. Some fruits, as they are commonly called, are not fruits at all in the strict botanical sense. A strawberry, for example (as we have just seen, 330, Fig. 282), although one of the choicest fruits in the common acceptance, is only an enlarged and pulpy receptacle, bearing the real fruit (that is, the ripened pistils) scattered over its...
surface, and too small to be much noticed. And mulberries, figs, and pine-apples are masses of many fruits with a pulpy flower-stalk, &c. Passing these by for the present, let us now consider only

335. Simple Fruits. These are such as are formed by the ripening of a single pistil, whether simple (309) or compound (311).

336. A simple fruit consists, then, of the Seed-casing (technically called the Pericarp), of the walls of the ovary matured, and the seeds contained in it. Its structure is generally the same as that of the ovary, but not always; because certain changes may take place after flowering. The commonest change is the obliteration in the growing fruit of some parts which existed in the pistil at the time of flowering. The ovary of a Horsechestnut, for instance, has three cells and two ovaries in each cell; but the fruit never has more than three seeds, and rarely more than one or two, and only as many cells. Yet the vestiges of the seeds that have not matured, and of the wanting cells of the pod, may always be detected in the ripe fruit. This obliteration is more complete in the Oak and Chestnut. The ovary of the first likewise has three cells, that of the second six or seven cells, each with two ovaries hanging from the summit. We might therefore expect the acorn and the chestnut to have as many cells, and two seeds in each cell. Whereas, in fact, all the cells and all the ovaries but one are uniformly obliterated in the forming fruit, which thus becomes one-celled and one-seeded, and rarely can any vestige be found of the missing parts.

337. On the other hand, a one-celled ovary sometimes becomes several-celled in the fruit by the formation of false partitions, commonly by cross-partitions, as in the jointed pod of the Sea-Rocket and the Tick-Trefoil (Fig. 304).

338. Their Kinds. In defining the principal kinds of simple fruits which have particular names, we may classify them, in the first place, into—1. Fibrous Fruits; 2. Stone Fruits; and 3. Dry Fruits. The first and second are of course indehiscent; that is, they do not split open when ripe to discharge the seeds.

339. In fibrous fruits the whole pericarp, or wall of the ovary, thickens and becomes soft (fibrous, juicy, or pulpy) as it ripens. Of this the leading kind is

340. The Berry, such as the gooseberry and currant, the blueberry and cranberry, the tomato, and the grape. Here the whole flesh is equally soft throughout. The orange is merely a berry with a leathery rind.
The prop, or compound fruit, is the sort of berry which belongs to the Gourd family, mostly with a hard rind and the inner portion welle.

The propy, squash, cucumber, and melon are the principal examples.

The prop is a name applied to the apple, pear, and quince; fleshy fruits like a berry, but the principal thickness is calyx, only the papery peel arranged like a star in the core really belonging to the pistil itself.

Secondly, as to fruits which are partly fleshy and partly hard, one of the most familiar kinds is:

The prop, or Stone-fruit; of which the cherry, plum, and peach (Fig. 285) are familiar examples. In this the outer part of the thickness of the pericarp becomes fleshy, or soft, like a berry, while the inner hardness, like a nut. From the way in which the pistil is constructed (335), it is evident that the fleshy part here answers to the lower, and the stone to the upper, side of the leaf;—a leaf always consisting of two layers of green pulp, an upper and an under layer, which are considerably different (433).

Whenever the walls of a fruit are separable into two layers, the outer layer is called the Exocarp, the inner, the Endocarp (from Greek words meaning "outside fruit" and "inside fruit"). But in a drupe the outer portion, being fleshy, is likewise called Exocarp (which means "fleshy fruit"), and the inner, the Parench or stone. The stone of a peach, and the like, it will be perceived, belongs to the fruit, not to the seed. When the walls are separable into three layers, the outer layer is named either exocarp or Epicarp; the middle one is called the Mesocarp (i.e., middle fruit); and the innermost, as before, the Endocarp.

Thirdly, in dry fruits the seed-pellet remains herbaceous in texture, or becomes thin and membraneous, or else it hardens throughout. Some forms remain closed, that is, are indehiscent (338); others are indehiscent, that is, split open at maturity in some regular way. Of indehiscent or closed dry fruits the principal kinds are the following.

The Anthocoria, or Achene, is a small, one-seeded, dry, indehiscent.
cent fruit, such as is popularly taken for a naked seed: but it is
plainly a ripened ovary, and shows the remains of its style or stigma, or the place
from which it has fallen. Of this sort are the fruits of the
Buttercup (Fig. 286, 287), the Cinquefoil, and the Strawberry (Fig.
279, 288); that is, the real fruits, botanically speaking, of the latter, which are taken for seeds,
not the large juicy receptacle on the surface of
which they rest (239). Here the succession are
simple pistils (290), very numerous in the same
flower, and forming a head of such fruits. In
the Nettle, Hemp, &c., there is only one pistil to
each blossom.
In the raspberry and blackberry, each grain
is a similar pistil, like that of the strawberry in the
flower, but ripening into a miniature stone-fruit, or
drupe. So that in the strawberry we eat the
receptacle, or end of the flower-stalk; in the rasp-
berry, a cluster of stone-fruits, like cherries on a
very small scale; and in the blackberry, both a juicy
receptacle and a cluster of stone-fruits covering it
(Fig. 289, 290).

348. The fruit of the Composite family is also
an achene. Here the surface of the ovary is
covered by an adherent calyx-tube, as is evident
from the position of the corolla, apparently standing
on its summit (321, and Fig. 290, b). Sometimes the
limb or divisions of the calyx are entirely wanting,
as in Mayweed (Fig. 291) and Whiteweed. Sometimes the limb
of the calyx forms a crown or cup on the top of the achene, as in
Sunflower (Fig. 322); in Coreopsis, it often takes the form of two
blunt teeth or scales; in the Sunflower (Fig. 293), it consists of two

FIG. 391. Arthrocum of Buttercup. 287. Nettle, cut through, to show the seed within.

FIG. 286. Nettles, cut through, to show the seed within.

FIG. 287. Slice of a part of a ripe strawberry, enlarged, some of the seeds shown cut away.

FIG. 288. Slice of a part of a blackberry. 289. One of the grains or drupes divided, more
enlarged; showing the stalk, the sterna, and the seed, as in Fig. 286.
thin scales which fall off at the touch; in the Goosefoot, of about five very thin scales, which look more like a calyx (Fig. 294); and in the Thistle, Acon, Soy-Thistle (Fig. 293), and hundreds of others, it is cut up into a tuft of fine bristles or hairs. This is called the 

**Pappus**; a name which properly means the down like that of the Thistle; but it is applied to all these forms, and to every other under which the limb of the calyx of the "compound flowers" appears. In Lettuce, Dandelion (Fig. 296), and the like, the achene as it matures tapers upwards into a slender beak, like a stalk to the pappus.

350. A **Eritile** is the same as an achene, but with a thin and bladdery base pericarp; like that of the Goosefoot or Pigweed (Fig. 297). When ripe it bursts open irregularly to discharge the seed; or sometimes it opens by a circular line all round, the upper part falling off like a lid; as in the Amaranth (Fig. 298).

351. A **Caryopsis, or Grain**, differs from the last only in the seed adhering to the thin pericarp throughout, so that fruit and seed are incorporated into one body; as in wheat, Indian corn, and other kinds of grains.

352. A **Nut** is a dry and indehiscent fruit, commonly one-celled and one-seeded, with a hard, europeous, or bony wall, such as the coconut, hickory, beestnut, and the acorn (Fig. 21, 209). Here the involucre in the form of a cup at the base, is called the **Cupule**. In the Chestnut it forms the bar; in the Hazel, a leafy bask.

**FIG. 291.** 
Arctium or Mayweed (ac pappus). 292. That of Scourcy (in pappus a small cup). 293. Of Rhi, or pappus of two different sorts). 294. Of Rhi, or (Holium), with its pappus of five scales. 295. Of seth, with its pappus of five scales. 296. Of seth, with its pappus of forms decay. 297. Of the Dandelion, its pappus raised in a long bask. 298. Of the Amaranth, its pappus standing or a long bask. 299. Of the Amaranth, standing or a long bask. 300. Of the Amaranth, opening all round (circumcinate).
LESSON 20.]

533. A Samara, or key-fruit, is either a nut or an achene, or any other indehiscent fruit, furnished with a wing, like that of the Maple (Fig. 1), Ash (Fig. 300), and Elm (Fig. 301).

534. The Capsule, or Pod, is the general name for dry seed-vessels which split or burst open at maturity. But several sorts of pod are distinguished by peculiar names. Two of them belong to simple pistils, namely, the Follicle and the Legume.

535. The Follicle is a fruit of a simple pistil opening along the inner suture (307). The pods of the Penny, Columbine, Larkspur, Marsh-Marigold (Fig. 302), and Milkweed are of this kind. The seam along which the follicle opens answers to the edges of the pistil-leaf (Fig. 291, 293).

536. The Legume or true Pod, like the Pea-pod (Fig. 303), is similar to the follicle, only it opens by the outer as well as the inner or ventral suture (307), that is, by what answers to the midrib as well as by what answers to the united margins of the leaf. It splits therefore into two pieces, which are called valves. The legume belongs to plants of the Pulse family, which are accordingly termed Leguminosae, that is, leguminous plants. So the fruits of this family keep the name of legume, whatever their form, and whether they open or not. A legume divided across into one-seeded joints, which separate when ripe, as in Tick-Trefoil (Fig. 304), is named a Lomentum.

537. The true Capsule is the pod of a compound pistil. Like the ovary it resists from, it may be one-celled, or it may have as many cells as there are carpels in its composition. It may discharge its seeds through chinks or pores, as in the Poppy, or burst irregularly in some part, as in Lobelia and the Snapdragon; but commonly it splits open (or is didaceous) lengthwise into regular pieces, called valves.

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538. Samara or key of the White Ash. 301. Samara of the American Elm.
539. Follicle of Marsh-Marigold (Caltha palustris).
540. Legume of a Sweet-Pea, open, usual.
541. Lenten or single Samara of Tick-Trefoil (Desmodium).
358. Dehiscence of a pod resulting from a compound pistil, when regular, takes place in one of two principal ways, which are best shown in pods of two or three cells. Either the pod splits open down the middle of the back of each cell, when the dehiscence is *loculicidal*, as in Fig. 305; or it splits through the partitions, after which each cell generally opens at its inner angle, when it is *septicidal*, as in Fig. 306. These names are of Latin derivation, the first meaning "cutting into the cells"; the second, "cutting through the partitions." Of the first sort, the Lily and Iris (Fig. 305) are good examples; of the second, the Rhododen- drum, Azalea, and St. John's-wort. From the structure of the pistil (305-311) the student will readily see, that the line down the back of each cell answers to the dorsal suture of the carpel; so that the pod opens by this when loculicidal, while it separates into its component carpels, which open as follicles, when septicidal. Some pods open both ways, and so split into twice as many valves as the carpels of which they are formed.

359. In loculicidal dehiscence the valves naturally bear the partitions on their middle; in the septicidal, half the thickness of a partition is borne on the margin of each valve. See the diagrams, Figs. 307-308. A variation of either inside sometimes occurs, as shown in the diagram, Fig. 309, where the valves break away from the partitions. This is called *septifragal* dehiscence; and may be seen in the Morning-Glory.

360. Three remaining sorts of pods are distinguished by proper names, viz.:

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Fig. 305. Capsule of Iris (with loculicidal dehiscence), fully open, X3.
Fig. 306. Pod of a Marsh St. John's-wort, with septicidal dehiscence.
Fig. 307. Diagram of septifragal; 308, of loculicidal; and 309, of septifragal dehiscence.
361. The Silique (Fig. 310), the peculiar pod of the Mustard family; which is two-celled by a false partition stretched across between two partial placentas. It generally opens by two valves from below upwards, and the placentas with the partition are left behind when the valves fall off.

362. A Silicle or Pocket is only a short and broad silique, like that of the Shepherd's Purse, of the Candy-staff, &c.

363. The Pyxis is a pod which opens by a circular horizontal line, the upper part forming a lid, as in Purslane (Fig. 311), the Purslane, Henbane, &c. In these the delithence extends all round, or is circumcissile. So it does in Fig. 298, which represents a sort of oneseeded pyxis. In Jeffersonia or Twin-leaf, the line does not separate quite round, but leaves a portion to form a hinge to the lid.

364. Multiple or Collective Fruits (334) are, properly speaking, masses of fruits, resulting from several or many blossoms, aggregated into one body. The pineapple, mulberry, Orange, and the fig, are fruits of this kind. This latter is a peculiar form, however, being to a mulberry nearly what a Rose-hip is to a strawberry (Fig. 279, 299), namely, with a hollow receptacle bearing the flowers concealed inside; and the whole edible part is this purplish common receptacle, or hollow thickened flower-cells.

365. A Strobile, or Cone (Fig. 314), is the peculiar multiple fruit of Pines, Cypress, and the like; hence named Coniferous, viz. cone-bearing plants. As already shown (324), these cones are made of open pistils, mostly in the form of flat scales, regularly overlying each other, and pressed together in a spike or head. Each scale bears one or two naked seeds on its inner face. When the cone is ripe and dry, the scales turn back or diverge, and the seed peels off and falls, generally carrying with it a wing, which was a part of the lining of the scale, and which facilitates the dispersion of the seeds by the wind (Fig. 312, 315). In Arbor-Vitae, the scales

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*Flg. 310.* Silique of Flying Crane (Nandina domestica), opening.

*Fig. 311.* The pyxis, or pod, of the common Purslane.

*Fig. 312.* Inside view of a scale from the cone of Pitch Pine; with one of the seeds (Fig. 313) detached, the other in its place on the scale.
of the small cone are few, and not very unlike the leaves (Fig. 265). In Cypress they are very thick at the top and narrow at the base, as to make a peculiar sort of closed cone. In Juniper and Red Cedar, the few scales of the very small cone become fleshy, and ripen into a fruit which might be taken for a berry.

LESSON XXI.

THE SEED.

366. The scales (224), when they have an embryo (or undeveloped placenta, 16) formed in them, become seeds.

367. The Seed, like the ovule from which it originates, consists of its coats, or integuments, and a kernel.

368. The Seed-coats are commonly two (224), the outer and the inner. Fig. 319 shows the two, in a seed cut through lengthwise. The outer coat is often hard or crustaceous, where it is called the Testa, or shell of the seed; the inner is thin and delinete.

369. The shape and the markings, so various in different seeds, depend mostly on the outer coat. Sometimes it fits

FIG. 314. Cone of White-Pine (Pinus rigida).
FIG. 315. Seed of Beechwood cut through lengthwise: a, the hilum or scar; b, the outer coat; c, the inner; d, the albumen; e, the embryo.
the kernel closely; sometimes it is expanded into a wing, as in the
Trumpet-Creeper (Fig. 316), and occasionally this wing is cut up
into shreds or tufts, as in the Cualpa; or instead of a
wing it may bear a case, or tuft of long and soft hairs,
such as we find in the Milkweed or Silkweed (Fig. 317).
The object of wings or downy tufts is to render the seeds
buoyant, so that they may be widely dispersed by the
winds. This is clear, not only from their evident adap-
tation to this purpose, but also from the interesting fact
that winged and tufted seeds are found only in fruits that split open
at maturity, never in those that remain closed. The coat of some
seeds is beset with long hairs or wool. Cotton, one of
the most important vegetable products,—since it forms
the principal clothing of the larger part of the human
race,—consists of the long and woolly hairs which
thickly cover the whole surface of the seed. Certain
seeds have an additional, but more or less incomplete
covering, outside of the real seed-coats, called an
370. Aril, or Arillus. The bossy and transparent bag
which encloses the seed of the White Water-Lily (Fig.
318) is of this kind. So is the are of the nutmeg; and also the
scarlet pulp around the seeds of the Waxwork (Celastrus)
and Strawberry-bush (Euonymus), so ornamental in autumn,
after the pods burst. The aril is a growth from the ex-
remity of the seed-stalk, or the placenta.
371. The names of the parts of the seed and of its kinds
are the same as in the ovule. The scar left where the seed-
stalk separates is called the
Hilum. The orifice
of the ovule, now closed
up, and showing only a
small point or mark, is
dnamed the Micropyle. The terms orthotropous, anatropous, &c.

FIG. 316. A winged seed of the Trumpet-Creeper.
FIG. 317. Seed of Milkweed, with a case or tuft of long silky hairs at one side.
FIG. 318. Seed of White Water-Lily, enclosed in its aril.
FIG. 319. Seed of a Violet (sasemspinosa); a, hilum; b, styles; c, calyx.
FIG. 320. Seed of a Larkspur (also anemopus); the parts labeled as in the last.
FIG. 321. The same, cut through lengthwise: a, the hilum; c, calyx; f, outer seed-coat; j, the interior or
embryo.
FIG. 322. Seed of a St. John’s-wort, divided lengthwise; here the whole kernel is
uncovered.
apply to seeds just as they do to ovules (325); and so do those terms which express the direction of the ovule or the seed in the cell; such as erect, ascending, horizontal, pendulous, or suspended (325); therefore it is not necessary to explain them now. The accompanying figures (Fig. 319–322) show all the parts of the most common kind of seed, namely, the anatropous.

372. The kernel, or Nucleus, is the whole body of the seed within the coat. In many seeds the kernel is all Embryo; in others a large part of it is the Albumen.

373. The Albumen of the seed is an accumulation of nourishing matter (starch, &c.), commonly surrounding the embryo, and destined to nourish it when it begins to grow, as was explained in the earlier Lessons (30–32). It is the floury part of wheat, corn (Fig. 38, 29), buckwheat, and the like. But it is not always at once in texture. In Poppy-seeds it is oily. In the seeds of Paviy and Barberry, and in the coconut, it is flaky: in coffee it is cornified (that is, hard and tough, like horn); in the Ivory Palm it has the hardness as well as the general appearance of ivory, and is now largely used as a substitute for it in the fabrication of small objects. However solid its texture, the albumen always softens and partly liquefies during germination; when a considerable portion of it is transformed into sugar, or into other forms of field nourishment, on which the growing embryo may feed.

374. The Embryo, or Germ, is the part to which all the rest of the seed, and also the fruit and the flower, are subservient. When the embryo is small and its parts little developed, the albumen is the more abundant, and makes up the principal bulk of the seed; as in Fig. 30, 321, 325. On the other hand, in many seeds there is no albumen at all; but the strong embryo forms the whole kernel; as in the Maple (Fig. 2, 3), Pumpkin (Fig. 9), Almond, Plum, and Apple (Fig. 11, 12), Beech (Fig. 13), and the like. Then, whatever nourishment is needed to establish the plantlet in the soil is stored up in the body of the embryo itself, mostly in its seed-leaves. And these accordingly often become very large and thick, as in the almond, bean, and pea (Fig. 16, 19), corn (Fig. 21), chestnut, and horehound (Fig. 23, 24). Besides these, Fig. 25, 26, 30 to 35, 43, and 45 exhibit various common forms of the embryo; and also some of the ways in which it is placed in the albumen; being sometimes straight, and sometimes variously coiled up or packed away.
LESSON 21. • THE EMBRYO

375. The embryo, being a rudimentary plantlet, ready formed in the seed, has only to grow and develop its parts to become a young plant (15). Even in the seed these parts are generally distinguishable, and are sometimes very conspicuous; as in a Pumpkin-seed, for example (Figs. 253, 254). They are, first,

376. The Radicle, or rudimentary stemlet, which is sometimes long and slender, and sometimes very short, as we may see in the numerous figures already referred to. In the seed it always points to the micropyle (371), or what answers to the foramen of the ovule (Fig. 326). As to its position in the fruit, it is said to be inferior when it points to the base of the pericarp, superior when it points to its summit, &c. The base or five-end of the radicle gives rise to the root; the other extremity bears

377. The Cotyledon or Seed-Leaves. With these in various forms we have already become familiar. The number of cotyledons has also been explained to be important (32, 33). In Corn (Fig. 40), and in all Genus Lilies, and the like, we have a

Monocotyledonous embryo; namely, one furnished with only a single cotyledon or seed-leaf. Nearly all the rest of our illustrations exhibit various forms of the

Dicotyledonous embryo; namely, with a pair of cotyledons or seed-leaves, always opposite each other. In the Pine family we find a

Polycotyledonous embryo (Fig. 45, 46); that is, one with several, or more than two, seed-leaves, arranged in a circle or wheel.

378. The Plumule is the little bud, or radicle of the next leaf or pair of leaves after the seed-leaves. It appears at the summit of the radicle, between the cotyledons when there is a pair of them, as in Fig. 324, 14, 24, &c.; or the cotyledon when only one is wrapped round V, as in Indian Corn, Fig. 40. In germination the plumule develops upward, to form the ascending trunk or stem of the plant, while the other end of the radicle grows downward, and becomes the root.

FIG. 325. Embryo of the Pumpkin, seen front. 324. Same cut through and viewed edgewise; the small plumule seen between the cotyledons at their base.

FIG. 326. Seed of a Violet (Fig. 320) cut through, showing the embryo in the section, edgewise; being an undivided seed, the radicle of the straight embryo points down to the base near the hilum.

FIG. 327. Similar section of the orthotropous seed of Buckwheat. Here the radicle points directly away from the hilum, and to the apex of the seed; also the thin cotyledons happen in this plant to be bent round into the same direction.
This completes the circle, and brings our vegetable history round to its starting-point in the Second Lesson; namely, The Growth of the Plant from the Seed.

LESSON XXII.

HOW PLANTS GROW.

380. A plant grows from the seed, and from a tiny embryo, like that of the Maple (Fig. 327), becomes perhaps a large tree, producing every year a crop of seeds, to grow in their turn in the same way. But how does the plant grow? A little seedling, weighing only two or three grains, often doubles its weight every week of its early growth, and in time may develop into a huge bulk, of many tons' weight of vegetable matter. How is this done? What is vegetable matter? Where did it all come from? And by what means is it increased and accumulated in plants? Such questions as these will now naturally arise in any inquiring mind; and we must try to answer them.

381. Growth is the increase of a living thing in size and substance. It appears so natural to us that plants and animals should grow, that people rarely think of it as requiring any explanation. They say that a thing is so because it grew so. Still we wish to know how the growth takes place.

382. Now, in the foregoing Lessons we explained the whole structure of the plant, with all its organs, by beginning with the seedling plantlet, and following it onward in its development through the
whole course of vegetation (12, &c.). So, in attempting to learn how this growth took place, it will be best to adopt the same plan, and to commence with the commencement, that is, with the first formation of a plant. This may seem not so easy, because we have to begin with parts too small to be seen without a good microscope, and requiring much skill to dissect and exhibit. But it is by no means difficult to describe them; and with the aid of a few figures we may hope to make the whole matter clear.

383. The embryo in the ripe seed is already a plant in miniature, as we have learned in the Second, Third, and Twenty-first Lessons. It is already provided with stem and leaves. To learn how the plant began, therefore, we must go back to an earlier period still, namely, to the formation and growth of the embryo itself.

For this purpose we return to the ovule in the pistil of the flower (323). During or soon after blooming, a cavity appears in the kernel or nucleus of the ovule (Fig. 274, a), lined with a delicate membrane, and forming a closed sac, named the embryo-sac (e). In this sac or cavity, at its upper end (viz. at the end next the orifice of the ovule), appears a roundish little vesicle or bladder-like body (v), perhaps less than one thousandth of an inch in diameter. This is the embryo, or rudimentary new plant, at its very beginnings. But this vesicle never becomes anything more than a grain of soft pulp, unless the ovule has been acted upon by the pollen.

Phl. 326 Magnified pistil of Heuchera; the ovary and ovule divided longitudinally; pollen on the stigma; one grain distinctly showing its valve, which penetrates the style, in the cavity of the ovary, enters the ovule of the ovule, and thus shows the origin of the embryo-sac (v), near the embryonal vesicle (v).
The pollen (297) which falls upon the stigma grows there in a peculiar way: its delicate inner coat extends into a tube (the pollen-tube), which sinks into the loose tissue of the stigma and the interior of the style, reaching as the root of a seedling sinks into the loose soil, reaches the cavity of the ovary, and at length penetrates the ovule of an ovary. The point of the pollen-tube reaches the surface of the embryo-sac, and in some unexplained way causes a particle of soft pulpy or mucilaginous matter (Fig. 328) to form a membranous coat and to expand into a vesicle, which is the germ of the embryo.

This vesicle (shown detached and more magnified in Fig. 329) is a specimen of what botanists call a cell. Its wall of very delicate membrane encloses a mucilaginous liquid, in which there are often some minute grains, and commonly a larger soft mass (called the nucleus).

Growth takes place by this vesicle or cell, after enlarging to a certain size, dividing by the formation of a cross partition into two such cells, cohering together (Fig. 330); one of these into two more (Fig. 331); and these repeating the process by partitions formed in both directions (Fig. 332), forming a closer or mass of cells, essentially like the st, and all proceeding from it. After increasing in number for some time in this way, by a continuation of the same process, the embryo begins to shape itself; the upper end forms a radicle or root-end, the other end shows a notch between two lobes (Fig. 333), the lobes become the cotyledons or seed-leaves, and the embryo exists in the seed is at length completed (Fig. 336).
388. The Growth of the Plantlet. When it springs from the seed it is only a continuation of the same process. The bladder-like cells of which the embryo consists multiply in number by the repeated division of each cell into two. And the plantlet is merely the aggregation of a vastly larger number of these cells. This may be clearly ascertained by magnifying any part of a young plantlet. The young root, being more transparent than the rest, answers the purpose best. Fig. 56, on page 30, represents the end of the rootlet of Fig. 55, magnified enough to show the cells that form the surface. Fig. 337 and 338 are two small bits of the surface more highly magnified, showing the cells still larger. And if we make a thin slice through the young root both lengthwise and crosswise, and view it under a good microscope (Fig. 340), we may perceive that the whole interior is made up of just such cells. It is the same with the young stem and the leaves (Fig. 355, 357). It is essentially the same in the full-grown herb and the tree.

389. So the plant is an aggregation of countless millions of little vesicles, or cells (Fig. 339), as they are called, essentially like the cell it began with in the formation of the embryo (Fig. 329); and this first cell is the foundation of the whole structure, or the ancestor of all the rest.

And a plant is a kind of structure built up of these individual cells, something as a house is built of bricks,—only the bricks or cells are not brought to the forming plant, but are made in it and by it; or, to give a better comparison, the plant is constructed much as a honeycomb is built up of cells,—only the plant constructs itself, and shapes its own materials into fitting forms.

390. And vegetable growth consists of two things;—1st, the expansion of each cell until it gets its full size (which is commonly not more than \( \frac{1}{10} \) of an inch in diameter); and 2d, the multiplication.
of the cells in number. It is by the latter, of course, that the principal increase of plants in bulk takes place.

LESSON XXIII.

VEGETABLE FABRIC: CELLULAR TISSUE.

391. Cellular Structure. A mineral—such as a crystal of spar, or a piece of marble—may be divided into smaller and still smaller pieces, and yet the smallest portion that can be seen with the microscope will have all the characters of the larger body, and be capable of still further subdivision, if we had the means of doing it, into just such particles, only of smaller size. A plant may also be divided into a number of similar parts: first into branches; then each branch or stem, into joints or similar parts (34), each with its leaf or pair of leaves. But if we divide those into pieces, the pieces are not all alike, nor have they separately the properties of the whole; they are not whole things, but fragments or slices.

392. If now, under the microscope, we subdivide a leaf, or a piece of stem or root, we come down in the same way to the set of similar things it is made of,—to cavities with closed walls,—to Cells, as we call them (386), essentially the same everywhere, however they may vary in shape. These are the units, or the elements of which every part consists; and it is their growth and their multiplication which
make the growth of the plant, as was shown in the last Lesson.

We cannot divide them into similar smaller parts having the properties of the whole, as we may any mineral body. We may cut them in pieces; but the pieces are only mutilated parts of a cell. This is a peculiarity of organic things (393); it is organic structure. Being composed of cells, the main structure of plants is called

393. Cellular Tissue. The cells, as they multiply, build up the tissue or fabric of the plant, which, as we have said (389), may be likened to a wall or an edifice built of bricks, or still better to a honeycomb composed of ranges of cells (Fig. 340).

394. The walls of the cells are united where they touch each other; and so the partition appears to be a simple membrane, although it is really double; as may be shown by boiling the tissue a few minutes and then pulling the parts asunder. And in soft fruits the cells separate in ripening, although they were perfectly united into a tissue, when green, like that of Fig. 340.

395. In that figure the cells fit together perfectly, leaving no interstices, except a very small space at some of the corners. But in most leaves, the cells are loosely heaped together, leaving spaces or passages of all sizes (Fig. 356); and in the leaves and stems of aquatic and marsh plants, in particular, the cells are built up into narrow partitions, which form the sides of large and regular canals or passages (as shown in Fig. 341). These passages form the tubes or cavities so conspicuous on cutting across any of these plants, and which are always filled with air. They may be likened to a stack of chimneys, built up of cells in place of bricks.

396. When small and irregular, the interstices are called intercellular spaces (that is, spaces between the cells). When large and regular, they are named intercellular passages or air-pasages.

397. It will be noticed that in slices of the root, stem, or any tissue where the cells are not partly separate, the boundaries of the cells are usually more or less splayed, like the cells of a honeycomb; and this is apt to be the case in whatever direction the slice is made, whether crosswise, lengthwise, or obliquely. The reason of this is easy to see. The natural figure of the cell is globular. Cells which are not pressed upon by others are generally round or roundish (except when they grow in some particular direction), as we see in the green pulp of many leaves. When a quantity of spheres (such, for instance, as a pile of cannon-balls) are heaped up, each one in the interior of the heap is touched by twelve others. If the spheres be
soft and yielding, as young cells are, when pressed together they will become twelve-sided, like that in Fig. 339. And a section in any direction will be six-sided, as are the meshes in Fig. 340.

308. The size of the common cells of plants varies from about the thirtieth to the thousandth of an inch in diameter. An ordinary size is from $\frac{1}{25}$ to $\frac{1}{250}$ of an inch; so that there may generally be from 25 to 150 millions of cells in the compass of a cubic inch!

309. Now when it is remembered that many stems shoot up at the rate of an inch or two a day, and sometimes of three or four inches, knowing the size of the cells, we may form some conception of the rapidity of their formation. The giant Puff-buff has been known to enlarge from an inch or so to nearly a foot in diameter in a single night; but much of this is probably owing to expansion.

We take therefore a more decisive, but equally extraordinary case, in the huge flowering stem of the Century-Plant. After waiting many years, or even for a century, to gather strength and materials for the effort, Century-Plants in our conservatories send up a flowering stalk, which grows day after day at the rate of a foot in twenty-four hours, and becomes about six inches in diameter. This, supposing the cells to average $\frac{1}{25}$ of an inch in diameter, requires the formation of over twenty thousand millions of cells in a day!

400. The walls of the cells are almost always colorless. The green color of leaves and young bark, and all the brilliant hues of flowers, are due to the contents of the cells, seen through their more or less transparent walls.

401. At first the walls are always very thin. In all soft parts they remain so; but in other cases they thicken on the inside and harden, as we see in the stone of stone-fruit, and in all hard wood (Fig. 345). Sometimes this thickening continues until the cell is nearly filled up solid.

402. The walls of cells are perfectly closed and whole, at least in all young and living cells. Those with thickened walls have thin places, indeed; but there are no holes opening from one cell into another. And yet through these closed cells the sap and all the juices are conveyed from one end of the plant to the other.

403. Vegetable cells may vary widely in shape, particularly when not combined into a tissue or solid fabric. The hairs of plants, for example, are cells drawn out into tubes, or are composed of a row of cells, growing on the surface. Cotton consists of simple long hairs on the cot of the seed; and these hairs are single cells. The hair...
like bodies which abound on young roots are very slender projections of some of the superficial cells, as is seen in Fig. 357. Even the fibres of wood, and what are called vessels in plants, are only peculiar forms or transformations of cells.

LESSON XXIV.

VEGETABLE FABRIC: WOOD.

404. Cellular tissue, such as described in the last Lesson, makes up the whole structure of all very young plants, and the whole of Mosses and other vegetables of the lowest grade, even when full grown. But this fabric is too tender or too brittle to give useful strength and toughness for plants which are to rise to any considerable height and support themselves. So all such plants have also in their composition more or less of

405. Wood. This is found in all common herbs, as well as in shrubs and trees; only there is not so much of it in proportion to the softer cellular tissue. It is formed very early in the growth of the root, stem, and leaves; traces of it appearing in large embryos even while yet in the seed.

406. Wood is likewise formed of cells,—of cells which at first are just like those that form the soft parts of plants. But early in their growth, some of these lengthen and at the same time thicken their walls; these are what is called Woody Fibre or Wood-Cells; others grow to a greater size, have thin walls with various markings upon them, and often run together end to end so as to form p.stry.  

Fig. 361. Part of a slice across the stem of the Celis, or rather Rheidius Africus, magnified.
large tubes, comparatively; these are called Ducts, or sometimes Vessels. Wood almost always consists of both woody fibres and ducts variously intermingled, and combines into bundles or threads which run longitudinally through the root and stem, and are spread out to form the framework of the leaves (126). In trees and shrubs they are so numerous and crowded together, that they make a solid mass of wood. In herbs they are fewer, and often scattered. That is all the difference.

407. The porosity of some kinds of wood, which is to be seen by the naked eye, as in mahogany and Oak-wood, is owing to a large sort of ducts. These generally contain air, except in very young parts, and in the spring of the year, when they are often gorged with sap, as we see in a wounded Grape-vine, or in the trunk of a Sugar-Maple at that time. But in woody plants through the season, the sap is usually carried up from the roots to the leaves by the

408. Wood-Cells, or Woody Fibre. (Fig. 342—345.) These are small tubes, commonly between one and two thousandths, but in Pine-wood sometimes two or three hundredths, of an inch in diameter. Those from the tough bark of the Basswood, shown in Fig. 344, are only the fifteen-hundredth of an inch wide. Those of Butternut (Fig. 345) are larger, and are here highly magnified besides. They also show the way wood-cells are commonly put together, namely, with their tapering ends overlapping each other, applied together, as it were, thus giving more strength and toughness to the stem, &c.

[Figures of wood-cells and other diagrams are shown, illustrating the text.]

Lesson 8.

Vegetable Fabric.
409. In hard woods, such as Hickory, Oak, and Butternut (Fig. 315), the walls of these tubes are very thick, as well as dense; while in soft woods, such as White-Pine and Basswood, they are pretty thin.

410. Wood-cells, like other cells (at least when young and living), have no openings; each has its own cavity, closed and independent. They do not form anything like a set of pipes opening one into another, so as to convey an unbroken stream of sap through the plant, in the way people generally suppose. The contents can pass from one cell to another only by passing through the partitions in some way or other. And as short as are the individual wood-cells generally, that, to rise a foot in such a tree as the Basswood, the sap has to pass through about two thousand partitions!

411. But although there are no holes (except by breaking away when old), there are plenty of thin places, which look like perforations; and through these the sap is readily transferred from one cell to another, in a manner to be explained further on (487). Some of these are exhibited in Fig. 315, both as looked directly down upon, when they appear as dots or holes, and in profile where the cells are cut through. The latter view shows what they really are, namely, very thin places in the thickness of the wall; and also that a thin place is one cell exactly corresponds to one in the contiguous wall of the next cell. In the wood of the Pine family, these thin spots are much larger, and are very conspicuous in a thin slice of wood under the microscope (Fig. 346, 347);—forming stamps impressed as it were upon each fibre of every tree of this great family, by which it may be known even in the smallest fragment of its wood.

412. Wood-cells in the bark are generally larger, finer, and tougher than those of the proper wood, and appear more like fibres. For example, Fig. 344 represents a cell of the wood of Basswood, of average length, and Fig. 342 one (and part of another) of the fibrous bark, both drawn to the same scale. As these long cells form the principal part of fibrous bark, or bast, they are named Bast-cells or Bast-fibres. These give the great toughness to the inner bark of Basswood (i. e. bast-wood) and of Leatherwood, and they

FIG. 344. A thin slice of bast, highly magnified, showing the large circular and oval markings of the wall of the wood-cells. 345. A separate wood-cell, much magnified, the varying thickness of the wall of these spots showing as rings.
furnish the invaluable fibres of flax and hemp; the wood of the stem being tender, brittle, and destroyed by the processes which separate for use the tough and slender bast-cells.

413. Ducts (Fig. 348-350) are larger than wood-cells, some of them having a calibre large enough to be seen by the naked eye, when cut across (407), although they are usually much too small for this. They are either long single cells, or are formed of a row of cells placed end to end. Fig. 349, a piece of a large dotted duct, and two of the ducts in Fig. 350, show this by their joints, which mark the boundaries of the several cells they are composed of.

414. The walls of ducts under the microscope display various kinds of markings. In what are called Dotted Ducts (Fig. 348, 349), which are the commonest and the largest of all,—their cut ends making the visible porosity of Oak-wood,—the whole wall is apparently riddled with holes; but until they become old, these are only thin places.

Spiral Ducts, or Spiral Vessels, also the varieties of those called Anular or Bordered Ducts (Fig. 350), are marked by a delicate fibre spirally coiled, or by rings or bands, thickening the wall. In the genuine spiral duct, the thread may be uncoiled, tearing the transparent wall in pieces,—as may be seen by breaking must young shoots, or the leaves of Strawberry or Amaryllis, and pulling the broken ends gently together, unrolling these gossamer threads in abundance. In Fig. 350, some of these various sorts of ducts or vessels are shown in their place in the wood.

415. Milk- Vessels, Turpentine-Vessels, Oil-Receptacles, and the like, are generally cavities or cavities formed between or among the cells, and filled with the particular products of the plant.

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FIG. 348. Part of a dotted duct from a grape-vine. 349. A spiral duct of a grape-vine. 350. Part of a bordered duct from the wood of an Almond tree. All reduced. All reduced.
LESSON XXV.

ANATOMY OF THE ROOT, STEM, AND LEAVES.

416. Having in the last preceding Lessons learned what the materials of the vegetable fabric are, we may now briefly consider how they are put together, and how they act in carrying on the plant's operations.

417. The root and the stem are so much alike in their internal structure, that a description of the anatomy of the latter will answer for the former also.

418. The Structure of the Rootlets, however, or the tip of the root, demands a moment's attention. The tip of the root is the newest part, and is constantly renewing itself so long as the plant is active (67). It is shown magnified in Fig. 50, and is the same in all rootlets as in the first root of the seedling. The new rootlets, or their new parts, are mainly concerned in imbuing moisture from the ground; and the newer they are, the more actively do they absorb. The absorbing ends of roots are entirely composed of soft, new, and very thin-walled cellular tissue; it is only farther back that some wood-cells and ducts are found. The moisture (and probably also air) presented to them is absorbed through the delicate walls, which, like those of the cells in the interior, are destitute of openings or pores visible even under the highest possible magnifying power.

419. But as the rootlet grows older, the cells of its external layer harden their walls, and form a sort of skin, or epidermis (like that which everywhere covers the stem and foliage above ground), which greatly checks absorption. Roots accordingly cease very actively to imbibe moisture almost as soon as they stop growing (67).

420. Many of the cells of the surface of young rootlets send out a prolongation in the form of a slender hair-like tube, closed of course at the apex, but at the base opening into the cavity of the cell. These tubes or root-hairs (shown in Fig. 55 and 56, and a few of them, more magnified, in Fig. 337 and 338), sent out in all directions into the soil, vastly increase the amount of absorbing surface which the root presents to it.

421. Structure of the Stem (also of the body of the root). At the beginning, when the root and stem spring from the seed, they consist
almost entirely of soft and tender cellular tissues. But as they grow, wood begins at once to be formed in them.

422. This woody material is arranged in the stem in two very different ways in different plants, making two sorts of wood. One sort we see in a Palm-stem, a ratoon, and a Corn-stalk (Fig. 351); the other we are familiar with in Oak, Maple, and all our common kinds of wood. In the first, the wood is made up of separate threads, scattered here and there throughout the whole diameter of the stem. In the second the wood is all collected to form a layer (in a slice across appearing as a ring) of wood, between a central cellular part which has none in it, the Pith, and an outer cellular part, the Bark. This last is the plan of all our Northern trees and shrubs, and of the greater part of our herbs. The first kind is

423. The Endogenous Stem; so named from two Greek words meaning “inside-growing,” because, when it lasts from year to year, the new wood which is added is interspersed among the older threads of wood, and in old stems the hardest and oldest wood is near the surface, and the youngest and softest towards the centre. All the plants represented in Fig. 47, on p. 19 (except the anomalous Cycas) are examples of Endogenous stems. And all such belong to plants with only one cotyledon or seed-leaf to the embryo (92) Botanists therefore call them Endogenous or Monoeotyledonous Plants, using sometimes one name, and sometimes the other. Endogenous stems have no separate pith in the centre, no distinct bark, and no layer or ring of wood between these two; but the threads of wood are scattered throughout the whole, without any particular order. This is very different from

424. The Exogenous Stem, the one we have most to do with, since all our Northern trees and shrubs are constructed on this plan. It belongs to all plants which have two cotyledons to the embryo (or more than two, such as Pines, 35); so that we call these either Exogenous or Dicoteyledonous Plants (16), accordingly as we take the name from the stem or from the embryo.

425. In the Exogenous stem, as already stated, the wood is all collected into one zone, surrounding a pith of pure cellular tissue in the centre, and surrounded by a distinct and separable bark, the
Lesson 25. AND EXOGENOUS STEMS.

Enter part of which is also cellular. This structure is very familiar in common wood. It is really just the same in the stem of an herb, only the wood is much less in quantity. Compare, for instance, a cross-section of the stem of Flax (Fig. 352) with that of a shoot of Maple or Horsechestnut of the same age. In an herb, the wood at the beginning consists of separate threads or little wedges of wood; but these, however low and scattered they may be, are all so placed in the stem as to mark out a zone (or in the cross-section a ring) of wood, dividing the pith within from the bark without.

426. The accompanying figures (which are diagrams rather than exact delineations) may serve to illustrate the anatomy of a woody exogenous stem, of one year old. The parts are explained in the references below. In the centre is the Pith. Surrounding this is the layer of Wood, consisting both of wood-cells and of ducts or vessels. From the pith to the bark on all sides run a set of narrow plates of cellular tissue, called Medullary Rays; these make the silver-grain of wood. On the cross-section they appear merely as narrow lines; but in wood cut lengthwise parallel to them, their faces show as gimmer.

Fig. 352. Cross-section of Flax stem, showing its bark, wood, and pith.
Fig. 353. A narrow piece of the same, taken from one side, remaining from the bark to the pith, and slightly magnified. a, a small bit of the pith; b, open ducts of wood, or vessels of the medullary rays; c, wood; d, dotted lines in the wood; e, a, main stems or vascular bundles; f, the outer or middle bark; g, the inner bark; h, the outer layer; i, the inner, or phellogen, layer of the medullary rays, or plates of silver-grain, seen on the cross-section.
ing plates, giving a peculiar appearance to Oak, Maple, and other wood with large medullary rays.

427. The Bark covers and protects the wood. At first it is all cellular, like the pith; but soon some slender woody fibres, called bast-cells (Fig. 342), generally appear in it, next the wood, forming the Liber, or Fibrous Bark, the inner bark; to which belongs the fine fibrous bast or bass of Basswood, and the tough and slender fibres of flax and hemp, which are spun and woven, or made into cordage. In the Birch and Beech the inner bark has few if any bast-cells in its composition.

The Cellular or Outer Bark consists of cellular tissue only. It is distinguished into two parts, an inner and an outer, viz.:

The Green Bark, or Green Layer, which consists of tender cells, containing the same green matter as the leaves, and serving the same purpose. In the course of the first season, in woody stems, this becomes covered with the Corky Layer, so named because it is the same substance as cork; common cork being the thick corky layer of the bark of the Cork-Oak, of Spain. It is this which gives to the stems or twigs of shrubs and trees the aspect and the color peculiar to each; namely, light gray in the Ash, purple in the Red Maple, red in several Dogwoods, &c. Lastly:

The Epidermis, or skin of the plant, consisting of a layer of thick-sided empty cells, covers the whole.

428. Growth of the Stem year after year. So much for an exogenous stem only one year old. The stems of herbs perish at the end of the season. But those of shrubs and trees make a new growth every year. It is from their mode of growth in diameter that they take the name of exogenous, i.e. outside-growing. The second year, such a stem forms a second layer of wood outside of the first; the third year, another outside of that; and so on, as long as the tree lives. So that the trunk of an exogenous tree, when cut off at the base, exhibits as many concentric rings of wood as it is years old. Over twelve hundred layers have actually been counted on the stump of an aged tree, such as the Giant Cedar or Redwood of California; and there are doubtless some trees now standing in various parts of the world which were already in existence at the beginning of the Christian era.

429. As to the bark, the green layer seldom grows much after the first season. Sometimes the corky layer grows and forms new layers, inside of the old, for a good many years, as in the Cork-Oak,
the Sweet Gum-tree, and the White and the Paper Birch. But it
all dies after a while; and the continual enlargement of the wood
within finally stretches it more than it can bear, and sooner or later
cracks and rends it, while the weather acts powerfully upon its
surface; so the older bark perishes and falls away piece by piece
year by year.

430. But the inner bark, or liber, does make a new growth an-
nually, as long as the tree lives, inside of that formed the year before,
and next the surface of the wood. More commonly the liber occurs
in the form of thin layers, which may be distinctly counted, as in
Basswood; but this is not always the case. After the outer bark
is destroyed, the older and dead layers of the inner bark are also
exposed to the weather, are riven or split into fragments, and fall
away in succession. In many trees the bark acquires a considerable
thickness on old trunks, although all except the innermost portion is
dead; in others it falls off more rapidly; in the stems of Honey-
cuckles and Grape-vines, the bark all separates and hangs in loose
shreds when only a year or two old.

431. Sap-wood. In the wood, on the contrary,—owing to its
growing on the outside alone,—the older layers are quickly buried
under the newer ones, and protected by them from all disturbance.
All the wood of the young sapling may be alive, and all its cells
or woody tubes active in carrying up the sap from the roots to the
leaves. It is all Sap-wood or Albureum, as young and fresh wood
is called. But the older layers, removed a step further every year
from the region of growth,—or rather the zone of growth every
year removed a step farther from them,—soon cease to bear much,
if any, part in the circulation of the tree, and probably have long
before ceased to be alive. Sooner or later, according to the kind
of tree, they are turned into

432. Heart-wood, which we know is drier, harder, more solid, and
much more durable as timber, than sap-wood. It is generally of a
different color, and it exhibits in different species the hue peculiar
to each, such as reddish in Red-Cedar, brown in Black-Walnut,
black in Ebony, &c. The change of sap-wood into heart-wood re-
sults from the thickening of the walls of the wood-cells by the de-
position of hard matter, lining the tubes and diminishing their calibre,
and by the deposition of a vegetable coloring-matter peculiar to each
species.

433. The heart-wood, being no longer a living part, may decay
and often does so, without the least injury to the tree, except by impairing the strength of the trunk, and so rendering it more liable to be overthrown.

434. The Living Parts of a Tree, of the exogenous kind, are only these: first, the rootlets at one extremity; second, the buds and leaves of the season at the other; and third, a zone consisting of the newest wood and the newest bark, connecting the rootlets with the buds or leaves, however widely separated these may be,—in the largest trees from two to four hundred feet apart. And these parts of the tree are all renewed every year. No wonder, therefore, that trees may live so long, since they annually reproduce everything that is essential to their life and growth, and since only a very small part of their bulk is alive at once. The tree survives, but nothing new living has existed long! In it, as elsewhere, life is a transitory thing, ever abandoning the old, and deploying itself afresh in the new.

435. Cambium-Layer. The new growth in the stem, by which it increases in diameter year after year, is confined to a narrow line between the wood and the inner bark. Cambium is the old name for the mucilage which is so abundant between the bark and the wood in spring. It was supposed to be poured out there, and that the bark really separated from the wood at this time. This is not the case. The newest bark and wood are still united by a delicate tissue of young and forming cells,—called the Cambium-Layer, loaded with a rich mucilaginous sap, and so tender that in spring the bark may be raised from the wood by the slightest force. Here, nourished by this rich mucilage, new cells are rapidly forming by division (387–390); the inner ones are added to the wood, and the outer to the bark, so producing the annual layers of the two, which are ever renewing the life of the trunk.

436. At the same time new rootlets, growing in a similar way, are extending the roots beneath; and new shoots, charged with new buds, annually develop fresh crops of leaves in the air above. Only, while the additions to the wood and bark remain as a permanent portion of the tree, or until destroyed by decay, the foliage is temporary, the crop of leaves being annually thrown off after they have served their purpose.

437a Structure of the Leaf. Leaves also consist both of a woody and a cellular part (155). The woody part is the framework of ribs and veins, which have already been described in full (136–147).
They serve not only to strengthen the leaf, but also to bring in the ascending sap, and to distribute it by the vessels throughout every part. The cellular portion is the green pulp, and is nearly the same as the green layer of the bark. So that the leaf may properly enough be regarded as a sort of expansion of the fibrous and green layers of the bark. It has of course no corky layer; but the whole is covered by a transparent skin or epidermis, resembling that of the stem.

438. The green pulp consists of cells of various forms, usually loosely arranged, so as to leave many irregular spaces or air-passage, communicating with each other throughout the whole interior of the leaf (Fig. 336). The green color is owing to a peculiar green matter lying loose in the cells, in form of minute grains, named Chlorophyll (i.e. the green of leaves). It is this substance, seen through the transparent walls of the cells, where it is accumulated, which gives the common green hue to vegetation, and especially to foliage.

439. The green pulp in most leaves forms two principal layers; an upper one, facing the sky, and an under one, facing the ground. The upper one is always deeper green in color than the lower. This is partly owing, perhaps, to a greater amount of chlorophyll in the upper cells, but mainly to the more compact arrangement of these cells. As is seen in Fig. 356 and 357, the cells of the upper side are oblong or cylindrical, and stand endwise to the surface of the leaf, usually close together, leaving hardly any vacant spaces. Those of the lower part of the leaf are apt to be irregular in shape, most of them with their longest diameter parallel to the face of the leaf, and are very loosely arranged, leaving many and wide air-chambers. The green color underneath is therefore diluted and paler.

440. In many plants which grow where they are subject to drought, and which hold their leaves during the dry season (as the Oleander for example), the greater part of the thickness of the leaf consists of layers of long cells, placed endwise and very much compressed.
pasted, so as to expose as little surface as possible to the direct action of the hot sun. On the other hand, the leaves of marsh plants, and if others not intended to survive a drought, have their cells more loosely arranged throughout. In such leaves the epidermis, or skin, is made of only one layer of cells; while in the Oleander, and the like, it consists of three or four layers of hard and thick-walled cells.

In all this, therefore, we plainly see an arrangement for tempering the action of direct sunshine, and for restraining a too copious evaporation, which would dry up and destroy the tender cells, at least when moisture is not abundantly supplied through the roots.

441. That the upper side of the leaf alone is so constructed as to bear the sunshine, is shown by what happens when their position is reversed: then the leaf soon twists on its stalk, so as to turn again its under surface away from the light; and when prevented from doing so, it perishes.

442. A large part of the moisture which the roots of a growing plant are constantly absorbing, after being carried up through the stem, is evaporated from the leaves. A Sunflower-plant, a little over three feet high, and with between five and six thousand square inches of surface in foliage, &c., has been found to exhale twenty or thirty cens (between one and two pints) of water in a day. Some part of this, no doubt, flies off through the walls of the epidermis or skin, at least in sunshine and dry weather; but no considerable portion of it. The very object of this skin is to restrain evaporation. The greater part of the moisture exhaled escapes from the leaf through the

443. Stomata or breathing-places. These are small openings through the epidermis into the air-chambers, establishing a direct communication between the whole interior of the leaf and the external air. Through these the vapor of water and air can, freely escape, or enter, as the case may be. The aperture is guarded by a pair of thin-walled cells,—resembling those of the green pulp within,—which open when moist so as to allow exhalation to go on, but promptly close when dry, so as to arrest it before the interior of the leaf is injured by the dryness.

444. Like the air-chambers, the breathing-places belong mainly to the under side of the leaf. In the White Lily,—where they are unusually large, and easily seen by a simple microscope of moderate power,—there are about 50,000 to the square inch on the epidermis of the lower surface of the leaf, and only about 2,000 in
LESSON 26.

THE PLANT IN ACTION.

the same space of the upper surface. More commonly there are few or none on the upper side; direct sunshine evidently being unfavorable to their operation. Their immense numbers make up for their minuteness. They are said to vary from less than 1,000 to 170,000 to the square inch of surface. In the Apple-tree, where they are under the average as to number, there are about 24,000 to the square inch of the lower surface; so that each leaf has not far from 100,000 of these openings or mouths.

LESSON XXVI.

THE PLANT IN ACTION; DOING THE WORK OF VEGETATION.

445. Being now acquainted with the machinery of the plant, we naturally proceed to inquire what the use of it is, and how it works.

446. It has already been stated, in the first of these Lessons (7), that the great work of plants is to change inorganic into organic matter; that is, to take portions of earth and air,—of mineral matter,—upon which animals cannot live at all, and to convert them

FIG. 357. Portion of a White-Lily leaf, cut through and magnified, showing a portion of the thickness, and also a part of the side of the lower side, with some breathing pores.
into something upon which they can live, namely, into food. All
the food of all animals is produced by plants. Animals live upon
vegetables; and vegetables live upon earth and air, principally
upon the air.

447. Plants feed upon Earth and Air. This is evident enough from
the way in which they live. Many plants will flourish in pure sand
or powdered chalk, or on the bare face of a rock or wall, watered
merely with rain-water. And almost any plant may be made to
grow from the seed in pure sand, and increase its weight many times,
even if it will not come to perfection. Many naturally live suspended
from the branches of trees high in the air, and nourished by it alone,
ever having any connection with the soil (81); and some which
naturally grow on the ground, like the Live-for-ever of the gardens,
when pulled up by the roots and hung in the air will often flourish
the whole summer long.

448. It is true that fast-growing plants, or those which produce
considerable vegetable matter in a season,—especially in such a
concentrated form as to be useful as food for man or the higher
animals,—will come to maturity only in an enriched soil. But
what is a rich soil? One which contains decomposing vegetable
matter, or some decomposing mineral matter; that is, in either case,
some decomposing organic matter formerly produced by plants;
said by this, grain-bearing and other important vegetables will
grow more rapidly and vigorously, and make a greater amount of
nourishing matter, than they could if left to do the whole work at
once from the beginning. So that in these cases also all the organic
matter was made by plants, and made out of earth and air.

449. Their Chemical Composition shows what Plants are made of. The
soil and the air in which plants live, and by which they are every-
where surrounded, supply a variety of materials, some likely to be
useful to the plant, others not. To know what elements the plant
makes use of, we must first know of what its fabric and its products
are composed.

450. We may distinguish two sorts of materials in plants, one of
which is absolutely essential, and is the same in all of them; the
other, also to some extent essential, but very variable in different
plants, or in the same plant under different circumstances. The
former is the organic, the latter the inorganic or earthy materials.

451. The Earthy or Inorganic Constituents. If we burn thoroughly a
leaf, a piece of wood, or any other part of a vegetable, almost all of
it is dissipated into air. But a little ashes remain; these represent
the earthy constituents of the plant. 452. They consist of some potash (or soda if a marine plant was
used), some silex (the same as flint), and probably a little lime, ol-
camine, or magnesia, iron or manganese, sulphur or phosphorus, &c.
Some or all of these elements may be detected in many or most
plants. But they make no part of their real fabric; and they form
only from one or two to nine or ten parts out of a hundred of any
vegetable substance. The ashes vary according to the nature
of the soil. In fact, they consist, principally, of such materials as
happened to be dissolved, in small quantity, in the water which was
taken up by the roots; and when that is consumed by the plant, or
flies off pure (as it largely does, 447) by exhalation, the earthy mat-
ter is left behind in the cells,—just as it is left incrusting the sides
of a teapot in which much hard water has been boiled. As is
very natural, therefore, we find more earthy matter (i. e. more
ashes) in the leaves than in any other part (sometimes as much as
seven per cent, when the wood contains only two per cent); because
it is through the leaves that most of the water escapes from the plant.
These earthy constituents are often useful to the plant (the silex, for
instance, increases the strength of the Wheat-stalk), or are useful in
the plant’s products as furnishing needful elements in the food of man
and other animals; and some must be held to be necessary to vege-
tation, since this is never known to go on without them.

453. The Organic Constituents. As has just been remarked, when
we burn in the open air a piece of any plant, nearly its whole bulk,
and from 88 to more than 99 parts out of a hundred by weight of its
substance, disappear, being turned into air and vapor. These are
the organic constituents which have thus been consumed,—the
actual materials of the cells and the whole real fabric of the plant.
And we may state that, in burning, it has been decomposed into ex-
actly the same kinds of air, and the vapor of water, that the plant
used in its making. The burning has merely undone the work of
vegetation, and given back the materials to the air just in the state
in which the plant took them.

454. It will not be difficult to understand what the organic con-
stituents, that is, what the real materials, of the plant are, and how
the plant obtains them. The substance of which vegetables consist,
viz. the wall of the cells, is made, is by chemists named Cellulose. It
is just the same thing in composition in wood and in soft cellular tis-
sun, in the tender pot-herb and in the oldest tree. It is composed of carbon, hydrogen, and oxygen, 12 parts of the former to 10 of each of the two latter. These, accordingly, are necessary materials of vegetable growth, and must be received by the growing plant.

455. The Plant's Food must contain these three elements in some shape or other. Let us look for them in the materials which the plant is constantly taking from the soil and the air.

456. Water is the substance of which it takes in vastly more than of anything else; we well know how necessary it is to vegetable life. The plant imbues water by the roots, which are specially constructed for taking it in, as a liquid when the soil is wet, and probably also in the form of vapor when the soil is only damp. That water in the form of vapor is absorbed by the leaves likewise, when the plant needs it, is evident from the way partly wilted leaves revive and freshen when sprinkled or placed in a moist atmosphere. Now water is composed of hydrogen and oxygen, two of the three elements of cellulose or plant-fabric. Moreover, the hydrogen and the oxygen exist in water in exactly the same proportions that they do in cellulose: so it is clear that water furnishes these two elements.

457. We inquire, therefore, after the third element, carbon. This is the same as pure charcoal. Charcoal is the carbon of a vegetable left behind after charring; that is, heating it out of contact of the air until the hydrogen and oxygen are driven off. The charcoal of wood is so abundant in bulk as to preserve perfectly the shape of the cells after charring, and in weight it amounts to about half of the original material. Carbon itself is a solid, and not at all dissolved by water: as such, therefore, it cannot be absorbed into the plant, however minute the particles; only liquid and air can pass through the walls of the cells (462, 410). It must therefore come to the plant in some combination, and in a fluid form. The only substance within the plant's reach containing carbon in the proper state is

458. Carbonic Acid. This is a gas, and one of the components of the atmosphere, everywhere making about 1/2 of its bulk, — enough for the food of plants, but not enough to be injurious to animals. For when mixed in any considerable proportion with the air we breathe, carbonic acid is very poisonous. The air produced by burning charcoal is carbonic acid, and we know how soon burning charcoal in a close room will destroy life.

459. The air around us consists, besides this minute proportion of carbonic acid, of two other gases, mixed together, viz. oxygen...
and nitrogen. The nitrogen gas does not support animal life; it only
contains the oxygen, which does. It is the oxygen gas alone which
renders the air fit for breathing.

460. Carbonic acid consists of carbon combined with oxygen. In
breathing, animals are constantly forming carbonic acid gas by unit-
ing carbon from their bodies with oxygen of the air; they inspire
oxygen into their lungs; they breathe it out as carbonic acid. So
with every breath animals are diminishing the oxygen of the air,—
so necessary to animal life,—and are increasing its carbonic acid,—
so hurtful to animal life; or rather, which would be so hurtful if it
were allowed to accumulate in the air. The reason why it does not
increase in the air beyond this minute proportion is that plants feed
upon it. They draw their whole stock of carbon from the carbonic
acid of the air.

461. Plants take it in by their leaves. Every current, or breeze
that stirs the foliage, brings to every leaf a succession of fresh atoms
of carbonic acid, which it absorbs through its thousands of breathing-
pores. We may prove this very easily, by putting a small plant or
a fresh leafy bough into a glass globe, exposed to sunshine, and hav-
ing two openings, causing air mixed with a known proportion
of carbonic acid gas to enter by one opening, slowly traverse the foliage,
and pass out by the other into a vessel proper to receive it; now
examining the air chemically, it will be found to have less carbonic
acid than before. A portion has been taken up by the foliage.

462. Plants also take it in by their roots, some probably as a gas,
in the same way that leaves absorb it, and much, certainly, dissolved
in the water which the roots imbibe. The air in the soil, es-
pecially in a rich soil, contains many times as much carbonic acid
as an equal bulk of the atmosphere above. Decomposing vegetable
matter or manure in the soil, are constantly evolving carbonic acid,
and a large part of it remains there, in the pores and crevices, among
which the absorbing roots spread and ramify. Besides, as this gas
is dissolved by water in a moderate degree, every rain-drop that falls
from the clouds as the ground brings with it a little carbonic acid,
dissolving or washing it out of the air as it passes, and bringing it
down to the roots of plants. And what flows off into the streams
and ponds serves for the food of water-plants.

463. So water and carbonic acid, taken in by the leaves, or taken
in by the roots and carried up to the leaves as crude sap, are the
general food of plants,—are the raw materials out of which at least
the fabric and a part of the general products of the plant are made.

Water and carbonic acid are mineral matters: in the plant, mainly
in the foliage, they are changed into organic matters. This is

464. The Plants proper Work, Assimilation, viz. the conversion by the
vegetable of foreign, dead, mineral matter into its own living sub-
stance, or into organic matter capable of becoming living substance.
To do this is, as we have said, the peculiar office of the plant. How
and where is it done?

465. It is done in the green parts of plants alone, and only when
these are actuated upon by the light of the sun. The sun in some way
supplies a power which enables the living plant to originate these
peculiar chemical combinations,—to organize matter into forms
which are alone capable of being endowed with life. The proof of
this proposition is simple; and it shows at the same time, in the
simplest way, what the plant does with the water and carbonic acid
it consumes. Namely, 1st, it is only in sunshine or bright daylight
that the green parts of plants give out oxygen gas,—then they do;
and 2d, the giving out of this oxygen gas is just what is required to
render the chemical composition of water and carbonic acid the same
as that of cellulose (454), that is, of the plant's fabric. This shows
why plants spread out so large a surface of foliage.

466. In plants growing or placed under water we may see bubbles
of air rising from the foliage; we may collect enough of this air to
test it by a candle's burning brighter in it; which shows it to be
oxygen gas. Now if the plant is making cellulose or plant-substance,—
that is, is making the very materials of its fabric and growth, as
most generally be the case,—all this oxygen gas given off by the
seeds comes from the decomposition of carbonic acid taken in by
the plant.

467. This must be so, because cellulose is composed of 10 parts of
oxygen and 10 of hydrogen to 12 of carbon (454); here the first
so are just in the same proportion as in water, which consists of
so part of oxygen and one of hydrogen,—so that 10 parts of water
of 12 of carbon represent one of cellulose or plant-fabric; and to
make it out of water and carbonic acid, the latter (which is composed
of carbon and oxygen) has only to give up all its oxygen. In other
words, the plant, in its foliage under sunshine, decomposes carbonic
acid gas, and turns the carbon together with water into cellulose, at
the same time giving the oxygen off into the air.

468. And we can readily prove that it is so,—namely, that plants
do decompose carbonic acid in their leaves and give out its oxygen, — by the experiment mentioned in paragraph 461. There the leaves, as we have stated, are taking in carbonic acid gas. We now add, that they are giving out oxygen gas at the same rate. The air as it comes from the glass globe is found to have just as much more oxygen as it has less carbonic acid than before — just as much more oxygen as would be required to turn the carbon retained in the plant back into carbonic acid again.

469. It is all the same when plants — instead of making fabric at once, that is, growing — make the prepared material, and store it up for future use. The principal product of plants for this purpose is Starch, which consists of minute grains of organic matter, lying loose in the cells. Plants often accumulate this, perhaps in the root, as in the Turnip, Carrot, and Dahlia (Fig. 57–60); or in subterranean stems or branches, as in the Potato (Fig. 68), and many rootstocks; or in the bases of leaves, as in the Onion, Lily (Fig. 73–75), and other bulbs; or in fleshy leaves above ground, as those of the Ice-Plant, House-leek, and Century-Plant (Fig. 82); or in the whole thickened body, as in many Cactiases (Fig. 76); or in the seed around the embryo, as in Indian Corn (Fig. 38, 39) and other grain; or even in the embryo itself, as in the Horsechestnut (Fig. 23, 24), Bean (Fig. 16), Pea (Fig. 19), &c. In all these forms this is a provision for future growth, either of the plant itself or of some offspring, as it springs from the seed. Now starch is to cellulose or vegetable fabric just what the prepared clay is to the potter’s vessel, — the same thing, only requiring to be shaped and consolidated. It has exactly the same chemical composition, and is equally made of carbon and the elements of water, by decomposing the same amount of carbonic acid and giving back its oxygen to the air. In using it for growth, the plant dissolves it, conveys it to the growing parts, and consolidates it into fabric.

470. Sugar, another principal vegetable product, also has essentially the same chemical composition, and may be formed out of the same common food of plants, with the same result. The different kinds of sugar (that of the cane, &c. and of grapes) consist of the same three materials as starch and cellulose, only with a little more water. The plant generally forms the sugar out of starch, altering one into the other with great ease; starch being the form in which prepared material is stored up, and sugar that in which it is ex-
pended or transferred from one part of the plant to another. In the Sugar-cane and Indian Corn, starch is deposited in the seed; in germination this is turned into sugar for the plantlet to begin its growth with; the growing plant produces more, and deposits some as starch in the stalk; just before blossoming, this is changed into sugar again, and dissolved in the sap, to form and feed the flowers (which cannot, like the leaves, create nourishment for themselves); and what is left is deposited in the seed as starch again, with which to begin the same operation in the next generation.

471. We might enumerate other vegetable products of this class (such as oil, acids, jelly, the pulp of fruits, &c.), and show how they are formed out of the carbonic acid and water which the plant takes in. But those already mentioned are sufficient. In producing any of them, carbonic acid taken from the air is decomposed, its carbon retained, and its oxygen given back to the air. That is to say,

472. Plants purify the Air for Animals, by taking away the carbonic acid injurious to them, continually poured into it by their breathing, as well as by the burning of fuel and by decay, and restoring in its place an equal bulk of life-sustaining oxygen (469). And by the same operation, combining this carbon with the elements of water, &c., and elaborating them into organic matter,—especially into starch, sugar, oil, and the like,—

473. Plants produce all the Food and Fabric of Animals. The herbivorous animals feed directly upon vegetation; and the carnivorous feed upon the herbivorous. Neither the one nor the other originate any organic matter. They take it all ready-made from plants,—leaving the form and qualities more or less, and at length destroying or decomposing it.

474. Starch, sugar, and oil, for example, form a large part of the diet of herbivorous animals and of man. When digested, they enter to the blood; any surplus may be stored up for a time in the form of fat, being changed a little in its nature; while the rest (and finally the whole) is decomposed into carbonic acid and water, and expelled in the lungs in expiration;—in other words, is given back to the plant as its food (463);—is given back to the air in the same form in that it would have been if the vegetable matter had been left where it grew, or if it had been set on fire and burned;—it with the same result, too, as to the heat, the heat in this case deduces and maintains the nearer temperature of the atmosphere. 
LESSON 26.] AND PRODUCING THE FOOD OF ANIMALS. 165

475. But starch, sugar, and the like, do not make any part of the flesh or fabric of animals. And that for the obvious reason, that they consist of only the three elements carbon, hydrogen, and oxygen; whereas the flesh of animals has nitrogen as well as those three elements in its composition. The materials of the animal body, called Fibrine in the flesh or muscles, Gelatine in the sinews and bones, Caseine in the curd of milk, &c., are all forms of one and the same substance, composed of carbon, hydrogen, oxygen, and nitrogen. As nitrogen is a large constituent of the atmosphere, and animals are taking it into their lungs with every breath they draw, we might suppose that they take this element of their frame directly from the air. But they do not. Even this is furnished by vegetables, and animals receive it ready-made in their food. And this brings us to consider still another and most important vegetable product, of a different class from the rest (omitted till now, for the sake of greater simplicity); namely, what is called

476. Proteins. This name has been given to it by chemists, because it occurs under such a protein variety of forms. The Glutens of wheat and the Legumines of beans and other leguminous plants may be taken to represent it. It occurs in all plants, at least in young and growing parts. It does not make any portion of their tissue, but is contained in all living cells, as a thin jelly, mingled with the sap or juice, or as a delicate mucilaginous lining. In fact, it is formed earlier than the cell-wall itself, and the latter is moulded on it, as it were; so it is also called Protoplasm. It disappears from common cells as they grow old, being transferred onward to new or forming parts, where it plays a very active part in growth. Mixed with starch, &c., it is accumulated in considerable quantity in wheat, beans, and other grains and seeds, especially those which are most nutritious as food. It is the protein which makes them so nutritious. Taken by animals as food, it forms their flesh and sinews, and the animal part of their bones, without much change; for it has the same composition.—is just the same thing, indeed, in some slightly different forms. To produce it, the plant employs, in addition to the carbonic acid and water already mentioned as its general food, some ammonia; which is a compound of hydrogen and nitrogen. Ammonia (which is the same thing as hartshorn) is constantly escaping into the air in small quantities from all decomposing vegetable and animal substances. Besides, it is produced in every thunder-storm. Every flash of lightning causes some to be made (in the
form of nitrate of ammonia) out of the nitrogen of the air and the vapor of water. The reason why it never accumulates in the air so as to be perceptible is, that it is extremely soluble in water, as are all its compounds. So it is washed out of the atmosphere by the rain as fast as it is made or rises into it, and is brought down to the roots of plants, which take it in freely. When assimilated in the leaves along with carbon and water, proteins is formed, the very substance of the flesh of animals. So all flesh is vegetable matter in its origin.

477. Even the earthy matter of the bones, and the iron and other mineral matters in the blood of animals, are derived from the plants they feed upon, with hardly an exception. These are furnished by the earthy or mineral constituents of plants (152), and are merely accumulated in the animal frame.

478. Animals, therefore, depend absolutely upon vegetables for their being. The great object for which the All-wise Creator established the vegetable kingdom evidently is, that plants might stand on the surface of the earth between the mineral and the animal creations, and organize portions of the former for the sustenance of the latter.

LESSON XXVII.

PLANT-LIFE.

479. Life is known to us only by its effects. We cannot tell what it is; but we notice some things which it does. One peculiarity of living things, which has been illustrated in the last Lesson, is their power of transforming matter into new forms, and thereby making products not produced in any other way. Life is also manifested by

480. Motion, that is, by self-caused movements. Living things move; those not living are moved. Animals, living as they do upon organized food,—which is not found everywhere,—must needs have the power of going after it, of collecting it, or at least of taking it in, which requires them to make spontaneous movements. But plants, with their widespread surface (34, 131) always in con-
tact with the earth and air on which they feed,—the latter and the most important of these everywhere just the same,—have no need of locomotion, and so are generally fixed fast to the spot where they grow.

481. Yet many plants move their parts freely, sometimes when there is no occasion for it that we can understand, and sometimes accomplishing by it some useful end. The sudden closing of the leaves of the Sensitive Plant, and the drooping of its leafstalks, when jarred, also the sudden starting forwards of the stamens of the Barberry at the touch, are familiar examples. Such cases seem at first view so strange, and so different from what we expect of a plant, that these plants are generally imagined to be endowed with a peculiar faculty, denied to common vegetables. But a closer examination will show that plants generally share in this faculty; that similar movements may be detected in them all, only—like those of the hands of a clock, or of the shadow of a sundial—they are too slow for the motion to be directly seen.

482. It is perfectly evident, also, that growth requires motion; that there is always an internal activity in living plants as well as in animals,—a power exerted which causes their fluids to move or circulate, and carries materials from one part to another. Some movements are mechanical; but even these are generally directed or controlled by the plant. Others must be as truly self-caused as those of animals are. Let us glance at some of the principal sorts, and see what light they throw upon vegetable life.

483. Circulation in cells. From what we know of the anatomy of plants, it is clear that they have no general circulation (like that of all animals except the lowest), through a system of vessels opening into each other (402, 410). But in plants each living cell carries on a circulation of its own, at least when young and active. This may be beautifully seen in the transparent stems of Chara and many other water-plants, and in the leaves of the Fresh-water Tape-Grass (Vallisneria), under a good microscope. Here the sap circulates, often quite briskly in appearance, (but the motion is magnified as well as the objects,) in a steady stream, just beneath the wall, around each cell, passing up one side, across the end, down the other, and so round to complete the circuit, carrying with it small particles, or the larger green grains, which make the current more visible. This circulation may also be observed in hairs, particularly those on flowers, such as the jointed hairs of Spiderwort, looking
under the glass like strings of blue beads, each bead being a cell. But here a microscope magnifying six or eight hundred times in diameter is needed to see the current distinctly.

484. The movement belongs to the protoplasm (476), or jelly-like matter under the cell-wall. As this substance has just the same composition as the flesh of animals, it is not so strange that it should exhibit such animal-like characters. In the simplest water-plants, of the Sea-ward family, the body which answers to the seed is at first only a rounded little mass of protoplasm. When these bodies escape from the mother plant, they often swim about freely in the water in various directions, by a truly spontaneous motion, when they closely resemble animals; and are often mistaken for them. After enjoying this active life for several hours, they come to rest, form a covering of cellulose, and therefore become true vegetable cells, fix themselves to some support, germinate, and grow into the perfect plant.

486. Dissection, Curriance of the Sap, &c. Although contained in cells with closed walls, nevertheless the fluids taken in by the roots are carried up through the stem to the leaves even of the topmost bough of the tallest tree. And the sap, after its assimilation by the leaves, is carried down in the bark or the cambium-layer, and distributed throughout the plant, or else is conveyed to the points where growth is taking place, or is accumulated in roots, stems, or wherever a deposit is being stored up for future use (71, 104, 128, 401).

487. That the rise of the sap is pretty rapid in a leafy and growing plant, on a dry summer’s day, is evident from the amount of water it is continually losing by evaporation from the foliage (447); a loss which must all the while be supplied from the roots, or else the leaves would dry up and die; so they do so promptly when separated from the stem, or when the stem is cut off from the roots. Of course they do not then lose moisture any faster than they did before the separation; only the supply is no longer kept up from below.

488. The rise of the sap into the leaves apparently is to a great degree the result of a mode of diffusion which has been called Endosmosis. It acts in this way. Whenever two fluids of different density are separated by a membrane, whether of dead or of living substance, or are separated by any porous partition, a flow takes place through the partition, mainly towards the heavier fluid, until that is brought to the same density as the other. A familiar illus-
tration is seen when we place powdered sugar upon strawberries, and slightly moisten them: the dissolving sugar makes a solution stronger than the juice in the cells of the fruit; so this is gradually drawn out. Also when pulpy fruits are boiled in a strong syrup: as soon as the syrup becomes denser than the juice in the fruit, the latter begins to flow out, and the fruit begins to shrivel. But when shrivelled fruits are placed in weak syrup, or in water, they become plump, because the flow then sets inwards, the juice in the cells being denser than the water outside. Now the cells of the living plant contain organic matter, in the form of mucilage, protoplasm, sometimes sugar, &c., and this particularly abounds in young and growing parts, such as the tips of roots (Fig. 56), which, as is well known, are the principal agents in absorbing moisture from the ground. The contents of their cells being therefore always much denser than the moisture outside (which is water containing a little carbonic acid, &c., and a very minute quantity of earthy matter), this moisture is constantly drawn into the root. What makes it wound in the leaves?

488. To answer this question, we must look to the leaves, and consider what is going on there. For (however it may be in the spring before the leaves are out), in a leafy plant or tree the sap is not forced up from below, but is drawn up from above. Water largely evaporates from the leaves (447); it flies off into the air as vapor, leaving behind all the earthy and the organic matters, — these not being volatile: — the sap in the cells of the leaf therefore becomes denser, and so drawn upon the more watery contents of the cells of the stalk, these upon those of the stem below, and so on, from cell to cell down to the root, causing a flow from the roots to the leaves, which begins in the latter, — just as a wind begins in the direction towards which it blows. Somewhat similarly, evaporated sap is drawn into buds or any growing parts, where it is concentrated into tubers, roots, seeds, and the like, in which it is condensed into starch and stored up for future use (74, 703, &c.).

489. So in absorbing moisture by the roots, and in conveying the sap or the juices from cell to cell and from one part to another: the plant appears to make use of a physical or inorganic force; but it manages and directs this as the purposes of the vegetable economy demand. Now, when the proper materials are brought to the growing parts, growth takes place; and in growth the plant moves.
under the glass like strings of blue beads, each bead being a cell. But here a microscope magnifying six or eight hundred times in diameter is needed to see the current distinctly.

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407. The rise of the sap into the leaves apparently is to a great degree the result of a mode of diffusion which has been called En- domotion. It acts in this way. Whenever two fluids of different density are separated by a membrane, whether of dead or of living substance, or are separated by any porous partition, a flow takes place through the partition, mainly towards the heavier fluid, until that is brought to the same density as the other. A familiar illus-
CONVEYANCE OF THE SAP.

When powdered sugar is placed upon strawberries, and slightly moistened, the dissolving sugar makes a solution stronger than the juice in the cells of the fruit; so this is gradually drawn out. Also when pulpy fruits are boiled in a strong syrup; as soon as the syrup becomes denser than the juice in the fruit, the latter begins to flow out, and the fruit begins to shrivel. But when shrivelled fruits are placed in weak syrup, or in water, they become plump, because the fluid then sets towards the juice in the cells being denser than the water outside. Now the cells of the living plant contain organic matter, in the form of mucilage, sap, sometimes sugar, &c.; and this particularly abounds in young and growing parts, such as the tips of roots (Fig. 56), which, as is well known, are the principal agents in absorbing moisture from the ground. The contents of their cells being therefore always much denser than the moisture outside (which is water containing a little carbonic acid, &c., and a very minute quantity of earthy matter), this moisture is constantly drawn into the root. What makes it ascend to the leaves?

488. To answer this question, we must look to the leaves, and consider what is going on there. For (however it may be in the spring before the leaves are out), in a leafy plant or tree the sap is not forced up from below, but is drawn up from above. Water heavily evaporates from the leaves (447); it flies off into the air as vapor, leaving behind all the earthy and the organic matters;—these not being volatile;—the sap in the cells of the leaf therefore becomes denser, and so draws upon the more watery contents of the cells of the stalk, these upon those of the stem below, and so on, from cell to cell down to the root, causing a flow from the roots to the leaves, which begins in the latter,—just as a wind begins in the direction towards which it blows. Somewhat similarly, elaborated sap is drawn into buds or any growing parts, where it is consolidated into sap of any growing parts, or is conveyed into tubers, roots, seeds, and the like, in which it is condensed into starch and stored up for future use (74, 201, &c.).

489. So in absorbing moisture by the roots, and in conveying the sap or the juices from cell to cell and from one part to another, the plant appears to make use of a physical or inorganic force; but it manages and directs this as the purposes of the vegetable economy demand. Now, when the proper materials are brought to the growing parts, growth takes place; and in growth the plant moves.
the particles of matter, arranges them, and shapes the fabric in a manner which we cannot at all explain by any mechanical laws. The organs are not shaped by any external forces; they shape themselves, and take such forms and positions as the nature of each part, or the kind of plant, requires.

410. **Special Movements.** Besides growing, and quite independent of it, plants not only assume particular positions, but move or bend one part upon another to do so. Almost every species does this, as well as what are called sensitive plants. In springing from the seed, the radicle or stem of the embryo, if not in the proper position already, bends itself round so as to direct its root-end downwards, and the stem-end or plume upwards. It does the same when covered so deeply by the soil that no light can affect it, or when growing in a perfectly dark cellar. But after reaching the light, the stem bends towards that, as every one knows; and bends towards the stronger light, when the two sides are unequally exposed to the sun. It is now known that the shoot is bent by the shortening of the cells on the more illuminated side; for if we split the bending shoot in two, that side curves over still more, while the opposite side inclines to fly back. But how the light causes the cells to shorten on that side, we can no more explain, than we can tell how the will, acting through the nerves, causes the contraction of the fibres of the muscles by which a man bends his arm. We are sure that the bending of the shoot has nothing to do with growth, because it takes place after a shoot is grown; and the delicate stem of a young seedling will bend a thousand times faster than it grows. Also because it is yellow light that most favors growth and the formation of vegetable fabric, while the blue and violet rays produce the bending. Leaves also move, even more freely than stems. They constantly present their upper face to the light; and when turned upside down, they twist on their stalks, or curve round to recover their original position. The free ends of twining stems, as of Hop, or Morning Glory, or Bean, which apparently hang over to one side from their weight, are in fact bent over, and, the direction of the bend constantly changing, the shoot is steadily sweeping round the circle, making a revolution every few hours, or even more rapidly in certain cases, until it reaches a neighboring support, when, by a continuation of the same movement, it twines around it. Most tendrils resolve in the same way, sometimes even more rapidly; while others only turn from the
Light; this is especially the case with those that cling to walls or trunks by sucker-like disks, as Virginia Creeper, p. 38, fig. 62. When an active tendril comes into contact with a stem or any such extraneous body, it incurves at the point of contact and so lays hold of the support; the same contraction or tendency to curve, affecting the whole length of the tendril, it soon shortens into a coil, part rolling one way, part the other, thus drawing the shoot up to the supporting body; or, if the tendril be free, it winds up in a simple coil.

This movement of tendrils is so prompt in the Star-Cucumber (Scurrurus) in Echinoecystis, and in two sorts of Passion-flower, that the end, after a gentle rubbing, coils up by a movement rapid enough to be readily seen. In plants that climb by their leaf-stalks, such as Murraya and Tremonia, the movements are similar, but much too slow to be seen.

491. The so-called sleep of plants is a change of position as might draw on, and in different ways, according to the species,—the Locust and Wood-Sorrel turning down their leaves, the Honey Locust raising them upright, the Sensitive Plant turning them forwards one over another; and the next morning they resume their diurnal position. One fact, among others, showing that the changes are not caused by the light, but by some power in the plant itself, is this. The leaves of the Sensitive Plant close long before sunset; but they expand again before sunrise, under much less light than they had when they closed. In several plants the leaves take the nocturnal position when bruised or jarred,—in the common Sensitive Plant very suddenly, in other sorts less quickly, in the Honey Locust a little too slowly for us to see the motion. The way in which blossoms open and close, some when the light increases some when it diminishes, illustrates the same thing. The stamens of the Barberry, when touched at the base on the inner side,—as by an insect seeking for honey, or by the point of a pin,—make a sudden jerk forward, and in the flower commonly throw some pollen upon the stigma, which stands a little above their reach.

492. In many of these cases we plainly perceive that a useful end is subserved. But what shall we say of the Venus's Fly-trap of North Carolina, growing where it might be sure of all the food a plant can need, yet provided with an apparatus for catching insects, and actually capturing them expertly by a sudden motion, in the manner already described (126, Fig. 61)? Or of the leaflets of the
Desmodium gyrans of the East Indies, spontaneously falling and rising by turns in jerking motions nearly the whole day long? We can only say, that plants are alive, no less than animals, and that it is a characteristic of living things to move.

**Cryptogamous or Flowerless Plants.**

493. In all the foregoing Lessons, we have had what may be called plants of the higher classes alone in view. There are others, composing the lower grades of vegetation, to which some allusion ought to be made.

494. Of this sort are Ferns or Brakes, Mosses, Liverworts, Lichens, Sea-weeds, and Fungi or Mushrooms. They are all classed together under the name of Flowerless Plants, or Cryptogamous Plants; the former epithet referring to the fact that they do not bear real blossoms (with stamens and pistils) nor seeds (with an embryo ready-formed within). Instead of seeds they have spores, which are usually simple cells (392). The name Cryptogamous means, of hidden germination, and intimates that they may have something answering to stamens and pistils, although not the same; and this is now known to be the case with most of them.

495. Flowerless plants are so very various, and so peculiar in each family, that a volume would be required to illustrate them. Curious and attractive as they are, they are too difficult to be studied botanically by the beginner, except the Ferns, Club-Mosses, and Horsetails. For the study of these we refer the student at once to the Manual of the Botany of the Northern United States, and to the Field, Forest, and Garden Botany. The structure and physiology of these plants, as well as of the Mosses, Liverworts, Lichens, Sea-weeds, and Fungi, are explained in the Structural Botany, or Botanical Text-Book, and in other similar works. When the student has become prepared for the study, nothing can be more interesting than these plants of the lowest orders.
496. Until now, we have been considering plants as to their structure and their mode of life. We have, as it were, been reading the biography of an individual plant, following it from the tiny seedling up to the mature and fruit-bearing herb or tree, and learning how it grows and what it does. The botanist also considers plants as to their relationships.

497. Plants and animals, as is well known, have two great peculiarities: 1st, they form themselves; and 2d, they multiply themselves. They reproduce themselves in a continued succession of individuals (2). Mineral things occur as masses, which are divisible into smaller and still smaller ones without alteration of their properties (291). But organic things (vegetables and animals) exist as individual beings. Each owes its existence to a parent, and produces similar individuals in its turn. So each individual is a link of a chain, and to this chain the natural-historian applies the name of species. All the descendants from the same stock therefore compose one species. And it was from our observing that the several sorts of plants or animals steadily reproduce themselves,—or, in other words, keep up a succession of similar individuals,—that the idea of species originated. So we are led to conclude that the Creator established a definite number of species at the beginning, which have continued by propagation, each after its kind.

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500. There are few species, however, in which man has actually observed the succession for many generations. It could seldom be proved that all the White Blue trees or White Oaks of any forest came from the same stock. But observation having familiarized us with the general fact, that individuals proceeding from the same stock are essentially like, we infer from their close resemblance that these similar individuals belong to the same species. That is, we infer it when the individuals are as much like each other as those are which we know to have sprung from the same stock. *

501. We do not infer it from every resemblance; for there is the resemblance of kind,—as between the White Oak and the Red Oak.
and between the latter and the Scarlet Oak: these, we take for
granted, have not originated from one and the same stock, but from
three separate stocks. Nor do we deny it on account of every
difference; for even the sheep of the same flock, and the plants
raised from panns of the same ped, may show differences, and such
differences occasionally get to be very striking. When they are
prety well marked, we call them

Varieties. The White Oak, for example, presents two or three
varieties in the shape of the leaves, although they may be all alike
upon each particular tree. The question often arises, practically,
and it is often hard to answer, whether the difference in a particular
case is that of a variety, or is specific. If the former, we may
commonly prove it to be so by finding such intermediate degrees
of difference in various individuals as to show that no clear line of
distinction can be drawn between them; or else by observing the
variety to vary back again, if not in the same individual, yet in its
offspring. Our sorts of Apples, Peas, Potatoes, and the like, show
us that differences which are permanent in the individual, and con-
tinue unchanged through a long series of generations when propa-
gated by division (as by offsets, cuttings, grafts, bulbs, tubers, &c.),
are not likely to be reproduced by seed. Still they sometimes are
so: and such varieties are called

Races. These are strongly marked varieties, capable of being
propagated by seed. One different sort of Wheat, Indian Corn,
Peas, Radishes, &c., are familiar examples: and the races of men
offer an analogous instance.

502. It should be noted, that all varieties have a tendency to be
reproduced by seed, just as all the peculiarities of the parent tend to
be reproduced in the offspring. And by selecting those plants which
have developed or inherited any desirable peculiarities, keeping them
from mingling with their less promising brethren, and selecting again
the most promising plants raised from their seeds, we may in a few
generations render almost any variety transmissible by seed, so long
as we take good care of it. In fact, this is the way the cultivated or
domesticated races, so useful to man, have been fixed and preserved.
Races, in fact, can hardly, if at all, be said to exist independently of
man. But man does not really produce them. Such peculiarities
—often surprising enough—now and then originate, we know not
how (the plant sports, as the gardeners say); they are only pre-
served, propagated, and generally further developed, by the culti-
vator's skillful care. If left alone, they are likely to dwindle and perish, or else revert to the original form of the species.

503. Botanists variously estimate the number of known species of plants at from seventy to one hundred thousand. About 3,850 species of the higher classes grow wild in the United States east of the Mississippi. So that the vegetable kingdom exhibits a very great diversity. Between our largest and highest-organized trees, such as a Magnolia or an Oak, and the simplest of plants, reduced to a single cell or sphere, much too minute to be visible to the naked eye, how wide the difference! Yet the extremes are connected by intermediate grades of every sort, so as to leave no wide gap at any place; and not only so, but every grade, from the most complex to the most simple, is exhibited under a wide and most beautiful diversity of forms, all based upon the one plan of vegetation which we have been studying, and so connected and so answering to each other throughout as to convince the thoughtful botanist that all are parts of one system, works of one hand, realizations in nature of the conception of One Mind. We perceive this, also, by the way in which the species are grouped into kinds.

504. Kinds. If the species, when arranged according to their resemblances, were found to differ from one another about equally,—that is, if No. 1 differed from No. 2 just as much as No. 2 did from No. 3, and No. 4 from No. 5, and so on throughout,—then, with all the diversity in the vegetable kingdom there is now, there would yet be no foundation in nature for grouping species into kinds. Species and kinds would mean just the same thing. We should classify them, no doubt, for convenience, but our classification would be arbitrary. The fact is, however, that species resemble each other in very unequal degrees. Some species are almost exactly alike in their whole structure, and differ only in the shape or proportion of their parts; these, we say, belong to one genus. Some, again, show a more general resemblance, and are found to have their flowers and seeds constructed on the same particular plan, but with important differences in the details; these belong to the same order or family. Then, taking a wider survey, we perceive that they all group themselves under a few general types (or patterns), distinguishable at once by their flowers, by their seeds or embryos, by the character of the seedling plant, by the structure of their stems and leaves, and by their general appearance; these great groups we call classes. Finally, we distinguish the whole into two great types or grades;
the higher grade of Flowering plants, exhibiting the full plan of vegetation, and the lower grade of Flowerless plants, in which vegetation is so simplified that at length the only likeness between them and our common trees or Flowering plants is that they are both vegetables. From species, then, we rise first to

505. Genus (plural of Genus). The Rose kind or genus, the Oak genus, the Chestnut genus, &c., are familiar illustrations. Each genus is a group of nearly related species, exhibiting a particular plan. All the Oaks belong to one genus, the Chestnuts to another, the Beech to a third. The Apple, Pear, and Crab are species of one genus, the Quince represents another, the various species of Hawthorn a third. In the animal kingdom the common cat, the wild cat, the panther, the tiger, the leopard, and the lion are species of the cat kind or genus; while the dog, the jackal, the different species of wolf, and the foxes, compose another genus. Some genera are represented by a vast number of species, others by few, very many by only one known species. For the genus may be as perfectly represented in one species as in several, although, if this were the case throughout, genre and species would of course be identical (504). The Beech genus and the Chestnut genus would be just as distinct from the Oak genus even if but one Beech and one Chestnut were known; as indeed was the case formerly.

506. Ords or Families (the two names are used for the same thing in botany) are groups of genera that resemble each other; that is, they are to genera what genera are to species. As familiar illustrations, the Oak, Chestnut, and Beech genera, along with the Hazel genus and the Hornbeams, all belong to one order, viz. the Oak Family; the Birches and the Alders make another family; the Poplars and Willows, another; the Walnuts (with the Butternut) and the Hickories, another. The Apple genus, the Quince and the Hawthorns, along with the Plums and Cherries and the Peach, the Raspberry, with the Blackberry, the Strawberry, the Rose, and many other genera, belong to a large order, the Rose Family.

507. Tribes and Suborders. This leads us to remark, that even the genera of the same order may show very unequal degrees of resemblance. Some may be very closely related to one another, and at the same time differ strikingly from the rest in certain important particulars. In the Rose Family, for example, there is the Rose genus itself, with the Raspberry genus, the Strawberry, the Cinquefoil, &c. near it, but by no means so much like it as they are like each
other: this group, therefore, answers to what is called a Tribe; and
the Rose itself stands for another tribe. But we further observe
that the Apple genus, the Hawthorns, the Quince, and the June-
berry, though of the same order, and nearly related among them-
selves, differ yet more widely from the Rose and its nearest relations;
and so, on the other hand, do the Plum and Cherry, the Peach
and the Almond. So this great Rose Family, or Order, is composed
of three groups, of a more marked character than tribes,—groups
which might naturally be taken for orders; and we call them Sub-
orders. But students will understand these matters best after a few
lessons in studying plants in a work describing the kinds.

508. Classes. These are great assemblages of orders, as already
explained (512). The orders of Flowering Plants are numerous,
no less than 134 being represented in the Botany of the Northern
United States; but they all group themselves under two great
classes. One class comprises all that have seeds with a mono-
cotyledonous embryo (23), endogenous stems (425), and generally
parallel-veined leaves (159); the other, those with dicotyledonous
embryo, exogenous stems, and netted-veined leaves; and the whole
aspect of the two is so different that they are known at a glance.

509. Finally, these two classes together compose the upper Series
of Flowering or Phanerogamous Plants, which have their
counterpart in the lower Series of Flowerless or Cryptogamous Plants,
—composed of three classes, and about a dozen orders.

510. The universal members of classification are Class, Order,
Genus, Species, always standing in this order. When there are
more, they take their places as in the following schedule, which
comprises all that are generally used in a natural classification,
proceeding from the highest to the lowest, viz.:

Series, 4
Class, 3
Subclass, 2
Order, or Family, 1
Suborder, 1
Tribe, 0
Subtribe, 0
Genus, 0
Subgenus or Section, 0
Species, 0
Variety, 0
LESSON XXIX.

BOTANICAL NAMES AND CHARACTERS.

511. Plants are classified,—i.e. are marshalled under their respective classes, orders, tribes, genera, and species,—and they are characterized,—that is, their principal characteristics or distinguishing marks are described or enumerated, in order that,

First, their resemblances or differences of various degrees, may be clearly exhibited, and all the species and kinds ranked next to those they are most related to;—and

Secondly, that students may readily ascertain the botanical names of the plants they meet with, and learn their peculiarities, properties, and place in the system.

512. It is in the latter that the young student is chiefly interested. And by his studies in this regard he is gradually led up to a higher point of view, from which he may take an intelligent survey of the whole general system of plants. But the best way for the student to learn the classification of plants (or Botany as a system), is to use it, in finding out by it the name and the peculiarities of all the wild plants he meets with.

513. Names. The botanical name of a plant, by which a botanist designates it, is the name of its genus followed by that of the species. The name of the genus or kind is like the family name or surname of a person, as Smith, or Jones. That of the species answers to the baptismal name, as John, or James. Accordingly, the White Oak is called botanically Quercus alba; the first word, or Quercus, being the name of the Oak genus; the second, alba, that of this particular species. And the Red Oak is named Quercus rubra; the Black-Jack Oak, Quercus nigra; and so on. The botanical names are all in Latin (or are Latinized), this being the common language of science everywhere; and, according to the usage of that language, and of most others, the name of the species comes after that of the genus, while in English it comes before it.

514. Generic Names. A plant, then, is named by two words. The generic name, or that of the genus, is one word, and a substantive. Commonly it is the old classical name, when the genus was known to the Greeks and Romans; as Quercus for the Oak, Pagus for the
LESSON 20.

BOTANICAL NAMES.

Beech, *Carpinus*, the Hazel, and the like. But as more genera became known, botanists had new names to make or borrow. Many are named from some appearance or property of the flowers, leaves, or other parts of the plant. To take a few examples from the early pages of the *Manual of the Botany of the Northern United States*, in which the derivation of the generic names is explained. The genus *Hepatica*, p. 6, comes from the shape of the leaf resembling that of the liver. *Muscus*, p. 10, means mouse-tail. *Dolphinium*, p. 12, is from dolphin, a dolphin, and alludes to the shape of the flower, which was thought to resemble the classical figure of the dolphin. *Zanthorrhiza*, p. 13, is from two Greek words meaning yellow-root, the common name of the plant. *Gymnocarpus*, p. 14, is formed of two Latin words, meaning, to drive away bugs, the same as its common name of Bagthune, the Siberian species being used to keep away such vermin. *Sanguinaria*, p. 26, is named from the blood-like color of its juice.

515. Other genera are dedicated to distinguished botanists or promoters of natural science, and bear their names: such as *Magnolia*, p. 15, which commemorates the early French botanist, Magnes; and *Jeffersonia*, p. 20, named after President Jefferson, who sent the first exploring expedition over the Rocky Mountains. Others bear the name of the discoverer of the plant in question; as, *Sarracenia*, p. 23, dedicated to Dr. Sarracin of Quebec, who was one of the first to send over our common Pitcher-plant to the botanists of Europe; and *Chrysothamnus*, p. 65, first made known by the early Virginia botanist Clayton.

516. *Specific Names.* The name of the species is also a single word, appended to that of the genus. It is commonly an adjective, and therefore agrees with the generic name in case, gender, &c. Sometimes it relates to the country the species inhabits: as, *Chrysothamnus Virginicus*, first made known from Virginia; *Sanguinaria Canadensis*, from Canada, &c. More commonly it denotes some obvious or characteristic trait of the species: as, for example, in *Sarracenia*, our northern species is named *purpurea*, from the purple blossoms, while a more southern one is named *flava*, because its petals are yellow; the species of *Jeffersonia* is called *diphylla*, meaning two-leaved, because its leaf is divided into two leaves. Some species are named after the discoverer; or in compliment to a botanist who has made them known: as, *Magnolia Fraseri*, named after the botanist Fraser, one of the first to find this species; *Rup-
worthia Michauxi, p. 65, named for the early botanist Michaux; and Polygala Nuttallii, in compliment to Mr. Nuttall, who described it under another name. Such names of persons are of course written with a capital initial letter. Occasionally some old substantive name is used for the species: as Magnolia Umbrella, p. 49, and Ranunculus Plunamoly, p. 41. These are also written with a capital initial, and need not accord with the generic name in gender, &c.

517. The name of a variety, when it is distinct enough to require any, is made on the same plan as that of the species, and is written after it: as, Ranunculus Plunamoly, variety reptans, p. 41 (i.e. the creeping variety), and R. abortivus, variety micranthus, p. 42, or the small-flowered variety of this species.

518. Names of Groups. The names of tribes, orders, and the like, are in the plural number, and are commonly formed by prolonging the name of a genus of the group taken as a representative of it. For example, the order of which the Buttercup or Crowfoot genus, Ranunculus, is the representative, takes from it the name of Ranunculaceae (Manual, p. 34); meaning Plantae Ranunculaceae when written out in full, that is, Ranunculaceous Plants. This order comprises several tribes; one of which, to which Ranunculus itself belongs, takes the name of Ranunculaceae; another, to which the genus Clematis, or the Virgin's-Bower, belongs, takes accordingly the name of Clematidaceae; and so on.

So the term Rosaceae (meaning Rosaceous plants) is the name of the order of which the Rose (Rosae) is the well-known representative; and Rosae is the name of the particular tribe of it which comprises the Rose.

519. A few orders are named on a somewhat different plan. The great order Leguminosae, for instance (Manual, p. 123), is not named after any genus in it; but the fruit, which is a legume (556), gives the name of Leguminosae Plants. So, likewise, the order Umbelliferae (Manual, p. 187) means Umbelliferous or Umbel-bearing Plants; and the vast order Compositae (Manual, p. 213) is so named because it consists of plants whose blossoms are crowded into heads of the sort which were called "compound flowers" by the old botanists (277).

520. Characters. The brief description, or enumeration in scientific terms, of the principal distinctive marks of a species, genus, order, or other group, as given in botanical works, is called its Character. Thus, in the Manual, already referred to, in the begin-
LESSON 30. HOW TO STUDY PLANTS.

Then, after the name of the order, follows its character (the ordinal character); under the name of each genus (as, 1. Clematis, p. 33) is added the generic character, or description of what essentially distinguishes it; and finally, following the name of each species, is the specific character, a succinct enumeration of the points in which it mainly differs from other species of the same genus. See, for illustration, Clematis Viorna, p. 36, where the sentence immediately following the name is intended to characterize that species from all others like it.

521. Under this genus, and generally where we have several species of a genus, the species are arranged under sections, and these often under subsections, for the student's convenience in analysis— the character or description of a section applying to all the species under it, and therefore not having to be repeated under each species.

Under Clematis, also, are two sections with names, or sub-genera, which indicates that they might almost be regarded as two distinct genera. But these details are best understood by practice, in the actual studying of plants to ascertain their name and place. And so this the student is now ready to proceed.

LESSON XXX.

HOW TO STUDY PLANTS.

522. Having explained, in the two preceding Lessons, the general principles of Classification, and of Botanical Names, we may now show, by a few examples, how the student is to proceed in applying them, and how the name and the place in the system of an unknown plant are to be ascertained.

523. We suppose the student to be provided with a hand magnifying-glass, and, if possible, with a simple microscope, i.e. with a magnifying-glass, of two or more different powers, mounted on a support, over a stage, holding a glass plate, on which small flowers or their parts may be laid, while they are dissected under the microscope with the points of needles (mounted in handles), or divided
by a sharp knife. Such a telescope is not necessary, except for very small flowers; but it is a great convenience at all times, and is indispensable in studying the more difficult orders of plants.

524. We suppose the student now to have a work in which the plants of the country or district are scientifically arranged and described: if in the Southern Atlantic States, Dr. Chapman's Flora of the Southern States; if north of Carolina and Tennessee, Gray's Manual of the Botany of the United States, fifth edition; or, as covering the whole ground as to common plants, and including also all the common cultivated plants, Gray's Field, Forest, and Garden Botany, which is particularly arranged as the companion of the present work; that containing brief botanical descriptions of the plants, and this the explanation of their general structure, and of the technical terms employed in describing them. To express clearly the distinctions which botanists observe, and which furnish the best marks to know a plant by, requires a good many technical terms, or words, used with a precise meaning. These, as they are met with, the student should look out in the Glossary at the end of this volume. The terms in common use are not so numerous as they would at first appear to be. With practice they will soon become so familiar as to give very little trouble. And the application of botanical descriptive language to the plants themselves, indicating all their varieties of form and structure, is an excellent discipline for the mind, equal, if not in some respects superior, to that of learning a classical language.

525. The following Illustrations and explanations of the way to use the descriptive work are, first, for The Field, Forest, and Garden Botany, that being the one which will be generally used by beginners and classes. This and the Lessons, bound together in a single compact volume, will serve the whole purpose of all but advanced students, teachers, and working botanists. Thus equipped, we proceed to

526. The Analysis of a Plant. A Botenegro will serve as well as any. Some species or other may be found in blossom throughout nearly the whole spring and summer; and, except at the very beginning of the season, the fruit, more or less developed, may be gathered with the blossom. To a full knowledge of a plant the fruit is essential, although the name may almost always be uncertain without it. This common yellow flower being under examination, we are to refer the plant to its proper class and order or
family. The families are so numerous, and so generally distinguishable only by a combination of a considerable number of marks that the student must find his way to them by means of a contrivance called an *Analytical Key*. This Key begins on p. 12.

527. It takes note of the most comprehensive possible division of plants, namely those "producing true flowers and seeds," and those "not producing flowers, propagated by spores." To the first of these, the great series of *Flanogamous* or *Flowering Plants*, the plant under examination obviously belongs.

528. This series divides into those "with wood in a circle, or in concentric annular circles or layers around a central pith, netted-veined leaves, and parts of the flower mostly in fives or fours,"—to which might be added the dicotyledonous embryo, but that in the present case is beyond the young student's powers, even if the fruit were at hand;—and into those "with wood in separate threads scattered through the diameter of the stem, not in a circle," also the "leaves mostly parallel-veined, and parts of the flower almost always in threes, never in fives." Although the hollowness of the stem of the present plant may obscure its internal structure, a practiced hand, by throwing the light through a thin cross section of the stem under the glass, would make it evident that its woody bundles were all in a circle near the circumference, yet this could hardly be expected of an unassisted and inexperienced beginner. But the two other and very obvious marks, the netted-veined leaves, and the number five in both calyx and corolla, certify at once that the plant belongs to the first class, *Exogenous* or *Dicotyledonous* Plants.

529. We should now look at the flower more particularly, so as to make out its general plan of structure, which we shall need to know all about as we go on. We observe that it has a calyx of 5 sepals, though these are apt to fall soon after the blossom opens; that the 5 petals are borne on the receptacle (or common axis of the flower) just above the sepals and alternate with them; that there are 5 stamens, a"
little higher up on the receptacle, an indefinite number of stamens; and, lastly, covering the summit or centre of the receptacle, an indefinite number of pistils.

A good view of the whole is to be had by cutting the flower directly through the middle, from top to bottom (Fig. 358). If this be done with a sharp knife, some of the pistil will be nearly divided, or may be so by a second slicing. Each pistil, we see, is a closed ovary, containing a single ovule (Fig. 359) ascending from near the base of the cell, and is tipped with a very short broad style, which has the stigma running down the whole length of its inner edge. The ovary is little changed as it ripens into the sort of fruit termed an achen (Fig. 360); the ovule becoming the seed and filling the cell (Fig. 361). Reverting to the key, on p. 13, we find that the class to which our plant belongs has two subclasses, one "with pistil of the ordinary sort, the ovules in a closed ovary"; the other "without proper pistil, the ovules naked on a scale," &c. The latter is nearly restricted to the Pine Family. The examination already had makes it quite clear that our plant belongs to the first subclass, Angiosperrous Exogenous or Dicotyledonous Plants.

530. We have here no less than 110 orders under this subclass. To aid the unpractised student in finding his way among them, they are ranked under three artificial divisions: the Polygalalanous, the Monogalalanous, and the Apetalous. The plant in hand being furnished, in the words of the key, "with both calyx and corolla, the latter of wholly separate petals," is to be sought under I. Polygalalanous Division; for the analysis of which, see p. 14.

531. Fully half the families of the class rank under this division. The first step in the key is to the sections A and B; to the first of which, having "stamens more than 5/0, and more than twice the number of the sepals or divisions of the calyx," our plant must pertain.

532. Under this we proceed by a series of successive steps, their gradations marked by their position on the page, leading down to the name of the order or family, to which is appended the number
of the page where that family and the plants under it are described.

The propositions of the same grade, two or more, from which determination is to be made, not only stand one directly under the other, but begin with the same word or phrase, or with some counterpart,—in the present case again with "Stamens," and with four propositions, with one and only one of which the flower in hand should agree. It agrees with the last of the four: "Stamens not monadelphous."

533. The propositions under this, to which we are now directed, are six, beginning with the word "Pistil," or "Pistils." The one which applies to the flower in hand is, clearly, the fourth: "Pistils numerous or more than one, separate, on the receptacle."

534. The terms of the analysis directly subordinate to this are only two: we have to choose between "Stamens borne on the calyx," and "Stamens borne on the receptacle." The latter is true of our flower. The terms subordinate to this are four, beginning with the word "Leaves." The fourth alone records: "Leaves not plicate: herba," — and this line leads us to the CROWFOOT FAMILY, and refers to p. 35.

535. Turning to that page, a perusal of the brief account of the marks of the RANUNCULACEAE (the technical Latin name) or CROWFOOT FAMILY, assures us that the Key has led us safely and readily to a correct result. Knowing the order or family, we have next to ascertain the genus. Here are twenty genera to choose from; but their characters are analyzed under sections and successive subsections (§, §, +, ++, &c.) so as to facilitate the way to the desired result. Of the two primary sections, we must reject § 1, as it agrees only in respect to the pistils, and differs wholly in the characteristics furnished by the sepalas, the petals, and the leaves. With § 2, "Sepals imbricated on the bud: not climbing nor woody," it agrees. It also agrees with the subsection immediately following, viz.: "Petals none: Sepals petal-like," and restricts our choice to the three genera, Aconitum, Myosurus, and Rasunules. The determination is soon made, upon noting the naked sepals, the petals with the little scale on the upper face of the short claw, and the sepalas in a head: so the genus is, 7. RANUNCULUS.
536. The arrangement of the species of Ranunculus is to be found, under the proper number, 7, on p. 37, and the following: The first section contains appriate species; ours is terrestrial, and in all other particulars answers to § 2. The smooth ovary and stamen, and the perennial root refer it to the subsection following, marked by the single star. The shape of the leaves excludes it from the "— Spearwort Crowfoots," the large and showy petals from the "— Small-flowered Crowfoots; while all the marks agree with "— + + Buttercups or Common Crowfoots. There is still a subdivision, one set marked, "— Nature of the country, low or spreading," the other "— Introduced weeds from Europe, common in fields, &c.; stem erect; leaves much cut,"— which is the case. We have then only to choose between the two field Crowfoots, and we have supposed the pupil to have in mind the lower, early-flowered one, common at the east, which has a solid bulb or corm at the base of the stem, and displays its golden flowers in spring or earliest summer, and which accordingly answers to the description of Ranunculus bulbosus, the Bulbous Buttercup.

537. Later in the season it might have been R. acris, the Tall Buttercup, or much earlier R. flacculata, or R. repens. Having ascertained the genus from any one species, the student would not fail to recognize it again in any other, at a glance.

538. If now, with the same plant in hand, the Manual (Fifth edition) be the book used, the process of analysis will be so similar, that a brief indication of the steps may suffice. Here the corresponding Analytical Key, commencing on p. 21, leads singularly to the first Series, Class, Sub-class, and Division;— to A, with numerous stamens; I, with calyx entirely free and separate from the pistil or pistils, thrown to the fourth line beginning with the word Pistil; thence to the third of the three subordinate propositions, viz. " Stamens inserted on the receptacle"; to the second of the ascending complex, or "Pistilous longer than the anthers"; to the second of the next couple, " Flowers perfect," &c., and to the first of the final couple, " Leaves not pinnate; petals deciduous,"— which ends in " Ranunculacea, 54." This is the technical name of the family, and the page where it is described.

539. Turning to that page we read the general description of that order, particularly the portion at the beginning printed in italics, which comprises the more important points. The " Synopsia of the
Genera which follow is similar to, but more technical than that of the other, more elementary book; and the names of the tribes or natural groups of genera (307) are inserted. The steps of analysis bring the student to the Tribe III. Ranunculae, and under it to the genus Ranunculus. The number prefixed to the name enables the student to turn forward and find the genus, p. 49. The name, scientific and popular, is here followed by a full generic character (320). The primary sections here have names: the plant under examination belongs to "§ E. Ranunculus proper"; and thence is to be traced, through the subdivisions *, ← ← ← ←, → → → →, to the ultimate subdivision 6, under which, through a comparison of characters, the student reaches the species C. bulbosus, L.

540. The L. at the end of the name is the recognized abbreviation of the name of Linnaeus, the botanist who gave it. Then come the common or English names; then the specific character: after this, the station where the plant grows, and the region in which it occurs. This is followed by the time of blossoming (from May to July); and then by some general descriptive remarks. The expression "Nat. from Eu." means that the species is a naturalized emigrant from Europe, and is not original to this country. But all these details are duly explained in the Preface to the Manual, which the student who uses that work will need to study.

LESSON XXXI.

HOW TO STUDY PLANTS: FURTHER ILLUSTRATIONS.

541. Beginners should not be discouraged by the slow progress they must make in the first trials. By perseverance the various difficulties will soon be overcome, and each successful analysis will facilitate the next. Not only will a second species of the same genus be known at a glance, but commonly a second genus of the same order will be recognized as a relative at sight, by the family likeness. Or if the family likeness is not detected at the first view, it will be seen as the characters of the plant are studied out.

542. To help the student by a second example, we will take the common cultivated Flax. Turning to the Key, as before, on
p. 12, the student is led to ask, first, is the plant Phenogamous or Flowering? Of course it is; the blossom, with its stamens and pistils, answers that question. Next, to which of the two classes of Flowering Plants does it belong? If we judge by the stem, we ask whether it is exogenous or endogenous (422-424). A section of the stem, considerably magnified, given on page 101, we may here repeat (Fig. 362); it plainly shows a ring of wood between a central pith and a bark. It is therefore exogenous. Moreover, the leaves are netted-veined, though the veins are not conspicuous. We might even judge from the embryo; for there is little difficulty in dissecting a flax-seed, and in finding that almost the whole interior is occupied by an embryo with two cotyledons, much like that of an apple-seed (Fig. 11, 12), and this class, as one of its name denotes, is dicotyledonous. If we view the parts of the blossom, we perceive they are five throughout (Fig. 363, 365), a number which occurs in that class only. All these marks, or as many of them as the student is able to verify, show that the plant belongs to Class I. Exogenous or Dicotyledonous Plants.

540. To which sub-class, is the next inquiry. The single but several-celled ovary in the centre of the flower, enclosing the ovules, assures us that it belongs to the Angiospermous sub-class, p. 13.

541. To get a good idea of the general plan of the flower, before proceeding further, cut it through the middle lengthwise, as in Fig. 364, and also take a slice across a flower-bud, which will bring to view an arrangement somewhat like that of Fig. 365. Evidently the blossom is regularly constructed upon the number five. It has a calyx of five sepals, a corolla of five petals, five stamens, and five
styles, with their ovaries all combined into one compound ovary. We note also, that the several parts of the blossom are all free and uninconnected — the leaves of the calyx, the petals, and the stamens all rising separately one after another from the receptacle underneath the ovary; but the filaments, on close inspection, may show a slight union among themselves, at the base.

545. So our plant, having 5 separate petals, is of the POLYPETALOUS division of the first class, for the analysis of which see page 14.

546. But it does not belong to the primary division A, which has more than 10 stamens. The student passes on, therefore, to the counterpart division B, on page 16, to which the few stamens, here only five, refer it.

547. Of the three subdivisions, with numerals prefixed, only the second answers; for the calyx is free from the ovary, and there is only one ovary, although the styles are five.

548. The divisions subordinate to this form a triplet; and our plant agrees with the second member of it, having "Stamens of the same number as the petals" [5] and "alternate with them." The division under this is a triplet, of which we take the third member; for the "Leaves are not punctate with pellucid dots." Under this, in turn, is a triplet beginning with the word Ovary, and the fifth, if not ten cells, determine our choice of the third member of it, "Ovary compound." Under this we have no less than nine choices, depending upon the structure of the ovary, the number of ovules and seeds, &c. But the 5-celled ovary with a pair of ovules in each cell, separated by a false partition projecting from the back (Fig. 365), so that the pod becomes in fact 10-celled, with a solitary seed in each cell, is described only in the tenth and last of the set, p. 18. Under this, again, we have to choose among five propositions relating to the seeds. Here the fifth — "Seeds and ovules only one or two in each cell" — alone meets the case. Under this, finally, we have to choose from six lines, beginning with the words Tree, Shrub, or Herbs. The fifth alone agrees, and leads to the FLAX FAMILY, p. 77.

549. There is only one genus of it in this country, namely, the FLAX genus itself, or LINUM. To determine the species, look first to the

Fig. 365. Cross-section of an expanded flower of the genus, a sort of Linseis.
at the three sections, marked with stars. The second answers to our plant; and the annual root, pointed sepals, and blue petals determine it to be the Common Flax, Linum usitatissimum.

550. By the Manual, the same plant would be similarly traced, along a somewhat different order of steps, down to the genus on p. 104, and to the species, which being a foreign cultivated one, and only by change spontaneous, is merely mentioned at the close.

551. After several analyses of this kind, the student will be able to pass rapidly over most of these steps; should ordinarily recognize the class and the division at a glance. Suppose a common Mallow to be the next subject. Having flowers and seeds, it is Phenopetalous. The netted-veined leaves, the structure of the stem, and the leaves of the flower in fives, refer it to Class I. The pistils of the ordinary sorts, refer it to Subclass L. The five petals refer it to the Polypetalous division. Turning to the Key in the Field, Forest, and Garden Botany, and to the analysis of that division, commencing as p. 14, the numerous stamens fix it upon A, under which the very first line, "Stamens monadelphous, united with the base of the corolla; anthers kidney-shaped, one-celled," exactly expresses the structure of these organs in our plant, which is thus determined to be of the Mallow Family,—for which see page 70.

552. After reading the character of the family, and noting its agreement in all respects, we fix upon § 1, in which the authors are all borne at the top, and not down the side of the tube of filaments. We pass the subdivision with a single star, and choose the alternative, with two stars, on account of the ring of ovaries, &c.; fix upon the division —, on account of the stigmas running down one side of the slender style, instead of forming a little head or blunt tip at their apex; and then have to choose among five genera. The three separate bracts outside of the calyx, the infundibuliform petals, and the fruit determine the plant to be a Malva. Then, referring to p. 71 — for the species, the small which flowers point to the first division, and a comparison of the characters of the two species under it, assures us that the plant in hand is Malva rotundifolia.

553. For the sake of an example in the Monopetalous Division, we take a sort of Morning-Glory which is often met with climbing over shrubs along the most banks of streams. Its netted-veined leaves, the sepals and the stamens being five,—also the structure of the stem, if we choose to examine it, and the embryo with two leafy
to study plants.

...cotyledon (as in Fig. 20), readily inspect if we have seeds,—

show it belongs to Class I. Its phyll is of course to Subclass I.
The corolla being a short funnel-shaped tube, theoretically regarded
as formed of five petals united up to the very summit or border, ren-
ders the flower a good illustration of the Mono-petalous Division,
the analysis of which begins on p. 29, in the work we are using.

554. The calyx five from the ovary excludes it from the section
A, and refers it to section B. This is subdivided, in the first place,
by the number of the stamens, and their position as respects the
lobes of the corolla. Now, as the petals of the corolla in this flower
are united up to the very border, the student may at first be puzzled
to tell how many lobes it should have, or, in other words, how many
petals enter into its composition. But the five leaves of the calyx
would lead one to expect a corolla of five parts also. And, although
there are here really no lobes or notches to be seen, yet the five
petals of the corolla answer to the notches, and show it to consist of
five petals perfectly united. Since the stamens are of the same
number as the petals of the corolla, and are placed before them (as
may be best seen by splitting down the corolla on one side and
spreading it out flat), it follows that they alternate with the lobes or
petals; therefore our plant falls under the third subdivision: "Stam-
ens as many as the lobes or parts of the corolla and alternate with
them." This subdivides the pistil. Our plant, having a pistil
with two stigmas and two cells to the ovary, must be referred to the
fifth and last category: "Pistil one, with a single compound ovary,"&c.
We are then directed to the stamens, which here are "plainly
borne on the corolla"; next to the leaves, which are on the stem
(not all at the root), also alternate, without stipules; the stamens
5, and the ovary 2-celled,—all of which accords with the seventh
of the succeeding propositions, and with no other. The middle one
alone under this agrees as to the ovary and seeds, and all is confirmed
by the twining stem. It is the Convolvulae Family, p. 262.

555. The proper Convolvulae Family has green foliage, as has
our plant. Its style is single and entire, as in § 1. Its calyx has a
pair of large leafy bracts, as in the subdivision with two stars. So
we reach the genus Calystegia, or Child's BINDWEED.

556. Under this genus two species are described: the twining stem,
and the other particulars of our plant, direct us to the first C. Alpina,
which in England is named HEDGE BINDWEED, and here is one
of the various Convolutionous plants known as Mornip-GoRg.
LESSON XXXII

HOW TO STUDY PLANTS: FURTHER ILLUSTRATIONS.

557. The foregoing illustrations have all been of the first or Exogenous class. We will take one from the other class, and investigate it by the Manual.

558. It shall be a rather common plant of our woods in spring, the Three-leaved Nightshade, or Birdfruit. With specimens in hand, and the Manual open at the Analytical Key, p. 21, seeing that the plant is of the Phenogamous series, we proceed to determine the class. The netted-veined leaves would seem to refer the plant to the first class; while the blossom (Fig. 366, 367), constructed on the number three, naturally directs us to the second class, in which this number almost universally prevails. Here the student will be somewhat puzzled. If the seeds were ripe, they might be examined, to see whether the embryo has one cotyledon only, or a pair. But the seeds are not to be had in spring, and if they were, the embryo would not readily be made out. We must judge, therefore, by the structure of the stem. Is it exogenous or endogenous? If we cut the stem through, or take off a thin slice crosswise and lengthwise, we shall perceive that the woody matter in it consists of a number of threads, interspersed throughout the soft cellular part without regularity, and not collected into a ring or layer. In fact, it is just like the Corn-talk (Fig. 351), except that the woody threads are few. It is therefore endogenous (422); and this decides the question in favor of Class II. Monocotyledonous or Endogenous Plants (page 39), notwithstanding the branching veins of the leaves. For neither this character, nor the number of parts is
the blossom, holds good universally, while the plan of the stem

does.

539. The single stamens of our plant with distinct stamens and corolla

takes us over the Speciosa to the Petaloidous Division; the

Petaloidous Division of Endogens starts on p. 28.

These parts being free from and beneath the ovary, refer us to the

third subdivision, viz: "3. Perianth wholly free from the ovary."

540. The pistil is next to be considered: it accords with the third

of the triplet: "Pistil one, compound (cells or placenta 3); authors

needed." Under this follow a triplet, of which the initial word is

"Perianth": our choice falls upon the first, as there is nothing

"glumaceous" about this flower.

541. The succeeding triplet relates to the stamens; here 6, so

we take the first alternative. The next refers to mode and place of

growth: our plant is "Terrestrial, and not rush-like." The next

again to the perianth: the second number of the triplet: "Perianth

of 3 foliaceous and green sepals, and 6 colored whirling-persistent

petals" (as would be seen after flowering-time), brings us to a par-

icular group in the great Lily family, or Lilieae, p. 50.

542. Reading over the family character, and collating the five

tribes comprised, we perceive that our plant belongs to the group,

quite peculiar among Liliaceous plants, here ranked as Tribe 1:

Trillideae, the Trillium tribe. And the next step, leading to a

choice between two genera, determines the genus to be Trillium.

543. Turning to this, on p. 522, and reading the full descrip-

tion of it, we proceed to the easy task of ascertaining the species. The

"flower is raised on a peduncle," as in § 2. This peduncle is slender

and nearly erect, and all the other particulars accord with the sub-

division marked by a single star. And, finally, the ovate, acutish, 

widely-spreading, dark dull-purple petals mark the species as the

Trillium erectum, L.

544. By the Field, Forest, and Garden Botany, the analysis is

similar, only more simple. The details need not be particularly

reprecipitated.

545. The student residing west of New England will also be

likely to find another species, with similar foliage, but with larger,

pure white, and obovrate petals, turning rose-color when about to

fdis. This will at once be identified as T. grandiflorum. And

towards the north, in cold and damp woods or swamps, a smaller
species will be met with, having dull-green and petioled leaves rounded at the base, and rather narrow, wavy, white petals, marked with pink or purple stripes at the base; this the student will refer to *T. nigrescens.* But the species principally found in the eastern parts of the country has a short peduncle recurved under the leaves, so nearly to conceal the much less handsome, dull white flower; this, it will be seen, is *T. campana,* the *Nodding Trillium* or *Wake Robin.*

565. Whenever the student has fairly studied one species of a genus, he will be likely to know the others when he sees them. And when plants of another genus of the same order are met with, the order may generally be recognized at a glance, from the family resemblance. For instance, having first become acquainted with the *Consolida* family in the genus *Calyxgla* (555), we recognize it at once in the common Morning-Glory, and in the Cypress-Vine, and even in the Dodder, although these belong to as many different genera. Having examined the common *Mallow* (552), we immediately recognize the Mallow family (*Malvaceae*) in the Marsh-Mallow, sparingly naturalized along the coast, in the Glade Mallow, and in the Indian Mallow, in the Hibiscus or Rose-Mallow, and so of the rest: for the relationship is manifest in their general appearance, and in the whole structure of the flowers, if not of the foliage also.

566. The study of one plant leads naturally and easily to the knowledge of the whole order or family of plants it belongs to;—which is a great advantage, and a vast saving of labor. For, although we have about one hundred and thirty orders of flowering plants represented in our Botany of the Northern States by about 2,540 species, yet half of these species belong to nine or ten of these orders; and more than four fifths of the species belong to forty of the orders. One or two hundred species, therefore, well examined, might give a good general idea of our whole botany. And students who will patiently and thoroughly study out twenty or thirty well-chosen examples will afterwards experience little difficulty in determining any of our flowering plants and ferns, and will find the pleasure of the pursuit largely to increase with their increasing knowledge.

567. And the interest will be greatly enhanced as the student, rising to higher and wider views, begins to discern the system of Botany, or, in other words, comprehends more and more of the Plan of the Creator in the Vegetable Kingdom.
LESSON XXXIII.

BOTANICAL SYSTEMS.

568. Natural System. The System of Botany consists of the orders or families, duly arranged under their classes, and having the tribes, the genera, and the species arranged in them according to their relationships. This, when properly carried out, is the Natural System; because it is intended to express, as well as we are able, the various degrees of relationship among plants, as presented in nature;—to rank these species, those genera, &c. next to each other in the classification which are really most alike in all respects, or, in other words, which are constructed most nearly on the same particular plan.

569. Now this word plan of course supposes a planner,—an intelligent mind working according to a system; it is this system, therefore, which the botanist is endeavouring as far as he can to exhibit in a classification. In it we humbly attempt to learn something of the plan of the Creator in this department of Nature.

570. So there can be only one natural system of Botany, if by the term we mean the plan according to which the vegetable creation was called into being, with all its grades and diversities among the species, as well of past as of the present time. But there may be many natural systems, if we mean the attempts of men to interpret and express the plan of the vegetable creation,—systems which will vary with our advancing knowledge, and with the judgment and skill of different botanists,—and which must all be very imperfect. They will all bear the impress of individual minds, and be shaped by the current philosophy of the age. But the endeavor always is to make the classification a reflection of Nature, as far as any system can be which has to be expressed in a series of definite propositions, and have its divisions and subdivisions following each other in some single fixed order.*

* The best classification must fail to give more than an imperfect and considerably-distorted reflection, not merely of the plan of creation, but even of our knowledge of it. It is often obliged to make arbitrary divisions where Nature shows only transitions, and to regroup genera, &c. into equal units, or groups of equally related species, while in fact they may be very unequal,—to assume, an
571. The Natural System, as we receive it, and as to that portion of it which is represented in the botany of our country, is laid before the student in the Manual of the Botany of the Northern United States. The orders, however, still require to be grouped, according to their natural relationships, into a considerable number of great groups (or alliances); but this cannot yet be done throughout in any easy way. So we have merely arranged them somewhat after a customary order, and have given, in the Artificial Key, a contrivance for enabling the student easily to find the natural order of any plant. This is a sort of

572. Artificial classification. The object of an artificial classification is merely to furnish a convenient method of finding out the name and place of a plant. It makes no attempt at arranging plants according to their relationships, but serves as a kind of dictionary. It distributes plants according to some one peculiarity or set of peculiarities (just as a dictionary distributes words according to their first letters), disregarding all other considerations.

573. At present we need an artificial classification in Botany only as a Key to the Natural Orders,—as an aid in referring an unknown plant to its proper family; and for this it is very needful to the student. Formerly, when the orders themselves were not clearly made out, an artificial classification was required to lead the student down to the genus. Two such classifications were long in vogue. First, that of Tournefort, founded mainly on the leaves of the flower, the calyx and corolla: this was the prevalent system throughout the first half of the eighteenth century; but it has long since gone by. It was succeeded by the well-known artificial system of Linnaeus, which has been used until lately; and which it is still worth while to give some account of.

574. The Artificial System of Linnaeus was founded on the stamens and pistils. It consists of twenty-four classes, and of a variable number of orders, which were to take the place temporarily of the natural classes and orders; the genera being the same under all classifications.

paper at least, a strictly definite limitation of genera, of tribes, and of orders, although observations, show no marked blending, here and there of natural groups, sufficiently distinct on the whole, as to warrant us in assuming the likelihood that the Creator's plan is one of gradation, not of definite limitation, even perhaps in the species themselves.
The twenty-four classes of Linnaeus were founded upon something about the stamens. The following is an analysis of them. The first great division is into two great series, the Phanogamia and the Cryptogamia, the same as in the Natural Systems. The first of these is divided into those flowers which have the stamens in the same flower with the pistils, and those which have not; and these again are subdivided, as is shown in the following tabular view.

Series I. PHANOGAMIA: plants with stamens and pistils, i. e. with true flowers.

1. Stamens in the same flower as the pistil:
   * Not united with each other.
   - Of equal length if odd or 6 or 4 in number.

<table>
<thead>
<tr>
<th>Case</th>
<th>Monandria</th>
<th>Diandria</th>
<th>Triandria</th>
<th>Tetrandria</th>
<th>Pentandria</th>
<th>Hexandria</th>
<th>Heptandria</th>
<th>Octandria</th>
<th>Enkandria</th>
<th>Decandria</th>
<th>Hendecandria</th>
<th>Icosandria</th>
<th>Icosyndria</th>
<th>Icospenta</th>
<th>Polyandria</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>One in each flower.</td>
<td>Two</td>
<td>Three</td>
<td>Four</td>
<td>Five</td>
<td>Six</td>
<td>Seven</td>
<td>Eight</td>
<td>Nine</td>
<td>Ten</td>
<td>Eleven or more set in the calyx,</td>
<td>Thirteen or more set in the calyx,</td>
<td>Four, 2 long and 2 shorter,</td>
<td>United with each other,</td>
<td>By their stamina,</td>
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<td>3.</td>
<td>Of unequal length and either 5 or 6.</td>
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Series II. CRYPTOGAMIA: No stamens and pistils, therefore no proper flowers.

21. Cryptogamia
576. The names of these classes are all compounded of Greek words. The first eleven consist of the Greek numerals, in succession, from 1 to 11, combined with andria, which here denotes stamens; — e.g. Monandria, with one stamen; and so on. The 11th has the numeral for twelve stamens, although it includes all which have from eleven to nineteen stamens, numbers which rarely occur. The 12th means "with twenty stamens," but takes in any higher number, although only when the stamens are borne on the calyx. The 13th means "with many stamens," but it takes only those with the stamens borne on the receptacle. The 14th means "two stamens powerful," the shorter pair being supposed to be weaker; the 15th, "four powerful," for the same reason. The names of the next three classes are compounded of adelphia, brotherhood, and the Greek words for one, two, and many (Monadelphia, Diadelphia, and Polypodelpia). The 19th means "united in one household." The 20th is compounded of the words for stamens and pistils united. The 21st and 22d are composed of the word meaning house and the numerals, one, or single, and two: Monocarya, in one house, Diocarya, in two houses. The 23d is fancifully formed of the words meaning plurality and marriage, from which the English word polygamy is derived. The 24th is from two words meaning concealed nidus, and is opposed to all the rest, which are called Phenogamous, because their stamens and pistils, or parts of fruitification, are evident.

577. Having established the classes of his system on the stamens, Linnaeus proceeded to divide them into orders by marks taken from the pistils, for those of the first thirteen classes. These orders depend on the number of the pistils, or rather on the number of styles, or of stigmas when there are no styles, and they are named, like the classes, by Greek numerals, prefixed to gynia, which means pistil. Thus, flowers of these thirteen classes with

<table>
<thead>
<tr>
<th>One style or sessile stigma belongs to</th>
<th>Two styles or sessile stigmas, to</th>
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<tr>
<td>One</td>
<td>Two</td>
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<td>Three</td>
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<td>Five</td>
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<td>Seven</td>
<td>Eight</td>
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<td>Nine</td>
<td>Ten</td>
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<tr>
<td>Eleven or twelve</td>
<td>More than twelve</td>
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|                                      | Order
|                                      | 1. MONOGYNIA.                  |
|                                      | 2. DIGYNIA.                    |
|                                      | 3. TRIGYNIA.                   |
|                                      | 4. TETRAGYNIA.                 |
|                                      | 5. PENTAGYNIA.                 |
|                                      | 6. HEXAGYNIA.                  |
|                                      | 7. HEPTAGYNIA.                 |
|                                      | 8. OCTAGYNIA.                  |
|                                      | 9. ENNEAGYNIA.                 |
|                                      | 10. DECAFYNA.                  |
|                                      | 11. DODECAGYNIA.               |
|                                      | 12. POLYGNIA.                  |
578. The orders of the remaining classes are founded on various
considerations, some on the nature of the fruit, others on the number
and position of the stamens. But there is no need to enumerate
them here, nor further to illustrate the Linnaean Artificial Classi-
cation. For as a system it has gone entirely out of use; and as a
Key to the Natural Orders it is not so convenient, nor by any means
so certain, as a proper Artificial Key, prepared for the purpose, such
as we have been using in the preceding Lessons.

LESSON XXXIV.

HOW TO COLLECT SPECIMENS AND MAKE AN HERBARIUM.

579. For collecting specimens the needful things are a large knife,
strong enough to be used for digging up bulbs, small rootstocks,
and the like, as well as for cutting woody branches; and a botanical
box, or a portfolio, for holding specimens which are to be carried to
any distance.

580. It is well to have both. The botanical box is most useful
for holding specimens which are to be examined fresh. It is made
of tin, in shape like a candle-box, only flatter, or the smaller sizes
like an English sandwich-case; the lid opening for nearly the
whole length of one side of the box. Any portable tin box of con-
venient size, and capable of holding specimens a foot or fifteen inches
long, will answer the purpose. The box should shut close, so that
the specimens may not wilt; then it will keep leafy branches and
most flowers perfectly fresh for a day or two, especially if slightly
moistened.

581. The portfolio should be a pretty strong one, from a foot to
twenty inches long, and from nine to eleven inches wide, and fasten-
ing with tape, or (which is better) by a leather strap and buckle at
the side. It should contain a quantity of sheets of thin and smooth,
unsized paper; the poorest printing-paper and grocers' tea-paper
are very good for the purpose. The specimens as soon as gathered
are to be separately laid in a folded sheet, and kept under moderate
pressure in the closed portfolio.
Botanical specimens should be either in flower or in fruit. In the case of herbs, the same specimen will often exhibit the two; and both should by all means be secured whenever it is possible. Of small herbs, especially annuals, the whole plant, root and all, should be taken for a specimen. Of larger ones branches will suffice, with some of the leaves from near the root. Enough of the root or subterranean part of the plant should be collected to show whether the plant is an annual, biennial, or perennial. Thick roots, bulbs, tubers, or branches of specimens intended to be preserved, should be thinned with a knife, or cut into slices lengthwise.

For drying specimens a good supply of soft and unsized paper—the more fibrous the better—is wanted; and some convenient means of applying pressure. All that is requisite to make good dried botanical specimens is, to dry them as rapidly as possible between many thicknesses of paper to absorb their moisture, under as much pressure as can be given without crushing the more delicate parts. This pressure may be given by a botanical press, of which various forms have been contrived; or by weights placed upon a board,—from forty to eighty or a hundred pounds, according to the quantity of specimens drying at the time. For use while travelling, a good portable press may be made of thick boards for the sides, holding the drying paper, and the pressure may be applied by a cord, or, much better, by strong straps with buckles.

For drying paper, the softer and smoother sorts of cheap wrapping-paper answer very well. This paper may be made up into driers, each of a dozen sheets or less, according to the thickness, lightly stitched together. Specimens to be dried should be put into the press as soon as possible after gathering. If collected in a portfolio, the more delicate plants should not be disturbed, but the sheets that hold them should one by one be transferred from the portfolio to the press. Specimens brought home in the botanical box must be laid in a folded sheet of the same thin, smooth, and soft paper used in the portfolio; and these sheets are to hold the plants until they are dry. They are to be at once laid in between the driers, and the whole put under pressure. Every day (or at first even twice a day would be well) the specimens, left undisturbed in their sheets, are to be shifted into well-dried fresh driers, and the pressure renewed, while the moist sheets are spread out to dry, that they may take their turn again at the next shifting. This course must be continued until the specimens are no longer moist to the touch.
which for most plants requires about a week; then they may be transferred to the sheets of paper in which they are to be preserved. If a great abundance of drying-paper is used, it is not necessary to change the sheets every day, after the first day or two.

585. Herbarium. The botanist's collection of dried specimens, ticketed with their names, place, and time of collection, and systematically arranged under their genera, orders, &c., forms a Hortus Siccus or Herbarium. It comprises not only the specimens which the proprietor has himself collected, but those which he acquires through friendly exchanges with distant botanists, or in other ways. The specimens of an herbarium may be kept in folded sheets of thin, and rather thick, white paper; or they may be fastened on half-sheets of such paper, either by slips of gummed paper, or by glue applied to the specimens themselves. Each sheet should be appropriated to one species; two or more different plants should never be attached to the same sheet. The generic and specific name of the plant should be added to the lower right-hand corner, either written on the sheet, or on a ticket pasted down at that corner; and the time of collection, the locality, the color of the flowers, and any other information which the specimens themselves do not afford, should be duly recorded upon the sheet or the ticket. The sheets of the herbarium should all be of exactly the same dimensions. The herbarium of Linnaeus is on paper of the common foolscap size, about eleven inches long and seven wide. But this is too small for an herbarium of any magnitude. Sixteen and a half inches by ten and a half, or eleven and a half inches, is an approved size.

586. The sheets containing the species of each genus are to be placed in genus-covers, made of a full sheet of thick, colored paper (such as the strongest Manilla-hemp paper), which fold to the same dimensions as the species-sheet; and the name of the genus is to be written on one of the lower corners. These are to be arranged under the orders to which they belong, and the whole kept in closed cases or cabinets, either laid flat in compartments, like large "pigeon-holes," or else placed in thick portfolios, arranged like folio volumes, and having the names of the orders lettered on the back.
Aciculate: armed with prickles, i. e. spines; as the Rose and Briar.

Aciculatie: armed with small prickles, or slightly prickly.

Acanth: armed with thorns, or spines; as Rose and Brier.

Acanthaceous: armed with small prickles, or slightly prickly.

Acumination: taper-pointed, as the leaves in fig. 97 and fig. 103.

Acumen: merely sharp-pointed, or ending in a point less than a right angle.

Adesia: united in a series (adhesive): see monadesia and disadesia.

Adhesia: sticking to, or, more commonly, growing fast to another body: p. 104.

Adhesion: growing fast to; it means long adherent. The amber is diffuse when fixed by its whole length to the filament or its prolongation, as in Tulip-tree, fig. 233.

Adherent, or appressed: brought into contact, but not united.

Adherent, mucronate, or acuminate: rising gradually upwards.

Adherent, or angustate: same as acuminate.

Adpressures: out of the proper or usual place; e. g. Adpressures leaf, p. 26, 27.

Adpressures: applied to foreign plants accidentally or spuriously spontaneous in a country, but hardly to be called naturalized.

Adpressed: equal-sided; opposed to oblique.

Adpression: the arrangement of parts in a flower-bud, p. 108.

Air-cells or Air-pores: spaces in the tissue of leaves and some stems, p. 145.

Air-borne, p. 34.

Ajar, or odorous. See Aromatic.

Ala (plural alae): a wing; the side-petals of a papilionaceous corolla, p. 105.

Alabaster: a flower-bud.

Albawn: united in the forks of a stem.

Alate: winged, as the seeds of Trumpet-Creeper (fig. 314) the fruit of the Maple, Elm (fig. 360), &c.

Albaceous: whitish, or turning white.

Abscission, p. 168.

Absorption of the seed: nourishing matter secreted up with the embryo, but not within it; p. 15, 156.

Absorben, a vegetable product; a form of precipitate, p. 162.

Absorptive (seeds): furnished with absences, as the seeds of Indian corn (fig. 38, 39), of Buckwheat (fig. 328), &c.

Absorptivas: young wood, sap-wood, p. 158.

Alpine: belonging to high mountains above the line of forests.

Alternate (leaves): one after another, p. 24, 71. Petals are alternate with the sepals, or stamens with the petals, when they stand over the intervals between them, p. 99.

Alumina: honeycomb-like, as the receptacle of the Cotton-Thistle.


Assimilas: leaf-like; without any definite form.

Assimilae: composed of starch, or starch-like.

Assimilaceous: composed of starch, or starch-like.
Glossary:


Anisostemous: forming a meshwork (anisostemous), as the veins of leaves.

Anisostylous or Anisostylous ovules, or seeds: p. 121, fig. 475.

Anisophylle (necrops): two-edged, as the stem of Bistort or Grass.

Anther (nemor): a name for the stamens taken together.

Antheropodia: having both staminate and pistillate flowers in the same cluster or inflorescence, as many species of Carex.

Antherophore: a column of united stamens, as in a Mallow; or the support on which stamens are placed.

Anthophila: bent latter and thiner, as the stamens of the Squash, &c.

Antherophrate, Antherophorn Plants: with their seeds formed in an ovary or pericarp, p. 166.

Anthe: Euph: of leaves, p. 75.

Anther (plast): flowering and fruiting the year it is raised from the seed, and then dying, p. 21.

Anther: in the form of a ring, or forming a circle.

Anther: marked by rings; or furnished with an angle, or ring, like that of the spore-case of most Ferns (Matth, Bot. N. biston, plate 9, fig. 2) in Momen it is a ring of cells placed between the mouth of the sporocyst and the lid, in many species.

Anther: in the blossom, is the part next the bract; i.e. external; - while the perigon is that next the axis of inflorescence. Thus, in the Fun, &c. the seed is anterior, and the standard posterior.

Anther: the essential part of the stamen, which contains the pollen; p. 36, 113.

Antheridio: (plural antheridia): the ovary in Momen, &c. which answers to the anther of flowering plants.

Antheriferous: anther-bearing.

Anthers: the period or set of the expansion of a flower.

Antheridium (fruits): name as multiple fruits; p. 322.

Anthen: same as anterior.

Anther: directed upwards or forwards.

Antherifer: denoting of petals; p. 38, fig. 172.

Anther: denoting of leaves, as long as foliage.

Anther: belonging to the apex or point.

Antheric: pointed; tipped with a short and abrupt point.

Antheridia (planting) among the several pistils of the same flower are separate, as in a Buttercup, Sedum (fig. 169), &c.

Antheridia: any irregular swelling; the enlargement at the base of the spore-case of the Umbelilla-Moss (Matth, plate 4), &c.

Antheridium: any superfluous part.

Antheridium: any superfluous part.

Antheridium: any superfluous part.

Antheridium: any superfluous part.

Antheridium: any superfluous part.

Antheridia: any superfluous part.

Aquatic: living or growing in water; applied to plants whether growing under water, or with all but the base raised out of it.

Arachnoid: coarsely hairy; clothed with, or consisting of, soft downy filaments.

Arachnoid, Arachnose: tree-like, in air or form; p. 36.
• Accipitation (plural accipitations): the organ in Mosses, &c., which is analogous to the pistil of Flowering Plants.

Asciote: bent or curved like a bow.

Asciote: marked out into little squares or nodes.

Ascites (nodes): furnished with an Aril or Arillus: a fleshy growth forming a false cost or appendage to a seed; p. 150, fig. 318.

Aril or Arillus: a fleshy growth forming a false cost or appendage to a seed; p. 150, fig. 318.

Ariloid: a fleshy growth forming a false cost or appendage to a seed; p. 150, fig. 318.

Articulate: diminutive of the last; short-awned.

Arnica-shaped or Arnica-headed: same as Arnicate: p. 39, fig. 95.

Articulations: jointed; furnished with joints or articulations, where it separates or unites to do so. Articulated base, p. 64.

Artificial Classification, p. 156.

Ascenting (stems, &c.), p. 37, (nodes or nodes), p. 122.

Arthropodium: shaped like the bracts used to sprinkles holy water; as the stigmas of many Grasses.

Asc凫alab, p. 162.

Asper: same as Ascenting, p. 37.

Asperna or Asperula (crevices): same as tertilepons.

Arillate: furnished with a little or ear-like appendage, p. 59.

Arillate: sharply-pointed from a broader base, p. 69.

Aril: the bristle or beard of Barley, Oats, &c.; or any similar bristle-like appendage.

Arillate: furnished with an arm or long-bristled-shaped tip.

Aril: the single on the upper side between a leaf and the stem, p. 29.

Aril: belonging to the axis, or occupying the axis; p. 119, &c.

Arillary (hook, &c.): occurring in an axis, p. 21, 77, &c.

Axis: the central line of any body; the organ round which others are attached; the cost and stem. Ascending Axis, p. 9. Descending Axis, p. 9.


Baccate: berry-like, berry-like tips, spout, in rows of hairs.

Baccate: furnished with a hook or double hook; as the apex of the bristle on the fruit of the bristle on the apple, p. 102, &c.

Baccate: bud-like; the buds of the poplar of some Composition (species of Linaria, &c.), when set off with short, stiff hairs, longer than when diminutive, but shorter than when plumeous.

Baccate: diminution of barbatae.

Barb: the covering of a stem outside of the wood, p. 150, 152.

Barb: belonging or attached to the

Barb: that extremity of any organ by which it is attached to its support.

Barb, Bar-a-bone, p. 147.

Barbed: ending in a prolonged margin tip.

Barbated: see barbate. Barbate is sometimes used popularly for barb, more commonly for long or stiff hairs of any sort.

Barbule: of the shape of a bell, as the cirrata of Marsell, fig. 207, p. 104.

Berry: a fruit pulpy or juicy throughout, as a grape; p. 127.

Bi-or Bis, in compound words: twice; as
Bivalve: twice jointed, or two-jointed; separating into two pieces.

Bivalve: having two ears, as the leaf in fig. 96.

Fissulate: having two callosities or pairs of spots.

Foliate: twice-paired, when the petiole forks twice.

Foliate: having two teeth (not twice or doubly dentate).

Foliate: of two years' continuance; springing from the seed one season, flowering and dying the next; p. 21.

Foliate: twice-naked; arranged in two rows.

Foliate: twofold to about the middle, as the petals of Mouse-eared Chickweed.

Foliate: a compound leaf of two branches; p. 66.

Foliate: twice forked; or, more commonly, forked into two branches.

Foliate: bearing two pairs of (basi-) leaflets, &c.

Foliate: two-dipped, as the corolla of sage, &c.; p. 105, fig. 209.

Foliate: of two plates (laminae), as the stigma of Monarda.

Foliate: the same as two-leaved.

Foliate: two-leaved; as most anthers, the pod of Foxglove, most Saxifrages

(Fig. 254), &c.

Foliate: in couples, two together.

Foliate (leaf): twice pinnate; p. 66, fig. 139.

Foliate: twice pinnatifid, p. 64; that is, pinnatifid with the lobes again pinnatifid.

Foliate: twice folded together.

Foliate, or Foliate: consisting of two rows, one within the other.

Foliate: doubly serrate, as when the teeth of a leaf, &c. are themselves serrate.

Foliate: twice ternate, i.e. principal divisions 3, each bearing 2 leaflets, &c.

Foliate: a leaf, thin and inflated, like the calyx of Silene inflata.

Foliate: a leaf: its expanded portion; p. 54.

Foliate: concave within and keeled without, in shape like a small boat.

Foliate: with opposite branches at right angles to each other, as in the Maple and Lilac.

Foliate (leaf): in couples. Bracts, in general, are the leaves of an inflorescence, more or less different from ordinary leaves. Specially, the bract is the small leaf or scale from the axil of which a flower or its pedicel proceeds; p. 78; and a

Bract (bracteola) is a bract seated on the pedicel or flower-stalk; p. 78, fig. 154.

Bract, p. 20, 36.

Bract: stiff, sharp bases, or any very slender bodies of similar appearance.

Bract: bract with bristles.

Bract-shaped: see superpiliform.

Bracteole: that part of Botany which relates to Muscic. 

-Brunet: a branch in its earliest or undeveloped state; p. 20.

Bud-vessel, p. 22, 50.

Bud: a leafy head, or thickly sori, usually subterraneous; p. 45, fig. 73.

Bulbiferous: bearing or producing bulbs.

-Bulb or bulbous: bulb-like in shape, &c.
Bulbus: small balls, borne above ground, as on the stems of the bulb-bearing Lily and on the fronds of Cisterneae (bulblets and some other Ferns); p. 46.

Bulbus: appearing as if blistered or bladdery (from bulbus, a bubble).

Culmosus: dropping off very early, compared with other parts; as the calyx in the Poppy Family, falling when the flower opens.

Capitulum, or Cephalium: growing in tuft-like patches or tufts, like most sedges, &c.

Calyx: furnished with a spur (calys), as the flower of Linaria, fig. 186, and Viola, fig. 144.

Calyx-segment or Calycesegment: slipper-shaped, like one petal of the Lady's Slipper.

Calyx: hardened, or furnished with callous or thickened spots.

Calyx-segment: belonging to the calyx.

Calyx-segment: furnished with an outer necessary calyx (calyculus) or set of bracts looking like a calyx, as in true Pinks.

Calyx-segment: the hood or veil of the capsule of a Moss: Manual, p. 607, &c.

Calyx-segment: shaped like a calyx-segment or candle-extinguisher.

Calyx: the outer set of the floral envelopes or leaves of the flower; p. 85.


Caulinum-segment: bell-shaped; p. 102, fig. 307.

Caulinum-segment, or Cephalodium: curved ovules and stamens of a particular sort; p. 129, fig. 271.

Caulinum-segment: applied to fruits of Umbelliferous when the seed is curvèd in at the edges, forming a groove down the inner face; as in Sweet Cicely.

Caulinum-segment: channelled, or with a deep longitudinal groove.

Caulinum-segment: flattened, resembling lattice-work.

Caulinum-segment: greyish-white; hairy, usually because the surface is covered with fine white hairs. "Eucalyptus in white still.

Cephalodium, Cephalag: hair-like in shape; as fine as hair or slender bristles.

Cephalodium: having a globular apex, like the head of a pin; as the stigma of Cherry, fig. 213; or forming a head, like the flower-cluster of Bumus-bush, fig. 161.

Cephalodium: diminutive of capitate; as the stigmas of fig. 260.

Cephalodium: [a little head]; a close rounded dense cluster or head of sessile flowers; p. 80, fig. 141.

Cephalodium: bearing tendrils (from cephalus, a head).

Cephalodium: a pod; any dry oblong seed-vessel; p. 191, fig. 505, 506.

Cephalodium: relating to, or like a capsule.

Carpel: a keel; the two anterior petals of a papposeaeous flower, which are combined to form a body shaped somewhat like the keel (or rather the prow) of a vessel; p. 105, fig. 219, &.

Carpel: keeled; furnished with a sharp ridge or projection on the lower side.

Carpel, or Carpillus: the one-seeded fruit or grain of Grasses, &c., p. 201.

Carinatum: bush-colored; pale red.

Carinatum: fleshy in texture.

Carpel, or Carpillus: a simple pistil, or one of the parts or leaves of which a compound pistil is composed; p. 117.

Carpillus: pertaining to a carpel.
A. GLOSSARY.

Carpology: that department of Botany which relates to fruits.

Carpophore: the stalk or support of a fruit or seed within the flower; as in figs. 214. 215.

Carpophorus, or Carpophoros: first and tough, like cartilage, in texture.

Caruncle: an excrescence at the base of some seeds; as those of Polygonum.

Carpoderm: furnished with a carpoderm.

Carpophyllum: pink-like; applied to a corolla of 5 long-curved petals; fig. 200.

Caryon: a berry-like spike of flowers, an aruncus; p. 83.

Caudate: tufted, or tail-pointed.

Caudex: a sort of trunk, such as that of Palms, an upright rootstock; p. 37.

Caudicent: having an obvious stem; p. 36.

Caudicle: a small stem, or rudimentary stem; p. 6.

Caulicle: of or belonging to a stem (cylis, in Latin), p. 36.

dalf (diminutive Cellis): the cavity of an anther, ovary, &c., p. 113, 119; one of the ovals or vessels of which plants are composed; p. 140, 142.

Cellular tissue of plants; p. 152.

Cellular, or Cylina: rolled inwards from the edge of a leaf, as the shoot of Fours; p. 76, fig. 154; the flower-clusters of Holosteum, &c.

Cone: rolled towards the base, like a crescent; as the shoots of Fours; p. 76, fig. 154; the flower-clusters of Holosteum, &c.

Conoide: or Cylindraceae: divided by a circular line round the sides, as the pods of Purslane, Plantain, &c.; p. 133, fig. 298, 311.

Columella: the general outline of a thing.

Cylindritis, or Cylindracea: furnished with a tendril (Latinum, cercus): as the Grape-vine. Cylindrus also means resembling or curling like tendrils, as leaf-stalks of Virgin's-bower; p. 37.

Cylus, p. 175, 177.

Classification, p. 172.
Glossary.

Clavate: luted; same as concavate.
Clavate: club-shaped; slender below and thickened upwards.
Close: the narrow or walk-like base of some parts, as of Fruits; p. 102, fig. 200.
Clusory: rising by clinging to other objects; p. 37.
Close-shaped: see clavate.
Clothed: leaves, flowers, &c. aggregated or enclosed into a bunch.
Clutcheb: buckler-shaped.
Clusiform: same as clavate; i.e. united.
Clusiform: growing together.
Clusocarp: compound or brought close together.
Clutated: Halie, p. 46.
Clusoid: same as clusiform; bearing bases like reeds or osiers.
Clusus (plant occur): anciently a berry; now mostly used to denote the carpels of a dry fruit which are separable from each other, as of Euphorbias.
Cocchyliform: spoon-shaped.
Cocculus: coated or shaped like a small-shell.
Cocentrocarpus: applied to those fruits of Umbelliferous which have the seed bore on the inside face, by the curving towards the top and bottom; as in Cardamine.
1 Cohort, in Botany, is usually the same as connect; p. 104.
Cohortive fruits, p. 133.
Collas or Gula: the neck or line of junction between the stem and the root.
Colobos: the axis to which the carpels of a compound pistil are often attached, as in Geranium (fig. 278), or which is left when a pod opens, as in Azalea and Rhododendron.
Colona: the united stamens, as in Mallow, or the stamens and pistils united into one body, as in the Orchis family, fig. 226.
Colonna: shaped like a column or pillar.
Colonna: tuft of any sort (literally, a head of hair); p. 135, fig. 517.
Column: tufted; bearing a tuft of hairs, as the seeds of Millet; fig. 517.
Column: the line of junction of two carpels, as in the fruit of Umbelliferous, such as Parsley, Caraway, &c.
Column: used as "general," in contradistinction to "partial"; e. g. "common involure;" p. 81.
Columns: flattened.
Complete (flower), p. 89.
Conspicuous: folded upon itself.
Compounded: flattened on two opposite sides.
Conspicuously: folded upon itself lengthwise, as on the leaves of Magnolia in the bud, p. 75.
Cone: the fruit of the Pine family; p. 133, fig. 344.
Conglomerate: blended together; or the same as coiled.
Confined: similar to another thing it is associated with or compared to; or closely fitted to it, as the skin to the kernel of a seed.
Conglomerate: confused together.
Conspicuous: compound; in single pairs.
Consoliate: united or grown together from the first.
Convoluted, Convolvulus: the part of the anther connecting its two cells; p. 113.

Contrasted forms of vegetation, p. 47.

Contrary: the reverse of interrupted or articulatum.

Contracted: twisted together; Contracted attraction, same as corolla; p. 100.

Contracted: twisted back upon itself.

Contrary: turned in an opposed direction to another organ or part with which it is compared.

Corolla: rolled up longitudinally, as the leaves of the Plant in vernalion; p. 76, fig. 131. In dissection, same as contracted; p. 109.

Corolae: heart-shaped; p. 60, fig. 90, 95.

Coronae: resembling leather in texture.

Corolla: of the texture of cork. Cork layer of bark; p. 102.

Core, Cornus: a solid ball, like that of Coreus; p. 44, fig. 71, 72.

Coreole: of the consequence or appearance of horn, as the altimena of the seed of the Date, Coffee, &c.

Corymb: furnished with a small horn or spur.

Corymb: horned: bearing a horn-like projection or appendage.

Corymb: the leaves of the flower within the calyx; p. 86.

Corymb, Corymb: like or belonging to a corymbus.

Corymbus: a corona or crown; an appendage at the top of the claw of some nhubs, as Silene and Snapwort, fig. 200, or of the tube of the corolla of Hordal's Tongue, &c.

Corymb: corned: furnished with a crown.

Corymb: belonging to the back (outer).

Corymbus: a sort of flat or convex flower-cluster; p. 79, fig. 158.

Corymbose: approaching the form of a corolla, or branched in that way; arranged in corymbs.


Calyx: the first leaves of the society; p. 6, 137.

Calyx: calyx; broadly trip-shaped.

Calyx (stam): growing flat on or beneath the ground and rooting; p. 37.

Calyx: calyx (stam); one of the two carpels of Umbellifera.

Calyx: calyx (stam); the edge scalloped into rounded teeth; p. 62, fig. 114.

Calyx: calyx (stam); having any elevated appendage like a crest.

Calyx: calyx (stam); bisected like a knife with small apertures.

Calyx: calyx (stam); bisected with long hairs, &c.

Calyx: calyx (stam); bisected with long hairs, &c.

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Calyx: calyx (stam); bisected with long hairs, &c.

Calyx: calyx (stam); bisected with long hairs, &c.
GLOSSARY.

Cap-shaped: same as cup-shaped, or more so.
Capsule: a little cup; the cup to the acorn of the Oak, p. 130, fig. 256.
Caryopse: provided with a cupule.
Caryophyllus: tipped with a sharp and stiff point.
Calyx: same as calyx, or applied generally to any sharp and deep division.
Cymule: the skin of plants, or more strictly its external piliferous line.
Cymiform: in the shape of a cup, or particularly of a wine-glass.
Cyme: one complete turn of a cyme, or a cicle, p. 73.
Cylindric: rolled up circularly, or coiled into a complete circle.
Cylindrous: the circulation in closed cells, p. 167.
Cylindrical: approaching to the cylindrical form, as that of stems, &c., which are round, and gradually if at all tapering.
Cylindric, or Cylindracea: same as boot-shaped.
Cyphus: a cluster of ovate-rounded obovate-cornua, p. 82, fig. 165, 167.
Cyme: terminated with cymes, or like a cyme.

Deo- (in composition of words of Greek derivation): demi.
Demeutral: with 10 pistils or stigmas.
Demeulate: with 10 stamens.
Demeulose: falling off, or subject to fall, and of leaves which fall in autumn, and of a calyx and corolla which fall before the fruit forms.
Demeun: rounded on one side, or downwards, as the stamens of Asclepias natalis.
Demeusoid: several times compound or divided; p. 67, fig. 128.
Demisepalous: reduced on the ground, the summit tending to rise; p. 37.
Demisepalous (leaves): prolonged on the stem beneath the insertion, as in Thlaspi.
Demisepalous: arranged in pairs which successively cross each other; fig. 147.
Difoliate: when of a uniform number, and not above twelve or so.
Difoloid: bent downwards.
Difolous: past the flowering state, as an anther after it has discharged its pollen.
Difolous: the mode in which an anther or a pod regularly bursts or splits open; p. 139.
Difolous: opening by regular delinquence.
Difolous: branching off so that the stem is lost in the branches, p. 25.
Diphlos: of a triangular shape, like the Greek capital Δ.
Diphlos: growing below the surface of the water.
Diphlos: Diphlos: resemble in form or appearance.
Diphlos: toothed (from the Latin dente, a tooth), p. 61, fig. 113.
Diphlos: furnished with denticleations, or very small teeth: diminutive of the last.
Diphlos: (improvisioned or surrised) below the natural size.
Diphlos: flat-topped, or as if pressed down from above; flattened vertically.
Diphlostomous: tending gradually downwards.
Diphlostomous: furnished with denticleations, or very small teeth: diminutive of the last.
Diphlos: (improvisation or surrised) below the natural size.
Diphlos: flattened, or as if pressed down from above; flattened vertically.
Diphlostomous: tending gradually downwards.
Diphlostomous: furnished with denticleations, or very small teeth: diminutive of the last.
Diphlos: (improvisation or surrised) below the natural size.
Diphlos: (in Greek compounds): two, α.
Diphlos: (in Greek compounds): united by their filaments in two sets; p. 111, fig. 287.
Diphlos: having two stamens, p. 112.
Diphlos: a short distinguishing character, or descriptive phrase.
GLOSSARY.

Didymous: transparent or translucent.

Dichogyrous (flower): having both calyx and corolla.

Dichogyrous: two-forked.

Didymous: having the stamens in one flower, the pistils in another; p. 89, fig. 176, 177.

Dicotylycos (fruit): splitting into two coats, or closed carpels.

Dioecious (embryo): having a pair of cotyledons; p. 16, 137.

Dioecious Plants: p. 150, 192.

Dilophous: twin.

Dihagonal (stamens): having four stamens in two pairs, one pair shorter than the other, as in fig. 194, 195.

Dipterous: spreading widely and irregularly.

Diploate (fingered): where the lobes of a compound leaf are all borne on the apex of the petiole; p. 89, fig. 129.

Diploous (flowers): having two pistols or styles, p. 116.

Dissymmetric: made up of two parts, or its organs in twos.

Distantiate: halved; as where a leaf or leaflet has only one side developed, or a stamen has only one lobe or cell; fig. 219.

Diorthophorous: of two forms.

Diurnal, or Diuonous: where the stamens and pistils are in separate flowers on different plants; p. 89.


Diplostigma or Doli-shaped: flat and circular, like a dish or saucer.

Diot: the face of any flat body; the central part of a head of flowers, like the Sunflower, or Conopis (fig. 221), as opposed to the ray or margin; a rusty expansion of the receptacle of a flower; p. 125.

Dissected: cut deeply into many lobes or divisions.

Dissepiments: the partitions of an ovary or a fruit; p. 119.

Distichous: two-ranked; p. 72.

Distichous: unaccompanied with each other; p. 102.

Discoideous: resembling; very widely divergent.

Double (flowers): cut into divisions extending about to the base or the midrib; p. 62, fig. 125.

Dodeca- (in Greek compounds): twelve; as Dodecupetalous: with twelve petals or styles.

Dodecupetalous: with twelve stamens.

Dodecahydrous: one-shaped.

Dorsal: pertaining to the back (dorsum) of an organ.

Dorsal Nerves: p. 117.

Dorsal Ducts, p. 148.

Double Flowers: at callis: where the petals are multiplied unduly; p. 89, 90.

Downy: clothed with a coat of soft and short hairs.

Drupaceous: a stone-fruit; p. 128, fig. 295.

Drouetous: like or pertaining to a drupe.

Duart: the so-called vessels of plants; p. 146, 148.

Drupeus: leathery, or resembling to a drupe.

Drupeous: the heart-wood, p. 133.

Drusy: remarkably low in stature.
214 GLOSSARY.

E- or Ex-, at the beginning of compound words, means destined of, as seated, without a stem by which; amblyoseous, without alburnum, &c.

Eighth : see seventeent; p. 30, fig. 86.

Eighth : destination of leaves.

Eighth : armed with prickle (like a hedgehog). Eighth : a diminutive of it.

Eighth : toothless.

Eighth : past bearing, &c.; seed of meshes which have discharged their pollen.

Eighth : destination of pollen.

Eighth : teeth or clefts mixed with the spaces of Livens. (Manual, p. 682.)

Eighth : approaching an elliptical figure.

Eighth : oval or oblong, with the ends regularly rounded; p. 58, fig. 86.

Eighth : matched at the summit, p. 49, fig. 108.

Eighth : the rudimentary undeveloped plant in a seed; p. 5, fig. 5, 12, 26, 31-37, &c., and p. 136. Eighth : p. 139.

Eighth : raised out of water.

Eighth : with thorns or spines. Eighth : with slender shoots.

Eighth : the inner part of a petiole or stem; p. 128.

Eighth : the vestigial part of a leaf.

Eighth : the leaves of the inner part of an orchid.

Eighth : with many prismatic styles.

Eighth : with nine stamens.

Eighth : sword-shaped; as the leaves of Iris; p. 134.

Eighth : the margins not all evenly, as listed, or divided, but even; p. 61.

Eighth : lasting for a day or less, as the remains of Purslane, &c.

Eighth, in composition: upon; as

Eighth : the outermost layer of a fruit; p. 128.

Eighth : relating to the Epidermis, or the skin of a plant; p. 132, 133.

Eighth : growing on the earth, or close to the ground.

Eighth : upon the orary; p. 106, 116.

Eighth : borne on the sepals or the calyx.

Eighth : borne on a leaf.

Eighth : a plant growing on another plant, but not nourished by it; p. 34.

Eighth : or Epiphylaceous: relating to Epiphylax; p. 34.

Eighth : the skin or coat of a seed, especially the outer coat.

Eighth : name as regular; or of the same number or length, as the case may be, of the body is 10 composed with.

Eighth : name as abruptly pointed; p. 63.

Eighth : riding straddle; p. 68, fig. 133, 134.

Eighth : crooked, as if gnawed.

Eighth : outermost.

Eighth : outermost Organ of the Flower, p. 85.

Eighth : see anterior.

Eighth : broken by excluding the light, as the stalks of Onion.

Eighth : holding the leaves over winter and until new ones appear, or longer

Evanescent: running out, as when a midrib projected beyond the apex of a leaf, or a trunk is continued to the very top of a tree.


Exostate: the notch in the outer root of the ovule; p. 122.

Explained: spread or flattened out.

Exorced: protruding out of, as the stamens out of the corolla of fig. 201.

Exostate: desiccated of stipules.

Extirpate: until of a branch or bud little out of the axil; as the upper normal leaf of the Butternut, p. 37, fig. 52.

Extra: turned outwards; the outer is extra worse when flattened to the filaments on the side next the leaf, and opening on the outer side, as in Iris; p. 113.

Exulate: spiral-shaped, a flat body curved, its edges parallel.

Family: p. 176.


Exurate: banded; also applied to monosome stems which grow flat.

Exultrate: a close cluster; p. 83.

Fassified, Fasified: growing in a bundle or whorl, as the leaves of Pine and Larch (fig. 139, 142), the roots of Peony and Dahlia, fig. 36.

Fistulate: close, parallel, and upright, as the branches of Laminaria Pinnari.

Fistulate (plural, fistules): the throat of a tube, corolla, &c.

Fissetate, Finous: honeycombed, same as alate.

Fistula-coron: where the veins of a leaf spring from along the sides of a middle rib; p. 47, fig. 65 - 64.

Fissile (flowers): with pitch and no stamens.

Fissitrate: pierced with one or more large holes, like windows.

Fissiparous, or Fissiparous: resembling iron rush; reddish yellow.

Fistrate: fruit-bearing, or capable of producing fruit; also said of authors when they produce good pollen.

Fertilization: the process by which pollen causes the embryo to be formed.


Filiferous: formed of small fibres.

Filiferous, p. 16.

Filiferous (flowers): abundant with deep recess on each side.

Filiation: the walk of a manicure; p. 86, fig. 170, a; also any slender thread-shaped appendage.

Filamentous, or Filamentous: bearing or formed of slender threads.

Filiform: thread-shaped; long, slender, and cylindrical.

Filipate: fringed; furnished with fringes (filaments).

Filipodium or Filipodium: hollow and cylindrical, as the leaves of the Onion.

Filipodium or Filipodium: feathery; broad, rounded at the summit, and narrowed at the base.

Filipodium, or Filipodium: long, narrow, and flexible, like the tend of a whip; or like the rambles (filigree) of the Strawberry.

Filipodium: yellowish; or coming yellow.

Fleshy: composed of firm jelly or jelly.

Fleshy Flowers, p. 47.
Glossary:

Flora, or Flora: belonging to the genus of flowers: the plants of a country or district, taken together, or of the so-called compound flower of Composite, p. 106.

Flower: the whole organ of reproduction of Phanerogamous plants; p. 84.

Flowered: an unopened flower.

Flowering Plants: p. 177. Flowering Plants, p. 172, 177.

Floriferous: belonging to, or of the nature of, a leaf (foliaceous).

Foliate: leafy; abaxial in leaves.

Foliate: relating to or bearing leaves (folia).

Follicle: a simple pod, opening down the inner suture; p. 131, fig. 262.

Follicular: resembling or belonging to a follicle.

Fold of Leaves, p. 169.

Folium: a leaf or rind, as that of the ovule: p. 122.

Fuscous: little arched scales in the throat of some cestias, as of Comfrey.

Fusiform: over-arched, or arching over.

Fused: deeply pitted. Fusedate: diminutive of fusate.

Fused not united with any other parts of a different sort: p. 108.

Fused: the margin betw. slender appendages, beside, &c.

Fused: what answers to leaves in Perns; the stem and leaves fused into one body, as in Dockwevet and many Liverworts, &c.

Fusionary: the bending into leaf.

Fusiloid: fusiform-bearing; like a frond; or sometimes used for leafy.

Fusiloid-folious: the state of fronding. Organ of, p. 76.

Fusiform: the matured ovary and all it contains or is connected with; p. 124.

Fusiform: somewhat shrivelled; becoming a shrub (frutex).

Fusiform: like a small shrub. Fusiform: shrivelled; p. 36.

Fusiform: soon falling off or petiching.

Fusiform: hairy; dull yellow with gray.

Fusiform: the stalk of a seed or ovule; p. 122.

Fusiform, or Fusiform-shaped: expanding gradually upwards, like a funnel.

Fusiform: funnel-shaped; p. 102.

Fusiform: forked.

Fusiform: covered with bean-like fine scurf.

Fusiform: marked by longitudinal channels or grooves.

Fusiform: deep gray-brown.

Fusiform: spine-like-shaped; p. 32.

Galeate: shaped like a helmet (oplos); as the upper sepal of the Monkshood, fig. 186, and the upper lip of the corolla of Dead-Nettle, fig. 209.

Galeate: of galea points; being an acposterious, and a better word; p. 109.

Galeous: formed of united leaves. Galeatus: formed of united sepals.
GROSARIO.

Gebra: twin; in pairs; as the flowers of Linnæa.
Gebra: a bud.
Gebra: the state of building, or the arrangement of parts in the bud.
Gebra: a small bud; the buds of Mosera; the glumel, p. 6.
Gebra: bent abruptly, like a knee (goni), as many arms.
Gebra: a kind; a rank above species; p. 165, 166.
Gebra: smooth, i.e. having no hairs, bristles, or other pubescence.
Gebra: round-shaped; as the leaves of lirii, fig. 134.
Gebra: small cellular organs which secrete silky or amniotic or other products; they are sometimes sunk in the leaves or bud, as in the Orange, Prickly Ash, &c.; sometimes on the surface as small projeclions; sometimes raised on hairs or bristles (glandular hairs, &c.), as in the Sweetbriar and Sand-dew. The name is also given to any small seedlings, i.e., whether they secrete anything or not.
Gebra: furnished with plants, or gland-like.
Gebra: the stems or base of a leaf and similar stalks.
Gebra: thinly glabrous, or bluish-gray.
Gebra: covered with a bloom, viz. with a fine white powder that rubs off, like that on a fresh linen, or a cabbage-leaf.
Gebra: spherical in form, or nearly so. Gebra: nearly glabrous.
Gebra: hairs or bristles; bushed; tipped with bristles, or with a double hooked point.
Gebra: closely aggregated into a dense cluster.
Gebra: a dense head-like cluster; p. 82.
Gebra: the department of Botany in which technical terms are explained.
Gebra: glume-like, or glume-bearing.
Gebra: Glaumes are the bracts or floral coverings of Grasses, or, particularly, the outer bracts or bracts of each spikelet. (Manual, p. 545.)
Gebra: the inner bracts, or palmar, of Grasses.
Gebra: a vegetable product consisting of nongems in thin lamina, p. 165.
Gebra: composed of grains. Gebra: a small grain.
Gebra: or Glaumes; formed of coarse clustered grains.
Gebra: spotted, as & by drops of something colored.
Gebra: naked-fruited.
Gebra: naked-united; p. 141.
Gebra: with stamens borne on, i.e. united with, the pistil; p. 117, fig. 266.
Gebra: a name for the pistil of a flower taken altogether.
Gebra: a particular receptacle or support of the pistil, or of the carpel of : a compound ovary, as in Geranium, fig. 277, 278.
Glossary:

Stalk or stem: a stalk rising a pistil above the stamens, as in the Goose Family, p. 276.
Stigma: located in a circle; name as circinate.
Stipple: strongly butt and thin.
Habit: the general aspect of a plant, or its mode of growth.
Habitat: the situation in which a plant grows in a wild state.
Hairs: hair-like projections or appendages of the stems of plants.
Hinny: horn-like hair, especially hooked hairs.
Hilberthed, or Hederothened: six points.
Hilum: when appearing as if two halves of the body were cut away.
Hilum: in Herbs: herboid; the end of a slender body being round.
Hilum: a hair of a small hook; a diminutive of the last.
Hilum or Hilum: shaped like a balled; furnished with a spreading kev on each side as the base; p. 59, fig. 97.
Hilum-shaped: of the shape of a heart as commonly pointed; p. 38, fig. 98.
Hilum: the older or matured seed of conspicuous trees; p. 133.
Hilum: called like a helix or snail-shell.
Hilum: the upper sepals of Monocotyledon in this shape, fig. 120, 60.
Hilum: (in compounds from the Greek): half; e.g. Hesperothem, &c.
Hilum: half-bent, or one corner of an Umbelliferous plant.
Hilum: or Hilum (corn: or root): nearly same as anthophila, p. 123.
Hilum: (in word of Greek origin): seven; as, Hippeastrum: with seven petals or styles.
Hilum: p. 90.
Hilum: of the texture of common heritage; not woody; p. 36.
Hilum: the botanist's arranged collection of dried plants; p. 201.
Hilum: or Hilum (flower): bearing both stamens and petals in the same blossom; name is perfect; p. 95.
Hilum: bearing fruit of two rays or shapes, as in Amphilicarpus.
Hilum: having two or more sorts of flowers on the same stamens and petals; as in Amur, Daisy, and Corchorus.
Hilum: of two or more stamens.
Hilum: or Hilum (wedge): the same as anthophila; p. 123.
Hilum: (in Greek compounds): six; as, Hippeastrum: six-angled. Hippeastrum: with six petals or styles.
Hilum: belonging to the helum.
Hilum: the seat of the seed; its place of attachment; p. 122, 133.
Hilum: or Hilum (wedge): horseshoe-shaped.
Hilum: hairy with stiltish or beard-like hairs.
Hilum: bristly; less with stiff hairs. Hippeastrum is a diminutive of it.
Hilum: grayish-white; see common, &c.
Hilum: or Hilum (wedge): a head or cluster with flowers all of one kind, as in Eupatorium.
Hilum: uniform in nature; all of one kind.
Hilum: (leaves, &c.): originating all round a stem, but all bent or curved.
Homozygous: all of one shape.
Heterozygous or Heterozygous (embryos): curved with the seed; curved one way
Head: want to be a head of, p. 205
Headed: want to be a head of; cone of
Headed: want to be a head of; cone of
Hered: want to be a head of; cone of
Horn: a spur or some similar appendage
Horse: the texture of horn
Horns: secret or secretion; secretion of horny plants; p. 204
Hypocycloidal: spread over the surface of the ground.
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GLOS AnY.

Inclusion: the place or the mode of attachment of an organ to its support; p. 73.

Interarterial Passages or Spaces, p. 143, fig. 341.

Intravascular: the part of a mass between two vessels; p. 48.

Intercauline: parts of a mass with small leaves intermixed with larger ones, as in Water Arums.

Infractalinae (stipules, &c.): placed between the leaf or petiole and the stem.

Insertion turned or facing inward, i. e., towards the axis of the inflorescence; p. 113.

Involute to four fold: where the apex is to the direction opposite to that of the organ it is compared with.

Involute: a partial or small involucre; p. 51.

Involutate: furnished with an involucre.

Involute: furnished with an involucre.

Involucrate: a single or set of leaves around a flower, bud, or head; p. 79.

Involucrate in variation, p. 76; rolled inwards from the edges.

Irregular Flowers, p. 31.

Involute: separate or separable at one or more places into pieces; p. 64, &c.

Involucrate: a projecting ridge on a surface, like the keel of a boat; the two anterior petals of a papilionaceous corolla; p. 106, fig. 217, 218, &c.

Involute: furnished with a keel or sharp longitudinal ridge.

Involute: the ovule and seed, p. 120, 126.

Involute-shaped: resembling the outline of a kidney; p. 58, fig. 100.

Involute; the odd petal in the Orchid Family.

Involute: same as bilabiate or two-lipped; p. 104.

Involute: shelled; cut into deep narrow lobes (called loculices).

Involute: producing milky juice, as do the Milkweed, &c.

Involute: full of holes or gaps.

Involute: smooth as if polished.

Involute or Lamellate: consisting of flat plates (lamellae).

Involute: a plate or blade: the blade of a leaf, &c., p. 54.

Involute: woolly; clothed with long and soft engiuged hairs.

Involute: lance-shaped; p. 57, fig. 86.

Involute: convolvulaceous; p. 26, 27.

Involute: belonging to the side.

Involute: the milky juice, &c., of plants.

Involute: loose in texture, or sparse; the opposite of crowded.

Involute: one of the divisions or blades of a compound leaf; p. 44.

Involute: same as bilabiate.

Involute: of about the consistency of leather; coriaceous.

Involute: simple pod, dehiscing into two pieces, like that of the Pea, p. 131, fig. 303; the fruit of the Pea Family (Leguminosae), of whatever shape.

Involute: belonging to legumes, or to the Leguminous Family.

Involute: less-shaped; i. e. flatish and convex on both sides.

Legume: the place or the mode of attachment of an organ to its support; p. 73.

Leguminosae: the part of a mass between two vessels; p. 48.

Leguminosae: parts of a mass with small leaves intermixed with larger ones, as in Water Arums.

Leguminosae (stipules, &c.): placed between the leaf or petiole and the stem.

Leguminosae turned or facing inward, i. e., towards the axis of the inflorescence; p. 113.

Leguminosae to four fold: where the apex is to the direction opposite to that of the organ it is compared with.

Leguminosae: a partial or small involucre; p. 51.

Leguminosae: furnished with an involucre.

Leguminosae: furnished with an involucre.

Leguminosae: a single or set of leaves around a flower, bud, or head; p. 79.

Leguminosae in variation, p. 76; rolled inwards from the edges.

Leguminosae, p. 58.
Glossary

Lepidote: leprous; covered with scurfy scales.
Lepros: the inner, firmous bark of Exogenous plants; p. 152.
Leprous, or Epine: woody in texture.
Lepidote: furnished with a leprous; p. 106.
Lepidote: the strip-shaped corolla in many Composite; p. 106, fig. 220; the little membranous appendage at the summit of the leaf-sheaths of most Grasses.
Lilac: the blade of a leaf, petal, &c.; p. 54, 102.
Lilac: narrow and flat, the margins parallel; p. 58, fig. 85.
Lilacate: marked with parallel lines. Lilacate: marked with minute lines.
Lilacote, Longiflorum: tongue-shaped.
Lip: the principal lobe of a labiate corolla or calyx; p. 105; the odd and peculiar petal in the Orchis Family.
Lobe: any projection or division (especially a rounded one) of a leaf, &c.
Locule (plural loculi): a small cell, or compartment of a cell, of an ovary or anther.
Locular: relating to the cell or compartment (locule) of an ovary, &c.
Loculicidal (dehiscent): splitting down through the middle of the back of each cell; p. 133, fig. 305.
Locule: a name for the spikelet of Grasses.
Locust: a pod which separates transversely into joints; p. 131, fig. 304.
Loculicidous: pertaining to or resembling a locule.
Linied: wing-shaped.
Ligule: tyr-shaped; a pinnaled leaf of an oburate or sacculate outline, the end-lobe lance and rounded, and the lower lobes small, as in Winter Cress and Radish, fig. 20.
Limb: the small of the Nutmeg; p. 133.
Linulate: spotted or blotted.
Male (flowers): having stamens but no pistil.
Membranose: membrane-shaped.
Membranous: withering without falling off.
Membranoid: belonging to the edge or margin.
Membranous: margined, with an edge different from the rest.
Membranoid: ten-petalled.
Membranous: belonging to the middle.
Medial: belonging to, or of the nature of pith (nodules); pithy.
Medial: Margin: the silver-grain of Wood; p. 151.
Medial: Margin: of a tree; just above the pith; p. 151.
Membranaceous or Membranous: of the texture of membrane; thin and more or less translucent.
Medullary Rays: crescent-shaped.
Medullary: one carpel of the fruit of an Umbelliferous plant.
Membranaceous: separating into parts by the formation of partitions within.
Membranous: the middle part of a petiole, when that is distinguishable into three layers; p. 128.
Memphlasm: the middle or green bark.
Microphyl : the clasping collar of the seed; p. 161.
Molt: the middle or main rib of a leaf; p. 53
Mold: p. 148.
Mint: vermilion-colored.
Midrib: the middle or main rib of a leaf; p. 148.
Mesophyll: the tissue between the upper and lower epidermis, in the form of a spongy mass.
Monadelphia: stamens united by their filaments into one set; p. 111.
Monandrous (flower): having only one stamen; p. 112.
Monochlorous: neckless-shaped; a cylindrical lobe-constructed as intervals.
Molluscidous: having only one floral envelope, i.e. calyx but no corolla, as
Anemone, fig. 176, and Cornus-oli Plant, fig. 178.
Molluscidous (embryo): with only one cotyledon; p. 167.
Molluscidous Plants, p. 134, 192.
Monocious, or Monocious (flower): having stamens or pistils only; p. 90.
Monogynous (flower): having only one pistil, or one style; p. 116.
Monopolous (flower): with the corolla of one piece; p. 101.
Monopetalous: one-petalled, or of one piece; p. 102.
Monopetalous (flower): a calyx of one piece; i.e. with the sepals united into one body; p. 103.
Monopetalous: one-seeded.
Morphology: an unnatural deviation from the usual structure or form.
Morphology: the department of botany which treats of the forms which an organ (say a leaf) may assume; p. 26.
Mucronate: tipped with an abrupt short point (snout); p. 60, fig. 111.
Mucronulate: tipped with a minute abrupt point; a diminutive of the last.
Multiflorous: in many flowers or ranks. Multiflor: many-flowered; p. 62.
Multiple Fruits. p. 123.
Muniflorous: with short and hard points.
Muniflorous: wall-like; resembling courses of bricks in a wall.
Muniflorous: the part of descriptive botany which treats of Flowers (i.e. Moll.
Muniflorous: pointless; headless; unarmored.
Muniflorous: the spelt of Fungi; i.e. the filaments from which Mushrooms, &c.
originates.
Muniflorous: testa-shaped. p. 31, fig. 37.
Muniflorous: introduced from a foreign country, but growing perfectly wild and propagating freely by seed.
Muniflorous: boat-shaped, like the glumes of most Grasses.
Muniflorous: looking like a string of beads; see multiflora.
Muniflorous: the honey, &c. secreted by glands, or by any part of the corolla.
Muniflorous: honey-bearing; or having a seedy.
Muniflorous: the old name for petals and other parts of the flower when of unusual shape, especially when honey-bearing. See the hollow spur-shaped petals of
Columbine were called nectarious; also the curious long-clawed petals of
Munkshood, fig. 186, &c.
GLOBSÂNT.

Necd-deed: long, slender, and nodulous, like the leaves of Poinsettia; p. 68, fig. 140.

Nerve: a vein for the ribs or veins of leaves, when simple and parallel; p. 56.

Nerved: furnished with nerves, or simple and parallel ribs or veins; p. 56, fig. 84.

Nodulated: furnished with branching veins forming network; p. 56, fig. 83.

Nodding (as Latin form, Nodum): bending so that the summit hangs downward.

Node: a knob; the "joint" of a stem, or the part where a leaf or a pair of leaves springs; p. 89.

Nodose: having or knobby. Nodules: furnished with little knobs or knots.

Nodules: according to rule; the pattern or natural way according to some law.

Nodules: marked with open or lines of a different color.

Nodose: resembling to or resembling a small nut.


Nudite: the "joint" of an ovary; p. 122) or seed (p. 126) of a cell; p. 149.

Nudite: a hard, closely one-coated, undulate fruit; as a chestnut, butternut, acorn; p. 190, fig. 259.

Nudite: a little nut; or the kernel of a drupe.

O, (meaning over against): when prefixed to words, signifies inversion; as,

O, expanded: flattened the opposite of the usual way.

Oblate: heart-shaped with the broad and notched end at the apex instead of the base; p. 60, fig. 169.

Oblate: heart-shaped with the tapering point downwards; p. 58, fig. 91.

Oblate: applied to leaves, i.e. means unequal-sided.

Oblong: from two to four times as long as broad, and more or less elliptical in outline; p. 58, fig. 87.

Oblong: inversely oval, the broad end upward; p. 38, fig. 93.

Oblong: blunt, or notched at the end; p. 60, fig. 165.

Oblong: same as inverse.

Oblate (in the bud); when the margins of one leaf alternately overlap those of the opposite one.

Oblate: furnished with sheath (bottos), or sigillae in the form of stellae; as in Papaveraceae, p. 69, fig. 137.

Oblate: yellowish-white; dull cream-color.

Oblate: elliptical, drawn into the composition of

Oblate: with eight petals or stamens.

Oblate: its parts in rights. Obovate: with eight stamens, i.e.

Oblate: short branches next the ground which take root; p. 58.

Oblate: one-seried, i.e.: furnished with only a single rib, &c., &c.

Oblate: applied to a surface, means ellipsoid, not shining.

Oblate: furnished with a lid or cover (episcia), as the capsules of Mosses.

Oblate: half of leaves and branches when on opposite sides of the stem from each other (i.e. in pairs); p. 83, 71. Branches are opposite the petals, &c.

Oblate: when they stand before them.

Oblate: circular to ovaline or nearly so; p. 56.

Oblate: any member of the plant, as a leaf, a stem, &c.; p. 1.

Organ of Vegetation, p. 7; of Reproduction, p. 77.


Orthosiphon or Orthotropo (ovule or seed): p. 122, 135, fig. 270, 274.

Ovum: of a large texture.

Ovate: broadly obovate; p. 88.

Ovary: that part of the pistil containing the ovules or ovary seed; p. 88, 116.

Ovule: shaped like an egg with the broader end downwards, or, in plants having, such as beaves, like the section of an egg lengthwise; p. 88, fig. 129.

Oval: ovate or ovoid in a solid form.

Ovoid: the body which is ovoid in form; p. 88, 116, 122.

Pedicel (plnlar pedicel): stalk; the inner banks of Grasses; the chaff or beards on the receptacle of many Compositae, as Coreopsis, fig. 220, and Heatflower.

Palmate: furnished with chaff, or chaffy in texture.

Palea (plumose pala): the inner husk of Grasses, as Coreopsis, fig. 220, and Heatflower.

Pappose: (velvety, balled, &c.): in a palmate manner: p. 57, 63, 65.

Papilliform: fiddlenosed (as, like the tooth of a com). p. 167, fig. 129, &c.

Papilliform: fiddle-shaped (as the tooth of a com). p. 167, fig. 129, &c.

Papillate: arranged in papillae, or like a paneke.

Paper: of about the consistence of letter-paper.

Papilloseous or butterly-shaped; applied to such a com as that of the Pea and the Lonicera; p. 109, fig. 217.

Papillose (plumose papillae): little nipple-shaped papilloseous.

Papilliform: fiddlenosed.

Pappose: downy-haired; the down covering the stigmas of the Thistle, and other Compositae, represents the calyx; so the scales, seeds, chaff, as well as brittle, or whatever takes the place of the calyx in this family, are called the papules; fig. 292-296, p. 130.

Papillary, or papilliform (papulae): p. 55, 56.

Paraphyses: jointed diameters mixed with the anthocodia of Moses. (Manual, p. 607.)

Parasclena: soft cellular tissue of plants, like the green pulp of boughs.

Parted: (placenta, &c.): divided into parts (parenchyma) of the ovary or pericarp; p. 119, 120.

Percent: separated or clef into parts almost to the base; p. 62.

Partial: sectional; same as an incised; partial peltate, a division of a whole leaf-stalk or the stalk of a leaflet; partial umbellet, a branch of a peltate; partial pedicel, an umbellet, p. 81.

Papulose: (plumose papillose): little nipple-shaped papilloseous.

Peduncle (plural peduncles): the stalk of each particular flower of a cluster; p. 78, fig. 156.

Pedunculate: furnished with a peduncle.
**Glossary.**

**Pedicel:** a flower-stalk, whether of a single flower or of a flower-cluster; p. 76.

**Pedicelled, Pedicellate:** furnished with a pedicel.

**Peltate:** shield-shaped; said of a leaf, whatever its shape, when the petiole is attached to the lower side, somewhere within the margin; p. 50, fig. 108, 178.

**Pendent:** hanging. **Pendulous:** somewhat hanging or drooping.

**Perculate:** tipped with a tuft of fine hairs, like a painter's pencil; as the stigma of some Gramineae.

**Perax.** (in words of Greek composition): five; as

**Pentagamous:** with five pistils or styles; p. 114.

**Pentamerous:** with its parts in fives, or on the plan of five.

**Pentandrous:** having five stamens; p. 112. **Pentastamenous:** in five ranks.

**Pepper:** a fruit like the Melon or Cucumber; p. 128.

**Pellate:** having the stem sunk; p. 67, fig. 131, 132.

**Pellitulent:** piercing through the leaf, in appearance; p. 67, fig. 131, 132.

**Perforate:** pierced with holes, or with transparent dots resembling holes, as an Orange-leaf.

**Perianth:** the leaves of the flower generally, especially when we cannot readily distinguish them into calyx and corolla; p. 85.

**Pericarp:** the ripened ovary; the walls of the fruit; p. 127.

**Peridia:** belonging to the pericarp.

**Perianth:** the cluster of peculiar leaves at the base of the fruit-stalk of Mosses.

**Perichetal:** belonging to the perichaetium.

**Perigynous:** flower within; same as perigynous.

**Perigon:** bodies around the pistil; applied to the closed cup or bottle-shaped body which encloses the ovary of Sedges, and to the bristles, little scales, &c. of the flowers of some other Cyperaceae.

**Perigynous:** the petals and stamens borne on the calyx; p. 104, 111.

**Perigynious:** around the outside, or periphery, of any organ.

**Perisperm:** a name for the albumen of a seed; (p. 126).

**Peristome:** the fringe of nectar, &c. around the orifice of the capsule of Mosses. (Mayr, p. 667.)

**Peristent:** remaining beyond the period when such parts commonly fall, as the leaves of evergreens, and the calyx, &c. of such flowers as remain during the growth of the fruit.

**Peristomous:** masked; a habituated corolla with a projection, or point, is the throat, as of the Hesperis; p. 106, fig. 210, 211.

**Petal,** a leaf of the corolla; p. 85.

**Petaloid:** petal-like; resembling or colored like petals.

**Petiole:** a footstalk of a leaf; a leaf-stalk, p. 54.

**Petiolate, Petiolules:** furnished with a petiole.

**Petiolulate:** said of a leaflet when raised on its own partial leafstalk.

**Phantagamous, or Phantagamous:** plants bearing flowers and producing seeds; same as Flowering Plants; p. 177, 182.

**Phylloclad (plural phylloclads):** a leaf where the blade is a dilated petiole, as in the New Holland Anchises; p. 69.

**Phyllidium, or Phyllydium:** the arrangement of leaves on the stem; p. 71.

**Physiological Botany, Physiology, p. 3.**
GLOSSARY.

Phyllot: a name used to designate the pieces which by their repetition make up a plant, technically, viz. a joint of stem with its leaf or pair of leaves.

Polydorus: bearing a slender bristle or hair (pilosus), or beset with hairs.

Pilos: hairy; clothed with soft slender hairs.

Pinnate: a primary branch of the petiole of a bipinnate or tripinnate leaf; as fig. 100, p. 66.

Pinnate (leaf): when the leaflets are arranged along the sides of a common petiole; p. 65, fig. 126-128.

Pinnately lobed, cut, parted, divided, etc.: p. 63.

Pinnatifid: same as pinnately cut; p. 63, fig. 118.

Pistil: the seed-bearing organ of the flower; p. 86, 114.

Pistillate: the body which in Mosses, Liverworts, &c. answers to the pistil.

Pinnate, p. 51, fig. 79, 80.

Pinnate: the surface or part of the ovary to which the ovules are attached; p. 118.

Pinnate (in the bud); p. 76, fig. 150; p. 116, fig. 225.

Pinnate: same as pinnatifid.

Pinnatifid: bearing a slender bristle (pilosus), or beset with hairs.

Pinnate: when any slender body (such as a bristle of a pappus) is beset with hairs along its sides, like the plumule or the beard on a feather.

Plicatus: the little bud or first shoot of a germinating plantlet above the hypocotyl; p. 6, fig. 5; p. 137.

Plicatus: in composition; many or several; as

Flower: with several leaves; p. 46.

Petiole: similarly a legume, p. 131; also applied to any sort of capsule.

Pedicel: the stalk of a seed.

Pedicel: the distal of any pointed tip, such as a motor, stem, univinollion, etc.

Pollen: the fertilizing powder of the anther; p. 86, 114.

Pollen-scene: applied to the pollen when the grains all cohere into a mass, as in Milkweed and Orchis.

Poly-(in compound words of Greek origin): same as multi- in those of Latin origin, viz. many; as

Polygamous: having the stamens united by their filaments into several bundles; p. 112.

Polyad: with numerous (more than 30) stamens (inferred on the stamench); p. 119.

Polygam: having many (more than two) carpelotone, as Pines; p. 17, 102, fig. 45, 46.

Polypodium: having some perfect and some imperfect flowers, on the same or on different individuals, as the Bird Maple.

Polygnal: many-seeded.

Polygnal: with many pistils or styles; p. 118.

Polygnal: formed of many parts of each sex.

Polygynous: of several or varying forms.

Polygnous: when the parts are distinct or separate (whether few or many); p.108.
Glossary

Polyphyllous: many-leaved; formed of several distinct pieces, as the calyx of

Sonata, fig. 169, Pllact, fig. 174, &c.

Polyplectum: same as the last when applied to the calyx: p. 103.

Polyplectum: many-seeded.

Pome: the apple, pear, and similar fleshy fruits: p. 128.

Pomace: Full of holes or pomes.

Pouch: the sillage or short pod, as of Shepherd's Purse: p. 133.

Piliferous: secreted as mentioned: p. 108.

Piliform: same as not, as p. 75.

Premature: arising abruptly, as if bitten off.

Prickles: sharp elevations of the bark, coming off with it, as of the Rose: p. 39.

Prickly: bearing prickles, or sharp projections like them.

Primary: the outer coast of the covering of the ovule: p. 124.

Primordial: earliest formed; primordial leaves are the first after the cotyledons.

Primus: prism-shaped; having three or more angles bounding flat or hollowed sides.

Process: any projection from the surface or edge of a body.

Procumbent: trailing on the ground: p. 57.

Produced: expanded or projecting, as the upper sepals of a Larkspur is produced

above into a spur: p. 91, fig. 183.

Prodrumus (literally, bearing offspring): where a new branch rises from an

older one, or one bud or cluster of flowers out of another, as in Fraxinus Germanica, &c.

Prospective: lying flat on the ground.

Pulvinate: a vegetable powder containing nitrogen: p. 165.

Pulvillus: the soft infiltrating lining or cortex of cells: p. 165.

Pulvinus, Pulvinita: cushioned; covered with a powder like hoar-frost.

Pulverulent: covered with fine and short, almost imperceptible down.

Pulverulent: hairy or downy, especially with fine and soft hairs or pulvini.

Pulvini, or Pulviniensia: dusted; covered with fine powder, or what looks like such.

Pulvinaceae: cushioned, or shaped like a cushion.

Pulvinate: dotted, either with minute holes or what look as such (as the

St. John's-wort and the Orange), or with minute projecting dots.

Pungent: very hard, and sharp-pointed, prickly-pointed.

Pustula: the stone of a drupe, or the shell of a nut: p. 128.

Pyramidal: shaped like a pyramid.

Pyreno, Pyrene: a seed-like nutlet or stone of a small drupe.

Pyxid, Pyxidium: a pod opening round horizontally by a lid: p. 139, fig. 298, 511.

Quadri-, QDtri- in words of Latin origin: four, as

Quadrangular: four-angled. Quadrifolium: four-leaved.


Quadrifoliate in four. Quadrato: in four.

Quinquial: in a quincaux; when the parts in activation are five, two of them

outside, two inside, and one half out and half in, as shown in the calyx,

fig. 294.

Quintuple: five-fold.
Glossary.

Race: a marked variety which may be perpetuated from seed; p. 174.
Rosette: a round-oval, with undivided petals; p. 78, fig. 126.
Rosaceae: bearing racemes, or raceme-like.
Rosette: see Rosette.
Rosary: belonging to the ros.
Rosas, or Rosas: furnished with ray-flowers; p. 107.
Rosaceous: belonging to the root, or apparently deriving from the root.
Roscous: a stem or root; p. 177.
Rosiger: belonging to a flower. Rosome: fall of branches (ruin).
Rosinose: fall of bracteoles (ruins).
Rosette: see Rosette.
Roset: the marginal flowers of a head (as of Coreopsis, p. 107, fig. 410) or cluster (as of Hydrangea, fig. 187), when distant from the root, especially when ligulate, and diverging (like rays or subumbels); the branches of an umbel, which diverge from a center; p. 79.
Rosetate: the axis or support of a flower; p. 86, 124; the common axis or support of a head of flowers; fig. 230.
Rosette: turned or curved downwards; nearly recumbent.
Rosette: curved outwards or backwards.
Rosette: (in articulation): valves with the margins turned outwards, p. 109.
Rosette: bent outwards or backwards.
Rosette: bent upwards, so as to appear broken at the base.
Rosette: all the parts similar; p. 89.
Rosette: kidney-shaped; p. 88, fig. 110.
Rosette: oval-shaped; p. 88, fig. 113.
Rosette: creeping, i.e. prostrate and rooting downwards.
Rosette: the permanent frame of some pods (as of Prickly Poppy and Cress), after the valves fall away.
Rosette: the axis or support of a flower; p. 76.
Rosette: inversely, or appearing as if upside down, or reversed.
Rosette: the vein forming network, as in fig. 60, 83; p. 80.
Rosette: bent backwards; same as reversed.
Rosette: blunted; the apex not only obtuse, but somewhat indented; p. 60, fig. 107.
Rosette: rolled backwards, as the margins of many leaves; p. 76.
Rosette: the axis of a spike, or other body; p. 78.
Rosette: the continuation of the seed-stalk along the side of an anomalous ovule (p. 183) or seed; fig. 273, r. 319 and 320, 3.
Rosette: crystals, especially needle-shaped ones, in the tissues of plants.
Rosette: a rosette; p. 40, fig. 66-67.
Rosette: for the shape of a rhombus. Rosette: approaching that shape.
Rosette: the principal piece, or one of the principal pieces, of the framework of a leaf, p. 55; or any similar elevated line along a body.
Ring: an elastic band on the spore-cases of Fungi. (Manual, p. 287, plate 9, fig. 2, 3.)

Rosetted: growing; gaping open; p. 160, fig. 909.

Root, p. 98.

Root-hairs, p. 31, 149.

Rootstock: root-like trunks or portions of stems on or under ground; p. 40.

Rudimentary: arranged like the petals of a rose.

Rudge: bearing a small beak (conulus).

Rudiment: bearing a beak (restruca) or a prolonged appendage.

Rudiments: in a regular cluster of spreading leaves, resembling a full or double rose, as the leaves of Honeysuckle, &c.

Rut: whorled or roundish in outline.

Rut: an imperfectly developed, or in an early state of development.

Rutaceous: resembling like the petals of a rose.

Rutaceous: bearing a small beak (roslflum).

Rutaceous: rostrum or a prolonged appendage.

Rutaceous: in a regular cluster of spreading leaves, resembling a full or double rose, as the leaves of Honeysuckle, &c.

Runner: a slender and prostrate branch, rooting at the end, or at the joints, as of a Strawberry, p. 35.

Saccate: any closed membrane, or a deep purse-shaped cavity.

Saccate: funnel-shaped; p. 59, fig. 95.

Saddle-shaped, or Sulfuriform: with a broader spreading at right angles to a slender tube, as the corolla of Thalictrum, p. 101, fig. 909, 902.

Samara: a wing-fruit, or key, as of Maple, p. 5, fig. 1, Ash, p. 131, fig. 300, and Elm, fig. 301.

Samara: like a samara or key-fruit.

Sap: the juices of plants generally. Ascending or crude sap; p. 161, 168.

Sap: the juices of plants generally. Ascending or crude sap; p. 161, 168.

Sclereome: the fleshy part of a stone-fruit, p. 128.

Sclerome: the fleshy part of a stone-fruit, p. 128.

Sclerome: bearing long and flexible twigs (asparina), either spreading or prostrate.

Sclerome: see saccate.

Scale: rough or harsh to the touch.

Scale-form: with cross-bands, resembling the steps of a ladder.

Scale of buds, p. 32, 50; of bulbs, &c., p. 40, 46, 56.

Scaley: furnished with scales, or scale-like in texture; p. 46, &c.

Sensate: climbing; p. 37.

Spur: a petaloid arising from the ground, or near it, as of the snowy Violet, &c.

Stoloniferous: resembling a stolon.
Scorpioid or Scorpoid: curved or cincinate at the end, like the tail of a scorpion, as the inflorescences of Helianthus.

Scrobiculate: pitted; excavated into shallow pits.

Scurf, Scurous: minute scales on the surface of many leaves, as of Goosefoot, Buffalo-berry, &c.

Scutate: buckler-shaped.

Scutellate, or Scutelliform: saucer-shaped or platter-shaped.

Scutoid: umbo-shaped; i.e. where flowers, leaves, &c. are all turned to one side.

Scutulsion: the inner coat of the ovule; p. 124.


Septate: a subdivision or lobe of any cleft body.

Sepiogon: separated from each other.

Semi- (in compound words of Latin origin): half; as Semiclino, as the calyx or ovary of Purslane, fig. 214. Semicraterid: half-heart-shaped. Semicrust: like a half-moon. Semicostate: half-crenate, &c.

Semicircular: relating to the seed. Semiplinifera: seed-bearing.

Sempervirens: evergreen.

Sepal: a leaf or division of the calyx; p. 88.

Sepaloid: sepallike. Sepaloid: relating to the sepals.

Separaed Flowers: those having stamens or pistils only; p. 89.

Septate: divided by partitions (septa).

Sepiogon: with parts in sectors.

Sepitidal: where a pod in dehiscence splits through the partitions, dividing each into two layers; p. 132, fig. 306.

Sepitropical: bearing the partition.

Sepitropical: where the valves of a pod in dehiscence break away from the partitions; p. 132.

Septum (pitted septum): a partition, as of a pod, &c.

Scirtal, or Scirrate: in rows, as bristles, in two rows, &c.

Serrate: saw-toothed, or crenate, or crenellate, with minute crenellulations. Serrate: having teeth. Serrulate: the margin cut into teeth (serrationes) pointing forwards; p. 61, fig. 112.

Serrulate: same as the last, but with fine teeth.

Sessile: sitting; without any stalk, as a leaf distinct of petiole, or an entire division of glomerule.

Seta: a bristle, or a slender body or appendage resembling a bristle.


Setigerae: bearing bristles. Setae: long with bristles or bristly hairs.


Skeuotheca: the base of such leaves as those of Grasses, which are

Skew: wrapped round the stem.

Skullshaped: same as scutate, or as peltate, p. 59.

Silph: p. 21.

Silo: curved in two directions, like the letter S, or the Greek sigma.

Siliculae: bearing a silicle, or a fruit resembling it.

Silicle: a pome, or short pod of the Cross Family; p. 132.

Silique: a longer pod of the Cross Family; p. 133, fig. 310.
Silique: bearing siliques or pods which resemble siliques.

Silky: glistening with a coat of fine and soft, close-pressed, straight hairs.

Silver: shining white or silvery-gray, usually from a silky pelucidness.

Simple: of one piece; opposed to compound.

Sessile: turned to the left.

Sinos: strongly wavy; with the margin alternately waved inward and outward; p. 62, fig. 116.

Siphon: a recess or bay; the re-entering angle or space between two lobes or projections.

Spadix of Plants (so called); p. 170.

Spadix: bearing shoots from near the ground.

Spadix: single; not associated with others.

Spars (plural spars): the proper name of a fruit of the Eremos.

Spalt: a finely split of flowers; p. 80, fig. 162.

Spalkm: resembling or furnished with a spax; a bent which turns an inflorescence; p. 80, fig. 162.

Spalth or Spaltleaf: shaped like a spathula; p. 54, fig. 92.

Spiral Movement: p. 170.

Sproce, p. 179.

Specifie Character, p. 181. Specific Name, p. 179.

Spthat: belonging to or disposed in a spike.

Spiciform: in shape resembling a spike.

Spikes: an inflorescence like a raceme, only the flowers are visible; p. 80, fig. 160.

Spiked: a small or a secondary spike; the inflorescence of Grasses.

Spines: a thorn; p. 50.

Spindleshaped: tapering to each end, like a spindle; p. 51, fig. 59.

Spinous: tipped by or degenerating into a thorn.

Spiny, or Spiciform: thorny.

Spiral arrangement of leaves, p. 72. Spiral veins or ducts, p. 148.

Sporangia, or Sporangium: spore-cases of Fungi, Muscua, &c.

Spore: a body resulting from the fructification of Cryptogamous plants, in them taking the place of a seed.

Spire: same as a spore, or a small spore.

Spire: any projecting appendage of the flower, looking like a spur, as that of Larkspur, fig. 189.

Squame, Squamous, or Squamaceous: furnished with scales (quamae).

Squamellate or Squamulose: furnished with little scales (squamellae or squamules).

Squamiform: shaped like a scale.

Squamous: where scales, leaves, or any appendages, are spreading widely from the axis on which they are thickly set.

Squamulose: diminutive of squamose; slightly squamose.

Spatha: the stem, petiole, peduncle, &c., as the case may be.

Spathe: furnished with spathes; p. 89. Spathulate: relating to the spathes.

Spathuliform: an abortive spathum, or other body resembling a sterile spathum.

Spathulate: the upper petal of a papilionaceous corolla; p. 105, fig. 217, 218, &c.

Sheart: a well-known vegetable product; p. 149.
Station: the particular place, or kind of situation, in which a plant naturally occurs.

Station, Stellar: starry or star-like; where several similar parts spread out from a common centre, like a star.

Station; Destitute or apparently destitute of stem.

Stelle: barren or imperfect; p. 89.

Stipitum: the part of the plant which receives the pollen; p. 87.

Stipitute, or Stipitum: belonging to the stigma.

Stipes (Latin stipes): the stalk of a pistil, i.e., when it has any; the stem of a Mushroom.

Stipes: a stalk of a leaflet, as of the Bean, &c.

Stipitate: furnished with stipules, as the Bean and some other Leguminous plants.

Stipitata: furnished with a stipule, as the pistil of Clove, fig. 376.

Stipitata: furnished with stipules.

Stipitata: the appendages on each side of the base of certain leaves; p. 69.

Stipitata: trailing or reclining and rooting shoots; p. 27.

Stipitata: producing stipules.

Stipitata (Latin stipes, plural stipites): the breathing- pores of leaves, &c.; p. 156.

Stipe (Latin stipes): long, flat, and narrow; p. 106.

Stipic, or Stipitum: marked with stouter longitudinal grooves or channelis.

(Latin stipes).

Striate: close and narrow; straight and narrow.

Striate, Strile: heart with stem and appressed, scale-like or rigid bristles.

Striate: relating to, or resembling a

Striate: a multiple fruit in the form of a cone or head, as that of the Hop and of the Pine; fig. 314, p. 133.

Striate: same as serrate. Stipitate: furnished with a stipitate.

Striate: a vein; a swelling or protuberance of any organ.

Style: a part of the pistil which bears the stigma; p. 86.

Styliferous: an epigynous disk, or an enlargement at the base of the style, found in Umbelliferae and some other plants.

Succulent: juicy or pulpy.

Succulent: shoots from subterranean branches; p. 87.

Suffruticous: slightly starchy or woody at the base only; p. 86.

Sulphur: yellow or waxy-like in texture.


Subulata: ovate-shaped; springing from a broadish or thickish base to a sharp point; p. 86.

Succulent: juicy or pulpy.

Succulent: shoots from subterranean branches; p. 87.

Suffruticous: slightly starchy or woody at the base only; p. 86.

Sulphur: p. 163.

Subulata: grooved longitudinally with deep furrows.


Suffruticous: p. 323.
Suspended: hanging down. Suspended ovules or seeds hang from the very summit of the cell which contains them; p. 122, fig. 268.
Natural: belonging or relating to a nature.
Cinate: the line of junction of contiguous parts grown together; p. 117.
Sessile: the joining of parts, as of petals, to the pedicel and not at a point; as those of Iris, fig. 183.
Symmetrical Flower: similar in the number of parts of each set; p. 99.
Spatulate, or Spatuliform: where stamens are united by their anthers; p. 112, fig. 829.
Spatulate: (fruit or pistil): composed of several carpels consolidated into one.
System: p. 190.
Systematic Botany: the study of plants after their kinds; p. 3.
Taper-pointed: acute as omninate; p. 60, fig. 168.
Taper-root: a root with a short tapering holy; p. 82.
Tomentose: dull yellowish, with a tinge of brown.
Tomentum: the part of Botany which treats of classification.
Tongue: a name for the inner seed-coat.
Tendril: a thread-shaped body used for climbing, p. 38: it is either 

Tenuiform: is either

Tendril: (in words of Greek composition): four; as,
Tetraecious: of four cocci or carpels.
Tetradynamous: where a flower has six stamens, two of them shorter than the other four, as in Mustard, p. 92, fig. 13.
Tetragonous: four-angled. Tetraedrous: with four pistils or styles; p. 116.
Tetradynamous: with four stamens; p. 112.
Thorn: a case; the pils or lobes of the anther.
Thorn: see spine; p. 29.
Thread-shaped: slender and round, or roundish like a thread; as the filament of anemones generally.
Thread: the opening or gorge of a monopetalous corolla, &c., where the border and the tube join, and a little below.
Thrya or Thrysus: a compact and pyramidal panicle; p. 81.
Thylacine: clothed with matted woolly hairs (toothed).
Tongue-shaped: long, flat, but thickish, and blunt.
Tongue: furnished with teeth or short projections of any sort on the margin; used especially when these are sharp, like saw-teeth, and do not point forward.
Top-shaped: shaped like a top, or a cone with its apex downwards.
Glossary

knobby; where a cylindrical body is swollen at intervals

the receptacle of the flower; p. 86, 124

p. 21

stamens united by their filaments into three bundles; p. 172

where the flower has three stamens; p. 112

p. 176

of three ovuli or roundish carpels

having three ribs

three-pointed

three-ribbed

having three years

in three vertical rows; looking three ways

three-leaved; p. 62

of three leaves; p. 66

three-angled, or triangular

three pistils or styles; p. 116

in three pairs (jups)-

three-leaved; p. 62

three-cleft, as the pistils or pods in fig. 235-237

in three, as Trillium, fig. 198

three-nerved, or with three slender ribs

where there are three pairs of flowers on the same or different individuals; as in Red Maple.

separable into three pieces

having three petals; as in fig. 199

composed of three pieces

three pinnate; p. 66

three-pinnately cleft; p. 64

where a midrib branches into three near the base of the leaf, as in Sunflower.

sharply three-angled; and especially with the sides concave, like a bayonet.

in three rows, under each other

in three longitudinal or perpendicular ranks.

having three stigmas

three-lobed, or three-lobate; p. 67

the specific name

polymorph-shaped

enlarged as or towards the summit, as the corolla of Trumpet-Creeper.

as if cut off at the top; p. 60, fig. 106

p. 102

the main stem or general body of a stem or tree.

a thickened portion of a subterranean stem or branch, provided with eyes (buds) on the sides; as a potato, p. 45, fig. 68.

a small exocarpe.

bearing exocarpe or pipsises.

resembling a tuber.

bearing tubers

hollow and of an elongated form; hollowed like a pipe.
GLOSSARY

Tumid: swollen; somewhat inflated.

Turbinate: top-shaped. Turbid: thick as if swollen.

Turvo (plural turves) : young shoots or suckers springing out of the ground; as Asparagus-shoots.

Turn-shaped: broader than high.

Twin: in pairs (see geminate).

Turgid: truck as if swollen.


Ulimate: at the umbrella-like form of inflorescence; p. 79, fig. 129.

Uncinate: hook-shaped; hooked over the end.

Undulate: wavy, or wavy-lined; p. 62.

Unequally pinnate: pinnate with an odd number of leaflets; p. 65.

Unilocular: one-celled. Univalved: a pod of only one piece after dehiscence.


Umbel: primary or partial umbel. Umbelliferous: bearing umbels.

Umbellate: a secondary or partial umbel; p. 81.

Unilocular: like a small bladder.

Uniporate: having only one orifice in a dehiscing pod, or any similar body, e.g. petals of a Rose, where the claw is very short, and those of Pinks (fig. 200), where the claw is very long.

Unc., in compound words: one; as


Unilocular: one-celled, as the pistil in fig. 201, and the author in fig. 239, 239.

Unilocular: having only one ovule, as in fig. 213, and fig. 267–269.

Uniseriate: in one horizontal row.

Uniserial: having only one piece after dehiscence, as in fig. 253.

Uniserial: one-seeded. orbicular: like a small bladder.

Vagina: the calyx of Mosses. (Manonl, p. 607.)

Vale: the small tube or branches of the framework of leaves, e.g. p. 55.
Glossary:

Veined, Veined: furnished with evident veins.
Veinless: destitute of veins.
Veinule: the smaller ramifications of veins.
Veins: furnished with conspicuous veins.
Veinless: destitute of veins.
Veinlet: the surface appearing as if varnished.
Veinless: have little projections like warts.
Veinless: attached by one point, so that it may swing in wind, as the anthers of the Lily and Evening Primrose; p. 113, fig. 234.
Veins: some.
Veinlet: the umbly cut of the leaves in the bud; p. 75.
Veinless: veiny; furnished with conspicuous veins.
Ventral: belonging to that side of a simple pistil, or other organ, which looks towards the axis or center of the flower; the opposite of dorsal; as the ventral Surface; p. 117.
Veinlet: furnished with veins.
Venation: the veining of leaves, &c.; p. 55.
Veinose: veiny; furnished with veins.
Veil: the standard of a papilionaceous flower; p. 105, fig. 218, 8.
Veinless: furnished with a wing; as the fruit of Ash and Elm, fig. 300, 301.
Veinless: twining, as the stem of Hops and Beans; p. 37.
Vestigial, Veinless: greenish; turning green.
Vesicular: the oil-tubes of the fruit of Umbelliferae. 
Wavy: resembling beeswax in texture or appearance.
Wedge-shaped: broad above, and tapering by straight line: to a narrow beam; p. 59, fig. 94.
Winged: furnished with a wing; as the fruit of Ash and Elm, fig. 300, 301.
Wingless: of the texture or consisting of wood.
Woolly Fibre, or Woolly-Card, p. 146.
Woolly: clothed with long and entangled soft hairs; as the leaves of Malva.
FIELD, FOREST, AND GARDEN

BOTANY.
Field, Forest, and Garden

BOTANY,

A SIMPLE INTRODUCTION TO THE

COMMON PLANTS OF THE UNITED STATES

EAST OF THE MISSISSIPPI,

BOTH WILD AND CULTIVATED.

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ASA GRAY,
In the Clerk's Office of the District Court of the District of Massachusetts.
This book is intended to furnish botanical classes and beginners generally with an easier introduction to the plants of the country than is the Manual, and one which includes the common cultivated as well as the native species. It is made more concise and simple, 1. by the use of somewhat less technical language; 2. by the omission, as far as possible, of the more recondite and, for the present purpose, less essential characters; and also of most of the obscure, insignificant, or rare plants which students will not be apt to meet with or to examine, or which are quite too difficult for beginners; such as the Sedges, most Grasses, and the crowd of Golden Rods, Asters, Sunflowers, and the like, which require very critical study.

On the other hand, this small volume is more comprehensive than the Manual, since it comprises the common herbs, shrubs, and trees of the Southern as well as the Northern and Middle States, and all which are commonly cultivated or planted, for ornament or use, in fields, gardens, pleasure-grounds, or in house-culture, including even the conservatory plants ordinarily met with.

It is very desirable that students should be able to use exotic as well as indigenous plants in analysis; and a scientific acquaintance with the plants and flowers most common around us in garden, field, and green-house, and which so largely contribute to our well-being and enjoyment, would seem to be no less important than in the case of our native plants. If it is worth while so largely to assemble around us ornamental and useful trees, plants, and flowers, it is certainly well to know what they are and what they are like. To students in agricultural schools and colleges this kind of knowledge will be especially important.

One of the main objects of this book is to provide cultivators, gardeners, and amateurs, and all who are fond of plants and flowers, with a simple guide to a knowledge of their botanical names and
structure. There is, I believe, no sufficient work of this kind in
the English language, adapted to our needs, and available even to
our botanists and botanical teachers, — for whom the only recourse is
to a botanical library beyond the reach and means of most of these,
and certainly quite beyond the reach of those whose needs I have
here endeavored to supply, so far as I could, in this small volume.
The great difficulties of the undertaking have been to keep the book
within the proper compass, by a rigid exclusion of all extraneous
and unnecessary matter, and to determine what plants, both native
and exotic, are common enough to demand a place in it, or so
uncommon that they may be omitted. It is very unlikely that I can
have chosen wisely in all cases and for all parts of the country,
and in view of the different requirements of botanical students on
the one hand and of practical cultivators on the other, — the latter
commonly caring more for made varieties, races, and crosses, than
for species which are the main objects of botanical study. But I
have here brought together, within less than 350 pages, brief and
plain botanical descriptions or notices of 2,550 species, belonging to
947 genera; and have constructed keys to the natural families,
and analyses of their contents, which I hope may enable students, who
have well studied the First Lessons, to find out the name, main char-
teristics, and place of any of them which they will patiently examine
in blossom and, when practicable, in fruit also. If the book an-
swers its purpose reasonably well, its shortcomings as regards cul-
culated plants may be made up hereafter. As to the native plants
omitted, they are to be found, and may best be studied, in the Man-
ual of the Botany of the Northern United States, and in Chapman's
Flora of the Southern United States.

This book is designed to be the companion of the First Lessons in
Botany, which serves as grammar and dictionary; and the two may
be bound together into one compact volume, forming a comprehen-
sive School Botany.

For the account of the Ferns and the allied families of Cryptogam-
ous Plants I have to record my indebtedness to Professor D. C.
Eaton of Yale College. These beautiful plants are now much cul-
tivated by amateurs; and the means here so fully provided for
studying them will doubtless be appreciated.

*Harvard University Herbarium,
Cambridge, Massachusetts, August 29, 1868.*
In revising the sheets for the present impressions, many small errors of the press, most of them relating to accentuation, have now been corrected.

January, 1874.

SIGNS AND ABBREVIATIONS.

The Signs and Abbreviations employed in this work are few. The signs are:

- " for an annual plant.
- " for a biennial plant.
- " for a perennial plant.

The signs for degrees, minutes, and seconds are used for feet, inches, and lines, the latter twelve to the inch.

Thus 1' means a foot in length or height, &c.; 2", two inches; 3", three lines, or a quarter of an inch. The latter sign is seldom used in this work.

The dash between two figures, as "5-10," means from five to ten, &c.

- "Fl." stands for flowers or flowering.
- "Cult." for cultivated.
- "Nat." for naturalized.
- "N., E., S., W." for North, East, South, and West.

The geographical abbreviations, such as "Eu." for Europe, and the common abbreviations for the names of the States, need no particular explanation.
# Analytical Key

To the

Natural Orders or Families.

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**Series I. Phlogogamous or Flowering Plants.**

<table>
<thead>
<tr>
<th>Plants producing true flowers and seeds.</th>
<th>Series I. Phlogogamous or Flowering, p. 53</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not producing flowers, propagated by spores.</td>
<td>Series II. Cryptogamous or Flowerless, p. 359</td>
</tr>
</tbody>
</table>

**Series I. Phlogogamous or Flowering Plants.**

With wood in a circle or in concentric annual circles or layers around a central pith; usually crisscrossed leaves; and parts of the flower mostly in fives or fours. (See p. 231.)

**Class I. Exogenous or Dicotyledonous Plants, p. 12**

With wood in separate threads scattered through the diameter of the stem, not in a circle; no annual circles or layers; leaves mostly parallel-veined; and parts of the flower almost always in threes, never in fives. (See p. 316.)

**Class II. Endogenous or Monocotyledonous Plants, p. 12**
CLASS I. EXOGENOUS OR DICOTYLEDONOUS PLANTS.

With pistil of the ordinary sort, the ovules in a closed ovary. (Cotyledons a pair.) .. Subclass I. ANGIOSPERMOUS, p. 32

With both calyx and corolla, the latter wholly separate petals. .. I. POLYPETALOUS DIVISION, p. 14

With both calyx and corolla, the latter united more or less into one piece. .. II. MONOPETALOUS DIVISION, p. 29

Without corolla, i.e. with only one sort of floral envelope, or even none at all. .. III. APETALOUS DIVISION, p. 21

Without proper pistil, the ovules naked on a scale or on the end of a short axis; cotyledons often more than two in a whorl. .. Subclass II. GYMNOSPERMOUS, p. 27

CLASS II. ENDOGENOUS OR MONOCOTYLEDONOUS PLANTS.

With flowers on a spadix or fleshy spike, perianth none or not corolla-like, and no glumes. .. I. SPADICEOUS DIVISION, p. 28

With flowers not on a spadix, and perianth or part of it more or less corolla-like. .. II. PETALOIDOUS DIVISION, p. 28

With flowers enveloped by glumes (chaffy bracts), and no manifest perianth. .. III. GLUMACEOUS DIVISION, p. 30

SERIES II. CRYPTOGAMOUS OR FLOWERLESS PLANTS.

Having stems with woody matter in them, also in the leaves. .. Class III. ACROGENOUS PLANTS, or ACROGENS, p. 30

(The lower classes of cellular plants, destitute of woody matter, including Mosses, Lichens, Sea-Weeds, and Fungi, are here omitted.)
I. POLYPETALOUS DIVISION OF EXOGENS.

A. Stems more than 10, and more than twice the number of the sepals or divisions of the calyx.

Stamens monadelphous, united with the base of the corolla; anthers kidney-shaped, one-celled.

Stamens monadelphous at base; anthers two-celled; leaves twice pinnate.

Stamens monadelphous at base; anthers two-celled; leaves not pinnate.

Leaves with joints between pedicles and blade, which is transverse-dotted.

Leaves without a joint and not transverse-dotted.

Stamens not monadelphous.

Petals numerous, but laminated over each other and adhering in a mass on a long receptacle.

Petals several immersed in hollows in a top-shaped receptacle.

Petals numerous and separate, at least their length, but concealed in a hollow flabby receptacle.

Which bears sepals or bracts on a surface of leaves simple, opposite.

Which is naked and admits an inferior ovary; leaves alternate, compound.

Rose, ROSE F. 115

Stamens borne on the calyx.

Stamens borne on the receptacle.

Leaves centrally pinnate; aquatic herb.

Leaves pellate near the margin; woody climbers.

Leaves not pellate, quiet cattails; trees or shrubs.

Spiny-aside-seamed; petals numerous; seed solitary.

Unpleasantly scented when bruised; petals 6 in 3 ranks; seeds several.

Leaves not pellate; herbs, or if wood-stemmed the leaves are compound.

F. CROWFOOT F. 33

Petals as to every one below but 3 several-celled or horned at the top.

Not sticky plants; petals unequal, cut or cleft; pod 1-celled, many-seeded.

Not sticky; pod several-celled, several-seeded.

Flaky plants; petals equal, narrow, entire.

MIGNONETTE F. 57

Nigella, CROWFOOT F. 53

FRI-MARIGOLD F. 154
Petalone, completely so as to the ovary, which is
One-celled and with one parietal placenta, or otherwise showing that the pistil is of a single carpel.

Shrubs or trees: leaves twice pinnate or else phyllodes; fruit a pod. ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... 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Stamens in 5 clusters, one on the base of each petal; calyx imbricated in the bud; no stipules.

- Ovary superior, 5-celled. ............................................. CAMELLIA F. 73
- Ovary partly inferior, becoming one-celled and one-seeded......... STORAX F. 220
- Stamens separate; leaves alternate, mostly with stipules. ........ PEAR F. 117
- Stamens separate; leaves opposite or some of them scattered; no stipules. ............................................... SAKURASAKI T. 131
- Calyx tube or cup wholly adherent to the 5-celled ovary. ........ SAKURASAKI T. 131
- Calyx cup extended beyond the 5 or adherent 5-many-celled ovary. .......... LOOSESTRIPE F. 149

B. Stamens not exceeding 10, or if so not more than twice the number of the sepals or divisions of the calyx.

1. Calyx free from the tube or more separate or nearly separate segments.
   - Woody twiners, with discolored flowers, separate stamens opposite or many petals, and few pistils. ......................... MOONSEED F. 44
   - Woody twiners, with numerous flowers, united stamens, and many pistils in a head, dull fruit scattered in a spike. .......... MAGNOLIA F. 42
   - Trees, with discolored or polymorphous flowers, pinnate leaves, and few winged fruits. ................................. QUASSIA F. 83
   - Herbs or shrubs; leaves not petiolated; flowers chiefly perfect. ................................................................. RUE F. 94
   - Succulent or fleshy stems; petals, petals, and sepals all equal in number. ......................................................... ORPINE F. 157
   - Not succulent nor fleshy-thickened.
     - Stamens inserted on the calyx - leaves alternate. ................. ROSE F. 115, & SAXIFRAGE F. 131
     - Stamens inserted on a disk adhering to bottom of the calyx; leaves opposite, compound. ................................. SPUR F. 88
     - Stamens inserted on the receptacle. .................................................. CROWFOOT F. 33

2. Calyx free from the tube (simple or compound) ovary; e. g. ovary superior.

Stamens the same number as the petals and opposite them.

- Anthers opening by split valves; ovary simple, 1-celled. ................................................................. BARBERRY F. 44
- Anthers opening lengthwise.
   - Ovary 1-celled, loculicid: style 5. ............................................... LEADWORT F. 222
   - Ovary 2-celled, with several styles on a central placenta. ........... PRIMROSE F. 222
   - Style or stigma club or ovoid; calyx deciduous. ........................................ PURSANE F. 99
Ovary: 2-celled, with several ovules in each cell. 
Ovary: 2-celled, with a pair of erect ovules in each cell. 
Ovary: 2-4-celled, with one erect ovule in each cell. 

Stamens when of the same number as the petals alternate with them, sometimes more numerous, sometimes fewer.

Leaves: opposite, with one petiolate leaf.
Leaves: opposite, without petiole.

Leaves pinnate with large petiolate leaf: leaves alternate or compound.

Leaves pinnate with pellucid dots.

Ovary: Simple, as shown by the style, stigma, and single petaloid placenta.
Ovary: compound, as shown by the number of petals, placenta, style, or stigma.

With 4 partial placenta, 2-celled: style 4, stigma 8, style 4, stigma 8, not tetradynamous.
With 2 partial placenta and 1-celled: style 6, stigma 6, not tetradynamous.
With 2 partial placenta, and 1-celled: stamens 6 in 3 sets.
With 2 (rarely 5) partial placenta, and 1-celled: stamens not 6.

Stamens inserted on the calyx, or with 5 clusters of gland-tipped stamen-like bodies.

Stamens on the receptacle.

Flower regular: style 1.

Flower irregular: styles various.

Stems or their divisions twice as many as the placenta: leaves glandular-brevipedunculate.

Stems as many as the placenta: leaves petiolate or petiolate on a central placenta.

Stems and stigmas one or more, stamens 5: stamens not 5.

With one cell, one erect ovule, and 3 styles or stigmas.

With one cell and many ovules on a central placenta.

With two cells and several or many ovules in each cell, not becoming 1-celled.

Stamens 4-11, on the receptacle.

ANALYTICAL KEY
H. MONOPETALOUS DIVISION OF EXOGENS.

A. Calyx with its tube adherent to the ovary, i.e., superior, or ovary inferior.

Flowers collected in a head which is provided with a calyx-like involucre; anthers synangiumous, i.e., united into a tube or ring around the style, only 4 or 5.

- COMPOSITE FAMILY, 179

- GOURD F. 138

Tendril-bearing herbs; leaves alternate; flowers monoecious or dioecious.

No tendril-bearing; flowers commonly perfect, at most polygamous.

- LOBelia F. 298

Stamens free from the corolla, or at most lightly adhering with its very base.

- CAMpanula F. 269

- WHEATLEBERRY F. 211

- VAlerian F. 177

- STORAX F. 229

Flowers irregular; stamens with the 5 anthers and sometimes the filaments also united.

Four, two of them shorter; ovary 2-celled, but two cells empty; fruit one-seeded.

- LINNIA, Honeysuckle F. 149

- GReENERY F. 228

Stamens borne on the tube of the corolla and fewer than its lobes, viz.

One to three: ovary sometimes 3-celled, but the fruit only 1-celled and 1-seeded.

Four, two of them shorter; ovary 2-celled, but two cells empty; fruit one-seeded.

- LIMONI, HONEYSuckle F. 149

- TEASEL F. 178

Stamens borne on the tube of the corolla, just as many as its lobes; leaves opposite or whorled.

With stipules, entire.

- CINNAMOMON F. 138

- Madder F. 173

Without stipules, erect; in whorls; ovary 2-celled; fruit twined, 2-seeded.

Without true stipules, often toothed or compound, chiefly obscure; flowers not in a proper head.

- HONEYSuckle F. 149

- TEASEL F. 178
<table>
<thead>
<tr>
<th>B.</th>
<th>Calyx free from the ovary, i.e. inferior, or many-seeded</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stamens 10 or 5, distinct:</strong> ovaries opening <strong>1</strong> a hole at the apex of each cell: ovary 5-celled.</td>
<td>BHATHE FAMILY, 219</td>
</tr>
<tr>
<td><strong>Stamens 10, didynamous or monogynous:</strong> ovaries opening lengthwise: ovary 1-celled.</td>
<td>POLYHYALOS 92</td>
</tr>
<tr>
<td><strong>Stamens 8 or 6, didynamous or monogynous:</strong> ovaries opening by a hole at the apex: ovary 2-celled.</td>
<td>POLYHYALOS 92</td>
</tr>
<tr>
<td><strong>Stamens 6, didynamous:</strong> the middle antenna of each set 2-celled, the others 1-celled; ovary 1-celled.</td>
<td>FUMITORY 49</td>
</tr>
<tr>
<td><strong>Stamens (with anthers) 10.</strong></td>
<td></td>
</tr>
<tr>
<td>Ovary deeply 4-lobed, making 4 seed-like fruits or pomes.</td>
<td>Echium, BOHAGE F. 254</td>
</tr>
<tr>
<td>Ovary not divided; fruit (usually a peel) many-seeded.</td>
<td></td>
</tr>
<tr>
<td>Calyx urn-shaped, enclosing the ped, which is 2-celled, the top separating as a lid.</td>
<td>Hyoscyamus, NIGHT-HAYDE F. 265</td>
</tr>
<tr>
<td>Calyx 5-lobed or 5-parted; ped 2-valved.</td>
<td>Verbascum, &amp;c. FIGWORT F. 229</td>
</tr>
<tr>
<td><strong>Stamens (with anthers) 6 or 2.</strong></td>
<td></td>
</tr>
<tr>
<td>Ovary 1-celled with 4 central placents, bearing several or many seeds: stamens 2.</td>
<td>BLADDERWORT F. 225</td>
</tr>
<tr>
<td>Ovary 1-celled with 2 or 4 peripheral placents: stamens 4, diliscent.</td>
<td></td>
</tr>
<tr>
<td>Leafy plants, brownish or yellowish, very green, with scales in place of foliage.</td>
<td>BROOM-HAYE F. 228</td>
</tr>
<tr>
<td>Ovary 1-celled, with ordinary foliage.</td>
<td></td>
</tr>
<tr>
<td>Leafy plants, with ordinary foliage.</td>
<td></td>
</tr>
<tr>
<td>Not climbing: seeds minute, ringless.</td>
<td></td>
</tr>
<tr>
<td>Climbing: seeds winged.</td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Ovary 2-celled, many-seeded; ped containing very many flat and winged seeds; woody climbers or trees.</td>
<td>BIGNORIA F. 226</td>
</tr>
<tr>
<td>Ovary 4-celled (but stamens only 2): many flat and winged seeds, filled by the endophytic herbs.</td>
<td>SESAMUM F. 227</td>
</tr>
<tr>
<td>Ovary 4-celled, many-seeded or few-seeded, the placenta in the axis.</td>
<td></td>
</tr>
<tr>
<td>Seeds few or several in each cell, flat and borne on hook-like projections of the placenta, or globular on a carillomine ring: no albumen.</td>
<td>*ACANTHUS* F. 229</td>
</tr>
<tr>
<td>Seeds many or few in each cell, not borne on hooks, &amp;c.; embryo in albumen.</td>
<td>*FIGWORT* F. 229</td>
</tr>
<tr>
<td>Ovary 2-4-celled, rarely 1-celled, with only a single ovule or seed in each cell, not united.</td>
<td>VERVAIN F. 241</td>
</tr>
<tr>
<td>Ovary 4-celled, making 4 seed-like pieces or national: around the single style.</td>
<td>MINT F. 243</td>
</tr>
</tbody>
</table>
Wallis Regius

Stamens more numerous than the divisions of the corolla. Here, from the cohesion of the bases of the petals, some

of the following, ranked as polythorae, may be sought:

Leaves twice pinnate, or the phyllodia: corolla, single, 1-celled.
Leaves simply compound, of 3 lobes: corolla 3-celled; stamens 10; monadelphous at the base. ORPINE F. 137
Leaves simple, in one compound, floccy, very thick; corolla 3-celled; petals as many as lobes of the corolla.
Leaves simple, or lobed or divided: stamens included, monadelphous; corolla kidney-shaped, 1-celled.

Stamens on the receptacle, free or merely free from the corolla; petals commonly opening at the end.

Flowers polygamous or dioecious; stamens separate; styles 4; each 2-celled.

Flowers perfect; stamens more or less monadelphous or 2-clustered.

Calyx wholly free from the ovary.

Stamens (with andreas) as many as the lobes or divisions of the corolla and opposite them.

Styles or stigmas 5, ovary 1-celled; ovules many and semi-inferior.

Trees or shrubs: corolla 5-celled; fruit 1-5-seeded; peduncles alternate with the petals.

Stamens (with andreas) as many as the lobes or petals of the corolla and alternate with them.

Filaments one and simple, with one staminal placenta; fruit a legume or baccate: leaves twice pinnate.

Fruits as many as the lobes of the corolla, separate: fleshy plants.

Solanum F. 266

Aromatic plants, with opposite leaves.

Not aromatic, with alternate and commonly rough leaves.

Mentha, &c., MINT F. 243

BORAGINEAE F. 254
Plants 2. to 4 ft. in height, pinnate, with leaves divided into narrow leaflets. Flowers in cymes or panicles. Sepals 4, united. Petals 4, distinct. Stamens 4, white or yellow. Style 1, white or yellow. Fruit a capsule, containing many seeds.

Phlox paniculata L. 2. 1. Flowers in panicles, white, blue or purple. Leaves lanceolate, acuminate. Stems square. FRAGILE.

Phlox drummondii A. DC. 2. 1. Flowers in cymes, white. Leaves linear, acute. Stems round. TENDER.

Phlox paniculata L. 2. 1. Flowers in panicles, white, blue or purple. Leaves lanceolate, acuminate. Stems square. FRAGILE.

Phlox drummondii A. DC. 2. 1. Flowers in cymes, white. Leaves linear, acute. Stems round. TENDER.

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Phlox drummondii A. DC. 2. 1. Flowers in cymes, white. Leaves linear, acute. Stems round. TENDER.
Flotile 3 or 4: calyx as well as corolla none; flowers perfect, in a spike.

Flotile 1-4, exfoliating by the persistent calyx; leaves alternate, pinnate or lobed, with stipules. Potentilla, &c. ROME F. 115

Flotile only one; leaves hairy, stylos or stigmas; leaves pinnately compound or cleft; flowers diocious. HEMP F. 297

Flotile none; leaves simple.

Calyx corolla-like (white); tube exsert, with the stamens; flowers perfect; leaves alternate. SANDALWOOD F. 272

Calyx corolla-like, free from the ovary, but the base of the tube hardening and persistent as a covering to the thin skene, making a sort of nut-like fruit; style and stigmas simple. FOXCLOVER F. 283

Calyx greenish, sometimes colored or corolla-like; seed solitary.

Style or stigma one and single; flowers numerous or occasional. NETTLE FAMILY. 296

Styles or stigmas 2 or 3, or 2-3-cleft; flowers mostly perfect. AMARANTH F. 286

Flowers crowded with dry and various bracts.

Flowers without indumentum and various bracts.

Leaves shorter alternate, often two-ranked, cleft, or lobed.

Leaves opposite, entire. GOOSEFOOT F. 284

Calyx none, except as an adherent covering to the ovary, without lobes; aquatic. CHICKWEED F. 64

Succulent, with one or two ovules in each cell.

Aquatic herbs, with 3-4-celled nut-like fruits in the axils of the leaves or bracts. WATER-MILFOIL F. 140

Herbs, shrubs, rarely trees, with numerous flowers, 3-celled ovary and 3-celled pod; the ovules and seeds single or a pair hanging from the summit of the cell; fruit milky, except in the box, &c. SPURGE F. 283

Herbs, with stout hollow stems, perfect flowers, and termed scaly, becoming herz-like.

Shrubs or trees, with 3-celled ovary, and winged fruit (cannabinus or key).

Of two keys, joined at their base and winged from the apex. MAPLE F. 89

Of a single key, winged from the apex and almost all sound; leaves pinnate. ELM F. 256

Of a single key, thin-winged all round; leaves simple. BUCKTHORN F. 86

Perforate or sometimes discous flowers; stamens 4 or 5; seeds erect. WITCH-HAZEL F. 140

Perfect flowers; stamens about 14, white; seeds hanging. FALLOPIA, WITCH-HAZEL F. 140
2. Flowers (all unisexual or dioecious) in catkins or catkin-like heads.

- flowering barth, with sterile "flowers" panicles, and fertile in a short scaly catkin (strobile)...
  - Humulus, SUTELE F. 236
- resinous shrub, on trees: fruit a berry...
  - Mistletoe F. 292
- reed or shrub.
  - PINE F. 309

With resinous juice, needle-shaped or scale-like leaves, and a cone (strobile) for fruit...

With milky or colored juice, spike flowers in spikes or racemes, and fertile in catkin-like heads or short spikes, forming a flowery cone in fruit, enclosing the scales...
  - FIG F. 396

With colorless juice, often strong-scented resinous- aromatic bark, pinnate leaves, and only sterile flowers in catkins. WALNUT F. 300

With colorless juice and simple leaves.

- Both kinds of flowers in short catkins or heads: fruit waxy-coated, berry-like or nut-like; leaves aromatic. SWEDE-GALE F. 305
  - Both kinds of flowers in scaly catkins: the fertile with 2 or 3 flowers, forming a single or sometimes sinuous...  RICH F. 306
  - Both kinds of flowers in catkins, divisions, one under each scale or bract: pod filled with downy-tufted seeds. WILLOW F. 307
  - Both kinds of flowers in heads, monocious, without calyx; leaves pubescently-faded.
  - Fruit of many two-seeded hard pods in a head: stipules deciduous...
  - WITCH-HAZEL F. 149
  - Fruit a head of club-shaped twice-hard catkins: stipules sheathing...
  - PLANE-TREE F. 300
  - Both kinds of flowers or commonly only the sterile in catkins: fruit a nut in a scaly cup, or bar, or even, or leafy-bracted involucres...
  - OAK F. 304

GYMOSPERMOUS EXOGENS.

- With palm-like columnar trunks or cone-like stalk, and pinnate palm-like foliage...
  - CYCADAEE F. or CYCAS F. 309
- With branching trunks, and simple, mostly needle-shaped, linear, or scale-like evergreen leaves.
  - CONIFERAE or PINE F. 309
III. GLUMACEOUS DIVISION OF ENDOGENS.

Ovary 3-celled or 1-celled with 3 perial placenta; becoming a pod, 3-many-seeded; flowers with a regular perianth of six glumeaceous divisions. In structure of the flower most like the Lily Family; but the glumeaceous perianth and the foliage imitate this division.

Ovary 1-celled, 1-seeded, in fruit an awn or grain. True glumeaceous plants; the glumes being linear.

Glumes single, bearing a flower in the axil. ................. RUSH F. 549
Glumes in pairs, an outer pair for the spikelet, an inner pair for each flower. ................. SEED F. 552

ACROGENOUS CRYPTOGAMOUS PLANTS.

With many-jointed stems and 3 or more leaves, except the united scales or teeth that form a sheath or ring at each joint:

spore-cases in a terminal head or spike. ................. HORSETAIL F. 359
With simple leaves often compound, all from a rootstock or trunk, and bearing the minute spore-cases.

With scale-shaped, linear, or rolled-up and wholly simple leaves thinly set on the leafy stems; spore-cases in the axil of some of them. ................. FERN F. 369

With scale-shaped leaves, and all the leaves of the stem. ................. CLUB-MOSS F. 372
KEY TO THOSE EXOGENS WHICH FROM THEIR FOLIAGE MIGHT PERHAPS BE MISSED FOR ENDOGENS.

1. Leaves indefinitely numerous: herbs, polygamous... Monocotyledoneous... Crowfoot F. 33

2. Stems 3 or 12, separate...
   Leaves heart-shaped: marsh plants, aquatic, aquatic plants. Lilies. F. 46
   Leaves thick and fleshy: polypetals or some few monogamous: flowers complexly symmetrical... Fig-Mallow F. 156

3. Stalk one, the ovary deeply 2-3 lobed or horiz and styles separate: leaves thick and fleshy: polygamous... Water-Milfoil F. 149

4. Stalk one, ovary not lobed: polygamous...
   Petals usually very numerous: many-many-seeded, many-many-seeded... Water-Lily F. 16
   Petals and styles, also the stamens 3: ovary 1-celled, one-seeded. Cactus F. 152

5. Stalks 2 or 3: ovary 1-celled, many-seeded, free from the calyx: leaves opposite, Diaphanous, sc., Plantain F. 23
   Petals 2: styles 2: ovary 2-celled, 2-seeded; teeth of the calyx on its summit: leaves alternate, Drying, sc., Parsley F. 162

6. Petals 3 or 4: style only one, not lobed...
   Calyx adherent to the several-celled ovary: stamens numerous... Acacia with phyllaria, Mimosas F. 99

7. Stalks only one, both as to ovary and style: monogamous...
   Calyx free from the 1-celled simple ovary: stamens numerous... Melastomata F. 148

8. Petals 3 or 4: style 3 or 4 at the apex, pod 3-celled... Polemonium F. 280
   Stems 4: style and stigma one: corolla 4-cleft, dry and scabrous: pod 3-celled: leaves ribbed... Plantain F. 221
   Stems 8 or 10: style and stigma one: corolla becoming dry and scabrous: leaves narrow... Heath, Heath-Efe F. 910

9. Petal if it may be so called, an open scale, or none... Gymnosperms, 100
KEY TO THOSE ENODOGENS WHICH FROM THEIR FOLIAGE MIGHT BE
MISTAKEN FOR EXODOGENS.

| Flowers spiked on a spadix, and with a prominent spadix | ARUM F. 317 |
| Flowers not on a spadix: pistils several or many; calyx and corolla distinctly different | WATER-PLANTAIN F. 319 |
| Flowers not on a spadix: pistil only one |
| Calyx coherent with the ovary: flowers diosorus or polygainous |
| Terrestrial plants: twining: small flowers in racemes, spikes, or panicles | YAM F. 325 |
| Aquatic plants: flowers from a spadix |
| Calyx free from the ovary |
| Aquatic herbs: flowers more or less irregular, from a sort of spadix | PICKEREL-WEED F. 322 |
| Terrestrial herbs, not climbing; petals 6; calyx 3-celled |
| Terrestrial and mostly twining shrubs or herbs, with tendrils on the petiole; petals one-celled | TILLANUM & LILY F. 327 |
| SMILAX F. 326 |
SERIES I.

FLOWERING or PHENOLOGOUS PLANTS:

Those which fructify by means of stamens and pistils, and produce true seeds.

CLASS I. DICOTYLEDONOUS or EXOGENOUS PLANTS: Distinguished by having the wood or woody matter of the stem all in a circle between pith and bark, and in yearly layers when the stem is more than one year old: also the embryo with a pair of cotyledons or seed leaves (or several in Pines, &c.). Generally known at once by having netted-veneered leaves. Parts of the flower seldom in threes, most commonly in fives or fours. See Lessons, p. 183. This class includes all our ordinary trees and shrubs, and the greater part of our herbs.

Subclass I. ANGOSPERMOUS: including all of the class which have their seeds in a pericarp, or their oociles in a closed ovary, i.e. all except the Pine and Cyps families.

I. POLYPETALOUS DIVISION. Includes the families which have, at least in some species, both calyx and corolla, the latter with their petals separate, i.e. not all united into one body. Yet some plants of almost all these families have apetalous flowers.

I. RANUNCULACEAE, CROWFOOT FAMILY.

Not perfectly distinguished by any one or two particular marks, but may be known, on the whole, by having an acid watery juice (not milky or colored), numerous stamens, and usually more than one pistil, all the parts of the flower separate from each other, and inserted on the receptacle. The bulk of the seed is albumen, the embryo being very small. The plants are herbs, or a few barely shrubby. Many are cultivated for ornament. The following are the common genera, with their chief distinctions.

§ 1. Seeds violet or with their edges turned inward in the bud. Petals never or small. Stalks many, twisted, becoming achenes. Leaves opposite on the plants mostly climbing by their leafstalks.

2. CLEMATIS. Seeds commonly 4, sometimes several, petal-like. Achenes tipped with the persistent style or a part of it.
Crowfoot Family.

1. *Seytis* shows different in the bed. Not flowering, nor closely except in 1 or 2 of the.
   • Plants and akeen notarly or long in a bed, narrow.
     = Petals none; sepalos persistent.


3. *Anemone*. Basal leaves of long opposite or whirled green leaves much below the flowers. Petals 4-20. Flowers very numerous in a showy bed (or fewer in one specimen), forming terminal or axillary clusters.

4. *Thalictrum*. Leaves numerous, and sometimes in clusters, all alternate, except in one species intermediate between this genus and *Anemone*. Sepals 4 or more. Flowers 4-12, forming terminal or axillary clusters. Perennials, with small flowers in panicles or spires, much of these flowers, and with terminal compound or terminal clusters.

   = Petals and sepals both conspicuous, 6 or more. Alons slender, short-pointed.

5. *Adonis*. Petals and sepals notarly, no pet or appendage at the base. Axes in a head or cluster.


8. = Petals several, several, becoming 1-2-ranked pods or berries.


11. *Dactylis*. Sepals 3, filling when the flower opens, pod-like. Petals minute, and with one or more. Stamens none or none. Leaves terminal and compound.

12. *Actaea*. Petals only one, becoming a berry. Flowers in a short and thick rosette or cluster.


   = Sepals notarly filling when the flower opens, in 15 and 20 persistent even till the final stage, in all the other petals and stamens.

   = Petals none or all; flowers regular.


18. *Nigella*. Sepals 5. Petals 2-lipped. Pods 4-4 or more united below into one. Alons, with finely dissected leaves.

   = Petals large, foliars projecting between the sepals; flowers irregular.


   = Petals 2 or 4, much smaller than the 2-seeded pods; i.e. the flowers irregular and compound.

20. *Delphinium*. Sepals 3-5, each smaller than the 2-seeded pod; i.e. the flowers irregular and compound.

21. *Peonia*. A flexible axis surrounding the base of 2 or more petals, which form a showy ped in fruit. Seeds large, rather flabby-coated. Perennials, with compound or terminal clusters; two species shrubbery.
1. **Clematis, Virginia's Flower.** (Ancient Greek name.) Ornamental climbers, the stalks of their leaves or flowers clinging to the support, and with somewhat woody stems, or a few erect herbs.

§ 1. Flowers (in spring) very large and widely open (3-6 across); with usually many small petals or petaloid altered stamens; leaves in threes.

C. **florida,** Great Wy, C. Cult from Japan, not hardy S.; the flower 3-4 across, up to 6 or more, sepals broad-cuneate and overlapping each other, white, purplish, or with a purple tinge of transformed stamens (var. Stearnii); leaves often twice compound.

C. **patens,** also called C. *fumata, grandiflora,* and various names for cultivar. Cult from Japan, hardy. Flower 3-5 across, with 6-9 or more oblong or lance-shaped sepals, blue, purple, etc.; leaves simply in threes.

C. **verticillata** or **AEGLE** AMERICAN, with flowers about 3 across, of a single purple sepals, in tufted races in rocky woods or ravines N. and in mountainous parts.

§ 2. Flowers (in summer) pretty large, of only 4 sepals, and no petals whatever, not white,也没有 the usual pedicels as in § 1.

* Leaves (except the apparent) pinnae of 3 or more leaves; alternate.

C. **Vinca,** Vine-flower C. Cult from Eu.: a hardy climber, with flower 2-3 across; the widely spreading sepals obtuse, thus, either purple or blue; leaves with short stalked petals.

C. **griseloides,** Hardy-leaved C. Cult from Thetis, recently introduced, very hardy; with spring yellow flowers (1/2 across, long and feather-tails to the flowers, and sharp-pointed calyx.

C. **Viburnum,** Leather-flowers C. Will from Penn. and this S., in moist soil; flower of very thick bell-shaped sepals, purple or purplish, 1 long or more, erect, and with the narrow tips only spreading or recurved; leaves with very feathery tails.

* * * Leaves simple, entire, acute; low erect herbs; tall sensation.

C. **integrifolia,** Ever-leaved C. Cult from Eu., hardy, tall, green stems, white or shining; flower blue, 1 long.

C. **ochroleuca,** Part C. Wild from Staten Island S., but rare, has white silky leaves and a dull silvery flower.

§ 3. Flowers (in summer) small, white-petalled, preceded by flat-topped white flowers.

C. **recepta,** Ever-leaved VIRGIN'S BOWER. Cult from Eu. Nearly erect herb, 30-45 in. high, with large panicles of white flowers, in early summer; leaves pinnate; bell-shaped or slightly heart-shaped, pointed, entire.

C. **Phlomis,** Sweet-scented V. Cult. from Eu. Climbing freely, with rose-colored scented flowers almost midsummer; leaves 3-5 or more of various shapes, often lobed or cut.

C. **Virginiana,** Common Wild V. Climbing high, with scissorial flowers in summer; leaves 3, rounded or lobed.

2. **HEPATICIA,** Liver-Leaf, Hepatica. (Shape of the 3 lobed leaves likened to that of the liver.) Among the earliest spring flowers. The involucre is so close to the flower and of such size and shape that it is most likely to be mistaken for a calyx, as the colored sepals for petals.

H. *triloba,* Root-leaved H. Leaves with 3 broad and rounded lobes, appearing later than the flowers, and lasting over the winter; leaves hairy; flowers blue, purple, or almost white. Wood, woods, common E. Full double flowered varieties, blue and purple, are cult. from Eu.

H. *acutifolia,* Sharp-pointed H. Wild from Vermont W.; has pointed leaves in the leaves, sometimes 5 of them, and paler flowers.

3. **ANEMONE,** Anemone, Wind-flower. (Peacefully so named by the Greeks, because growing in windy places, or blossoming at the windy season, it is doubled with.) Erect herbs, with all the stem-leaves above and opposite or whorled, forming the involucre or involucres. Peduncles 1-flowered.
§ 1. Some hairy styles, bear foliage tubes in the axils, like those of Virginia's flowers. The large, purple, in early spring. The genus PLANTILLA of some authors.

A. Plantilla, Purple-stem of Europe. Cult. in some flower-gardens; has the two leaves thinly three-pinnately divided or cut; stems much like the stem.

A. patens, var. Nuttalliana, Willd. P. On the plains N.W.; the lanceolate purple or purplish flower (1½ or more across when open) rising from the ground on a long slender stem (½ - 6 ft.), with an involucre of many very narrow divisions; the leaves from the old appearing later, and twice or thrice-truncate divided or cut.

§ 2. Short styles and no long tubes; but only small or hairy styles.

* * * A. AXOSONIA, from A. E., with tubular tube and very large flowers.

A. coronaria, with leaves cut into many fine lobes, and 6 or more broad oval sepals; also

A. hortensia, with leaves cut into broader wedge-shaped divisions and lobes, and many larger and narrower sepals, — are the originals of the showy, mostly double, or semi-double, garden-anthemis, of all colors, bred in the wild state, — not fully hardy, treated like bulbs.

* * * Wild species, smaller flowered.

A. cylindrica. Less-derived A. Involve several-leaved, surrounding several long naked peduncles; fl. late in spring (in dry soil S. & W.), followed by a disappointment of fruit.

A. Virginiana, Virginian A. Involve-flowered; peduncles formed in succession all summer, the middle one first, the others bearing 2 leaves (revolute) at the middle, from which grew two more peduncles, and so on: head of fruit oval or oblong. Common in woods and meadows.

—- A. Patula, not usually in fruit; flowers ½ or more broad.

A. Pennsylvanica, Pennsylvania A. Stem 1½ high, bearing an involucre of 5 wedge-shaped leaves and oval middle leaves, and a naked peduncle; show 2 or 3 peduncles with a pair of smaller leaves at their middle, and so on; fl. white, in summer. (Lesson, fig. 178.) Alkaline ground, N. & W.

A. nemerosa, Winner A. Stem 4 - 10 high, bearing an involucre of 3 long-pointed leaves of 3 or 5 lobes, and a single short-pointed flower; sepals white, or purple outside. Woodlands, early spring.

4. THALICTRUM, MEADOW-LOUSE. (Old name of daisy derivation.) The following are the common wild species, in woodlands and low grounds.

§ 1. Flowers perfect, few, in an involucrum, resembling an Asterae; styles 5 - 10.

T. anemonoides, He-Axme. A very smooth and delicate little plant, growing with Wood Anemone, which it resembles in having no stems; but those that form an involucrum around the umbel of small, (early pinkish) flowers, appearing in early spring; leaves roundish, 3-lobed at the end, long-sulcate; leaves many-grooved, and with a flat-topped evenly angled: otherwise it would rank as an Axme.

§ 2. Flowers mostly discinae and not lanceolate, small, in loose compound panicles; the 4 or 5 sepals falling early; styles slender; always unseparated and undeciduous: leaves ternately compound (Lesson, fig. 330), all alike; all the ages not forming an involucrum.

T. dicocum, Early Meadow-Loose. Herb, glaenzend, 1½ - 2½ ft. high; flowers: white, in early spring; the yellow linear satins of the sterile plant hanging on long capillary filaments: leaves all on general peduncle. Rockey woods.

T. purpuraeosa, Pulleme M. Later, often a little downy, 2½ - 4½
CROWFOOT FAMILY.

* high; stem-leaves not raised on a general petiole; flowers greenish and pale purple, much short-sesquiped, dropping on capillary and ascending rather thickened filaments.

T. Cornuti, Tall M. Herb 40-80 high; stem-leaves not raised on a general petiole; flowers white, in summer; anthems oblong, not drooping; the white filaments thickened upward. Low or wet ground.

5. ADONIS. (The red-flowered species, fabled as spring from the blood of Adonis, killed by a wild boar.) Some leeks; leaves finely much cut into very narrow divisions. Grown from Europe for ornament.
A. autunnilis, Phalanx's Adonis. 1. Stem 10-15 high, or the branches terminated by a small flower, of 3-5 scarlet or crimson petals, commonly dark at their base. Has run wild in Tennessee.
A. vernalis, Spring Adonis. 1. Stem 6-8 high, bearing a large showy flower, of 10-20 lanceolate light-yellow petals, in early spring.

6. MYOSOTIS, MONSET L. (which the same names in Greek). O. minima. An insignificant little plant, well or wild, along streams from Illinois W., with a tuft of narrow entire toothed, and very obtuse 2-3 high, bearing an oblong yellow flower, followed by the like: joes of fruit of 1-2 long, in spring and summer.

7. RANUNCULUS, CROWNFOOT, BUTTERCUP. (Latin name for a little frog; and for the Water Buttercups, living with the frogs.) A large genus of wild plants, except the double-tongued and water-cress three species cult in gardens for ornament. (Lessons, p. 124, 125, 188-189.)
§ 1. Ranunculus: the leaves are mostly under water, and sepals commonly divided into many equal divisions; flowering all summer.
B. aquatilis, White Water Crowfoot. Capillary leaves collapsing into a circle when drawn out of the water; petals small, white, or only yellow at the base, where they form a spot of little use, but no scales; sepals wrinkled over.
B. divaricatus, Steep W. Like the last, but less common; the leaves still not rigid enough to keep their shape (spreading in a circular outline) when drawn out of water.
B. multiflora, Yellow W. Leaves under water much as those of the White Water Crowfoot, or rather larger; but the bright yellow petals so large as to show, of Common Buttercups, and, like those, with a little scale at the base. (Formerly named R. ficaria, &c.)
§ 2. Territorial, growing in wet places, but universally growing with the flowers of other species, petals with the little leaf at the base, yellow in all the wild species.
* Above not precisely: we briefly do not divide in the nature.

- STREAMWORTS CROWNFOOT: growing in very wet places, with mostly entire and serrate leaves; 2. All annual.
B. alabamensis. Stem ascending, 10-20 high; leaves lanceolate at the base, oblong at the base, all rather small in diameter; flowers white, with slender stems three or four inches in height; leaves linear and entire, slender 1 long; flower only 1 broad.
- SMALL-FLOWERED CROWNFOOT: in wet or moist places, with upper leaf 3 parted or divided, and very small flowers, the petals shorter or not longer than the sepals; 2. All annual. 
B. abbreviatus, Small-flowered Crowfoot. Very smooth and slender, 1-2 high; leaves roundish, entire; leaves 1 globular; stem 1 smooth along the margins; 2. All annual.
B. sceleratus, Curled C. So called because the leaf is very acrid and stinging; flowers the same and thicker-veined, equally smooth, even the
16. NIGELLA, FENNEL FLOWER. (Name from the black seeds.) 2. Garden plants from Eu. and Orient; with finely cordate, the leaves finely divided, like Fennel; known by having the 3 stamens united into one 3-lobed pod. Seeds large, blackish, sticky; have been used as a substitute for spice or pepper.

N. Damascena, Common N. or Ragged-Lance. Flower bluish, rather large, surrounded and overgrown by a much-divided leafy involucre, like the other leaves; succeeded by a smooth inflated 3-ribbed pod, in which the lining of the cells separates from the outer part.

N. sativa, Nigella-flower. Cult. in poor old gardens; has coarser leaves, and smaller rough pods.

17. AQUILEGIA, COLUMBINE. (From columba, an eagle, the spurs of the petals turned to resemble talons.) X. Well-known, large-flowered ornamental plants; flowers in spring and early summer, usually nodding, so that the spurs ascend.

• North American species, with long straight spurs to the corolla.
A. Canadensis, Wild C. Flowers about 2" long, scarlet and orange, or light yellow inside, the petals with a very short tip of blade, and stamens projecting. Common on rocks.

A. Skinnorii, Mexican C. is taller, later, and considerably larger-flowered than the last, the narrower white spurs usually tinged greenish; otherwise very similar. Cult.

A. cerulea, Long-ribbed N., native of the Rocky Mountains, lately introduced to gardens, and worthy of special attention; has blue and white flowers, the stamens 18", the very slender spurs 2" long; the blade of the petals (white) half the length of the intensely blue spurs, spreading.

• Old World species, with hooked or incurved spurs to the corolla.
A. vulgaris, Common Garden C. Cult. in all gardens, 1"-3" high, many-flowered; spurs rather longer than the blade or rest of the petal; pods pubescent. Flowers varying from blue to purple, white, etc., greatly changed by culture; often fall double, with spur within spur, sometimes all changed into a mass or plane petals or spurs.

A. glandulosa, Spotted N. A more choice species, 6"-18" high, with short very showy deep blue flowers, the blade of the petals white or white-tipped and twice the length of the short spurs; pods and summit of the plant glandular-pubescent.

A. Siberica, Siberian C. Equally choice with the last, and like it; but the spurs longer than the mostly white-topped short blade, as well as the pods, for smooth.

18. DELPHINIUM, LARKSPUR. (From the Latin name of the delphin, alluding to the shape of the flower.) The familiar and well-marked flower of this genus is illustrated in Lessons, p. 91, 94, figs. 183, 184, 192.

• Garden annuals from Eu., with only the 3 upper petals united into one tube, one petal, and leaves finely and much divided; Jt. stamens and stamens.
D. Consolida, Field L. Escaped sparingly into road-sides and fields; flowers scattered on the spreading branched, blue, varying to pink or white; pod smooth.

D. Ajacis, Rowley L. More showy, in gardens, and with similar flowers crowded on a long green stem, and small pods; stamens shorter; some twins on the fragrant white petals were fancied to read AIAL = Ajax.

• D. Consolida, white or white-pink and 2-3, mostly 1-petaled.
D. grandiflorum, Greater L. Of the garden, from Siberia and China, in 1"-3" high, with leaves cut into narrow linear divisions; blue flowers, 18", or more across, with simple oval sepals, and the 2 lower petals rounded and emarginate. Votations in color, also double-flowered; summer.

D. chinense, of which D. chinense, Sweet L., is one of the various garden forms, also Siberian, is commonly still larger-flowered, deep
blue, with lower petals also entire or nearly so; the mostly downy leaves have fewer and lanceolate or wedge-shaped divisions; is now much mixed and crossed with others; summer.

**D. exaltatum**, Dwarf Wild L. 3° - 5° high, with narrow linear divisions to the leaves, and a spike-like raceme of rather small, azure, pale-blue, or sometimes white flowers, in spring; sepals and 2- or 3-leaf lower petals oblong; var. with full-double flowers in gardens: summer.

**D. tricolor**, Dwarf Wild L. Open woods from Penn. W. & S.; about 1° high from a branched tuberous root; has broader linear lobes in the leaves, and has a loose raceme of few or several rather large showy flowers, deep blue or sometimes white, in spring; sepals and cliff lower petals oblong; pods strongly diverging.

**D. exilium**, Tall Wild L., is the wild species (from Penn. W. & S.) most resembling the next, 3° - 5° high, but the less handsome flowers and panicked raceme hairy or downy: & summer.

**D. alba**, Rare, 1° high, with early crimson flowers, white or rose-colored, often downy,iset more or less hairy; leaves tornately decimated, rather small flowers, single, also entire or nearly so; the mostly downy leaves, generally full-double, and with yellow-bearded in the common garden form. There are many varieties and mixtures with other species, some double-flowered.

**19. ACONITUM, AONITE, WOLFGANG, MONKSHOOD.** (Ancient name.) & Herb, thick, tuberous or many-shaped, a violent poison and medicine. Leaves palmately divided or entire and cut-leaved. Flowers showy; the large upper sepal from its shape is called the cup or helmet. Under it are two long-stalked smaller leaves which support the petals. See Lessons, p. 53, fig. 145, 146, 147. The following are all cult. from Eu. for ornament, except the first: & summer.

**A. uncinatum**, Wild A. or Monkshood. Stem slender, 3° - 5° erect, but bending over above, so as inclined to climb; leaves deltoid or parted into 3-5-leaf or wedge-lobed shallow cut-leaved lobes; flowers loosely panicked, blue; the windmill helmet nearly as broad to high, its pointed visor turned down. Low grounds, from Penn. S. & W.

**A. variegatum**, Variegated A. Ever; leaves divided to the base into rather broad-based and cut divisions; flowers in a loose panicled or racemose, blue and often variegated with white or yellow; the helmet remarkably higher than wide, its top curved forward, its pointed visor scarcely or horizontally.

**A. napellus**, Tree Monkshood or Officinal Aconite. Ever; from a many-stalked root; leaves divided to the base and then 2-4 times; 3-5 into linear lobes; flowers crowded in a close raceme, blue (also a white variety); helmet broad and low.

**A. Anthea**, a low species, with very finely divided leaves, and crowded yellow flowers, the broad helms rather high, occurs in some old gardens.

**20. P. EONIA, P. EONY.** (Ancient name, after a Greek physician, Pem.) & Well-known large-flowered ornamental plants, cult. from the Old World. Leaves ternately compound. Roots thickened below.

- **P. officinarum**, Common P. Very smooth, and with large coarsely divided green leaves; the great flowers red, white, blue, single or very double.
- **P. peregrina**, # Eu., in the gardens called P. Kamtsch., has leaves glaucous and more or less downy beneath, and smaller flowers than the last, rose-coral, &c., generally full double, and petals cut and fringed.
- **P. tenuifolius**, Slender-leaved P. of Siberia, is low, with early crimson flowers, and narrow linear divisions to the leaves.

- **P. albidum**, White-fl. or Fragrant P., or Chinese P. Very smooth about 3° high, with bright green foliage, and white or rose-colored, often streaked, rather small flowers, single, also double, and with purple varieties.
2. **MAGNOLIACEAE, MAGNOLIA FAMILY.**

Trees or shrubs, with aromatic bitter bark, simple mostly entire alternate leaves, and solitary flowers; the sepals and petals on the receptacle and usually in threes, but together occupying more than two ranks, and imbricated in the bud; pistils and mostly the stamens numerous, the latter with advance anthers (Lesson, p. 119, fig. 238); and seeds only 1 or 2 in each carpel; the embryo small in abundance.

I. Stipules to the leaves forming the ind-scales, and falling early.

Flowers perfect, large. Stamens and pistils many on a long receptacle or axis, the carpels imbricated over each other and cohering into a mass, forming a sort of cone in fruit. These are the characters of the true Magnolia Family, of which we have two genera.

1. **LIRIODENDRON.** Sepals 3, reflexed. Corolla bell-shaped, of 4 broad greenish-orange petals. Stamens almost equaling the petals, with slender filaments, and long silky opening stamens. Carpels thin and scale-form, closely packed over each other, dry in fruit, and after ripening separating and falling away from the slender into the wing-like portion answering to style; the usual seed-bearing part at the base and indioecious. Seed-fall: stipules free from the petiole.

2. **MAGNOLIA.** Sepals 5. Petals 6 or 9. Stamens short, with barely any filaments; stamens opening towards. Corolla becoming flaccid in fruit and forming a red or rose-colored cone, each when ripe (in autumn) splitting down the back and disclosing 2 or 3 conical berry-like seeds, which hang on extended retractile stamens. Stipules united with the base of the petals, falling as the leaves fall.

II. Stipules none. Here are two Southern plants which have been made the representatives of as many small orders.

1. **ILLICIIUM.** Flowers perfect. Petals 2-10. Stamens many, wyrmate. Flower, several in one nest, forming a ring of almost ready 500 petals.

2. **SCHIZANDRA.** Flowers numerous. Petals nearly 6. bisemem 3, united into a disk or butter-shaped body, which bears 6 anthers on the sides of the 2 lips. Petals many in a head, which brightens into a spike of scattered red berries.

3. **LIRIODENDRON, TULIP-TREE (which is the meaning of the botanical name in Greek).** Only one species.

4. **MAGNOLIA.** (Named for the botanist Magnol.) Some species we call Umbrella-trees, from the way the leaves are placed on the end of the shoot; others, Cucumber-trees, from the appearance of the young fruit.

- Native tree of this country, often planted for ornament.

**M. grandiflora, Great-flowered Magnolia of S., halcyonly in the Middle States. The only perfectly evergreen species; splendid tree with**
coriaceous oblong or obovate leaves, shining above, mostly hairy beneath; the flowers very fragrant, white, very much larger than the seeds, in spring.

**M. glabrum**, Small. of Sweet Bay. Wild in southern N. to New Jersey and Mass.; a shrub or small tree, with the oblong glabrous leaves white, glossy beneath, and glaucous and white fragrant flowers (2"-3" wide), in summer. The leaves are thick and almost evergreen, quite so in the north.

**M.annabin**. Cyanus M. or Cucumber-Tree. Wild from N. Y. W. & S.; a stately tree, with the leaves thin, green, oblong, acute or pointed at both ends, and somewhat downy beneath, and pale yellowish-green flowers (6' broad), late in spring.

**M. cordata**, Yellow Cucumber M. of Georgia, rarely even in New England; like the last, but a small tree with the leaves ovate or oval, seldom cone-like; and the flowers lemon-yellow.

**M. macrophylla,** Great Cucumber M. of Carolia, nearly hardy N. to Mass. A small tree, with leaves very large (12'-30' long), oblong-obovate with a cordate base, downy and white beneath, and an immense open-bellshaped white flower (6'-12' wide) when contrasted, somewhat fragrant, in early summer; petals ovate, with a purple spot at the base.

**M. Umbrella,** Umbrella M. (also called M. tripetala). Wild in Penn. and southwest. A low tree, with the leaves on the end of the flowering branches crowded in an umbrella-like circle, smooth and green both sides, oblong-lanceolate, pointed at both ends, 1'-3' long, surrounding a large white flower, in spring; the petals 3'-5' long, oblong-lanceolate and acute, narrowed at the base; the sweet-scented cone of fruit, showy in autumn, rose-red, 3'-5' long.

**M. Frascri,** Karate Rubelia M. (also called M. aculeata). Wild from Virginia S. barely as the last, and like it: but a taller tree, with the leaves seldom 1' long and smooth on each side, the white oblong-spatulate petals more narrowing below into a claw; cone of fruit smaller.

* * * Chinese and Japanese species.

**M. conspicuous**, Ylean of the Chinese, half-hardy in N. States. A small tree, with very large white flowers appearing before any of the leaves, which are ovate, pointed, and downy when young.

**M. Soulangeana** is a hybrid of this with the next, more hardy and the petals tinged with purple.

**M. purpurea**, Purple M. of Japan, hardy N. A shrub, the showy flowers (pink-purple outside, white within) beginning to appear before the leaves, which are orbiculate or oval, and bright dark green.

3. **ILLICITUM**, STAR-ANISE. (From a Latin word, meaning to anise.) Shrubs, semi-woody, especially the bark and pods, with evergreen shining leaves.

**I. anisatum**, of China, which yields an oil of anise, has small yellowish flowers, in rare in greenhouses.

**I. Floridum**, Wild Anise-Tree, of Florida, &c., has larger dark purple flowers, of 20-30 narrow petals, in spring.

4. **SCHIZANDRA**. (Name from two Greek words, means cut-ups.)

**S. coccinea**, a twining shrub of S. States, scarcely at all aromatic, with thick ovate or oblong leaves, and small crimson-purple flowers, in spring.

3. **ANONACEA**, CUSTARD-APPLE FAMILY.

Trees or shrubs, with 5 sepals and 6 petals in two sets, each set palisade in the bud, and many short stamens on the receptacle, surrounding several pistils, which ripen into pulpy fruit containing large and flat bony seeds. Embryo small; the albumen which forms the bulk of the kernel appears as if cut up into small pieces. Foliage and properties resembling Magnolia Family, but seldom aromatic, and no stipules. All tropical, except the single genus...
5. **JEFFERSONIA**, TWIN-LEAF. (Named for Thomas Jefferson.)

J. diphylla, sometimes called Heart-leaf. Wild in rich woods, W. & N., sometimes cult.; the pretty white flower and the leaves both long-stalked, from the ground, appearing in early spring.

6. **PODOPHYLLUM**, MAY-APPLE, or MANDRAKE. (Name means from root, the 5-7-parted root likened to a webbed-foot.)

P. peltatum. Wild in rich soil: the long running rootstocks which are persistent and tuberous send up in spring some shoots terminated by a large, 7-bladed, regular, umbrella-shaped leaf (i.e. peltate in the middle), and some which bear two one-sided leaves (peltate towards their inner edge), with a large white flower nodding in the fork. The sweet pulp of fruit as large as a peas's egg, ripe in summer; nearly 2 or more to one flower.

6. **NYMPHÆACEÆ, WATER-LILY FAMILY.**

Aquatic perennial hercules, with the leaves which float on the surface of the water or rise above it mostly peltate or roundish-heart-shaped, their margins involut in the bud, long-petioled; axil-barry 1-flowered pedicles: sepals and petals hardly over 5, the latter usually numerous and imbricated in many rows. The genera differ so widely in their botanical characters that they must be described separately. One of them is the famous Amazon Water-Lily, *Victoria regia*, with floating leaves 6 feet or more in diameter, and the insignificant flowers almost in proportion; while the dull flowers of Water-shield are only half an inch long.

1. **BRASENIA.** Sepals and petals each 3 or 4, narrow, and much alike, dull purple. Stemmen 12-18 ft. Stems slender. Petals 4-6, forming inferior half-circular pods. All the parts separate and persistent. (Ducks commonly on the dorsal surface.) *Emberiza*, &c. as in Water-lily.

2. **NELUMBIUM.** Sepals and petals many and pass gradually into each other, deciduous. Stamens very many, on the receptacle, the upper part of which is clumped into a button-shaped leaf, bearing a single or more cymes, each tipped with a head stigma and separately inserted in so many hollows. *Lotus*, p. 248, fig. 254a. Its blood these form clustered nests, resembling small acorns. The whole kernel of the seed is embryo, a pair of fleshy and terminates with bald within hollow. (Lotus, p. 249.) In both these forms slender, resembling small acorns. The whole kernel of the seed is embryo, consisting of the ovary; and terminates with bald within hollow. (Lotus, p. 249.)

3. **NYPHEA.** Sepals 4, green outside. Petals numerous, many times 4, passing successively gradually into the numerous stamens (Lotus, p. 249); both ovaries are attached to the globular mass-called ovary, the former to its sides which they cover, the latter below its compressed summit. Around a little kink at the top of the ovary the numerous stigmas radia from a poppy-head, ending in long and narrow tubular tubes. Fruit like the ovary, elongated, still covered by the decaying persistent bases of the petals; numerous seeds cover the pericarp. Ripens each in an aëris or bag upon the top. (Lotus, p. 246; fig. 318.) *Emberiza*, like that of Nelumbium on a very small scale, but enclosed in a bag, and at the end of the last line; the rest of which is usually ash-like.

4. **NYPHEA.** Sepals usually 4 or 5, partly green outside. Petals many small and thickish bodies inserted on the ovary along with the very numerous, short stamens. Ovary naked, trilocular at the top, which is many-seeded by stigma, fleshy in fruit: the internal structure as in Nymphæa, only there is no aëris to the seeds.

1. **BRASENIA, WATER-SHIELD.** (Name unexplained.) One species, *B. peltata*. In still, rather deep water: stems rising to the surface slender, coated with clathr jelly, bearing floating oval centrally-peltate leaves (2-3 in. long), and purplish small flowers, produced all summer.

2. **NELUMBIUM, NELUMBO.** (Coylone name.) Rootstocks interrupted and submersed, sending up, usually out of water, very long peduncles and
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pinnate, bearing very large (15-20” wide) and more or less discolored or
enlarged centrally-plioteum leaves, and great flowers (6-10” head);
in season. Seeds, also live berries, seed.

N. teubium, Yellow N. or Water Chamomile. Common W. & S.:
iroduced, by Indians perhaps, in South Bay, N. Y., Longmead,
and below Philadelphia. Flowers pale dull yellow: another good species.
N. spectabilis, Showy N. Lottis or Sacred Bean of India, with
pinkish flowers and broader leaves: cult. in choice conservatories.

3. NYMPHAEA, WATER-LILY, POND-LILY. (Dedicated to
the Water-Nymphs.) Long prostrate rootstocks, often as thick as one’s arm,
and up floating leaves (rounded and with a narrow cleft nearly or quite in
the petiole) and large handsome flowers, produced all summer: these close
in the afternoon; the fruit ripens under water.

N. odorata, SWEET-SCENTED WHITE N. Common in still or slow
water, especially in. Flower richly sweet-scented, white, or sometimes pinkish,
with pink-tinted, variable in size, are the leaves; seeds-oblong.
N. tuberosa, Tuberous N. Common through the Great Lakes,
and W. & S. Flower nearly white (in faint color like that of apples);
pure white, usually larger (6-8” in diameter), are the leaves (6-10”
wide); petals broader and blunter; seeds almost globular; rootstock bearing
long trumpet-shaped flowers, “attached by a narrow neck and spontaneously
separating.
N. cernula, Back W., of Egypt, i.e., cult. in aquaria: a tender species,
with cream-scented leaves, and blue or bluish sweet-scented flowers, the
petals fewer and acute.

4. NUPHAR, YELLOW POND-LILY, or SPATTER-Dock. (05)
(Greek name.) Rootstock, i.e. in Nymphaea: leaves often rising out of
water; flowers by no means showy, yellow, sometimes purplish-tinted,
produced all summer.

N. advenum, the common species, everywhere; has 6 unequal sepals, or
sometimes more; petals, or what answer to them, truncate; shorter than the
stamens and resembling them; the thick leaves rounded or obovate,

N. latum, rare S.; has smaller flowers, with 5 sepals, petals dilated
upwards and more concolorous, and a globular fruit with a narrow neck;
the var. palmatum, a small variety, has flowers only 1”, and leaves 1-3’
in diameter; rather common.
N. gigantea, Arrow-leaved N., from North Carolina S.; has gigantea
bears (1” by 2’), and 8 petals. This and the last produce their earlier
leaves under water and very soon.

7. SARRACENIACEAE, PITCHER-PLANT FAMILY.
Consists of one South American plant, of the curious DARLINGTONIA CALIFORNICA in the mountains of California, and of the
following:

1. SARRACENIA. (Named for Dr. Sarrasin of Geneva.) Sarracenia.
Flowers, a single showy purplish bloom. Leaves all radially from a per-
central root, and in the form of follow tubes or pitchers, downward
the inner side, open at the top, where there is a sort of sucking blade or hood.
The whole lingk yellowish-green or purplish. Stems tall, bearing a
single large nodding flower, in early summer. Sepals 3, with 3 bracts at
the base, colored, persistent. Petals 5, blade-shaped, inserted over the
petals and valve-shaped, banded pale-green up to the style. Stamens
very numerous. Ovary 3-valved. Pod many-seeded, rough, hairy.

5. purpurea, Purple S. or Pitcher-Plant of the North, where it is
common in bogs. Leaves pitcher-shaped, open, with an erect round-heart-
shaped hood and a broad side-wing, purple-violet; flower deep purple.
S. rubra, Red-flowered Trumpet-Leaved of S. States: sometimes cult. in gardens. Leaves trumpet-shaped, cheery, a foot long, with a narrow wing and a crest orange pointed heel: flower crimson-purple.

S. Drummondii, Grey Trumpet-Leaved of Florida: sometimes cult. Leaves arrow-like, but, 2' or 2½' long, upper part of the tube and the conical crest heel variegated and purple-overy; and the deep-purple flower very large.

S. pett迄今s, Plume-leather-Plant of S. States, and rarely cult. Leaves short and spreading, with a narrow tube, a broad wing, and an attached globular head, which is seared over the mouth of the tube, spotted with white; flower purple.

S. variolosa, Spotted Trumpet-Leaved of S. States. Leaves erect, trumpet-shaped, white-spotted above, longer than the scope, with a broad wing, and an erect hood arching over the orifice: flower yellow.

S. hava, Yellow Trumpet-Leaved of S. States: cult. more commonly than the rest, as a curiosum, and almost hardly N. Leaves trumpet-shaped, 2½' long; erect, yellowish or purple-overy, with a narrow wing, and an erect roundish but pointed head, a tall-scape, and yellow flower.

8. PAPAVERACEAE, POPPY FAMILY.

Herbs with milky or colored juice, regular flowers, a calyx mostly of 2 sepals which fall when the blossom opens, petals twice or 3-5 times as many, numerous stamens on the receptacle, and a compound 1-seeded ovary, with 2 or more parietal placenta. Fruit a pod, many-seeded. Juice medicated, as in Poppy (opium), or acrid.

No. 5 has watery juice, with the odor of mucic acid, and the calyx like a cup or lob.; No. 7 has no petals and few seeds.

* Pots calypso in the forest-clay, which drops on its pedestal before opening.

1. PAPAVER. Stigma united into a many-rayed circular body which is closely united in the center. Pod globular or oblong, imperistally mucro-ed by the projecting placenta which are covered with similar seeds, opening only by pores or chinks at the top. Juice white.

2. STYLOPHORUS. Stigma 3-4 lobed, raised on a style. Pod oval, bisected, opening from top into 3 or 4 valves, leaving the thread-like placenta between them. Juice yellow.

3. CELLIDONIUM. Stigma 8 lobed, almost sessile. Pod linear, with 8 placenta, splitting from below into 2 valves. Juice orange.

* ** Pots more or less crumpled in the bud, which is erect before opening.

4. ACHROME. Stigma 2-lobed, almost sessile. Sepals and oblong pod prickly; the latter opening by valves from the top, leaving the thread-like placenta between. Juice yellow.

5. FASICHOLZIA. Sepals united into a pointed cup which falls off entire. Receptacle or stalk of the flower-spike divided into a top-shaped body, often with a spreading rim. Stigma 4-6, spreading, many-seeded; but the placenta only 2. Pod long and slender, greenish. Juice colorless.

* ** Pots not crumpled in the bud, which does not drop.

6. SANGUINARIA. Sepals 2; but the petals 8-12. Stigma 8 lobed, on a short style. Pod oblong, with 2 placenta. Juice tannin-red.

* ** Pots none. Flowers in pencil, drooping in the bud.


1. PAPAVER, POPPY. (Ancient name.) We have no truly wild species: the following are from the Old World.

* Anemone, flowering in season: cult. and used of cultivation.

P. somniferum, Opium Poppy. Cult. for ornam., especially double-flowered varieties, and for medical use. Smooth, glossy, with creeping and wavy leaves, and white or purple flowers.
P. Rhoeas, Corn Poppy of Eu. Low, broadly, with almost pinnate leaves, and deep red or scarlet flowers with a dark eye, or, when double, of various colors; pod oblong.

P. dubium, Lowne-Heath P. Leaves with their divisions more cut than the last; flowers smaller and lighter red, and pod oblong-ovate; run wild in fields in Pens. * * Perennial; cult. for ornament; flowering in late spring.

P. orientalis, Oriental P. Rough-hairy, with tall flower-stalks, almost pinnate leaves, and a very large deep-colored flower, usually some leaves persistent beyond. Var. flavus, has these leaves larger, petals still larger and deeper red, with a dark spot at the base.

2. STYLOPHORUM, CELANDINE, POPPY. (Name means style-bearer, expressing a difference between it and Poppy and Celadine.)

8. dubium. From Penn. W. in open woods; resembling Celadine, but low, and with the larger (yellow) flowers, in spring.

3. CHELIDONIUM, CELANDINE. (From the Greek word for the yellow.)

C. majus, the only species, in all gardens and moist waste places; 10-40 high, branching, with pinnate or twice pinnatifid leaves, and small yellow flowers in a sort of umbel, all summer; the pods long and slender.

4. ARGEMONE, HISPIDLY, POPPY. (Mentioning of Roman Minerva.)

A. Mexicana, Mexican P. White petals and garden. Prickly, 10-30 high; leaves entire-lobed, bluish with white flowers yellow or yellowish, pretty large, in summer. Var. albiflora has the flower larger, sometimes very large, white; cult. for ornament.

5. ESCHSCHOLTZIA. (Named for one of the discoverers, Eschscholtz.)

E. Californica, Californian anemone, now common in gardens; with pale spotted leaves, and large pendent red flowers, remarkable for the top-shaped dilatation at the base of the flower, on which the extinct-museum-shaped calyx rests; this is forced off with the opening petals. The latter are bright orange-yellow, and the top of the receptacle broad-rounded. Var. rosesantha wants this rim, and its petals are pure yellow, or sometimes white; but the scars are more mixed in the gardens; and there are smaller varieties under different names.

6. SANGUINARIA, BLOOD-ROOT. (Name from the color of the juice.)

S. Canadensis, the common and only species; wild in rich woods, hawthorns in cultivation. The thick red rootstock in early spring sends up a rounded-reiform and palmate-lobed leafy stem, wrapped around a flower bud; as the leaf comes out of ground and opens, the scape lengthens, and carries up the handsome white, many-petalled flower.

7. TROCOCOA. (Named in honor of an Italian botanist, Fracassini.)

B. cordata, Coreata B., from China, the only hardy species; a strong root sending up very tall leafy stems, with round-cordate lobed leaves, which are venous and glaucous, and large panicles of small white or pale rose-colored flowers, late in summer.

9. FUMARIACEAE, FUMITORY FAMILY.

Like the Poppy Family in the plan of the flowers, but the 4-petalled corolla much larger than the 2-secale-like sepals, also irregular and closed, the two inner and smaller petals united by their
spoon-shaped tips, which enclose the anthers of the 6 stamens in two sets, along with the stigma: the middle anther of each set is 2-celled, the lateral ones 1-celled. Delicate or tender and very smooth herbs, with colorless and inert juice, and much dissected or compound leaves.

- **Corydalis** heart-shaped or spurred at base: pod several-seeded.

1. **Dicentra**. Petals slightly cohering with each other. Seeds crested.

2. **Adlumia**. Petals all permanently united into one slightly heart-shaped body, which encloses the small pod. Seed-crested. Climbing by the very compound leaves.

- **Corydalis** with only one petal spurred at base.

3. **Corydalis**. Spicy and pod slender, several-seeded. Seeds crested.

4. **Fumaria**. Urinary and small closed fruit glabrous, hooded.

1. **Dicentra** (meaning two-cupped in Greek). Commonly but wrongly named *Dicaea* or *Dicentra*. Flowers: Fi in spring.

- Wild species, low, with delicate decomposed leaves and fine-flowered scape sent up from the ground in early spring.

**D. Bucculata**, DICKMAN'S BUCKEYE. - Common in bottomland woods. Fruit and flowers from a sort of graminee-calyx bulbus; corolla white tipped with yellow, with the two diverging spurs at the base longer than the petals.

**D. Canadensis**, CANADIAN D. or SQUIRREL-CORN. With the last N. Separate yellow grains, like Indian corn, in place of a calyx bulbus; the corolla narrower and more hours-shaped at last, white or delicately flesh-colored, sweet-scented; inner petals much crested at tip.

**D. extima** is rarer, wild along the Alleghenies, occasionally cult., has smaller bulbus, and more numerous flowers than the last, pink-purple, and produced throughout the summer, from tufted slender rootstocks.

- Cultivated species, taller and nearer, leaf-stemmed, mono-flowered.

**D. spectabilis**, SNOWY D. or BLEEDING HEART. From N. China, very ornamental through spring and early summer, with ample Peony-like leaves, and long drooping racemes of bright pink-red heart-shaped flowers (1" long): the two small sepals fall off in the bud.

2. **Adlumia**, CLIMBING FUMITORY. (Named in honor of a Mr. Adlum.) The only species is

**A. cirrhosa**. Wild in low shady grounds from New York W. & S. and cult., a climbing erect shrubs or low trees, by means of its 2-3-pinnately compound delicate leaves, the stalks of the flowers acting like beads; flowers flesh-colored, panicled, all summer.

3. **Corydalis**. (Greek name for Fumitory). Our species are leaf-stemmed, 0.5 or 3, wild in rocky places, Fi spring and summer.

**C. glauca**, PALE CORYDALIS. Common, 0.5-3" high, very glaucous, with the whitish flowers viregneted with yellow, and pink, a short and rounded spur, and erect pods.

**C. flavula**, YELLOW C. From Penn. S. & W., has the flowers pale-yellow, with the tips of the outer petals wing-crested; seeds sharp-edged; otherwise like the next.

**C. aurea**, GOLDEN C. From Vermont W. & S. Low and spreading; flowers golden-yellow with a longish spur, and crested tips, hanging pods, and smooth hispid-seeded.

4. **Fumaria**, FUMITORY. (Name from fumus, smoke.) Low, leaf-stemmed, with finely cut compound leaves.

**F. officinalis**, COMMON F. Common in old gardens, waste places, and dung-heap; a delicate small weed, with a close spike of small pinkish crimson-
10. CRUCIFERAE, MUSTARD FAMILY.

Herbs, with watery juice, of a pungent taste (as exemplified in Horseradish, Mustard, Water-Cress, etc.), are mostly distinguished by the cruciferous flower (of 4 sepals, 4 petals, their upper part generally spreading above the calyx in the form of a cross), the petaloid stamens (i.e. 4, two of them shorter than the other two), and the simple 2-celled pistil with two partical placenta, forming the kind of pod called a silique, or when short a silicle. (See Lessons, p. 92, fig. 157, 188, for the flower, and p. 153, fig. 316, for the fruit.) The embryo fills the whole seed, and has the radicle bent up against the cotyledons. Flowers in racemes, which are at first short, like simple corymbs, but lengthen in fruiting: no bracts below the pedicels. The blossoms are all nearly alike throughout the family; so that the genera are mainly known by the fruit and seed, which are usually to be had before all the flowers have passed.

1. Foot in long pod, opening longitudinally by two valves, which fall away and leave the thin persistent partition when ripe.
   * Seeds or cotils move thern up to each cell.
   ** Pod backed or printed beyond the summit of the lobes, or the style with a central base.

2. SEYSMURUS. Foot in the common species shortish, lance-shaped, elongated, pressed to the stem. Seeds oval, marginate. Flowers small, yellowish.

3. NASTURTIUM. Pod shorter or short (broader long slender to almost spherical), seeds in 2 rows in each cell, peculiar, marginate. Flowers yellow or white.

4. HESPERIS. Pod long and slender, with a single row of marginated seeds in each cell (as broad as the partition); the radicle laid against the back of the cotyledons. Flowers rather large, pink-purple. Signa of 2 erect filaments.

5. MALCOLMIA. Pods somewhat thickened at the base. Stigmas of 2 rounded lobes. Opposite or 4.

6. MATTHiola. Pods long and narrow, seeds one-rowed in each cell (as broad as the cotyledons), the radicle laid against one edge of the broad cotyledons. Flowers pink-purple, reddish, or varying in white, large and showy.
   ** Seed long and slender, linear, 4-sailed (the cross section square or oblong), or of flattened bearing a strong yellow habit, in the middle. Seeds marginated, nearly single-rowed in each cell. Flowers yellow or orange, never white.

7. CHEIRANTHUS. Seeds flat, the radicle laid against the edge of the broad cotyledons. Flowers showy. Leaves entire.

8. ERYSSIMUM. Seeds oblong; the radicle laid against the back of one of the narrow cotyledons. Leaves simple.

9. BARBARA. Seeds oval; the radicle laid against the edge of the broad cotyledons. Leaves lanceolate or oblanceolate.

10. ARABIS. Pod long and narrow-linear, not opening longitudinally; the calyx with a midrib. Seeds often wrapped or marginated.

11. GARDESAMINE. Pods linear or lanceolate; the valves with an or hardly any midrib, opening straightly from the base upwards. Seeds marginated and tender-disked, unscrewed in each cell. No sealy-mouthed respiratory.
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10. BENTARIA. Pods, bac. or in the preceding. Seed-stalks broad and flat, stem 3-lobed in the middle, naked below, springing from a horizontal, self-clasped or irregularly fleshy rootstock.

11. LUNAMIA. Pods oval or oblong, large and very flat, stalked above the calyx. Seeds wizened, covered in each cell. Flowers purplish large, purple.

12. DEIMA. Pods round-oval, oblong or linear, flat. Seeds wizened, covered in each cell. Flowers small, white in the common species.

13. VAR. Pod short, flat and parallel to the broad partition. Flowers yellow, small. "

14. CAMELINA. Pods turgid, ovate or nearly smooth. "

15. CAPSICELLA. Pods elevarate-triangular, or triangular with a notch at the top. "

16. Brassica, Cabafia, Mustard, &c. (Andent Latin name of the cultivated or wild, &c. in the preceding. Seed-stalks broad and flat, stem 5-lobed or nearly smooth, stalked nearly smooth, part longer than the calyx, usually empty, the stem therefore deeply toothed. Flowers white, small.

17. C. C. TURNIP (B. Nappe); cult. for the root, accumulated in the narrow partition; the roots therefore deeply toothed. Flowers white, small.

18. C. C. SULTANA. Flowers yellow. Fruit turgid, 2-seeded, resembling a small sunflower. "

19. C. C. TURK. Fruit complete, resembling a small sunflower.

20. L. Fruits yellow or whitish. Flower, large, purple.

21. Mustard Family. Fruit several-seeded, with cellular matter or with constrictions between the spherical seeds.

1. BRASSICA, CABBAGE, MUSTARD, &c. (Ancient Latin name of Cabbage. Botanically the Mustards rank in the same genus.) 1. & 2. Cult. from Bac. or as wild as seeds; known by their yellow flowers, beak-pointed pods, and globular seeds, the cotyledons wrapped round the radicle.

B. oleaceus, Cabbage. The original is a sea-coast plant of Europe, with thick and hard stem, and pretty large pale yellow flowers; the leaves very glossy and glaucous; upper ones entire, clasping the stem, not notched at the base; cult. as a biennial, the rounded, thick, and fleshy, strongly veined leaves collected into a head the first year upon the summit of a short and stout stem. — Var. BACCAVARUM is a state in which the stem divides into short fleshy branches, bearing clusters of abortive flower-blades. — Var. CASTROPFRAVUS has the flowering stem mostly concealed in short imperfect flower-branches, collected into a flat head. — Var. KERKELANDI has the nourishing matter accumulated in the stem, which bears a turnip-like enlargement above ground, beneath the closer of leaves. — RAEF is more nearly the natural state of the species, the fleshy leaves not forming a head.

B. campestris, of the Old World; like the last, but with brighter flowers; the lower leaves pinnatifid or divided, and rough with stiff hairs, and the upper notched at the base, is represented in cultivation by the Vae. COLTA or RAPE, with small annual roots, cult. for the oil of the seed. — Var. TURNIP (B. NAPPE); cult. as a biennial, for the nourishment accumulated in the tapiform white root. — Var. HETZEBAGA or Switish Turnip, has a longer and yellowish root.

B. Sinapis arvensis, Charlock. A troublesome weed of cultivation in grass-fields, annual, with the somewhat rough leaves barely toothed or little lobed, and nearly smooth; pods spreading in a loose raceme, the seed-bearing part longer than the cocoon (usually empty) bead.

B. (or Sinapis) alba, White Mustard. Cult. and in waste places, annual; the leaves all pinnatifid and rough-hairy; pods spreading in the racemes,
briestly, the lower and upper few-seeded portion shorter than the inserted stamn and filament base; seeds large, pale brown.

B. (or Sinapis) nigra, **Black Mustard.** Cult. and in waste places; leaves very hairy and less divided than the last; pods erect in the raceme or spike, smooth, short, 1-sided (the valves having a strong midrib), and tipped with the short empty central base of a slender style; seeds dark brown, smaller, and more pungent than in the last.

2. **SISYMBRIUM, HEDGE MUSTARD.** (The ancient Greek name.)

B. officinale, **Common H.** *3* Coarse weed in waste places, with branching stems, rotundate leaves, and very small pale yellow flowers, followed by oval-shaped or ovoid pods that proceed in the axis of the narrow spike.

B. canadensis, **Heart H. or Tart Mustard.** *6* Commonly only S. & W., hoary, with finely cut twice-panniform leaves, minute yellowish flowers, and obovate-oblong or oval pods on slender horizontal pedicels.

3. **NASTURTIUM, WATER-CRESS, HORSE-ADEISH, &c.** (Name from horse treading, convolvulus men, from the pungent qualities.) Here are combined a variety of plants, widely different in appearance: the following are the commonest.

* * Nat. from Eu.; the white petals twice the length of the calyx.

B. officinale, **Water-Cress.** Planted or run wild in streams, spreading and rooting, smooth, with pinnate leaves of 3-11 ovalish or oblong lobes; 6-12 summer; pods broadly linear, slightly curved upwards on their spreading pedicels. Young plants eaten.

B. Armoracia, **Horseradish.** Planted or run wild in moist soil; with very large, obovate or lanceolate leaves, chiefly from the ground, creasc; early cut or pinnatifid; pods globular, but seldom seen. The long deep root is a familiar condiment.

* * Indigent species, in wet places; petals yellow or yellowish.

B. palustris, **Marsh-Cress.** A very common lowly weed, erect, 10-30 high, with pinnatifid or lyrate leaves of several obovate-cleft lobes, small yellowish flowers, and small obovate or oval pods.

B. scassiflorum, like the last, but with less lobed leaves, very minute yellow flowers, and longer obovate pods, more common from Illinois S. And there are 2 or 3 more in some parts, especially S.

4. **HEMEROCALLIS, ROCKET.** (Greek for evening, the flowers being then fragrant.) *2*

B. maculata, **Cowslip or Dame H.** Tall and rather coarse plant in country gardens, from Eu., inclined to run wild in rich shady soil; with oblong or obovate toothed leaves, and rather large purple flowers, in summer, followed by (2'-4') long and slender pods.

5. **MALCOLMIA.** (Named for W. Malcolm, an English gardener.)

B. maritima, **Marine Sow-thistle,** called Virginiola Sowthistle in England, but comes from the shores of the Mediterranean; a garden annual, not much cult., with pale green stems or stamn; grayish flower, pretty purple or pink, pinkish flowers, cream or white, also a white car. (much smaller plant, those of true Knackpods, not long and slender.

6. **MATTHIOILA, STOCK or GILLIFLOWER.** (Named for the early summer.)

B. maritima, **Marine Sow-thistle,** called Virginiola Sowthistle in England, but comes from the shores of the Mediterranean; a garden annual, not much cult., with pale green stems or stamn; grayish flower, pretty purple or pink, pinkish flowers, cream or white, also a white car. (much smaller plant, those of true Knackpods, not long and slender.

B. maritima, **Thistle Stock.** *3* Probably only an herbaceous variety of the last; flowers usually not double.
7. **CHISARANTHEUS, WALLFLOWER.** (Cheiri is the Arabic name.)

Like **Sisyrinchium**, but slightly if at all hairy, and the flowers orange, brown-red, or yellow. **C. Cheiri**, Common Wallflower. Cult. from N. Eu., not hardy, N., a much-globed house-plant; stem woody, crowded with the narrow and pointed entire leaves.

8. **ERYSIDUM.** [Name from Greek, and meaning to draw blisters, from the miracle.]**

**E.asperum**, Western Wallflower. Wild from Ohio W. & S., like the wild end of the Wallflower, with bright yellow or orange flowers, but the seeds are different, and the long pods quite square in the cross-section; the leaves somewhat toothed and hairy.

**E. scorpioides**, Teeliee Mustard or Woolseed Mustard. A rather insignificant annual, wild or run wild in waste sunny places, with slender branches, lanceolate almost entire leaves, and small yellow flowers, followed by shortish and obscurely 4-sided pods on slender spreading peduncles.

9. **BARKAREA, WINTER-CRESS.** (The Herbs of Santa Barbara.)

Different from the last genus in the seeds, divided leaves, and in the general aspect. Leaves used by some Kow winter salad, but hidden. **B. vulgaris**, Common W. or Yellow Rocket. Sow, common in old gardens and other rich soil, with green lyrate leaves, and bright yellow flowers, in spring and summer; pods erect, crowded in a dense raceme, much thicker than their pedicels.

**B. procera**, Early W. or Street Cress. Cult. from Penn. S. for early salad, beginning to run wild, probably a variety of the last, with more numerous and narrower divisions to the leaves; the less erect pods scarcely thicker than their pedicels.

10. **ARABIS, ROCK-CRESS.** (Name from Arabic.)**

Fl. spring and summer. Leaves mostly simple and undivided.

* Wild species, or trees, gr.; flowers white or whitish, or yellow. **

**A. lyrata**, Low R. A delicate, low, nearly smooth plant, with a cluster of lyrate leaves; stem-leaves few and narrow; bright white petals rather compressed; pods slender, spreading.

**A. hirsuta**, hairy R. Strictly erect, 1-2' high; stem-leaves many and serrate; small greenish-white flowers and narrow pods erect.

**A. lomatium**, Smooth R. Erect, 1-2' high, glabrous; upper leaves spatulate; flowers rather small; pods 3' long, very narrow and not very flat, recurving; seeds winged.

**A. canadensis**, Canadian or Nicoll's R. Tall, growing in twines; stem-leaves pointed at both ends, pellucid; petals white, narrow; pods 3' long, whiteish, very flat, hanging; seeds densely winged.

**A. horridipes**, Rocket R. Smooth, erect, 1-3' high; with rounded or heart-shaped long-petiolate rosettes, lanceolate stem-leaves (½'-2' long), the lower or a winged pedicel or with a pair of small bracteoles; petals long-clawed; pods spreading, narrow; seeds angular. Habits like the Ohio and S. **

**A. alpina**, Alpine R., and its variety A. alpina, from Eu., low and tufted, hairy or soft-downy, are cult. in gardens; fl. in early spring.

11. **CARDAINE, BITTER-CRESS.** (Ancient Greek name.)

**C. hispanica**, Small B. A low and branching insignificant herb, usually not hairy, with slender fibrous root, pinnate leaves, the leaves anged or toothed, and small white flowers, followed by narrow upright pods; common in moist soil, fl. spring and summer.
C. pratensis, Cuckoo-Flower or Ladies’ Smock. Stem ascending from a short perennial rootstock; the pinnate leaves with rounded and stalked entire small leaflets; flowers in spring, showy, pink or white; in bags at the north, and a double-flowered variety is an old-fashioned plant in gardens.

C. rhomboidea. Stems upright from a small tuber, simple, bearing rather large white or rose-purple flowers in spring, and simple sudded or spathulate toothed leaves, the lowest rounded or heart-shaped, the upper ovate or oblong; in wet places northward.

12. DENTARIA, Toothwort. (From the Latin dente, a tooth.)

D. diphylla, Two-leaved T. Pepper-root, or Crease-root. So calleted from the fleshy, long and toothed rootstocks, which are eaten and taste like Water-Cress; down are only 2-stem leaves, close together, each of 3 rhombic-ovate and toothed leaves, and the rootleaf is similar; flowers quite large, white, in spring. Worts in vegetable mould, W.

D. jacquimontii, JACQUIMONT’S T. Rootstock meek-shaped or constricted in 2 or 3 parts, scarcely toothed; stem-leaves 2 in a wheel, each 3-parted into linear or lanceolate leaves, which are cut or cleft into narrow teeth, at the lateral ones 2-toothed; flowers purplish, in spring; banks of streams.

13. LUNARIA, Honesty or Natin-Flower. (Name from Luna, the moon, from the shape of the broad or rounded pods.)

L. biennis, COMMON Honesty. Not native to the country, but cultivated in old-fashioned places, for the singular large oval pods, of which the broad white partitions, of earlier litre, remaining after the valves have fallen, are used for ornament; leaves somewhat heart-shaped; flowers large, pink-purple, in early summer.

L. rosliva, Perennial Honesty, is a much rarer sort, with oblong pods; seldom met with here.

14. DRAEA, Whitlow-Grass. (Name a Greek word, meaning outward.) Low herbs, mostly with white flowers: the common species are the following: 8, early spring; winter annuals.

D. Caroliniana. Leaves ovate, hairy, on a very short stem, bearing a short racemose or corymb on a scape-like peduncle 1"-4" high; petals not notched; pods broadly linear, much larger than their pedicles; in sandy waste places.

D. verna. A diminutive plant, with a tuft of oblong or lanceolate round leaves, and a scape 1"-3" high; pedate 2-leaf: pods oval or oblong; in a stage, shorter than their pedicles; in sandy waste places.

15. CAMÉLINA, False-Flax. (An old name, meaning deceiving:) the common species was fancied to be a degenerate flax.)

C. nivosa, Common F. A weed, in grain and flax-fields, 1"-2" high, with lanceolate leaves, the upper ones sagittate and clasping the stem; small pale-yellow flowers, followed by oblong brown pods in a long loose raceme; style emarginate.

16. CAPSICUM, Shepherds-Purse. (Name means a little pebb.)

C. Bures-Pastoris, Common C. The commonest of weeds, in waste places, spot-leaved pinnaled or notched, those of the stem sagittate and partly clasping: small white flowers followed by the triangular and nutched pods in a long raceme.

17. HEDRIS, CANDYTUFT. (Name from the country, Flanders, an old name for Spain.) Low garden plants, from Europe, cultivated for ornament; different from the rest of the order in the irregular cymes.

I. umbellata, COMMON C. (b) Lower leaves lanceolate, the upper linear and entire; flowers purple-palae (or pale), in flat clusters, in summer.

I. sempervirens, Evergreen C. (c) Rather woody-rammed, tufted, with bright green lanceolate or linear-spatulate thickish entire leaves, and flat clusters of pure white flowers, in spring.
18. **LEPIDIUM**, PEPPERGRASS. (A Greek word, meaning little scale, from the pods.) Our common species have 4-angled or pinnatifid leaves, and very small white or whitish flowers.

L. Virginicum, Wild P. A common weed by roadsides, with petals, and usually only 2 stamens; the little pods orbicular and scarcely margined at the notched top; seeds flat, the radicle against the edge of the ovule.

L. ruderalis, introduced from Europe, is much less common, more branched, with no petals, smaller notched pods, and trigonal seeds, the radicle against the back of one of the ovules.

L. saltatium, Garden P. Cult. as a root, has petals, and the larger ovate pods are winged and slightly notched at the top.

19. **ALYSSUM**, MARDIORT. (Name refers to being a favored remedy for canine madness.) Cult. for ornament; from Eu.

A. maritimum, Sweet Alyssum. A spreading little plant, from Europe; in all gardens in gardens, or in the greenhouse in winter, green or slightly hairy, with lanceolate or linear entire leaves exserting at the base, and small white, yellow- or crimson flowers, in 8-shaped elongated crimson, the round little pods with a single seed in each cell. A variety much used for borders has larger and white-angled leaves.

A. saxatile, Rock A. Low, hairy-leaved, with abundant bright yellow flowers, in spring; cult. from Europe.

20. **ISATIS**, WEIH. (Name of obscure derivation.) One common species of Eu.,

I. tinctoria, Dyer's Weed. Rather tall, glabrous and glaucous, with the stem-leaves lanceolate and entire, scented and somewhat aromatic; the exuviae of small yellow flowers, pinnated, succeeded by the hanging sesbania-like closed pod; & in early summer. Old gardens, formerly cult. for a blue dye.

C. **CAMELE**, SEA-ROCKET. (An old Arabic name.)

C. Americana, American S. A fleshy herb, wild on the shores of the set and Great Lakes, with obsolete wavy-margined leaves, and purplish flowers.

21. **RAPHNUS**, RADISH. (Ancient Greek name, said to refer to the rapid germination of the seeds.)

R. sativus, Radish. Cult. from Eu.; with bristy lower leaves, purple and white flowers, and thick and pointed closed pods; the seeds separated by irregularly flat, papery partitions; cult. for the tender and fleshy pungent root; inclined to run wild.

R. raphanistrum, Jointed C. from India, lately introduced into gardens, rather as a curiosity, a probable variety of the Radish, with the narrow pod a foot or so long, eaten when green.

B. **CAPARIDACEAE**, CAPER FAMILY.

In our region these are herbs, resembling Cressions, but with stamens not tetradynamous and often more than 6, no partition in the pod (which is therefore 1-celled with two parietal placenta), and kidney-shaped seeds, the embryo rolled up instead of folded together; the leaves commonly pinnately compound, and the herbage bitter and nauseous instead of pungent. But in warm regions the Cress-like pungency sometimes appears, as in capers, the pickled flower-buds of **CAPPARIS SINORA**, of the Levant. This and its near relatives are trees or shrubs.
PITTOSPORACEAE, PITTOSPORUM FAMILY.

A small family of shrubs and trees, belonging mostly to the southern hemisphere, in common cultivation represented only by one house-plant, a species of

1. PITTOSPORUM. (Name means sticky and in Greek, the seeds being generally covered with a sticky exudation.) Flowers regular, of 3 sepals,
14. VIOLACEAE. VIOLET FAMILY.

Commonly known only by the principal genus of the order, viz.

1. VIOLA, VIOLET. (Ancient Latin name.) Sepals 5, persistent. Petals 5, more or less unequal, the lower one with a spur or spur at the base. (Lessons, p. 91, fig. 44, 192.) Stamens 5, short; the very broad flat filaments curving and slightly curving around the petal, which they cover, all but the end of the style and the (usually one-angled) stigmas, bearing the anthers on their inner face, two of these spurred at the base. Ovary and pod 1-celled, with 3 parietal placentae, containing several rather large seeds. — Horts, with stipules to the alternate leaves, and 1-flowered peduncles.

* Stemmata Violae, with leaves and peduncles all from creeping or subterranean stalks; leaves having no proper spreading stem; all flowering in spring, also producing inconspicuous flowers and seed of the fruitful pods, all summer, succeeded among the leaves.

— Garden species, from Europe; fragrant.

V. odorata, Sweet Violet. Cult. from Eu., the tufts spreading by creeping runners; leaves rounded heart-shaped, more or less downy; flowers purple-blue (violet-color) varying to bluish and white, single or in cultivation commonly full-double. Hardy; while the Italian Violet, the variety used for winter-flowering, with leaves smoother and brighter green and flowers paler or grayish-blue, is tender northward.

— = Wild species: slightly sweet-scented or acrid.

— = Flowers blue or violet-color.

V. Sulkirkii, Sulkirka’s V. Small, only 2” high, the rounded heart-shaped leaves spreading flat on the ground; the flower large in proportion, its thick spat nearly as long as the bell-shaped petals, on smooth stalks, only V.

V. nigritta, Arrow-leaved V. One of the commonest and earliest; leaves varying from oblong-heart-shaped to ovate and often rather half-round, the ears on short and rounded pericarpels; flower large in proportion; spurious and racemose, as in all the following:

V. cucullata, Cornace Blue V. The tallest and commonest of the blue violets, in all low grounds, with teddy beetle and scaly-touched roots, erect and heart-shaped or kidney-shaped abruptly serrated leaves, with the sides of the leaves yellow in Winter; on long pedicels, flowers sometimes pale or variegated with white.

V. palmata, Hand-leaved V., is a variety of the last, with the leaves, or all the leaf-case, 3 – 5-cleft or parted; common in southern.

V. pedata, Bird-foot V. Grows in sandy or light soil, from a short and thick or tubercle-like rootstock; the leaf all cut into linear divisions or lobes; the flower large, bell-shaped, nearly light violet-color; sometimes the bell-shaped petals deep violet, like a pansy.

V. delphinifolia, Heath-leaved V., takes the place of the preceding in gardens, &c. W. and is like it, but has the lateral petals bearded.

— = Flowers (small) white, the lower petal purplish-mauve.

V. blanda, Sweet White V. Very common, with finely sweet-scented flowers, all the petals bell-shaped; leaves rounded heart-shaped or kidney-shaped.

V. primulifolia, Primrose-leaved V., Common S., between the last and next, has oblong or erect leaves.

V. lancifolia, Lance-leaved V. Common S., has lanceolate leaves tapering into long petioles, and bell-shaped petals.
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**V. rotundifolia,** Round-leaved V. Only in cool woods N.; the roundish heart-shaped leaves flat on the ground, becoming large and shining in summer; spikes by runners; flower small.

- **Leaf-stemmed Violets,** with lower leaf small, petal-like, heart-shaped, or thread-like; flower small.

- **Flowers not yellow; stem branched, leafy below; leaves rounded heart-shaped.**

V. striata, Pale V. Not near N. & W.; low: flowers creamy-white, with lower petal purple-tinted; spur short; stamens large in proportion, strongly fringed.

V. canina, Dog V. from India; common in low grounds; low, with creeping branches or short runners, fringed-tipped stamens, and spur half the length of the violet flower.

V. rostrata, Long-spurred V. Tiny hills N. & W.; 6 high, with fringed-tipped stamens, and slender spur longer than the pale violet petals.

V. Canadensis, Canad V. Common in rich woods N. & W.; taller than the others. 15–20 high, large-headed, with entire stamens; flowers all summer, the petals white or purplish above, the upper ones violet-purple underneath; spur very short and blunt.

- **Fairy Violets,** from Europe, with leafy and branching stems, and large leaf-like stipules; flowering through the spring and summer.

V. tricolor, Penny or Heart's-bane. Cult. or running wild in gardens, low, with roundish leaves, or the upper oval and lower heart-shaped; stipules lyraceous-pinnatifid; petals of various colors, and often variegated, and under cultivation often very large and showy, the spur short and blunt. - Var. atrovirens, is a field variety, slender and small-flowered, thoroughly naturalized in some places.

V. cornuta, Hearted V. From the Pyrenees, cult in borders of late; has stipules more toothed, and light violet-purple flowers with a very long and slender spur.

15. DROSERAEE, SUNDEW FAMILY.

Suckers, with regular flowers, on spikes; leaves in a tuft at the root, glabrous-bristly or loosely-fringed, and rolled up from the apex in the bud, in the manner of Ferns: the persistent sepals and withering-persistent petals each 5; stamina 5–15 with their anthers turned outward; and a 1-celled many-seeded pod. Represented by two genera.


2. **DIONEA**. Stems 5. Styles 1, glabrous and fringed. Ovule and seeds all at the broad base of the flower and pod. Leaves terminated by a finely-borasted 5-lobed tip.

1. **DROSERA**. Sun Dew. (Name means in Greek, dew, or heat with dewdrops, the plant surrounding the bridges of the leaves producing a clear and dew-like drop of liquid, which is glutinous, and serves to catch small flies.) Flowers small, in a 1-sided spike or raceme, each opening only once, in sunshine, in summer.

- **Flowers small, white; leaves with a blade.**

D. rotundifolia, Round-leaved D. The commonest species in spring, white round leaves on long petioles spreading in a rosette, when a small fly or other insect is caught by the sticky glands on the upper face of the leaf.
the bristles of the outer rows very slowly turn inward, so that their glands help to hold the prey.

D. longifolia, LONGER-LEAVED S. In very wet bogs or shallow water, with quaking, floating leaves, some of them even, on long peduncles.

D. brevifolia, SHORT-PETAL S. In wet sand, only at the S.; small; scape only 2-3' high; few-flowered; leaves short, wedge-shaped.

** Flowers one-purple. ** no blade to the leaf.

D. filifolia, THREAD-LAYED S. In wet sandy soil near the coast, from Plymouth, Mass., to Florida; leaves entire; thread-shaped; scape 6-12' high, from a bulblike base; flowers lavender, 3' or more broad.

2. DIONAEA, VENUS'S FLY-TRAP. (Named for the mother of Venus.)

Only one species.

D. muscipula. Grows only in sandy bogs near Wilmington, N. C., but kept in conservatories as a great curiosity. (Lessons, p. 52, fig. 51.) flowers white, borne in an umbell-like cyme on a scape 1' high, in spring.

16. CISTACEÆ, ROCK-ROSE FAMILY.

Shrubby or low herbaceous plants, with regular flowers; a persistent calyx of 3 sepals, two of them exterior and resembling bracts; the petals and stamens on the receptacle; the style simple or none; every 4-celled with 2 or 3 parietal placentae (Lessons, fig. 261), bearing orthotropous ovules. Represented in greenhouses by one showy species, CISTUS LARMENIENSIS of Europe (not common), and in sandy woods and fields by the following wild plants.

1. HELIANTHEMUM. FROST WEED. (Name from Greek words for frost and flower; the blossoms opening only in sunshine. Popular name, from crystals of ice sticking from the cracked bark at the root of the plant.) Low, yellow-flowered, in sandy or gravelly soil. 2. H. Canadense, CANADIAN or COMMON F. Common, and the only one N.; has lance-shaped leaves heavily blotched; flowers produced all summer, some with showy corolla 1' broad and many stamens; others small and clustered along the stem, with inconspicuous corollas and 3-10 stamens; the latter produce small few-seeded pods.

H. corymbosum, only along the coast S., is downy all over, with smaller flowers clustered at the top of the stem, and larger ones long-peduncled. H. Carolinianum, grows only S., is hairy, with green leaves, the lower ovate and clustered; flowers all large-petalled and scattered, in spring.

2. HUDSONIA. (For an English botanist, William Hudson.) Bush-like little shrubs, 6-12' high, mostly confined to sandy shores of the ocean and Great Lakes, with minute downy leaves, closely covering the branches, and small yellow flowers, opening in sunshine, in spring and summer.

H. ericoides, HEATH-LIKE H. Greenish; leaves awl-shaped; flowers prolonged. From New Jersey S.

H. tomentosa, DOWN H. Bluish with soft down; leaves oblong or oval and close gnarled; peduncles short or rarely any. From New Jersey to Maine and Lake Superior.
ST. JOHN’S-WORT FAMILY.

2. LECHEA, PINWED. (Pet. linda, a Swedish nickname.) Small, loosely herba, with inconstant greenish or purplish flowers, and pods about the size of a man’s head, whence the popular name: common in sterile soil, and in summer and autumn.

L. majus, LEMNION F. Stem upright, hairy, 15–30 high; leaves elliptical, sericeous; flowers densely clustered. Rivers of shrews, woodlands.

L. minor, SEALBIP F. Stems low, 6–12 high, softly stinging, oblong-lanceolate, leaves lustrous; flowers loosely scattered on the branches. Open sterile ground.

17. HYPERICACEAE, ST. JOHN’S-WORT FAMILY.

Distinguished from all other of our plants by the opposite and entire simple and chiefly sessile leaves, with translucent and commonly some blackish dots, perfect flowers with the stamens (usually many and more or less in 5 or 5 clusters) inserted on the receptacle, and a pod either 1-celled with partial placenta or 3–5-celled (see Lessons, p. 120, fig. 260, 262, 263), filled with many small seeds. Juice resinous and acrid. All here described are wild plants of the country.

• A pair of leaflets in the pedicel: styles short.

A. Cruc-x-And-rew, ST. ANDREW’S CROSS. From New Jersey to Illinois & N. Stems erect or spreading; leaves thinnish, narrow-oblong and tapering to the base; flowers rather small, with narrow pale-yellow petals and only 4 styles.

A. St. PETEr’S WOrT, ST. PETER’S-WORT. From New Jersey &; stems 20–30 high; leaves thickish, closely sessile, oval or oblong; flowers larger, with obcordate petals and 3 or 4 styles.

• No leaves on the pedicel; styles longer than ovary.

A. amplissimum, CLIPPING-LEAVED. Only found S., with erect stems many times forking above, and closely smoky heart-shaped leaves; styles 5.

2. HYPERICUS, ST. JOHN’S-WORT. (Ancient name, of uncertain derivation.) Fl. in summer, in all sorts yellow.

• Shrubs or prostrate herbs; stems very many.

H. pyramidatus, GREAT-FL. S. Herb, F–2 high, with ovate-oblong partly-dropping leaves, and large flowers; the petals rather narrow, 1′, long, and 5 clusters of stamens. River-banks N. & W.

H. KalmiK Tân, KALM’S S. Low shrub, with glaucous olive-colored leaves and rather large flowers. N. W.: rare, except in Niagara Falls.

• Styles 5 partly united, or at first wholly united to the top into one (see Lessons, p. 116, fig. 256): seeds large, spreading.

H. prolificus, ST. JOHN’S-WORT. Like the last, but leaves scarcely glaucous, lance-oblong or linear; pod 3-celled.
H. fanerocladum, Paller. S. Leaves narrow-linear and small, and
with shorter ones clustered in the axils; peduncles. Wet pine barrens.

H. myrsinifolium, Myrsino-fo-liat. S. Leaves heart-shaped and partly
clawed, thick, glaucous; peduncled. Wet pine barrens.

H. streptom, Cowles S. Leaves obovate with a narrow base, glaucous
bland; thick; flowers neatly single, very large (2 feet broad), orange-yellow;
peduncles. Riverbanks towards the mountains.

H. nudiflorum, Naked-flowered S. Shabliey and evergreens S. less
so in Virginia, etc. has 4-angled branches, dark olive leaves, and a peduncled
naked calyx of rather small flowers; peduncles.

H. spharcecalyx, Sphene-gecl-ys S. About 2½ high; leaves
diverging, obovate-sharp (1½ long); obtuse; flowers brownish, small, in a naked
the calyx; sepals oblong; pod glabrous, 1-seeded. Rocky banks, W.

H. adpressum, Uprooted-toad S. A foot high; leaves ascending,
linear, often acute; flowers for and rather small; sepals narrow; pod
oblong; nearly 3-seeded. Low grounds, Pennsylvania to Rhode Island.

H. ellipticum, Elliptical S. Rarely 1½ high; leaves spreading,
oblong, thin; flowers rather few in a mostly naked calyx, pods; the ped
purple, obovate-oval, obtuse, 1-seeded. Wet soil, N.

H. stylis 3 wholly spurred (see Locoweed, fig. 20): herbs.

H. ovary and pedicels; petals black-dotted; style nearly diverging.

H. perforatum, Common S. The only one not indigeneous, not from
Eu.; a spreading weed in fields, etc.; spikes by one from the base;
branching stems branching; leaves oblong or linear-oblong, with pubescent dots;
flowers, rather large in open barbery S.; the deep-yellow petals twice the length
of the lanceolate brown sepals. The plant is very acid.

H. coreymbosum, Coreymboid S. Common S. In moister ground; stem
2½ high, sparingly branched; leaves obovate, slightly clawed, having black
as well as pubescent dots; flowers rather small, crowded; petals light yellow and
black-striped as well as dotted; sepals oblong; styles not longer than the pod.

H. maculatum, Spotted S. Common S. Has somewhat heart-shaped or
more clawed leaves, lanceolate sepals, and very long and slender styles; otherwise
likewise the last.

H. unguiculatum, Angled S. Wet pinchweeds from New Jersey S.
Stems sharp; angled (¾–2½ high); smooth; leaves ovate or lanceolate;
flowers scattered along the ascending branches of the cyme, small, upright;
yellow, style slender.

H. pilosum, Hair S. Wet pinchweeds S. Stems terete, and with the
lancolate leaves angusti-lanceolate; style short.

H. multiflora, Small S. Shabliey much branched and leery up to the
flowers; leaves partly clawed, thin, leaved, acute or obtuse; petals pale
yellow. Everywhere in bog grounds.

H. serpens, Cylinder S. Short and bronzy-mottled, erect; leaves
linear or lanceolate, 1-several at the base; petals copper-yellow. Wet sandy soil.

H. Drummondii, Drummond’s S. In dry barrens, W. Illinois and S.,
with linear-oval-shaped leaves, short-petalled flowers, and peduncles not longer
than the calyx.

H. brevifolia, Narrow-leaved or Pigeon. Common in dry sterile
soil, with minute self-sown pressed seeds for leaves, flowers small on the
wiry branches, and short peduncles much exceeding the calyx.
18. ELATINACEAE, WATER-WORT FAMILY.

Little marsh annuals, resembling Chickweeds, but with membranaceous stipules between the opposite leaves, and seeds as in preceding family. Represented by

E. Virginica, E. petiolaris, commoner, has the leaves sundering into a short petiole.

19. TAMARISCINEAE, TAMARISK FAMILY.

Shrubs or small trees of the Old World, represented in ornamental grounds by


20. CARYOPHYLLACEAE, PINK FAMILY.

Bland herbs, with opposite entire leaves, regular flowers with not over 10 stamens, commonly recalling watery with the crudes rising from the bottom of the cell or on a central column, and with 2 - 5 styles or sessile stigmas, mostly separate to the base. (Lesseps, p. 120, fig. 258, 259.) Seeds with a slender embryo on the outside of a meaty albumen, and usually curved into a ring around it. Calyx persistent. Petals sometimes minute or wanting. Divides into two great divisions or suborders, viz. the true PINK FAMILY, and the CHICKWED FAMILY, to the latter of which many plants like them, but mostly single-seeded and without petals, are appended.

17. PINK FAMILY PROPER. Sepals (5) united below into a tube or cup. Petals with slender claws, which are enclosed in the calyx-tube, and commonly raised within it, with the 10 stamens, on a sort of stalk, often with a clath scale or crown at the junction of the blade and claw. (Lesseps, p. 101, fig. 260.) Pod mostly opening at the top, many-seeded.
DIANTHUS. Calla cylindrical, finely many-nerved. Petals without a crown. Needs attached to the base; coryphea in the axils and nearly straight.

1. LYCHNIS. Styles 4, nearly 4. Calyx not angled, but mostly 10-angled.
2. MILDO. Styles 2. Calyx not angled, usually 10-angled.
3. VACCARIA. Styles 2. Calyx pyramidal, becoming 4-wing-angled.
4. HYPALYRA. Styles 2. Calyx cylindrical or strong, not angled, 4-toothed. Pod 6-angled at the base.

H. SILEX. Style 5. Stipules sometimes 3. '1, opposite to the pod. Pod mostly elongated, some 6-seeded, others 3-seeded. Flowers small and scattered, resembling those of Cardamine. &c.

CHICKWEED FAMILY, &c. Petals spreading, without claws, occasionally wanting. Sepals (4 or 5) separate or united only at base, or rarely higher up. Flowers small, compared with the Pink Family, and the plants usually low and spreading or tufted.


1. DIANTHUS. Pink. (Greek name, meaning Jo-a's own flower.) All but the first species cultivated for ornament; fl. summer.

1. D. ARMORICA. Deftford Pink of Europe, has been introduced into fields in a few places; a rather insignificant plant, somewhat hairy, narrow-leaved, with very small scented flowers; petals rose-colored with white tips.
2. D. BARBATA. Sweet William or Burch Pink of Europe, with blithness whole-leaved green leaves, and a very flat-topped cluster of various-colored flowers, the petals sharply toothed, abundant in all country gardens; the many double-flowered varieties are more choice.
3. D. CARTHUSIANA. Carthusian's Pink, in Eu., has linear leaves, slender stems, and a dense cluster of small flowers; leaves narrow or oblong, sharplyawn-crested, brown, shorter than the calyx; petals merely toothed, short, usually dark purple or crimson; now rather scarce in gardens.
FLOWERS single at the ends of the branches; leaves narrow and often serrulate, either rigid, glabrous and pubescent, usually without any evident color.

D. Chamaejasme, China or Indian Pink, has lanceolate leaves, less rigid and greener than any of the following, and direct white scales or hairs as long as the scales; the large petals toothed or cut, of various colors, lilac, purple, violet, &c. The garden variety, hearts-eat, is a more glabrous and large-flowered form, lately introduced. 2, 4.

D. Caryophyllus, Coral Pink, the parent of all the sorts of Carna-

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tian, &c, has the stems dilated nearly below, very glabrous, long-linear leaves; the flowers under the calyx very setulose and broad; petals freely toothed, of various tints. See: loosely. 2, 8.

D. plumarius, PRECIOUS Pink or Redroot Pink. A low, hardy speci-

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te, making spread thorns, with small two glabrous leaves, setting up flower-

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S. noctiflora, Night-flowering C. Tall coarse weed in cult. or waste grounds; lower leaves spatulate, upper lanceolate and pointed; flowers single or in loose clusters terminating the branches, with oval-shaped calyx-teeth and white or pale rose 5-petalled petals, opening at nightfall or in close shade.

S. Arméria, SWEET WILLOW C. In old gardens or running wild, from Europe; stem about 1° high, branching into flat-topped cymes of many flowers, which are rather showy; calyx oval-shaped; petals unched, bright pink, or a white variety, opening only in sunshine; leaves lanceolate, glaucous.

S. antirrhina, Nancy C. Wild in sandy or gravelly soil; stem slender, 6°-20° high, rather simple; flowers very small, panniced, calyx ovate; petals rose-colored, opening only at midday in sunshine; leaves lanceolate or linear.

S. Stellata, Starry Campion. Wild on wooded banks; stem slender, 2°-4° high; leaves ovate or lanceolate; flowers in small clusters in a narrow panicle, and narrower shorter flowers in a narrow cyme; petals rose small, white.

S. officinalis, Common S. or Bocking Bet. A rather stout, 1°-3° high, rather smooth herb, in gardens, and running wild by roadsides; leaves 2-3-nerved, the lower oval or oval, upper lanceolate; flowers rather large, clustered; petals pale rose or almost white, nodding at the end. The double-flowered is most common.

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7. **Sagina, Pearlwort.** (Latin name, means rich, wonderful, which, however, these small and insignificant plants can hardly be.) There are four or five species in the country, none very common; the most so is **S. procumbens.** Springy places and damp shores, S.; a smooth little plant, reflexed and spreading; 1-3' high, with almost round-shaped leaves; the blunt equals, small white petals, stalks, and styles 4 or rarely 5.

8. **Cerastium, Mouse-Ear Chickweed.** (Name in Greek refers to the hoof-shaped pair of some species.) The popular name is from the shape and soft hairiness of the leaves of the common species.

* * Flowers inconspicuous, the deeply 2-lobed petals being shorter or little longer than the calyx; the pedicels becoming much longer and curving more or less. Flowering all summer, white.

C. vulgatum, "Common M., from Penn. But scarce in, graceful places. An insignificant soft-haired weed; stems erect, 4'-6' high, slightly clamy; leaves ovate or oblong, small; pedicels even in fruit and petals shorter than the calyx.

C. viscosum, Clayey M., Common in gravel places; stems spreading, 6'-10' long; clamy-hairy; leaves oblong; pedicels becoming longer than the calyx; petals as long as the calyx. **2**

C. diurnum, Nothing-Fire-tail M., Common in moist or clayey grounds, with. Clayey-hairy, erect, 6'-18' high, brevistyle broadly-flowered and branched; leaves oblong-lanceolate; petals longer than calyx; pods long, nodding on the slender flowersstalk and curved upwards. **5**

* * Flowers conspicuous, the narrow white petals 2 or 3 times the length of the calyx; pedicels shorter; pedicles fascicled and nodding. **2**

C. arvense, Field M., Springy, petals very slender, leaves varying from narrow oblong to linear, flowering stems 4'-6' high, fine-flowered; petals narrow at the end.

C. tomentosum, Carpet M., Cult. from Eu. for borders, &c, in spreading shrubs, crowded with oblong white-waxy leaves, making sense silver mats; petals deeply 2-lobed.

9. **Stellaria, Starwort-Chickweed.** (Name from Latin Stella, a star.) Petals white, but sometimes small or noticing. Fl. spring and summer. None cultivated but the first is a weed in every garden.

* * Stems erect and spreading, marked with palisade lines; leaves broad.

S. média, Common S. or Chickweed, in all damp cult. grounds; leaves ovate or oblong, the lower on hairy pedicles; petals shorter than the calyx, 2-parted; stamens 3-5. **4**

S. pubera, Great S., Shaded rocks, wild from Penn. S. & W.; leaves oblong or oval, wavy; petals longer than the calyx, 2-lobed.

* * Stems erect and spreading, and whole plant smooth; leaves narrow, wavy. **2**

S. longifolia, Long-Leaved S. or Nitchcock, Common in damp gravel places S.; stems weak, 6'-18' high; leaves linear, widely spreading; flowers numerous on slender spreading pedicels in a loose cyme; petals 2-parted, longer than the calyx.

S. borealis, NORTHERN S., Wild gravel places N.; stem 3'-10' high, forked repeatedly and with flowers in the forks of the leaf branches; leaves broadly lanceolate or ovate-oblong; petals shorter than the calyx, or none.

10. ** Arenaria, Sandwort.** (So named because several grow in sand or sandy soil.) All the following are wild, some others less common. Fl. spring and summer.

* * Petals inconspicuous, white.

A. serpyllifolia, Twin-Leaved S., An indigenous little weed in sandy or gravelly waste places, 2'-6' high; axils erect, spinfully, simply branched; leaves ovate, pointed; petals scarcely longer than the 3-blossomed estivated scales. **2**
A. diffusa, spreading S. Shady grounds S. Plant soft-downy; stems penicillate, 1-2 or more long; leaves lanceolate; peduncles lateral, 1-flowered; petals shorter than the sepals or none. 2.

* A. petiolifera, lower than the calyx; white. 2

A. lateriflora, side-flowering S. Gravelly shores and banks S. Plant minutely downy; stem erect; 3-10' high, sparsely branching; peduncles few-flowered; soon becoming lateral by the further growth of the leafy stem; leaves ovate or oblong.

A. stricta, Rocky or shady banks N. Tufled, smooth, 4-6' high; stems crowded with slender almost bottle-form leaves; flowers several in a terminal open cyme; sepals sharp-pointed.

A. squarrosum, fine-grained S. In sand, coast of New Jersey and S. Density tufted on a deep root, 3-6' high; leaves much crowded, short, sub-rounded, smooth; the flowering branches or few-flowered peduncles glandular; sepals obtuse.

A. Gracilis, Mountain S. On rocky summits of mountains and N. E. coast. densely tufted, soft; leaves thread-form; flowering stems 2'-4' high, few-flowered, the flowers large in proportion; petals notched at the end.

A. pappoidea, Sea Sandwort, in sands of seashore N., in large, very fleshy ovate leaves, and axillary flowers.

11. SPERGULARIA, SANDBUR. (Name from likeness to Spurge.) A sort of Sandworts with softly-membranous stipules, and red-flowered, produced all summer: chiefly maritime. 2

B. rubra. The field form of this is common in sand or gravel, along roads and paths. E. quite away from salt water; smoothish, procumbent in turf; leaves thread-shaped; pod and pink-edged corolla hardly exceeding the calyx; seeds rough, wingless, half-obovate.

S. salina. Larger and morefleshy, only in brickish sands; with short pedicels, pale corolla, pod longer than the calyx, and rough obovate-rounded (winged or 'wingless') seeds.

S. media. Like the last, in salt marshes and sands, but with longer pedicels and smooth seeds.

12. SPERGULA, SPURREY. (Latin spargere, to scatter, i.e. its seeds.)

S. pinnata. Corn S. Stems 1'-6 or so high; bearing several thread-shaped leaves in the whorls, and terminating in a panicle of white flowers. A weed in grain-fields, cult. in Europe as a forage plant, sheep being fond of it; 8. summer.

13. ANYCHIA FORKED CHICKWEED. (Name of obscure meaning.)

A. dichotoma, a common little herb; in shady places it is smooth and erect, 4'-10' high, with repeatedly forking long-pointed very slender stems, minute short-stalked greenish flowers in the forks, and oval or oblong leaves; in dry or parched soil it is spreading on the ground, short-stemmed, narrow-leaved, often pale-green, the flowers more clustered and nearly sessile; all summer.

14. SCERANTHUS, KNAWLE. (From Greek words meaning and flower, referring to the tubular tube of the calyx.)

S. annuus, our only species, is native from Eu. in generally grassy, around gardens, &c., a very pale little herb, 3'-5' high, very much branched and spreading, with short set-shaped leaves, and greenish small flowers clustered or sessile in the forks, in late summer and autumn.

15. MOLLUGO, CARPET-WEED. (An old Latin name for moss.)

M. verticillata, A very common, small, prostrate and spreading little weed in recent gravelly soil, gardens, &c., with ovate leaves and thread-shaped petals in clusters or whorls at the joints; the sepals white inside; summer 3.

S. all summer.
21. PORTULACACEAE, PURSLANE FAMILY.

succulent-leaved herbs, with 2 sepals and 5 petals, the stamens sometimes many, sometimes few, and then one before each petal; ovary 3-celled, becoming a pod, with many or few kidney-shaped seeds on a central placenta, or on slender seed-stalks from the base. Seeds as in the Fink Family.

1. **PORTULACA.** Stamens more numerous than the petals. Style short, with several slender stigmas. Lower part of the ovary and many-seeded perianth united with the bottom of the calyx; the upper part when mature falling off as a lid. Flowers opening only once, in bud. 

2. **TALIUM.** Stamens few in number, sometimes as many as the petals. Style behind the ovary. Calyx often free from the ovary, deciduous. Pod 3-celled, many-seeded. Flowers opening only once, in bud. 

3. **CALANDRINIA.** Stamens few, style 6-cleft at the summit. Calyx free from the ovary, persistent, enclosing the 3-valved many-seeded pod. Flowers opening only once, in bud. 

4. **CUTAVONIA.** Stamens 6, free, attached to the base of each petal. Style 6-cleft at the summit. Calyx persistent, free from the few-seeded pod. Flowers usually opening for more than one day.

1. **PORTULACA, PURSLANE.** (014 Latin name for Purslane.) Leafy and branching, low and spreading, with finely serrate leaves; f. all summer (Lesson, p. 106, fig. 149.)

2. **PORTULACA, Pur~LANE.** (C. discolor, Common P. Very smooth, with pinnate stems, obtuse or wedge-formed leaves, and small white flowers opening only in bright sunshine, and for a short time; the petals pale yellow. The commonest garden weed, sometimes used as a pot-herb.

3. **PORTULACA, PURSLANE.** (C. pilosa, Least P. Wild for S. has linear tricuspid leaves, with a tuft of bright-blue hairs in the axils, and rather large pink flowers.

4. **PORTULACA, PURSLANE.** (C. grandiflora, Booth P. is probably a variety of the last, from North America, commonly called for ornament; the large very showy flowers brilliant purple, crimson, red, sometimes white or yellow, or with light center, of many shades of various colors.

2. **TALIUM.** (Name unexplained.) One wild species in some places.

3. **TALIUM, Tetrahedron T.** Low and smooth, with thick and finely two-, short stems bearing crowded linear leaves, and a slender 3-celled and many-seeded pod, curved, many-flowered; petals rose-purple. Serpentinite rocks, Pennsylvania, and near west and south. F. all summer.

3. **CALANDRINIA.** (Named for a Swiss botanist, Calandrin.) Cultivated for ornament in choice gardens; f. all summer.

4. **CALANDRINIA, DISCOLO.** Very smooth, with large leaves and a tuft of brick-red flowers in the axils, and rather large pink flowers.

5. **CALANDRINIA, DISCOLO.** Cultivated for ornament in choice gardens; f. all summer.

4. **CALANDRINIA, DISCOLO.** Very smooth, with large leaves and a tuft of brick-red flowers in the axils, and rather large pink flowers.

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5. **CALANDRINIA, DISCOLO.** Very smooth, with large leaves and a tuft of brick-red flowers in the axils, and rather large pink flowers.
flowers 1/1 in diameter; the petals rose-colored or white, striped with dark purple or violet veins. 3. M. sylvatrrna. Braun: M. Gardens and roadsides; 2°-3° high, branching, with rather sharply 3-5-lobed leaves, and purplish-orange-colored flowers rather smaller than in the last; fruit wrinkled-velvety. 4. M. Alonso: Gardens; 2°-4° high, hairy, with stem-leaves parted almost to the base into 3-5 divisions which are again 3-5-lobed or cut-toothed; and showy flowers in clusters or terminal racemes; corolla deep rose-colored, 1½-2' broad; fruit smooth, narrowly wrinkled-velvety. 5. M. moschata. Mc-Neill: M. Gardens, and steeply in roadsides; 1½-2° high, rather hairy, with the calyx family un-lobed, leaves about twice parted or cut into slender linear lobes; and short-tubular flowers somewhat chasitrous or mucroned; corolla 1½-2' broad, rose-colored or white; fruit downy.

6. CALLIRHOE. (A Greek mythological name, applied to N. American plants.) Species chiefly farther W. and S., becoming rather common in choice gardens. Flowers crimson, massy, or red-purple, very showy; produced all summer. 1. Hot thick, often two-winged, cuneate: stem rough-hairy or smooth. 2. C. triangulata. Dry prairies from Wisconsin S.; stems erect, 2° high; leaves triangular, half-lobed, or the lowest heart-shaped, the upper cut-lobed or 3-5-lobed; flowers somewhat panicked and short-peduncled; corolla as long as the calyx; corolla 1½ or less in diameter; carpels of the fruit even on the back, tipped with a short point. 3. C. involucrata. Wild from plains of Nebraska S., and cult. for ornament; stems spreading on the ground, 1½-3° long; stipules conspicuous; leaves rounded, 3-parted or cut and enfolded, shorter than the auxiliary peduncles; involucre shorter than the calyx; corolla 2° or more broad; carpels of the fruit revolute, tipped with a flat and inconspicuous beak. 4. C. Papaver. Wild in rich woodslands from Georgia to Texas, and sparingly cult.; stems short, ascending, few-toothed; leaves 3-5-parted with lance-linear divisions, or the lowest rather heart-shaped and cleft into oblong lobes; auxiliary peduncles very often 1½-2° long; involucre of 1-2 leaves or none; corolla 2° or more broad; carpels of the fruit wrinkled or revolute and with a stout incurved beak. 5. C. digitata. Wild in prairies of Arkansas and Texas; 1½ high; leaves mostly from the root, 3-5-parted into long linear sometimes 2-3-lobed divisions; peduncles long and slender; involucre none; corolla 1½-2° broad, the petals fringe-toothed at the end; fruit nearly as in the last. 6. Hot slender or tapering: beak smooth. 7. C. pedata. Wild in F. Texas; not rare cult.; stems erect, 1½-2° high, hairy; leaves rounded, 3-5-lobed or parted and the wedge-shaped divisions cleft or cut; peduncles slender, longer than the leaves; involucre none; corolla about 1½ broad, the petals minutely crenated at the end; carpels of the fruit smooth and even on the back, with a stout incurved beak. 8. NAPÉA, GLADE-MALLOW. (Pрусa Greek name for the glads or synops of the groves.) Only one species, N. dioica. In valleys, chiefly in finestate districts of Penn., Virginia, and W. A rather coarse, rough-hairy herb; stem 4°-7° high; leaves 3-5-lobed and parted and their lobes cut and toothed, the lowest often 1½ in diameter; flowers small, in panicked umbels, in summer. 9. ANODA. (Origin of the name obscure.) Low herbs from Mexico, Texas, &c., sparingly cult. for ornament. Stems, &c., hirsute; peduncles long and slender, 1-flowered. Fruit in the form of a many-celled star, sur­ parted by the spreading-acutate calyx; when ripe the rim of each carpel falls away with the seed in close, the seed or partitions disappearing. A. hastata has mostly half-bordered leaves, and blue or violet corolla only 1½-1½ in diameter; lobes of the calyx ovate, acutely pointed.
MALLOW FAMILY.

A. cristata has mostly triangular or obscurely half-rounded and placed bracts, and purple or blue-colored corolla 2" in diameter; lobes of the only triangular, toothed.

9. SIDA. (Ancient name, of obscure meaning.) Mostly rather small-flowered, with 5-12 styles and carpels; ± smooth and autumn.
   | Podanema axillarum} corolla yellow.  
S. spinosìa. No name from the little-pointed projection or tubercle at the base of the petals, which can hardly be called a spine; stamens much branched, 10'-60' high; leaves heart-shaped, serrate, thinly-subcutaneous; peduncles very short; flower very small; peduncle of 5 carpi, each splitting at top into 3 points. A common weed 8. of New York.
S. rhombifolia. But the bracts are hardly channeled; usually whitish, short-pointed, serrate, pale and which downy beneath; above 1'-2'- high, much branched; peduncles rather long; flower small; fruit of 10 or 12 one-pointed carpels. A weed 8. of N.  
S. hoffii. Neatly smooth, 1'-4'- high; leaves linear or lanceolate, acute, short-pointed; flower 1' broad, on a short peduncle; fruit of 10-12 nearly blunt carpels. Woodlands. 8. 2.
   | Podanema bearing a corolla of several white flowers from the upper apex.
S. Napa. Smooth; flower simple, 4'-6'- high; leaves rounded, 5-lobed, the lobes toothed and taper-pointed; corolla about 1' broad; styles and tails of the pod 10. Wild in N. Penn. and Virg. Cult. in old gardens. 8. 2.

10. ABUTILON. INDIAN MALLOW. (Origin of common name.) Resembles Sida, but has more than one-angled; flowers totally larger.
A. Avicennae. VELVET-LEAF. Cult. soil and old gardens, 3'-6'- high; leaves roundish heart-shaped, upper-pointed, subcutaneous; peduncles slender than petals, 1-3-flowered; corolla orange-yellow; fruit of 12 or 18 united hairy carpels with spreading hairs. Fl. autumn.  
A. stratum. STEEPLE ABUTILON. Cult. in greenhouses, &c. from Brazil; a tall shrub, very smooth, with rounded heart-shaped divided leaves, the lobes very taper-pointed, and pretty large solitary flowers hanging on a very long and slender peduncle; corolla not spreading open, trifoliate, with deeper or brownish veining or stripes.

11. MODIOLA. (The shape of the depressed fruit likened to the Roman moneta medallia.) Prostrate or spreading, small-flowered, woody plants.
M. multifida. Virginia and N. in low grounds; leaves 5'-7'-left and cut, or the earlier ones rounded and undivided; flowers red, 1' broad; fruit hairy at the top. 8. 2.

12. MALVAVISCUS. (Same compound of Malus, Mallow, and viscum, tendrils, from the plaited pin of the bee-like fruit.) Shrubby plants, with showy scarlet flowers, of peculiar appearance, the petals not exceeding, but remaining conical around the lower part of the slender projecting and soon twisted ovary, held together as if were by a little thimble near the base of the inner edge.
M. arboreus, the common West India species, cult. in some hothouses, like heart-shaped hoarse leaves, hoarse and broad, and yellowish fruit.
M. Drummondii. of Texas, if housed in winter flowers all summer in open ground, to soft-downy, with more rounded and somewhat 3-lobed leaves, and orange fruits.

13. KOSTELČITSKÝA. (Named for a Bohemian botanist, Kostelecký.) Like Hibiscus, only the calyx of ovary and fruit 1-seeded. Fl. summer.
K. Virginiae, VIRGINIANA. In and near salt marshes, from New York and New Jersey S.; angustish-hairy, 2'-6'- high; leaves heart-shaped and mostly 3-lobed, often half-rounded; flowers somewhat incurved or penodized, rose-purple, 1'-2' broad. 2.
14. HIBISCUS, ROSE-MALLOW. (Ancient name, of obscure origin.)
Flowers showy, usually large, in summer and autumn.

H. Syriacus, True H. or SCAFFOLD ALPGE, of gardens and grounds, common, native of the Levant; nearly smooth, with wedge-shaped and toothed leaves, and short-peduncled flowers in their buds, in autumn, about 3" broad, purple, rose-colored, white, or often double.

H. Rose-Syriacus, China H. or Rose of China. Cult. in conservatories, from China, where the splendid corollas, which stain black, are used to black stems; very smooth, with bright green stems and pointed somewhat toothed leaves, and very showy flowers on slender peduncles, 4" or 5" broad, scarlet (rarely rose-pink with or without), often double.

**Hibiscus, with persistent and regular lobed edges, and a short ped.**
- Wild species, but sometimes cultivated, tall and large.

H. cocceius, Great Red H. or ROSE-MALLOW, Marshes from Carolina S.; very smooth, 4"-6" high, with leafy 3-parted or deeply cut into long involucres and upper-painted divisions, and bright-red corolla 6'-11' broad, the petals narrower below.

H. muticus, HIBISCUS-LAVENUS R. Low grounds from Pennsylvania and Illinois; S.; smooth, 3"-10" high, with ovate or heart-shaped toothed or 3-lobed leaves, some of them ball-edged, and slender-petalled flowers, with inflated calyx, and reflexed corolla 4'-5' broad.

H. Moscheutos, Moseh-TOOTUS R. Common in breaklands and marshes on the larger rivers; 3"-6" high, soft-downy; the ovate pointed and often 3-lobed leaves nearly entire, generally smooth above; pedicels slender; corolla 4'-6" broad, pale rose or white, with or without a darker centre; ped smooth.

H. grandiflorus, LARGE FLOWER H. R. Neurons, from Illinois and Carolina S.; like the last, but leaves soft-downy both sides, and ped velvety-hairy.

H. aculeatus, ESPINEUX or Thorns H. Marshes only S.; rough with stiff thorns and barbed points. 2'-6' high; leaves 3-lobed or trifoliate, shortly toothed; flowers short-peduncled; leaves of the involution often forked; corolla yellow with a purple centre; ped broad; ped hairy.

**= Evergreen species, in gardens or cultivated grounds.**

H. Trionum, BLANKER BEEHIVE or FLOWER-MASS. Rather hairy, 1"-3" high, with the leaves toothed, of the upper 3-parted into lanceolate lobes, the middle lobes much longer; calyx inflated and bladdery; corolla about 3" long, sulphur-yellow with a blackish eye, open only in middle stamina.

**= Here, with calyx splitting down to only, and generally falling off or bare, and with leafy 3-parted or trifoliate divided or petal ped. Notice of Endalia.

H. esculentus, OLKA or ELENKA. Nearly smooth, with rounded heart-shaped lobed toothed leaves, greenish-yellow flowers on slender peduncle (involucres falling early); and narrow pods 3'-4' long, which are very much prolonged, and when green coarsely and rather, or like thick coarse, calyx. cult. S.

H. tricolor, TRICOLORE, with leaves 3-2-parted into long narrow divisions; the large and showy corolla pale yellow with a dark eye; the leaves of the involucres hairy and soon falling off. Introduced or cult. S. W. 2.

15. GOSSEYFUM, COTTON. (Name given by Flinny, from the Arabic.)
Plants now cultivated over warm countries, most valuable for the wool on the seeds; the species much mixed up.

G. herbaeaeae, FLESHY COTTON. Cult. S. Leaves with 5 short and roundish lobes; petals pale yellow or rose-colored, purple at base.

G. Barbadosae, BARBADOS or PINK BEACON C. Cult. on the coast S. Indifferent to be shrubbery at base; branches black-dotted; leaves with 3 longer lanceolate and taper-pointed lobes, leaves of the involucres with very long and slender teeth; petals yellowish or white with purple base.

G. arboreum, Tree C. Cult. S.; only for curiosity, has 3-7 more lanceolate and taper-pointed lobes in the leaves, leaves of the involucres slightly toothed, and a purplish corolla with a darker centre.
33. STERCULIACEÆ, STERCULIA FAMILY.

Chiefly a tropical family, to which belongs the Theobroma or Chocolate-Tree; in common cultivation known here only by a single species of

1. MAHERNIA. (Named after a species of Hernanéa, a genus very like it.) Indistinct; corolla 5-lobed; stamens numerous; the filaments united at the base; the anthers slender and linear, opening by two slits.

M. verticillata. From Cape of Good Hope, in conservatories producing a succession of heavy yellow or yellow-white small blossoms, on slender pedicels, all winter and spring; a sort of woodiness prevailing; with slender and spreading or hanging longitudinally bunched, and small green irregularly limbed leaves; the specific name given because the leaves seem to be whorled; but this is because the stipules, which are cleft into several linear divisions, imitate leaves.

24. TILIACEÆ, LINNÉN FAMILY.

Chiefly a tropical family, represented here only by an herbaceous Convolvulaceae on our southernmost borders, and by the genus of fine trees which gives the name.

1. TILIA, LINDEN, LIME-TREE, BASSWOOD. (The old Latin naming: Tilia 5, late in the bud, as in the Mallow Family, but deciduous; petals 5, united in the bud, spatulate-elliptic. Stamens numerous; their filaments colorless, their anthers opening in 5 rounds, sometimes with a petal-like body in each cluster; style 2-celled. Fruit with a 2-celled ovary, having 2 ovules in each cell, in fruit becoming a rather woody, globular, 1-seeded little nut. Style 1; stigma 3-lobed. Bark, with a slender red and buff-colored epidermis furred up in the almost. Trees with marcescent leaves, bright inner bark (bough), soft white wood, alternate and deciduous, and seen leaves more or less heart-shaped and quadrinately oblate at the base, deciduous stipules, and a crown of small, dull cream-colored, heart-shaped flowers; borne in early summer on a budding axillary pustule which is united to a long and narrow deciduous heart.

• A petal-like scale before each pod; to the base of which the stamens are joined.

T. Americana, American Linden or Common Basswood. A handsome and large forest tree, with leaves of rather firm texture and smooth or smoothish both sides, or in one variety thinner and more downy but not white beneath.

T. heterophylla, White Linden. Along the Alleghany region from Penn. and Kentucky N., less larger leaves silvery white with a fine down underneath.

• No scales with the stamens. Native of Europe.

T. Europaea, European L., embraces both the Small-leaved variety, which is commonly planted about cities, and the Large-leaved or Dutch L., with leaves as large and full as those of our wild Basswood.

25. CAMELLIACEÆ, CAMELLIA or TEA FAMILY.

Trees or shrubs, with alternate and simple feather-veined leaves, and no stipules; the flowers large and showy, mostly axillary, regular, with both sepal and petals imbricated in the bud; the very numerous stamens with filaments more or less united at the base with each other and with the base of the corolla: stamens 2-celled; ovary and thick or woody pod 3-celled, with one or more seeds in
each cell. The petals themselves are commonly more or less united at their base; they are 3 or sometimes 6 or even more in number in natural flowers, and in cultivated plants apt to be increased by doubling.

1. **CAMELLIA.** Sometimes separate in or near anthodium within the ring or cup formed by the united bases of the two werner eperate stamens. Style 2-cleft. Seeds large, usually single in each cell of the thick and woody pod. Leaves evergreen, entire.

2. **THEA.** Separate interior stamens only as many as the petals (3 or 6); otherwise nearly like Camellia; flowers less showy; bracts under the calyx inclosed.

3. **GORDONIA.** Stamens in 5 clusters, one attached to the base of each petal.

4. **STUARTIA.** Staminodia uniformly united by a short ring at the base of the flower. Seeds 2 in each cell, wingless. Leaves thin and deciduous.

1. **CAMELLIA.** (Named for G. Camellia or Kins. in the 17th century.)

2. **THEA, TEA-PLANT.** (The Chinese name.) Granis too slightly different from Camellia. Shrubs, natives of China and Japan, sparingly cult. for ornament.

3. **GORDONIA.** (Named for Dr. Gordon and another Scotchman of the same name.)

4. **STUARTIA.** (Named for John Stuart, the Lord Bute, at the time of the American Revolution.) Ornamental shrubs, with thin leaves and handsome white flowers 3 or 3 across, in late spring or early summer, wild in shady woods of the eastern States.

5. **Virginia,** grows in the low country from Virginia S.; shrub 8°–12° high, with finely serrate leaves soft downy undermound, pure white petals, purple stamens, one style, and a roundish pod.

6. **GORDONIA.** belongs to the mountains S. of Virginia, and is habit N.; has insomnate leaves and rather large very handsome flowers, their petals jagged-edged and tinged with cream-color, the sepals often reddish outside, 5 separate styles, and a 3-angled pointed pod.
26. LINACEAE, FLAX FAMILY.

A small family, represented here only by the main genus,

1. LINUM, FLAX. (The classical Latin and latter name.) Flowers (see Linnaeus, p. 69, fig. 147, 148, and p. 100, fig. 181) usually opening for only one day, and in sunshine, regular and symmetrical; the perianth petals, deciduous petals, slightly monadelphous cymes, and usually the styles 5, but the latter are sometimes fewer, occasionally partly united; every petal and with or without 2-seeded cells of there are styles, of nearly twice as many and one-seeded, each cell being divided more or less by a false partition. Seeds with a micropylar scar and a large straight slit embryo. Leaves simple, nearly sessile, and compound. Fl. all summer.

a. Wild species, annual or scarcely perennial, with small yellow flowers.

L. Virginianum, the commonest. Wild Flax, in dry woods, 2½ high, with spreading or recumbent tertiary branches at the summit of the stem; the leaves oblong or lanceolate, only the lower spindle and opposite; flowers scattered; styles separate; petals shorter than the petals lead.

L. striatum, also common, usually on boggy ground, like the first; but has the branches shorter, scattered along the stem, and sharply glandular with intermediate grooves (whence the name); some of the various-leaved appendage; flowers more crowded.

L. sulcatum, much less common, in dry soil, also has grooved (upright) branches, but the leaves are linear and scattered; flowers and pods twice as long; equals short-pointed, 5-seeded and with rough glandular margins; styles much half-way up.

• Cultivated, hardly, hardy, with 5 styles and bunched handsome flowers.

L. usitatissimum, Common Flax. Cult. from Old World, and divided into wild wild in fields; with narrow alternate leaves, toothless bluish flowers, and printed sepals.

L. perenne, PERENNIAL FLAX. Cult. from Eu. In some varieties, for ornament, wild beyond the Mississippi; less tall than the foregoing, appendage; sepals blunt; petals sky-blue, sometimes pale, at least towards the base. 2. 2.

L. grandiflorum, LARGE-Flax. Red Flax. Cult. as an annual, from North Africa; 1½ high, with linear or lanceolate leaves, and showy crimson-colored flowers. • 2.

• Cultivated in connection with, chiefly, with 5 styles and large flowers.

L. trigynum, of Berlin, less robust, large elliptical leaves, and a succession of large and showy bright-yellow flowers.

27. GERANIACEAE, GERANIUM FAMILY.

As now received a large and multifarious order, not to be characterized as a whole in any short and easy way, including as it does Geraniums, Natureums, Wood-Sorrel, Balsams, &c., which have to be separately described.

1. Flowers regular and symmetrical; sepals persistent. Herbs.

1. OXALIS. Sepals and petals 6, the latter inclosed, the latter corolla in the bud. Sidewards 1½, somewhat at base, the alternate one shorter. Styles 6, separate on a 6-celled ovary, which becomes a membranous several-seeded pod. Spicy sour and watery. Leaves commonly of three alternate or two-sided leaves, which drop at nightfall. Flowers usually open only in sunshine.

2. LINANTHEAE. Sepals and petals 6, the former entire, the latter corolla in the bud. Clam and the sepals 6. Stems 1½, separate at the base. Styles 6, free-leaved at the apex, rising from the centre of a deeply divided ovary, which in fruit becomes 6 separate thicken and wrinkled states. Leaves pinnate; the islets entire or cleft.

GERANIUM FAMILY.
3. FLEECE. Sepals, small petals, stigmas, and lobes of the ovary 1; and stamens 6, otherwise like Eranthis.

4. GERANIUM. Sepals and petals, the former imbricated, the latter curvilinear; stamens 6. Stigmas 10, moniliform at the base. Stems 3-5 ft. long; leaves alternate, oblong, short-stalked, usually bearing several, partly red margins. Setting 6; 4-lipped, the lower 3 united, with rosy sepals and blue petals; secondarily these united, with rosy sepals and white petals, which remain hanging by their long naked recurved styles in these spines, which are borne upon short peduncles or little pods, from a long central leaf or axis. (Linn. p. 106; fig. 227, 278.) Leaves with stipules. Heritage scented.

5. GONION. Stems with flowers only 2, style when they split off from the leaf bound inside, often twining spirally; otherwise like Geranium.

6. GONIANT. Flowers somewhat irregular, linear-linear. Sturdy or softly-crested.

7. FELARIUM. Sepals and petals 4; the base of one-serial extended downward on one side the petal forming a narrow tube or adjacent spur, and the two petals on that side of the flower differ from the rest more or less in size or shape. Stamen with style lower than 16, commonly 7. Filiform, &c. in Geranium. Heritage scented. Leaves with stipules.

8. FLOWERS very irregular, spurred, also unperforated. Tender herbs.

9. TRPOGON. Sepals 6, united at the base, and in the upper side of the flower extended into a long drooping spathe. Petals 3, or sometimes fewer, usually with extra: the two upper more or less different from the others and directed at the mouth of the spathe. Stamens 8, meals if 4, didymous, united downward and curving. Ovary of 6; Stout, surrounding the base of a single style. In flower unperforated, and softly cased separate stalk: each containing a single large seed. Hybrids, climbing from long pedicels; the water place with the pinkish color and roots of Aon. Leaves alternate: sepals more or less united. Peduncle white, somewhat contract.

10. IMPATIENS. Sepals and petals similarly colored, the parts belonging to each but easily distinguished. There are 3 small outer petals, plainly visible on the side of the flower; then, on the other side, a large hanging cup, continued by the bottom into a spur or little tube, within two small, irregularly rounded petals, on each side of the tube. Stamens 4, short, curving to lightly bending anther, and conceiving the 4-celled ovary, which is in full terminus & several-seeded and: this flower, skilfully, lying in pieces, at the touch, collecting its seeds by 3 twisted wings and a thick mass, style more. Seeds rather large. Knob, branching, spreading-violaceous, branched, with utricles ate and spicules.

1. OXALIS, WOOD-SORREL. (Name from Greek words meaning sour, from the oxali or "sulphur-colored" contained in the juice.)

* Native species, flowering through the winter: bitter roots broadly odorous.

O. stricta, Yellow W. Extremely common in waste or cultivated soil and open woodland; stems 3'-12' high, leaf; slender petal-like being an umbell of 5-6 small yellow flowers, followed by slender pods. 2

O. acetosella, Teek W. Common in many woods; N.; the leaves and 1-flowered scape 2'-4' high from a creeping and rooted rootstock; flower rather large, white with definite reddish veins. 2

O. violacea, Teek W. Common N.; rarer, N., in moosy or sandy soil; leaves and slender scape from a sturdy leaf, the flowers several in an umbel, middle-sized, violet. 2

* Cultivated in conservatories, from Cape of Good Hope.

O. Bow科, a stemless species, with a small bulb on a spindle-shaped root; leaves and few-flowered scapes 6'-10' high; broad oblong leaves almost 2' long; petals deep rose-color, 1' long.

O. appendiculata, a more hairy; leaves obtuse and sessily notched, commonly crimson underneath, only 1' long; scapes short, 1-flowered; petals 1'-1' long, pink and with a yellowish base.

O. Zara, from a strong bulb, sends up to the surface a short yearly stem, bearing 1 flat-spiced leaves and short 1-flowered scape; the leaves 6'-10' and linear; petals nearly 1' long, yellow, often edged with redish.
O. versicolor, the commoner and prettiest species, from small bulbs sends up slender stems, 2-3 ft. high, bearing at summit leaves of a almost linear-lanceolate, unequally cleft at the end, and slender flowered peduncles; petals if long, white or tinged with rose, with bright pink-red margins underneath, so that the bloom is red wine fulled up, in the bud or closed in shade, while open when in sunlight.

∗ ∗ ∗ Cultivated from South America for the edible tubers.

O. tuberosum, the native of Peru, bears abundant flowers in clusters, resembling those of Pelargonium, of which it is closely allied. Leaves, 3-4 ft. high, dark green, elliptical-oblong, unequally cleft at the base, with a distant line of veinings on the lower surface.

2. LINNANANTHE. (Name from Greek words for needle flower; but in fact the plant flowers in nearly moist soil.)

L. Douglasii. Cult. for ornament from California: a slow and spreading, mostly smooth, and slightly succulent garden annual, with leaves of 2-3 ft. high and intermediate and often 3-5-petalled flowers, or rather 3-petalled flowers in summer, solitary on slender slender peduncles: the petals white with a yellow base, wedge-shaped, nothad at the end, twice the length of the calyx, about 1/4 long.

3. PHELMA, FALSE MELOMAD. (Named for Florida, a German botanist.)

F. proserpinacoides, in marshes and wet alluvial soil: a small and insignificant plant, with the 3-5-leaves lanceolate and entire, or rarely 2-3-cleft; the axillary and peduncled flower inconspicuous (in spring and summer), the oblong petals shorter than the calyx and entire.

4. GERANIUM, CRANESBILL. (From old Greek name for the Crane, alluding probably to the long beak in fruit.) The following are wild species of the country; the so-called Geraniums of cultivation belong to Pelargonium. Sepals usually slender-pointed. Pet, spring and summer.

G. maculatum, WILD or NOOTED CRANESBILL. Common in woodlands and open grounds: stem erect from a stout root or rootstock, about 2 ft. high, hairy, branching and terminating in long peduncles bearing a pair of flowers; leaves palmately parted into 3-7 wedge-shaped divisions: at and leaf at the end, sometimes whitish-blushed: petals wedge-shaped, light purple, 1/2 long, terminal on the short claw.

G. Carolinianum, CAROLINA C. In open and mostly barren soil: stems erect or soon diffuse branching from the base, only 6-12 ft. high; leaves palmately parted into 3-5 much ind, and cut divisions: petals and sepals short; flowers merely half so large as is the forgoing; the pale rose-golden petals much shot at the end.

G. Robertianum, HEN'S HOODE. Common N. in shady rocky places; very strong-willed, hairy, closely spreading; leaves finely cut, being divided into 4-5-petalled divisions; flowers small; petals pink or red purple.

5. ERODUM, STORKSBILL. (From Greek name for a Heron.)

E. cicutarium, COMMON 8. Nat. from Eu., in sterile soil, but not common, except in Texas and California, where it greatly abounds; low, hairy and rather vernal; the leaves from the root, purple; the flowers white or two-pinnatifid divisions; petals bearing an umbel of several small pinkish flowers, in summer.

6. PELARGONIUM, the GERANIUM, so-called, of houses and summer-garden culture. (Name from Greek word for the Stork, from the beak of the fruit, which is like that of Geese. All are perennial, and most of the common ones more or less shrubby, natives of the Cape of Good Hope; in cultivation so mixed up by crossing that students will hardly be able to make out the species. The following are the types or originals of the commonest...
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GERANIUM FAMILY.

§ 1. Leaves pinnate and flabby, the 5 leaves entire; stems trailing.

P. petiolatum, BRUSH-ROSE P. Generally smooth, the leaf axis towards the middle, with or without a darkish zone; flowers pink or varying to white.

§ 2. Leaves rounded and crenate, very obscurely many-lobed and with a deep narrow sinus; petals all of one color (usually pink, or emerging to white), the two upper a little narrower than the others; stems erect, shaggy and robust.

The two species greatly mixed.

P. monale, HOUSE-ROSE P. So called from the dark horse-shoe mark or zone, which however is not always present; speedwell; petals narrow.

P. liguissimum, IVORY OR WHITE P. In the shrubby state is soft-woody and crenate, the leaves without the zone; petals broadly obsolete, originally obscure-scabrous.

§ 3. Leaves rounded, modestly at all labeled; branches scarcely serrated; petals more compact; the two upper more or twice longer than the three lower.

* Leaves soft-woody; leaves oblong or oblong-obovate; flowers small; stems or branches herbaceous or half herbaceous, spreading or straggling.

P. capitatum, ROSE-SCENTED P. Softly hairy, with the most-lobed leaves more or less labeled, the lobes short and broad; peduncle bearing many sessile flowers in a head; petals rose-purple, barely \( \frac{1}{3} \) long.

P. tomentosum, PEPPERMINT P. Rounded softly hairy; branches long and thickish; leaves rather large, round-heart-shaped and with 3-7 open lobes, velvety-hairy both sides; flowers on long peduncles in pendant umbels, insignificant; petals white, the 3 lower a little longer than the calyx.

P. odoratissimum, NET-SMELLING P. Branches slender and straggling; from a very short calyx stem or base; leaves rounded and crenate, softly-woody, small; flowers on short pedicels, very small; petals white, scarcely exceeding the calyx.

* * * Leaves not even-lobed; flowers large, pink, purple, white, \( \frac{1}{3} \) the two upper petals longer and broader than the three lower and rounded or pointed; shaggy and erect. (All work armed.)

P. nuculatum, CLOVED P. Soft-hairy, the rounded kidney-shaped leaves cleft, soft-woody.

P. cordatum, HEART-LEAVED P. Like the last but less hairy, with flatter even-well-shaped leaves.

P. angustatum, MAPLE-LEAVED P. Harder-hairy; the leaf ribbed, divided to be lobed, truncate or even wedge-shaped at the base (entire or heart-shaped), sharply toothed.

§ 4. Leaves deciduously lobed or not, in some species compound or decumbent.

* Smooth and pale or glabrous, roundish, pinnate, 3-7 leaflets.

P. grandiflorum, GREAT-FLOWERED P. Shrubby; peduncles bearing about 3 large flowers, with white petals \( \frac{1}{3} \) long, the two upper larger and elegantly colored with pink or rose-color.

* * * Silky-hairy, pinnately veined and somewhat pubescent.

P. tricolor, THREE-COLORED P. Low, rather shaggy; the long-petioled small leaves inch divisions; peduncles bearing 2 or 3 showy flowers; the three lower petals white, the two upper crimson, with a dark spot at their base, and rather smaller, \( \frac{1}{3} \) long; not common.

* * * Soft-hairy or velvety, pinnately or palmately, \( \frac{1}{3} \) petiolate, small, no obvious stipules.

P. extispicium, PENNY-ROYAL P. Low, rather shrubby; leaves with the sweet scent of Penny-Royal or Bergamot, \( \frac{1}{3} \) wide, this leaves wedge-shaped and crenate; flowers small and insignificant, white.

* * * Hair, roughish, or downy; leaves more or less pinnate or pinnately compound or the main axis or pinnate-stipitate, weakly or strongly stipitate present.

* P. quadrifolium, OAK-GRAVED P. Shrubby, hairy and glandular; leaves deeply sinuose-pinnatifid, with wavy-toothed blunt lobes (the lowest
in the imple or compound inflorescences, containing a pungent, or acrid
many [or orange and lemon more numerous], in short stalks, of very various shades (from white to red
and purple). The flowers are simple.

28. RUTACEAE, RUE FAMILY.

Known by the transparent dots or glands (resembling punctures) in the simple or compound leaves, containing a pungent or acid binone-aromatic volatile oil; and stamens only as many, or twice as many (or in Orange and Lemon more numerous), inserted on the
base of a receptacle (or a glabrous disk surrounding it) which
ZANTHOXYLUM. (umr compound pitul or the 2 - 3 more or less separate carpels. Leaves either compound or alternate, in ours mostly alternate, without stipules. Flowers only in No. 2 irregular. Many species are medicinal.

1. Peregrina, strong-scented, hardy (evergreen) herba.看看perfectum: antennae 3 or
10. Everett 3 - 10-nerved. 4 - 5-celled. 

3. ZANTHOXYLUM. (umr compound pitul or the 2 - 3 more or less separate carpels. Leaves either compound or alternate, in ours mostly alternate, without stipules. Flowers only in No. 2 irregular. Many species are medicinal.

1. Ruta, strongly scented, with a strong balsamic scent, stamens 4 or 1, as many as the petals, petals usually petaloid, and very long, with small, white, scented flowers in axillary clusters.

2. Dictamus, Praxinella. (Ancient Greek name.) Above or woody base, in clusters, without stipules. Flowers only in No. 2 irregular, sometimes more than 10, mostly 5, thickish, Filaments irregularly united or free. Ovary many-nerved, united at the base for a balsamic scent, restoring the scented compound, and the terminal carpel, or sometimes paired, in one variety, pale purple with red veins, another white.

4. Ranunculus, P. or Toorclewoman. Rocky woods and banks N.; a prickly shrub or small tree, with leaves downy when young, of 9 - 11 ovate or oblong leaves; the greenish flowers in axillary clusters, in
QUASSIA FAMILY. 83

spring, preceding the leaves, either the sepals or petals wanting; petals 3–5 with slender style; the little nectar about the size and shape of pepper-corn, loosely drawn, raised from the receptacle on thickish stalks.

2. Carilium (sugg.) T. & G. (syn. Sorbus P.) Sandy tree S.; a small tree, the bark covered with a viscid and the leaves with very slender prickles, smooth, with 7–9 leaves or lanceolate leaves, and white flowers in a terminal cyme, in early summer; later than the leaves, with the petals and sepals both present, or as short-cylindric pods, and pods not stalked.

4. Ptelea, ROSE-TREE. (The ancient Greek name for the Elm, from the resemblance in the winged fruit.)

P. trifolata, Three-Leaved P. Rocky woods from Peck, S. & W.; a tall shrub or small tree, with acute pointed leaves, and a terminal cyme of small greenish-white unpleasantly scented flowers, in early summer; the ericaceous winged fruit bitter, and as much as for hops.

5. Sketchia. (Natives are in Japan, from which country the common species was recently introduced into ornamental cultivation.)

S. japonica, a low quite hardy shrub, smooth, with oblong and entire bright green leaves scattered on the end of the branches, which as spring are terminated with close panicles or clusters of small and white sweet-scented flowers, of no beauty, but followed by bright red berries which last over winter.

8. Citrus, CITRUS, ORANGE, &c. (Ancient name for Citrus.)

Natives of India, &c., cultivated with or only for ornament. Flowers white, very sweet-scented, rather showy. The species or varieties are much confused or mixed.

C. vulgaris, Bitter Orange, with broadly winged pedicel; fruit with a thin roughish rind and acid bitter pulp.

C. aurantium, Sweety Orange, with a very narrow wing or slight margin to the pedicel; fruit globular, with a smooth and thin separable rind and a sweet pulp.

Var. myrtifolius, Myrtle-leaved or French Orange, dwarf, with small leaves (1–1½ long) and small fruit, depressed or sunken at the apex.

C. limonum, Lemon, with a narrow wing or margin to the pedicel, oblong and acute toothed leaves, petals commonly purplish outside, and fruit oval-oblong, with adherent rind and a very acid pulp.

C. limetta, Lime, with wingless pedicel, roundish or oval serrate leaves, and globular fruit with a thin rind and sweetish pulp.

C. medica, Citron (named from the country, Medea), with wingless pedicel, oblong or oval acute leaves, petals purplish outside, and a large oblong sweet-scented fruit with a very thick roughish adherent rind, and slightly acid pulp.

29. Simarubaceae, QUASSIA FAMILY.

May be regarded as having without transparent dots in the leaves; here represented by a single tree, the

1. Atlanticus, Chinese; MACH or TREE-OF-HEAVEN.

(African, a native name.) Flowers polygamous, small, greenish, in terminal branched panicles, with 3 short sepals, and 3 petals, 10 stamens in the fertile florets and few or none in the sterile; the latter with 2 to 3 stamens (their styles lateral, anointed or soon separate), which in fruit become linear-eeding thin and membranaceous very slender or keys, like those of Acanthus on a smaller scale, but less-angled in the middle.

A. giandulosa, the only species known here, from China, is a common shade-tree, tall, of rapid growth, with hard wood, very long pinnate leaves, and many obtusely lanceolate entire or sparsely serrate leaves; flowers in very summer, the staminate very ill-scented.
30. MELIACEÆ, MELIA FAMILY.

Trees, chiefly with pinnately compound deciduous leaves, stamens twice as many as the petals and united up to or beyond the anthers into a tube, and a several-celled ovary with a single style: almost all tropical,—represented in Florida and farther south by Swietenia Mahogani, the Mahogany-tree, and by an eagle shade-tree at the South, viz.

1. MELIA. (Greek name of the Ash, transferred to a widely different tree.) Calyx 5-8-parted. Petals 5 or 6, linear-petalately. Stamens united into a cylindrical tube with a 10-th Indentate mouth, enclosing as many stigmas. Fruit a globose berry-like drupe, with a heart-shaped stone, and a single seed in each cell. Flowers in large compound panicles.

M. Aspera. Protocalycium or Cholla-tree. A favorite shrub-tree at the 8, 20°-40° high, with twice pinnate smooth leaves, ovate and pointed toothed buds, of a deep green color, and numerous fragrant white-capped flowers, in spring, succeeded by the yellowish fruit.

31. ANACARDIACEÆ, CASHEW FAMILY.

Trees or shrubs, with resinous or acid, sometimes poisonous, often colored or milky juice; alternate leaves without stipules; small flowers with sepals, petals, and stamens 3; and a 3-celled 3-valved ovary bearing 3 styles or stigmas,—represented by the genus

1. RHUS, SUMAC. (Ancient name.) Flowers polygamous or dioecious, sometimes perfect, which or greenish, in terminal or axillary panicles. Stamen inserted under the edge or between the lobes of a scattered disk in the bottom of the calyx. Fruit a small dry or berry-like drupe, the solitary seed on a curved stalk rising from the bottom of the cell. (The stigmatic leaves of some species are useful for dyeing and tanning, those of R. portulaca on in Asia for moccaso binder). The juice of some Japanese species yield their famous lacquer: the fruit of another a sort of wine.)

§ 1. Cultivated from Europe, with simple entire leaves: not poisonous.

B. Cotinus, Smoke-tree or Venetian Sumac. Shrub 5°-9° high, smooth, with oblong leaves on slender peduncles, some peduncles of flowers in early summer, followed rarely by half-heart-shaped fruits; usually most of the flowers are abortive; while their greenish color, beech, and short long, plumy hairs, making large and light, feather or cloud-like bunches, either greenish or stippled with red, which are very ornamental. The same or one very like it is wild in Alabama.

§ 2. Native species, with compound leaves of 3-11 leaflets.

* Poisonous to the touch for some people, the juice resinous: flowers in slender axillary panicles, in summer: fruit smooth, white or blue-black.

B. Toxiodendron, Poison Ivy or Poison Oak. Common in low grounds, climbing by roots over rocks, & c., or ascending trees; leaves 3, palmate, often sinuate or cut-lobed, rather downy beneath. A vile pest.

B. venenata, Poison Sumac, P. Klonor, or P. Dowsonii. In swampy ground; shrub 5°-18° high, smooth, with pinnate leaves of 7-13 ovate entire leaflets, and very slender peduncles. More virulent than the foregoing.

* = Not poisonous: fruit red and bent with reddish hairs, very acid.

Leaves pinnate: flowers white, in large and very compact terminal panicles.

B. typhina, Staghorn Sumac. Shrub or tree, on hillsides, & c., 10°-20° high, with resinous milky juice, brownish-yellow wood, velvety-hairy
VINE FAMILY.

WINE FAMLY.

En s! ,

1. VITIS, GROWTH OF VIRGIL. (From Latin: rooted wood.) In late spring.

leaves never cottony, green with all, thall, heart-shaped, little lobed, but toothed

ISABEL LEA, and furnish with nearly hardy N. GROWS, bloom, TV 800, ripe 80 but

roundly, and leaves, which are thick and shining above; juice remains.

— Leaves of a roundish button: petioles light yellow, in spring before the lowest

R. aromatica, FRANKENH. S. A slender bush in rocky places, from

Vy. PINUS, with the small rhombic-ovate leaves persistent when young,

32. VITACEI, VINE FAMILY.

Woody plants, climbing by tendrils, with waxy and often acid juice, alternate leaves, deciduous stipules, and small greenish flowers in a cyme or thyrso; with a minutely 4-5-toothed or almost obsolete calyx; petals valvate in the bud and very deciduous; the stamens as many as the petals and opposite them; a 2-celled ovary with a pair of ovules rising from the base of each cell, becoming a berry containing 1-4 bony seeds. Tendrils and flower-clusters opposite the leaves.

1. VITIS. Calyx very short, a dozen disk connecting it with the base of the ovary and bearing the petals and stamens.

2. AMPHIGRAPH. Calyx nearly lo在中国: disk. Petals expanding before they fall. Section 8.

1. VITIS, GRAPE-VINE. (The classical Latin name.) FL in late spring.

§ 1. TRUE GRAPES. Petals and stamens 5, the former lightly colorless at the top and thrown off without separating; the base of the very short and transverse calyx filled with the disk, which is a thick disk or glands between the stamens; leaves alternate, rounded or heart-shaped, usually 3-5 lobed.

* Flowers all perfect, somewhat fragrant: autumn.

V. vinifera, EUROPEAN GRAPE. Cult. from immemorial time, from the East, furnishing the principal grapes of our vineyards, etc.; some varieties nearly hardy N.; leaves green, cottony only when very young.

* Flowers more or less polymonoous (some plants instead to produce only staminate flowers), yielding a fragrance like that of Stephanther: native species.

— Bark of stems early separating in long strips; petals compounded and base.

V. labrusca, NORTHERN FOX-GRAPE, the original of the Catawba, Isabella, and furnishing many of the American table and wine grapes; commonly in moist grounds N. & W.; large and young shoots very cottony, even the slight leaves retaining the cottony wood underneath, the lobes separated by roundish sinuses; fruit large, with a tough mushy pulp when wild, dark purple or darker-sable, in compact clusters.

V. sylvestris, SILVER GRAPE. Common N. & S.; leaves green above, and with loose suberose down underneath, the lobes with roundish open 

1 2

3

4

5

V. cordifolia, WESTERN OR FOXTAIL GRAPE. Common on banks of streams: leaves never cottony, green both sides, thin, heart-shaped, little lobed, but <closely

sharply toothed; clasping bases; fruit small, blackish or black with a bloom, very sour, ripe after frost. Var. PSEUDA, the common form along river-banks W. has broader and more cut or lanced leaves.
BUCKTHORN FAMILY.

— Buck of men close and smooth, pale.

V. vulpina, Manganese, Bellflower, or Five-Grace of the South. Ripe

berries from Maryland and Kentucky &; leaves rather small, round in outline,

seldom and slightly lobed, glossy and mostly smooth both sides, the margin cut

to coarse and broad teeth; clusters small; fruit large, f - f in diameter,

purple, thick-skinned, mealy, or pleasant-flavored, ripe in early autumn: the

original of the New England Grape, &c.

§ 2. Circaea. Petals and stamens 4 or 5, the former opening regularly; disk

thick and broad, 4-lobed; flowers mostly perfect; berries large; thin or

persistent.

• Wild species 4- 5, smooth, usually with 5 stamens and petals.

V. indivisa, a species with simple leaves like those of a true Grape, heart-

shaped or ovate, pointed, closely-toothed, but not lobed; flowers-colors small

and brown; style shorter.

V. bipinnata, a bushy or low-climbing plant, with few tendrils, and de-

compound leaves, the small leaflets cut-toothed.

• Entire species, with nearly 4 stamens and petals.

V. heterophylla, from Japan; a form with the leaves blushed or varie-

gated with white (small), thin, variously 3-5-lobe, and small blue berries, is

hardy in gardens; cult. for the variegated foliage.

V. discolor, from China, cult. in hothouses; for its splendid foliage; leaves

large—along with a heart-shaped base, crimson underneath, violet-hoary

and dark-green shaded with purple or violet, or often marbled with white, on

the upper surface, the shoots reddish.

2. AMP'ELOPSIS, VIRGINIA-CREEPER. (Name from Greek words,

meaning like the Vine: indeed, it is hardly distinct enough from the second

section of Tinos.)

A. quinquefolia, the only genuine species: in all low grounds, climbing

excellently, sometimes by roots as well as by the tendrils, the latter espe-

cially fixed for mounting walls and trunks, to which they attach themselves

by sucker-like disks at the tip of their branches (Lessons, p. 38, figs. 42, 68);

leaves 3-5-pinnate or pinnatifid, uniodont, changing in crimson in autumn;

flowers cymose, in summer; berries small, black or bluish.

33. RHAMNACEAE, BUCKTHORN FAMILY.

Shrubs or trees, of litterish and acuminous properties, with simply

chased opposite or alternate leaves and small flowers; well marked by the

stamens of the number of the valvate sepals (4 or 5) and alternate

with them, i.e. opposite the petals, inserted on a disk which lines

the calyx-tube and often unites it with the base of the ovary, this

having a single erect ovule in each of the (2-5) cells. Branches

often thorny; stipules minute or none; flowers often spathaceous

or polygamous. Petals commonly hooded or involucrate around the

stamen before it. (Lessons, p. 126, figs. 282, 283.)

• Calyx free from the ovary.

1. Berchemia. Turning slender, with straight-raised leaves. Petals, with

out claws, rather larger than the stamens. Disk thick, nearly filling the bot-

tom of the calyx. Ovary 3-5-celled, becoming a 3-5-celled small stone-fruit, with

purple and thin pulp.

2. Rhamnus. Erect shrubs or trees, with loosely-raised leaves. Petals 4 or 5,

with short claws. Stamens short. Ovary 2-4-celled, becoming a black

berry-like fruit, containing 2-4 cartilaginous seed-like sections, which are

grooved on the back, as is the contained seed. Cylindrical follicles.

3. Frangula. Like Berchemia, but with straight-raised leaves; the sepals

not grooved but prominent on the back: calyx-lobes thick.
1. BERCHEMIA, SUTLIEF-JACK. [Probably named for some benefactor of the name of Burchfield.]  
*B. volubilis.* Common in low grounds, climbing high trees, smooth, with very tough and little stems (whence the popular name), small oblong-ovate and simply parallel-veined leaves, and greenish-white flowers in small panicles terminating the branches, in early summer.

2. RHAMNUS, RUCKTHORN. (The ancient name.) Flowers greenish- 

3. FRANGULA, ALDER-RUCKTHORN. (From Frangula, to break, the stress broken.) Flowers greenish, generally perfect, and the parts in fives.

4. CEANOTHUS. (An ancient name, of unknown meaning, applied to those N. American plants.) Flowers in little umbels of four to five, usually clustered in dense bunches or panicles, handsome, the calyx and even the pedicels colored like the petals and stamens. There are low undershrubby plants, with white flowers. In and beyond the Rocky Mountains, especially in California, are many species, some of them shrubs or small trees, adorned with showy blossoms.

C. ANDRACHNUS, NEW-JERSEY TEA OR RED-ROOT. 

D. OVALIS. 

34. CELASTRACEAE, STAFF-TREE FAMILY. 

Shrubs, sometimes twining, with simple leaves, minute and deciduous stipules or oval, and small flowers with sepals and petals both infurcated in the bud, and stamens of the number of the latter, alternate with them, and inserted on a disk which fills the bottom of the calyx and often covers the 2-3-celled few-ovuled ovary; the seeds usually furnished with or enclosed in a fleshy or pulpy aril.
Represented both as to native and cultivated plants by two genera:

1. CELASTRUS. Flowers polygamous or dioecious. Petals and stamens 6, on the edge of a dense disk which lines the bottom of the calyx. Filaments and style rather slender. Pod globose, berry-like, but dry. Leaves互生。

2. EUONYMUS. Flowers perfect; the calyx-lobes 4 or 5, widely spreading. Stamens twenty with short filaments or short staminal styles, borne on the surface of a flat disk which more or less encircles or covers the ovary. Pod 2-lobed, generally bright-colored. Leaves opposite: branches 4-sided.

1. CELASTRUS, STAFF-TREE. (Old Greek name, of obscure meaning and application.)

C. scandens, CLIMBING CHINESE WAX-WOOD. A twining high-climbing shrub, smooth, with thin ovate-oblong and pointed deciduous leaves, racemes of greenish-white flowers (in early summer) terminating the branches, the petals green or greenish-white, and orange-colored berry-like pods in autumn, which open and display the seeds enclosed in their scarlet pericarp; wild in low grounds, and planted for the showy fruit.

2. EUONYMUS, SPINDLE-TREE. (Old Greek name, name of good repute.) Shrubs or twining, with dull-colored inconspicuous flowers, in small cymes on axillary peduncles, produced in early summer; the pods in autumn ornamental, especially when they open and display the seeds enclosed in their scarlet pericarp;

- Larvae defoliatory, feed on shoots or newly open.

— North American species: unless stated or nearly so.

E. atropurpureus, BURNING-BUSH or SPINDLE-TREE. Tall shrub, wild from New York W. & S., and commonly planted; with oval or oblong polished leaves, blooms with rounded dark dull-purple pods (generally 4), and smooth dark-red fruit, hanging on slender peduncles.

E. americanus, AMERICAN SPINDLE-TREE. Low shrub, wild from New York W. & S., and sometimes cult.; with thickish ovate or lanceolate almost acute oval leaves, usually 3 greenish-purple rounded petals, and rough-warty smooth glossy globose fruit, entire when ripe. Var. ornatus, with glossy and still ovaries of shining horn, has long and spreading or trailing and rooting branches.

= Exotic: others valued as ornamental.

2. EUROPEUS, EURASIAN SPINDLE-TREE. Occasionally planted, but inferior to the foregoing; a rather low shrub, with lanceolate or oblong short-pointed leaves, short obtuse petaloid petals; 4 greenish oblong petals, and a smooth 3-lobed red fruit, the seed orange-yellow.

E. japonicus, JAPAN S. Planted S. makes the name of CHINESE BUSH, there hardy, but is a greenhouse plant N.; has stellate shining and bright green leaves (also a form with white or yellowish variegation), several drooping pedicels, 4 oblong whitish petals, and smooth globular pods.

35. SAPINDACEAE, SOAPBERRY FAMILY.

Trees, shrubs, or one or two herbaceous climbers, mostly with compound or lobed leaves, and asymmetrical flowers; the stamens sometimes as many as the petals or lobes of the calyx, but petals commonly rather fewer, when of equal number alternate with the petals; there imbricated in the bud, inserted on a disk in the bottom of the calyx and often coherent with it: ovary 2 – 3-celled, sometimes 2 – 3-lobed, with 1 – 3 (or in Sapindus several) ovals in each cell. The common plants belong to the three following suborders.
I. BLADDER-NUT FAMILY: has perfect and regular flowers, stamens as many as the petals, several large, empty seed cases, a straight embryo in a scanty albumen, and opposite compound leaves both stipulate and stipellate.

1. STAPHYLEA. Two sepals, petals, and stamens; the latter borne on the margins of a single disk which forms the bodice of the calyx. Styles are regular appearing to be 5 united, very slightly 5-lobed, in fruit becoming a bladder-like inflated and reniformed large pod. Stipules, with probably compoundaceous blades of 2 or 6 leaves.

II. SOAPBERRY FAMILY: has flowers often polygamous or diocious, and more or less irregular or asymmetrical, only 1 or 2 ovules, ripening but a single seed in each cell of the ovary, the embryo curved or curved, without albumen. No stipules.

1. Laurus alternifolia. Pod bladder-like inflated, erect as No. 1.

2. CARDIOPISCEM. Heads, with two tertiary and one sub-deltoid ovary, climbing by hook-like tendrils in the flower clusters. Sepals 4, the inner pair larger. Petals 6, each with an appendage on the inner face, of the two upper large and petal-like, of the two lower more-like and with a broad upper gracefully, broadened, to a short disk, attached, divided into two glands, one before each locule. Styles 3, united towards the upper side of the flower, the stamens next to these styles. Styles or stigmas 5, each. Floral tube, united, with a single ovary rising from the middle of each cell. Fruit a large and broad bladder-like pod, seea long, globular, with a stalk-like heart-shaped and adherent to the base.

3. KELPITA. Small tree, with palmate leaves. Sepals 5, petals 5 or 6, the pieces of the scales racented, each with a small pointed scale-like appendage attached to its edge. Fruit enlarging into a base before each petal. Stamens 3, 5, or 6, declined; filaments hairy. Style single, slender; ovary transversely united, ovule 1, with a pair of veins in each cell. Pod bladder-like inflated, 1-seeded.

4. SAPINDUS. Trees, with sharply pointed leaves. Sepals and petals each 5, or nearly 5; the latter commonly with a little scale or appendage adhering to the short disk. Styles 3, or 5, united, with a single ovule in each cell. Fruit nearly globular and hairy, a bladder-like berry (the other calls oblative); filled with a large glosseted seed, its coat erose-crustaceous, very leathery thick, and hairy.

5. Laurus oppositifolia, of 3-6 digits below. Pod bladder-like inflated.

6. ESCULUS. Tree or shrub. Calyx lobed or 2-lipped. Petals 4 or 5, more or less unequal, no style erected in the centre, not appended. Stamens 5, or rarely 4; filaments slender, often anastomosed. Styles single, as also the minute stigmas; ovary 2-celled, with a pair of ovules in each cell. Fruit a large hairy nut, splitting at maturity into 2 valves, ripening 1-2-year long, chestnut-like, hand-seeded seeds; the kernel of these consists of the very thin cortex, externally Armed, together, and a minute tufted calyx.

III. MAPLE FAMILY: has flowers generally polygamous or diocious, and sometimes apetalous, a mostly 2-lipped and 2-celled ovary, with a pair of ovules in each cell, ripening a single seed in each wing of the winged fruit. Embryo long and thin ovate-elliptic, coiled or crumpled. (See Lessons, p. 5, fig. 1-3, &c.) Leaves opposite: no stipules.

6. Acer. Trees, or a few only shrubs, with palmate-nerved or even-paired leaves. Only mostly 5-lobed. Petals as many as 10, and stamens 6-8, rarely more, borne on the edge of the disk. Styles or stigmas 3, similar. Fruit a pair of samarae, or wingdynamites, united at the base or iner two in winged plumage from the back. Occasionally the ovary is 2-seeded and the fruit 2-winged.

7. NITRIDOR. Trees, with paired leaves of 3-2 lobes, and diocious or very small flowers, without petals or disk; the only common: stamens 4 or 5. Fruit, &c. of Acer. S & F. 13-19.
1. **STAPHYLÉA, BLADDER-NUT.** (Name from a Greek word for a bunch of grapes, both applicable.)

*Staphylea trifolia, American B. Small woody shrub, with greenish-striped leaves, 2 erect pointed green berries, distinct, stipitate, and hanging rosmarinus-like clusters of white flowers at the end of the branches of the season, in spring, followed by the large bladder pods. Shrub or small tree; leaves very nearly smooth on both sides, and entire or subdenticulate above; small flowers in racemes; white, in summer, followed by the bladder pods.

2. **CARDIOSPERMUM, BALLOON-VINE, HEART-SEED.** (The latter is a misspelling of the Greek name.)

*Cardiospermum halicacabum, the common species, wild in the S. W. States, is cult. in gardens, for its various inflated pods; it is a delicate herb, climbing over low plants or spreading on the ground, with small white flowers, in summer.

3. **KELREUTERIA.** (Named for Kellreuter, a German botanist.)

*K. paniculata, a small tree from China, planted in ornamental grounds; has glossy leaves of numerous thin and entirely toothed or cut leaves, and a terminal and branched panicle of small yellow flowers, in summer, followed by the bladder pods.

4. **SAPINDUS, SOAPBERRY.** (Soap Berries, i.e. Indian soap, the berries used as a substitute for soap.)

*S. marginatus, wild N. & S. W.: a small tree, with 5–10 broadly lanceolate green leaves on a wingless but often margined common stalk, and small white flowers in panicles, in summer, the whitish berries as large as bullets.

5. **ASCULUS, HORSE-CHESTNUT, BUCKEYE.** (Ancient name of an Oak or other mast-bearing tree, applied to these trees on account of their large edible seed.)

*A. hippocastanum, common H. Tall fine tree, with 7 leaves, and large yellow flowers of 5 petals, white, and marked with some purple and yellowish; stamens 5, yellow, at base there is a double-flowered variety.

*A. rubicunda, H. K. Less tall, flowering every as a shrub, with brighter green leaves of 5–7 leaves, flowers with 4 rose-red petals not so spreading, and mostly 3 segments less declined. Probably a hybrid between Horse-Chestnut and some red Buckeye.

6. **SAPINDUS.** (Soap Berries, i.e. Indian soap, the berries used as a substitute for soap.)

*S. marginatus, wild N. & S. W.: a small tree, with 5–10 broadly lanceolate green leaves on a wingless but often margined common stalk, and small white flowers in panicles, in summer, the whitish berries as large as bullets.
siaminae not exceeding the consistently light yellow petals, those of two dissimilar pairs, the longer pair with very small blade; fruit smooth.

**Acer purpureum**, Pers. B. has both calyx and corolla tinged with purple or reddish, and flowers generally drooping suberect.

**A. discolor**, Red Beecket. N. & W.: shrub or low tree, like the last, but leaves generally smooth; the lobes and tubular calyx and the petals bright red; showy in cultivation.

6. **Acer**, MAPLE. (The classical Latin name.) Mostly fine trees.

- **Flowers** in late spring or early summer, appearing more or less later than the leaves; in small drooping racemes or corymbs, commonly terminating a 2-4-foot shaft of the season, greenish or yellowish, with petals: stems more than 5, generally 8.

- **European Maples**, planted for ornamental and shade.

**A. Pseudo-Platanus**, Nymane M. A fine tree, with spreading branches, simple lobed leaves which and rather drooping, on long redish peduncles, the lobes toothed, long racemes, and moderately spreading wings to the pale-yellow fruit.

**A. platanoides**, Norw. M., here so called. A handsome, shrill-headed tree, with thin and broad smooth leaves, bright green both sides, short 5 short bases set with 2-5 coarse and taper-pointed teeth, a small corolla of flowers, and flat smooth fruit with wings long, diverging in a straight line. Juice milky: leaves holding green later than the others.

- **Oregon and Californian Maples**, beginning to be planted East.

**A. circinatum**, Round-leaved of Vinea M. Tall, spreading shrub with thin and rounded moderately 7-10 leaved leaves, their lobes serrate, small umbels of purplish flowers, and wings of fruit diverging in a straight line.

**A. macrophyllum**, Familiar M. Small timber-tree, with thickish leaves 12-15 inches and deeply 3-7 lobed, the lobes with one to two square lobes of coarse teeth, mostly yellowish flowers in a compact raceme, and hairy fruit with spreading wings.

- **Native Western and Mountain Maples**.

**A. pinifolium**, Mountain M. Tall shrub, common S., with slightly 3-lobed and narrowly toothed leaves downy beneath, and upright dense racemes of small flowers, followed by small fruits with diverging narrow wings. The interflowering species.

**A. Pennsylvanicum**, Striped M., also called Moose-wood and Striped Dogwood. Small tree, common N., with light-green bark striped with darker lines, large thin leaves finely sharply serrate all round, and at the end with 1 short and very taper-pointed lobes, slender hanging racemes of rather large green flowers, and fruit with diverging wings.

**A. saccharinum**, Rock or Sugar M. Large tree, common especially N., valuable for timber and for the sugar of its sap; with rather deeply 3-5 lobed leaves pale or whitish beneath, the flowers open and rounded, and the lobes with fine or few incised coarse teeth; calyx bell-shaped and hairy-fringed: wings of fruit according, rarely 1 long.

**A. nigricum**, Black Sugar M., a form with leaves green or grayish and more or less downy beneath, even when old, the flowers at the base all to be deep and narrow.

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deeply 3-lobed leaves silvery-white and when young downy beneath, the narrow lobes nearly entire and toothed; flowers greenish, in earliest spring, without petals; fruit woody when young, but smooth, 2'-3' long including the great diverging wings.

A. rubrum, Rand or Swamp M. Rather small tree, in wet grounds, with soft white wood, reddish twigs, moderately 3-lobed leaves within beneath, the middle lobe longest; all irregularly serrate; flowers scarlet, crimson, or sometimes yellowish (later than in the buckeye species); fruit smooth, with the slightly spreading wings 4' or less in length, often reddish.

7. NAGUNDO, ASH-LEAVED MAPLE, BOX-ELDER. (Obscure or unmeaning name.)

N. acerifolium. A handsome, rather small tree, common from Penn. S. & W., with light green twigs, and drooping clusters of small greenish flowers, in spring, rather rather than the leaves, the fertile ones in drooping racemes, theugging fruits half the length of the very very wing; handsome crown, pointed, unusually covered, very very. A variety with white-splashed leaves is lately said, to be ornamental.

36. POLYGALACEÆ, POLYGALA FAMILY.

Bitter, some of them medicinal plants, represented mainly, and here wholly, by the genus

1. POLYGALA, MILK-WORT. (Name from Greek words, meaning milk: a cattle; but the plants have no milkly juice at all; they are thought to have been so named from a notion that in pasturage they increased the milk of cows.) Flowers remarkably irregular; in outward appearance as if papilionaceous like those of the pea family, but really of a quite different structure. Calyx persistent, of 5 sepals; three of these small, viz. two on the lower, and one on the upper, side of the Blossom; and one on each side erected wings which are larger, covered, and would be taken e spirits. Within these, on the lower side, are three petals united into an "envelope", the middle one keeled-shaped and often bearing a crest or appendage. Stamina 8 or sometimes 6; their filaments united below into a split shaft, separating above usually in two equal parts, concealed on the broadened middle petal; anthers 1-celled, opening by a hole at the top. Style curved and commonly enlarged above or subibly irregular. Ovary 8-celled, with a single stile hanging from the top of each cell, becoming a small fleshy 2-celled pod. Seed with an appendage at the appendage (appendage): embryo straight, with flat cotyledons in a little albumen. Leaves simple, entire, without stipules. Our native species are numerous, mostly with small or even minute flowers, and are rather difficult to study. The following are the commonest.

§ 1. Notice species, line locis, usually smooth.

• Flowers yellow, some bearing green or yellow, in hanging spikes or heads; leaves alternate. Growing in line or wet places on pinchweeds, S. E. Fl. summer.

P. olympica. Stem 1½-2' high, branching at top into a compound corymb of spikes, leaves linear, scaly, the uppermost small; no caruncle on the seed. From North Carolina.

P. ramiflora. Stem 6'-10' high, more branched; lowest leaves oblong or obovate, upper ones lanceolate; a caruncle at base of seed. Delaware and S.

• Short and thick spine or hard angle: not-common clustered. "

P. latifolia, Yellow Buckwheat-BUTTON of S. Stem 6'-8' high, in a cluster from the spathulate or linear leaves; flowers brighter yellow.

• Flowers purple or rose-red, in a single drooping terminal blossom or branch, no subterranous flowers. Fl. all summer.
P. incarnata. From Porto, W. & N.; stem slender, 6'-10' high; leaves middle and oblong-shaped; the three united petals extended below into a long and slender tube, the rest of the middle long-conspicuous.

P. sagittata. Sandy damp prairies; stem 4'-5' high, leafy to the top; leaves oblong-linear; flowers bright rose-purple (sometimes pale or even white), in a thick cluster at length oblong head or spike, without pedicels.

P. fastigiosa. Prostrate; New Jersey s., slender, 6'-10' high, with smaller narrow-linear leaves, and oblong dense spike of smaller rose-purple flowers, six pedicels as long as the ped.; leaves falling off.

P. Nuttallii. Sandy soil, from coast of Mass. S.; lower than the forming 2; flowers rather broader in some cylindrical spikes, greyish-purple; oblong leaves remaining on the axis after the flowers are quite old. (.

== Leaves all or all the lower in pairs in whorls of four.

P. cruciata. Low ground; stems 9'-11' high, angular, and with spreading branches; leaves linear or spatulate, mostly in fours, spike thick and short, sandy yellow, its axis much with present leaves; where the flowers have fallen, wings of the flower bannerlike or beak-shaped, loosely-podded.

P. brevifolia. Sandy hills from Rhode Island S.; different from the last only in more slender stems, narrower leaves, those on the branches alternate, the spike thick, and wings of the 6, not loose and many 

** Flowers of summer; greenish-white or sometimes tinged with purple, very small, in slender spikes, more subumbrella; leaves slender, the leaves in whorls of four to six.

P. verticillata. Very common in dry sandy soil; stem 6'-10' high, much branched; all the leaves of the main stem whorled.

P. ambiguus. In similar places and very like the last, chiefly S. & W., more slender; only the lower leaves whorled; flowers more scattered and often purplish-tinted, in long-peduncled spikes.

** = * Flowers white, small (in late spring) in a close spike terminating simple spike stems which rise from a perennial root, none subumbrellaceous; leaves narrower, all alternate.

P. Sargentii, NEVADA SNAKEFOOT. A medicinal plant, common W., 6'-12' high, with inarticulate or oblong, or even lanceolate short leaves, cylindrical spike, nodal alternate wings, and small corymb.

P. albida. Common only for W. & N. S.; more slender than the last, with narrow-linear leaves, more tapering long-peduncled spike, and oval wings.

** = * Flowers rose-purple in a corymbose, or simple, fringed; leaves alternate.

P. graciliflora. Dry soil S.; pubescent, with branching stems 15' high, lanceolate leaves, curved flowers scattered in a loose corymbose (in last summer), bright purple turning greenish.

** = * Polygama. Sandy barrens, with tubed and very leafy stems 5'-8' high, linear-oblong or oblanceolate leaves, and many-flowered acumen of hand-some rose-purple flowers, their cones conspicuous; also on short underground runners are some whiteish very fertile flowers with no evident corymb. Fl. all summer.

P. paucifolia, TURNED Polygama, sometimes called FLOWERING WATERTREES. Light soil in woods, chiefly N.; a delicate little plant, with stems 3'-4' high, spicy from long and slender runners or subterranous stems, on which are crowded inconspicuous fertile flowers; leaves few and crowded at the summit, ovate. Pericarp, some of them with a slender-peduncled showy flowery from the axil, of delicate rose-red color (very a white variety), almost an inch long, with a conspicuous fringed crest and only 6 stamens; in spring.

** § 2. Shrubs of the genus Polygama, from the Cape of Good Hope.

P. oppositifolia, with opposite sessile heart-shaped and mucronate leaves, of a pale blue and large and showy purple flowers, with a tufted crest.

P. myrtifolia, has crowded alternate oblong or obscure leaves, on short peduncles, and showy purple flowers 1'-long, with a tufted crest.
PULSE FAMILY.

37. LEGUMINOSAE, PULSE FAMILY.

Distinguished by the papilionaceous corolla (Lesson, p. 105, fig. 217, 218), usually accompanied by 10 monadophous or dudaphous or rarely distinct stamens (Lesson, p. 112, fig. 227, 228), and the legume (Lesson, p. 131, fig. 305, 304). These characters are combined in the proper Pulse Family. In the two other great divisions the corolla becomes less papilionaceous or wholly regular. Alternate leaves, chiefly compound, entire leaflets, and stipules are almost universal in this great order.

1. PULSE FAMILY proper. Flower (always on the plan of 5, and stamens not exceeding 10) truly papilionaceous, i.e. the standard outside of and in the bud enveloping the other petals, or only the standard present in Amorpha. (For the terms used to denote the parts of this sort of corolla see Lessons, p. 105.) Sepals united more or less into a tube or cup. Leaves never twice compound.

A. Stamens monadophous or dudaphous.

1. HERBA, shrubs, or are a small tree, never twining, trailing, nor tendril-bearing, with lower simple or of 2 or more composite flowers, monadophous stamens, and the alternate few whorls differing in size and shape from the other five; pod usually narrowed constricted.

1. LUPINUS. Leaves of several leaflets, in one species simple: stipules adherent to the base of the pods. Flowers in a long thick raceme. Calyx deeply 5-lipped. Corolla of purplish blue, the sides of the rounded standard being caudic basal, and the wings lightly coloring over and encroaching the lower and incurved sepal-shaped or sickle-shaped keel. Pod flat. Mostly herbs.

2. CRUCIFER. Leaves in our species simple, and with feathery stipules free from the pedicles but running down on the stem. Calyx lobed. Keel sepal-shaped, pointed. Stamens with the tube of filaments split down on the upper side. Pod inflated. Usually herbs.

3. GENISTA. Leaves simple and entire: stipules very minute or none. Calyx bell-like. Keel obtuse, slightly straight, blunt, turned down when the flower open. Pod mostly flat. Low shrubby plants.

4. CYTISUS. Leaves of one or three leaflets, or the green branches sometimes leafless: stipules minute or wanting. Calyx 5-lobed or 5-tubed. Keel straight or somewhat curved, blunt, soon turned down. Stigma incurved or even curled up after the flower open. Pod flat. Seeds with a yellow or white appendage (tappula) at the base. Low shrubby plants.

5. LABURNUM. Leaves of three leaflets: stipules inconspicuous or wanting. Calyx with 2 short tips, the upper tip inserted. Keel incurved, and pointed, sturdy and flat pod somewhat wrinkled in the calyx. Seeds naked at the base. Trees or shrubs, with golden yellow flowers in long hanging racemes.

1. Herb, never twining nor tendril-bearing, with leaflets of 3 leaflets (rarely more but than double), their margins commonly entire or at least toothed (which is remarkable in this family), stipules conspicuous and united with the base of the petiole (Lesson, p. 69, fig. 143); stamens diadelphous: pod 1-3-seeded, never divided across into joints.

* Leaves pinnately 2-foliate, as is seen by the bud leaflet being joined with the common petiole above the side branch.

6. TEGONELLA. Heritage aethereal. Flowers in the common cult species: simple and nearly sessile in the axil of the leaves. Pod elongated, shining or granified, tapering into a long-pointed apex.

7. MEDICAGO. Flowers small, in spikes, heads, &c. Corolla short, not united with the tube of stamens. Pod curved or coiled up, at least kidney-shaped.

**PULSALIUM.** Flowers in heads, spikes, or head-like umbels. Calyx with slender or bristle-like teeth or lobes. Corolla showy or becoming so after flowering. The corolla of the petals except sometimes the standard) more or less united below with the tube of stamens or tube with each other. Pod small and thin,很少 or included in the calyx or the persistent calyx.

*TRIFOLIUM.* Flowers in heads, spikes, or head-like umbels. Calyx with slender or bristle-like teeth or lobes. Corolla showy or becoming so after flowering. The corolla of the petals except sometimes the standard) more or less united below with the tube of stamens or tube with each other. Pod small and thin,很少 or included in the calyx or the persistent calyx.

*HERBA.* herbs, with crowded leaves. Fruit petals similar, spreading, borne on the top of the tube of the calyx; the fifth (answering to the caudex) rising from the bottom of the calyx, and heart-shaped or oblong. Stamens only 1.

*DALEA.* herbs, with crowded leaves. Flowers as in the last, but rather more pulpitrum-like, four of the petals borne on the middle of the tube of the calyx.

*PETALOSTEMON.* herbs, with crowded leaves. Fruit petals similar, spreading, borne on the top of the tube of the calyx; the fifth (answering to the caudex) rising from the bottom of the calyx, and heart-shaped or oblong. Stamens only 1.

*AMORPHA.* Herbs, with leaves of many leaflets. Standard the other petals widely spreading, wrapped around the 10 filaments and style. Flowers violet or purple, in single or clustered terminal spikes.

*ERYTHINA.* See p. 138.

*PULSABA.* Flowers obviously pulpitrum-like, all the petals conspicuously present. Stamens mostly dehiscing.

*PHORALAE.* Flowers of 3 or 5 leaves, often glabrous-dotted. Flowers never yellow) in spikes or racemes, often 2 or 5 under each leaf. Pod ovate, thick, included or partly so in the inflorescence; persistent calyx, often wavy.

*OXOBRYCHUS.* Leaves of 3 or 5 leaflets, often glabrous-dotted. Flowers never yellow) in spikes or racemes, often 2 or 5 under each leaf. Pod ovate, thick, included or partly so in the inflorescence; persistent calyx, often wavy.

*STYLOSAINTHES.* Leaves of 3 or 5 leaflets, often glabrous-dotted. Flowers never yellow) in spikes or racemes, often 2 or 5 under each leaf. Pod ovate, thick, included or partly so in the inflorescence; persistent calyx, often wavy.

*LYNCEPELDA.* Leaves pulpitrum-like, 2-lipped. Stipules small and free, or falling early. Flowers purple, rose-purple, or white, in spikes, clusters or paniculate racemes, or axillary. Stamens usually 10, anthers of 5, filaments of 5, included in the tube of the calyx, which is often divided.

*ACANTHODELA.* Leaves pulpitrum-like, 2-lipped. Stipules small and free, or falling early. Flowers purple, rose-purple, or white, in spikes, clusters or paniculate racemes, or axillary. Stamens usually 10, anthers of 5, filaments of 5, included in the tube of the calyx, which is often divided.

*COHONILLA.* Leaves pulpitrum-like, 2-lipped. Stipules small and free, or falling early. Flowers purple, rose-purple, or white, in spikes, clusters or paniculate racemes, or axillary. Stamens usually 10, anthers of 5, filaments of 5, included in the tube of the calyx, which is often divided.
PULSAR FAMILY.

20. ARACHIS. Annual. Leaves 4, straight-erect. Flowers small, yellow, in axillary heads or spires. Calyx with an inner lip making a lower lip, the upper lip broad and 4-toothed. Keel incurved and pointed. Stamens many-lobed. Styles longer and erect by outer side, the stigmas somewhat incurved and fixed by their middle. (Very at the bottom of the very long and stalk-like tube of the calyx, containing 2 or 6 seeds.) When the fruit splits and the calyx with the rest of the flower falls away, the fruit is pressed on a rigid, flat, stalk which walks upon the soil, and is joined into the soil where it tips into the string, inflated, black, common-felt fruit, which contains two very large and edible seeds; the stems composed of a pair of very thick and bulky clypeoses and an extremely short nearly straight peduncle.

21. SESAMUM. Herbs, with many pairs of leaves, and minute or nearly deciduous stipules, flowers in axillary cymes, or sometimes axillary, calyx short, 4-toothed. Standard rounded, spreading; seed not very numerous. Pod usually comprized internally with cellular matter or incoherence between the cells.

22. BARACHIS. Annual. Leaves 4, straight-erect. Flowers small, yellow, in axillary heads or spires. Calyx with an inner lip making a lower lip, the upper lip broad and 4-toothed. Keel incurved and pointed. Stamens many-lobed. Styles longer and erect by outer side, the stigmas somewhat incurved and fixed by their middle. (Very at the bottom of the very long and stalk-like tube of the calyx, containing 2 or 6 seeds.) When the fruit splits and the calyx with the rest of the flower falls away, the fruit is pressed on a rigid, flat, stalk which walks upon the soil, and is joined into the soil where it tips into the string, inflated, black, common-felt fruit, which contains two very large and edible seeds; the stems composed of a pair of very thick and bulky clypeoses and an extremely short nearly straight peduncle.
c. Leaves oblanceolate: stem white: stipula shallow: stipula small.


30. APIS. Herbs, twining over branches, with 3-4 leaves, and erect-oriented chocolate-purple flowers, in dense and short racemes: peduncles variable. Calyx with 2 upper very short teeth, and one lower lower one, the side teeth nearly wanting. Standard very broad, turned back: keel long and acutely, strongly incurved, or at length coiled. Pod flattened, flat, almost straight, straight-seeded.

31. Leaves of 3 leaves similarly disposed or very one, commonly stipulate.

1.抽查, from a nearly low: wings and sometimes keel small and inconspicuous.

88. ERYTHRINA. Stems, branches, and even the inflorescences usually precocious. Flowers large and showy, usually red, in racemes. Calyx without tooth. Standard elongated: Wings often wanting or so small as to be concealed in the calyx; keel much shorter than the standard, sometimes very small. Pod exiled in the calyx, linear, narrowly, usually opening only down the seed-bearing mature. Seeds erect.

2. Herbs, mostly twining, with wings and keel in ordinary proportion.

— Flowers not yellow: seed or not and the several smaller: leaflets stipulate.

81. PHASEOLUS. Keel of the corolla rolling into a ring or actin, usually with a tapering blunt apex: standard rounded, turned back or spreading. Style united with the keel, branching above the inner side: stigmas obtuse or minute; Pod linear or oblong-shaped. Flowers usually clustered on the knotty points of the raceme. Stipules acutish, persistent.

32. DOLICHOS. Keel of the corolla imbricate and keel towards at a right angle, but not keeled. Style united under the terminal stigma. Stipules small, otherwise nearly as Phaseolus.

33. GALAGA. Keel straightish, blunt, as long as the wing: standard turned back. Style naked. Calyx of 4 pointed sides, upper one broadest. Pod flat, mostly linear. Flowers clustered on the knotty points of the raceme. Flowerlets larger pointed. Stipules and bracts small to deciduous.

34. AMPLIFOLIA. Keel and wing: similar wings narrow straight, blunt: the standard erect partly rolled around them. Style naked. Calyx tubular, 4-toothed. Flowers small: those in loose racemes often sterile, their pods when formed slender, long and few seeded: these at or near the ground as on creeping branches very small and without prominent needle, but very fertile, making small and flaky, abortive or peduncle-modified, mostly subterraneous pods, ripening one or two large seeds. Bracts rounded and persistent, ovate, as are the stipules.

35. CUNDRAELE. Keel broad, incurved, nearly equalling the wings: standard large and rounded, spreading, and with a spur-like projection behind. Calyx short, 4-toothed. Style bearded only at the tip around the stigmas. Pod long, linear, with thickened edges bordered by a raised line on each side. Flowers showy. Stipules, bracts, and leaflets entire, persistent.

36. CLITORIA. Keel small, shorter than the wings, incurved, acute: standard much larger than the rest of the flower, turned to the end, erect. Calyx tubular (hooded). Style bearded down the inner side. Pod oblong-linear, linear, not bearded. Flowers large and showy, 1-3 on the peduncle. Stipules, bracts, and leaflets persistent, striate.

37. BARCHESSIA. Keel small, much shorter than the wings, incurved, blunt: standard large in proportion, rounded, spreading. Calyx short, 4-toothed, the 2 upper teeth united. Style short, naked. Pod bearded, not bearded. Flowers rather small, in racemes. Stipules and bracts small, striate, mostly deciduous. Leaves mostly opposite.

— Flowers yellow (sometimes purple-stipled outside): seed only 1; ped 1-3-grooved.

89. RHYNCHOCHA. Keel of the corolla increased at the apex: standard spreading. Calyx subulate: 2 upper lobes partly united. Style bearded. Pod linear, not bearded. Flowers showy, red, single or few on the peduncle. Stipules and stipules entire.
side of the other petal! Stamens 10 or 10 + + separate. The leaves are sometimes twice pinnate, which is not the case in the true Pulse Family. Embryo of the seed straight, the radicle not turned against the edge of the cotyledons.

II. BRASILETTO FAMILY. Flowers more or less irregular, but not papilionaceous: when they seem to be so the petal answering to the standard will be found to be higher instead of outside of the other petals. Stamens 10 or fewer separate. The leaves are sometimes twice pinnate, which is not the case in the true Pulse Family. Embryo of the seed straight, the radicle not turned against the edge of the cotyledons.
PULSE FAMILY.

6-toothed. Petals 5, the one answering to the standard smaller than the wing-petals and covered by them; the keel-petals larger, convoluted; 14 distinct. Stamens 10, including with the style. Pod linear-oblong, flat, thin, several-seeded, not edge-winged.

62. Leaves simply 3-pinnate. Calyx red or crimson, almost regular.

63. Cassia. Flowers commonly yellow. Calyx of 4 nearly separate sepals. Petals 6, spreading, unequal (the lower larger) or almost equal. Stamens 10 or 5, none of the upper anthers of the imperfect or smaller, their cells opening by a line or line at the apex. Pod many-seeded.

64. Mimosas. Calyx compositely minute, or nearly so. Petals 6, nearly equal, spreading more or less unequal. Stamens 10, differing, along with the thread-shaped styles. Pod flat.

65. Gymnocladus. Tall, thorny tree, with large compound leaves, no stipules, and dissepiments or polygamous which regular flowers, in exserted clusters or short racemes terminating the branches of the season. Calyx a bell-shaped cup, and with 5 spreading lobes, the throat bearing 5 adnate petals and 10 short stamens, three of these fertile flowers generally imperfect. Pod oblong, flat, very hard, tardily opening, with a little pulp or seminal matter inside, containing few or several large and thick hard seeds (over 1 in diameter); the finely-cut leaves remaining disintegrated in the pod.

66. Glehnia. Thorns tree, with usually twice pinnate or some of them once pinnate leaves, the leaves often crease-marked, inconspicuous stipules, and small greenish-polygamous flowers in narrow racemes. Calyx a bell-shaped cup, the lobes and the 2-3 nearly similar petals narrow and spreading. Stamens 10-16. Pod flat, very tardily opening, often with some whitish matter around the 1-3 several flat seeds. Cotyledon thin.

III. MIMOSA FAMILY. Flowers perfectly regular, small, crowded in heads or spikes; both calyx and corolla valvate in the bud; and the 4 or 5 sepals usually and petals frequently united more or less below into a tube or cup. Stamens 4, 5, or more, often very many, usually more conspicuous than the corolla and brightly colored, the long cylindrical filaments inserted on the receptacle or base of the corolla. Embryo of the seed straight. Leaves almost always twice pinnate and with small leaves, or apparently simple and parallel-veined when they have phyllodium in place of true leaves. The foliage and the pods only show the leguminous character.

67. Mimosas. Flower regularly united, 4-10. Pods hard or nearly so, with brown-colored or black flowers, and leaves of many small leaflets.

68. Sorrhavia. Calyx commonly minute or inapparent. Corolla of 4 or 5 petals or less united sepals. Pod flat, oblong or linear, when ripe the valves fall out of a persistent slender margin or frute and also usually break up into numerous leaflets.

69. Adenanthera. Calyx minute, corolla filaments from the 5 petals being united up to the middle. Stamens 10. Pod rough-prickly all over, long and narrow.

70. Desmatocarpus. Calyx broad-cordate. Corolla of 6 separate petals. Stamens 6 or 10. Pod flat, smooth, linear or oblong, 3-valved, no persistent margins.

71. Senna monosperma, or more than 10. Pods all sterile or trees.

72. Albizia. Flowers flesh-color, rose-color, or nearly white; the long stamens mereossus of the base. Corolla tubular, the 5 petals united beyond the middle. Pod flat and thin, broadly linear, not opening elliptically. Leaves twice pinnate.

73. Adenanthera. Flowers yellow or straw-color; the stamens separate and very numerous. Corolla of 4 or 5 separate or partly united small petals. Pod various.
1. **LUPINUS, LUPINE.** (Old Latin name, *from lupus*, a wolf, because Lupines were thought to destroy the fertility of the soil.)

- *Wild species of Atlantic N. is woody and / in spring.*
- *Grown as ornamentals: / in summer.*

L. *perennis, Wild L.* Somewhat hairy; with erect stem 2-4 ft. high, 1-1' quadrilateral oblong or oblong-ovate green leaves, and a long raceme of showy purplish-blue (rarely pale) flowers, in late spring.

L. *villosa, One-leaved L.* Silky-downy, with short spreading or ascending stems, oblong or long-ovate; simple leaves, and a dense raceme of blue, purple, or rose-colored flowers. Near the coast, from North Carolina.

2. **CROTALARIA, RATTLEBOX.** (From Greek word for rattle, the seeds rattling in the constricted inflated pod.) Native in sandy soil; / in summer.

C. *angustata.* Low; 3-6" high, branching, bear with rusty-colored spreading hairs, with nearly smooth or hairless oblong leaves, and 2 or 3 flowers on the peduncle.

C. *ovata.* Spreading, rough with appressed hairs; leaves short-petioled, ovate, oblong, or lanceolate; peduncle with 3-5 scattered flowers.

3. **GENISTA, WOAD-WAXEN, WHIN.** (Celtic word: little bush.)

G. *tinctoria, Dwarf W., or Green-waxen. Native from Eu. in sterile soil / in summer.

G. *vacillans,* running wild ', especially in Mass. - low and undershrub, not thorny, with lanceolate leaves, and bright yellow rather small flowers somewhat masses at the end of the alternate-angled green branches, in early summer.

4. **CYTRUS.** (Ancient Greek name, after an island where it grows.)

The following are the only species generally cultivated.

C. *or Scrothamnus* acarpianus, Scrotum Raccoon. Shrub, from Europe; 2-3' high, smooth, with long and rough erect angled and green branches, bearing small leaves, the lower short-petioled and with 3 ovate oblong, the upper of a single ovate leaf, and in the sparsely and showy golden yellow flowers on slender pedicles; calyx with 2 short and broad lips; style and stamens slender, hold in the seed, but dehisced and suddenly springing upward when pressed (as when bees alight on the colored head), thus causing spirally; pod hairy on the edges. Hardy in gardens S. running wild in Virginia; / in early summer.

Lupin Raccoon, so called, but is from Portugal, is another species, less hardy.

Scrotum Raccoon is Scrotium Zuncum, of another genus.

C. *Scrophularia, from the Citrus Islands, is cultivated in conservatories; a shrub with crowded slender branches, soft-leaved leaves of 3 very small oblanceolate oblong leaves, and small yellow sweet-scented flowers, produced all winter.*
5. LABURNUM. (Ancient Latin name. Genus represented from Cytisus from the different appearance, and the seeds deficient of spheroidal or appendage at the base.)

L. vulgaræ, Common Laburnum, Goldchain, or Beak Trefoil. Tree of Europe. Planted for ornament, a low tree, with smooth green bark, slender-petioled leaves of a shining texture (5" - 6" long), and pretty large showy golden-yellow flowers hanging in long racemes, in late spring; pods with one thicker edge.

6. TRIGONELLA. (Old name, from Greek word for triangular, from the shape at the corolla or the seeds.) Low herbs. T. cernella is the plant used in Switzerland for impeding the flow like that of Melilot in certain kinds of cheese.

T. Perennis-Gracilis, Finemarch. Occasionally cut, in gardens, in Europe a large and popular medicinal plant, strong-scented; with wedge-shaped leaves, one or two nearly sessile small flowers in the axils, yellowish or whitish corolla, and a long long-pointed and somewhat curved pod 3" - 4" long, with very sides.

7. MEDICAGO, MEDIC. (The Old name of Lucerne, because it is come from the Greeks from Medon.) All natives of the Old World: a few have run wild here.  
- Flowers violet-purple or blue.
- Flowers yellow.

M. sativa, Lucerne or Spanish Trefoil. Cultivated for green fodder, especially M. sativa, lucerne erect, 1" - 2" high, from a long deep root; leaves oblong-elliptical; racemes elongate; pod several-seeded, linear, called about 2 turns.
- Flowers violet-purple or blue.

M. lupulina, Black Medick. Nonnative. A weed of pasture plant, in dry or sandy fields, &c.: low, spreading, downy, with wedge-shaped leaves, roundish or at length oblong-elliptical or spikes of small flowers, and little kidney-shaped 1 seeded pods turning black when ripe.

M. moschata, Sweetpea M. Sweet-scented flowers, S. & E.: spreading or bushy; with broadly heart-shaped leaves marked with a dark spot, 3-5-flowered pedicels, and a flat pod compactly ended three or more turns, its thickest edge bent with a double row of curved prickles.

M. dentata, like the last, but rare, with pod of lesser coats, sharp edges, and mostly shorter prickles.

M. scutellata, Small Medick, Buckwheat. Cult. occasionally in gardens for its curious pods, which are pretty large, ended up like a small-shell, in many turns, smooth and even.

8. MELILOTUS, MELLOP, SWEET CLOVER. (From Greek words for honey and Latex, 1. e. Sweet Latex: honey-sweet-scented, especially in drying.) Natives of the Old World: somewhat cultivated in gardens, &c., and running wild in waste or cultivated ground. All summer.

M. albus, White M. Buckwheat or Tree Clover. Tall, 2" - 6" high, branching, with oblong or oblong-elliptical somewhat narrowed at the end, and loose racemes of white flowers. Has been cult. for green fodder.

M. officinalis, Yellow M. Like tall, 2" - 3" high, with merely blunt lobes and yellow flowers.

9. TRIFOLIUM, CLOVER, TREFOIL. (Latin name: three leaves.)
- Low, spheroidal seeds, nat. from Europe in dry waste fields, &c.
- Flowers yellow, in round heads, produced through late summer and autumn, reflexed and turning chestnut-brown, dry and papery when dry.

T. agrestiun, Yellow Hare-C. Smooth, 6" - 12" high, with oblong-oblong-elliptical leaves all near the summit or at the end of the period; heads rather flat.

T. pratense, Low Hare-C. Smaller, spreading, rather downy, the wolfsgarvan leaves much at the edge, the middle one at a little distance from the others.
DALEA. (Nutmeg for n
coln or linCl-obilong lea
tets, long-peduncled spikes, with wk-pointed
flowers in a dense spike, in summer.

10. PETALOSTEMON, PRAIRIE CLOVER. (Name composed of the Greek words for petal and straw combined.) In prairie, pine-barrens, &c.

11. DÁLEA. (Named for an English botanist, Thomas Dale.) There are many species S. W. beyond the Mississippi.

12. AMORPHA, FALSE INDIGO. (Name, amorphe, wanting the ordinary term, from the absence of four of the petals. There are usually five sepals to the flowers. P. 3.)

A. fruticosa, Common A. Riverbanks from Penn. S. & W.; a tall or middle-sized shrub, smooth, with pointed leaves of 12—25 cm or alligating leaves, violet or purple flowers in early summer, and nearly 2-angled pods.

A. herbacea, Berg 234; it is not an herb of low plains. 20—32 cm high, often downy; but the leaves more rigid, dotted, and striped, villose, calyx-teeth, lower blue or white flowers, and 1-angled pods.

A. canescens, called AMORPHA; it prostrates and on rocky banks W. and N. W.; 0—30 high, bluish with soft down, with small leaves of 22—30 elliptical leaves, smooth well when old, violet-purple flowers in late summer, and 1-angled pods.

13. Psoraeria. (Greek, wood for scoria, from the roughish bark or branches on the trees, calyx, &c.) Wild S. & W.; if early summer, violet, bluish, or almost white. 2

* Leaves primarily stipulate, i. e. the side-leaves a little below the apex of the common points, or the uppermost of a single leaflet.

P. Oenothera, River-banks. Ohio to Illinois and S. 30—50 cm high, nearly smooth, with lanceolate crenate-pointed leaves 3—5 cm long, small flowers in short-peduncled racemes 30—60 cm long; tuberous and wrinkled.

P. milioides, Dry plains. W. & N.; 15—20 cm high, somewhat paler, slender, with lanceolate or lance-oblong leaves, oblong spikes on long peduncles, and strongly wrinkled pods.

* * Leaves stipulate, of 3—7 leaflets.

P. Lupinus, Dry plains. 3—7 cm high, slender and slender, with 3—7 very narrow or thread-shaped leaves, small flowers in loose racemes, and oblanceolate wrinkled pods.

P. norlandicus, Prairies from Illinois S. W.; bushy-branched and slender, 20—30 cm high, somewhat hairy when young, with 3—5 linear or oval-oblong much-dotted leaves, small flowers in short-peduncled racemes, and glabrous-unconspicuous pods.

P. canescens. Dry plains. 3—7 cm high, long-petioled, with 3 (or upper leaves of single) oblong leaves, some racemes of few flowers, and a smooth pod.

P. argophylla, Prairies N. W., mostly across the Mississippi, widely branched, 1—30 cm high, silvery white all over with silky hairs, with 3—5 broad-lanceolate spikes of rather few large flowers.

P. esculenta, FLOWER BLANCHE of the N. W. Voyagers; the trumpet-shaped or tubular flowers, containing a desirable food to the Indians N. W.; low and stout, 30—150 cm high, rough-hairy, with 3 lance-oblong or oblong leaves, a dense oblong spike of pretty large (3 cm long) flowers, and a hairy pointed pod.

14. OENOTHERA, SAINFOIN. (Name from Greek, means Assainmold.)

O. sativa, Common S. Springing cult. from Europe as a fodder plant, but not quite hardy N.; herb 15—20 cm high, with numerous oblong small leaves, brown and thin pointed stipules, axils, and spikes of light pink flowers on long axillary peduncles, in summer, the little semicircular pod bordered with short prickles or teeth. 30

15. STYLOPHANTES, PENCIL-FLOWER. (Name from Greek stylos, rod, and phantes, the calyx being raised on its stalk-like base.

The application of the popular name is not obvious.)

S. elato, of paniculata from New Jersey and Illinois S., is an insignificant low herb, in tufts, the wiry stems downy on one side; leaves lanceolate, with strong straight veins; flowers orange-yellow, small, in little clusters or heads, in late summer. 42
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17. DESMODIUM, TIECK-TREFOIL. (Name from Greek, means-bound together, from the connected joints of the pod.) 2

We have many native species, common in open woods and copses; fl. late summer; the following are the more common.

§ 1. Native species: the little joints of the pod adhere to clothing or to the coats of animals; flowers sometimes turning greenish on withering.

= Pod raised; five seeds, on slender stalk of the same, straightened on the upper surface, divided from base into not more than 4 points; flowers in one-rayed, solid terminal cyme of peduncles; petals white, 1½-3½ high; stipules bristle-like.

D. nudiflorum. Flowers-stalk and leaf-bearing stem rising separately from a common root; the leaflets all crowded on the summit of the latter, and with broadly ovate bluish leaves, pale beneath.

D. acuminatum. Flowering-stalk terminating the stem, which bears a cluster of leaves, the large leaflets (4½-5½ long) round-ovate with a tapering point, or the end one-bladed, given below.

= Pod little if at all raised above the edge.

= Stems erect, 30-60 high; stipules large, ovate or lanceolate and pointed, strigous, puberulous, but deciduous. Flowers large for the genus; racemes peduncled; pods of 3-7 rhomboidal joints, each joint about ½ long.

D. cuspidatum. Very smooth, with a straight stem, lanceolate and taper-pointed leaflets (3½-5½ long) longer than the common petals, and pod with unequal joints.

D. capitatum. Leafy, with branching stems, pale leaves; the ovate bluish-lavender leaflets about the length of the common petals, oblanceolate at both sides roughish with fine close pubescence; joints of pod very adhesive.
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Stems erect, 2° - 4° high; leaves broadly obovate or obovate-oblong, small, thickish, roughish and reticulate, 1° - 2° long, longer than the common petiole.

D. Dillenii. Stems and the oblong or oblong-obovate blades very thin leafeets finely pinnatifid; the latter 2° - 3° long.

D. paniculatum. Smoothly so throughout; leaflets lanceolate or lance-oblong, tapering to a blunt point, 3° - 4° long; palmate bloom.

D. strictum. Stems erect thin below, above and the narrow petiole rough-ovate-lanceolate; leaflets linear, blunt, reticulate, very smooth, 1° - 2° long. From New Jersey S.

D. Canadense. Stem hairs: 3° - 5° high; leaf, up to the petiole; leaflets lance-ovate-oblong, blazed, 2° - 3° long; racemes dense, the pink-purple flowers larger than in any other, fully 3° long; leaves large, conspicuous before flowering. Chiefly N.A.W.

D. sessilifolium. Stem pubescent, 2° - 4° high; the long petiole naked; common petiole barely any; leaflets linear or lance-oblanceolate, blunt, reticulate, rough above, barely beneath; flowers small. Penn. to Ill. & S.

D. viridiflum. Commonly in two sets of smallish, 2° - 3° long; stipules and leaves awn-pointed and deciduous; petiole naked, base; flowers small of 2 or 3 small seed or roundish pods.

D. rigdum. The largest of this section, with rough-pulvinate stems sometimes erect; leaflets near-oblanceolate, blazed, thickish, roughish and reticulate, 1° - 2° long, longer than the common petiole.

D. cilare. More or less hairy; slender, very leafy; common petiole very short; leaflets round-ovate to obovate, thickish, 1° - 1½ long.

D. Marilandicum. Smooth of nearly so, slender; leaflets ovate or roundish, sick, the lateral ones about the length of the slender petiole: otherwise like the preceding.

D. lineatum. Stems smooth; stems irregularly oblong or oval, thickish, 1° - 1½ long.

D. rotundifolium. Soft-hairy; stems running 3° - 5° along the ground; leaflets orbicular, about 3° long; stipules ovate, entire, taper-pointed, persistent; flowers and the 2 - 3 clawed-ovate points of the pod rather large.

§ 2. Exotic, conservatory species.

D. gyranus, of East Indies, one of the most extraordinary plants known, to really grown as a potted animal: the smooth leaves are remarkable for their movements; the leaf slowly changing position with the light; the lateral ones, very much smaller, moving very rapidly up and down, in elliptical sweeps, through the day when the temperature is about 80° Fahr.

18. SCHYNOMENE, SENSITIVE JOINT-VETCH. (From Greek word meaning ensnared, the leaflets of some species being more or less sensitive to the touch in the manner of the common Sensitive Plant.) Species commonly in two sets of 5 each. Pod resembling that of Desmodium.

D. hispida. Stem rough-bristled, 3° - 4° high; leaflets very many, broadly linear; joints of the bristly pod 6 - 10, nearly square. Low grounds from Penn. S.

D. viscidula. Stems clumsy-pulvinate, slender, spreading on the ground; leaflets 7 - 9, oblong; joints of the bristly pod 2 or 3, hairless or hirsute, hardly shorn S.
20. **ARACHIS, PEANUT, GROUND-NUT.** (Meaning of same obscure.)

A. hypogaea, the only common species, originally from South America, cult. N.; the nut like pods familiar, the oily fatty seeds being largely eaten by children, either raw or roasted.

21. **SEBANIA.** (Azure name Selen, a little altered.) Fl. late summer.

S. macrocarpa, wild in swamp S. is tall, smooth, with linear-oblong leaves, few flowers, on a peduncle shorter than the leaves; the calyx yellow with some reddish or purple, followed by linear nectar hanging pods 8" - 12" long, containing many seeds.

S. venosa (or *Tephrosia floridana*), in low grounds S. resembles the preceding in flowers and small yellow flowers, but has a broadly oblong angled pod, only 1" or 2" long, pointed, raised above the only on a short stalk of its own, soft, 2-seeded, the pods remaining encased in the bluish white lining of the pod when the outer calyx have fallen.

S. grandiflora (or *S. grandiflora*), a slender or treelike plant of India, rare wild in Florida, occasionally cult. for ornament S., has very large flowers, 3" - 4" long, white or red, and slender hanging pods 10" or so long.

22. **CARAGANA, PEA-TREE.** (Tuatar name.) Natives of Siberia and China: planted for ornament, but uncommon, scarcely hardy N.

C. arborescens, *S. floridana*. Prickly or low tree, with spiny stipules, 4 - 6 pairs of obovate obovate leaves, a soft tip to the common pedicel, and solitary yellow flowers, in spring.

C. triflora has soft stipules, and only 2 pairs of obovate leaves crowded at the summit of the petiole, which is tipped with a spiny point.

C. Chamaiga, Chinese P., a few or spreading shrub, has 2 rather distant pairs of smooth ovate or oblong leaves, the stipules and tip of the pedicle spiny.

23. **INDIGOPERA, INDIGO-PLANT.** (Name means producer of indigo.) One or two perennials, sometimes with woody base, and numerous small flowers in racemes of S. Growth, in dry soil - d. common.

I. Caroliniana. Wild from Carolina S.; smooth leaf, with 10 - 15 oblong or obovate pale leaves, raceme longer than the leaves, flowers soon brownish, and oblong pods only 2-seeded.

I. tinctoria. This and the next furnish the indigo of commerce, were cult. for that purpose S., and have rusted in waste places: woody at base, with 7 - 15 oval leaves, raceme shorter than the leaves, the dark blue knobly terminal pods curved and several-seeded.

I. Anil differs mainly in its flatish and even pods thickened at both edges.

24. **TEPHROSIA, HOARY PEA.** (From Greek word meaning hoary.) Native plants, of dry, sandy or barren soil, chiefly S.; B. common.

T. Virginiana. Called *Carag*, from the very tough, long and slender roots white silky-downy, with erect and simple stems 1" - 2" high, 17 - 20 linear-oblong leaves, purplish large and numerous flowers yellowish-white with purple, and downy pods. Common N. & S.
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23. *Stenos branch, often spreading or decumbent; leaves scattered; racemes appressed or spreading; flowers small; petals or sepals 4-5; pods persistent or rusty.

T. canadensis. From Delaware S.; 1-2 ft. high, loosely softly-hairy, with 9-10 winged-oblong or oblong-obovate, flowers, few and scattered; racemes 4-5; pods persistent or rusty.

T. hirsuta. From Virginia S.; low, closely pubescent or smooth, with 11-15 oblong, small, broad, obovate, or obovate-oblong, the lowest pair above the base of the pod, and 2-4 small red-purple flowers.

T. chrysophylla. From Georgia S. & W.; nearly prostrate, with 3-7 winged-oblong leaves, smooth above and yellowish, silvery beneath, the lowest pair close to the stem; flowers as in the last.

26. ROBINIA, LOCUS-TREE. (Dedicated to two early French botanists.) Native of America, Europe, and Southern Asia, planted, and the common Locust running wild in the south and eastern states.

R. pseudacacia, Common L. of false Acacia. Tree of valuable timber, with naked branches, slender, and loose hanging racemes of fragrant white flowers, and smooth pods.

R. viscosa, COMMON L. Smaller tree, with clanny branches and stamens, very short pedicles, short and dense racemes of finely rose-colored sericeous flowers, and rough clusters of pods.

R. hispida, Bayberry L. or Rose-Acacia. Ornamental shrub, with branchy branches and stamens, broad leaves, curled into a long, large, and showy bright rose-colored flowers in close to loose racemes, and clanny briefly peled.

28. COLUTEA, BLADDER-SENNA. (Dedication of none obscure; the English name refers to the bladdery pods and to the leaves having been used as a substitute for those of Senna.)

C. arborescens, Common H. European shrub, planted in gardens, with 7-11 oval and rather truncate leaves, a raceme of 3-10 yellow flowers, in summer, succeeded by the large, very thin-walled, closed pod.

C. torquata, Oriental R., with oblong, notched leaves, lower flowers suffruticose-colored or greenish, and pods opening by a little slit before they are ripe, in scarlet harsh S.

27. ASTRAGALUS, MILK-VETCH. (Old Greek name of the ankerhorn and of some leguminous plant; application and meaning uncertain.)

Very many native species west of the Mississippi.

A. Canadensis. River-banks, the only widely common species; rather coarse, 1-4 ft. high, slightly pubescent, with leaves of narrow leaves, long dense spikes of greenish cream-colored flowers, in summer, followed by small and verrucose ovate pods, completely divided by a longitudinal partition.

A. Cooperi. Gravity shore, N. & W.; resembles the preceding, but another, 1-2 ft. high, with small white flowers in a short spike, and inflated ovate pods about 1 in., thin-walled, and not divided internally, it is early summer.

A. glaber. Pin-barrens S.; nearly smooth, 2 ft. high, with very many oblong-linear small leaves, loosely milky-flowered spikes of white flowers, in spring, succeeded by oblong curved and flabellate, 2 ft. long, 2 ft. wide, and divided internally; it is early summer.

A. caryocarpa, Quicks Pian, of the Western superiors, so called from the fruit, which is of the size and shape of a small plum, and flabby, but becoming dry and corky, very thick-walled, a short spike; the plant low, smooth, with many small narrow oblong leaves, and short racemes or spikes of violet-purple of nearly white flowers, in spring; common along the Upper Mississippi and W. coast S. on the plains.

A. villosus. Pin-barrens S.; low and spreading, loosely hoary-hairy, with about 12 oblong leaves much of the end, a short and oblong, narrow, ovate spike of small yellowish flowers, in spring, and an oblong-hinged curved and soft-hairy pod, its cavity not divided.
29. **A PIOS, GROUND-NU T, WILD BEAN.** (Name from Greek word for poor, from the shape of the tubers.)

- **A. tuberosa.** Wild in low grounds; subterranean shows bearing strings of edible fumarious tubers. 1' - 2' long; stems slender, rather hairy; leaves ovate-lanceolate; flowers brownish-purple, violet-veined, crowded in short and thick racemes, in late summer and autumn.

30. **ERYTHRINA.** (From Greek word for red, which is the usual color of the flowers.)

- **E. herbacea.** Wild in sandy soil near the coast S.; sending up herbaceous stems 2' - 4' high from a thick woody root or base, some truly the most beautiful broadly lanceolate-ovate; others nearly leafless, terminating in a long erect raceme of narrow yellow flowers, of which the straight and folded lanceolate standard (2' long) is the only conspicuous part; semi-evergreen; d. spring.

- **E. Crista-galli.** Cult. in conservatories, from Benul; with a tree-like trunk, oval or oblong leaves; and loose racemes of crimson large flowers, the keel as well as the broad spreading standard conspicuous, the rudimentary wingshidden in the calyx.

31. **PHASEOLUS, BEAN, KIDNEY BEAN.** (An ancient name of the Bean.)

- **P. perennis.** From Connecticut and Illinois S. in woody places; slender stems climbing high; leaves roundish-ovate, short-pointed; racemes long and loose, often pointed; flowers small, purple; pods drooping, semiterete, five-valved. 1.

- **P. diversifolius.** Sandy shores, i.e., spreading on the ground, with rough hairy stems, ovate entire or commonly 3-lobed or angled leaflets, peduncles once or twice the length of the leaves, bearing a small cluster of purplish or at length greenish flowers, and linear to roundish straight pods. 2.

- **P. hovolus.** Sandy soil, from New Jersey and Illinois S.; more slender than the preceding, somewhat twining a little, with the ovate or oblong leaflets entire or short-pointed, with reddish or brownish flowers, and small racemose racemes of crimson small flowers, the seed very small, in pods narrow, flat, and hairy. 3.

- **P. purpureus.** Common Kidney, String, and Pole Bean. Twining, with racemes of white or sometimes dull purplish or variegated flowers shorter than the leaf, linear straight pods, and small seeds. Many varieties, among which may be reckoned the next.

- **P. nuris, Dwarf or Field Bean; low and bushy, not twining; seeds very small.**

- **P. lunatus, Lima Bean, Sieva B.** Twining, with racemes of small greenish-white flowers shorter than the leaf, and broad and curved or semiterete pods, containing few large and flat seeds. 5.
P. multiflora, Spanish Bean, Scarlet Runner when not-flowered; twining high, with the showy flowers bright scarlet, or white, or mixed, in profuse racemes surpassing the leaves; pods broadly linear, straight or a little curved; seeds large, bright, white or colored.

P. Caracas, small-flowered. Stem twining extensively, rather woolly below, from a tender root; leaves rhombic-oblong, taper-pointed; racemes longer than the leaf; flowers showy, 2' long, white and purple; the standard as well as the very long-awned keel spirally twisted, giving somewhat the appearance of a millet-head.

D. dolichos, Black Bean. (Old Greek name of a Bean, meaning elongated, perhaps from the tall-climbing stems.)

D. lablab, Egyptian or Black Bean, cult from India, for ornament and sometimes for food, in a smooth twiner, with elongated racemes of showy violet, purple, or white flowers, 1' long, and thick and broadly oblong pointed pods; seeds black at maturity with a white scar.

D. sinensis, China Bean, the melonophthalmus, Black-eyed Bean, with long pods bearing only 3 or 2 (white or pale) flowers at the end; the beans (which are good white with a black circle round the scar, is occasionally met with.

G. galactia, Milk-PEA. (From a Greek word for milky, which these plants are not.) There are several other species in the Northern Atlantic States; a rare one has purplish leaves. Fl. summer.

G. glabra, Sandy wild from New Jersey; pinnate, nearly smooth, with rather rigid ovate-oblong leaves, their upper surface shining, a few rather large non-purple flowers on a peduncle not exceeding the leaves, and a 4-6-seeded at length smoothshelled pod.

G. mollis, Sandy bushes, from Maryland; spreading, seldom twining, not-ovate and hairy, even to the 8-16-seeded pod; racemes long-peduncled; many-flowered; leaves small.

A. monophylla. A slender much-branched twiner, with brownish-hairy stems, leaves of 3 rhombic-oblong thin leaflets, and numerous small plume purple flowers in clustered drooping racemes, having the more fertile stamens more; the tinged pods of the latter hairy; herbage generally fed upon by cattle; fl. late summer and autumn.

C. Virginianum, Sandy woods, chiefly S.; trailing and low twining, slender, muchbranched with minute hairs; leaflets varying from oval-oblong to linear, very slender, shining; the 1-4-flowered peduncles shorter than the leaves; the showy violet-purple flowers [1'-4'] long, in summer.

C. macrantha, our only species, in dry ground from New Jersey S.; smooth, with erect or slightly twining stem (1'-6' high), ovate-oblong leaflets pale brown, very showy light blue flowers 3'-3' long, single or 2-3 together on a short peduncle, and a few-seeded straight pod; fl. summer.

H. C. mollis, a choice greenhouse plant, has leaves of a single oval or lanceolate leaflet 3' or 5' long, and slender racemes of small violet-purple flowers; whole plant smooth.
38. **KENNEDYA.** (Named for a distinguished English botanist.) Australian plants, of coarse cultivation in conservatories.

K. rubicunda, a hairy, free-climbing, with 3 ovate leaves, and 2-4
flowered pedicels; the dark red or crimson flowers over 1" long.

39. **RHYNCHOSIA.** [Name from the Greek, means foxtail, of no obvious application.] Climax Southern; f. summer.

R. tomentosa. Low, soft-haired, in several varieties, erect, spreading, or the taller forms climbing more or less, with one or three round or sometimes oblong-ovate leaves, and clusters or tufts of small yellow flowers. Dry sandy soil, from Maryland to.

R. galactoides. Bushy-branched, 3'-4' high, not at all disposed to twist, minutely pubescent, with 3 small and rigid oval leaves, hardly any common period, and scattered flowers in the upper axils, the standard reddish outside. Dry sand-beds, from Alabama.

40. **PISUM, PEA.** (The Old Greek and Latin name of the Pea.)

P. sativum, **Common Pea.** Cult. from the Old World; smooth and glaucous, with very large leafy stipules, commonly 2 pairs of leaflets, branching tendrils, and pedicels bearing 2 or more large flowers; corolla white, bluish-purple, or purplish-colored; pods rather fleshy.

41. **LATHYRUS, VETCHLING.** (Old Greek name.) Some species clearly resemble the Pea, others are more like Vetches. FL. summer.

- Cult. from En., for ornament; some and podcs winged; infest the soil.

L. odoratus, **Sweet Pea.** More or less rough, hairy; leaflets ovate or oblong; flowers 2 or 3 on a long peduncle, sweet-scented, white with the standard rose-color, or purple, with varieties variously colored.

L. latifolius, **Evergreen Pea.** Smooth, climbing high; stems broadly winged; leaflets ovate, with parallel veins very conspicuous beneath; flowers numerous in a long peduncled raceme, pink-purple, also a white variety, scented.

- Native species: stems winged or merely stippled; infests 2-8 pairs.

L. martius, **Rex Pea.** Sea-shore of New England especially N., and along the Great Lakes: about 1' high, leafy, smooth, with stipules nearly as large as the 5-15 oval crowded flowers, and the pedicels bearing 6-10 rather large purple flowers.

L. venosus. Short banks W. & S., climbing, with 10-17 more scattered ovate or oblong leaves, often downy beneath, small and slender stipules, and pedicels bearing many purple flowers.

L. ochroleucus. Hillsides and banks N. & W.: slender stems 1'-3' high; the leaflets 6-8, glaucous, thin, ovate or oval, larger than the leafy stipules; pedicels bearing several rather small lilacish-white flowers.

L. palustris. Swampy and wet grounds N. & W.; low, 1'-2' high, with or without or slightly winged stems; small lilacish stipules, 4-6 leaflets varying from linear to oblong, and pedicels bearing 3-5 rather small purple flowers.

Var. myrtifolius, common W. & E., usually appears very distinct, climbing 2'-4' high, with oblong or oval leaves, larger and more leaf-like stipules, and paler flowers.

42. **VICIA, VETCH, TARE.** (The Old Latin name of the genus.)

V. **Americana.** Common N. & W.; with 10-14 oblong and very blunt oval leaves, and purple flowers over 2" long.

V. **acutifolia.** Near the coast S.; with about 4 linear or oblong leaves, and small blue or purplish flowers.
PELSE FAMILY.

43. LENS, LENTIL. (Classical Latin name. The shape of the seed gave
the name to the glass lens for magnifying.)

44. CICER, CHICK-PEA. (An old Latin name for the Vetch.)

45. CHORIZEMA. (A fanciful name of Greek derivation.)

46. BAPTISIA, FALSE INDIGO. (From Greek word meaning 'to dye,
these plants yielding a poor sort of indigo.) foliage of most species tending
blackish in drying, nearly all grow in sandy or gravelly dry soil; h. spring
and early summer.

B. perfoliata. Low and spreading, smooth and glaucous, with simple
unlobed leaves surrounding the stem (perfoliate, probably answering to
united stipules), and single small flowers in their axils; pod small and glabrous.
Carolina and Georgia.

B. tinctoria, Common or Wild False-Indigo. Pale or glaucous,
smooth, bushy, 2-6 ft. high, with 8 small wedge-shaped leaves, hardly any
true petals; minute deciduous stipules, few-dowered racemes terminating the
branches, and small glabrous pods.
B. lanceolata. Downy when young, spreading, with 3 thickish short leaflets varying from lanceolate to oblanceolate, a very short common petiole, small deciduous stipules, and rather large flowers solitary in the axils and in short terminal racemes, the ped greenish and slender-pointed. Common in S. & S. W.

B. villosa. Minute downy, with short stems 2° high, 3 apetale-oblong or well-cordate leaves, becoming smooth above, a very short common petiole, stipules more or less persistent, and many-drewed racemes of large flowers on slender pedicels; the ped minutely downy, oblong, taper-pointed. From Carolina S. W.

* * * Flowers white, in the first croton color; three of 3 leaflets varying from wedge-shaped to oblanceolate, and flowers in long racemes terminating the branches.

B. leucophila. Low and spreading, 1° high, soft-hairy, with persistent large and leaf-like hearts and stipules, reduced one-sided racemes of cream-colored large (1' long) flowers on slender pedicels, and hairy ovate pods. Open woods, chiefly W.

B. alta. Smooth, 2°-2° high, with slender glabrous branches, slender petioles, minute deciduous stipules and hearts. Boon erect or spreading long-peduncled racemes of small flowers (°' - ' long), and cylindrical pods. From Virginia S.

B. leucantha. Smooth and glaucous, 3° - 5° high, with spreading branches, rather short pedicels, the lanceolate stipules and leaflets deciduous, erect long racemes of large (1' long) flowers, and oval-oblong pods 3' long, based on 8 stalk fully twice the length of the rachis. Alluvial soil, from Ohio W. & S.

* * * Flowers bluish-white of 3 leaflets as in the foregoing.

B. australis. Smooth and stout, pale, erect, 2°-3° high, with oblong-winged-leaved branches, lanceolate and rather persistent stipules as long as the short petiole, erect racemes of pretty large (nearly 1' long) flowers on short pedicels, and oval-oblong pods 2°-3° long, on a stalk of the length of the rachis.

47. THERMOPSIS. (From Greek words meaning that the plants resemble the Lupine.) Flowers yellow. 2

T. molliis. Wild in open woods from N. Carolina S.; downy, 1°-2° high, with spreading branches, 3 ovoid-oblong leaves, oblong-ovate leafy stipules, some of them as long as the short petiole, and long narrow-linear spreading pods destitute of the calyx. L. s. [There are two other species in the Sunflower Alleghenies.]

T. fabkes, which is erect with oval leaflets and upright pods, a sparingly cult. from Siberia, and wild in N. W. America.

48. CLADRATIS, YELLOW-WOOD. (Meaning of name obscure, perhaps from Greek for brittle branches.)

C. tinctoria (also named Virgilia picta), native of rich woods from E. Kentucky S. planted for ornament, one of the very handsomest and most of ornamental trees; with light yellow wood, plain bark like that of Beech, leaves of 7 - 11 parallel-edged oval or ovate leaflets (3'-4' long and smooth, as is the whole plant), and ample hanging pinnate (1° or more long) of pretty, delicately fragrant, cream-white flowers, terminating the branches of the season, in May or June.

49. SOPHORA. (An Arabic name altered.) There is a wild herbaraceous species beyond the Mississippi, a low shrub like one on the coast of Florida, and a tree in Arkansas and Texas which in its showy jointed pod and in appearance much resembles the following: —

S. Japonicus, JAPAN S. Planted for ornament, hardly to New England; tree 30' - 50' high, with greenish bark, 11 - 13 oval or oblong acute smooth leaflets, and loose clusters of cream-white flowers, terminating the branches at the end of summer, the fruit a string of showy 1-seeded pods.
50. CERCIS, RED-BUD, JUDAS-TREE. (Ancient name of the original species, the English name from the old notion that this was the tree under which Judas hanged himself.)

C. Canadensis, AMERICAN RED-BUD. Wild from New York S. (but perhaps not in Canada as the name implies); a small, handsome tree, ornamental in spring, when the naked branches are covered with the small but very numerous flowers; of the color of peach blossoms or redder: the rounded leaves are somewhat pointed, and the pods scarcely stalked in the calyx.

C. Siliciflora, European B. or JUDAS-TREE. Rarely hardy N., except as a shrub; has larger flowers, pod raised out of the calyx on a short stalk, and almost kidney-shaped leaves. A seeming variety of this inhabits Texas and California.

51. CASSIA, SENNA. (Ancient name, obscure meaning.) The following all are species, the first sometimes called in country gardens, and the flowers used in place of true, oriental Senna. P. stamens, in all ours yellow.

§ 1. Small, hooks, in rich or alluvial soil, with rather large leaves, deciduous shrub, flowers in short arching clusters or scapes in a panicle, and the pods short. Some of the upper-stem sepals.

C. Marilandica, WILD Senna. The only common one at the north, 3°-4° high, with 4-5 pairs of narrow-oblong, blunt and sometimes lobed, slightly glandulate in the calyx pedicel bracteate near the base, bright yellow petals often turning, which when soil, blackened shoots, and inner leaf (at first hairy) petals.

C. occidentalis, Western S. or CALIFORNIA. Common S., not from South America; 1-2° high, with 4-5 pairs of lanceolate acute leaflets, a glandulate glabrous on the base of the petiole, and low linear smooth pods to long.

C. obtusifolia. From Illinois and Virginia S.; with 2 or 3 pairs of oblong leaflets, a petiolate gland between the leaves, the flat pods in pairs, and slender curved pods to long.

§ 2. Last and smallest, smooth or roughish hairy hooks, in sandy or dry hilly soil, with persistent sepals sharp, 10-20 petals of small linear-oblanceolate shape or unguinate lobed, which are somewhat oblong, becoming when fully blushed, a roundish-shaped gland below the lowest pair, flowers compound in the axils.

C. Chamaecrista, Long-leaved Sensitivity of PLANTAGO PEA. Flowers from larger, showy, in slender peduncles, with the petals about purple-polated at base, a longstyle, and 15 equal nerves, some of the nerves widely yellow and others purple. Like the next two common.

C. pleiophylla, Stately S. Flowers small, on very short pedicels, with a short style, and 6 nearly equal anthers.

52. CANELIOPSIS. (Named for the early Italian botanist Canella.)

One species of tropical America, cult. in some conservatories, is planned out in Gulf States, etc.

C. pulcherrima (also called POSEYAN TURCHEENIAL, BARRADIERS FLOWER-PENST. Small tree, prickly with two-pinnate leaves, numerous globular flowers in short racemes, all large, with yellow flowers, the short-stalked petiole and edged-edged petals 1° long and reddish-orange, and the capillary filaments 5° long.

53. SIMONOCLODA, KENTUCKY COFFEE-TREE. (Name from Greek words for wooded branch, the branches being very stout, and when the leaves have fallen appearing branches of spruce.)

G. Canadensis. The only species, a fine ornamental and timber tree, wild from W. New York S. and especially W., with rough bark, two-pinnate leaves 2° or 3° long, each partial leaflet, bearing 7-13 ovate and stalked leaflets, except the lowest pair, which are single leaflets (2°-3° long); the leaflets
remarkable for hanging pods Widow. Flowers in early summer; opening in late summer, the large and indurated pod 9-40" long and 1½-2" wide; the seeds oval or round.

54. GLEDSCHIA, HONEY-LOCUST. (Named for the early Greek botanist, Candeb. A. The early summer, pinnate, appearing the pods late in summer. There is simple or compound; these on the slender, above 15" in length. Leaves are smooth, those of the abortive pair in succession on quite densely, smooth plants.


G. speckleri, Alas. and British Columbia. Wild in the wild from the States.

55. MIMOSA, SENSITIVE-PLANT. (From Greek word σωπτός, i.e. the movements showing an unusual facility. These are wild shrubs widely used in Texas and further S. The following are both, procumbent, or trailing, with finely toothed pods.

M. pudica, Common. S. Roots with spreading brittle hairs and somewhat prickly; the leaves very sensitive to the touch, with many numerous linear leaves on 2 pairs of branches of the common pods, covered on the tips, so as to appear digested; flowers orange-purple, in scattered axillary heads, in summer. Usual from South America.

M. strigillosa, With S. Roots with spiny, small, sharp, prickly; leaves 3 or 6 pairs of branches of the common pod, each bearing 10-14 pairs of oblong-linear pods, if ever necessary; seeds hard on very long pod. Wild in the wild from the S. to S. summer.

56. SCHIRANKIA, SENSITIVE-BRUSH. (Named for a German botanist, Schirank. Two species widely in the eastern part of N. W., spreading on the ground, appearing much alike, with leaves varying from the Sensitive Plant, but not under much handling; flowers orange-purple, small, in globular heads on axillary peduncles, in summer.

G. umbilica. Stems, petals, peduncles, and oblong-linear short leaflet much smaller. Pods broad with rather smooth hooked prickles; leaves opposite, flattened with small epicarps underneath.

G. angustata. Pods scattered, slender, and less hooked; leaflets oblong-linear, not recurved; seeds slender, taper-pointed.

57. DESMANTHEUS. (Greek name, meaning that the flowers are bowed together; they are rarely crowded in a head. A few species very far S., and the following W.

D. brachylobus. Prairie from Illinois S. & W.; nearly smooth, 10-40" high, erect, with 4-15 pairs of partial petals, each bearing 20-30 pairs of very small narrow leaves, one or more gland on the main petiole; small heads of white flowers, followed by short 2-3-seeded pods; summer.

58. ALBLIZELLA, SILEN-FLOWER. (Named for an Indian botanist.)

A. Julibrissin, SILK-FLOWER of Silk-Thread, from Asia, planted for ornament S.; a small tree, with leaves of numerous pairs of partial petals, each bearing about 60 oblong rose-purple flowers, and the silky threads in the fruit (giving the popular name), being mainly conspicuous; pod 6-8" long, oblong-linear, very flat and thin.
LEMONIUM, oft called "lemon-plant," is a common name for species of the genus Citrus, which includes the lemon (Citrus limon), lime (Citrus aurantifolia), and many other citrus fruits.

**89. ACACIA.** (Ancient Greek and Latin name of Acacia trees; one species yields Gum Arabic.) No native species north of Texas. The following are exotic shrubs or trees, cult. in conservatories S., and one of three planted or run wild for S.

**A. Obtusifolia.** Native of South America; not along the Gulf of Mexico; sometimes cult., a finely smooth shrub, with pairs of short prickles along the branches, small linear leaves, small heads, on short peduncles (2 to 3 together) of yellow very sweet-scented flowers, used by the perfumers. The plant also yields gum. Pod thick, palisade, or pithy within.

**A. Dalisbata, of Australia:** a fast-growing small tree, not prickly nor thorny, but whitened with minute obscure down or minutely; with leaves of 10 to 20 pairs of partial petals (a little plant on the main petiole between each pair), and very many pairs of closely set and minute linear leaves; the bright yellow flowers in globular heads collected in an ample very open raceme or panicle, odorous.

**§ 3.** Only the leaves of the median twin-paniculate, the rose single and entire mostly bluish-purple petals parted phyllodes, Linn. p. 60, standing erect or instead of flowers, but otherwise including rigid single leaves. Chiefly native of Andalusia, when they are extremely common.

- Leaves short, and with only a central nerve or six.
- Linear and oblong, or almost needle-shaped, prickly-tipped, small, about 1/2 long.

**A. Juniperina.** Rigid bushy shrub, with the leaves scattered over the branches, and flowers in single small round heads.

**A. Vorticillata.** Spreading shrub, or low tree, with the leaves crowded more or less in whorls of 5 to 8 or more, and flowers in cylindrical spikes.

- **Oblong, oblong-linear, or lanceolate, not prickly-tipped.**

**A. Arbores.** Tall-growing shrub, usually with hairy branches, and with conspicuous prickly-like spikes; built mass-oblong or incurved lanceolate leaves mostly blunt, with somewhat wavy margins, feathered, not over 1/2 long; flowers in round heads.

**A. Vrontina.** Tall-growing shrub, not downy, with drooping branches, pale obliquely wedge-shaped or oblongate and curved bristly-pointed leaves, and small globular spikes of flowers in racemes.

**A. Cultriformis.** Shrubs smooth, mostly glabrous when young, with triangular or lanceolate and curved narrowly pointed leaves, of thick and firm texture, and globular heads in racemes, forming a leafy, terminal parasite.

- **Oblong, oblong-linear, or lanceolate, with 2 to 5 parallel nerves, or when very narrow only covered; flowers in slender bow or irregularly terminal spikes.**

**A. Longifolia.** Shrubs or small tree, smooth, with angular branches, and leaves varying from lance-oblong to linear, generally varying, 2-keeved, often finely wavy between the nerves.

**A. Linharia.** Left the preceding, but with leaves (2 to 10 long) very narrow-linear and with only one placenta nerve.

**38. ROSEACEAE.** ROSE FAMILY.

Plants with alternate stipulate leaves and regular flowers, with usually indefinite or indeterminate stamens inserted on the calyx, one, few, or many simple separate pistils (except in the division to which the Pear belongs), and single, few, or occasionally numerous seeds; those filled with a straight embryo. Deciduous or annual qualities (excepting the bark, leaves, and kernels of some Cherries, and the like), and furnishing the most important fruits of temperate climates, as well as the queen of flowers. We have three principal groups,
I. ALMOND or PLUM FAMILY: consists of trees or shrubs, with simple leaves, stamens free from the pistil (often minute or early deciduous, so that there may appear to be none), a calyx which is deciduous after flowering, and a single pistil, its ovary topped with a bract or bracteoles (Lesson, p. 105, fig. 210), retaining a pair of ovals, and becoming a simple drupe or stone fruit.

(Leaves, p. 129, fig. 286.)

1. PRUNUS. Calyx with a bell-shaped or urn-shaped tube and 5 spreading lobes. Petals 5, and stamens 5 or fewer in number, or many, sometimes numerous, inserted on the base of the calyx. Flowers white or rose-colored.

II. ROSE FAMILY: proper. consists of herbs or shrubs, with stamens either free from or united with the base of the pistil, calyx persisting below or around the fruit, which is composed of sometimes one but commonly several or many distinct fruits.

1. Cercis: with a thin, sickle-like calyx, and a 10-merous, or compound flower, deciduous in early deciduous, so that there may appear to be none), a calyx which is deciduous after flowering, and a single pistil, its ovary topped with a bract or bracteoles (Lesson, p. 105, fig. 210), retaining a pair of ovals, and becoming a simple drupe or stone fruit.

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17. PHTHIA. Tree, or shrub, with minute, evergreen flowers in clusters or corymbs. Calyx with 4 or 5 lobes or accessory spreading lobes. Petals none. Flowers small, petals none. 

18. ALCHEMILLA. Low herbs, with pinnately lobed or compound leaves, and minute, evergreen flowers in clusters or corymbs. Calyx with 4 lobes and 4 outer or accessory spreading lobes. Petals none. Flowers small, petals none. 

20. AGROSTIS. Herbs, with broadly ovate leaves, and white, purple, or greenish flowers sometimes showy, in dense, leafy spikes or long, erect panicles. Calyx with a short, stipitate, closed tube, terminated by 4 broad and petal-like, in length, linear, linear-lanceolate, petals none, styles 4-12 or more, with long and slender projecting styles. Flowers small, petals 4. 

21. BOISDA. Shrubs, or shrub-like trees, with shiny, inconspicuous flowers. Flowers small and showy. 

22. ROSA. Rubby, mostly prickly, with pinnate leaves, of 2-5 or rarely more entire leaflets, styles dilated at the base of the petals, and flowers in clusters or in corymbs terminating leafy branches. Calyx with or sometimes leafy styles which are often compound into some of them, dilated into petals. petals 5, or more in cultivation, broad, inserted along with the many stamens at the mouth of the corymbs. petals entire, with terminal styles, and one or more rare terminal styles, becoming flat or broken, enclosed in the tube of the corymb, which at fruit becomes papery and initiates a berry or peony. (Lesson, p. 125, fig. 22b) Leaves of the calyx and petals 5. Stamens numerous, or rarely only 10-15. 

* Fruit simple; the seeds solitary in a fleshy or stony fruit. 

23. CRANESBILL. Trees or shrubs, mostly with terminal leafy or terminal flowers in clusters or corymbs, or sometimes solitary, terminating the branching, the leaves lobed or incised. Styles 2-5, (or rarely 1) sepal of so many stamens. petals with a style of 2-5 (rarely one) involute cells or carpels, none of less coloring with each other. 

24. CHAMAESANDER. Trees or shrubs, with small enclosed leaves entire, whitish-ovate, incised, small, drooping flowers, and the calyx white-ovate, incised. styles 2-5-6. Fruit small, the papery calyx enclosing 2-5 6 small seed-like hairy seeds. 

* Fruit with this capulaceous or papery 7-3, capellaceous carpels in the peony. 

25. PHOTISSA. Trees or shrubs, mostly with terminal buds, sterile or simple, with many stamens, flowers constricted. petals of 2-5, dilated at the apex. Fruit berry, like the 2-6 partitions thin, or vestigial. 

* = Lyrates deciduous. 

26. AMBLOCHERIS. Trees or shrubs, not thorny, with simple leaves, rounded flowers, and upward white petals. Stems 2-3, lateral leaves, ovary of 3 ovulate cells, but each cell seen divided more or less by a proliferation of growth from its back, marking the two-ovulate fruit bractell. 

27. PYRUS. Trees or shrubs, sometimes rather thorny, with various filiform, and flowers in corymbs, or large-flowered. Styles 2-5. Flowers of 2-5 ovulate cells or in compound species, ovulate cells, which are thin and papery or carnosaceous in fruit, the discs or calyx calyx calyx. 

28. CISSUS. Trees or shrubs, with entire or many-ovulate leaves, and rather large flowers, which resemble those of Pyrus, so that the fruit, only the cells are many-ovulate and many-seeded.
1. **Prunus, Plum.** (The ancient Latin name of the Plum.) As now received, this genus comprises all the following groups, which it has been found impracticable to keep up as botanical genera. Foliage and the stems and kernels of the fruit mostly with the flavor of prunic acid, especially in the Peach and Cherries.

§ 1. **Almond and Peach.** Flowers about twice, from separate newly buds, in spring, before the leaves; the latter folded together longitudinally (exstipulate) in the bud; fruit encased, stone: the stone with wrinkled beaks.

*P. (Amygdalus) nana, Dwarf or Flowering Almond. Cult. for ornament from Asia; a low shrub, with abundant and handsome rose-colored (or by variation white) small double flowers, earlier than the long and narrow smooth leaves; calyx-tube short-cylindrical; fruit dry when ripe, with the outer part separating as a husk from the brittle stone, as in the old Apple Almond.*

*P. (A.) Persica, Peach. Cult. from Asia for the fruit, also a double-flowered, large, tree for ornament; small tree, with surpassingly rose-colored flowers, bell-shaped calyx-tube, lanceolate leaves, and globular fruit ripening a thick pulp, either clingy to or separate from the wrinkled-pitted stone. Known in a wild state, probably derived from the Common Almond, *P. (A.) communis.*

— Var. Japonica, the Nectarine, is a fruit with a smooth-skinned fruit.

§ 2. **Apricot.** Flowers about-petalled or almost sessile, from separate newly buds, in early summer, before the leaves, which are rolled up (hypanthium in the bud), close together, but with a smooth stone having general margins, one of them sharp-edged.

*P. Armeniaca, Apricot. Cult. from Armenia; a low smooth tree, with ovate and mostly rather heart-shaped leaves, white or slightly rose flowers solitary or in pairs, and early-opening fruit, of character intermediate between peach and plum.*

§ 3. **Plum and Cherry.** Flowers petalled and almost always white; shape smooth, no stone; with a smooth or somewhat roughed.

*P. domestica, Common Plum, of many varieties; tree with spreading thorny branches, and oblong or lanceolate leaves; the fruit very various in size and shape, with a flat or flattish and roughish stone. Doubtless at least in part a long-cultivated derivative of *P. insititia, Bellach Plum*, introduced in some places near the seaboard, has been used as a stock for grafting, i.e., in a little theory, the podocarp and boxwood families of the leaves, the fruit round and black.*

*P. spinosa, Sour, or Bear Thorn. Cult. or nat. in old gardens or waste places; a low tree, with spreading thorny branches; the oblong-shaped or lance-shaped leaves and petals soft glossy; fruit small, globose, purplish-black, with a rind-stone and a smoothest atrillement pulp. Probably this is the original of the Baelage.*

— *Native species of the country, but two of them have been planted for the fruit.*

They are seedling Plums rather than Cherries, although the last is supposed to be the fruit, only the Baelage Plum has an aromatic bloom on the fruit, and all have the leaves folded as in the bud.

*P. maritima, Beach Plum. Seashore and sandy soils bear the most; a scarcely thorny shrub, 3–5 ft. high, with the same or oral finely serrate leaves soft-downy underneath, short and downy; petals and globular purple or crimson fruit with a bloom (3–1 long), rather pleasant-scented, sometimes used for preserving.*

*P. americana, Wild Red and Yellow Plum. Along streams through the country; occasionally planted; a tall shrub or small tree, often theory,
with the oral or oblong and polished leaves thin, very weak, coarsely or doubly serrate, smooth when old; the globular or oval fruit (1'-1" in diameter) yellow with some red, orange, or crimson, with a pleasant juice but a tough mealy skin, the same dark-colored or margined.

P. Chickasaw. Chickashaw Plum. Planted or run wild from Penn. & W., native S. W., 2'-8' high, somewhat thorny, with long and narrow almost lanceolate acute leaves, edged with very fine teeth, a globular red fruit (1'-2' in diameter) of pleasant flavor, thin-skinned, and containing a bumpy-less almost globular stone.

* 9. Cherries of the Carolina Cherry sort, i.e., those flowers in medicine, from separate lateral buds, in groups, with or without spreading the leaves, which are placed together in the bloom.

P. Carminus, Garden Red Cherry. Cult. from Eng. a tree 10'-20' high, with slender spreading branches, oblong and lanceolate acute leaves, rather large flowers do not spread pedestrians and somewhat spreading the leaves, and an oval red globular fruit. The Mohicano Cherry is a variety with dark purple more-parting fruit. Probably derived from, or now sometimes mixed with the next.

P. avium, Bird Cherry of Eng. English Cherry. Cult. from E.; making a larger tree than the preceding, with ascending branches, rather and coarsely or doubly toothed more pointed leaves, usually some length, the flowers develop at the same time with the leaves, and the roundish or somewhat heart-shaped fruit sweet or bitter-sweet (not acid), of various colors. Double-flowered varieties are cult. for ornament.

P. Pennsylvania. White Red Cherry. Rocks woods N. Small tree, with light reddish-brown bark, obovate-oblong and pointed leaves smooth and green both sides, their margins finely and sharply serrate; small flowers on long pedicels, and light red sweet fruit not larger than peas.

P. purpurea, Dwarf Cherry. Rocks or same woods N. Slender spreading or forming broad leaves in the ground, seldom rising 2"; leaves oblong-linear, pale green, toothed only towards the apex; flowers 5-8 together; fruit oval, dark red, with some as large as a pea.

* 9. Cherries of small size, with flowers in clusters.

In late spring or early summer, terminating forked shoots of the season.

P. sororia, Weir Black Cherry. Tree or shrub, westward becoming a hard and forest tree, with bitter aromatic bark, short-grained reddish wood valued by the cabinet maker; the oblong or long-oblong smooth leaves of thickish or firm texture, usually leathery, serrate with curved short ruffling teeth; flowers in long racemes, considerably larger than the next; purplish black berries viscos fruit ripening in autumn.

P. Virginiana, Carolia Cherry. Tall shrub or small tree, with grayish bark, crumbly or oblong and abruptly pointed leaves very grayish serrate with slender projecting teeth; flowers in shorter and closer racemes, in spring; the fruit ripe in summer, red turning dark crimson, astrigent, but edible when fully ripe, the stone smooth.

P. Pudica, Small Red-Cherry of Eu., is occasionally planted; resembles the last, has longer and lower often deepening racemes, and a shrubbed stem.

* 9. Small cherry is early spring, from the moist of evergreen woods.

P. Carolina, Carolina Latrobe-Cherry, also called Mock Orange at the South, probably from the continuous smooth and glossy leaves, which are lanceolate or obovate, entire or with a few sharp and approved teeth, longer than the racemes, the calyx as well as petals white; small fruit black and bitter, becoming dry. Ornamental small tree; the leaves said to be poisonous to cattle.

P. Lauro-Capitatae, Laurel-Cherry of Europe, from Asia Minor and Portugal. L., from Portugal and the Azores, beaugard evergreen shrub or small trees, used for hedges and screens in Europe, are not hardy N., but would stand south of Penn. Their leaves and kernels are strongly licorice with the prune-odor or bitter-almond flavor.
2. SPIRAEA, MEADOW-SWEET, &c. (Greek name of some shrub, of the flowering branches of which parties were made.) All Hardy shrubs or perennial herbs: fl. late spring and summer.

§ 1. Shrubs, with simple leaves.

S. oppulenta, Neat Brit.; recalled from the moor bogs, appearing in that annual layers from the stems: a tall shrub, with long recurved branches, the compound and many heart-shaped leaves partly rolled and cut-margined, white flowers (of no leaves) in indistinct cymes, the pods large for this group, tender, and commonly turning purplish. Wide on rocky banks, from New York, W. & S.

S. carvynodas. From S. Penn., N. not common: shrub 1'-2' high, smooth, with small leaves entwined towards the apex, and white flowers in a flat compound cyme.

S. tomentos, Harlock or Steelhead. Common N. in low grounds; 2'-3' high, hairy-downy, except the upper edge of the outer or inner serrate and leaves, the two-petalled white flowers, crowded in a very dense terminal spade; glabrous in the plates.

S. salicifolia, COMMON MEADOW-SWEET. Common in wet grounds, also in old prairies: shrub 2'-3' high, bushy, smooth, with wedge-obovate or oblong leaves simply or doubly serrate, and white or faintly discolorous flowers in a crowded cyme.

= Cultivated for ornament, native on the North prairies.

Flowers in dense or open flat clusters, or in a close and narrow or spike-like terminal panicles, pink-purple.

S. douglasii, DOUGLAS'S MEADOW-SWEET. Cult. from Oregon and California, resembles our native Harlock (S. tenuissima), but has longer usually indistinctly and very blunt leaves earlier winter beneath, and deeper pink flowers with smooth petals.

= Flowers in compound cymes or broad panicles.

S. callias (also named S. Portulacea), from Japan: shrub 1'-2' high, smooth, with lance-oblong and taper-pointed oval and in a very slightly serrate leaves, branches terminated by clustered dense cymes of inconspicuous pinkish flowers; the gland at the mouth of the calyx, the purple shadows.

S. armeniaca. Tall shrub from Oregon, with similar branches, terminated by a very large and light or rather decomposed cyme of small yellowish-white flowers; the leaves simple-oblong, very obtuse, thin, cut on each side into 3'5 blunt and toothed lobes, sometimes almost pinnulate, soft downy, at least beneath.

= = Flowers in simple, with a little like corolla terminating leafy shoots of the same nature: native of Europe and Asia; petal white except the first species.

S. bella, from Nepal: a low shrub, with erect stems and very simply serrate leaves whitish-downy beneath, the simple corolla, sometimes clustered, and white-petalled flowers.

S. abundiosa, or E. from China, has along, lanceolate, or some three- or four-toothed leaves, and showy flowers.

S. hypnoides, ITALIAN MAID, or ST. PETER'S WEALTH. Shrub 2'-4' high, smooth or somewhat, with long recurved branches, and very small white, roundish leaves, a little crenate or lobed at the end; flowers small, white, in dense umbels.

= = = Flowers in simple or massed umbels along the slender branches of the preceding year, extended only by growth had winter, or imperfect leaves, earlier, than the proper flowers, in spring.
S. pruniifolia, from Japan: slender shrub, with small oval, finely and sharply serrate leaves, smooth above, often minutely downy beneath; the flowers furnished with full-double pure white blossoms, 4 in diameter, produced in great abundance.

§ 2. Smooth, with pinnate leaves.

S. sorbiifolia. Cult. from Siberia; very hard; 30 - 40 high, with leaves (as the name denotes) resembling those of the Mountain Ash, of 17 - 20 lamellate taper-pointed densely and sharply serrate leaves, and white flowers in an ample terminal panicle, the surplus petals a little coarsening.

§ 3. Heals, with three pinnately-compounded leaves, or stipules, and stellate flowers.

S. Arboreus, HEBRERA. Rich woods, from New York & S. W., also in some gardens: smooth, 20 - 30 high; with lance-shaped or lanceolate taper-pointed leaves, sharply serrate and cut, and yellowish-white very small flowers in great clusters, composed in slender spikes, which are reflected in a great compound panicle: petals narrow; pedicel reduced in fruit.

§ 4. Heals, with compoundly pinnate leaves, compound stipules, perfect flowers, exerted sepals and petioles smooth; 4 and 3 - 12 leaves 1 - 3 - pinnate pods.

S. Filipendula, DRAPÉ. Cult. from Europe: some of the coarse long thorns meets wounded at the lower and lower stabbing manner; herbage smooth and green; leaves clavate or near the ground, with more or less entire handly deeply toothed, cut, or pinnately cut, and gradually diminishing in size downward; the nearly naked stem 15 - 20 high, bearing a compound terminal cyme of white or mauve-pink flowers, one variety full-double.

S. Ulmaria, ECLIPSE MALLOW. Dutch, from Europe: F. 20 high, softly smooth, except the lower surface of the leaves and in particularly, pinnate leaves which is usually white-green; the yellowish-white small and sweet-scented flowers very numerous and round in a compound cyme at the naked summit of the stem: little buds twisting spirally.

S. lobata, QUEEN-OF-THE-PRAIRIE. Well in woods and prairies W., also cult.: smooth and green; the leaves mostly linear or near the ground; the leaflets very large, 7 - 9 parted, and its leaves cut-nerved; stems 25 - 30 or even 40 high, bearing an ample and provisioned compound cyme crowded with the hand-some peach-blossom-scented flowers. Dumosus foliage exudes the odor of Sweet Balm.

3. GILLENIA, INDIAN PHYSIC, AMERICAN EPECAM. (Named for a Mr. Gillen of Virginia.) F. summer. 2.

G. triflora, DOLPHIN HEAD. Loopy, from New York & S. W.; smooth, bractless; 20 high, with the 3 compound-paired pointed leaves cut-nerved, entire stipules, small and slender, and rather white or silvery-mottled flowers, loosely pointed on the slender branches.

G. strigillosa, LARGE-STIPULIFER. 1 of American Epecam. Open woods, W., has the lanceolate leaves and leaf-like stipules deeply cut and nerved: otherwise like the other.

4. KERRIA. [Named for Robertson Kerr, a British botanist.]

K. japonica, COMMONWEAL. Of the gardens, from Japan: a familiar, smooth, ornamental shrub-like plant, 40 - 60 high, with lanceolate thin leaves, and handsome yellow flowers, in summer, usually full-double; the natural state, with 6 petals and numerous stamens only recently introduced and rare.

5. WALDESTEINIA. (Named for F. von Waldstein, an Austrian botanist.)

W. fragarioides, BAREK STRAWBERRY. Wooded banks, chiefly N.; in aspect and especially in the 3 broadly wedge-shaped leaves resembles a Strawberry plant (as the specific and the popular names denote), but is smoothish and yellow-flowered: in summer.
G. GEUM, AVENS. (From Greek word, meaning to give an agreeable flavor; the root of some species somewhat sweet.) Several wild species, only the following common: 1. late spring and summer.

G. rivale, P. Canadensis, or WATER AVENS. In low and large grounds. N.: thickish rootstock (sometimes used in medicine as an antimonial) sending up branchy and intercrossed palmate leaves, and rather naked several-branched stems [20° high]; the flowers pretty large, nodding, with purplish-orange and broadly ovate or oblong petals; rootstock in the base, never spreading; in fruit the head of skews erect, stalked in the persistent calyx, the persistent styles jointed and bent in the middle, the upper part plumose-hairy.

G. vernum, Scoring A. Thickets, from Ohio to Illinois and Kentucky: slender, 20°–30° high; two leaves heart-shaped and 3-lobed, or some of them pinnate and cut; flowers small, with yellow petals about the length of the slightly 3-lobed calyx; the head of fruit raised above the calyx on a conspicuous stalk; the styles, i.e. smooth, the upper joint falling off.

G. strictum, Field A. Most grounds and fields: a coarse herb, 30°–50° high, rather hairy, with two leaves intercrossed palmate and the foliaceous-oblanceolate; those of the stem with 3–5 narrowed leaflets; in summer bearing panicked flowers with broadly ovate golden-yellow petals exceeding the calyx; stipules large, deeply cut: head of fruit close in the calyx; the persistent naked styles tucked at the end, after the short upper joint falls; receptacle downy.

G. Virginianum, White A. Thickets and border of woods: coarse and thriving herb 15°–20° high, with root and lower leaves of several palmate leaflets, the upper 3-lobed and cut; the panicked flowers small, with large conspicuous greenish-white petals shorter than the calyx; head of fruit like the last, but its receptacle smooth.

G. album, White A. Grow in similar places with the preceding, and like it, but smooth or soft-hairy, with root-leafs of 3–5 leaflets, or some of them rounded and single except a few lower leaflets below: the petals as long as the calyx, white or pale greenish-yellow, receptacle of fruit hairy.

7. POTENTILLA, CINQUEFOIL, FIVE-FINGER. (Name from patas, powerful, from reputed medicinal virtues, but these plants are nearly mild astringents.) Wild places of the country, except those of the last section, and one yellow one; but the Scoring Compressa is also planted.

P. Norvegica, Norway C. An erect, hairy, woolly plant, 10°–20° high, branching above, with only 3 oblong-oblong and cut-toothed leaflets; its summer, in fields.

P. paradox, A spreading or procumbent, pubescent, weedy plant, on riverbanks, W., with palmate leaves of 3–5 oblong-oblong cut-toothed leaflets, and stems with a thick appendage at their base; its summer.

P. arguta. A stout, erect, brownish-hairy, coarse plant, 10°–40° high, rather chamois white, on rocky hills N. & W., with palmate leaves of 3–5 ovate or oblong cut-toothed leaflets soft-downy beneath, and a more terminal cluster of rather large flowers, of no beauty, in summer.

§ 3. Petals bright yellow, larger than the base of the calyx.

* Leaves of 5 dentate lobes.

P. réctica. Cult. in some old gardens, from En.: a coarse, erect, hairy plant, 20°–30° high, with sometimes 7 narrowly wedge-shaped leaflets coarsely toothed, and rather large crimson flowers.

P. Canadensis, Cosmos Woul C. or FIVE-FINGER. Open dry ground; dwarf, silky-hairy, with wedge-shaped leaflets, and auxiliary 1-flowered pedicels: flowering from early spring to midsummer, and spreading by runners.

V. simplic, in meadow or rather well, usually well marked by its greater size and greener foliage; the stems 10°–20° long, ascending or spreading from a short tuberous rootstock; leaflets more oblong; flowers produced through the strainer.
P. argéntum, Silvery C. Dry fields, banks, and meadows N.; a low, trailing or prostrate; much branched, white-woolly weed, with wedge-shaped, pointed, and toothed leaves green above, white with silvery wool beneath, and the margins revolute; the small flowers somewhat purplish, all summer.

P. Anserina, Silver-Goose. Wet banks and shores, N. & W.; leaves all from the roots, in tufts on the long, slender stems, given above, silvery with silky down beneath, of 8-12 oblong, toothed, principal leaves, and some pairs of minute ones increased; stipes conspicuously many-veined; flower solitary on long scaly-like peduncles, all summer.

P. fruticosa, Sweet C. Wet grounds N.; 8-10 high, woolly, silky, very much branched, with 5 or 7 crowned oblong-ovate entire leaves, scale-like stipes, and loose clusters of rather short flowers, all summer.

§ 4. Petals white; stamens green and receptacle hairy; leaves only 3, digitate.

P. tridentata, Three-Leafed C. Used of N. England N. and on mountains; 4-6 high, tufted, spreading, with 3 thickly-nerved smooth petals nearly 3-lobed at the end, and several flowers in a cyme, in early summer.

§ 5. Petals purple, recurved, or crimson; stamens smooth.

* Well in wet and cold bogs N.; petals narrower, shorter than the calyx.

P. palastris, Marsh Violet. Some according to an almost woody creeping State, Boston, May 16, 5-7 inch-long, entire and crowded leaves, which beneath, in a small cyme, the calyx mostly 1-branched, the trilobed as well as the petals dull dark purple; receptacle becoming large and soft; petals white, all summer.

* * From Hawaii, cult. for ornament; petals broad and large, abscissed.

P. nepalensis, Nepal C. Leaves 3 in the upper, 3 in the lowest tuft,digitate, hairy but green beneath, woolly-woolly, commonly nerved; flowers numerous, all summer. P. Hirsutula, with short-petalled flowers, is a garden hybrid of this and P. reniflora.

P. aureosanguinea, from Nepal C., is soft silky-hairy, with 3 leaves to all the leaves, and much darker-colored flowers than in the preceding; brown-purple or crimson.

8. PRAGARIA, STEWART. (Name from fence, the old Latin name of the strawberry.)

§ 1. The Strawberry. Petals white; receptacle of the first high-flowered; nages well-dissected; leaves obtuse. If in spring; and silky-smooth, 7 or of all but the first species no more or less than to be determined. In cultivation the species are commonly mixed with broaching.

P. ëlesc, Common S. of Europe, yields the Alpine, Perfitæ, &c., plentifully native N., is mostly similar, save that small flowers strongly marked by the stipes, calyx-petals opened or reflected after flowering, small sessile or elongated (not high-arched, and the stamens supple.

P. clanzia, Hairy S. of Europe, sometimes used, is tall and quite distinct, with the calyx strongly reduced away from the fruit, which is dull reddish and smooth-seeded.

P. Virginiana, Virginia Wild S. original of the American Scab-let, &c. The leaves of firm texture, their smooth and often shining upper surface with sunken veins, calyx becoming erect after flowering and closing over the hairy receptacle when unreforced; fruit with a narrow neck, mostly globular, its surface with deep pits in which the atoms are evident.

P. Illinoensis, perhaps a distinct species, is rounder and larger, grows in other soil, from W. New York W. & S., the hair of the same, &c. shaggy, is the supposed original of Hooker's Skunkling, Boston Fern, &c.

P. Chilensis, native of Pacific coast from Oregon S.; it variegated and crossed with the foregoing have given rise to the Pine-apple S. and the like; a large and robust species, with very firm and thick leathery soft-silky leaf on both faces, and a hairy receptacle, the large rose-colored fruit erect in the pure state (instead of hummocky), remaining late.
E. rubeus, *Rubus* Family. Everywhere along thickets, fences, etc., and several varieties exist: 'stems 1"−4" high, firm-, and sickle-shaped, prickles strong and hooked; fruit of 3−5, white or lance-shaped, painted, their lower surface and stalks hairy and glandular, the middle one long-stalked and sometimes

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2. Petals yellow; receptacle tubercles; fruits bearing leaves and 5-flowered peduncles; edge with & external parts very large, imbricate, and lobed.

3.打印, *Rubus* Family, etc., cult. running wild. E. N., violet handsome both in flower and (red) fruit, which are produced all summer and autumn.

9. DALIBARDA. (Named for Dalibarda, an early botanist of Paris.)

D. repens, of wooded slopes N., is a low, stemless, twined, downy little plant, spreading more or less by underground runners, with the aspect of a Violet, the scape bearing one or two delicate white flowers, in summer.

10. RUBUS, BRamble, etc. (The Roman name, connected with roller, red.)

1. Flowering: Raspberry, with simple leaves and broad, fluted fruit, the very small and numerous tubules or under-colored grass at length separating from the preceding receptacle.

B. odoratus, Purple F. Heils, etc., N.: shrub, 3"−5" high, clump-summer and autumn, not prickly; with purple 3−5-blobed flowers, the lobes painted and the middle one longest, peduncles many-flowered, calyx lobes with long slender tips; and petals purple-tissue-color; the showy flowers 1−2" across, produced all season.

R. Nutiens, White F. From Upper Michigan to Pacific, etc., and: like the other, but less briefly and summer, with leaves more equal 3-blobed and coarsely toothed, and fewer flowers with narrower white petals.

2. True Raspberry, with 3−5 lobes, the fruit falling when ripe from the three dry canes receptacle: flowers with small white erect petals, in early summer; or heavy dew of the evening which is all but the first (red) summer from prickly stems or less sturdy stems of the preceding year.

R. trifolius, Theare Rawberry. Low woods N.; almost wholly herbaceous, slender, trailing, not prickly, with thin smooth leaves, of 3 thumb-shaped acute leaves, or the whole leaf, divided, making 3, all brightly serrated, peduncle bearing 1−3 small flowers, and the fruit of few grains.

R. occidentalis, Heil's or Tentaculata. Flowers of field and thickets N., especially where ground has been burned over: plumose-whiskered, the long-recessed stems, stalks, etc., armed with hooked prickles, but not bristles; flowers mostly 3, ovate, pointed, white-tissue-borne, coarsely remotely toothed, the lateral ones-stalked; petals shorter than the sepals; fruit purple-black (or an under-colored variety): flatish, ripe at midsummer.

R. Ideus, Garden R. Cult from Eu. for the fruit: tall and nearly erect, best with straight slender prickles or many of them more briefer; leaves thicker, and fruit smaller and larger than in the next red or yellowish, ripening through the summer.

R. strigosus, Wild Red R. Common especially N.: 3"−4" high, the upright stems, stalks, etc., less with campanulate, and some of them becoming weak prickles; also glandular. Leaves alternate, ovate, pointed, as-serrate, white-downy beneath, the lateral one: (middle one or two pair) not stalked; petals as long as the sepals; fruit fleshy, tender and watery but high-flavored, ripening all summer.

3. Blackberries, with the purple species of the fruit (or sometimes attached to the leafy receptacle, which at length falls away from the cane) stem prickles; leaves of 2, or usually 3−5 lobes; flowers in lightly cluster from stems of the preceding year, in spring or early summer, with white spreading petals.

Stems more or less woody: fruit black: when ripe, minute, the blackberries of this kind, ripening in late summer and autumn.

E. villus, High Blackberry. Everywhere along thickets, fences, etc., and several varieties exist: 'stems 1"−4" high, furrowed; prickles strong and hooked; fruit of 3−5, white or lance-shaped, painted, their lower surface and stalks hairy and glandular, the middle one long-stalked and sometimes

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11. ALCHEMILLA. (Name said to come from the Arabic.) A minute annual-wildspike. A. vulgaris, called Discus Plant in England, has got introduced in Virginia, &c.
A. vulgaris, Lady's Mantle, from Europe, is cult in some gardens; it is a low herb, not showy, with somewhat downy, rounded, 7-8 lobed leaves from the root, on long stalks, and loose corymbose or panicled clusters of small light green flowers, through the summer.

12. AGRIMONIA. AGRAMONTE. (Old name of obscure meaning.) Woody herbs, in beds and border of woods, producing their small yellow flowers through the summer; the foliage is, containing the 2 spikes, described as not having a small bar, lightly adhering by the hooked bristles to the stems of plants.
A. Euagamoa, Common A. Principal leaflets 3-7, oblong-obovate and coarsely toothed, with many minute saws incisionate; petals rare, the length of the calyx; stamens 10-15.
A. parviflora, shrub, 8, has smaller flowers, 11-13 lanceolate principal leaflets, and 10-15 stamens.
A. linguæ, ciliate, has 7-8 oblong or oblong and smaller principal leaflets, small flowers, and 5 stamens.

13. POTERIUM, BURNET. (Old Greek name, of obscure application.)
P. Sanguinolenta, Garden or Salt B. Common in old gardens, from Europe; nearly smooth, growing in clumps, leaves of same small size and deeply toothed leaflets; stems about 2 ft. high, bearing a few heads of light green or purplish mononemerous flowers, in summer, the lower flowers with numerous drooping stamens, several of the uppermost with pales, the style ending in a purple-tipped stigma.
P. Canadensis, or Sanguinolenta Canadensis, Canadian or Wild B. Wet grounds N. 30-60 ft. high, nearly smooth, with numerous lanceolate, coarsely-toothed leaves often heart-shaped at base, and cylindrical spikes of white perfect flowers, in late summer and autumn; stamens only 4, their long white anthers club-shaped.
14. **ROSA, ROSE.** (The ancient Latin name of the Rose.)

§ 1. **Wild Roses of the country; only the first species enumerated.**

- *Nigra* lightly trailing in a shrub, and projecting out of the calyx-seam.

R. setigera, **Precious or Climbing Wild Rose.** Rich ground, W. & S.; also planted, and partly the original of *R. gigantea* and *R. gigantea*, &c., double roses. Tall-climbing, armed with stout nearly straight prickles, not bristly; leaves with only 3-5 semi-sweet leaves; the corolla, flowers produced towards midsummer; stiff and calyx glabrous; petals deep rose becoming nearly white.

- *Nigra* separate, included in the calyx-tube, the stamina bearing 3 stigmas; petals narrower; stamens not disposed to climb.

R. Carolina, **Swamp Rose.** Wet ground, stems 4-6 ft. high, with hooked prickles and no bristles; leaves 5-9, smooth, dull green, and pubescent; flowers numerous in the corolla (in summer); the calyx and globular hip glabrous but in the later season.

R. lanata, **Swamp Wild Rose.** Dry or moist ground; 1-2-2* ft. high, with nearly or slender-straight prickles, 5-9 glabrous or almost glabrous leaves shining above; 1-5-5 flowered peduncles, brightly calyx, but the depressed hip nearly smooth; F. all summer.

R. blanda, **Early Wild Rose.** Rocky banks N.; 1-2-3 ft. high, with straight weak prickles or none; 2-7 oval or oblong leaves and pale leaves; sometimes borne beneath, large stipules, 1-3-flowered peduncles and the calyx smooth and glabrous, the hip glabrous; F. spring or early summer.

§ 2. **Brier-Roses, naturalized from Europe, by washables and in thickets, or sometimes planted; flowering in summer.**

R. rubiginosa, **Sweet Briar.** Tall, disposed to climb, armed with strong and hooked and some slender and unbranched prickles, the staminal and doubly-serial small leaves-rows and mist with rusted glands beneath, giving the aromatic fragrance; flowers mostly solitary, pink; hip pear-shaped or oblong, covered with the calyx-tube. R. multiflora, **Swamp Brier.** Probably a more variety of the common Sweet Briar, with uniform hooked prickles, smaller flower, and more oblong or oval hip, from which the calyx-tube fall entire.

R. canina, **Rosy Rose.** Rambles E. Penn. and probably elsewhere; resembles Sweet Briar, but the leaves smooth or destitute of aromatic glands and simply serrate; flowers 2 or 4 together, pink or nearly white.

§ 3. **Evergreen Roses, naturalized in the Southern States from China; flowering in spring, the flowers not double.**

R. Sinensis (or **LETHGAYN'S**), **Cherokee Rose.** Planted for garden-bushes, &c., also run wild S.; disposed to climb high, armed with strong hooked prickles, very smooth, with bright green and glossy evergreen leaves of mostly only 3 leaves, and single flowers at the end of the branches, with broadly calyx-cup and large paralveolate petals.

R. brevipes, **New Britain Rose.** It flowers far S., not common; has downy branches armed with strong hooked prickles, 5-9 roundish leaves, and single large white flowers on very short peduncle, the calyx covered by hairy leaves.

§ 4. **Exotic Garden Roses proper, from Europe and Asia.** Moderately the petaloid types; the greater part of the modern garden rose too much mixed by crossing and changed by variation to be subjects of botanical study.

- *Bifera* united in a column which projects out of the calyx-seam. All with long spreading shoots, or disposed to climb.

R. esculentus, **Evergreen Rose** of S., not hardy nor holding its beauty S., with scarious bright green oblong leaves, curved prickles, and nearly solitary white flowers, not double. The *Athorax Rose* is a more hardy form of it.
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R. moschata. Moscat or Monk Rose: not climbing, with slender fragrant prickles, leaves of 3 or 7 lanceolate and pointed leaves, a corolla of white flowers with a yellowish base to the petals, very sweet-scented, especially at evening.

R. multiflora, MAY-FLOWERED ROSE. A well-known climbing species, from Japan and China, hardy in Middle States, with 3 or 7 soft and somewhat supple leaflets, slender scattered prickles, and full clusters of small flowers, white, pale red, or rose-purple, not sweet-scented. The Bourbon Rose, said to come from the multiflora, is probably from a cross with some hardy European species.

- *8 Styles not usually present in this kind.

R. Banksii, Banks's Rose, from China, a slender conservatory species, very sweet, with 3—5 lanceolate glossy leaves, and umbels of very small white or buff and violet-scented flowers.

- * Tender, armed only with distinct hooked prickles, smooth, with leaves of mostly 3 (5—9) rather recurved and shining leaflets, and anathized or serrate margins.

R. Indica, or China Rose; includes the Tea, Perpetual or Bengal, Bourbon, and Noisette Roses, and the canal and polyanthas. See the latest annuals for fuller details.

- * Hardy or tender as to the north, not climbing, more or less prickly, and with leaves of 3 or more leaflets.

R. Gallus, French or Provance, Red Rose, has slender stems beset with both stem and slender straight prickles, leaves of 5—7 narrow and glossy-oblong leaflets with a downy base, erect flowered pedicels, and pink-red or crimson spreading petals (or variegated with white), which have some fragrance, and are used for purposes of love, &c.

R. centifolia, HARMONY or Cabbage Rose, perhaps derived from the preceding, has mostly straight prickles, 5—7 oval leaflets with glossy teeth or edges, pinkish and ealy, (variegated with: yellow), the hips freely and glabrous, the flowers mostly nodding, large, and full-scented, rose-purple, or of various shades, pink, red, &c. Provence Roses are miniature forms of miniature origin.

- * Hardy or tender as to the north, not climbing, more or less prickly, and with leaves of 3 or more leaflets.

R. Damascena, Damascus Rose, &c. Known from the Damascus by the greater size, larger curved prickles, serrated flowers looking in the bud, and with the leaves smaller; and given to this description for the sake of convenience, the size of the rose, &c.

R. Alba, White Rose, is between the preceding and the Dog Rose; leaves 5, palmate and a little downy beneath; prickles small and slender; petals pure white.

R. Chinensis Aromatica, Cinnamon Rose, of Eu. and many of the cultivars, as the Kantz, 10 to 30 ft. high, with brownish-red bark, and some straightish prickles, pale large, downy underneath, and small pale-red cinnamon-scented (mostly double) flowers, not shown.

R. spinosissima, Harvey or Nootka Rose, of Eu. Low, 1 ft. or 2 ft. high, exceedingly prickly, with straight prickles, 2 to 9 small and rather smooth-lobed leaves, and small early flowers, either single or double, and white, pink, and even yellow, the hips curvilinear.

R. Eglanteria, Yellow Eglantine Rose. Like a Sweet-Brier, but lower, 2 ft. or 3 ft. high, with scattered straight prickles; leaves deep-green and sweet-scented, flowers deep yellow, orange, or buff, and sometimes variegated with red, either single or double.

R. sulphurea, the Old Yellow Rose, from the Far East. Tall, with scattered prickles, glaucous or pale scented leaves, and sulphur-yellow (full-leaf) flowers.
15. CRATOGUS, HAWTHORN, WHITE THORN. (Old Greek name.) Small tree or shrub, with hard wood; flowers white, except in some varieties of English Hawthorn, in spring or early summer; ripening the red or crimson fruit mostly in autumn.

§ 1. Flowers single in the axil, small, with 5 petals; fruit larger than small pea, scarlet or crimson-red; leaves, 3-7, smooth or hairy.

C. Pyracantha, Evergreen Thorn. Planted for ornament and espalier fruit. from S. France, (from S. Europe) shoots 6-8 cm. with the shining evergreen leaves, lace-shaped and crested; only 1 ft. long, and small clusters of flowers terminating the shoot branches.

C. spathulata. Tall shrub or low tree, from Virginia, with almost evergreen shining sparsely-leaved, ovate towards the apex, or ovate-oblong oblong-obtuse, shoots cut-backed and with hardly any petals.

C. cordifolia, Washington's Thorn. Small tree, from Viny and Kentucky, and has been planted for hedges; has broadly triangular or heart-shaped toothed leaves, often 3-5 lobed or cut and serrate, or slender petals.

§ 2. Flowers single in the axil, middle-sized, 1-3 mm. long, scarlet, rather small.

C. arborescens. River hawthorn for S., tree with few thorns at base, thin, oblong, entire leaves some at both ends, 7 slender petals; styles 1.

C. oxyacantha, English Hawthorn. Planted from cut. for ornament and hedges; tree or shrub with alternate smooth leaves wedge-shaped at base, cut-out and toothed above; styles 2 or 3, rarely only 1. With single or double, white, rose, or pinked flowers.

C. spinosum, Prickly-leaved, French Thorn. Small tree, self-fertile when young; the leaves assumed with age, pubescent, the 3-7 lobes crowded, cut and toothed, petals slender; styles 1-3.

§ 3. Flowers single in the axil, large; the sepals with the leaves and stipules often long with petals; fruit edible, hard, or soft; bag, its ribs or smooth and the stylesvisible in number, 1-3. All thorn shrubs or low trees, of thickets and hedge hedges; so planted.

C. cordifolia, Scarlet-leaved T. Smooth, with the leaves thin, consis-tently, sharply toothed or lobed, or slender petals, the coral or scarlet fruit much smaller than in the next and hardly edible.

C. tomentosa, Pear or Fluffy Thorn. Deciduous or half-hardy when young; the leaves thickened, ovate, entire, or alternate, sharp toothed or cut, below slightly serrated, above mostly in petals; the upper surface impressed along the main veins or ribs; flowers single or few, and similar or orange fruit from 3 to 5, or even 3-4 inches long, pleasant-tasting; of same upright; the two which differ most from the common one are with the well-flavored fruit are:

Var. pumila, with smaller and wedge-shaped leaves intricately toothed towards the point, and smaller fruit and yellowish fruit, sometimes whitened; in habit, of the Western States, with crowded unattractive leaves, but tapering; sometimes even heart-shaped at base, sharply toothed and cut; fruit yellow and less pleasant-tasting.

C. Crucigalli, Cow-caged T. Smooth; the wider-ovate or transverseolate leaves thick and firm, deep-green and glossy, serrate above the middle, tapering into a very short point; thorns: very long and sharp; fruit bright red. The best species for hedges: has both narrow and broad-leaved varieties.

§ 4. Flowers usually in pairs, or only 3-4 in the axil; style, 4-5; fruit usually colored underbrush; fruit usually minute.

C. megalosperma, Summer Hawthorn of 8. States. Along pine-barren ponds, from S. Carolinas to S. W.; tree with sparsely or wedge-ovate obovate leaves, ovate above the middle, with glandular 3-5-pointed petals, and large red juicy fruit, pleasantly acid, used for tarts, &c. ripe in summer.

C. rubra, Yellow or Summer Thorn. Hardy shrub, from Virginia: small tree, with wedge-ovate leaves downy or smoothish, parted or cut above the middle, the main or margins into short pointed segments; the yellowish or glaucous fruit yellowish, greenish, or tinged with red.
C. parvifolia, SMALL-LEAVED OR DWARF TASSOY. Pine-barrens from N. J. to S. Va. 7-10 in. high, small, with a few linear-oblong leaves, these as well as the mostly solitary flowers almost rounded, only the upper flowerRenish-edged and as long as the pedicel; the large fruit purplish or glaucous, at first hairy, greenish and villous.

16. COTONEASTER. (Cotoneaster was a Roman name of the Quince.)

Name here applies to the common wild shrub of the low country, low in height, and much covered with small, crimson flowers and leaves, chiefly the wild cherries. 16. C. vulgaris. Planted from Eu. hardy, 27-30 in. high, much-branched, with numerous erect or nodding leaves, hairy 5-10 in. long, glaucous, oval, dark or white flowers in spring, and reddish fruit. Some other evergreen species are in closer ornamentation possible.

17. PHOTINIA. (From Greek word for shining, alluding to the glossy leaves of the genuine species.) Choice greenhouse shrubs or small trees, from N. S. with large evergreen leaves.

P. serotina, of Virginia, a smooth shrub, with red, clearly marked leaves and bright purplish red flowers, should be hardy in Penn. 17. P. serotina, of Japan, is smooth, with longer finely serrated leaves, and crimson white flowers.

P. (or Erythroceys) japonica, the Long-Tailed, of Japan, with almost entire leaves nearly 4 in. long, the lower surface and suctorials covered with dense round woolly wool, few leaves and larger flowers yellowish-white flowers, and an edible yellow fruit, resembling a small apple, with 1-3 large seeds.

18. AMELANCHIER, JUNE-BERRY, SERVICE-BERRY. (Popular name of the European species in Sweden.) Flowering in spring, and producing the berry-like purplish fruit edible, sweet, sometimes very pleasant-flavored in summer. We have apparently two or three wild species, but they run together so that botanists in line to regard them as forms of one.

A. Canadensis, also called Service-wood in New England, because it blossoms just when the trees in the forest. Var. Estellae is the tree, smooth from the trunk, or nearly so, with woolly wooly, very sharply serrated leaves, long, loose racemes, and oblong fruits 4 times the length of the calyx. Var. canadensis ale in other tree of bush, with the oblong leaves and branches, white-somnous when young, and the racemes and fruits smaller. 18. A. canadensis, clary W., is a shrub with greenish yellow leaves smooth only ovary, flowers white, and oblong yellow with only oval racemes, 1-2-3 flowers in the raceme.

19. SVURUS, PEAR, APPLE, &c. (Classical name of the Panacea.) Botanically the is made to include a great variety of things, including in the cattail, tussock, or thin-walled cells that contain the flowers. Wood hard and tough. 19. Pear.

§ 1. Pear. Leaves simple, long, almost 20 in. long, with its base tapering downward to the base.

P. communis, Common Pear. Cult. from Eu.: a smooth tree, with branches inclined to be thorny, white leaves, and purplish white flowers, the authors purple.

§ 2. Apple. Leaves simple, flowers showy, in a single cluster or simple umbel, fruit smooth (apricot) at both ends, especially at the base.

P. dulcis, Common Apple. Cult. from Eu.: tree with buds, lower face of the leaves when young, and only woolly, flowers white and tinged with pink, and large fruit.
P. spectabilis, Common Flowering Shrub. Cult from China, for its showy bright rose-colored flowers, which are double or semi-double; the leaves are smooth, except when very young.

P. prunifolia, Siberian Crab. Cult for the fruit: smooth or nearly so, except the newly developed leaves and the peduncles; stylus usually at the base; fruit yellowish. The Siberian Crab-apples are perhaps roseness of this with the Common Apple.

P. coronaria, American or Garland Crab. Cult from W. New York W. & S. small tree, very smooth, with the mostly white leaves rounded or abruptly heart-shaped at base and inrolled to be bladdery.

P. angustifolia, Narrow-leafed Crab. Cult. W. & S., with narrow-oblong or lanceolate leaves; otherwise too like the last.

§ 2 Choicenes. Leaves simple, the upper ones with very small glandular along the midrib; flowers (with) in compressed corymb terminating the branches: style united at base; fruit hermaphrodite with small obovate or oblong, finely sericeous leaves, and a hairy bladdery berry, not larger than a pea, either pearly or black, heart-shaped or globose.

§ 3 Roe-Crab or Mountain-Shrub. Leaves subimperforate, of several (5-17) leaves; flowers (united) in single compound flat cymes terminating the branches of the season; fruit hermaphrodite when ripe. Often planted for ornament, especially for the clusters of heavy fruit in summer.

P. americana, American Mountain-Shrub. Slender tree or tall shrub, wild in the colder districts; smooth or soon becoming so, with lanceolate taper-pointed and sharp-pointed bright-green leaves on a reddish stalk, pointed and smooth glossy bladdery fruit, and berries not larger than peas.

P. sambucifolia, Enormeriata H. or M. Wild along the northern frontier; smooth or nearly so, with oblong or lanceolate and blunt or abruptly short-pointed leaves, finely sericeous with more spreading teeth, sparingly hairy leaf-stalks, and larger berries.

P. usambirana, H. or M. Planted from Eu.; forms a good tree, with oblong or oval pale pubescent, their lower surface, stalks, and the leaf-hands downy; and the berries larger (1" in diameter).

20. CYDONIA, QUINCE. (Named from a city in Cyre.)

C. vulgara, Common Quince. Cult. from the Levant; small tree, nearly thorny, with oval or oblong entire leaves (Lessons, p. 55, fig. 51) cut-lobed beneath; flowers solitary at the end of the leafy branches of the season, in late spring, with leathery calyculus, white or pale-green, and stamens in a single row: the large and hard fruit peeld-sheathed, or in one variety apple-shaped, fragrant; seeds unanimous.

C. pannonica, Almond Quince (also named Pyrus pannonica). Thorny, smooth, widely branching shrub, from Japan; pelt. for the large showy flowers, which are produced in spring, earlier than the oval or oblong-oblong leaves, on long stalks; in great abundance, single or more or less double, scantly, and sometimes with rose-colored or even almost white sepals, corymb with short and rounded lobes; fruit green, very hard, resembling a small apple, but totally unpalatable.

29. CALYCANTHRACEAE, CALYCANTHRUS FAMILY.

Shrubs with opposite entire leaves, no stipules, sepals and petals imbricated and indefinite in number and pannec into the other, stamens few or many with anthers turned outwards, all these parts on a hollow receptacle or calyx-cup in the manner of a rose-bush,
SAXIFRAGE FAMILY

1. CALYCANTHUS. Flowers bright-purple or dull red, solitary in the axils or terminating slender branches, with long leaves spreading or crowded in opposite pairs, and other liker smaller terminal leaves, which are borne on the same or opposite thimble-shaped bracts. The outer 2 or more having yellowish red in a lip, the inner smaller and with impetous purple or white. Petals crested in the middle ring, heavy and of slender styles slender. Althaea, commixtus, echinum, in the lastly hipped, \textit{C. laciniatus} about 2' long.

2. CHINONANTHUS. Flowers yellow and purplish, along stilted stems, small in axils of yellow leaves. Leaves and sepals whitish, petals purple or hoary. Petals honey yellow, at the innermost end. Staminea with anthers only 8.

1. CALYCANTHUS, CAROLINA ALLSPICE, or SWEET-SCENTED SHRUB. (Name from Greek, kalyx and anthos.) All wild in U. S., and cult, especially the first, which has the more fragrant strawberry-scented blossoms. In spring and all summer.

C. floridus. Wild S. of Virginia in rich wood; leaves not downy below, 1' or 2' long, oval or oblong.

C. laevigatus. Wild from S. Penn. S.: smooth and green, with oval or oblong leaves 1' or 2' long, and rather small flowers (1' or 3' scars).

C. glutinosus. Wild from Virginia S.: like the foregoing, but with nearly large and up-curved leaves, glumes beneath.

C. occidentalis. Variety C. Cult from California: smooth, with acute or exscissile and slightly heart-shaped leaves (1' or 2' long), green both sides, the upper surface roughish; the brick-red flowers 3' across, scented; flowers hairy.

2. CHINONANTHUS, JAPAN ALLSPICE. (Name in Greek means 'small flowers in flowers in the winter in a mild temperate climate."

C. fruticosus. Shrub or low, branches, which may be planted like a shrub, smooth, lanceolate pointed leaves, and smaller small fragrant flowers, hardy S. of Penn.

40. SAXIFRAGACEAE, SAXIFRAGE FAMILY.

A large family not readily defined by any single characters: distinguished generally from \textit{Berberis} by having albumen in the seeds, ovaries partly or wholly united, and seldom any stipules; the herbs, and most of the herbs of the family have only as many or twice as many stamens, and fewer styles or stigmas, than there are petals or sepals. Flowers mostly perfect. - Besides the plants described, there may be met with in choice conservatories: \textit{Cerastium capitatum}, a small tree from Cape of Good Hope, with opposite oval-pinnate leaves and a large stipule between their petioles on each side; \textit{Baueraurophila}, from Australia, a slender bushy shrub, with opposite oval-like narrow leaflets, looking like 6 simple leaves in a whorl, and pretty rose-colored widely open flowers in their axils.

1. Shrubs, with simple leaves (includes plants which have been ranked in two or three different families). None of the following have stipules, except \textit{Klebs}. Seeds numerous.
1. RIBES. Leaves palmately veined and lobed; sometimes with serrate margins united with the base of the petiole. Calyx with its tube opening with the ovary, and often extended beyond it, the 5 lobes usually recurved like the petals. Petals and stamens each 4, on the throat of the calyx, the former small and nearly erect. Styles 2 or partly united into one; ovary beaked with 2 papillose placenta, in fruit becoming a fleshy berry, crowned with the channeled remains of the rest of the flower.

2. IPEA. Leaves distinctly veined, not lobed. Flowers in a raceme. Calyx nearly flat from 2-lobed or 4-lobed. Petals subglossy, much longer than the calyx, and inserted along with the 6 stamens near its base. Pod subshiny, beaked, splitting through the style and the perianth.

§ 2. Checklists. Chiefly contained with the top-shape or hemispherical ovary, but not at all extended beyond it.

3. DILCUMARIA. Flowers small, in a compound terminal cyme. Calyx minutely 7 to 16 toothed. Style thick. Petals 7 to 10 valves in the bud. Pod small, top-shaped, many ribbed, bearing in the node between the ribs.

4. PHILADELPHUS. Flowers showy, often corollate or prunoid. Calyx with 4 or 5 valvate lobes. Petals 4 to 6, broad, recurved in the bud. Styles 1 to 2, nearly somewhat united below. Ovary 3 to 4-locular, becoming a pod, which splits at length into as many pieces.

5. STOECHIANTHI. Leaves two-parted, with the 2-celled ovary: styles 1 to 2, rarely 3 to 4, united into one; ovary beaked at its apex, opening between the styles.

6. HYDRANGEA. Flowers in cymes, commonly of two sorts, the terminal flower in high-colored plants almost colored and natural, consisting of compound corolla only. Hyperic, p. 84. Fig. 217.; the others perfect, with 4 to 6-valved calyx, as many stamens with slender filaments. Style 2 to 4, diverging. Ovary 2 to 6-locular, becoming a small pod which opens at the top between the styles.

II. Herbs, forming the Saxifrage Family proper. Stipules none or confluent with the base of the petiole. Seeds usually many.

- Stamine as many on the petals and alternate with them, usually 5, and a cluster of glandular papillose filaments before each petal: styles many, 6, or less.
- PARKASIA. Flower solitary, terminating a scape-like stem; the leaves usually from the root, muched, smooth, and entire. Stamine 5 to 6, from the ovary, of 6 styles. Petals 4 to 6, very muched in the bud. Styles many, 1 to 3-locular, many-seeded.
- STOECHIANTHI. Flower solitary, with a scape-like stem; the leaves mostly from the root, muched, smooth, and entire. Stamine 5 to 6, from the ovary, 6 styles. Petals 4 to 6, muched in the bud. Styles many, 1 to 3-locular, many-seeded.
- HUGHIERA. Flowers small, in a long paniculate cyme. Calyx beaked, the tube ending below with the ovary, and continued upward in 2 styles, and bearing 6 valvate ovary petals at the sinus. Styles 2 to 6, with 1 to 3-locular, many-seeded.
- BOYKINIA. Flowers in a compound-like cyme. Calyx 1-lobed, the tube ending with the 3-lobed ovary. Petals 4, innumerable in the bud, deciduous. Styles 2, short. Pods 2-lobed, opening between the two leaves.
- STOECHIANTHI. Flowers as many on the petals and alternate with them, usually 5, and a cluster of glandular papillose filaments before each petal: styles many, 6, or less.

- SAXIFRAGE. Flowers in cymes or paniculate, or rarely solitary, perfect. Petals simple or palmately cut. Styles 2 to 6, or rarely 3, and bearing 5 to 6, or rarely 10 petals, many-seeded.
- ASTILBE. Flowers in spikes or racemes columnar in an ample compound panicle, sometimes polygamous or dioecious. Leaves simple, decomposed.
RASPBERRY FAMILY.

Pekoe small, spicate or linear. Little pods 2 or 3, nearly separate, opening down the inner sepal; several-seeded.

11. THALIUM. Flowers in a raceme. Calyx colored (white), sepals, and in the same bearing 8 very narrow slender-edged petals. Pedicels well pubescent; styles long and slender. Very leafless, with a 2-valved capsule. Fruit black, club-shaped, and enclosed in a long tubular membranous pod, which is few-seeded towards the bottom.

= Ribes b, powdered, very delicate.

12. MITRELLA. Flowers in a simple raceme or spike, small. Petals colored like the short open calyx (white or green). Stamens short. Styles 2, short, recurved. Pod oblong, 1-valved, with 2 parietal placentae at the base, magn-celled, opening across the top.

= Petals none.

14. CHRYSOSPENIUM. Flowers yellowish-green, solitary or in a loose cyme. Styles 3, the tube or expanded ovary with 4 or 5 broad lobes. Stamens 4 or 5, very short. Pod oblong, 1-valved, with 2 parietal placentae, several-seeded.

1. RIBES, CURRANT, GOOSEBERRY. [An Arabic name.] Leaves planted in the fall, except the last species, often clasped in the axils of those of previous season. Fl. spring. Fruit mostly edible.

§ 1. GOOSEBERRY. Some somewhat with 1 or 2 thorns below the leaflets or the clusters of berries; often with numerous mouthed prickles beneath, these sometimes on the berry also.

II. Cultivated species.

R. speciosum, SHORT, FASHIONING-GOOSEBERRY, of California, cult. for ornament, especially in England, likely to succeed in Southern States, is trained like a climber, has small and shining leaves, 1-3 very handsome flowers on a hanging peduncle, the short-tubular calyx, petals, and long-projecting stamens deep red, so that the blossom resembles that of a Peonie; berry prickly, few-seeded.

R. Grossularia, GARDEN OR ENGLISH GOOSEBERRY. Cult. from Eu. for the well-known fruit; thorny and prickly, with small closely 3-budded leaves, green flowers 1-3 on short pedicels, bell-shaped calyx, and large berry.

= Native species similar. N. and W. 1, mutation under the general name of the Gooseberry, with greenish or dark-purple bloom, only 1-3 on each peduncle.

R. hirtulum, the commonest, is seldom downy, with very short thorns or none, very short pedicels, stamens and 2-styled style scarcely longer than the bell-shaped calyx; and the smooth berry, purplish, small, and sweet.

R. rotundifolium, commoner. W. is often downy-leaved; peduncles slender, the inner stamens and apetalose style longer than the narrow calyx; berry smooth.

R. Cyndabola, in rocky woods. N. is downy-leaved, with slender pedicels, stamens and undivided style not exceeding the broad calyx, and large berry usually prickly.

= Native species with the prickly stem of a Gooseberry, but with a monster of flowers like those of a currant.

R. laciniatum, LACE-LEAVED. Cold bogs and wet woods. N. low, with 3-5-petalled flowers, their lobes deeply cut, very small flowers with broad and flat calyx, short stamens and style, and small bristly berries of unpleasant flavor.

§ 2. CURRANT. No thorns nor prickles, and the flowers numerous in the racemes.

= Wild, or cultivated for the fruit; flowers greenhouse or whitaker.

= Leaves without racemose dots: calyx flat and open; berries red or black.

R. prostratum, FERRY C. Cold woods N. with reclining stems, deeply heart-shaped and usually 5-7 lobed leaves, erect racemes, numerous and nodding.
1. SAXIFRAGE. Flowers in cymes or panicles, or rarely solitary. Petals and stamens each 6, on the throat of the calyx, the former much and mostly coiled. Styles 2 or rarely united into one, ovary 1-celled, or 2-petalaceous, in fruit becoming a juicy berry, crowned with the shriveled remains of the rest of the flower.

2. LEUCOJUM. Flowers in racemes, Calyx nearly free from the 2-celled ovary, 6-lobed. Petals indeterminate, much longer than the calyx, and inserted along with the 6 stamens near its base. Pod slender, 2-celled, splitting along the style and the partition.

3. DECUMANUS. Flowers small, in a compound terminal cyme. Calyx usually 7-10-toothed. Style 1, nearly free. Petals 7-19, inserted in the bud. Pod nearly bi-celled, many-seeded, becoming hairy at the mouth of the cell.

4. PHILADELPHUS. Flowers solitary, often composed or racemose. Calyx with 4-6 teeth, united into a tube. Styles 4-5, unequal somewhat united below. Ovary 2-5-celled, becoming a pod, which splits at length into many pieces.

H. Herbs, forming the Saxifrage Family proper. Stipules none or caducous with the base of the petiole. Seeds usually many.

5. PARNASSIA. Flowers on peduncles, resembling a scape-like stem; the leaves mostly from the root, rounded, smooth, oval, entire. Calyx free from the ovary, 6-lobed. Petals 6, quite, included in the bud. Styles many, united.

6. REICHENBACHIA. Flowers small, in a long panicle, mostly on a scape. Calyx 1-celled, the tube constricted below with the bisected ovary, and continued beyond it, 6-lobed, and bearing 6 small spiracular erect petals at the stamine. Styles 6-10. Pod 1-celled, 3-seeded, opening along the style.

7. BOTRYNUM. Flowers in a corymb-like cyme. Calyx 6-cleft, the tube constricted with the 2-celled ovary. Petals 6, convolute in the bud; Stamens 6, short. Styles 2, soft. Pod 3-celled, opening between the two pods.

8. SAXIFRAGA. Flowers in spikes or racemes collected in an ample compound panicle, sometimes polygamous or dioecious. Leaves entire, decomposed.

9. ANTHEL. Flowers in spikes or racemes collected in an ample compound panicle, sometimes polygamous or dioecious. Leaves entire, decomposed.
SANDRAKE FAMILY.

Petals small, epicalyx or bract. Little pod 2 or 3, nearly separate, opening from the upper summit, several-nerved.

12. FILAGINIA. Flowers in 3 racemes. Calyx colored green, fruited, and in the mature becoming 3 or 4 narrow slender-clawed petals. Filaments and style long and slender. Berry 3-seeded, with several erect towards the base of the 2-parted placentum, 3-beaked; one of the beaks or carpels growing much more than the other and making the larger part of the home-shaped, membranaceous pod, which is few-seeded towards the bottom.

— Folia 5, panicked, very distinct.

13. MITELLA. Flowers in a simple raceme or spike, small. Petals colored like the short tuber epicalyx (white & green). Stamens short. Style 2, very short. Berry and pea glandular, 1-seeded, with 2 parietal placenta at the base, many-seeded, opening across the top.

— Folia none.

14. CHYSOROSPLENIUM. Flowers yellowish-green, solitary or in 2 leafy cymes. Calyx-lobes colored with the ovary, the tube or expanded barrier with 3 or 4 blunt bases. Stamina 6 or 10. Very short. Style 2, short, recurved. Peduncles thin, its twisted summit rising above the calyx, 1-seeded with 2 parietal placenta, several-many-seeded.

1. RIBES, CURRANT, GOOSEBERRY. (An Arabic name.) Leaves planted in the bud, except the last species, often clustered in the axils of those of previous season. Fl. spring. Fruit mostly edible.

§ 1. Gooseberry. Stone commonly tall 1 or 2 thorns below the longstalks or the clusters of leaves, often with numerous scattered prickles besides, those sometimes on the berry axis.

* Cultivated species.

R. speciosum, Showy Flowering Gooseberry, of California: cult. for ornament, especially in England, likely to succeed in Southern Middle. Note, is treed like a climber: has small and shining leaves, 1 3 3 very handsome flowers on a hanging peduncle, the short-tubular epicalyx, petals and long-projecting stamens deep red, so that the blossom resembles that of a forestia; berry prickly, few-seeded.

R. Grossularia, Garden or English Gooseberry. Cult. from Eu. for the walk-known fruit; thorns and prickles, with small oblong 3-5-lobed leaves, green flowers 1 3 3 on short pedicels, bell-shaped calyx, and large berry.

* * Native species (early X. N. & W.), passing under the general name of Wild Gooseberry, with greenish to dull purplish blooms, only 1 3 on such pedicels, 2.

R. hirtellum, the commonest E., is seldom downy, with very short thorns or none, very short pedicels, stamens and 2-cleft style scarcely longer than the bell-shaped calyx; and the smooth berry purple, small, and sweet.

R. rotundifolium, commonest W., is often downy-shielded; pedicel slender, the stamens and 2-parted style longer than the narrow calyx; berry smooth.

R. Gyrostaphyus, Rocky woods, X., is downy-leaved, with slender pedicels, stamens and undivided style not exceeding the broad calyx, and large berry usually prickly.

* * * Native species with the pricky stems of a Gooseberry, but with a mixture of flowers like those of S. Current.

R. lacustris, Lake-w. Stuart G. Cold woods and wet woods. X., low, with 2 3-paired leaves, their bases deeply cut, very small flowers with broad and flat calyx, short staminodes and style, and small mildly berries of unpleasant flavor.

§ 2. CURRANT. No thorns nor prickles, and the flowers numerous in the raceme.

* Wild, or cultivated for the fruit: flowers greenish or white.

— Leaves without racemose data: calyx flat and open; berries red or white.

R. prunastrium, Farco x. Cold woods N., with reclining stems, deeply heart-shaped and nearly 3 5-lobed leaves, erect racemes, pedicels and pale-red
berries glandular-biennally: these and the bristle-like hairs also an unpleasant
skunk-like odor.

R. rubrum, R. C. Cult from R. also wild on norther borders;
with spreading or procumbent stems, somewhat heart-shaped moderately 5-lobed leaves, the bines reddish, and drooping, trusses from lateral bird births
different from the leaf-beds; unlike berries red, of a white variety.

— Leaves spiralated with various dots, fewness larger, with oblong-bell-shaped
calyx; berries larger, black, truncate, and surprise, glandular-teethed.

R. floridum, Wild Black C. Woody N. Berries slightly heart-shaped, sharply 3-lobed and deeply serrate; trusses drooping, downy, bearing many white flowers, with conspicuous berries larger than the pedicels.

R. nigrum, Florida Black C. Cult. from R. like the preceding, but has greener and fewer flowers in the trusses, minute berries, and a shorter calyx.

C Cultivated for ornament from for W. : the flowers highly colored.

B. sanguineum, Red-vel C. from Oregon and California: glandular and somewhat clumpy, with 5-lobed leaves; initial-downy, small trusses of modest flowers, the calyx-tube oblong-bell-shaped, the berries glandular and bluish.

B. aureum, Volpin, Buffalo, or Massaunt C. from W. Massu to Oregon; abundantly cultivated for its spacy-scented light-yellow flowers in early summer, smooth, with rounded 5-lobed and cut-leafed leaves (which are pulled up in the bud), short trusses with both berries, and tube of the yellow calyx very much longer than the spreading lobes; the berries blackish, inedible.

3. TREA. (Greek name of Willow, applied to something widely different.)

I. Virginica, a tall shrub, in low pine-barrens from N. Jersey N. smooth, with oblong minutely serrate leaves, and trusses of pretty white flowers, in early summer.

B. DECEDARIA. (Name probably meaning that the parts of the flower are in twos, which is only occasionally the case.)

D. barbata. Along streams N. a tall, mostly smooth shrub, with long branches disposed to climb, acute or oblong, entire leaves, and a compound terminal cyme of small white odorless flowers, in late spring.

4. PHILADELPHUS, MOCK-ORANGE, SYRINGA (which is the botanical name of the Linen). The generic name is an ancient one, afterwards applied to these shrubs for no particular reason). Ornamental Shrubs; natives of the S. Atlantic and Pacific States, Japan, &c.; the species mixed or much varied in cultivation. The following are the principal Types.

P. coronarius, Common Mock-Orange. Cult. probably from Japan. Shrubs with erect branches, smoothish oblong-cuneate leaves having the taste and smell of carvorners, and crowded clusters of handsome semi-odorious cream-white flowers, in late spring.

P. latifolius, Broad-leaved M. Cult. from Japan. Shrub with erect branches, smoothish oblong-cuneate leaves having the taste and smell of carvorners, and crowded clusters of handsome semi-odorious cream-white flowers, in late spring.

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P. inodorus, Sweetly Scented Wild. In upper districts S. shrub, with spreading slender branches, mostly entire ovate-oblong leaves, rather small flowers scattered at the end of the diverging branches, and very large pure-white scentless flowers in early summer, either single or in loose clusters at the end of the branches, the slender-petalled calyx-lobes much longer than the ovary.
8. DEUTZIA. [Named for one Deutz, an amateur botanist of Amsterdam.]

Fine flowering shrubs of Japan and China, with numerous panicles of white blossoms, in late spring and early summer; the lower side of the leaves, the calyx, &c, beset with many curly clusters of hairs or stellae.

D. gracilis, the smallest species, is 20 high, with lanceolate sharply serrate leaves bright green and smooth, and rather small white flowers, earlier than the rest, often forced in greenhouses; filaments forked at the tips.

D. crenulata. Commonly planted; a tall shrub, rough with the fine pubescence; with pale white or silvery-white minutely cream-scented leaves, and rather dull white blossoms in summer; the filaments broaden upwards and with a bluish lobe on each side just below the anther. This is generally cited, under the name of the next, viz.

D. scabra, with more rugged and coarser finely sharp-serrate leaves, and entire taper-pointed filaments; seldom cult. here.

6. HYDRANGEA. [Name of two Greek words meaning water and sail; the application obscure.] Fl. summer.

a Cultivated from China and Japan; from plants X., turned out for summer.

H. Hortensia, Common Hydrangea, is very smooth, with large and small, closely toothed, bright green leaves, and the flowers of the cyme nearly all smooth and enlarged, blue, purple, pink, or white.

b Wild species, on shady banks of rivers, &c., but often planted for ornament.

H. quercifolia, Oak-leaved H. Stout shrub 30 - 60 high, very leafy, downy, with oval lobed large leaves, and cymes clustered in allonged panicles with numerous sterile flowers. Wild from Georgia S., hardly N. in cult.

H. radiata, called more fittingly H. Stella, having the same or somewhat heart-shaped pointed leaves very white-scented beneath, but smooth and green above; the flat cymes with a few enlarged sterile flowers round the margin. Wild S. of Virginia.

H. arborescens, wild from Penn. and Ill. S., rarely planted, is smooth, with ovate or slightly heart-shaped serrate pointed leaves green both sides, the flat cyme often without any enlarged sterile flowers, but sometimes with a full row round the margin.

T. PARNASSIA. GRASS-OF-PARNASSUS. Wild at wet banks; the large white flower handsome, in summer and autumn. 2

P. Caroliniana, the common species, both N. & S., has the same or almost 15 - 20 high, bearing one逃避e leaf low down, and terminated with a flower over 1" broad, the many-veined petal sessile, with 5 small yellow filaments before each.

P. palustris, seen on northern borders, is small throughout, with several slender filaments before each five-veined petal.

P. ascocarpha, along the Alleghanies S., has rather kidney-shaped leaves, and petals narrowed at base into a short claw; otherwise like the last.

8. HEUCHERA, SALM-BERRY, the rootstock being astringent. [Named for a German botanist, Heucher.] Wild plants of rocky woods, chiefly W. and S. along the middle country; the leaves rounded heart-shaped and more or less lobed or cut, mostly being the rosaceae, often one or two on the tall stalk of the panicles. Flowers mostly greenish, in summer. 2.
H. Americana, Creeping A.; the only one N. and E. of Penn., has weak stems and long leafy-paniculate, panicle with mottled white flowers in early summer.

H. williamsii, from Maryland and Kentucky, N. along the upper country, has lower leaves with soft bristly hairs, but deeply lobed leaves, and very small white flowers, later in summer.

- Flowers very small; caespitose and style protruding.

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SAXIFRAGE FAMILY.

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9. BOYKINIA. [Named for the late Dr. Boykin, of Georgia.] 2

B. acuminatiloba, v. only along the Alleghany, from Virginia S.; new flower glabrous, bearing 2 or 4 alternate petals 1.5 to 1.7; leaf short and cut leaves; and a group of rather small white flowers, in summer. There is one very like it in Oregon and California.

10. SAXIFRAGE, SAXIFRAGE. (Latin name, means rock-leaved; many species rooting in the crevices of rocks.) Besides the following, there are a number of rare or local wild species.

- Wild species, with leaves all clustered at the perennial root, the whole species spreading above and bearing many small flowers or a panicle in spring, the two species united having at the base, without visible length, a pair of nearly opposite divergent petals.

S. virginica, v. N. S. On rocks and moist banks; with obtuse or wedge-shaped, thickish mass of less branched leaves in an open cluster, scape 3 to 5 high, bearing in early spring white flowers, a dense cluster, which at length opens into a loose panicle-like cyme; this is not half the length of the petals, pods turning purple.

S. Pennsylvanica, v. N. S. In low wet ground, with linear, slender or clavate slender, white leaves (4 to 6 long) narrowly oblong or nearly round, maturing in a small, short round panicle, scape 1 to 2 high, bearing small greenish flowers in an axillary cyme, opening with a petal in a more pendent flower in spring; the reduced leaves of the cyme as long as the lower inner petals.

S. wnyi, v. S. Cold brook, from Penn. S. among the Alleghany; the thin, ovate-oblong leaves (6 to 12 long) sharply emarginately, with a broad-based, oblong, or nearly round, maturing in a small, short round panicle, scape 1 to 2 high, bearing a lower panicle of slender-petalled white flowers in spring; with reflexed sepals as long as the outer petals, and club-shaped laminae.

- Entire species, root for ornament; leaves all clustered at the perennial root; solitary 2, or sometimes 3 to 4, white sepals, forming an emarginately toothed leaf, yellow.

S. crassifolia, Thick-leaved S. Cult. from Siberia, very smooth, with densely and evanescent or pubescent, mealy, but dense, with leafy-petioled, slimy, white, nearly smooth leaves, 6 to 10 long, and scape bearing an amplex at first compact cyme of large, greenish-rose, in early spring.

S. sarmentosa, Bunched S. Cult. from China and Japan as a house-plant, not quite hardy S., rather hairy, with rounded heart-shaped or kidney-shaped and deep green leaves, of medium texture, purple underneath, green-violet or white, with white sepals, in a purplish cyme, from their axils, with a slender, strawberry-like ramosum, by which the plant is multiplied, and scape bearing a light spring panicle of irregular flowers, with 3 to 6 petals, dense, white-pink and white-petalled, and 3 much longer and nearly white cox comatose and hanging.
11. ASTILBE. (Name means 'not shining.') Also called Honeys, after a Japanese bracteata. Fl. summer. 3
A. decandra. Rich woods along the Alleghenies from Virginia S.; tall, rather pubescent herbs, 3'-5' high, imitating Sprites Amuricas (p. 121) in appearance, but cause: leaves of the downy-powder leaves mostly heart-shaped, cut toothed (1'-2' long); flowers, greenish-white, with inconspicuous petals.

A. Japonica, or Honea Japonica. Cult. from Japan for ornament; only 1'-2' high, with leaves of the three-crested leaves lanceolate or oblong, and crowded white flowers of considerable beauty.

12. TIARELLA, FALSE MOTHERWORT. (Diasynov of home, a tur- 
ban; name not very appropriate.)
T. cordifolia, one only species, in rocky woods, especially N.: a low and hairy herb, spreading by summer leaf runners; leaves rounded heart-shaped, sharply lobed and toothed; flowers in a short raceme on a branch scape, bright white, in spring.

13. MITELLA, MOTHERWORT. BISHOPS-CAP. (Name means a lit- 
tle sub, from the slope of the 2-leaf spring and young pod.) Delicate plants of moist woods, especially N., spreading by summer leaf runners or root- 
stocks; 6' late spring and early summer.
M. diphylla, Commons or Two-leaved M. Hairy, with rounded heart- 
shaped and somewhat 3-lobed leaves on slender petioles, and a pair of opposite nearly sessile leaves on the scape below the slender raceme of many white flowers.

M. nuda, NAKED-MOTHER M. Mower woods N.: a delicate little plant, with rootstock kidney-shaped doubly crested leaves, and leafless scape 1'-2' high) bearing a few greenish-bloomed;

14. CHRYSPLENIUM, GOLDEN SAXIFRAGE. (Name in Greek means gold-spots.) Fl. spring.
C. Americana, our only species, in woods and shady wet places N.: a low and delicate smooth herb, with spreading repeatedly forked stems, shorter spreading small leaves, which are conical, subulate, crumpled, and mostly opposite; the inconspicuous golden flowers nearly sessile in the forks.

41. CRASSULACEAE, ORPINE FAMILY.
Succulent plants, differing from the Saxifrage Family mainly in the comple insymmetry of the flowers, the sepals, petals, stamens, and pistils equal in number, or the stamens of doublenumber; the petals all separate and forming as many (mostly many- 
seeded) little pods, except in Penchornum, where they are united together. (Lessing, p. 86, fig. 160-171.) Penchornum, which is not succulent, is just intermediate between this family and the foregoing. Several are monoelepetalous, i.e. have their petals united below into a cap or tube.

1-2. Leaves not at all fleshy, but thin and membranous: the 5 leaves united into one 2-parted-lobed petal: no acros before the ovary.
1. PENTHORUM. Petals 5. Petals small, or usually none. Stamens 10.
2. Petals opening by the falling away of the 4 breaks, many-seeded. Leaves the parts are in size or smaller.
3. Petals separate: sepals merely as or united at the base.
4. Penchornum. Sepals, more or less small, and petals 6-10 or even more, and stamens twice as many. Plants usually multiplying by leaf offsets, on which the leaves are curved to their rids like ramulae.
5. E. 17-
3. **Sedum**. Sepals, narrow petals, and pistils 4 or 5; the stamens twice as many, the alternate ones commonly adhering to the base of each petal.

4. **Tilera**. Sepals, petals, stamens, and few-seeded pistils 2 or 4. Very small annuals, with axillary flowers.

5. **Crassula**. Sepals or bracts of the calyx, petals, stamens, and many-seeded pistils 6. Perennial herbs or fleshy-herbaceous plants, with flowers in cymes or clusters.


7. **Cotyledon**. Corolla tubular, bell-shaped, or cylindrical, sometimes twanged. Stamens 10.

8. **Droopyllum**. Calyx inflated, the lobes of the corolla at length projecting and spreading. Stamens 6, projecting. Leaves opposite, petiolate, simple or sub-pinnate, remotely.

L. **Penthorum**, Ditch Stone-Crop. (Name from the Greek, apparently alluding to the parts of the flower being in fives.)

P. sedoides, a homely weed, about 1½ high, with alternate lanceolate and serrate leaves, and yellowish-green inconspicuous flowers loosely spiked on one side of the branches of an open cyme, all summer and autumn.

2. **Semprevivum**, Houseleek. (Latin for live-for-ever.)

S. tomentosum, Common or Houseleek, the plant in Europe usually grown upon roofs of houses: propagating abundantly by offsets on short and thick runners; leaves of the dense clusters oval or oblong, smooth except the margins, inermate; those on the flowering stems scattered, oblong, clavate-pilose, as well as the clustered purplish or greenish flowers; sepals, petals, and pods mostly 12. Cult. in country gardens, and on walls, roofs, &c., nearly flowering all summer.

3. **Sedum**, Stone-Crop, Oripine. (Old name, from sedo, to sit, &c., upon rocks, walls, &c., upon which these plants often flourish, with little or no soil.) The following are all smooth perennials, and hardly N. except the first species.

§ 1. Leaves flat and broad, oblong, subacute, or rounded.

1. The lower ones of least width in this.

S. sieboldii, Siebold's N. Cult. in Japan, mostly in pots; with slender and weak or spreading stems; alternate and mostly reddish-green round and often coarse leaves (½ or less long), with a wedge-shaped base and upturned margin, all in wheels up to the cyme of rosy-purple flowers, which all have their parts in fives.

6. **Geranium**, Three-Leafed. S. With red leaf stems from Penn. S. & W., and rhizomes in gardens; with spreading stems creeping at base and rising 3'-6' when they bloom; the lower leaves wedge-shaped and whorled; the upper oblong and mostly serrate, about ½ long; flowers white, the first or common ones with parts generally in fives, the others mostly along the upper side of the usually 8 spreading branches and mostly with their parts in fours; in late spring.

b a All or most of the leaves alternate: flowers in a corymb-like terminal cyme, purple or purplish, in summer, old with their petals in fives.

S. Telephium, Garden Oripine or Live-for-are. Cult. from Eng. in old country gardens; erect, about 2½ high, with oval and mostly upturned pale and thick leaves, small and discolored flowers in a compound cyme, and short-pointed pods.

L. telephium, White, O. or L. Dry rocks on mountains, chiefly along the Alleghanies; 1½-2½ high, very like the last, but with fewer flowers, and pods inserting into a slender style.
§ 2. Leaves narrow and thick, borne flat-topped or torose; low or creeping plants.

B. kore, Money S. or Wall-Pepper. Cult. from Ris., for bedding and rock-work, running wild in some places: a moss-like little plant, forming rosettes on the ground, yellow-green, with very succulent and thick round small and crowded leaves, and yellow flowers in summer, their parts in four.

S. pulchellum, Beautifil. S. Wild & W. on rock; also cult. in garden, etc.; springing and rooting stems 2-1'- long; leaves crowded, erect, linear-lanceolate-shaped; flowers, maroon-purple, corymb on the upper side of the 4 or 3 spreading branches of the cyme, their parts mostly in fours, while those of the central or umbel flower are in threes. In summer.

S. cornutum, variegatum. Cult. of low for borders, etc., of unknown origin; has creeping stems, and the small leaves nearly opposite, sometimes in threes, linear, flat-topped, stems, very pale green, and white-edged: flowers not yet seen.

4. TILLAEA. (Named for an Italian botanist, TILLI.) Fl. all summer.

T. simplex, is a minute plant of muddy river-banks along the coast, spreading and rooting; only 1'-2' high, with thin-elongate appressed leaves, and solitary inconspicuous white flowers scalled in their axil.

5. CRASSULA. (So named from the heavy-leaved leaves.) House-plants, occasionally cult. from 1 cap of Good Hope.

C. arborescens. Fleshy shrub, with glossy roundish-obovate leaves (2 long) tapering to a narrow base, and divided on the upper face; the flowers rather large and rose-colored.

C. lanata. has green and linear-obovate leaves, comma at the base, and a padle of smaller white flowers.

C. illinata. has slightly nodding stems, oblong and rather falcate or curved leaves comma at base 3-4'- long, pointed, obtuse, and a common round mass of many red sweet-scented flowers, the petals with erect edges, partly united below, and ascending slightly above, so that the plant has been placed under the next group, and named in Cakile.

6. ROCEA. (Named for a Swiss physician, Leeper.) Half-shady succulent house-plants of the Cape of Good Hope.

R. cooica. About 1'-2' high, thickly beset with the oblong-ovate (1 long) leaves up to the terminal and oblong-like sessile clusters of handsome flowers; tube of the scented corolla 4 long.

7. COTYLEDON. (From Greek word for a slender cup.) House-plants, not common.

C. orbiculara. Half-shrubby succulent plant from Cape of Good Hope, with opposite white-powdery or glaucous subulate-linear leaves (2'-4 long), and a cluster of showy red flowers (nearly 4 long) raised on a slender naked period, the flower-stem not more than the corolla-length. In summer.

C. (or Echeveria) cooica, from Mexico, is shrubby at base, with the oblong-obovate stems in clusters, and alternate and scattered on the flowering stems; flowers in a leafy ring, the 2-petalled corolla not longer than the spreading calyx, 5-angled at base, red outside, yellow within.

8. BRYOPHYLLUM. (Name of Greek words for spray or bud and long.)

B. caryoticum. A scarcely shrubby succulent plant, originally from Tropical Africa, cult. in houses, etc., with opposite periodical leaves, 3 or 5 plumose filaments, or the upper of single leaflet, and an open panicle of large and rather handsome hanging green flowers tinged with purple; the calyx is oblong and bluish; one of it the tubular corolla at length open, and has a wholly spreading corolla; the leaves oval, 2-3 inches long, erect; when laid on the soil, or kept in a moist place, they root and form the mother, and produce little plants. The name refers to the propagation of the plant in this way.
42. HAMAMELACEAE, WITCH-HAZEL FAMILY.

Shrubs or trees, with alternate simple leaves, deciduous stipules, small flowers in heads, spikes, or little clusters, the calyx united below with the base of the 2-styled ovary, which forms a hard or woody 2-celled and 2-beaked pod, opening at the summit. Stamen and petals when present inserted on the calyx. Three wild plants of the country, belonging to as many genera.

1. **Hamamelis**, *Witch Hazel*. (An old Greek name of Medea, improperly transferred to this wholly unlike American shrub.)

**H. Virginica**, tall shrub, of damp woods, with the leaves oblong or oval, wavy-toothed, straight-veined like a Hazel, slightly downy; the yellow flowers remarkable for their appearance late in autumn, just as the leaves are turning and about to fall. Seeds ciliate.

2. **Fothergilla**. (Named for Dr. Fothergill of London, a friend and correspondent of Hartman.)

**F. hololoba**, low, rather ornamental shrub, in swamps, from Virginia S., with oval or oblong, straight-veined leaves, situated at the summit and often hazy beneath, the white flowers in spring.

3. **Liquidambar**, SWEET-LIME TREE or RUMLESTIL. (Names alike to the fragrant nenfchisch pine or balau which exudes when the trunk is wounded.)

**L. Styraciflua**, the only species of this country: a large and beautiful tree in low grounds, from S. New England to Ill. and especially S., with fine-grained wood; gray bark forming wavy edges on the branches, and smooth and glossy deeply 5-lobed leaves, which are fragrant when bruised; changing to deep crimson in autumn, their triangular lobes pointed and beset with glandular teeth; greenish flowers appearing with the leaves in early spring.

43. HALORAGACEAE, WATER-MILFOIL FAMILY.

Contains a few insignificant aquatic or marsh plants, with small greenish flowers sessile in the axils of the (often whorled) leaves or bracts, and a single ovule and seed suspended in each of the 1—4 cells of the ovary.
1. **MYRIOPHYLLUM.** Flowers usually monocious, with sepals or teeth of the calyx, again when there are any, lobes and cells of the ovary and nut-like fruit, with the ascus stigma each 1; the stamens 4 of 8.

2. **PROSERPINACA.** Flowers perfect, with lobes of the calyx, stamens, stigmas, and cells of the elongated nut-like fruit each 2; petals none.

3. **HIFFURUS.** Flowers mostly perfect, with separate calyx not continued above the adherent ovary, and a single stamen, slender style, and seed.

1. **MYRIOPHYLLUM.** **WATER-MILKWEED.** (Botanical name, from the Greek, like the popular name, means [translated]: plants, that is, divided leaves usually slightly dissected into six hard-like divisions.)

   **M. apiculatum.** Leaves in threes or fours, those at the summit of flowering stems reduced to small ovate leaves shorter than the flowers, which therefore form an interrupted spike; petals deciduous; stamen 8; fruit smooth.

   **M. verticillatum.** Like the first but the uppermost leaves longer than the flowers and pinnatifid.

   **M. heterophyllum.** Chiefly W. & N.; with leaves whorled in threes or fours, those under the flowers ovate or lanceolate and serrate or rarely pinnatifid; anthers and petals 4; fruit singlet-like on the back.

   **M. subalatum.** Chiefly N. & W.; with leaves and flowers as in the preceding, but more slender, the leaves under the flowers lanceolate and cut-toothed, and the lobes of the fruit singlet-like and nut-like on the back.

   **M. ambiguus.** Contains mix it.; with widely scattered very delicate or capillary leaves, often perfect flowers, 4 petals and 4 stamens, and a bilobed smooth fruit.

2. **PROSERPINACA.** **MERMAID-WEB.** (Name from Latin pro-ser-pina, to creep, or after Proserpine.) Stems creeping at base in the mud or shallow water, the upper part emerging: flowers in the axils of the alternate leaves, produced all summer.

   **P. palastris.** Leaves above water lanceolate and merely serrate; fruit sharply tongued.

   **P. procumbens.** Leaves all pinnae divided into very slender divisions; angles of the fruit bluish. Chiefly E. & N.

3. **HIFFURUS.** **MARESTAIL.** (Which the botanical name means in Greek.)

   **H. vulgaris.** In ponds and springs N. & W., rare; stems 15-20 high, the linear acute leaves in wheels of 8-12; the upper ones with thin flowers in 4-axils.

44. **ONAGRACEAE, EVENING-PRIROSE FAMILY.**

   **Herbs, or sometimes shrubs, without stipules; the parts of the symmetrical flowers in fours (rarely in two or fives) throughout; the tube of the calyx usually prolonged more or less beyond the adherent ovary, its lobes valvate in the bud, its throat bearing the petals (convolute in the bud) and as the many or twice as many stamens; styles always united into one. Embryo filling the seed; no albumen. Compress many plants with showy blossoms, cultivated for ornament; these almost all American.** (Lepota has irregular flowers with only one perfect stamen.)

1. **Parts of the flower in twos.**

   **CIRCEA.** Delicate low herbs, with opposite thin leaves, and very small whitish flowers in racemes. Calyx with 2 reflexed lobes, its tube slightly prolonged beyond the 1-seeded ovary, which becomes a 1-celled[1] nut-like reddish fruit, covered with weak hooked bristles. Petals 5, obovate. Stamens 5. Style slender, tipped with a capitate stigma.
EVENING-PRIMORE FAMILY.

3. Plants of the flower in pairs, or 4 in No. 8.

2. Gaura. Herbs with alternate oval leaves, and small or smooth flowers in racemes or spikes. Calyx with slender tube much prolonged beyond the 4-celled ovary. Petals 4, on claw, mostly turned toward the upper side of the flower. Stamina 5, these and the long style turned down. A little scale before each filament. Fruit small, 4-angled or oblong, 1-4 seeded.

--- Deering and fruit with many small seeds in cluster of the calf.
--- Seeds furnished with a crown or tuft of long and soft hairs at one end, by which they are widely dispersed by the wind.

3. Eupatorium. Calyx with tube scarcely at all extended beyond the linear ovary. Petals 4. Stamina 5. 4. Zauschneria. Calyx expanded much beyond the linear ovary into a funnel-shaped tube, with an emarginate upper base where it joins the ovary, and with 4 lobes as long as the 4 oblong-obovate petals, both of bright scarlet color. Stamina 4 and, as well as the long style, projecting.

--- Seeds noticed, i.e., without a tufting tuft.
--- Flowers regular and symmetrical; calyx-tube extended more or less beyond the ovary; the tube nearly reduced; petals 4.

5. Clarkia. Calyx-tube continued beyond the ovary into a short funnel-shaped cup. Petals broad, scallop-shaped or truncate, sometimes it birds, netted on a slender claw. Stamina 8, with slender filaments, the alternate ones shorter; anthers curved or eluted after opening, those of the short stamina much smaller, or abraded and sterile. Stigma 4, red or oblong. Pod linear and becoming narrowed, angled. Flowers usually yellow.


--- Flowers irregular and asymmetrical; calyx- tube not in the least extended beyond the linear ovary; as much the shorter the petals of the petals, and cells of the pod; i.e. 4 or 10, rarely 2.

8. Ludwigia. Stamina as many as the lobes of the calyx and cells of the pod, almost always 4. Petals 4, often small, or none.

9. Fuchsia. Flowers small. Calyx 4-celled. petals with claws, 4, lateral lobes of the upper side of the flower, the two uppermost stamens shorter and sterile. Style slender, 0. stigma ovate. Pod glabrous.

--- Seeds short; fruit 4-celled berry.

10. Lobelia. Flowers small. Calyx 4-celled. petals with claws, 4, lateral lobes of the upper side of the flower, the two uppermost stamens shorter and sterile. Style slender, stigma ovate. Pod glabrous.

--- Seeds 4; fruit 4-celled berry.

11. Fuchsia. Flowers showy; the tube of the highly colored nectar extended much beyond the ovary, bell-shaped, funnel-shaped, or tubular, the 4 lobes spreading. Petals 4. Stamina 8. Styles long and club-shaped; stigma club-shaped or capitate.

1. Cicoria. ECHANTER'S NIGHTSHADE. (Named from Cicoria, the enchantress, it is not obvious why; the plants are insignificant and iner, native of gymnos woods, flowering in summer.)
2. SAUSA. (Name in Greek meant much, which these plants are not; only one of them is worth cultifering.) Pl. all summer.

G. Lindesmiti, of Texas, cult. for ornament, nearly hardy, about 30 high, hairy, with lanceolate sparingly toothed leaves, long weak branches producing a continued succession of handsome white flowers; the calyx hairy outside; petals nearly 1 long.

G. blundsii, the treatment will species, 30–40 high, soft-hairy or downy, with oblong-ovoidate obscurely toothed leaves, small white or lilac-colored flowers, and downy fruit.

3. EPILOBIUM, WILLOW-HERB. (Name compounded of the Greek willow and herb, these plants are like a willow in general appearance, except in the long tube to the style, and with ovate-ovate or oblong leaves, the lower petiolate, fine-purple or white flowers, in summer.)

4. ZAUSCHNERIA. (Named for Zauschner, a Bohemian botanist.)

Z. California. Cult. for ornament, from California, flowering through late summer and autumn, 10–20 high, the oval or lanceolate leaves and the pods with every sort of seeds resembling those of Epilobium, but the handsome erect flowers more like those of a Fuchsia: these are single and usually in the axis of the upper and alternate leaves, or at length somewhat racemose, about 2 long.

5. CLARKIA. (Named for Capt. Clark, who with Capt. Lewis made the first official exploration across the mountains to the Pacific, and brought home one of the species.) Herbs of Oregon and California, with alternate mostly entire leaves, and spiny flowers in the upper axils, or the upper running into a loose raceme; cult. for ornament: Pl. summer.

C. pulchella. About 15 high, with narrow lance-linear leaves, deeply divided petals (purple with rose-colored) and white varieties, bearing a pil of minute teeth low down on the slender flower, the lobes of the stigma broad and yellowish. There is a partly double-flowered variety.

C. elegans. Fully 30 high, more commonly flowered in the conservatory, with long branches, large-ovate or oblong leaves, the lower petiolate, fine-purple or white flowers broader than long and much shorter than their naked claw, smaller lobes to the stigma, and a hairy ovary and pod.

6. SUCHARDIUM. (Name from the Greek, means charming.)

E. concinnum, of California, cult. for ornament: a low and branching plant, like a Clarkia in general appearance, except in the long tube to the style, and with ovate-ovate or oblong leaves, in summer.
7. GENTHERTA, EVENING-RBIMBOSE. (Name from Greek words for sunny and host; application obscure.) Very many species, all originally American, and most of them from the U. S., especially from N. W. and W. The following are the principal common ones, both wild and cult. for ornament: B. amesi. (Polem-grass loosely connected by cobwebly tendrils, strongly TimeSpan  1:13, fig. 226.)

§ 1. Stigma 4, long and slender, spreading in the form of a cross; tube of the calyx beyond the stamens long and mostly slender.

• Yellow-flowered Evening-Primrose, properly so-called, the flowers opening (usually suddenly) in evening brightness, and fading away when sun-shine returns, hence: the yellow petals commonly obsolete.

— None detached and long: ped cylindrical or spindle-shaped, smooth. 5 6

G. biennis, Common E. Wild in open grounds, and the large-flowered forms cult. for ornament: erect, 2'-3' high, hairy or smoothish, with lance-like leaves entire or obscurely toothed, flowers all length forming a terminal leaf-bracteate spike, and petals obsolete. Nurse into several varieties, of which the largest and most now cultivated is

Var. Lamprokiana, from S. W. U.S., which is tall and stout, with corolla 3'-4' in diameter: the slender stalk at dusk very striking.

G. rhombipetala. Wild on our western limits: more slender, hairy, 1'-2' high, the rather small flowers with rhombic-ovate and aceto petals.

G. Drummondii, cult. from Texas: has its stems spreading on the ground, and large flowers, like those of the first, in the upper axils, the lanceolate leaves, 6-8, setulose.

G. auricula. Wild from New Jersey S., in sandly ground; low and spreading, hairy, with lance-oblong or lance-shaped, small flowers in their axils, pale-yellow petals turning rose-color in fading, and slender pods.

— None short and prostrate or scarcely long: ped short, 4-angled.

G. triloba. Cult. from Arkansas: leaves pinnatifid and cut, like those of Dandelion; smooth, all in a tuft at the upper of the ground, on short stolons, which in summer is crowded with the almost woody pinnatilimbatae, narrowly winged sessile pods, forming a mass 3'-5' in diameter; flowers rather small, the slender tube of the calyx 4'-5' long, its lobes about as long as the obscurely ciliate and notched pale-yellow petals, which turn perish in fading. V 6

G. Missourensis, the pinnate-leaved form also called G. missourica. Cult. from Missouri and Texas: often hairy or tenui setulose, with many short prostrate stems 6'-12' long from a thick woody root, crowded lanceolate entire leaves, very large and showy flowers in their axils, opening before sun-set; the tube of the calyx somewhat enlarging upwards, 6'-7' long; the bright-yellow corollae 4'-6' across; pod with 4 very broad wings. V 6

• White-flowered Evening-Primrose, usually turning rose-colored in fading, none of them opening in the daytime: petals broadly oblong or ob-ovate; lanceolate commonly baccate.

G. taraxicifo!ia (probably a variety of G. auricula, from Chili: rather hairy, all stems slender, at length forming prostrate stems, with pinnatilimbatae leaves, after the manner of Dandelion; the same dorete, and very large flowers in the axils, tube of calyx 3'-4' long, corolla 3'-5' across, and a woody oblong and sharply 4-angled seedle pod.

G. speciosa, Nutt. of Arkansas and Texas, not hardy in cult. N. : pulleunt, with erect and branching stems 6'-10' high, many flowering cut-leaved leaves, the lower mostly pinnatifid; flowers somewhat recurved at the summit, and opening in the daytime; calyx-tube rather club-shaped and just much longer than the corolla; corolla 3'-4' across; pod imbricated. V 6

G. Ménardii, a species mostly found in the Pyrenees, with leaves and flowers very much resembling those of G. auricula, with lanceolate and often obovate-tuberculatod soft-hairy leaves, and peduncled oblong-cylindrical roughish pods; G. rameseskii, soft-hairy, conspicuously so on the calyx-tube and petals, deeply obsolete petals, long-tubercled pods with a thicker closely sessile base and smooth scoi,

G. angusti, with ascending stems, smooth or slightly hairy,
smaller entire petals, but pods and seeds like the foregoing, and *C. strigcosa*, with petals as to *C. trichogyne*, and similar pods, but with minute and exfoliative seeds.—all handsome white-flowered species of Western plains and the Rocky Mountains.—are beginning to be cultivated.)

**8. JUSSIA.** (named for Bernard, the elder de Jussieu.) Leaves entire. Flowers yellow, all summer.

**J. dioecia.** Wet grounds, Virg. to Ill. and S. Erect stems and slender branches marginal or winged in lines proceeding from the base of the lanceolate leaves, smooth throughout; flowers sessile or short-stalked, with 4 lobes of calyx, nearly as long as the petals, and oblong-cylindrepod. **4, 2.**
J. grandiflora. Marshes S.; hairy, with stems erect from a creeping base, lanceolate leaves, flowers 2" in diameter, the 6 calyx-holes only half so long as the petals, and pods cylindrical and stalked.

J. repens. In water from S. Ill., S.; smooth, with creeping or floating and rooting stems, oblong leaves tapering into a slender petiole, long-pedunculated flowers " or more across, with 6 calyx-holes, the cylindrical or ellipsoid pods tapering at the base.

9. LUDWIGIA, FALSE LOOSESTRIFE. (Named for C. G. Ludwig, a German botanist, rather earlier than Linnaeus.) Marsh herby, with entire leaves; flowers seldom handsome, in summer and autumn.

§ 2. Leaves alternate, mostly sessile.

- Flowers peduncled in the upper axils, with yellow petals (about 1" long) spilling the involucrate ovate or semicircular calyx-holes; stems and axes slender; pedicels, strong and slender, opening 4/4 hole at the base: stems 2'-3' high.

L. alternifolia. Common E., the only one found for S.; smooth, branching, with lanceolate leaves tapering to both ends, petals scarcely longer than calyx, and angles of pod winged.

L. virginica. Fine herby, S.; downy, with mostly simple stems, blunt oblong leaves or the upper linear and smaller, and petals twice the length of the reflexed calyx.

L. hirtula. Fine herby from New Jersey N.; hairy, with simple stems, oblong or lanceolate short or blunt leaves, and petals twice as long as the barely spreading calyx-holes.

- Flowers sessile in the upper axils, small, with pale yellow petals about the length of the prominent calyx-holes; stems and simple short; leaves of flowering stems narrow and linear.

L. linearia. Stems from N. Jersey S.; smooth, loosely branched, 3'-4' high, with acute leaves on the flowering stems, but alternate ones on creeping runners; pods oblong-ellipsoid or top-shaped and much longer than the triangular-elliptic calyx-holes.

L. litorea, only S., is 6'-12' high, with blunter leaves, and cylindrical pods little longer than the lanceolate calyx-holes.

- Flowers small, often clustered, and with no petals, or mostly more radiate; leaves mostly lanceolate, new species with shorter or oblolute flowers on creeping runners; flowering stems mostly 2'-3' high.

- Flowers sessile, flowers peduncled or equal or short stalked at the end of the branches.

L. pilosa. Only S.; much branched, with lance-oblong leaves, and globose-4-sided pods about the length of the spreading calyx-holes.

L. cylindrica. From Illinois and N. Carol.; much branched, with long lanceolate and acute leaves, tapering into a petiole, small axillary flowers, and cylindrical pods much longer than the small calyx-holes.

L. sphaerocarpa. From E. New England N.; with lanceolate or linear leaves, 6 calyx-holes as both ends, very small flowers in the axils, and globular pods not longer than the calyx-holes, with hardly any bracts at their base.

L. polycarpa. From Michigan N.; like the last, but smoother, and with conspicuous slender bracts at the base of the 4-sided rather top-shaped pod, which is longer than the calyx-holes.

L. capitata. From N. Carolina S.; with slender simple stems angled towards the top, long lanceolate leaves; flowers mostly crowded in an oblong or broadish terminal head, and oblong-angled pods longer than the calyx-holes.

L. alata. From S. Carolina S.; with simple or sparingly branched stems strongly angled above, few flowers, in the axils of the upper withered calyx-leaves, and in variously pyramidal pod as long as the white calyx-holes, with concave sides and angled angles.

L. microcarpa. From N. Carolina S.; the low stems creeping at base and channeling above, leaves oblongate or oblanceolate, with minute flowers in their axils, the short 4-angled pods not larger than a pin's head.
EVENING-PERMOUR FAMILY.

§ 2. Leaves opposite, obtuse or acute, long-petiolate, with small and nearly sessile flowers in their axils; stems creeping or floating.

L. palustris. Common in ditches and shallow water: smooth, with at petals, or small and reddest ones when the plant grows out of water, and-sided, 4-sided pods longer than the very short calyx-lobes.

L. nana. From N. Carolina: larger than the foregoing, and with yellow petals as long as the calyx-lobes, the pods tapering to the base.

§ 3. Leaves opposite, nearly sessile, with a long-petiolate flower in the axil of some of the upper ones; stems creeping in the mud.

L. arcuata. From coast of Virginia: small and smooth delicate plant, with oblong-obovate leaves shorter than the petal-spur; yellow petals longer than the slender calyx-lobes, and chilb-shaped somewhat curved pod.

10. LOPEZIA. (Named for J. Lopez, an early Spanish naturalist.)

L. racemosa. From Mexico: a slender, branching, nearly smooth plant, with alternate or lance-oblong leaves on slender pedicles, the leaves borne on long petioles as if on small flowers or leaves. The species is cultivated, now generally mixed with, and chiefly come from the following:

§ 1. SIMPLE-PETAL-FLowered LUPEZIA, or LAMIAE' Euphorbeae: with the lobes of the normally red calyx lobes longer than the tube and then the petals, the latter normally violet or blue, always or rarely, sometimes rounded to the base of the fruit; usually less than six inches and smaller, flowers growing in long racemes from the sides of the leaves.

F. corymbifora, or F. argentina. Low, rather small, small flowers with globose or oval calyx-lobes between the leaves and lobes, which also form a globular bed and hardy spread after opening; leaves somewhat obtuse.

F. Magallanica, from N. Chile and Fergus: less tender, with tube of the calyx bell-shaped and much shorter than the lobes; hairs short-petiolate or the upper membranous.

F. microstigma, from Chile: leaves on slender pedicels; calyx-lobes tinged with scarlet or red; leaves small or less short than the spreading lobes.

These species now greatly varied in color; some varieties with calyx white or light and the petals deeply colored, some with the reverse; also double-flowered, the petals being multiplied.

§ 2. LONG-PETAL-Flowered LOP ZIA, with long-petiolate or slightly foned-shaped tube of the usually 3-lobed to the end, or 3-2 long, very much longer than the spreading lobes, which little exceed the tube or pointed somewhat spreading petals; stems and style little projecting; flowers crowded into a rather close drooping raceme or coryd: lobe of the calyx: large calyx-lobes.

F. filipina, from Mexico: smooth, with some somewhat heart-shaped leaves, and scarlet flowers, the flowers on calyx-lobes often tinged with green.

F. corymbulosa, from Peru: mostly pubescent, with lance-oblong and taper-pointed almost oblong leaves, and red flowers, the lanceolate calyx-lobes and the lance-oblong petals taper-pointed, at length widely spreading.

§ 3. PANILOE FuchSIA, with small flowers erect in a naked and compound terminal peduncle or cluster; lobes of the calyx and petals wider spreading.

F. arborescens, T. E. F., from Mexico: a stout shrub rather than a tree, with oblong or lance-oblong entire leaves acute at both ends and usually pubescent; flowers light rose-colored, 4-5 long, with narrow-oblong calyx-lobes, and petals rather longer than the tube, about as long as the stamens and style.
45. MELASTOMACEAE, MELASTOMA FAMILY.

Plants with opposite and simple 3-ribbed leaves, no stipules, as many or twice as many stamens as petals, both inserted in the throat of the calyx, anthers usually of peculiar shape and opening by a small hole at the apex. Flowers usually handsome, but mostly scentless. A large order in the tropics, represented in northern temperate regions only by the genus Phacelia of the Atlantic States. None in common cultivation, but the following are those more usually met with in choice conservatories:

Centradenia ː from Mexico: a low and bushy almost herbaceous plant, with stipulate-veined and lanceolate broadly lanceolate leaves, apparently alternate (which comes from the diminution of total suppression of one leaf of each pair), producing great abundance of small flowers in short racemose clusters, with a white and rose-stung petals, and 5 anthers with various club-shaped and bimiscle appendages.

Heterocentron ː from Mexico: an herb, or nearly so, with this erect herbichich leaves which are feather-veined rather than ruffled, and with terminal panicles of handsome bright rose-colored flowers (and a white variety), of 4 petals and 5 very unequal and dissimilar stamens, none with appendages at base, none without.

Cyanophyllum ː from Central America, cultivated in hot houses for its magnificent flowers: the spat form sometimes fully 2 feet long, purple beneath and bluish above with metallic bloom. There we have the U. S. genus.

1. RHÉXIA, BEER-GRASS, MEADOW-BEAUTY. (Name from Greek for explain: application obscure.) Low erect herbs of wet or sandy ground, common S., often brief, at least on the margins of the resoles 3-5-ribbed leaves, with handsome flowers in a terminal cyme or panicule. Tab of the calyx urn-shaped, adherent to the lower part of the keeled ovary and prolonged beyond it a short 4-angled cup, persistent. Peats 4, oblong. Stamens 6, with ovules opening by a single minute loco. Stamens simpler: stigma simple. Seeds numerous in the pod, suhlike the minutest milliards. F. summer. 2

* = Authors' bloom and经查，with a sebile base and usually a minute spat; flowers in a panicle or loose cyme.

R. Virginiana. The common species S., in sandy swamp 6-20 high, with square stem almost winged at the angles, leaves or lanceolate small leaves, and large pink-purple flowers.

R. Mariana. From New Jersey and Kentucky S.: 10-24 high, with tertes on 3-angled branching stem, linear or lance-shaped leaves narrowed at base, and pink-purple flowers hairy outside.


R. citrina. Bees in pine barrens from Maryland S.: stem 16-19 high; leaves broad on the upper side, and calyx smooth.

R. serrulata. Bees in pine barrens wholly S.: stem 8-6 high; leaves smooth above; calyx brief.

R. lutea. From North Carolina S. & W.: stem 18 high, briefly; leaves lanceolate, or the lower oblong; calyx smooth.
46. MYRTACEAE, MYRTLE FAMILY.

Trees or shrubs, with simple entire and mostly aromatic leaves pinnate with yellowed or resinous dots, no stipules, perfect flowers, calyx-tube adherent to the ovary, its throat, or a disk surrounding it, bearing the petals and numerous stamens: style and stigma single. A large family in the tropics and southern hemisphere, here commonly known only by a few house-plants, which may be briefly noted as follows:

1. Myrtus communis, Common Myrtle, from the Mediterranean region: smooth, with ovate or lanceolate opposite shining leaves, small in the variety nativa cultivated, polychas in its axils bearing a small white or rose-colored flower (sometimes fall double), followed by a black berry, containing several kidney-shaped seeds.

2. Eugenia Jambos, Rose-Apple, from India: smooth, with opposite shining long and narrow leaves, and clusters of large white flowers with their long stamens most conspicuous; the calyx-tube dilated and prolonged beyond the ovary, which forms a large edible berry, like a small apple, sourish, but when ripe of a rose-like odor; seeds very few, large.

3. Psidium guajava, Guava, of tropical America: with oval oblong opposite leaves, and two or two white flowers at the end of a leafy peduncle; the fruit a large and pyriform-shaped edible berry which is edible, and from which Myrtus fruit is dried to the West Indies.

4. Callistemon lanceolatus, from Australia, called Bottle-Brush; no account of the appearance of the leaves, several all round the stem below the last leaves with their very long thin red stamens; the petals small and lasting early; the fruit a small many-seeded peduncle opening at the top; the alternate intermediate leaves remarkable for being turned edgewise by a twist at their base, as in many related Myrtaceae plants of Australia.

47. LYTHRACEAE, LOOSESTRIFE FAMILY.

Differ from the related orders in having the ovary and peduncle free from, but mostly enclosed in, the tube of the calyx, the leaves usually, the stamens opening longwise. To this family has lately been appended the Pomegranate, which, although peculiar, is commonly referred to the Myrtle Family, notwithstanding the drooping leaves.

† 1. Ovary coherent with the calyx-tube, becoming a fleshy fruit. Small tree.

1. PUNICA. Calyx-tube colored (purple), thick and succulent, its longitudinal base enlarged with the ovary, always enlarged and 4-seeded; its throat bearing the 4-5 petals and very many in several stamens. Style slender. Ovary with many cells in two rows, one above the other, and very many ovules in each. Fruit large, globular, covered with the calyx-label, berry-like, but with a hard rind; the numerous seeds coated with a juicy adhesive pulp.

† 2. Ovary free from the calyx-tube, becoming a 1-4 seeded peduncle.

1. RHAMNUS. Ovary never fully numerous. Small tree.

2. LAGERSTROEMIA. Calyx globose. Petals 6, very varying-shaped, raised or shorter than, borne on the throat of the calyx. Stamens borne in the bottom of the calyx, very long and slender, & considerably larger than the two. Style very slender. Ped, oblong, thick, many-seeded, 2-seeded, only the base covered by the persistent calyx.

* Rhamni 1-5, only as many or twice as many as the leaves of the calyx, lanceolate and stouter than the petals. Bears or nearly so, edge mostly with projecting fiddles, or occurring teeth between the proper teeth of the leaf.
M. Lindleyi. Cultivated, from California, usually under the name of
B. californica. Plant 18-24 high, with broad lanceolate in outline
and deeply pinnatifid, or nearly linear, flowers with 5 alternate and pointed
bright yellow petals opening in sunshine, and the very numerous filaments all
slender.

M. ortuzana, the B. ortuzana of Nuttall, is a very large-flowered
species, of the plains of Nevada and S. 25-30 high, with oblong-lanceolate
oblong or linear leaves, and white fragrant flowers opening at sun or on a
cloudy afternoon, half-bloomed under the ovary, and with 10 lanceolate or
spindle acute petals, about 2" long, the 10 inner narrower, and the 20-30
filaments all slender: seeds very many and flat. Rarely cult. for ornament,
but well worth of it.* 2 5

M. ruhowii, the B. ruhowii of Nuttall, of the same district and further
south, and less rare in cultivation than M. ortuzana, resembles it, but has flowers
of half the size and often without half the flowers under the ovary, outer
filaments mostly broader: seeds wing-margined. 5 2 2

3. Echinocereus. Pail short, containing very many minute roundish
or oval seeds: flowers shorter, golden, opening on bright sunshine.

M. longipes. Cult. from Mexico and Texas under the name of Echinocereus
longipes, a tender perennial plant, branching and usually spreading on
the ground, briefly, with ovate to needle-like, 5-6 " long, 3 white petals and very many slender filaments up to 1" long.

2. BLUMENBACHIA. (Named for the distinguished German physiologist,
Blumenbach.) Includes CALOPHE. Pl. all summer.

B. insignis. Cult. from Chili; rather curious than ornamental, with
pinnately 5-lobed leaves, small flowers with white petals and yellow
re-curved stern appendages; the pet stamens, slightly twisted, with 3 strongly
projecting interior.

B. littorina. Cult. from South America, under the name of Leucos or
CALOPHE, LIPAROPHYLL: stamens erect, with pinnate or pinnately-5-lobed leaves of
or more lanceolate divisions or spines, which are compound or some of
them again pinnate, flowers about 2" across, with bristled petals, the long
petal at length much twisted.

49. CACTACEae, CACTUS FAMILY.

Floury plants of peculiar aspect, mostly persistent, destitute of
foliage (with exception of the rare Pereskia), its place supplied by
the green rood of the flattened, columnar, globular, or various-shaped
stems; the perfect solitary and sessile flower with calyx adherent to
the ovary, its lobes or sepals, the petals, and disc-camara numerous,;
usually in several ranks, the latter mostly very numerous; ovary
1-celled with several parietal placenta; style single, with several
stigmata; the fruit a 1-celled generally many-seeded pulpy berry.
(See Lessons, p. 48, fig. 74, and p. 96, fig. 197.)

We have three or four wild species, several others in common
house-cultivation, and a larger number in choice collections, some
of which are hybrids.

4. OPUNTIA. Stem branching, formed of successive joints, which are mostly
flat, bearing at first some minute awl-shaped bodies answering to leaves,
which soon fall off, and then of tuberous branches and other prickles also
in their place. Flowers from the edge or side of a joint, opening in sunshine
for more than one day.
1. **Opuntia.** Prickly-pear Cactus, Indian Fig, &c. [An ancient name, transferred to these American plants.] To summer. From often suitable.

1. **Simonsia** not longer than the misconduct, in more golden, widely opening petals.

* O. vulgaris, Common Prickly-pear. On the banks and sand, from coast of New England S., with pale and rounded oblong flat joints, 3"-6" long, bearing minute apple-shaped leaves, having brickish last rarely any spines in the middle, and a mostly smooth cottony berry.

* O. Radisperis. Common W. & S. W.: deeper green, with joints 4"-8" long, the little hayly spreading, several small spines and a single stronger one in the center, and having often with a reddish center.

* O. Missouriensis. From Missouri W. on the plains: with ovulate joints 2'-4' long and insected, tufts of finely divided brickish and 2'-10" long and slender spines; the berry dry and prickly.

* O. Pus-Corpore. On the coast S. with small and narrow, almost cylindrical, finely separable joints, their spines in pairs; the berry small and bony.

+ Eres, shrub of tree-like, cultivated in conservatories, from West Indies and South America: berry edible.

* O. Ficus-Indica. Joints ovular, thick and heavy, 1" long, with minute pins or none; berry edible, bony.

* O. Tunja. Joints ovular, 4'-8' long, with several unequal spines in the tufts, he longer ones about 1" long.

* O. Brasilensis. Tree-like, with a round straight trunk rising 80' or more high, bearing short branches, their ultimate joints ovular or oblong, minute, thinner and more leaflike than in the others, armed with single long and very sharp spines.
CACTUS FAMILY.

§ 2. Flowers longer than the stem or terminal pedicle, shorter than the style.
C. obconicafera. Call from Mexico and West Indies; trailing 6'-10' high, with petals of the branches oblong-elliptic, 4'-12' long, spreading or nearly so, yellow, with single rounded spines, bluish; bright red. One of the plants used which the ecclesiastical orders hold, whence its name.

2. EPIPHYLLUM. (Name from Greek, meaning upon a leaf, i.e. the flower from the top of what seems to be a leaf.) Full, mostly in summer.
E. truncatum. Call from Brazil, low, bright green, with drooping branches; the flowers, pure white, 3'-4' long, the upper and with a yellow bud; flowers 2'-3' long, oblong, with petals and short sepals spreading or recurved. It is said so arranged that the insect can never see the flower.

3. PHYLLOCACTUS. (From Greek words meaning Leaf-Cactus.) Call from South America and Mexico; all summer.
* Flower with the tube shorter than the pedicle, red, scarlet, open through more than one day; petals and stems many, except in the dwarf species.

P. biforins. The best flower species; with slender stems, and two sorts of flowers, open or of closing, the latter intermediate; the latter producing a short pink flower; 2'-3' long, with about 4 slender sepals, as many narrow linear-oblong; persistent petals with spreading tips, and only 8-10 stamens.
P. phyllanthoides. The narrow-oblong; slender; leaf-like branches, minute, paired; round-oblong; elongated and similar sepals and petals, the two most widely spreading, the uniform color.
P. Ackermannii. Like the preceding, but much more showy, with bright red and sharply pointed petals spreading and 2'-3' long, and the cacti small and bristly.

P. corymbus. Leaf-like branches 1'-2' long, 2'-3' broad, circularly notched, flower open in the daytime for several days; 3'-5' in diameter, with the most 15-20 petals, the outer petals or inner sepals bristly.
P. Phyllanthus. Branches nearly as in the preceding; but the flower open at evening and lasting only till morning, the slender tube many times longer than the small petals.

4. CEREAU. (Latin name of a posy or wreath, from the form of the stem of some common species.) The following are the commonest in cultivation, mostly from Mexico and South America; all winter.
§ 1. Stems and branches long, spreading, creeping or clinging, recently jointed near or low, only 3'-7' long; very few spines.
* Flower red, open in daytime for several days; annual much described.
C. speciosissimus. The specimen red-flowered Cactus; with stems 3'-5' high, rarely exceeding 4' or 5' broad and thin, waxy-margined, various shades of red, with spines of various shades, 4'-5' in diameter, the tube shorter than the petals. There are various hybrids of this with others.
* Flower white in the petals, opening at night, remaining in the morning, 4'-5' in diameter; when expanded, the tube 3'-6' gay, strongly colored, with joints, pricks short and few. Night-blooming Cereus.
C. triangulana has distinctly triangular stems, minute prickles, and flower with glaborous tube, glabrous sepals, and yellow stamens.
C. hystrixgigantea has 4-6 jointed with very many prickles, and flowering much like the next but with broader sepals.
C. grandiflorus, Common Night-blooming Cereus, has more stems with 3'-4' long grooves and blunt angles, bearing more conspicuous prickles, long bristles on the flower-tube, and dull yellow sepals.
CACTUS FAMILY

§ 2. Stems and branches long, dark, disposed to trail or creep, remotely pitted, cylindrical, with 8 to 12 ribs or grooves and rows of apparent short and
fine prickles-ciliae; flowers white.
C. serpentinus. Stems 3' or more in diameter, tapering at the apex, about 12-bifid, disposed to stand when short, not trailing; flowers opening for a night, fragrant, with lower petals reddish-purple outside, nearly white inside, 2' long, rather shorter than the tube.

C. flagelliformis. Stems long and slender, prostrate or hanging and running; flower 2' – 3' long, the narrow sepals and petals not very many, reversed, open by day.

§ 3. Stems erect, self-supporting, bifurcated, cylindrical and rostrate-like, with about 14 to 20 alternate ribs and grooves, about nearly straight-angled prickles 3' – 12' in the cluster, and no long bristles; flower long, white; tube 3' – 5' long.

* Flower opening at midday, enclosing before night.

C. Peruvianus. The largest species (except the Giant Cereus of Arizona), becoming even 20' high and thick in proportion, with rather strong compressed ribs and stout prickles; the flower 6' long, with greenish sepals and white or externally two-colored petals apparently short. — Var. monstrosus, in old conservatories, has a short stem with 4 to 6 broader and wavy wing-like angles, sometimes breaking up into tubercles.

* Flower opening at midnight, enclosing next day; till snow remover at the top.

C. eriphorus. Stems jointed at intervals, with twisted ridges and needle-like prickles; lower 6' – 7' long, with woolly tube and narrow greenish sepals, the upper 4' – 6' long, longer than the petals.

C. repandus. Stems with flatter ridges, and with flowers much as in the foregoing, but the tube not woolly.

C. californicus. Stems light green, becoming about 1' thick, with wrinkled ridges and smooth prickles; flower 8' in diameter, with end-tipped petals and ovate and brown-purple sepals, the longer of these little shorter than the smooth tube.

§ 4. Stems erect and simple, to length cylindrical, with 20 to 25 narrow ridges, heavy clusters of short prickles and woolly bearing bristles.

C. secundus, Old-Man Cactus. Cult, for its singular appearance, the long white hanging bristles as the top like the lace of an aged coat; flowers (within with) not large, with a very short tube.

§ 5. Stems short and stout, cylindrical or ovate, clustered or branching from the base; flowers with very short bell-shaped tube.

C. cymaticus. Wild on the plains from Nebraska S. 3' – 6' high, brevissimis, thinly clad, with 12 – 18 thick ribs, covered with the false clusters each of 20 to 30 short sharp-flowering prickles; flower rose-purple, in daytime, 3' – 5' in diameter.

§ 6. Echinocereus. Stems glabrous or at times very pendent, resembling Echinocereus, but flowers from the side; the short flowers usually white when they first open and short, and with a long greenish-yellow tube, 5' – 8' long, to which an outer set of stamens is united up to the throat, while the inner ones are separate for about the petals and sepals pointed.

* Flower white, fragrant, 5' wide at the top of the bell-shaped seed at each side: globular stem by-pearly or ovate at top, about 5' in diameter.

C. Eryniei. Stems with about 12 acute slightly wavy ridges, and many somewhat prickles from woolly tubercles.

C. tubuliflorus, or Zecheliana. Stems broader than high, broad at top, with 14 very strong and prominent wavy ridges, the woolly tubercles bearing 6' – 8' short and dark spines.

* Flower delicate rose color; edges thin with scattered hairs and the stigma colorless; spines usually pinnate-sedent and slender, 5' – 8' long.

C. oxygopus. Stems bluish, with about 14 acute ridges from a lanceolate, and no thorns; very short and numerous in the clusters.
C. multiplex. Stem green, with about 18 acute ridges and 10-12 rather long spined spines.

5. **ECHINOCACTUS.** (Name means Spring- or Holiday-Cactus.) There are many wild species in S. W., but few common in cultivation. Flowers mostly small, opening for 2 or 3 days, closing at night.

6. **MELOCACTUS,** or **MELIAX-CACTUS.** One species is often brought from the West Indies, but does not long survive, viz.,

M. communis, called Tecua-x-Cay. Globular or ovate, dark green, often 1' high, with 12-20 edges, bent with clusters of short brownish spines; the cylindrical needle-like spines of basils and rodent wood, 2'-3' high, in which the very small pink flowers are bulb-like hooded; berries small, red.

7. **MAMILLARIA.** (Name from the nipple-shaped tubercles which cover the stem.) Many wild species for W. and S. W. on the plains: few common in cultivation.

M. longimamma, from Mexico, has the tubercles rising from a depressed base, or apparently almost from the root, 1' or more long, loosely spreading, much longer than the 9-11 prickles at their apex. Flowers pink, 1' long.

M. sauriflora, with globular and at length short-cylindrical stems 1'-3' long, numerous, prostrate or reclining tubercles bearing 10-12 prickle-like spines, yellowish, 1'-2' long, small, white.

M. graminiflora, with 12 or more low-cylindrical stems 1'-3' long, exceedingly prostrate, the small tubercles bearing about 15 recurving white prickles, and an older plant 1' or 2' long and 1' or 2' straight, or a brown hue: flowers small, white.

M. ollongata, with cylindrical clustered stems, covered with short conical tubercles, which bear 15-20 uniform radiating and recurved: slender prickles in a very rare central one; flowers small, white.

M. viridipallida, from Neurock, X., 1'-2' high, simple, or prostrate in tufts, globular, with the small tubercles slightly grooved along the upper side, bearing 12-18 slightly radiating white prickles, and a 3-12 stouter and darker one; flower pink-purple, large for the plant, about 2' in diameter.

50. **MESEMBSYANTHEMUM, FR-Marigold Family.**

Fleshy plants, of aspect between the Cactus, Portulaca, and Opuntia, with simple entire leaves, and calyx-tube coherent with the compound ovary, which has 4-20 styles and as many cells: represented in cultivation by the following.

1. **MESEMBSYANTHEMUM.** Heterorrhous or true-solitary and prostrate or low branching plants, with very succulent leaves and mostly headless flowers, opening only in bright light, commonly at noon. Leaves of the calyx mostly 5. Petals linear and stamens very numerous, on the calyx. Styles, cells of the ovary, and radiating flowers or blooms of the many-seeded and 4-20.

2. **TETRAGONIS.** Low spreading herbs, with broad and flat thickly leaves, and small flowers in their axils. Style usually united. Petals none. Species few or many. Styles 1 and 1-seeded cells of the ovary few; fruit hard and

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*Note:* The text appears to be a description of various species of cacti and related plants, detailing their characteristics and cultivation. The text is rich with specific botanical terms and descriptions, typical of a botanical or horticultural reference. However, without the original context or formatting, it's challenging to provide a concise summary. The information seems to be from a historical or educational context, possibly from a 19th-century botanical reference. The page number and other metadata suggest it is part of a larger work, possibly a guide or dictionary of plants.
PASSION-FLower FAMILY.

1. MESEMBRYANTHEMUM, FIG.-MARIGOLD. (Name com-
posed of Greek words signifying flowering or waliety.) Calla for ornament,
study from S. Africa; 6. summer.

a. Anass or binomial, bronzy-furred, perennil, cultivated in open ground.
M. crystallinum, low-plant. Plant remarkable for the glistening little excretales
which cover the lyre-shaped, like heart-ovate; leaves soft and tender,
long, the lower broadened heart-shaped or ovate, upper spatulate, wavy; flowers
assise, white or purplish, ± across.

b. Perennial, yellow-green annual plants, from Cape of Good Hope:
flowers of opposite, sessile or eulax at base, smooth.
M. dolabriforme, Hatch-leaved F. With glaucous and dotted
broad-oblong leaves, and yellow flowers opening at evening.
M. nolitangium, symmetrical F. With pale yellow oblong
shaped leaves (± long, fully ± wide), flattened branches and peduncle, and
pink-purplish flowers ± across.
M. spectabile. With glaucous and linear ±-angled pointed leaves, and
pink-purple flower ± across.

2. TETRAGONIA. (Name Greek for four-cornered, from shape of the fruit.)
T. expansa, New Zealand Nasturtium. Occasionally called a Spinach:
leaves pale, triangular or oblong ovate; with short marginal petals; greenish
small flower assise in the axil; stamens several, in clusters alternate with the
4 lobes of the calyx. 1

51. PASSIFLORACEAE, PASSION-Flower FAMILY.

Represented mainly by the Passion-flowers described below.
In conservatories may be found one or two species of Tacsonia, dif-
ficult from true Passion-flowers in having a long tube to the flower,
but they are uncommon, and rarely bloss.

1. PASSIFLORA, PASSION-Flower. (Flower of the Passion; the
carly Roman Catholic missionaries in South America finding in them symbol-
of the crucifixion, the crown of thorns in the fringes of the flower, thorns in the
styles with their capitate stigmas, hammers to drive them in the stamens,
ovules in the tendrils.) Herbs or woody plants with alternate leaves and con-
spicuous stipules, climbing by simple axillary tendrils; the flowers also axi-
illary, saffron with 3 bracts underneath, and 6 joined in the peduncle. Calyx
with a very short tube or pubescent; 5 divisions which are colored inside like the
petals, and often with a claw-like tip. Tube 3 or 4 at the throat of the calyx, or
sometimes none: within them the conspicuous crown of numerous filaments
or rays, forming a double or more compound fringe. Stamens 3, with nar-
row-oblong versus; anthers; their filaments united in a tube below sheath-
and adhering more or less to the long stalk which supports the I-ediled ovary.
Styles 2, mostly club-shaped; stigma capitate. Fruit (berry-like, edible in several species, with many seeds, enveloped in pulp, on 3 petiolate
placenta. F1. summer, open for only one day.

a. Wild species of the country, hardy, smooth, with 3 lobed leaves.

P. foixii. Low herbs, from S. Peru, to Ill. 8. slender, low-climbing,
with the short and blart lobes of the leaves entire, and a greenish-yellow flower
of no beauty, barely ± wide. 2
P. incarnata, the fruit, called Myrtus in S. States, edible, as large as a
large egg; trailing or low-climbing, with deeply 3-lobed serice leafes, a pair of
glands on the peduncle and one or more on the small bracts, the purple crown
of the handsome flowers (2–3 across) rather longer than the pale yellow
Dry ground, from Virginia and Kentucky. 2

b. Cult from South America. Stone wood, except the first. (These are the
commoner species: there are a few hybrids and rare ones.)
C. VITICICUS, WINE-PLUM, LONG-NOSE, AND CHOCOCUMBER SQUARE, VEGETABLE MELON, &c. Fruit mostly hard-shelled at maturity, the surface warty, ribbed, or sometimes smooth and even, from 3 to 6 or 8 inches in length in the very various forms, in a remarkable one, 20-48 long and little thicker than a ham's arm.

§ 2. Stalks and bright green 3-5 lobed leaves push out with soft hairs; fruit slightly 5-lobed, prominently enlarged above & once the fruit, the central pulp barely through.

C. MOSCHATUS, WILTED CUCUM, or BAYBART SQUASH, &c. Cult. for the edible stem, which produces only 8, and in clustered, pea-shaped, or long-elliptical, with a blanched-white surface.

§ 3. Stalks and abrupt leaf-shaped thinly or simply lobed green-enough, hairy; flower-stalks bracts; that of the first third, margined but not raised and grooved; inner pulp violet an and not brown.

C. MAXIMUS, GREAT or WINTER SQUASH, &c. Fruit rounded, depressed, often much wider than high, and (as in winter S.) entire and pointed, usually hand-sized tough-skinned, varying from 4 to 8 or 12 in length or breadth, the hard flesh commonly yellow or orange. The crowned or TEAK SQUASHES have the top of the fruit projecting beyond an encircling line of contraction which marks the margin of the individual cells.

3. CITRULLUS, WATERMELON. (Name made from Citrux, Latin for Orange or Citrus.)

C. vulgaris, Watermelon. Cult. from Asia. Plant, with leaves deeply 3-4 lobed, and the divisions again lobed or sub-marginal lobes, twin or kidney, the refreshing edible pulp of the fruit, in which the dark seeds are imbedded, consists of the enlarged and juicy placenta, which are red or white. — The unripe Citruses of our gardens is a variety with a firm or hard flesh, used for preserving.

4. CUCUMIS, MELON and CUCUMBER. (The Latin name.)

C. Melo, Melon, MUSCUM. Leaves round-heart-shaped or kidney-shaped, the lobes if any and always rounded, fruit with a smooth, thin, and sweet flesh, the edible part being the inner portion of the pericarp, the thin and watery placenta being discarded with the seeds. The Summer Melon, sometimes called SATURDAY-CUCUMBER, is a strange variety, occasionally met with, with a long and anaconda-like fruit.

C. sativus, Cucumber. Leaves more or less lobed, the lobes acute, the middle one more prominent, often pointed, fruit rough or minutely star-like, young, smooth when unripe, eaten unripe.

5. MEDICINE. (An ancient Greek name for some sort of grape.)

6. ROCINOCYTIS, WILD BALSAM-APPLE. (Name from Greek for hedgehog and bladder.)

B. lobata. Low ground, chiefly N. & W., and cult. for roots; tall-climbing, smooth, with strongly and sharply 5-lobed leaves, cupules and rather pretty white flowers, producing all summer, and oval fruit if large, and bladder after opening; seeds flat.

7. SICOSIS, STAR-CUCUMBER. (Ancient Greek name of Cucumber.)

B. angulatus. A weed in damp or shady grounds, northern S., climbing stuff, losing leaves, roundish, heart-shaped and 3-angled or slightly lobed leaves, inconspicuous flowers, and little lute-like fruits, almost like a grass. The tendrils are very active in their movements, and in a warm day fall by a visible motion after contact with a solid body.
BEGONIACEAE, BEGONIA FAMILY.

Somewhat succulent herbaceous or more or less woody-stemmed house-plants, of peculiar aspect, with alternate and unequal-sided leaves, deciduous stipules, and monochasium flowers, in cymes or clusters on axillary peduncles, numerous stamens, inferior triangular ovary, becoming a many-seeded pod, — represented in choice cultivation by the genus

1. BEGONIA, ELEPHANT'S-EAR. (Named for M. Begon, Governor of St. Domingo 200 years ago.) Flowers with the calyx and corolla colored alike, sometimes dull but totally harmonious, both kinds commonly in the same cyme, and flat in the bud; the outer pieces answering to sepals mostly 6, violet in the bud; the inner, or true petals, 2, or in the fertile flowers usually 2 or 4, or not rarely wanting; in the sterile flowers surrounding a cluster of numerous stamens with short filaments: in the fertile are 2 styles with thick or lobed stigmas; ovary and seed triangular, often swung.

B. fuchsioides, alluded because the bright scarlet flowers, hanging on a similar creeping stalk, may be likened to those of Fuchsia; the crowded and small green and glaucous leaves only a little unequal-sided at base.

B. nitida, with obliquely heart-shaped glaucous leaves green both sides, and with large light green-colored flowers.

B. sanguinea, with large and truly oblong-obovate heart-shaped leaves, having a narrow revolute margin, pale green above, red beneath, as are the stalks; the flowers white, or white and greenish.

B. maculata, cult. under the name of B. amboinensis, both names referring to the silvery-white spots scattered over the upper face of the leaves, which are narrower and more oblong than in the preceding, purplish or crimson beneath, the margin corrugated but not revolute, the flowers white or flesh-colored.

B. coccoidea, with scarlet flowers, as the name denotes, and oblong heart-shaped leaves glossy above, and green both sides or purple at the margin, which is a little wavy-toothed.

B. Evansiana (or B. telekian), an old-fashioned species from China, now rare, almost bluish even in N., producing all summer showy rose-colored flowers in the open ground; the ovate and heart-shaped pointed leaves not very oblique, red beneath.

B. manicata, a handsome species of the conservatory, remarkable for the purple bracts-bearing carpels or fringes on the apex or upper part of the petiole, and smaller smaller than on the ribs of the lower face of the large and broadly ovate-heart-shaped leaves; flowers small, yet numerous and elegant, in open panicles on a very long slender peduncle, flesh-colored.

B. phylloloma, has the stem thickly beset with bilobed nodes or little oblong leaves, from which the plant may be propagated, both habitually and peduncles briefly, the large leaves ovate-heart-shaped and opening to a narrow point, their margins cut-toothed, and rather large but not showy flowers.
54. UMBELLIFERAE, PARSLEY FAMILY.

Heres, some innocent and many of them aromatic, others acrid-narcotic poisons, with small flowers in umbels, calyx adherent to the 2-celled ovary which has a single ovule hanging from the summit of each cell, 5 minute calyx-teeth or none, 5 petals, 5 stamens, and 2 styles; the dry fruit usually splitting into 2 seed-like portions or achenes: seed with hard albumen and a minute embryo. Eryngium and one or two others have the flowers in heads instead of umbels. Stems usually hollow. Leaves alternate, more commonly compound or decumbent. Umbels mostly compound: the circle of bracts often present at the base of the general umbel is called the involucre; that at the base of an umbellet, the involucel.

The flowers being much alike in all, the characters have to be taken from the form of the fruit, and much stress is laid upon the receptacles of aromatic oil (oil-tubes or oil-tubes) which are found in most species and give characteristic flavor. The family is too difficult for the beginner. So that only the common cultivated, and the most conspicuous or noteworthy wild species are given here.

For the remainder the student is referred to the Manual, and to Chapman's Southern Flora.

§ 1. Fruits covered with little scales or tubercles, rounded (see the flowers) in a head instead of an umbel, and with a pointed or toothed under each flower.

1. ERYNGIUM. Flowers blue or white, with evident spath-shaped calyx-teeth, and top-shaped fruit without any ribs. Leaves in our species simple and with finely or prickly teeth.


2. SANICULA. Flowers greenish or yellowish, so short-stalked or nearly sessile that the umbellets appear like little heads, each with some perfect and sterile and some staminate flowers. Fruits grooved or globose, not readily splitting in two, not ribbed, simply covered with short hooked prickles. Leaves pinnately parted.

3. DAUCUS. Flowers white or cream-color, in a regular compound umbel: the petals integral, or those of the marginal flowers larger. Prickles in rows on the sides of the short fruit, which splits in two when ripe. Leaves pinnately compound or decumbent.
PARSLEY FAMILY. 163

16. OPAULOA. Fruit oval or oblong, with thin or thickish membrane. Leaves simple.

15. HYMENOSTYLI. Flowers white. Fruit much flattened contrary to the line of junction of the two carpels: no calicles. Leaves toothed.

14. OLYSLOSTOMA. Fruits usually with oil-tubes in the form of lines or stripes, one or more in the intervals between the ribs, and some in the inner face, sometimes also under the ribs.

13. Fruit single.

12. COMBANURA. Fruit globular, not readily splitting in two, insensibly Ritch-slied, a pair of large oil-tubes on the inner face of each carpel. Flowers white. Leaves pinnately compound. Fruit strongly-seriulate.

11. Seed very small, deep green or yellow, too small to be noticed. Oil-tubes many and minute.

10. APIUM. Fruit oval or oblong, thinner than long, flattened on the sides, each carpel with 6 strong or very thick oil-tubes in the narrow intervals. No axis or paraxile left when the carpels separate. Flowers white. Leaves pinnately compound. Fruit strongly-seriulate.

9. SYL. Fruit globular or short-oblong and contracted on the sides, each carpel with 5 strong or very thick oil-tubes and commonly 2 or more oil-tubes in the narrow intervals. No axis or paraxile left when the carpels separate. Flowers white. Leaves pinnately compound. Fruit strongly-seriulate.

8. APUM. Fruit oval or broader than long, flattened on the sides, each carpel 6-ribbed and a single oil-tube in the intervals: axis left when the carpels separate splitting in two. Flowers white.

7. CARUM. Fruit ovoid or oblong, Ritchil on the sides; each carpel with 5 narrow ribs, and a single oil-tube in the intervals: axis from which the carpels separate splitting in two. Flowers mostly white. Leaves pinnately compound. Fruit strongly-seriulate.

6. FOLIULUM. Fruit oblong, the two carpels with a broad flat face, 5 stout ribs, and a single oil-tube in the intervals between the ribs. Flowers yellow. Leaves decussate. The leaflets slender thread-shaped. Whole plant sweet-scented.

5. Fruit pinnately or wing-margined at the junction of the two carpels, which are flat on the face and 10 or more ribs, and 3-ribbed on the back. Leaves pinnately or ternately compound.

4. Wing double at the margin of the fruit.

3. LEVICTICUM. Fruit ovoid-oblong, with a pair of chlokkie marginal wings, and single oil-tubes in such interval. Flowers and involucrum complanated, for bases of the latter united by their margins. Flowers white. Fruit sweet-scented.

2. AEGISANGLICA. Fruit oval or short-oblong, with this or fringed marginal wings, and many small oil-tubes rendered in the surface of the nut. Involute of separate mostly small bracts: involucrum hardly any. Flowers white or greenish.

1. MAKLEUM. Fruit single, splitting in two only when the ripe carpels separate.

3. PARSERICA. Fruit ovoid, very flat, thin-winged: the single oil-tubes running from top to bottom. Flowers yellow, the marginal ones not larger. Leaves ternately compound.

2. PARSERICA. Fruit oval, very flat, thin-winged: the single oil-tubes running from top to bottom. Flowers yellow, the marginal ones not larger. Leaves ternately compound.

1. PARSERICA. Fruit ovoid, very flat, thin-winged: the single oil-tubes running from top to bottom. Flowers yellow, the marginal ones not larger. Leaves ternately compound.
1. ERYNGIUM, ERYNGO. (Ancient name, of obscure meaning.) Fl. in summer.

E. yuccifolium. Button Scolopendron: Sandy and mostly damp ground, from New Jersey S. & W. 1 foot high, 6–20 inches, smooth, of aspect quite unlike most Umbelliferous plants, having linear and tapering greenish leaves, parallel-sided; in the manner of an Umbelligen, and fringed with bristles, a few globular third leaves in place of umbels, a very short involucre, and white flowers. 2°

E. Virginianum. Wet grounds from New Jersey S. with lance-linear rather very leaves showing some distinction between blade and petiole, the former with rigid teeth, and involucre larger than the blush heads. There are several other species from North Carolina S.

2. SANICULA, SANICLE. (Latin name, from ass, to heal.) Common in thickets and open woods. Flowers general, crowded in small and head-like umbels, in summer. 2°

S. Canadensis. Stems 1–2 feet long; leaves thin, palmately 3–5-parted or divided; flowers many, the sterile ones on slender peduncles, fertile ones with long styles.

S. Virginica. Leaves cut into fine divisions; umbels concave at the base of the fruit, like a bird’s nest; involucre of pinnate leaves.

S. Virginica. Leaves cut into fine divisions; umbels concave at the base of the fruit, like a bird’s nest; involucre of pinnate leaves.

3. DAUCUS, CARROTS. (Ancient Greek name.) Fl. in summer.

D. Carota, Common C. Cult. from Europe for the root, occasionally ran wild; leaves cut into fine divisions; umbels concave and dense in fruit, like a bird’s nest; involucre of pinnate leaves.

D. Carota, Common C. Cult. from Europe for the root, occasionally ran wild; leaves cut into fine divisions; umbels concave and dense in fruit, like a bird’s nest; involucre of pinnate leaves.

4. HYDROCOTYLE, WATER-PENNYWORT. (From Greek words for water and flat dish.) Low and small very smooth herbs, growing in water or wet places, mostly with creeping or rooting stems, and simple roundish leaves, either kidney-shaped or petiolar. Fl. all summer. 2°

H. umbilicata. Along the coast and rivers from Mass. S.: flowers many in the umbel, on slender peduncles; petioles and peduncles 3–6 inches high.

H. interrupta. Same range, smaller than the other, with five flowers on short peduncles in each of the little umbels, growing on where the other to form an interrupted spike.

5. CORIANDRUM, CORIANDER. (Name from Greek word for bug: the berries have a bug-like scent.)

C. sativum. Cult. from the Orient; for the aromatic coriander-seed; low, with small umbels of light-colored flowers. There are two larger, long-petiolated, but less common species from Pennsylvania S., viz. H. repanda and H. sanguiculoides.

H. sanguiculoides. Long-petiolated, with minute flowers in their axils.

6. OSMORRHAZA, SWEET CICELY, not the European plant of that name, which is Osmorhiza, with much more sweet-scented fruit. (Name, Greek for sweet root, the root being sweet-fragrant.) Rich moist woods, common N. & E. late spring and summer. 2°

O. longistyla, the smoother species, with the sweeter root, has slender style, and small end-nodulous short-pointed heads, which are slightly downy.

O. brevifolia, has conical styles and longer than the height of the ovary, and deeply hairy taper-pointed almost pinnately lobed leaves.
7. CONIUM, POISON HEMLOCK. (Greek name of the Hemlock by which criminals and philosophers were put to death at Athens.)
   C. maculatum, Scotch H. Waste grounds, run wild, from Eu.; a smooth, branching herb, with spotted stems about 2-6 ft. high, very compound leaves with laticifers and pinnatifid leaves, ill-scented when bruised; a revolting plant, used in medicine: E. settmer. § 1

9. CIUCIATA, WATER-HEMLOCK. (Ancient Latin name of the Hemlock, transferred to some equally poisonous plants.) Fl. summer. § 2
   C. maculatum, Scotch Cowbane, Mousel-Root, Brayer-Poison, &c.; Tall smooth stem sometimes streaked with purple, but seldom really spotted; leaves alternate, coarse toothed or sometimes cut, crenate, the main veins mostly running into the branches; fruit aromatic when bruised; root a deadly poison.

9. SIUM, WATER-PARSNIP. (Old name, of obscure meaning.) § 2
   S. linare, the common species, in water and wet places; tall, smooth, with green-angled stems, simple, pinnate leaves, the long annual linear or lanceolate, very sharply serrate and pungently pungent, and globular fruit with wing-like very thin. § 2: all summer. Root and heritage skin poisonous.

10. APium, CELERY, &c. (Old Latin name.) One species cult.: viz.
   A. graveolens. A strong-scented, sweet, not poisonous plant, of the coast of Europe; of which the var. odorata, Garden Celery, is a state twined and the base of the botanic enlarged, succulent and tuberous when blanched, through long cultivation; leaves pinnately divided into 2-7 coarse and wedge-shaped cut or lobed leaves or divisions: umbels and fruits small. Var. hypochondrium, Turnip-rooted Celery, is a state with the root enlarged and edible. § 1

11. CARUM, CARAWAY, &c. (Name applied from the country, Cario.) § 1
   True Caraway: with finely pinnately-compound leaves, and white flowers.
   C. Carvi, Garden Caraway: cult. from Eu., for the curiously-shaped, the obsolete highly aromatic fruit; stem-leaves with slender but short toothed divisions.

§ 2. Parsley or Petroselinum, with curved leaves and greenish flowers.
   C. Petrodilum (or Petroselium sativum). Parsley: cult. from Eu., for the brownish-angled stems, for the pinnately divided leaves, and in cookery, chiefly the root-leaves, which have wavy and wedge-shaped 3-lobed and cut-toothed divisions; fruit erect. § 3

12. Foeniculum, FENNEL. (Name from the Latin fenen, hay.) § 1
   F. vulgates, Common F. Cult. from Eu., for the sweet aromatic foliage and fruit; most very smooth herb 1-4-6 ft. high; leaves with very numerous slender toothed-sawed divisions; large united with no involucral or involucre: fruit 3; or 1 long, in late summer. § 2

13. Levisticum, LOVAGE. (Ancient Latin name.) One species.
   L. officinale, Garden L. Cult. in old gardens; from Eu.; a tall, very smooth, sweet-scented herb, with large terminal and pinnately compound leaves, coarse wedge-shaped and cut or lobed leaves, a thick root, and small many-involucre umbels. § 1

14. Archangelica. (Genus established on a species of Angelica.) Fl. summer. § 2
   A. atropurpurea, Great A. Moist deep soil N.; strong-scented, smooth, with very stout dark-purple stems 30-60 ft. high, large leaves texture-compound, and the divisions with 5-7 pinnate leaflets, which are ovate and
GINGSENG FAMILY.

15. HERACLEUM, COW-PARSNIP. (Named after Hercules.) Fl. summer.

16. PASTINACA, VAHSHT. (Latin name, from pastus, pastur.)

55. ARALIACEAE, GINSENG FAMILY.

Like the foregoing family, but often shrubs or trees, usually more than two styles and cells to the ovary and fruit, the latter a berry or drupe. Besides a few choice and uncommon shrubby house-plants, represented only by the two following genera. The flowers in both are more or less polygamous, and the lobes or margin of the calyx very short or none. Petals and stamens 5.

1. ARALIA. (Derivation obscure; said to be a Canadian name under which a species was sent from Quebec to the Garden of Plants at Paris.)

2. HELENA. Flowers in simple or panicle umbels, white or greenish; the petals lightly overlapping in the bud. Stems 2-4, separate to the base, except in sterile flowers. Leavescompound or decomposed. Root, bark, fruit, dec- ter-steroidal or pithy.

3. RHEUM. Flowers in panicled or clustered umbels, greenish; petals valvate in the bud. Ovary 3-loculed: the style united into a terminal column. Leaves simple, pulvinately 2-ribbed or winged. Woody stems climbing or pulvinate.

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- Large and tough-stemmed, with very compound leaves sometimes 3'-3" across, and with many umbels in a large compound panicle 2'-3' in diameter.

- Smaller: shorter stems more woody at base; few umbels: 1'-2' in diameter.

A. spinosa, AMERICAN TREE, HERACLES' CLUB. River banks from Penn. N., and planted: a shrub or low tree, of peculiar aspect, the simple stout trunk rising 6'-30' high and bent with prickles, bearing immense leaves with coarse serrate leaves, and normal or pinnatilobed leaves.

A. racemosa, SPIREIAND. Woodlands in rich soil, with herbaceous stems 3'-3" high from a thick aromatic root, not prickly, widely spreading branches, heart-shaped leaves doubly serrate and slightly downy, and racemose-umbels.

- Smaller: shorter stems more woody at base; few umbels: 1'-2' in diameter.

A. hispida, BRIGHT SPARAPARR. Rocky places: briefly stems 3'-5" high, fairly hoary, naked and bearing compound umbels above; leaves twice pinnate, the leaflets oblong-ovate and coarsely-toothed.

A. nodifolia, COMMON WILD. Less ground: the aromatic boxleaf-stemmed branches 3'-5" long, used as a substitute for official Sparaparr; the smooth proper stem rising only 3'-4" high, bearing a single long-stalked
DOGWOOD FAMILY

1. CORNUS, CORNEL or DOGWOOD. (Names from corn, horn, from the hardness of the wood.) Fl. late spring and early summer.

1. Actinidia, a singular Californian shrub, with thick opposite leaves, and discoid greenish flowers in hanging catkin-like spikes, is rarely cultivated or planted.

2. HELENIUS, IVY. (The ancient Latin name.) Fl. late summer.

3. NYSA. Flowers polypetalous or diocious, greenish, crowded or clustered on the summit of an axillary peduncle, the sterile ones numerous, the fertile 2-5 in a hooded cluster, or rarely solitary. Calyx of 5 or more lobes or teeth. Petals small and varying, or minute, or none. Style slender or straight, bearing a stigma disked, the entire length of one side, revolute. Ovary and style of the drupe 1-celled and sessile. Trees, with deciduous alternate leaves, often crowded on the end of the branches, either entire, angled, or few-toothed.

1. CRONUS, CORNEL or DOGWOOD. (Name from corn, horn, from the hardness of the wood.) Fl. early spring and early summer.

1. Flowers greenish or yellowish, crowded in a broad or dense cluster, which is surrounded by a showy ovate-elliptic white or rarely pinkish bract, and an ovate leave.
which are slightly woody, bearing 4-6 ovate or oval leaves at the summit, as if in a whorl, below the marked flower-head; petal-like leaves of the involucre ovate; fruits globose, in a cluster, naked outside.

C. floridal, Flowering Dogwood. Rocky woods, also planted for ornament: tree 12°-30° high, with ovate pointed leaves, petal-like leaves of the involucre (14 long) albumaceous or ovate and noduled, and oval fruits in a head. According to common tradition flowering just at the proper time for planting Indian Corn.

§ 2. Flowers yellow (earlier than the leaves), in a small whorl, surrounded by a small and dull-colored involucre of 4 scales; fruit bright red.

C. Max. Sparingly planted from Eu.: to tall shrub or low tree, with oval pointed leaves and handsome yellow fruit, the pulp edible and pleasantly acid.

§ 3. Flowers white in open flat cyrums, without involucres, in early summer: fruit small, globular, not outside, blue or white, in no species birds.

- Branches of the previous year red or purple, especially in spring.

C. sanguinea, European Red-Orange D. Sometimes planted from Eu.: tree, with ovate leaves rather downy beneath, and black or dark purple fruit.

C. stolonifera, Wild Red-Orange D. Shrub 3°-6° high, in wet places, spreading by prostrate or subterranean running shoots, smooth, with ovate abruptly pointed leaves ragged both sides and whitish beneath, small cyrums, and white or browny-coral fruit.

C. sylvatica, Silver D. or Kewinkrite (the dry bark smoky by the Indians W.): in wet places, has tall red branches, the slender, cyrums, and lower face of the narrow ovate or oblong pointed leaves silky-downy; fruit bluish.

- **Braches bronchial or gray.**

C. saperifolia, Beaked-Leaved D. Dry soil from Illinois N.: shrub 3°-5° high, with branches and small oblong or oval leaves pubescent, upper face of the latter tough, the lower downy; cyrums small and flat; fruit bluish.

C. stricta, Stiff D. Wet grounds N.: shrub 3°-15° high, with ovate or lance-ovate taper-pointed leaves smooth and green both sides, loose flat cyrums, and pale blue fruit.

C. paniculata, Panicled D. Moist grounds, common N.: shrub 3°-8° high, much branched, smooth, with subteraneous bark, lance-ovate pointed leaves acute at base and whitish beneath, and proportionally large and numerous convex cyrums, often purplish; fruit white.

- **Branches bronze tinged with bronzy-green or whitish.**

C. circinata, Round-Leaved D. Wooded hillsides, &c.: shrub 3°-10° high, with warty-dotted branches, pretty large rounded and serrated pointed leaves downy beneath, small flat cyrums, and light blue fruit.

C. alternifolia, Alternately-Leaved D. Hillsides and banks of streams: shrub or tree 3°-25° high, with striped alternate and spreading branches, oval or oblong taper-pointed leaves acute at base and only minutely pubescent beneath, mostly alternate, but crowded at the end of the branches; cyrums large and flat, very open; fruit bright blue on reddish stalks.

2. AUCUBA. The Japanese name of the species commonly cultivated as a house-plant, viz:

A. Japonica. Shrub, with large ovate-oblong leaves bright green and usually marked with yellow, the flowers inconspicuous, but the red berries when formed handsome.

3. NYSSA. Tupelo, Pepperidge, Sour Gum-Tree. (The Greek name of a Nymph, of no very obvious application to these trees.) Fl. spring. Fruit acid.

- Sterile flowers in some clusters: fruit blue, not edible.

N. multiflora, Common Tupelo or Sour Gum, in rich woods, &c. N. & S.: tree 30°-50° high, with horizontal branches and lioots-like spiny, ovate or oblongate leaves entire and smooth or glossy when old, sterile flowers 3-8 on the
slender peduncle; and dark bluish-fuchia 1' long. Wood tough, hard to split.

N. aquatica, Water Tyme. of the S., in pools, fresh or brackish; with slender leaves in the preceding (1'-4' long) and varying from lance-oblong to roundish, short peduncles, the flowers 2-3' long, and smaller oval fruit.

N. uniflora, Water Tyme. in water, from Virg. and Kentucky; large tree, with leaves twice or thrice as large, often with a few sharp teeth. 4'-6' long, on slender peduncles, wholly beneath; fertile peduncles long and 1-flowered; fruit oblong, about 1' long. Wood soft; roots very spongy, used for corks.

* Shrubs in a bed; many fruit red and edible.

N. capitata, Allegheny Tyme. no called Allegheny Tyme: in swamps; S.; a small tree, with oblong or oblong lanceolate leaves (2'-5' long) showy beneath; fertile beneath, on very short pedicles.

II. MONOPETALOUS DIVISION. Includes the orders of this class which have but one calyx and corolla, and the latter in one piece, that is the petals united more or less into one body.

57. CAPRIFOLIACEÆ, HONEYSUCKLE FAMILY.

Shrubs, or rarely herbs, with calyx excentric to the 2-3-celled ovary (the teeth or limb above it; sometimes nearly obsolete or in), stamens as many as the lobes of the corolla (or in Linnea, one fewer) and borne on its tube, and opposite leaves without stipules. Yet in some species of Viburnum there are but appendages imitating stipules on the base of the petiole. Seeds with a small embryo in flaky albumen.

1. Perennial herbs, with bell-shaped or tubular corolla, prominent and-shaped or linear lobes to the calyx, and a slender style tipped with a opiate stigma.

1. LINNEA. A pair of flowers nodding on the summit of a slender reed-like peduncle. Corolla bell-shaped, with 3 almost equal rounded lobes, Stamina 4, two of them shorter. Ovary and small pod 2-celled, but perfecting a seed in only one cell. Creeping evergreen herb.

2. TRISTEMON. Flowers sessile in the axils of the leaves, single or in a cluster. Corolla olm-shaped, with 5 almost equal lobes, scarcely longer than the lobes-like tubes of the calyx. Stamina 5, equal. Fruit fleshy, orange or red, ovoid, with the persistent calyx-tubes, containing 2 long seeds or rather nutlets. Erect and coarse leafy herbs; their leaves narrowed at base, but milled beyond the simple stem.

3. Shrubs, with tubular or bell-shaped corolla, slender style, and opiate stigma.

1. Tooth of the calyx very short on the 2-4-celled ovary: fruit 5-lobed: entire, or varying very or lobed on some vigorous young shoots.

2. SYMPHORESAPS. Flowers small, in close clusters or interrupted spikes. Corolla bell-shaped, with 4 or 5 equal roundish lobes so as to many short stamens in the throat. Ovary 4-celled, but the berry only 2-seeded, two cells being empty. Low upright shrubs, with nod short-petioled leaves.

4. LONGISSII. Ocella tubular, funnel-form, or oblong, more or less irregular, being gibbous or bulging on one side at base, and the 5 lobes not all alike, but in one species nearly so. Stamina 5. Ovary 2-celled, becoming a semi-seeded berry. Twining or upright shrubs.

5. OBERRII. Corolla funneled, almost regular, bladed: Stamina 5, Ovary 3-celled, becoming a semi-seeded berry. Low upright shrubs, with flowers in terminal or axillary loose clusters or clusters.
liO Bon1!.T&UOttLE FAMILY •

4. LONICERA. Lonicera, Honey-Suckle, Woodbine. (Named for Lonicera.)

§ 1. True Honeysuckles, with twining stems (in one wild species slightly so).

- L. sempervirens, Trumpet H. Wild from New York S. and commonly tall. Leaves evergreen (as the name denotes) only at the S., thickly, pale beneath, the lower spongy, the uppermost pairs united round the stem; flowers sometimes, in small white, 2-5 long, scarlet with yellow inside (also a yellow variety), produced all summer; berries red.

- L. caprifolium, Common European H., has leaves smooth on both sides, and flowers usually only in early summer.

- L. bracteata, Italian or Perpetual H., has the leaves downy beneath and whitish, and flowers through the summer.

- L. gracilis, Sweet Wild H. Wild in Middle States and S., sometimes tall, leaves smooth; corolla white with a pink or purple slender tube, lasting yellowish, fragrant.
L. Bava, Yellow H. Wild N. W. and along the Alleghenies; low-climbing: the broad and thickish leaves very white-glanscescent both sides; flowers light yellow.

L. parviflora, Small H. Low and bushy, with oblong leaves green above, but very white-glanscescent beneath; the corolla (less than 1\" long) strongly gibbous at base, greenish-yellow or white and tinged with purple; in the USA. Douglasii, found only S. W., nearly crimson, and the greener leaves downy beneath or ciliate.

--- WILD species with plumo-pubescent orange-colored flowers.

L. hirsuta, Hair H. Moist or rocky grounds N. & W.; with oral and large dull green leaves, the lower face and branches downy-hairy.

--- Leaves all separate and short-petioled, not glanscescent, plumose; flowers in pairs on axillary peduncles.

L. Japonica (commonly called L. COFFEE, DC.); JAPAN or CHINA H. Commonly sold; the slender downy forms twining freely, with oral dull green leaves, and flowers very fragrant at evening; corolla deeply 2-lipped, reddish outside, white inside turning yellow.

§ 2. FLY-HONEYSUCKLE. upright or struggling bushes, never twining, with leaves all distinct to the base, and a piec of flowers on the summit of an axillary peduncle, the two berries sometimes united into one.

- A large large leaves surrounding two cylindrical (1\" long) yellowish flowers.

L. involucrata, Wild from Lake Superior to California, and sparingly planted: shrub 20-50 high, DOWNY when young, with oval or oblong leaves 3\''-5\'' long, on short pedicles, clammy flowers, and berries quite separate.

- The two or four flowers under the ovaries small or minute.

- Planted for ornament from Europe; flowers rose or pink-red, profuse and showy.

L. Tartarica, TARTARIA H. Much-branched shrub 5'-8' high, smooth, with oval heart-shaped leaves, short corolla, and red berries uniting at base as they open: 8. spring.

- Wild species, in moist cold woods or bogs N. ; flowers yellowish.

L. lilata, Early Fly-H. Struggling, 30'-50' high, with oval or oblong and partly heart-shaped leaves thin and downy beneath when young, slender peduncles; honey-yellow corolla (1\" long) with short nearly equal lobes and very unequal-edged base, and separate red berries: 8. early spring.

L. oblongifolia, Swamp F. Upright, 20'-50' high, with oblong leaves, long and slender peduncles, deeply 2-lipped corolla (1\" long) in early summer, and purple berries.

L. ciliata, Mountain F., the earliest species, 1'-2' high, with oval leaves, very short peduncle, moderately 5-lobed corolla, and two ovaries united to form one blue berry.

S. DIERVILLA, BUSH-HONEYSUCKLE. (Named for one Dierville, who took the common species from Canada to France.)

- Wild species, on rocks or hills, with pale or honey-yellow and slender funnel-form corolla, not showy, and oblong pod.

D. trifida, Common B.; everywhere N. X. 1'-4' high, with oblong-ovate taper-pointed leaves on distinct pedicles, mostly 5-flowered peduncles, and slender, pointed pods: 8. all summer.

D. sessiliflora, only along the Alleghenies; has lance-ovate sessile leaves, many-flowered peduncles, and short-pointed pods: 8. summer.

- Planted for ornament from Japan and China; the showy rose-colored corolla broadly funnel-form with an abruptly narrowed base, very slender stalk-like corymb and linear pod.

D. Japonica. Shrubs 20'-50' high, loaded with the handsome flowers in late spring; corolla 1' or more long; leaves oblong-ovate, taper-pointed.
VI\[\text{BURN\text{U}M, ARROW-WOOD, &c. (Ancient Latin name, of uncertain meaning.)} \]

**Flowers white, or nearly so, in spring or early summer:** fruit ripe in summer.

\[\text{§ 1.} \]

- Cult. or planted from S. Europe, with evergreen entire leaves.

**V. Tinus**, LAURUS (S. NICH. hardy). 

- A common house-plant, inter- \"flowering, or planted in summer; leaves oblong; fruit dark purple.

**V. Lentago**, SHEEP-BERRY. 

- Ten 15°-30° high, common in moist woods, chiefly N.; leaves ovate, conspicuously marked, on long margined petioles; cyme broad, sessile; fruit oval, 5 or more long, sweet, edible.

**V. prunifolium**, BLACK HAW. 

- Dry soil, from Conn. to Ill. and S.; hardly so tall as the preceding, with smaller and oval mostly blinn leaves.

**V. obovatum.** 

- Along streams from Virginia S.; shrub with oval leaves shining over 5° long, and small woolly cynes.

**V. nudum,** WITHE-NON. 

- From Conn. to Florida; with oval, oblong, or almost lanceolate, not glossy; cyme on a peduncle; fruit roundish.

**V. dentatum.** ARROW-WOOD (the stems having been used by the Indians to make arrows). 

- Common in wet soil, 30°-10° high, smooth, with sub-colored dark pale and broadly ovate evenly sharp-toothed leaves, on slender petioles, and bright blue fruit.

**V. mollis,** New A. From Kentucky S., soft-downy, with less sharply toothed oval or oburate leaves, on slender petioles, and blue milky fruit.

**V. pubescens,** BOWEN A. 

- A low and struggling shrub, with ovate or oblong and acute or taper-pointed leaves, having rather few curved teeth, their lower surface and the very short petioles soft-downy; fruit dark purple.

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Europe, occasionally planted (but that has no enlarged neutral flowers) \* cold
moist woods N., with naked boughs, large roundish leaves heart-shaped at base
and abruptly pointed at the apex, closely serrate, and pinnately many-veined;
the veins and serrated veins prominent underneath and covered, like the stalks
and branchlets, with rusty scurf; crimson early, very broad, scented, fruit not
edible, coriaceous turning crimson.

7. SAMBUCUS, ELDER. (From Greek name of an ancient musical instru-
ment, supposed to have long use of Elder sticks.)

8. Canadensis, Common or BLACKBEREED ELDER. Alluvial soil,
streambanks, &c. Stems woody only towards the base, 4-8 ft. high, with white
bark, 7-11, oblong or smoothish leaves, the lowermost often 3-paired;
fruit in early summer, and small black-purple fruit.

9. pubens, RUBBER or Black-bered Elder. Rocky woods chiefly N., with
more woody stems and warty bark, yellow-brown pith, fewer and more lanceolate leaves
underneath, paniculate or ovate leaves, in spring, followed by bright
red berries.

58. RUBIACEAE, Madder Family.

Like the preceding family, but with stipules between the opposite
(or sometimes ternately whorled) entire leaves, or else (in the true
Madder Family) the leaves whorled without stipules. An immense
family in the tropics, and here represented by several wild and a
few commonly cultivated species. (The commonest in choice conserva-
tories, not here described, are Burschellia Capensis, a shrub
with a head of orange-scarlet flowers, the corolla almost club-shaped;
Miletia cordifolia, a twiner with some somewhat heart-
shaped leaves, and long tubular somewhat 4-sided scarlet corollas,
or M. bicolor, with lanceolate leaves, and corolla red toward the
base, yellow toward the summit; PENTAS CANES, with ovate-
shaped hairy leaves, and terminal corolla of handsome flowers,
with salver-form flesh-colored corolla, hairy in the enlarged throat
and 5-lobed.)

I. Madder Family Proper. Leaves in whorls, without
stipules. 1. NUBIA. Like the next, but with the divisions of the corolla and the stamens 5.
Fruit berry-like.

2. GALIUM. Flowers small or minute, mostly in clusters, with a wheel-shaped 4-petalled or sometimes 3-petalled corolla, and as many short stamens.
Styles 2. Similar herbs, with square stems, their angles and the edges of the
leaves often rough or almost prickly.

II. Cinchonax Family, &c. Leaves opposite, or some-
times in threes or fours, and with stipules.

§ 1. Only a single corolla and stamens in each flower.

1. Low herba, with narrow salmon-form or salmon-form corolla, 4 leaflets (reflex in the
base) and the stamine 4.

2. DODIA. Flowers in the axils of the narrow leaves. Stipules absent,
leafy, fringed with long bristles. Ovary 3-celled, its fruit splitting into
3 valves and dry closed nutlets.
4. MITCHELLIA. Flowers in pairs at the end of branches, the two ovaries united. Anti car, which, in stout leaves, a 2-celled aculeate berry. Corolla densely woolly-briefed inside, white or purplish-ftinged outside. Style 1; stigma 4, slender. Seeds, 8 to each of the two flowers. Stipules small, not fringed.

5. CAPTALANTHUS. Flowers stam 2 and small, rounded in a close yellow head rose on a peduncle. Calyx 4-lobed. Corolla, tufted with 2 very short hairs. Style 1: stigma 2, subulate or ovate. Fruit small, ovary and ovules, at length splitting into 2 or 4-lobed irregular portions.

6. COFFA. Flowers in small clusters in the axils of the leaves. Calyx 4-6-lobed. Corolla, with a short tube and 4 or 6 spreading convolute from the tube length. Stamens 4 or 6, with filaments-angled styles. Style spreading 2-styled stigmas. Fruit 2-valved, becoming 4-valved, containing 2 hard plane-scented seeds with a groove down the face (exilis), enclosed in a loose perigynous-like box.

7. SORELLE. Flowers in small clusters at the end of branches. Calyx with 6 lobes, 4 of them small and lanate, the fifth also transformed into a large bright rose-scented leaf! Corolla, hair, with a slender tube and 4 oblong-fingered recurving lobes. Nutrures, 6, proceeding. Fruit a globular 2-celled pod, filled with many very thin, winged seeds.

8. GAERTNERIA. Flowers solitary at the end of the branches or merely so, large, very fragrant. Calyx with 6 or more somewhat leaf-like lobes. Corolla filiform-shaped or oblong-shaped, with 2 or more spreading lobes convolute in the tube, and as many linear styles arising from its center. Style 1; stigma of 2 short lobes. Fruit freely, surrounded by the calyx lobes, ribbed down the side, many-seeded.


10. HUNSONTONIA. Corolla oblong or oblong-linear, the 6 lobes united in the tube. Stamens 6. Style 2; stigma 3. Filament, 2, filiform, the scape short. Being more or less free from the hooked calyx, opening across the top, and opening with a recurved filiform-shaped or oblong-shaped pliend seed in each cell, disposed short and entire, sometimes a more or less connecting the leaves of the opposite leaves.

11. RUBIA, Madder. (Name from Latin ruber, red, alludes to the red roots, which furnish the well-known red dye.)

12. TINCTORIUM, Newborn or Dyve M. Cult from Eu. For the red roots, branching from the general, 1-2" high, with angles of the stems and ends of the leaves-dull or off-massed leaves (mostly in mass) very rough; flowers greenish, in summer; berry black. 42.

13. GALLIUM, Bedstraw or Cleavers. (Name from Greek for milk, which some species in Europe were used for cattle.) Fl. summer. The following all wild species. Several have a red root like that of Madder.

14. 1. Fruit a black berry, like that of Madder; but the parts of the white flowers are only 4. Only in Southern States, so dry sunny soil. 42.

15. G. hydropiper, spreading stems 1-2" long; leaves in fours, 1" or less in length, lance-cord; peduncle 1-2" long; berry roughish. 42.
Madder Family.

§ 3. Fruit dry when ripe, small.

G. agrélellum, ROSEAT BERNERW. Low thistles: 9' - 10' high, as it were climbing, the backwardly prick-rounded angles of the stem and edges and middle of the lowermost-floored leaves adhering to contiguous plants; leaves in whorls of 6 on the stem and of 4 or 3 on the branches: flowers Numerous.

G. tridérum, SMALL B. Swamps and low grounds, 6' - 8' high, smooth or sometimes nearly smooth; leaves varying from linear to oblong, 4' - 6' in the whole; flowers rare; few; their parts often 3.

G. boreale, NORTHB B. Rocky lands of streams; 2° - 3° high, smooth, sweet, with three-linear leaves in flower.

G. pilésum, Commone S. in high rhymes, dotted, (1碾), 10' long; nowcrs blue-purple or rosy-purple, all perfumed, the peduncle 1' - 2' long. VASCULATURE is a smooth form S.

G. circézans, WILD FLOWE'R, the root being overset: common in diverts; leaves and stems: shining, silky, silt; peduncles much forked, their long branches bearing short-perfumed short or brownish leaves along the rita, the fruit nearly round.

G. BIANCÉUM, like the preceding, common N.; but with lanceolate or lanceolate tapering leaves, 9' long.

S. DIONI, BUTTON-WEB. (Name from Greek for a flowered, being bowers, often growing by the wayside.) Fl. all summer, white or whilish.

D. Virginica. Sandy lands from Maryland S; with spreading stems 1° - 2' long, broadly lanceolate serrate leaves, shapely-edged corns 9' long, 3-segment style, and long fruit crowned with 2 calyx-teth.

D. whitea. Sandy lands from Y. Keney and Illinois S; with slender stems 8' - 9' long, linear and rigid leaves, small serrate summer shorter than the long branches of the species, undivided style, and oblong little Fruit crowned with the 4 short calyx-teth.

4. MITCHELLA, PARTRIDGE-BERRY. (Named for Dr. J. Mitchell, who corresponded from Virgina with Linnaeus.) Fl. in curly summer. S.

M. repens, the only species, common in woods; a little herb, creeping over the ground, with the small evergreen leaves round-edged, very smooth and glossy, bright green, sometimes with whitish lines, short-pointed; the flowers pretty and sweet-scented; the earliest fruit remaining over winter, edible, but dry and almost tasteless.

5. CEPHALANTHE, BUTTON-BUSH. (Name from Greek words for head and flower.) Fl. summer and autumn.

G. occidentalis, the only species, is a tall shrub, common along the bor
dore of petals and stamens, with lance-oblong or ovate-pointed leaves, on peduncles, either in pairs or threes, and with short stipules between them; the head of white flowers about 1" in diameter.

6. COFFEA, COFFEE-TREE. (The Arabic name somewhat altered.)

C. arabica, the species which produces coffee, is a shrub or small tree, sometimes cult. in conservatories, with smooth and glossy oblong leaves, bearing fragrant white flowers in their axils, followed by the red berries, containing the half of seeds.

7. FINCKNEYA, GEORGIA BARK or FEVER-TREE. (Named by Michael in honor of Geo. Finckney.)

F. pubens, the only species, is a rather downy small tree or shrub, in wet pine terrains. S. Car. to Georgia, with large oval leaves, slender stipules, and purplish flowers of little beauty, but the great calyx-leaf commonly produced is striking. This plant is of the same tribe with the CYMOSA OF PERUVIAN BARK, and has similar medicinal (tonic) properties. Fl. early summer.

8. GARDENIA, CAPE JESSAMINE. Not an appropriate name, as the species so called does not belong to the Cape of Good Hope. (Named for Dr. Garden of South Carolina, who corresponded with Linnæus.)

G. floridana, a favorite house-plant from China, 2'-4' high, with smooth and bright-green oblong leaves acute at both ends, large and showy very fragrant flowers, the white corolla 2-9-lobed, or full double, and large oblong orange-colored berries 5-6-angled and tapering at the base.

9. BOUVARDIA. (Named for Dr. Bouvard, director of the Paris Garden of Plants over a century ago.)

B. triplicata. Straggly or half-straggly house-plants, blossoming through the winter, and in grounds in summer, from Mexico, with ovate or oblong-ovate smooth leaves, in threes or the upper in pairs, and scarlet corolla, minutely downy outside, nearly 1" long.

B. leichniana, now commoner and winter-blooming, has more downy leaves and smooth deep-scarlet corolla.

10. HOUSTONIA. (Named by Linnaeus for a Dr. Houston, an English physician, who resided on the coast of Mexico, where he died early.)

- Delicate little plants, with 1-flowered peduncles, flowering from early spring to summer; corolla sub-ovate: peduncle somewhat rounded, its upper half free: seeds with a deep hole occupying the face.

H. carolina, Common H. or Blythe. Moist bays and grassy places, 3'-5' high, smooth and slender, erect; with oblong or spathulate leaves only 9' or 4'-long, very slender peduncles, and light blue, purple, or almost white and yellowish-edged corolla, its tube much longer than its lobes.

H. minimata. Dry hills from Ta N. W.: longish, 1'-4' high, at length much branched and spreading; with leaves ovate, spathulate, or the upper linear, earlier peduncles slender, the rest short, and tube of the purplish corolla not longer than its lobes and those of the calyx. 7.

H. rotundifolia. Sandy soil from North Carolina, S.; with prostrate and creeping leafy stems, peduncles shorter than the roundish leaves and returned in fruit; corolla white.

- Erect, leafy-stemmed, 3'-20' high, with flowers in terminal clusters or cymes; in summer: corolla funnel-form; seeds rather wavy-shaped.

H. purpurea. Wooded or rocky banks, commoner W.; smooth or slightly downy, with ovate or lanceolate 3'- leafed leaves; pale purple flowers, and upper half of globular pod free from the calyx.
VALERIANACEAE, VALERIAN FAMILY.

Herbs, with opposite leaves, no stipules, calyx coalescent with the ovary, which has only one fertile one-ovuled cell but two abortive or empty ones, and stamens always fewer than the lobes of the corolla (1–3, distinct), and inserted on its tube. Style slender; stigma 1–3. Fruit small and dry, indehiscent; the single hanging seed with a large embryo and no albumen. Flowers small, in clusters or cymes.

1. VALERIANA. (Name from oil from, to be well, allied to medicinal properties, the peculiar-scented root of some species used in medicine.) Fl. early summer, often dioecious, white or purplish. U. Garden species from Europe, producing the medicinal Valerian-root.

V. officinalis, the commonest in gardens, 20–30 in., a little downy, with leaves of 11 to 21 lanceolate or oblong cut-needled leaves, and rosette-like, not running.

V. pubescens, smooth, with rosette-like simple, stem-leaves of 3–7 entire leaves or lobes, and rosette-like, horizontal.

2. CENTRANTHUS. Corolla in the preceding, but with a spur at the base. Staminodes only one.

V. polyantha, Woodlands, Penn. to Illinois and S. W.; 10–20 in., smooth, with dissepiment and heart-shaped to oval rosette-leaves, stem-leaves of 3–7 ovate leaves, rather few flowers in the crowded panicked cymes, and long slender corolla.

V. sylvatica, Woodland from Vermont W. & N; with rosette-leaves mostly ovate or oblong and entire, stem-leaves with 3–11 lance-ovate or ovate almost entire leaves; corolla funnel-shaped.

V. edulis, Alkaline from Ohio W.; 10–40 in., with a large spindle-shaped root (eaten by the Indians W.); thickish leaves mostly from the root in a small bunch, and rather few flowers in the crowded panicked cymes, of the stem cut into 3–7 long and narrow divisions.

4. CENTRANTHUS, SPURRED VALERIAN. (From Greek words for spur and flower.) Fl. summer. U. Garden species from Europe, often large-leaved, purplish or white, with crossing roots and a panicled or cymose panicle, of a white variety.
2. FEDIA, CORN SALAD, LAMB-LETTUCE. (Origin of the name obviou.") Our species are all very much alike in appearance, smooth, with
feathery stems 6'-30' high, tenere oblong leaves either entire or enclosed
towards the base, and small flowers in clusters or close cymes, with leafy
bracts, and a short white or whitish corolla, in early summer. They
belong to the section (by most botanists regarded as a separate genus)
VARIANSIA. 12

F. chitica, Common Corn Salad of Eu., sparingly naturalized in the
Middle States, has fruit broader than long, and a thick corky coat at
the back of the fertile cells.

F. Fagopyrum, from New York W., in few grounds, has ovate-triangular
smooth fruit shaped like a grain of buckwheat when dry (where the
specific name), the cobwebby style cells occupying six angles, and much smaller than
the broad and flat seed.

F. radula, common from Penn., and Michigan S., has fruit usually downy
and somewhat angular, the pendent narrow empty cells contiguous, but with
8 deep grooves between them.

60. DIPSACEAE, TEASEL FAMILY.

Diffs from the preceding family by having the flowers strictly
in heads, surrounded by an involucre, as in the next family,—from
which it differs in the separate stamens, haging seed, &c. All
are natives of the Old World.

1. DIPSACUS. Coarse and short hawks, with stems and midrib of leaves often
prickly, and the heads with rigid prickly-pointed bracts or chaff under each
flower, under the whole a cylindrical hollow involucre. Each flower mem-
er has an anther in the form of a little calyx-like body enclosing the
ovary and stamens. Calyx continued beyond the ovary into a short truncate
Style slender. Involution enclosing the ovary and the calyx vittae.

1. DIPSACUS, TEASEL. (Name from Greek word meaning a hedge; the
united bases of the leaves in the common species each some rain-water.)
Fl. summer.

D. sylvestris, Wild T. Ban wild along roadsides, 4'-5' high, prickly,
with long-oval leaves, the upper ones united round the stem, large oblong
shaped, purplish or dark purple, and slender-pointed straight chaff under each
flower.

D. fulloaurum, Fuller's T. Less prickly than the other, with involucres
hardly longer than the flowers, the corymb-like tips of the rigid chaff looked at
the end, which makes the head useful for curling woolen cloth ; cultivated in
fields for this purpose, sometimes escaping into waste places and roadsides. 22

2. SCABIOSA, SCARIOUS. (From Latin word for the, perhaps from
use of the plants to cure skin-diseases.) Fl. summer. One European
species is commonly cultivated for ornament, viz.

S. atraporphora, Sweet S., or when with dark purple or crimson
flowers called Daucicosa Rusae; the flowers are sometimes rose-colored or even
white; plant 8'-30' high, with clover-like or spathulate and toothed wool-leaves,
previously-paired semi-leaves, the cup or involucr enclosing the ovary 8-grooved,
calyx proper with 5 long bristles surrounding the stamens; the outer corolla
united.

1 23

22
61. COMPOSITÆ, COMPOSITE FAMILY.

Herbs, or a very few shrubs, known at once by the "compound flower," as it was termed by the older botanists, this consisting of several or many flowers in a head, surrounded by a set of bracts (formerly likened to a calyx) forming an involucre, the stamens as many as the tubes of the corolla (almost always 5) and inserted on its tube, their anthers syngenesious, i.e. united in a ring or tube through which the style passes. Calyx with its tube incorporated with the surface of the ovary, its limb or border (named the propo) consisting of bristles, either rigid or downy, or of teeth, awns, scales, &c., or of a cup or crown, or often none at all. Corollas either tubular, funnel-form, &c. and labeled, or strap-shaped (ligulate), or sometimes both sorts in the same head, when the outermost or marginal row has the strap-shaped corollas, forming rays (which answered to the corolla of the supposed compound flower), the separate flowers therefore called ray flowers; those of the rest of the head, or disk, called disk-flowers. The end of the stalk or branch upon which the flowers are borne is called the receptacle. The bracts, if there are any, on the receptacle (one behind each flower) are called the sheaf of the receptacle; the bracts or leaves of the involucre outside the flowers are commonly called scales. Style 2-cleft at the apex. Ovary 1-celled, containing a single ovule, erect from its base, in fruit becoming an acene. Seed filled by the embryo alone. For the flowers and fruit, and the particular terms used in describing them, see Lessons, p. 106-108, fig. 219-221, p. 114, fig. 222, 230; p. 129, fig. 291-296.

The largest family of flowering plants. generally too difficult for the beginner; but most of the common kinds, both wild and cultivated, are here briefly sketched. For fuller details as to the wild ones, with all the species, the student will consult the Manual, and Chapman's Southern Flora. There are two great divisions which include all the common kinds.

I. Head with only the outermost flowers strap-shaped, and these never perfect, i.e., they are either pistillate or neutral, always without stamens, or else with strap-shaped corollas entirely wanting. Plants destitute of milky or colored juice.

A. No strap-shaped corollas or true rays.

§ 1. Thistle or Thistle-like, the heads with very many flowers, all alike and mostly perfect. Bracts of the style short or united, even to the tips. Scales of the involucre being-awned, these or the bracts commonly tipped with prickly or biliary points.

Propos of many long-pointed bristles: receptacle with bristles between the flowers.

1. CYNARA. Scales of the involucre of the great heads thickened and fleshy towards the base, commonly toothed at the end, with or without a prickle. Achenes slightly ribbed. Otherwise much as in the next.

2. CHICORÉE. Scales of the involucre not fleshy-thickened, prickly-tipped or also merely pointed. Achenes flat-tipped, not ribbed. Filaments of the stigma separate.
COMPOSITE FAMILY.

1. **Aristea**. Heads of stems united into a head. Leaves white, ± serrated.

2. **SILYBUM**. Scales of the involucre with the upper part leaf-like and spreading, spiny. Receptacle naked with bristles. Alexes flattened, pappus of many rather short and rigid bristles minutely barbed on their edges.


4. **APUZONIA**. Heads of the involucre involute, spherical, and the two branches of the style united into one body almost or quite to the tip, as in § 1; but the outer flowers of the head differ from the rest red sterile, except in a few species of Certaines. Receptacle bare with bristles.

5. **CNEUS**. Outer flowers smaller than the rest, densely-lamellate, sterile. Scales of the involucre tipped with a long gland-like appendage which is spine-shaped downward; which is a pappus of thin and rigid and 10 short naked bristles. Leaves prickily-toothed.

6. **CENTAUREA**. Outer flowers simple and with corolla larger than the rest, often funnel-shaped and with long sometimes irregular lobes, forming a kind of false cup; but these are wanting in a few species. Involute various, but the scales commonly fringed, sometimes with soft tips. Alexes flat or flattish papery, those of several or many bristles or narrow scales, or terms.

7. **BUC-ile** or **Sedum**like, with long-coiled involucres united to the involucre, many-flowered, and the two branches of the style united into one body almost or quite to the tip, as in § 1; but the outer flowers of the head differ from the rest red sterile, except in a few species of Certaines. Receptacle bare with bristles.

8. **NEWTBUY**. Heads of Staminate flowers in short or in spikes, their involucre of several scales in one row; fertile flowers below them, clustered in the axils, two together in a pyramidal or hemispherical form.

9. **AMMELIA**. Heads of staminate flowers in racemes or spikes terminating the stem or branches, the involucre of several scales in flat or cup-like or short-cupped cap; fertile flowers clustered below the staminate, only one enclosed in each small achene-like involucre, which is naked, or with a few tubercles or strong points near the top in a single row.

10. **PLANTA not Thistle-like nor bur-like.

11. **TAXACEUM**. Heads of many yellow flowers; the marginal ones with pistil only and a 3-broadened ovary. Alexes angled or ribbed, with a flat top, crowned with a cup-like toothed or lobed pappus. Very strong-smelling leaves, with heads in a spiny.

12. **ARKENBILLIA**. Heads small, of few or many yellow or dull purple flowers, of the marginal ones pulpy and soft, the others perfect, but sometimes not maturing the many. Alexes oblong or club-shaped, small at the top, covered with pappus: Blunter-awned, and strongly-spined plants, with heads in panicles.
COMPOSITE FAMILY.

20. BIDEN. Heads small, crowded in close clusters, of many inconspicuous flowers, each fertile pedicel yellow in the axil of a thin and dry chaffy scale, and with a very slender thread-like corolla; the central flowers with a more expanded 4- or 5-toothed corolla. Lower bracts, clothed with cottony wool; leaves before.

19. CORCIIIS: 9. fo-" spec. low in the stem, corymbose heads of the heads small and inconspicuous, yellow in the axil of a thin and dry chaffy scale, and with a very slender thread-like corolla; the central flowers with a more expanded 4- or 5-toothed corolla. Lower bracts, clothed with cottony wool; leaves before.

18. ERICHTHITES. Heads of many white or yellowish flowers, surrounded by an involucre of many scales of dried and white or otherwise colored (not green) variously colored scales, abaxially and persisting scales yellow at least; the flowers all fertile: the outer ones with 4- or 5-toothed corolla; the central ones fertile and with three expanded 6-toothed corolla. Pappus a row of very slender and ragged bristles. Cottony herbage. Leaves before.

17. ECHINOPS. Like Erichthites, but the plants nearly or quite nodose: the abaxial flowers with a simple style, but the ovary stalks, and their pappus of slender bristles which are thickened at the summit and there more or less barbed or plumose.

16. ANTHELIAS: Like Echinochloa, but the plants nearly or quite nodose: the abaxial flowers with a simple style, but the ovary stalks, and their pappus of slender bristles which are thickened at the summit and there more or less barbed or plumose.

15. ASTERINIA. Flowers perfect, with open rays or rays very slender, and their pappus of slender bristles which are thickened at the summit and there more or less barbed or plumose.

14. ENGERON. Some species have short and inconspicuous rays that it may be looked for here.

13. EUPATORIUM. Many species have short and inconspicuous rays that it may be looked for here.

12. COMPOSITAE. Involucres of many imbricated scales, or nearly so, with cottony wool; the outer ones with 4- or 5-toothed corolla; the central ones fertile and with three expanded 6-toothed corolla. Pappus a row of very slender and ragged bristles. Cottony herbage. Leaves before.

11. VERNONIA. Rend. conformed with

10. HEOPOCA. Corolla of (many) yellow, will, chaff belo ... filaments.

9. VERSEDIA. Heads crowded, in corymbose heads, of many inconspicuous flowers, each fertile pedicel yellow in the axil of a thin and dry chaffy scale, and with a very slender thread-like corolla; the central flowers with a more expanded 4- or 5-toothed corolla. Lower bracts, clothed with cottony wool; leaves before.

8. SECO: two or two species which are distinct of my flowers.

7. SECO: two or two species which are distinct of my flowers.

6. SECO: two or two species which are distinct of my flowers.

5. SECO: two or two species which are distinct of my flowers.

4. SECO: two or two species which are distinct of my flowers.

3. SECO: two or two species which are distinct of my flowers.
182 COMPOSITE FAMILY.

b. Bracts of the style long and slender or mostly rather club-shaped, smooth or very minutely puberulent under a lens.

21. LIATRIS. Heads of several or many rose-purple flowers, surrounded by a more or less indurated involucre. Leaves of the culm rather long. Flowers slender, about 1/8-inflated: pappus of many long slender bristles, which are plain or else beset with a short beard or roughness for their whole length. Leaves alternate, entire.

22. BUNIA. Heads small, of 10-25 dull cream-colored flowers, surrounded by a few lanceolate scales of the involucre. Corolla slender, barely 3-lobed. Leaves elliptical, many-seriate; pappus a row of white plumose bristles.

23. MIKASA. Heads of 4 (or 8) flowered flowers, with an involucre of only 4 scales. Corolla 3-lobed. Leaves opposite; stem twining.

24. EUPATORIUM. Heads of 3 or more flowers, and an involucre of several or many scales. Corolla 4-lobed. Receptacle flat or nearly convex. Flowers slender, pappus a row of bristle-like naked (thirdly rough) bristles.

25. CONOCLEISTIA. Heads, etc., as in the preceding, but the receptacle concave. Flowers many, blue or blue-purple. Leaves opposite.

AGERATUM. Like the preceding, but the receptacle flat, and the pappus of a few fewer scales, mostly tapering into 4 slender stiff rough bristles. Leaves opposite.

27. PIQUEIRA. Heads very small, of 2-4 white flowers, and involucre of 3 or 4 scales. Akene 3-angled; pappus none. Leaves opposite, stridulous.

c. Bracts of the style smooth, with a conical or flat annually minutely hairy tip.

28. CACALIA. Heads very small, with 1-20 white or whitish flowers. Seeds of the involucre a single row, with a few small bractlets at base. Corolla length. Akene silky, smooth; pappus of very many fine and soft down-like naked bristles. Leaves alternate.

29. BELLIS. A cultivated state of the Daisy, with pappus (mesostichous) flowers may be sought here.

B. With club-shaped corollas or rays of the margin of the head.

§ 1. Herbs or not withied with large toadstools or colored swamp-plants.

-- Rays paler, except in one or two species of Scenecio and one species, bald, pinnate.

29. TUSSTLAGE. Ray flowers very numerous and in many rows, fertile, with narrow lobes; the yellow disk-flowers few in the centre, and not fertile. Scale of the involucre nearly to one row. Pappus fine and soft. Head small. Leaves ovate, serrate.

30. SECORES. Ray flowers several in a single row, or sometimes more; the disk-flowers in all theaceous or peltate and fertile. Scales of the involucre in a single row, or often with small bractlets at the base. Pappus very fine and soft. Heads ovate or reniform. Leaves ovate or reniform, serrate.


32. ENULA. Ray flowers very numerous in one row, with many bristles. Outer scales of the involucre limb-like. Pappus of many slender limb-like bristles. Akene narrow. Heads large and broad, the tubular perfect flowers very numerous, their authors with two tails in the base. Leaves alternate.

33. CHRYSOPS. Ray flowers numerous in one row, scales of the involucre narrow, not limb-like. Pappus of many rather limb-like bristles, with one or more rows of very short and stout or chaff-like bristles. Akene flattened, hairy. Heads single or coarctated. Leaves alternate.

34. SOLIDAGO. Ray-flowers 1-3, or rarely 10-15, the tubular disk-flowers several, rather many; involucre oblong, its scales imbricated and oppressed, of unequal length. Pappus a row of slender much-bristled. Akene narrow, but not limb-like. Heads in panicled cymes, ovate, or elliptic, mostly small. Leaves alternately.

-- Rays white, purple, blue, etc., never yellow, the flowers of the disk usually yellow. Anther and the style. Leaves alternate, simple. Akene flattened or flaccid.

35. CALLISTEPPUS. Ray-flowers very numerous, usually in more than one row, or in cultivated varieties in several rows. Involutes in several rows, more or
COMPOSITE FAMILY.

GAZANIA. Heads solitary on long terminal peduncle, surrounded at base by a little cup or crown, consisting of many little scales or short stiff bristles, large and broad. Leaves small, comprise stalked. Root annual.

HELENIUM. Rays flowers borne at the terminus of one petiole, involucral bracts.

CORYLIS. Heads terminal on short peduncle outside. Heads usually panicked or corymbose. Root annual.

ERIGERON. Rays flowers terminal, narrow, and commonly occupying more than one row. Involucral bracts more simple than in Aster, the scales narrower, usually of equal length and occupying only one or two rows, with or without leaf-like tips, and the purplish achenes widely, often some minute short and sometimes corymbose bracts at the base of the long ones.

1. **Bartia**. Not of long habit-like bracts, either a little cup or crown, or of a few scales, teeth, none, or none at all.

1. **No chief on the receptacle among the flowers, except in 41–42 and some corymbous and involucrate forms of 46. Leaves mostly alternate.**

1. **Always flat, not zygo-pilifera, not yellow, at least in our species.**

BOLTONIA. Flowers terminal three of 86 and 27. Receptacle conical or hemispherical. Always very flat; erect or semi-erect; or with yellow or white pappus of several minute and short scales, and sometimes 3 or 5 short white. Leaves-crimson, tall, branching herbs, with pale-green thickish and chalky entire leaves often turned white.

BREACHYCOMA. Flowers like those of 86 or 27. Receptacle conical. Always flat, white, pappus a ring of minute short bristles or narrow scales united into a short crown.

BULLIS. Heads with numerous white, reddish, or purple rays. Receptacle high conical. Always flat, ovate, white; no pappus. Low herbs, with solitary pappose heads, and nerves or merely toothed leaves.

ACHILLEA. Heads mostly with few and white mostly one or red or yellow rays. Receptacle small, flat-topped, chaffy. Always small, ovate, united; no pappus.

ACHYLOME. Always not flat, not hastate-crowned; pappus a short green or white; rays piliferae and fertile except in 42.

1. **Marina. Rays terminal, white: otherwise almost exactly as in the previous.**

ANTHEMIS. Rays-piliferae and fertile, terminal, white or sometimes yellow. Involucral of many small close-packed scales. Receptacle convex, with some slender chief at least at the centre. Always green, mostly united. Leaves more or less pinnately or pinnately divided.

CHRYSANTHEMUM. Including LEUCANTHEMUM and PYRETHRUM. Rays piliferae and fertile, numerous. Receptacle convex or flat, without chief. Except in some double-decided varieties. Receptacle mostly with a flattened tube. Pappus none. Otherwise nearly as in Achnémis.

CHRYSANTHEMUM. Always not-pilifera or adnate, not cottony in any manner, pappus 3–5-3: in 3–5 continuous tips, each scales with short bristles or long haired into a bracteate or very convex ray; in one ray, not venous, yellow, not hairy, white or yellow, yellow or white, not red or white, purple, or white: number of separate scales.

HELENIA. Rays piliferae. Involucral of a few small and narrow spreading or reflexed scales. Receptacle globular or conical. Heads mostly campanulate. (Always and pappus, Linnor, p. 143, fig. 268.)

GAILLARDIA. Rays terminal, often papyraceous. Involucral of two or more rows of loose leafy-cupped scales. Receptacle conical. Pod-scales with scarlet: the styles with very slender hispid bristles. Heads solitary on slender terminal peduncle.

1. **Always pilifera, not coriaemed, covered with extremely long finely hairy scales, which must not be confused with pappus, killing the minute pappus of many deliquescent little scales: rays numerous in one row, terminal, yellow or yellowish, not at base, mostly entire; number of 1 or 2 rows of short scales united in a cup.

GAZANIA. Head solitary on a long terminal peduncle, large andshowing; the rays expanding only to a maximum of bright yellow. Receptacle flat. Heads flowers yellow: their style simply thickened below the two short bristles.
CALSICHIPS. Heads showy, solitary terminating the branches, with the very numerous rays pediellate and fertile, expanding in radiation or bright, disc-like, the disc flowers sometimes few in the central and sterile. Involucrum of numerous very scales. Receptacle flat. Akene all that distinctly belonging to the ray flowers, strongly imbricated, some of them even bent outward, fitted, or ended into a ring, and especially the outer ones with thickened margins.

POLYGYROS. Heads either small or middle-sized, with about 6 lanceolate scales to the involucrum, and some thin and small lower ones, few or several ray flowers producing terminal ovate or partly triangular achenes with no pappus. Heads clavate-pedicellate and rather aggregated; all but the upper most brown opposite, and their petals twisted or dilated and chip-like at the clasping bases.

SILPHIUM. Heads mostly large, with numerous somewhat leaf-tipped or green scales, or the involucrums furnished in 2 or more rows, numerous ray flowers producing very broad and flat achenes (parallel with the scales of the involucrums), which bear commonly a wing-like tawny and 2 teeth at the apex. Juice viscid.

DAHLIA. Rays in the natural flowers of the inferior in the customary species more or less polyadical, but in the garden race all of the flowers are changed into rays. Inner involucrums of numerous more or less united scales. Acorns oblong, subover or inserted at the apex.

COROLLOPSIS. Rays on the inner, mostly yellow, or brown-purple at base. Involucrums monadical of about 3 outer 3 lanceolate scales and 3 or more inner ones. Chaff slender, deciduous with the flat achenes, which have nearly a pappus of 2 teeth or none, the latter not hinged downwards.

BIDES. Like Corylopsis, but simple without rays, and some with slender or bent-upwards scales; all bear 2 or more rigid persistent achenes, which are hinged downwards.

Althaea annual. (n) of all contrary to the scales of the involucrums and the chief of the receptacles, having the latter usually encroaching or folded round their outer margins.

Althaea calendula. (n) of all flowering, yellow, sometimes brown-purple at base in 30, 41, or twelve in one of 5. Leaves either opposite or alternate in very pairs, in 44 - 56.

ACTINOMEDES. Rays neutral, few or several. Involucrums of several nearly equal scales. Receptacle convex or conical. Acorns flat, real, wing-margined; petals of 2 persistent smooth achenes. Leaves single, seriate, often drawn into wings on the stem. C

VERDESENA. Rays few in ones 1 - 5, pediellate. Involucrums of few erect scales. Receptacle either flat. Acorns flat, winged or winged-segments; petals of 2 persistent achenes. Leaves simple, deciduous into wings on the stem.

XIMENIA. Rays numerous, pediellate. Scales of the involucrums spreading. Receptacle flat or convex. Acorns of the ray wrinkled and whipless, of those of the disk flat and wing-margined, with two slender achenes united in the wing. Leaves mostly with winged petals which are dilated and clasping at the base.

HELIANTHUS. Rays several or many, neutral. Scales of the involucrums imbricated. Receptacle flat or convex. Acorns distich, more or less 4 angular or hilly-ridged, wingshaped; petals of 2 thin ciliate scales corresponding with the inner and outer layer of the achenes, and sometimes with truncate inner margin over, all drawn down from the disk (8). (Lem. p. 130, fig. 146.) Leaves simple, entire or serrate; stems not winged.

HELICSOPS. Rays 10 or more, pediellate. Scales of the involucrums in 2 or 3 rows, the inner shorter than the disk. Receptacle convex. Acorns 4-angled, somewhat excised; no pappus. Leaves opposite, pinnate, tripli-cleft.

COMPOSITE FAMILY.
II. Head with all the flowers strap-shaped and perfect. Plants with milky juice. Leaves alternate. (No chaff on the receptacle in any of the following.)

1. Poppy of many minute chaffy seeds, forming a short crown or cap.

2. Cichorium. Head of several blue flowers. Headbuttons: the outer of 4 short and spreading, the inner of about 10 erect scales. Achenes smooth, with broad siphon. Some bringer, left mostly towards the base. (Lactuca, p. 19, fig. 52; the same, p. 180, fig. 226.)


4. Tragopogon. Head large, of many yellow or purplish flowers. Involucres of about 12 lanceolate rather fleshy scales in a single row, somewhat united at the base. Achenes terete, slender, roughish, tapering into a long base, which bears the rigid long-glandular bristles of the pappus, but these long and united at the summit. Stem leafy; leaves entire, parallel-cut, clasping at the base.

5. Lontophorum. Head rather small, of many yellow flowers. Involucres of many narrow equal erect scales, and a few short bristles at base. Achenes spindle-shaped: pappus a single row of very few bristles. Leaves all at the root or base of the scape.

6. Poppy of very many slender, but not stiff and rough, stick-like bristles.

7. Hieracium. Heads small or smallish, of 12 or more yellow flowers. Scales of the involucre unequal and in more than one row. Achenes short, strong or, columnar, not hooked; the fragile bristles of the pappus not very copious. Stem naked or leafy.

§ 4. Pappus of extremely opaque and feel soft hair-like seeds.

1. VAMBRONIAPPPE. Head of yellow flowers as in the pea; but the pappus rusty red, and with a minute ring of soft down underneath it. Stem branching and many-branched, green. 20-30 in. (Lessons, p. 500, fig. 706.)

2. TOHANAX. Head of very many yellow flowers on a slender hollow and wholly naked scape. Because of this, the base of numerous narrow scales in a single row, the outer of short broad scales. Acorns erose and spindly, the rachis ribbed and tubercled on the rib, much shorter than the slender beak which exhibits at maturity the soft and white pappus. (Lessons, p. 180: fig. 506.)

3. LACTUC. Heads of several variously colored flowers. Involution of several嬛ncents or white radiate scales of equal length. Acorns flat, abruptly contracted into the slender beak which exhibits the very white soft pappus. Stem leafy.

4. Avena with a short and thick beak or none; heads many-flowered.


6. SORGHUS. Involution as in 13, or with narrow and more equal scales, and tufted at base. Flowers yellow. Acorns flat and short, without a tuft to support its very soft white pappus. Stem branching and leafy. (Lessons, p. 320, fig. 706.)

1. CYNARA, ARTICHOKE. (Ancient Greek name.) Two species occasionally visit the Old World, as cucullus. 2

C. Scutum, Tree Artichoke, with stout stems, slightly prickly leaves mostly once or twice pinnatifid and corymbose beneath, the rachis and usually pointless scales of the involucres and the receptacle of the young flower heads flaky, and edible when cooked.

C. Cardunculus, Cardoon, has the leaves more deeply and compactly divided and prickly; the less flaky scales of the head prickly-cleft; the flabby involucres and middle eaten after being blanched in the manner of celery.

2. CISCIUM, TRUE THISTLE. (Old Greek name.) Flowers purple or pink, occasionally yellow or white, in summer. 2

§ 1. All the modes of the head armed with spreading prickly tips.

C. lanceolatum, Carsons Thistle. Nat. from Eu. in pastures, &c.; the base of the rough deeply pinnatifid leaves running down the stem in lobed prickly wings; 1 ft. purple. 2

§ 2. All or most of the modes of the head armed, the innermost not prickly-pointed, the outer with a short prickly or point, or none.

Leaves green both sides or a little cutcheon or velvety underneath.

C. Crenatae, Camia T. A vire pest in fields and meadows N., nat. from Eu.; spreading by deep running roots as well as by seed; numerous short-pennate heads only 3½ in., with rose-purple flowers, leaves moderately pinnatifid, weak-prickly. 2

C. horridulum, Yellow T. Wild near the coast in sandy ground; has very prickly leaves, rather large heads surrounded at base by an involucre or skirt of leaf-like very prickly lance; and yellowish or purplish flowers.

C. pinnatum, Pasture T. Wild in dry fields, 1½-3½ ft. high, with lance-oblong pinnatifid leaves, singly very large heads (almost 3 ½ seems) of fragrant (purple or more white) flowers, sometimes leafy-beamed at base. 2

C. muticum, Sweet T. Wild in swamps and low ground; 3½-4½ ft. high, with stately divided leaves, few or no prickles; and much larger naked heads, most of the scales pointless; flowers purple. 2

Leaves whistling with wind; flowers purple, rarely white. Wild species.

C. albusum, Tall T. Fields from Penn. and R.; 3½-10 ft. high, branching, leafy, up to the rather small heads, the oblong leaves wavy or only slightly pinnatifid, except the lowest. 2
C. Virginianum, VIRGINIA T. Chiefly S. & W. on plains and barrens, with either simple stems 10-60 high, studded with long-baked phyllodes; leaves lanceolate and slightly or not at all pinnatifid; head small. 2
C. discolor, VIRGINIANUM T. Low growing, 30-60 high, branching and leafy, with either small heads, and deeply pinnatifid leaves green above white beneath, short lobes narrow and prickly-pointed. 1

3. SILYRUM, MILK THISTLE. (An ancient Greek name.)
C. Maritimum, the only species, unit in some gardens and rarely running wild, from the Old World, well marked by its white-branched or vessel smooth leaves with clasping base and merely minutely prickly margins; flowers purple, in late summer. 2 3

4. ONOBORDON, COTTON or SCOTCH THISTLE. (The ancient Greek name.)
C. Acanthium. Not from Eu. in waste places; tall, white-cottony, with weak prickles on the minute-pinnatifid leaves and the broad leaf-like wings of the stem and branches; flowers purple, late summer. 3

5. LAPPA, BURDOCK. (Name from a Greek word meaning to lie hold of, from the burrs or hook-crowned bracts.)
L. officinale, var. major, the Common B., with large leaves loosely corymbose, of somewhat tassel, the lower heart-shaped, upper ovate, is common in meadows and hedges. Var. minor is smaller and smoother, with burrs tapering at the base, often calibrated or clef. FL mostly purple, all summer and summer. 1 2

6. CARTHAMUS, SAFFLOWER, FALSE SAFFRON. (Arabic name of the plant, from the properties of the orange-colored flowers, which are used in dyeing or coloring yellow, as a substitute for true Saffron.)
C. tinctorius, the only common species, cult. in country gardens, from the Orient; smooth, 6-12 high, with ovoid-oblong leaves and large head, in summer. 4

7. CNICUS, BLESSED THISTLE. (Greek name of a kind of Thistle.)
C. benedictus, the only species, seedy in waste places S., from Eu.: has much branched loosely woolly acrite, leafy up to the rather small heads of yellowish flowers, and pale pinnatifid leaves with slightly prickly edges.

8. CENTAUREA, CENTAUREA or STAR-THISTLE. (Ancient name, after Chiron the Centaur.) FL summer.
1. Flowers white, in the head, the marginal ones not enlarged and ray-like: papery of very short bracts: scale of head with short fringed appendage.
2. nigra, BLACK C. or LARKSPUR. A coarse weed, in fields and waste places N., S. from Eu.: stem 80 high; leaves lanceolate, the lower with some coarse teeth; flowers purple. 1 2
3. Centauras, or Centaurea, a low species, cult. from B. Eu. with very white-woolly pinnatifid leaves, and purple flowers, innumerable short enlarged; not sandy. 2
4. American C. Cult. from Arkansas and Texas: smooth, with stout stem 10-20 high, oblong or lance-oblong leaves, the upper entire, very large head of showy pale purple flowers, the outer ones much enlarged, and the stamens with large white-flowered appendage. 1 2

9. CYSPHERUS, BACKHOLT or COWHIBBLE. In gardens, from Eu., sparingly running wild: loosely cottony, with stem-leaves linear and mostly entire.
solarily long-stalked head, the outer flowers very large and blue, with white or rose-colored centers. 11

C. montana. Cult. from Eq.: low and stout stems from creeping root stock, leaves lance-oblong, head larger, but flowers similar to last. 12

§ 3. AMBROSIA. Marginal ovate flowers many; pappus of narrow bristles, or none; veins of head united and smooth. Cult. for ornament, from Asia.

C. odorata, or Ambrosia, Sweet Neltana. Smooth, with mostly pilosulous leaves, long-stalked head of yellow fragrant flowers, the outer rays enlarged, and shaggy-bristled pappus. 13

C. moschata, Mus-scented N., has rose-purple or white musk-scented flowers, the outer little enlarged, and no pappus. 14

9. XANTHIUM, CHELYBUL, CLOTBUL. (Name from the Greek for yellow, the plants said to yield that color.) Coarse and rip-ripped, with stout and low branching stems, alternate and purired merely toothed or lobed leaves, and obscure greenish flowers, produced all summer. 15

X. strumarium, Common C. Barnyards and waste manured ground: rough, 1°-2° high, with broadly triangular-heart-shaped toothed or slightly lobed leaves on long peduncles: the fruit a bar fully 1" long, with 2 straightish beaks at the apex.

X. echinatum, on sandy slopes, has a tufted bar 1" long, with incurved hooks and more numerous prickles, hirsute with glandular bristles.

X. spinosum, Sweet C. Sandy shores and waste places. E. & S. Henry: the branching stems armed with slender triple prickles at the base of the many short-pedigerous leaves; bar small, with a single hook-like tip.

10. AMBROSIA, RAGWEEF. (The classical name means feed for the Greeks: perhaps etymologically applied to these marseable weeds.) Leaves opposite or the upper alternate, mostly lobed or cut: flowers greenish, all summer and autumn. 16

A. trifida, Great Ragweed. Tall coarse herb along low borders of streams, 2°-10° high, with opposite deeply lobed leaves on marginal pedicles, the lobes heart-shaped and entire, subulate heads in racemes, their involucre subtended on one side, the fertile one or fruit obtuse and with 1 or 6 ribs ending in a needle or spiny point.

A. bidentata. Peaks from Ill. & S., 1°-2° high, hairy, very leafy; the leaves alternate, closely serrate, lanceolate, and with a short leaf or tooth on one side near the base: heads in a dense spike, the uply-shaped involucres of sterile ones with a large lanceolate appendage on one side.

A. artemisiaefolia, Russian Woolwood, Honeyweed, or Betterweed. Waxy places and road sides, 1°-3° high, hairy or rough; with twice pinnate leaves either opposite or alternate, pale or blutbly, subulate heads in panicled racemes or spikes, the small cumbrous fruit with about 6 little teeth or spines.

11. TANACETUM, TANSII. (Old name, said to be a corruption of Athenaeum, unflying, from the durable flowers.) Ft. all summer. 17

T. vulgare, Common Tansy, from Eu.: cult. in old gardens, and a road side weed, 2°-4° high, smooth, strongly-scented and sudden, with deep green 1-3-plinmate compound leaves, the leaflets and winged edges of the pectile cut and finished: in our gardens, leaves more cut and crisped.

T. Balseatica, Contrast: a garden herb, from Eq. 1°-2° high, smooth, with pleasant scent, the pale leaves oblong and nearly whitened, and small heads of pale yellow flowers.

12. ARTEMISIA, WORMWOOD. (Designated as Artemisia, the Greek Dams.) Ft. summer.

A. Absinthium, Wormwood, from Eu.: in old gardens and a road side weed; strong-scented, silky-hairy, with stems 2°-4° high and rather

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woody at base, twice or thrice pinnately parted leaves with lanceolate lobes, and small nodding hemispherical flowers.

A. volatina, **MUGWORT** of Eu., in old gardens and meadows, with pinnate leaves green above and cut-margined below, their lance-linear divisions, mostly villous and reflex, and small heads in open panicles.

A. LADINIANUM, **WESTERN M.**, is wild from Michigan W. and N. W., with lanceolate leaves mostly cattley-white on both sides, many of them entire or merely sinuate, and larger heads in narrow or spike-like panicles.

- **Lance** (and whole plant) smooth and green or nearly so.

**A. biennis**, **BUNNYLvore.** Generally banks and shores N. W., extending E. along roadsides, 19-30' high, with small growthy heads much crowded in the scale of the leaves or twice pinnatifid leaves, their linear-linear, in the lower coiled-with.

**A. Dretnia**, **sward.** is sparingly wild from Eu. for the acuminate (lance-linear entire) leaves, used in a cement.

- **Very fine thread-like or capillary divisions to the 1-5-pinnately divided leaves to heads nearly pointed.**

**A. Abrotanum**, **southerncrass.** from S. Eu.; wild in gardens for the pinnatifid foliage, 20-30' high, woody-connate.

**A. ovidiate**, is a wild Wormwood along the nearby coast and take shores, 20-40' high.

13. **FILAGO, COTTON-Rose.** (Latin name, from the cottony hairs.)

**F. Grossa**, **Germ. C.** or **Herba Fata** of the old herbalists, branches with a new generation of clustered heads arising out of the parent cluster at the top of the stem (as if suddenly springing from themselves); stems 4'-10' high, crowded with the lanceolate erect and entire cottony leaves. Old dry fields from New York S.; f. summer and autumn.

14. **EBRECTHITES, FIREWEED.** (Ancient name of some Groundsel, **Erodium**.) 4. summer and autumn.

**E. hieracifolia**, one of the plants called **Fireweed**, because springing up where woods have been burned and greatest burned seen especially N.; very rank and coarse herch, often hairy, 19-30' high, with lanceolate or oblong extended leaves, the upper with stelled clasping base, and panicled or corymbed heads of dull white flowers, in front with copious white and very soft downy papules.

15. **GNAPHALIUM, EVERLASTING, IMMOBILE, CUMWREED.** (Name from Greek, meaning lack of seed.) 4. summer and autumn.

- **Wild species**, with crowded small heads, the slender pistillate flowers very numerous and occupying several sides.

**G. polycephalum, Common Everlasting.** Leaves lanceolate, with narrowed base and wavy margins, the upper surface nearly naked; the perfect flowers few in the center of each head.

**G. descuemu**, **Decumbens E.**, equally common from New Jersey to Michigan and N., bears lance-linear, corymbose both sides, the long pithy clarying and extending down the stem; many perfect flowers in the center of each head.

**G. ultigineum, Low Cow-wort.** A most common, insignificant little weed in waste places, especially pondsides, with lanceolate or linear leaves, and inconspicuous heads in terminal clusters.
C H A P T E R XX.

COMPOSITE FAMILY.

19. G. purpureum, PURPLE C. In sand or gravel along and near the seashore: taller, with oblong-patulate or lanceolate leaves green above and whitish or yellow beneath, and purplish heads in axillary clusters, or spikoid along the upper part of the stem.

§ 2. Ornamental exotic IMORTELLES in the gardens, thus in different moral HELICANTHUM, with pistillate flowers sooner or in a single sporadic row.

G. bracteatum, or HELICANTHUM BRACETATUM, from Australia: tall, smooth-topped or slightly hairy, with lanceolate leaves, large heads terminating the branches and with some leaf-like bracts of the petaloid, the permanent and very numerous scales of the involucres very showy and petal-like, spreading in many ranks, golden yellow, and with white varieties.

G. (or H.) makranthum, from Australia, is less tall (15–20 high), with roughish stem and lanceolate or spatulate leaves green throughout, and the showy solitary heads nearly 3' across; the scales of the involucre rose or white on the upper face.

16. ANTEMNARIA, EVERLASTING, IMMORTELLE. (Name from the disk-shaped pappus of the staminate flowers, which resembles the auricles of certain insects.)

A. margaritae, PEARLY EVERLASTING. Dry fields and woods, especially N. & S. in summer: stem about 10 high, leafy to the top: the leaves lanceolate; head in a broad corymb, the fertile ones with a few imperfect staminate flowers in the centre; scales of the involucre nearly white, rounded.

A. plantagineus, PLANTAIN-EYED E. Dry knolls and slopes, fl. early spring: in patches, appearing to runners and offsets; the receptacular spatulate or ovate and tufted; flowering stems 4–8 high, with few and small lanceolate bracts; heads in a small corymb, the fertile ones with narrow and acutish, the staminodes with white and rounded scales.

17. RHODANTHE. (Name from Greek words meaning living in sand.)

A. alatum, of Australia, cult. for ornament: 15–20 high, rather corymb, with rosette-spatulate and tapering downwards into a petaloid stem-leaves small and lanceolate, and extended down the branches and stems in the form of leaf-like wings; heads solitary with partly white involucres surrounding yellow flowers.

19. HUMEA. (Named for Lady Hume.) From Australia, cult. for ornament.

H. oligos. Tall, 30–60 high when in flower, with simple stem thickly set with the alternate lanceolate and clasping green leaves, the summit branch- ing into a large drooping pistil, its branches slender, beary numerous and small purplish heads.


V. novembraeae, New York or COMMON IRON-W. Near the coast and along rivers: 20–60 high, with lanceolate auriculate leaves, corymbose along the whole height of the stem, heads in a broad corymb, and scales of involucre with slender awn-shaped or awn-like tips.

V. fasciculata, only W. & S. in prairies, &c., has the scales of involucres brown and pointless, except perhaps some of the lowest.

V. angustifolia, only S., has narrow linear and more textured leaves.
21. LIATRIS, BUTTON-SNAKEROOT or BLAZING-STAR. (An
unclassified native.)-Closely in pine-barrens or sandy soil. Fl. late summer
and autumn. } 2
§ 1. Stems extremely stalk-like and simple, rising from a round ever or short tuber,
very leafy with narrow and scale, often purplish leaves; heads spikel or
ovoid, or occasionally branching into a panicle, with colored involucres;
tubes of the ray-purple or yellow and slender.
• Division of the prop pollinically pleseant to the naked eye.
  Heads small, only 4-6 flowered.
  L. tenuifolia, in S. pine-barrens, has very slender mostly thread-shaped
leaves, stem 3-4 ft. high, very slender raceme, and scales of involucres erect and
pointed.
  Heads small, only 4-6 flowered.
  L. eulans, from Virginia S. 10-20 ft. high, often very hairy, with com-
 pact spike, short lanceolate or linear leaves, and scales of involucres with
spreading non-purple tips.
• Heads large and few, cylindrical, many-flowered.
  L. squarrosa, COMMON BLAZING-STAR, from Penn. S. & W. 10-20 ft.
 high, with linear leaves, few heads about 1 ft. long; and scales of involucres with
spreading induplicate tips.
  L. cylindrica, from W. Canada S. W., smaller than the preceding, 0-10 ft.
 high, the narrow heads with short and rounded appressed tips.
• Heads of the propol pollinically pleasant to the naked eye.
  Heads small, only 4-6 flowered, commonly on inch long.
  L. scabra, with short stem 10-20 ft. high, lanceolate leaves, or the lower
spreading-oblong, and very numerous scales of the involucres with rounded tips,
often scarios or purple on the margin.
• Heads large and few, cylindrical, many-flowered.
  L. pyrocoma, in Pennsylvania, W. with linear or lance-linear leaves, and
 a very dense spike of about 12-20-flowered heads, the scales of the involucres
with recurving purplish tips.
  L. spicata, the commonest species; in low grounds, with 8-10-flowered
heads crowded in a long spike, the oblong and blunt scales of involucres without
any obvious tips.
  L. graminifolia, in wet pine-barrens from New Jersey S., has 7-10-
flowered heads in a lower spike or raceme, the rigid appressed scales blist or
slightly pointed.
  L. gracilis, from N. Carolina S., with spreading leaves, the lower lance-
oolong and long-petioled, the others linear and short, and 3-7-flowered small
heads on spreading pedicels.
§ 2. No tuber or corm; leaves broad; heads small, in a corymb.
  L. odorata, Vanilla-plant of pine-barrens. S. (also wrongly
called Hemlock-plant) 2-30 ft. high, very smooth, with pale yellow or ob-
lance-linear leaves, 3-7-flowered heads in a long spike, the oblong and blunt
scales of involucres without any obvious tips.
  L. gracilis, from N. Carolina S., with spreading leaves, the lower lance-
oolong and long-petioled, the others linear and short, and 3-7-flowered small
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called Hemlock-plant) 2-30 ft. high, very smooth, with pale yellow or ob-
lance-linear leaves, 3-7-flowered heads in a long spike, the oblong and blunt
scales of involucres without any obvious tips.

22. KUHNAIA. (Named by Linnaeus for Dr. Kuhs of Pennsylvania.)
K. eupatricoides; the only species from New Jersey to Wisconsin S.,
is rather laminy leathery, with lanceolate leaves, and panicled or enwrapped small
heads of flowers, in autumn. } 2

23. MIKANIA, CLIMBING HEMPWEED. (Named for a Bohemian
botanist, Prof. Mikov.)
M. ecandens, a rather hardy plant, clinging to bushes in low grounds,
with triangular-heart-shaped or haller-shaped leaves, and small heads of pur-
plish flowers, in summer. } 2
24. EUPATORIUM, THOROUGHWORT, BONESET. (Old name, dedicated to Eupator, Hellebore, who is said to have used the European species in medicine. Most of the species are American.)

E. echinocentroides, of Chile, and one or two other somewhat woody-stemmed and white-flowered species are cultivated in greenhouses for winter-blooming. — The following are the occasional wild species; it is native in summer and autumn.

§ 1. Leaves 2–6 in a whorl; heads 5–12-flowered, capitate. The parthenium is a very strong-smelling annual, or biennial annual, or biennial, with smooth or rough-textured and pointed leaves on petioles, and those compound corollas.

E. purpureum, Purpule T. or Joe-Pye Weed. Low grounds, with simple stems 3–12 high, with or without purplish spots or dots, very rarely exceeding 4 inches in height; covered with rough-hairy and pointed leaves on petioles, and those compound corollas.

§ 2. Leaves opposite (or only the uppermost alternate) and entire; heads corollaed, the winter white or very much reddened, flowers white.

* * Leave unrolled at base of flower in pairs (cornutus-purpureum).

E. perfoliatum, Thorn-wort or Boneset. Low grounds, very near the latter (infamously used as a popular medicine). 2°–4° high, hairy; the inflorescence leaves in point-pointed, acute, very velvety and somewhat wrinkled, 3°–6° long; the very numerous heads crowded in a dense umbel, 10–30-flowered.

* * Leaves unperfoliatum at base; heads nearly 5–6-flowered.

E. assilifolium, on stony banks, is smooth, 4°–6° high, with lanceolate serrate leaves (3°–6° long) tapering from a rounded usually square base to a slender point, and small heads in very compound flat corollas.

E. pubescens, in dry soil and sandy, 2° high, with ovate serrate and notched downy leaves, and 4–8 flowers in the heads.

E. rotundifolium, in similar places and like the foregoing, but with smaller-ovate blunt leaves more deeply toothed, and 5-flowered heads.

E. tenuifolium, in low grounds near the coast, roughish-puberulent, with ovate-stemmed or lance-stemmed very deeply serrated leaves and small corollas.

E. album, in sandy soil from New Jersey S, 2° high, is roughish-hairy, with ovate lanceolate entire and strongly wavy leaves, and heads crowded in the corolla, the lanceolate and pointed tips of the inflorescence white above and larger than the flowers.

E. alismum, in dry soil from Penn. to Ill and N, is short and tall, 2°–7° high, flower, with lanceolate leaves (resembling those of other California) tapering from both ends and conspicuously arrowed, either entire or notched above the middle; corolla tube, 1–2 in the inflorescence tube.

E. hysopifolium, in dry, stony soil, from Mass. S, 1°–2° high, smooth, with narrow linear or lanceolate blunted 1–3-flowered heads.

§ 3. Leaves alternate or the lower opposite, all long-petioled corolla compound; flowers 12–15 in the head, small, white.

E. scirpoides, to low grounds from Maryland to Ill and N, is mostly petioled, 1°–2° high, bobby pricked; leaves entire lanceolate and taper-pointed, very much toothed, 3°–6° long; the inflorescence very showy.

§ 4. Leaves opposite, petioled, triplicated; heads in corolla, 8–35-flowered, the corolla of the inflorescence and almost to one of the flowers white.

E. ageratoides, White Snake-Root. Common in woods, especially N, 2°–3° high, smooth, with broadly ovate long-petioled entire and sharply toothed thin leaves (4°–8° long), and heads of handsome plane-white flowers in compound corollas.

E. aromaticum, like the preceding, but somewhat finer; their leaves more closely toothed on short petioles, the corolla usually less compound.
25. **CONOCLINIUM, MINT-FLOWER.** [Name from Greek, means special receptacle, in which name it differs from *Scabiosa*, t. e. from such species to those of the last section.] 2

*C. coelestinum*; in rich soil from Penn. to Ill. and S., sometimes call for ornament; 15—20 high, with triangular-ovate or slightly heart-shaped coarsely toothed leaves, and a flat ovary of small heads of blue-purple flowers, in autumn.

26. **AGERATUM.** [An ancient Greek name, which means not growing old, probably applied originally to some sort of everlasting.] A. *conyzoides*, the variety with azure-blue flowers called *A. MEXICANUM*, cult. for ornament from *Trop. Amer.*; 20—30 high, soft down, with white or sometimes heart-shaped pointed leaves, and coarsely teethed heads of azure-blue flowers, produced all summer and autumn.

27. **PIQUERIA.** (Named for an obscure Spanish botanist, *Piquerio.*)

*P. trinervia*, from Mexico, cult. for winter-blooming; smooth, 20—30 high, branched, with large showy ruffled sparingly serrate leaves, and loose pinnated corymb of very small white-flowered heads; much used for dressing larger cut flowers.

28. **CACAIIA, INDIAN PLANTAIN.** [Ancient name, of uncertain meaning; Native of rich soil. It blooms in late summer.] 2

*C. cacaillla*; *condyloides*, from Conn. to Wisconsin and S., but rare; 30—50 high, with lillate-shaped serrate leaves on winged petioles, and rather large heads of 20—30 flowers.

* * * 1. Rhizomes in the middle; flower 2-flowered, of 8 scales, naked.

*C. rosiniflora*, [from New Jersey to Illinois and S. along the mountains, 40—50 high, with large and green round-toothed pointed leaves, the lower lobed-toothed, the upper: fan-shaped.]

*C. atropurpurea*, [from Ontario, 50—70 high, with equally toothed or ciliate leaves, the lower almost kidney-shaped, the upper wedge-shaped.]

*C. tuberosa*, [from the mountains, 50—70 high, with equally to ciliate leaves, the lower kidney-shaped, the upper ovate,] 1. Wet prairies, W. with angular stem and green thick 5—7-seeded mostly entire leaves, the lower lance-shaped and tapering into long petioles, the upper short-petioled. Flowers in early summer.

29. **TUSILAGO, COLTSFOOT.** [Name from the Latin *tusila*, a rough, for which the plant is a popular remedy.] 2

*T. farinosa*, the only species, is wild along brooks, damp meadows, and new swellings, S. probably introduced from Europe, spreading very much by its creeping semi-bulbous and horse nostrils, which grow up, to surface spring, early-bracted leaves, 3—6 high, bearing a single white or about toothed kid "*dandelion-like* head, followed by the rounded and somewhat angular or toothed heart-shaped or kidney-shaped leaves, which are corymbose beneath when young.

30. **BENÉCIO, GROUNDSEL.** [Name from the Latin *benis*, an old man, referring to the beady hairs of many species, or to the white hairs of the papus.] 2

* * * 1. Wild species, chiefly of low or wet grounds, with yellow flowers.

* * * 2. No ray flowers, from *E. a. all manner.*

*S. vulgaris*, *C. commutata*; a low weed in waste or cultivated grounds, 6—9 cm, very smooth, with pinnatifid and toothed leaves.

* * * 3. Wild ray flowers, narrow leaves. *S. vulgare* spring and early summer.

*S. lobatus*, *L. common*. Low banks of streams S. & S. W. very high, 15—20 high, with slender tongue-like leaves or petioles and very short oval to oval lobed leaves, small heads in naked corymb, and about 12 conspicuous rays.
S. arenarius, Golden Ragwort of Shady-weather. Curly when young, becoming smooth with age; sometimes quite smooth when young, with simple stems, 1-3 ft. high, much-branched, and in different varieties either round, oblong, heart-shaped, oblong, or spatulate, conic or cut-toothed, on slender petioles, lower stem-leaves lunate, upper ones sessile or clasping and cut-pinnatifid; corymb umbel-like; May 6-12. 2

S. conchifolia, Tassel-flower: cult. as a summer annual, from India, very smooth or a little bristly, pale or glaucous, 1-2 ft. high, with root-leaves obscure and petiolate, sternos-perforated and partly clefting, and rather showy heads in a naked corymb, in summer.

S. scandens, cult. as house plant under the name of German Ivy, but is from Cape of Good Hope, and resembles Ivy only in the stems, which are round-heart-shaped or angled and with 3-7 pointed lobes, soft and tender in texture, and very smooth; the flowers seldom produced.

S. cineraria, or Cineraria maritima, of Mediterranean coast, an old-fashioned house-plant, ash-white all over (whereas the name Cineraria and the popular one of Dainty Millaq; with a woolly coating; the branching stems somewhat woolly at base; leaves linearly parted and the divisions mostly smooth-bordered; the small heads in a dense corymb.

S. herba-hummi, or Cineraria lanata, from Tenerife, with woolly base to the stem, roundish heart-shaped 3-7-lobed leaves on slender petioles, very white-outlined beneath but soon smooth and green above, and petiolate bearing solitary rather large head of purple flowers, is a less common house-plant than the last.

S. crucifera, the Common Cineraria, of the greenhouse, from Tenerife, is herbaceous, smooth-stemmed, with the heart-shaped and angled more or less cut-toothed leaves green above and usually crimson or purplish underneath, the lower with wing-margined petals dilated into clasping marcescent at the base; heads numerous in a flat corymb, the handsome flowers purple, crimson, blue, white, etc.

S. elegans, Purple Ragwort, from Cape of Good Hope, a scurvy herb, with deeply pinnate leaves, the lower petiolate, the upper with half clasping base, the lobes oblong and often urceolate-toothed; heads corymbose, with yellow or purple disk-flowers and purple or white ray-flowers.

S. abronia, Old name, thought to be a corruption of Perovskia. The swaying European species is used in medicine. The following probably has similar properties.

A. nudicaulis, so called for the naked stem, which bears only 1 or 2 pairs of small leaves, although 1-3 ft. high, the main leaves being clasped at the root, thickish, scalled, oval or oblong, 3-5-lobed, mostly entirely hairy; heads ovate, densely corymbose, partly large and showy, in spring. Low native-plant from S. Parn. 8
23. **HELENIUM**, COMMON ELECAMpane. (Ancient Latin name.) Ye summer. *Y*

C. Heleiiuni, common Elecampane. In old gardens and not from E. by meanders; a stout herb, with stems 2' to 5' high from a thick unallegorical root (used in medicine), large entire leaves woolly beneath, those from the root ovate and petiolated, the others partly clasping, heads large, but the rays very narrow.

24. **CHRYSOPSIS**, GOLDEN ASTER. (Name from two Greek words meaning golden in appearance, from the yellow flowers.) Low herbs, wild chiefly in N. & W., in dry and barren or sandy soil: 8. summer and autumn.

C. graminifolia, Delaware N.: silver-silver, with long lanceolate and grass-like shining swordlets, and single or few heads. *Y*

C. falcoata, on the coast, from Cape Cod to New Jersey: only 4' to 10' high, woody, clubbed to the top with short and linear 3-ribbed rigid leaves, which are often curled or scythe-shaped (whence the specific name); heads small, coriaceous. *Y*

C. rosea, from Virginia S.: white-cotton all over (whence the name), with oblong dense nearly nodulose leaves, and few pretty large heads. *Y*

C. Mariana, the common species, from Long Island N.: silky with long and weak hairs, or smooth when old, with oblong leaves, and a few coriaceous heads on glabrous peduncles. *Y*

C. villosa, from Wisconsin N. & W.: coarsely hairy and somewhat bristly, lastly to the top, with coriaceous bracts bearing entire heads on short peduncles, and narrow-oblong leaves. *Y*

25. **SOLIDAGO**, GOLDEN-ROD. (Old name, from Latin words meaning whole, from supposed healing qualities.) There are very many species, flowering through late summer and autumn. See Manual and Chapman's S. Flora. The following are a few of the very common. *Y*

1. Heads clustered in the axils of the feather-crowed leaves.

S. bipalata. Pale and downy or hairy, with oblong or lance-oblong scarcely toothed leaves, and small heads with cream-colored or nearly white ray-flowers! *Y*

S. laetiflora, of slender finely N.: smooth, with broadly ovate pointed and sharply acerate these leaves, and bright yellow ray-flowers. *Y*

S. scabiosa is like the last, but with more branched and glaucous stems, and lanceolate or lance-oblong oblong-leaves. *Y*

2. Heads in racemes forming a terminal panicle.

S. arguta. Smooth, with the lowest and root-leaves oblong or lance-oblong pointed and sharply toothed, the upper narrower and entire: the slender one-sided naked raceme, widely spreading or drooping.

S. altissima, badly named, as it is mostly only 4'-6' high, one of the earliest-flowering Golden-roses, with rough-hairy stem, small lanceolate or oblong, and serrate very velvety leaves, and one-sided racemose racemes of small heads of bright-yellow flowers.

• • Leaf feather-crowed, but 3-crowed.

S. glycinum is smooth, with rough-hairy stems, lanceolate and usually serrate pointed leaves rather downy beneath but rough above, and small heads with short rays.

S. gigantea is smooth or smoothish, especially the stem, and with larger buds and rays than the preceding.

**COMPOSITE FAMILY.**

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3. Heads much crowded in a terminal compound corymb. 1.5 - 10cm.

S. rigida, in dry soil, a tall and most species, smooth, heart-shaped and
margined, 3 - 5 cm. high, very leafy-branched, usually smooth, with lanceolate 1 - 3-ribbed leaves, and dense flat corymbs of small heads about 1 cm. across, the small rays 15 - 30, the disk drooping, lower.

S. temulifolia, in sunny ground, usually near the coast. Like the preceding, but more slender, with narrow upper heart-shaped yellow disk in corymbs of yellowish heads, and usually in flat corymbs, the small rays 5 - 12.

55. CALLISTEPIUS, CHINA-ASTER. (Name from Greek words meaning beautiful coronet.) Fl. all summer. 1

C. chinensis, the well-known China-aster, of the gardens, a native of China and Japan, has numerous varieties of various colors, the finest double.

56. ASTER, STARWORT, ASTER. (Name, aster, a star.) This vast genus (with which NIMCOGRAPHIS and DIPSACUS may be here included) is too difficult for lexicographers, and those who are prepared for their study will naturally use the Manual for the northern species, and Chapman's Southern Flora for the few that are peculiarly southern. We barely mention the commonest and most distinct or striking of our 40 or 50 wild species. Fl. late summer and autumn.

1. With heart-shaped and pointed leaves, at least the upper half.

• Heads in open corymbs, oblong-cylindric, rays white of nearly so and rather few.

In woodlands, rather early flowering.

A. corymbosus, CORYMBOSU A STRAIGHTER, slender, with thin coarsely-toothed and sharply-pointed leaves, which are considerably broader than broad, and only 1/2 - 1 1/2 in.

A. macrophyllus, LARGE-LEAVED A. Larger and stouter, 2 - 3 in. high, with broader and thicker, rather rough leaves, and more rigid corymbs of larger heads, with 12 - 24 rays.

• A. pumilus, OF small and small. In woodlands.

A. cordifolius, HEART-LEAVED A., is smooth or smoothish, much branched, with thinnish scaly leaves on slender peduncles, and very numerous loosely-pinnated small heads, the rays pale blue or white.

A. undulatus, WAVE-LeAVED A., is minutely dentate, with the leaves only slightly nerved or wavy, the lowest heart-shaped and on elongated peduncles, the upper abruptly contracted into short and broadly-winged pedicles with dilated and ciliate base, or else nerved by a heart-shaped base; the heads larger and in narrow or racemose panicles, and with rather starchy purple-blue rays.

2. With leaves broader, more heart-shaped, the upper once sepal and partly clasping by a heart-shaped or oval peduncle base: heads large or rather large, shiny, the numerous rays purple or blue.

• Stems of the herbaceous not at all leafy, but with short greenish tips, rigid, clasping to many scales, the outer prominently yellow: rays deep-purplish: leaves entire or nearly so. Dry grounds.

A. bartcom & N. A. ALSO WITH HEADS. In perfect branching, pale or often. Glomerately, with lanceolate or lance-like leaves, heads nodding on a slender lower peduncle, bracteate or clasping which scales, with about green tips, and rays sky-blue.
**COMPOSITE FAMILY.**

* * * Scales of the involucre not leafy but linear and slender, all of about the same length, conical-elliptic, bases entire.

**A. Novo-Anglica, NEW ENGLAND.** A, but everywhere common in low grounds: the stem hairy stout 4"-8" high, thickly beset to the top with alternate narrowly lanceolate leaves, which all have an arched clasping base; heads many and large in a cup-shaped corymb; rays very numerous and narrow, violet-purple, or in very late season rose-purple or reddish.

* * * Scales of the involucre about equal in length, base and with more or less leaf-like spreading tips, or the involucre wholly green; flowers narrow in the middle or sometimes nearly entire; heads heavily encased or provided, few in the ground.

**A. prenanthoides.** In rich woodlands chiefly N. & W.; only 1'-2' high, almost smooth, with lanceolate leaves coarsely toothed in the middle, tapering shortly into a long point, and below into a portion narrower than the deeply dilated heart-shaped clasping base; rays pale blue.

**A. puniceus,** HAND-STEMMED A. In wet grounds, mostly 3'-6' high, densely branched, rough-hairy, some of petals tipped, with lance-oblong or lanceolate, sparsely-serrate, tough leaves, the base toothed and partly clasping; scale of involucre slender; rays long, bright or pale blue.

**A. longibractea,** LOW-SLABER A. Smooth or nearly so, 1'-4' high, with lanceolate or narrowly oblong, upper-pointed rather firm and glossy leaves, more leaf-like scales to the involucre, and bright blue-purple rays.

§ 2. With leaves none of them heart-shaped, those of the stem all small; heads very small and numerous, crowded or pressed; involucres indented in five or several rows: the scales with green tips, the oversegmented shorter.

* * * In dry or open ground, about 1'-4' high; rays white: unless of the involucre rigid and thickened, with short and spreading aromatic green tips.

**A. ericoides,** HEAT-LIKE A. Smooth or rather hairy, with lanceolate or linear-oblongish leaves acute at both ends, and scales of the involucres broadest at base, the green tips acute.

**A. multiflorus,** MAIN-CROWNED A. Very common in sterile dry soil, pale or slightly hairy with fine close down, much branched and bushy-like, with spreading linear leaves tough or slightly on their margins, the upper scales, so partly clasping to a broad base; scales of involucre spatulate, the green tip shorter than the whitish lower portion.

* * * In hot, moist, or shady places, 1'-3' high; scales of involucre with short and clear-acuminated green or purplish tips.

**A. Tradescantii.** Nearly smooth, with slender stems, linear or lanceolate leaves, and very small and numerous heads closely crowded along the upper side of the flowering branches, the scale of the involucre narrow linear and acute; rays white.

**A. missisa.** Similar, with more hairy, with lanceolate or lance-oblong thin leaves tapering to each end and shortly toothed about the middle; heads loosely crowded or scattered on diverging branches, and with linear or linear-oblong heads of the involucre; rays pale blue-purple or white.

**A. dumosum,** BRISTLE A. Smooth or almost so, loosely bushy-branched, with mostly linear entire or slightly serrate rhombic oblong leaves, and loosely crowded flowering branches bearing solitary or few heads; scales of the involucre linear-spatulate and CLAVATUM, closely imbricated in several rows; rays usually light purple-blue, sometimes nearly white.

§ 4. With small and very rigid linear without leaves, a large head solitary at the end of the single stem or few branches, the involucre of acorn rigid mostly closely imbricated in very many rows, without green tips, and many violet-blue rays.

**A. linearifolius,** of the side bones, strictly D. (Carpenter having a double pappus, the most of very short blades), entire in shape mostly ovate-elliptic, 2'-4' high; the spreading leaves with long, glossy, strongly toothed margin, slender middle, and no veins.
37. ERIGEBON, PLEANANE. (Name of Greek words, for snork and naike, suggested probably by the heavy appearance of some vernal species.) ERIGEBON SPECULUM of Oregon is occasionally cultivated as a garden perennial, is more showy than any of the following, which are the common wild species of the country.

§ 1. ERIGEBON conspiciosus: stems more or less encrusted; stem erect.

B. purple or purplish, very numerous (50–150); pappus simple. 2

E. Philadelphicum, Common E. Low grounds, 2° high, rather hairy, with obvious mostly entire and partly clasping stem-leaves, spathulate and notched bracts, and several heads; the rays very many and narrow, pale reddish-purple; E. summer.

E. bellidiforme, Daisyalava F. or RARE'S PLANTAIN. Moist ground, soft-hairy, 1°–2° high, with a cluster of rather large roundish rosettes-lying flat on the ground, the stem-leaves rather few and small; heads 1–9 and long peduncled, rather large, with about 30 linear light bluish-purple rays; E. late spring.

B. purple, only about 10, rather broad; pappus simple. 2

E. vernum. Low grounds from Virginia S.; smooth, with oval or spatulate leaves all at the root, slender scape 1°–2° high, with a few small leaves; E. spring.

B. white or nearly so, 50 or more, narrow; pappus double, the outer of a rose of minute chiefly bristly or little minute. 2

E. strigosum, Smaller Daisyalava. Fields: 2°–4° high, smooth-hairy, or roughish with minute close-closhed hairs; leaves entire, the lower spatulate and slender-periodic, the upper lanceolate; rays pretty long; E. all summer.

E. varnum, Low E. Found in Virginia S., with spinous spikes, 1°–2° high, covered with spinelike hairs; leaves ovate or lanceolate, the lower ones scarcely toothed; rays rather short, often tinged with purple; E. all summer.

§ 2. B. conspiciosus, scarcely taller than the cylindrical ball-shaped nodules and the entire pappus, numerous, in more than one row.

E. Canadænum, Honesty or Butterweed. A common weed in waste or rock ground, briefly hairy; with erect strict stems 1°–3° high, linear leaves, only the lowest ones crinkled, and very small palmately parted heads of white flowers, all summer. 2

38. BOLTONIA. (Named for J. Bolton, an English botanist.) Wild plants of low grounds S. & W., resembling flowers except in the akenes and pappus: ray-flowers blue-purple or nearly white; disk-flowers yellow; in autumn.

B. difformis, of Illinois & S., has small heads loosely partitioned on the slender open branches, which bear small ovate-shaped leaves, those of the stem lanceolate; pappus of several bristles and 2 short awns.

B. geastrophorum, from Penn. S. & W., has flower larger and compound heads, lanceolate partly erect leaves, broadly winged akenes, and 2 or 3 short awns in the pappus.

B. asteroides, from Penn. S., has common, is very like the last, but with narrow margins to the akenes and no awns (only a few short bristles) in the pappus.

39. BRACHYCOME. (Name in Greek, mean short root, from the pap·

B. serratifolia, cult., for ornament, from Australia, has slender branching stems nearly 1° high, prominently parted leaves with very similar divisions, and handsome heads with adnate ray-flowers and similar or darker purple centres, produced all summer.
40. **BELLIS, DAISY.** (The old Latin name of the Daisy, from *bella*, pretty.) (Fl. spring and summer.)

**B. integrifolia**, Western Wild Daisy: In open grounds from Kentucky N. W., has branching spreading stems 4-10 in. long, bearing some intermediate-cloding or solitary flowers, and terminal slender-petalled heads with pale bi-narichrome rays. 2 2

**B. perennis**, Trick of English Daisy, cult. from Eu., mostly in double-flowered varieties, 1-2 ft. high, with many of all the disk-flowers changed into rays, or, in the common valued form, all ray-flowers (pink or white). In the northern state the centre is yellow, the rays white and borne of less plethora or crimson-tipped tubular length; head solitary on a short scape; leaves spatulate or oblanceolate, all attached at the root. 2

41. **ACHILLEA, YARROW, SNEEZEWORT.** (Named after Achilles.)

Leafy-stemmed, with small heads in corymbs. 2

**A. Millefolium**, Common Y., or Millefoin, abounds over fields and hills, 10-20 in. high, with leaves twice pinnately parted into very slender and crowded linear 3-5-serrate divisions, heads crowded in a close flat corymb, with 4 or 5 short rays, white, sometimes rose-colored; all summer.

**A. Filipina**, Sneezewort. Run wild from Eu. in a few places, cult. in gardens, especially a full double variety, which is pretty, & in autumn; leaves simple, lance-linear, sharply cut-acute; heads in a loose corymb, with 8-12 or more rather long bright white rays. 2

42. **MARBUTA, MATWED.** (Meaning of the name uncertain.) Native of the Old World.

**M. Cotula**, or Anthemis Cotula, the common Matweed, along roadsides, especially Eu., low, strongly-scented and wiry, with leaves three pinnately divided into slender leaves or lobes, rather small heads terminating the branches, with white rays and yellow centres; all late summer. 3

43. **ANTHEMIS, CHAMOMILE.** (Ancient Greek name, from the procession of flowers.) Native of Old World; fl. summer. Peduncles bearing solitary or very few heads.

**A. arvensis**, Field C. Resembles Matwed and grows in similar places, but rare, not unpleasantly scented; has fertile rays and a minute border of pappus. 2 2

**A. nobilis**, Garden C., yields the Chamomile-flowers of the apothecaries, spreads over the ground, very finely divided foliage pleasingly strongly-scented; rays white; pappus none. 2

**A. tinctoria**, Yellow C., is cult. for ornament, but hardly common; 2-3 ft. high, sparingly divided and again pinnatifid or cut-toothed leaves, and heads as large as those of White Hed, with golden-yellow flowers, or the rays sometimes white. 2

44. **CHRYSANTHEMUM**, including Leucanthemum and Pyrethrum. (Name means gold flowers.) All natives of Old World.

§1. **Leucanthemum** or White Hed and **Pyrethrum**: (Name means golden flowers in Greek, but they are of various colors.) All natives of Old World.

**C. leucanthemum**, Leucanthemum, or White Hed, filling meadows and pastures, and difficult to eradicate; has stems mostly simple and erect from the creeping base at rootstock, bearing cut-toothed or slightly pinnatifid leaves below (the lowest pinnate, upper partly clasping); the wished waxy-leaved bearing the single showy head, in early summer. 2

**C. loeselii**, Leucanthemum, or Pyrethrum Tansy-leaved, Tansy-leaved, the two common Whitehed or Olive Hed, filling meadows and pastures, and difficult to eradicate; has stems mostly simply and erect from the creeping base at rootstock, bearing cut-toothed or slightly pinnatifid leaves below (the lowest pinnate, upper partly clasping); the waxy waxy-leaved bearing the single showy head, in early summer. 2
high, leaves twice pinnately divided into rather coarse narrow lobes, and those of rather small heads, in summer. A double-flowered variety has the disk-corollas transformed into white or yellow tubes.

C. parthenioides, Boiss. & Kots., or Parthenium leucanthum Fernald, from China; probably a low, flaccid-leaved, and much altered full double variety of the foregoing, with pure white flowers all in the form of rays, produced through the summer and autumn.

§ 2. Chrysanthemum of the garden; the flowers of various colors, but only in certain varieties white.

C. roseum, from Persia and N. Asia, with simple stems bearing once or twice pinnately divided smooth leaves with linear divisions, and at the naked summit single heads as large as those of Whitehead, but with pale rose or bright pink-edged rays (and in some varieties full double), is coming into ornamental cultivation; the pulverized flower-heads form the well-known Persian mash powder. B. summer. 2

C. indicum, one of the Chinese Chrysanthemums, flowering in late autumn, of numerous forms and colors, mostly full-double, &c. from China and Japan. 2

C. coronarium, Scrophulariaceae, with yellow or sometimes white flowers, cult. from N. Africa; smooth, with branching stems, twice pinnately parted leaves with serrated and clasping base, and involucrate or linear cut-branched divisions; the inedible of broad and concave scales.

45. HELÉNIUM, SNEEZEWEED. (The old Greek name of some very different plant named after Heo.) North American herbs.

H. autumnale, the commonest species, wild in low grasses, 12–40 high, with inarticulate toothed leaves, these bare often decurrent on the stem, and a curve of showy yellow-flowered heads, the rays often drooping, in autumn. 2

46. GAILLARDIA. (Named for Theodor Gaillarde, a French amateur of botany.) North American low or spreading herbs: B. all summer.

G. lanceolata, wild from Carolina S. in pine woods, has narrow mostly entire lanceolate leaves, commonly small and few yellow rays, and purple disk-flowers. B. 2

G. pulchella, wild from Louisiana W. and cult. for ornament (a form called G. pulcill) has broader leaves, some of them exarate or lobed, and showy heads with the large rays mostly brownish crimson-purple with yellow tips. B. 2

G. aristata, wild from Missouri W., and cult., is more downy than the last, less laciniate, with large showy rays yellow throughout, or dark base bluish-purple. B. 2

47. GASÁNIA. (Named for a learned entomologist of the middle ages, Théodore de Gram.) South African plants of the conservatory, and flowering all summer when hottest out.

G. rigens, also named šumý, of Cape of Good Hope, with short stems spreading on the ground, bearing spathulate or some pinnate leaves, which are nearly smooth and green above, but very silvery with white cotton underneath, and a large showy head, the orange rays over 1½ long, and with a dark eye-spot at base. B. 2

48. GALÉNDULA, MARGOLOD. (Name from the Latin calendula or calendule, flowering throughout the months.)

C. officinalis, Garden Marigold, of the Old World; cult. in country gardens, 8–12 high, spreading, with green and saucers oblong and entire or oval leaves, rather thickly scented, and large head of yellow flowers, produced at summer, sometimes nearly flat-headed, most of the common being strap-shaped. B.
49. PATURNIA, LEAF-CUP. (These coarse and insignificant plants are oldfahiedly held to be of the Mosses.) 2

50. SILPHIUM, ROBIN-PLANT. (Ancient Greek name of some very different plant.) Fl. summer and autumn. 2

51. DAHLIA. (Named for a Swedish professor, Dahl, contemporary with Linnaeus.) 3

52. CORNOPSIS, TICKNEED. (Named from Greek word for hay, from the shape of the flowers.) 2 Many wild species; several cult. for ornament; these are the commonest. Fl. summer. (See Lessons, p. 106, 107, fig. 219, 220.)
C. Drummondii, of Texas, is low and spreading, rather hairy, with leaves of 1-3 palmate lobes, or some of them simple, heads on long peduncles, and very broad rays, golden yellow with small dark spot at base.

C. coronata, of Texas, is low, with slender-proved leaves oblong or spatulate, or some of them 3-5 parted, and very long peduncle; rays broad and handsome.

C. lanceolata. Wild W. & S., and cult. in gardens; 10-20 foot high, smooth or sometimes downy, in tussocks, with lanceolate or oblanceolate entire leaves mostly crowded at the base, and long slender peduncles; flowers in early summer.

C. auriculata. Wild W. & S., and in some gardens; taller, sometimes with red or purple leaves at base, hairy to near the top; upper leaves oblong; lower roundish and sometimes wrinkled as base or with 3-5 lobes or leaflets.

§ 2. Rays entire or nearly so, oblong or lanceolate; oblong along with a very narrow stripe or band, not incurred, and shortly if at all crowded at the apex; heads of yellow involucral involute and yellow; heads rather small, the flowers all yellow. M.

C. lanata, 10-20 foot high, leaves 3-5 parted, leaves nearly opposite and nearly, but divided into 5 leaflets, this coming to be in a wheel. Wild chiefly in S. States, but the first-row cult. in gardens.

C. senifolia, has a spreading 6 lanceolate and entire leaflets in a whorl, (i.e. two, but each 3 divided) smooth or downy.

C. verticillata, has the pale cut into once or twice pinnate almost thread-shaped divisions, smooth.

C. delphinifolia, cry like the last, but with fewer lance-linear divisions.

C. tripteris. Rich ground W. & S., with simple stems 4-9 foot high, leaves of 1-5 lanceolate entire leaflets, very short outer involucral, and blunt rays.

§ 3. Rays oval or oblong, golden yellow, slightly marked; oblong simple, not incurved, bearing 2 or more heads for a pappus; outer involucral and involute leaves; branching plants of wet grounds, with this leaves mostly of 3-7 pinnate tufted or red rising leafy; resting the next year, but the stems not discoursed forked. F. E.

C. trichosperma. Swamps mostly near the coast, 15-20 foot high, with 3-7 lanceolate or linear cut-throat leaves or divisions, numerous heads, and narrow-oblong or linear wedge-shaped margined skinks with 2 stout teeth.

C. abro, only S., has upper leaves often simple, lower nearly as in the foregoing, and shorter wedge-shaped skinks with 2 or 4 short chaff-like teeth.

C. aristata, from India S., has more compressed leaves with oblong or lanceolate often pinnatifid leaflets, and broad-obovate very flat skinks slightly margined and breast-elliptic, the pappus of 2 long and slender arrow, or sometimes 3 or 4, or in one variety same at all.

55. BIDENS, BUR-MARIGOLD, BEGGAR-TICKS. (Latin for two-toothed, from the usually 2 arms of the pappus.) Our species 3 or 8; summer and autumn. The skinks adhering to the dress or to the fleece of animals by their barbed arms.

§ 1. Skinks broad and flat, with broadly elliptic margins.

§ 2. Coarse and very hairy leaves, commonly without any rays.

B. frondos, Common Beggarticks. Coarse wood in low or meaner grounds, 25-60 foot high, branched, with pinnate leaves of 3-5 broad lanceolate
COMPOSITE FAMILY

Actinomeris. (Greek-mode name, alluding to the irregularity of the rays in the composite species.)

A. squarrosa, common in low rich soil from W. New York & N. with branching stems 4°-6° high, lanceolate leaves tapering to both ends, numerous rather corymbed heads, spreading involucres, 4-10 irregular rays, and broadly winged akenes: fl. Sept.-Oct.

Bipinnata, dry soil, from Conn. to Ill. and S., 1°-3° high, branched, with 1-3-lobed or parted terminal leaves, very numerous short tomentose akenes, small heads, short pale-yellow rays, and slender akenes with 3-4 barbed awns.

B. backii, Water R. Immersed in water, N. and W., the single short-petiolated heads rising above the surface, and with short rays; leaves cut into very numerous fine hair-like divisions; achenes of the stout akenes 4-6, barbed near the tip.

B. chrysanthemoides, Laidlaw Herb-Medicine. Shallow water or wet ground, 6°-30° high, with simple lanceolate sessile serrate leaves, outer involucres shorter than the rays, and wedge-shaped akenes with almost prickly downy and barbed margins and 2-4 awns.

Actinomeres. (Greek-mode name, alluding to the irregularity of the rays in the composite species.)

A. squarrosa, common in low rich soil from W. New York & N. with branching stems 4°-6° high, lanceolate leaves tapering to both ends, numerous rather corymbed heads, spreading involucres, 4-10 irregular rays, and broadly winged akenes: fl. Sept.-Oct.

B. bipinnata, dry soil, from Conn. to Ill. and S., 1°-3° high, branched, with 1-3-lobed or parted terminal leaves, very numerous short tomentose akenes, small heads, short pale-yellow rays, and slender akenes with 3-4 barbed awns.

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56. XIMINÉGIA. (Named for J. Ximines, a Spanish apothecary.)

X. esculentus, of Texas and Mexico, and cult. for ornament, 3° high, spreading, rather hirsute, at least the lower face of the oblong or heart-shaped clasping serrate leaves; the bright yellow heads somewhat corymbed, showy, the rays deeply 3-toothed: fl. all summer.

57. HELIÁNTHUS, SUNFLOWER (which is the name means in Greek).

The following are the commonest of the numerous species, many of which are difficult.

1. Receptacle flat and very broad; disk broad; leaves alternate, broad and triangular, pointed; fl. summer. Cult. for ornament: wild only for S. W. of fl. all summer.
COMPOSITE FAMILY.

- Disk dark purple, transected with the yellow rays.
  - Leaves long and lanceolate, 1-4-petaled, entire, smooth; heads small and simply
    corollated; involucres of leaf-like spreading scales.

H. angustifolius, of pine-barrens from New Jersey N., has slender rough
stems 2°-6° high, three leaves opposite and much.

H. ovatifolius, of Kansas and Alabama, each has stems (6°-10° high),
and corolla very narrow alternate leaves smooth; 8-10.

- Leaves oval or lanceolate, append.; stems 1°-3° high, bearing solitary or
  few long-peduncled rather large heads; involucres of short close scales.

H. heterophyllus, of pine-barrens N.; rather hairy, with lowest
leaves ovate or oblong, upper ones lanceolate and low; scales of involucres lanceolate.

H. rigidus, of dry prairies W. & S.; rough, with thick firm leaves latero-
along the lower ovate; scales of the involucres ovate or oblong, blunted.

- Disk yellow as well as the rays, or hardly daisy-branched.
  - Scales of the involucres short and loosely lanceolate, regularly indented, without
    leaf-like tips; leaves mostly all opposite and mostly entire.

H. occidentalis, of dry barrens from Ohio W. & S.; somewhat hairy,
with slender simple stems 1°-5° high, scaling off runners from base, naked
above, bearing 1-5 heads; lowest leaves ovate or lanceolate; upper ones
narrow, small and distant.

H. mollis, of same situations, is soft white-tomentose all over, 2°-4° high,
least to the top, the leaves heart-ovate and partly clasping.

- Scales of the involucres lanceolate and leaf-like tipped; stems long to the top.
  - Leaves chiefly alternate and not tripartitapetal.

H. giganteus, common in low grounds N.; rough and rather hairy, 5°-10° high,
with lanceolate-acetate nearly sessile leaves, and pale yellow rays.

- Leaves mostly opposite, erect in the last, decapitated at base or triple-ribbed.

H. variabilis, common in dry sterile soil, has smooth stem 1°-3° high,
rugoses lanceolate leaves tapering to a point and scarred at the rounded
sessile base.

H. hirsutus, only W., differs from the preceding in its rough-hairy stem
1°-2° high, and leaves with narrower base more or less pointed.

H. arundinaceus, common in low grounds, has mostly smooth stems 3°-4°
high, broadly lanceolate-lanceolate leaves 3°-4° high, and white or whitish
yellow, beneath, their margins beaked with fine appressed teeth, and petioles
short and angled.

H. decapetalus, so named because [like the preceding] it commonly has
10 rays; occasion along stream, has branching stems 3°-4° high, thin and
bright-green smoothish leafy brown tomentose and abruptly contracted
into connected petals; scales of the involucres long and broad.

H. tuberosus, Jerusalem artichoke (i.e. Grouse or Sunflower in
Italian, corrupted in England into Jerusalem); cult. for the tubers and
wild in fescue, probably a native wild S. W. species; 3°-7° high, with
tripled-ovate petiolate leaves, rough-hairy as well as the stems, all the
upper ones alternate, the running rootstocks ending in ovate or oblong edible
tubers.

58. HELIOPSIS, OX-EYE. (Greek-made name, from the likeness to
Sunflower.)

H. frem, our only species, common in rich or low grounds, resembles
a Sunflower of the last section, but has pistillate rays and perfect shot
without poppers: 3°-8° high; smooth; leaves ovate or lanceolate, triple-ribbed,
petiolate, acute; head of golden-yellow flowers terminating the branches, in
summer.
60. **RUBBECKIA**, CONE-FLOWER. (Named for Rubbeck, father and son, Swedish botanists.) The following are the common species, all natives of this country: B. nummularia.

§ 1. Disk broadly terminal, dark red-brown; the soft chief not pointed; rough-hairy plants 14–20 high, leafy below, the entire margin of the stem or branches bearing simple oblong heads: leaves simple.

B. **spp.,** from Penn. W. & S., and also in some gardens; leaves lanceolate and entire, ovate-oblong, terminated at both ends, 3–5-nerved, petiolate, usually toothed or cut.

B. hirta, common in open ground W. & S., introduced into mountainous E., with flowered; stems stout and mostly simple; leaves nearly entire, triple-ribbed, oblong-lanceolate of the lowest stipulate, the upper smaller.

§ 2. Disk conical, dark-purple, the chief non-pointed: lower leaves often prominently pointed at the base.

B. **triloba,** from Penn. to B. & S.; leaves, 20–50 high, much branched, with upper leaves lanceolate and toothed, and the numerous small heads with only about 4 rays.

§ 3. Disk globular, pale dull; handsome (ecoryphioid, smooth), the chief bluish and oblong at the end: leaves 3- or 3-lobed, hirtellous.

B. **subtenuefolia,** of the prairies and plains W.; somewhat downy, with leafy stems 20–50 high, more or less lanceolate entire upper leaves and short-lobed leaflets.

§ 4. Disk oblong, or in some cylindrical and 1½ long, granulated yellow, the chief very broad and downy at the end: leaves all compound or divided.

B. **laciniata,** COMMON CONE-FLOWER, in low thickets: 30–70 high, smooth, branching above; lowest leaves pinnate with 5–7 cut for each leaflet, upper ones 3–5-petaled, or the uppermost divided; heads long-stipitate, with linear drooping rays 1½–2½ long.

60. **LEPACHYS.** (Supposed to be formed from Greek words for thick and spine.) Resembling anise when crushed. Fr. nummularia.

L. **pinnata,** in dry soil from W. New York W. & S.; minutely roughish and slightly hairy; the slender leaf stems 20–50 high, bearing leaves of 3–7 lanceolate leaflets, and somewhat toothed with the oval or oblong disk much shorter than the oblong drooping yellow rays; abaxially scarcely 3-needled, flaccid, the lower edge hardly wing-marginated.

L. **colymaris,** of the plateau W. of the Minnesopias; 30 for ornament; 15–20 high, with single or few long-lobed leaflets, their cylindrical disk often becoming 2½ long, and longer than the 5–8 broad drooping rays, those other yellow, or f. purpurea, with the lower or half lower leaves purple; abaxially 1–3-toothed at the end and winged down one edge.

61. **DRACOPTIS.** (Name refers in some obscure way to a Dragon.)

D. **amplexicaulis,** wild for S. W., sometimes cult. for ornament; smooth, 15–20 high, with clapping heart-shaped pale leaves, and long-lobed leaves, like those of the preceding, the broad rays mostly shorter than the cylindrical disk, and other yellow or the lower part purplish.

62. **ECHINACEA**, HEDGEHOG CONE-FLOWER. (Name means like a hedgehog, viz., resupinate with prickly-pointed chaff.) Fr. summer.

E. **purpurea,** in prairies and open grounds from W. Penn. W. & S.; stems 15–25 high from a thick and black pungent-tasting root (called Black Sungrass by quack-doctors), bearing coarse or lanceolate 3-nerved and vein leaves, the lower long-lobed, and terminated by a large head: rays 1½–2½, dull rose-purple.

E. **angustifolia,** from Wisconsin S., a more slender form, with narrow lanceolate 3-nerved entire leaves, and 1½–15 bright-blue-colored rays.
63. ZINNIA. (Named for a German professor, Zinn.) Commonly cultivated for ornament: fi. all summer.

Z. elegans, the Favorite Garden Zinnia, from Mexico, with ovate-lanceolate half-cringing leaves, and very large heads of rose-colored, purple, violet, red, or white flowers, 2–3 in diameter, of late also full-double like a small Dahlia; chaff of receptacle crowned-toothed at tip; seeds barely 3-toothed at summit. (1)

Z. multijuga, from Mexico, &c., now not common in gardens, being less showy, has ovate-lanceolate leaves, hollow peduncle much enlarged under the head, oblong red-purple rays, blunt entire chaff, and 1-toothed achenes. (1)

Z. angustifolia, cult. as Z. amara, from Mexico, is widely and copiously branched, rough-hairy, with lanceolate leaves, many small heads, oval or yellow rays, and conspicuously pointed chaff.

64. TAGETES, FRENCH or AFRICAN MARIGOLD, but from South America and Mexico. (Mythological name.) Fi. all summer. (1)

T. lucida, now rather uncommon in gardens, has glossy lanceolate sepals, and orange-yellow rays. (1)

T. erecta, from Mexico, &c., now not so common as is the last, with much larger heads, many small heads, red-orange or yellow rays, often full double. (1)

T. patula, from Mexico, &c., now not so common as is the last, with much larger heads, many small heads, red-orange or yellow rays, often full double. (1)

T. signata is a more delicate low much-branched species, with finely cut leaves, smaller peduncles, and smaller heads, the 1 rays purple-spotted and sparsely with darker orange at base.

66. DYSODIA, FETID MARIGOLD. (Name, in Greek, denotes the ill-scent of the plant.) Fi. late summer and autumn.

D. chrysanthemoides, roadsides and river banks W. & S. W.: a low weed, nearly smooth, with spreading branches, opposite pinnately parted and finely cut leaves, and yellow rays scarcely exceeding the involucre.

66. CICHORIUM, SUCCORY, CICHORY, or CHICORY. (Arabic name of the plant.) Fi. all summer.

C. intybus, COWS ORS C. Nat. from Eu. by roadsides, &c., mainly E.: leaves ruellate, rough-hairy on the midrib, or the upper ones, on flowering stems small and lance-like, entire; showy blue flowers opening only in the morning and in cloudy weather; deep root used as substitute for coffee. (2)

C. Endivia, ENDSIVE, cult. from East Indies, for autumn salad; leaves smooth, slightly or deeply toothed, or much cut and crinkled, flowering stems short and leafy. (2)

67. TRAGOPOGON, ALFALY. (Greek name for goat's-hair, from the pappus.) Fi. early summer.

T. porrifolius, COMFORS S. or UPTER PLANT. Cult. from Eu. for the edible taproot, sometimes running wild; smooth and pale, 2°–4° high, branching, with long leaves tapering from a creeping base to a slender apex, very large heads on hollow peduncle much thickened upwards, and deep violet-purple flowers. (2)

68. LEONTODON, HAWKBIT. (Greek name for lion's-head, from the caliiform leaves of some species.) Fi. autumnale. Fall DANDELION or HAWKBIT. Nat. from Europe in meadows and along E.: leaves pinnatifid or incisate, lanceolate, 6–17 high, branching; peduncles thickish and much-branched, seed the small head; fi. summer and autumn. (2)
69. HIERACIUM, HAWFWEED (which the name means in Greek).
Wild plants of the country, to dry ground: f. stouter and amusing.
H. Canadianum, chiefly N., has simple stems 1' - 3' high and leaves up to the corymbed panicles; terminal or olden acute leaves with a few coarse teeth, and tender longer heads with loose inarticulated involucre.
H. paniculatum, in woods, has slender and branching leafy stems 2' - 3' high, lanceolate narrowly saw-toothed leaves, 2 long pinnate of very small 12 - 20-flowered heads on slender peduncles, the involucre very simple.
H. salicrum, in open spots, to tough-barked trees, with rather stout simple stems (1' - 2' high), tending elevates or oval broadly entire leaves, and a narrow pedicel of many small heads, the 40 - 50-flowered involucre and stiff pedicels thickly with dark glandular bristles; flowers not tapering.
H. longipes, in prairies, W., is so named from the exceedingly long (often 1') straight bѣst hairs of the stem; has narrow oblong entire leaves, panicled and 20 - 30-flowered involucre between the last and the next, and slender spike-shaped.
H. Grunovii, common in sterile soil, with slender stems leafy and very hairy below, leaves oblong or ovate, panicle narrow, small heads, smaller pedicels and 20 - 30-flowered involucre, sparingly glandular-bristly, and spinelike-shaped stamens with rather tapering.
H. venosum, RATTLE-RAW-ROOT; common in dry sandy ground, very smooth or with a few hairs; with leaves chiefly at the root, oblong or oblong, thin, purple-ginger beneath and purple-violet above; scape slender, 1' - 2' high, forking into 3 - 7 slender peduncles bearing small slender 20-flowered heads; stamens linear, not tapering.

70. NABALUS, RATTLE-RAW-ROOT. (Name from Greek word for a hairy, alluding probably to the lance leaves of some species; plant tuberous or spindle-shaped, bitter. F. late summer and autumn.
N. achilleum, TALL R. or WHITE-LATITUDE. Rich woods N., 30' - 40' high, with long and narrow leafy panicle, leafed stem indented to be ovate-triangular; leaves 5 - 6-flowered; pappus dirty white.
N. altissimum, OXBOO WHITE-LATITUDE, in open woods, chiefly N. and W., is glaucous, with more corymbed panicles of 8 - 12-flowered heads, usually more cut or divided leaves, and common-colored pappus.
N. Frasieri, LION'S-FOOT, or WALNUT, is common in dry and E. and S., 1' - 4' high, with narrow-corymbed panicles of 8 - 12-flowered heads, and pappus dull straw-color.
N. racemosum has smooth wand-like stem 20' - 30' high, biny-oblong slightly toothed leaves, the upper ones partly clasping, and a narrow spikelike panicle of about 12-flowered heads.
N. apiceum is similar, but rough-pubescent, the 12 - 14-flowered heads mostly erect and larger.
N. crepidioides, only W., is smoother, with stout stem 30' - 60' high, wide corymbed panicles of 30 - 40-flowered heads, brown pappus, and broad leaves 6' - 12' long on winged pedicels.

71. PYRRHOPAPPUS, FALSE DANDELION. (Name means in Greek yellow-colored geppus; this and the leafy stems conveniently distinguish this genus from the next.)
P. Carolinianus, in sandy fields from Maryland E.: 10 - 20' high, with oblong or lanceolate leaves often pinnatifid or cut, the upper partly clasping; A. spring and summer.

72. TARAXACUM, DANDELION. (Greek name referring to medicinal properties of the root.)
T. Carolinum, GROUND-DANDELION. In all fields, 6 in the spring, then in summer. Inner involucre closes after blooming till the skins mature and the leaf
lobelia family.

Lengthens and elevates the pappus; then the involucre is released, the pappus spreads, and with the fruit is blown away by the wind.

73. LACTUCA, LETTUCE. (Ancient Latin name, from the milky juice.)

L. sativa, Garden Lettuce. Cultivated from Europe, the broad and tender root-stems used for salad; stem-leaves heart-shaped and clasping; flowers yellow.

L. Canadensis, Wild Lettuce. Open grounds, 3°–30° high, with lanceolate or oblong leaves often pinnatifid, sometimes entire; flowers pale yellow, sometimes purple or reddish.

74. MULGEMIUM, FALSE or BLUE LETTUCE. (Name from Latin words, to milk.) Fl. summer, in thickets, borders, &c.

M. acuminatum, from New York to Ill. & S.; 2°–6° high, with ovate or lanceolate densely serrate leaves on winged petioles, blue flowers, and bright white pappus.

M. floridanum, from Penn. & S.; like the first, but with all the leaves or the lower ones lanceolate or linear, uppermost sharply clasping.

M. leucophyllum, in low grounds; resembles Wild Lettuce, with equally variable lanceolate or oblong often irregularly pinnatifid leaves, very compound pappus of pale blue or bristle-white flowers, and hairy pappus.

75. SONCHUS, SOW-THISTLE. (Ancient Greek name.) Coarse weeds, with soft sprouting roundish-pinnatifid leaves; hail from Euri.; fl. summer.

S. clerodens, Common S.; in wooded soil and damp waste places; 1°–6° high, with serrate leaves in the clasping base of the leaves, pale yellow flowers, and skates wrinkled transversely.

S. lapponum, like the last, but the leaves less divided and more serrate- toothed, the bracts of their clasping base rounded, and skates smooth with 3 nerves on each side.

S. kranérops, Field S.; less common E.; 1°–2° high from creeping root-stems, with larger heads of bright yellow flowers, and bristly podlike and involucrum.

62. LOBELIACEÆ, LOBELIA FAMILY.

Plants with milky acid juice, alternate simple leafy, and scattered racemose or panicled flowers; the calyx-tube adherent to the many-seeded ovary and pod; the corolla irregularly 6-lobed and mostly split down as it were on the upper side; the 5 stamens united into a tube commonly by their filaments and always by their anthers; style only one.

Downingia elegans, under the older name of Cistostema elegans, and D. pulchella, formerly Cistostema pulchella, are delicate little anuens from California, recently cultivated. They resemble small Lobelia, with very bright blue flowers, but are known by the very long and slender 1-celled pod, and short tube of corolla not much split down. The former has the 3 narrow lobes appearing each other opposite the 3-lobed lip which, has a white central stripe. The latter has a larger corolla, with centre of the 3-lobed lip yellow and white, and the 3 other lobes widely diverging. — The other common plants of this order belong to

1. LOBELIA (named after the herbalist Es. Lobel or Lobel). Tube of the calyx and corolla greenish. Corolla split down on one side, the 5 lobes mostly or less irregular or unequal. Two or all 5 anthers bearded at top.
CAMPANULACEAE, CAMPANULA FAMILY.

Herbs with milky juice, alternate leaves, and scattered flowers, with regular 5-lobed (blue or white) corolla and 5 stamens borne on the corolla tube which is adherent to the 2-5-celled many-seeded ovary and ped; style 1; stigmas as many as the cells of the ovary. Stamens separate in all our plants of the order, which by this and by the regular corolla (valvate in the bud) are distinguished from the preceding.

1. SPECULARIA. Corolla nearly wheel-shaped. Stigma 3. Pod linear or narrow obovate, opening by a lateral valve or short claw into each cell. Otherwise as in the next.

2. CAMPANULA. Corolla bell-shaped, of various shapes. Stigma and cells of the short pod 4-6, each cell of the latter opening by a lateral valve or short claw.

3. PLATYCODON. Corolla very broadly open from a narrow base, bell-shaped in the bud. Pod spadix-shaped, 5-celled, opening at the top into 5 valves.

I. SPECULARIA, VENUS'S LOOKING-GLASS. (Old Latin name of European species of CAMPANULA.) Pl. all comestis. (1)

1. Specularia, Gigantea V., val. from Eu. for ornament, is a low herb, with oblong leaves, pretty blue flowers terminating the spreading branches, and linear triangular pods.
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S. pseudofolia, a wild weedy plant in similar or sandy ground, with simple stems 3'-6' high, furnished throughout with round-heart-shaped clasping leaves, and small flowers in their axils, only the later ones expanding a small blue corolla; pod oblong.

2. CAMPANULA, BELLFLOWER or HAREBELL. (Diminutive of Latin or late Latin name bell.) Fl. summer. (Lessons, p. 104, fig. 207.)

1. Wild species of the country, all with 2 stamens and 5-celled pod.

C. Americana, Tall Wild Bluebell. Rich moist ground especially W., with stems 6'-30' high, thin lanceolate unpointed alternate leaves, and long loose spike of flowers, the almost boat-shaped light-blue corolla 6'-10' long, and long curved style 1'-2'.

C. aparinoides, Small Marsh Bluebell. Grassy wet places, with delicate white stems 8'-20' high, much backward on the angles, bearing small lanceolate leaves and a few small flowers on diverging peduncles, the bell-shaped corolla 6'-10' long.

C. rotundifolia, Common Harebell. On precipices and rocky banks N., with tubed spreading slender stems 6'-12' high, round or heart-shaped leaves, dying early, but narrow mostly linear linear leaves (the specific name therefore unfortunate), and a few slender-peduncled flowers, the blue bell-shaped corolla 6'-8' long.

2. European species of the garden; flowers mostly blue, with white varieties.

— Stems and calyx of the pod 3; no appendages to calyx. 2'

C. Carpatica. Smooth, tall, 6'-10' high, with roundish or oval pointed small leaves, slender 2-flowered peduncles, and open bell-shaped corolla about 1'-2'.

C. rapunculoides. Weedy, spreading inveterately by the root, rather hairy, the sweet leafy stems 10'-20' high, with lowest leaves heart-shaped and pointed, upper lanceolate and sessile, nodding flowers in the axil of bracts forming a laxy raceme, and tubular-bell-shaped corolla 1'/2'.

C. Trachelium. Roughish-hairy, 2'-3' high, with more coarsely toothed and broader leaves than the last, and rather larger bell-shaped corolla. C. porricinfolia. Smooth, with upright stems 10'-2'/2' high, and bearing small lance-linear leaves, not-leaves broader, all but minute close teeth; the flowers nearly sessile and cere, rather few in a sort of raceme, the open bell-shaped corolla 1'/2'-2' long, sometimes double.

C. Medium. Common Harebell. Erect, branching, hairy, with coarse toothed leaves, and oblong bell-shaped flowers 2'-3' long, often double.

3. PLATYCODON. (A Greek-made name, means broad bellflower.) 2'

P. grandiflorum. Cult, from Siberia; very smooth, pale or glaucous, rather low and spreading, with lanceolate coarsely toothed leaves, terminal peduncle bearing a showy flower, the broadly expanded oblong corolla fully 1'/2, blue or white, sometimes double, in summer.

64. ERICAeSE, HEATH FAMILY.

Very large family, chiefly of shrubs, difficult to define as a whole; the leaves are simple and mostly alternate; the flowers almost all regular, and with as many or twice as many stamens as there are petals or lobes of the corolla; their anthers 2-celled, each cell more commonly opening by a pore or hole at the end; ovary mostly with as many cells as there are lobes to the corolla; style usually one, and seeds small.

ERICAs is a genus and the type of a family or sub-order of Heath-like shrubs, of Australia, some of them cult. in conservatories.
Epacrids and the like differ from Heaths in their stamens (often inspersed on the tube of the corolla) having one-celled anthers. The Heath Family comprises the following subordinate families:—

1. WHORTLEBERRY FAMILY, known by having the tube of the calyx adherent to the ovary, on which the monopetalous corolla and the stamens are therefore mounted. All are shrubs, with waxy buds. Fruit a berry or berry-like.

   a. Gaylussacia. Stalks 10.; anthers with the cells opening by a chink at the blunt or tapering top. Flowers in or with a spike in each cell, forming a berry-like fruit containing 10 apparent seeds, or proper 10 stony stones. Flowers in lateral racemes; branchlets and leaves basi-ent with resinous or timbery dots or spots.

   b. Vaccinium. Stalks 10.; anthers tapering up into a tube with a hole at the top. Flowers with several or many spikes in each cell, forming a pyriform seed-cased berry (rarely with few seeds) berry.

2. CISTACEAE. Stalks 10.; anthers with short cells minutely 2-tooted, and opening by a large chink down to the middle. Flowers 4-celled, in fruit a white many-seeded berry.

II. HEATH FAMILY PROPER; shrubs or small trees with calyx free from the ovary.

1. Heath: the calyx persisting dry and variously long after the flowers open, encircling the pet: the enveloping leaves on the shoot or minute or minute. Lobes of calyx and corolla 4; always 8. No waxy leaf-bud.

2. Eriica. Corolla of various shades, 4-toothed or 4-celled, longer than the calyx. Pod beak-pointed. Leaves needle-shaped or linear with margins revolute.

3. Calluna. Corolla bell-shaped, 4-toothed, much shorter and less conspicuous than the 4 yellow and scarlet-precedent sepals; below these 3 or 4 pairs of bracts, the lower ones scale-like. Pod sepulcral. Leaves very short and small, opposite, crowded, and indeterminate.

4. Ceratostaphylus. Corolla urn-shaped, 5-toothed, enclosing the 10 stamens; their anthers opening at the top, and 2-toothed on the back. Leaves alternate.

5. Gaultheria. Corolla tube-shaped, 5-toothed, opening the 10 stamens; their anthers opening at the top, and 2-toothed on the back. Leaves alternate.

6. Balfouriella. Corolla tube-shaped, 5-toothed, enclosing the 10 stamens; their anthers opening at the top, and 2-toothed on the back. Leaves alternate, broad, often spiny-crenulate, evergreen.

7. Epacris. Corolla tube-shaped, 5-toothed, enclosing the 10 stamens; their anthers opening at the top, and 2-toothed on the back. Leaves alternate, broad, often spiny-crenulate, evergreen.

8.Erica. Corolla tube-shaped, 5-toothed, enclosing the 10 stamens; their anthers opening at the top, and 2-toothed on the back. Leaves alternate, broad, often spiny-crenulate, evergreen.

9. Gaultheria. Corolla tube-shaped, 5-toothed, enclosing the 10 stamens; their anthers opening at the top, and 2-toothed on the back. Leaves alternate, broad, often spiny-crenulate, evergreen.
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11. ANDROMEDA. Calyx valvate in the bud; no bracteoles. Corolla various. Petals glabrous or short-ciliate, 6-valved, deciduous. Shrub.


13. KALMIA. Calyx broadly ovate, slightly lobed, and with 10 pouches in which the 10 stamens are said to be located for insects, when the fruit is ripe: filaments long and slender, anthers linear. Pod glabrous. Leaves evergreen. Flowers in terminal or axillary-like clusters.

14. RHODODENDRON. Corolla bell-shaped, funnelform, or various. Stamens 10, pink or purple, or rarely more, and usually deciduous: oval to ovate, yellowish or greenish, mostly of one color. Flowers in umbels or clusters. Leaves opposite or whorled, ovate, or rarely deciduous.

15. AZALEA. Stamens 5, or rarely more, and leaves deciduous; otherwise nearly as in Rhododendron. The calyxes are together, so that Azaleas would hardy be kept distinct, except that they are not suitable in cultivation.

16. RHODODENDRUM. Calyx ovate, or nearly so, the upper part slightly dilated, the lower part of 3 almost or quite separate petals; and stamens 5. = Polygona or nearly so: the (white) corolla of 5 equal petals, 

17. LEPTOPHYLLUM. Stamens 10; anthers opening lengthwise. Pod 2-valved. Leaves small, smooth both sides, glabrous, usually opposite.

18. LECUM. Stamens 5–10; anthers opening not below at top. Pod 2-valved. Leaves alternate, thorny, rusty-white underneath. Flowers from scaly terminal buds, as in Azalea.

19. PSEUDOCOCCUS. Leaves deciduous: flowers in axillary racemes.

20. CLETHRA. Several and short-flooming glands. Stamens 10; anthers somewhat club-like near the bottom. Style filiform at the apex. Pod 2-valved, scutellate, enclosed in the calyx. Leaves alternate, numerous, toothed, deciduous.

III. PYROLA FAMILY; evergreen herbs or nearly so, with calyx free from the ovary, corolla of separate petals, anthers turned outwards in the bud, sometimes inverted, when the flowers by which they open are at top. Seeds inacicular, with a loose cellular coat.


22. MONOCHAS. Flowers minute, with achenes widely spreading, sometimes only 4 petals, conspicuously leafy rotation, large, long-petalled on a straight stalk, and pod as in the next genus, otherwise like Pyrola.

23. CHIMAERA. Flowers several in a corolla or umbel, with oriental and widely-spreading petals, long and leafy on filaments enlarged and hairy in the middle. Very short tubular-shaped style covered by a broad orbicular stigma, and valves of pod smooth on the edges. Stamens below: leaves narrow, smooth, and glabrous.

IV. INDIAN PIPE FAMILY; herbs desolate of green foliage, parasitic on roots of other plants; commonly represented by one common genus, viz.

25. MONOTRABA. Calyx 4 or 5 or more deciduous bract-like scales. Corolla of 4 or 5 or more or bract-like scales, resembling the calyx of the plant. Stamens 6 or 8, the stamens kidney-shaped, opening opposite each other,风格 sheath: stigma depressed. Pod 4–6-valved, seeds immovable, minute, resembling dust in a web.
1. Gaylussacia, Huckleberry or American Whortleberry. (Named for the French chemist Gay-Lussac.) Flowers white tinged with reddish, in late spring; the edible fruit ripe late in summer, that of the first species largely gathered for the market.

G. rosticana, Common or Black H. Low or rocky ground, common except N.W., 10-20 high, slender, racemose when young, with rigid branches, oval leaves, short one-sided racemes in clusters, rather cylindrical corollas, and black fruit without a bloom.

G. frondosa, Back-Tangle or Dangleberry. Low grounds from New England S., with drooping slender branches, pale leaves white beneath, slender racemes and pedicels, short corollas, and sweet black-blue fruit with a bloom.

G. dumosa, Dwarf H. Nearly soil near the coast, rather hairy of branch, with drooping rather clasping leaves, long racemes, likeable oval leaves to the pedicels, half-elliptical corollas, and shaped black fruit.

2. Vaccinium, Cranberry, Blueberry, &c. (Ancient Latin name, of obscure meaning.) Berry edible. (Lesson, p. 104, fig. 316.)

§ 1. Bluetsberries, beyond New England commonly called Huckleberries; with leaves deciduous at least in the Northern States; flowers in spring in clusters from early buds separate, free and rather narrower than the latter; corolla white or short cylindrical, 5-tubed, reunited for 10 anthers, berries ripen in summer, sweet, blue or black with a bloom, each of the 3 many-seeded caps divided into two.

V. Pennsylvanicum, Dwarf Early Blueberry. Dry or barely moist grounds N. and E. 6-12 high, with green angular branches, mostly lance-oblong leaves finely-acuminate and smooth and clasping both sides, the sweet berries earliest to ripen.

V. Canadense, Canada B. Low grounds only N., is taller, 10-20 high, the broader entire leaves and branches droopy.

V. vacciniana, Low File B. Dry woods, less northern; 10-30 high, with yellowish branches, smooth and pale or glaucous leaves oblong or oval and oblique, and berries ripening later than the first.

V. tenellum, Southern B. Low grounds from Virginia S.; 1-2 high, with greenish branches rather pubescent, showy-oblong or oblanceolate leaves scabrid-serrulate and often pubescent, 1-1' long.

V. corymbosum, Common Swale B. N. & S. is wet or low grounds; 3-16 high, with oval or oblong leaves, either smooth or droopy, pale or green, and smooth berries ripening in late summer; in one downy leaved variety pure black without a bloom.

§ 2. Ever bearing Blueberries of the South, in late pine barrens, prominent at only 1-2'-high, with 5-tubed corollas and 10 anthers.

V. myrtillus, with stems 6-20 high; lanceolate or lance-obovate leaves ½-½ long and mostly pale beneath, and black or blue berries.

V. crassifolium, with prominent slender stems, thick and shining oval or oblong leaves ½ or less in length, their margins revolute, globular-bell-shaped corollas, and black berries.

§ 3. Fotherberry or Physocarpus; over shrubs with single racemes or unarmed flowers on slender pedicels, in early summer, oval-bell-shaped corollas, 10 anthers, white with very slender tubes and 2 bases on the back, and uplifted berries ripening late, each of their 5 caps divided into two, and maturating for 4 years.

V. arborescens, Fotherberry. Open woods from Virg. and R. L. S.; 10-12' high, evergreen for S., with oval glossy leaves, clusters included in the 5-tubed white corollas, and black many berries.

V. stamineum, Physocarpus or Squaw-Huckleberry. Dry woods, N. & S. 10-20 high, rather thorny, with thick and pale ovate or oval leaves; clusters much longer than the greenish or whitish 5-cleft corollas, and large greenish berries.
HEATH FAMILY.

4. Chamarberry; creeping or trailing very slender, nearly woody plants, with small evergreen leaves whorled beneath, white flowers in summer, berries on slender erect peduncles, pale russet corolla deeply parted into 4 narrow reflexed lobes, a number with very long tubes but no stamens on the back, and oval red berry scented, ripe in autumn.

V. Oxycedrus, Small C. Cold post-bogs N. & E.; a delicate little plant, flowering at the end of the stems, the ovate acute leaves (only ½ long) with strongly revolute margins, borne only half as large as in the next, often spotted with white, seldom gathered for market.

V. macrocarpon, Link or American C. Bogs from Virginia N.; with stems 1½ to 3½ long, growing so that the flowers become lateral, oblong obtuse leaves sometimes ½ long, and with less revolute margins, and berries ½ or more long; largely cultivated for the market.

3. CHIOGENES. (Greek-woolly name, alluding to the snow-white berries.)

C. hispidula, Creeping Snowberry. Cool post-bogs and low moist woods N.; with nearly herbaceous slender creeping stems, very small ovate pointed evergreen leaves, their lower surface and the branchlets bear with many bristles, minute axillary flowers in late spring, and white berries ripe in summer; these and the foliage have the flavor of Aromatic Wintergreen.

4. ERICA, HEATH. (Ancient Greek name.) All belong to the Old World. The Heath of the conservatories, blooming in winter, belong to various species from Cape of Good Hope. Of the European species one bears the winter well at the North, and is planted, viz.

E. camts, (in the form called E. remblets), of the Alps; a low underbrush, with linear blunt leaves whorled in fives, and rose or bright flushed-colored flowers, with narrow corolla rather longer than calyx, in early spring.

5. CALUNA, HEATHER, LING. (Name from Greek, to weep, brooms being made from its twigs in Europe.)

C. vulgaris, Common L. of Europe; seldom planted, very sparingly found wild in E. New England and Nova Scotia, &c.; in summer.

6. ARCTOSTAPHYLOS, BEARBERRY (the name in Greek).

A. Uva-Ursi, Common B.; trailing over rocks and bare hills N., forming mats, with thick smooth and entire oblong or obovate evergreen leaves, and small red and white flowers in a short raceme, early spring, followed by the red austere berries. Leaves used in medicine, aromatic and somewhat musky.

7. GAULTHERIA, AROMATIC WINTERGREEN, &c. (Named for Dr. Caultrust, or Caultrust at Quebec, over 100 years ago.)

G. procumbens, Creeping W., Bearberry, Checkberry, &c.; common in evergreens and low woods, spreading by long and slender mostly subterraneous runners, sending up stems 3½ to 5½ high, bearing at summit a few oblong or oval leaves and in summer one or two holding white flowers in the axils, the edible red "berries" lasting over winter: these and the foliage familiar for their spicy flavor, yielding the oil of wintergreen.

G. Shalilo, in the shade of evergreen woods of Oregon, &c., and sparingly planted, a shrub spreading over the ground, with glossy ovate slightly heart-shaped leaves about 3½ long, and flowers in racemes.

8. SPIGA. (Name in Greek means on the ground, from the growth.)

B. repens, Trailing Arbutus, Ground laurel, &c.; in New, long and Mayflower. Sandy or some rocky woods, chiefly E., under pines, &c.; p proc
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...with rusty-bristly shoots, somewhat heart-shaped leaves slender-pointed, and small clusters of rose-coloured or almost white spiny-fragrant flowers in early spring.

9. CASSANDRA, LEATHER-LEAF. (A mythological name.)

C. calyculata. Wet bogs N. and mostly E.; low much branched shrub, with small and nearly evergreen dull oblong leaves sprinkled with some fine scurf or scaly stumps, and small white flowers in the axils of the upper leaves forming one-sided leaf racemes, in early spring.

10. LEUCOTHOE. (Mythological name.) Flowers white, in naked scaly-bracted racemes or spikes, which are formed in summer and open the next year.

§ 1. Evergreen on moist banks of streams, with very smooth and along, finely and sharply serrate leaves; the rather cylindrical dense racemes made in their axils; buds large on the base of the short pedicels; flowers in spring, exuding the scent of Chatsworth-leaves.

L. Catesbeianus annuals from Virginia S. along and near the mountains, with long recurving branches, ovate-lanceolate and very upper-painted leaves on conspicuous pedicles, and narrow-opposed sepals.

L. axillaris, belongs to the low country S., flowers very early, has broader less pointed leaves on very short pedicels, and broader-opposed sepals.

§ 2. Deciduous-leaved, with unexpanded lower racemes at the ends of the branches, flowering in late spring or summer after the numerous leaves are developed; buds close to the nodes, acutish.

L. racemosa. Low grounds E. & S.; erect, 4-6 ft. high, with oblong scaly serulate leaves a little downy beneath, long and upright racemes, and 4-awned anthers.

11. ANDROMEDA. (Mythological name.) Flowers white, rarely tinged with rose, mostly in spring.

§ 1. Flowers in naked one-sided racemes crowded at the end of the branches, formed in summer and opening early the next spring; leaves evergreen.

A. floribunda. Along the Alleghanies N. and planted for ornament; 5-10 ft. high, very leafy, the lower-oblong acute leaves serulate with very fine bristly teeth, abundance of handsome flowers, the ovate-armshaped corolla strongly 5-angled; anthers 2-awned low on the back.

§ 2. Flowers in umbel-like clusters; leaves evergreen; stemma 2-awned.

A. polifolia. Cold wet bogs N.; 6-18 ft. high, smooth and glaucous; the inner-laceolate ovate-oblong leaves white beneath, flowers in a simple terminal umbel, the corolla almost globular.

A. nitida. Low pine-barrens from North Carolina S.; 2-4 ft. high, very smooth, with 3-angled lanceolates, ovate or oblong and entire glossy leaves; abundant honey-scented flowers in numerous auxiliary clusters, and ovate-cylindrical corolla.

§ 3. Flowers in umbel-like clusters on wood of the previous year, in late spring or early summer; leaves mostly deciduous, but often thickish or coriaceous; pistils 2-angled by a prominent rib or ridge at the base of opening.

**Flowers ** in a mass, nodding, smooth, rooting mostly on leafless shoots:

* A. taxiformis. Smooth ornamental shrub, 20-40 high.

* A. speciosa. Low bushes S., barely hardy N. in cultivation; with oval or oblong bluish and serrate leaves, often nearly-whitened; corolla open bell-shaped.

* A. Mariana, Brazen-arm (the foliage said to poison lambs and calves).

Low grounds E. & S.; with glossy oval or oblong entire rusty leaves, and leaf-like lanceolate sepals half the length of the almost cylindrical corolla.
20. PYROLA, WINTERGREEN, SKIN-LEAF. (Old name, diminutive of Pyrus, the Pear-tree, the application not obvious.) Flowers mostly greenish-white, in summer.

* Flowers nodding, the petals partly expanding, the hanging style more or less curved, tipped with a narrow stamen, and stamens accrescent.

P. rotundifolia. Drum or noddy wood; has thick and shining round leaves on short pedicles, many-flowered racemes, and bluish anthers: a variety in bogs has rose-purple flowers.

P. elliptica. Rich woods N.; has thinish and dull upright leaves on rather long and margined petioles; the greenish-white flowers nearly as in the preceding.

P. chlorantha. Open woods N.; smaller, the scape only 1' - 6' high, with a few greenish-white flowers, thick but dull roundish leaves only V long; and anthers short-armed.

* * Flowers all turned to one side, rather spreading, rather nodding, the petals connating, stamens and style straight, stigmas large and b-rounded.

P. secunda. Rich woods N. E.; slender, 3' - 6' high, with thin ovate leaves and dense spike-like racemes.

21. MONESE, ONE-FLOWERED WINTERGREEN. (Name, from the Greek, refers to the solitary flower.) Flowering in early summer.

M. uniflora. Cold woods N. E.; with roundish and serrate ovate leaves about 3' long, scape 2' - 4' high, and rather large white or rose-colored flower.

22. CHIMAPHILA, PIPSINSÉWA or PRINCES-PINE. (Name from the Greek, means Prince's pine.) Plants of very woods, branched at base, 3' - 10' high, with fragrant wax-like mostly flesh-colored flowers, in early summer.

C. umbellata, Common P. Leaves wedge-shaped, sharply serrate, not notched; flowers 4 - 7, with viscid-colored anthers.

C. maculata, Spotted P. Lower, 2' - 6' high, with ovate-lanceolate remotely toothed leaves blotched with white, and 1 - 5 flowers.

23. MONOTROPA, INDIAN PIPE. (Name from the Greek, refers to the flower or stain of the stem turned over to one side or hanging: in fruit it straightens.) FL. summer.

M. uniflora, Common INDIAN PIPE or CORN-FLATLY; in rich woods, smooth, waxy-white all over, 3' - 6' high, with one rather large nodding flower of 3 petals and 10 stamens.

M. Hypopitys, PUSHEEN or FAIRY HATKEN; in Oak and Pine woods; rather downy, tawny or reddish, fragrant, 4' - 12' high, with several smallish flowers in a spike raceme, having 4 petals and 8 stamens, or the uppermost 5 petals and 10 stamens.

65. AQUIFOLIACEAE, HOLLY FAMILY.

Trees or shrubs, with alternate simple leaves, small mostly pinnatifid or dissected axillary flowers, having divisions of the free calyx, petals (these almost or quite distinct), stamens (alternate with petals), and cells of the ovary of the same number (4 - 6 or even 9), and fruit berry-like, containing 4 - 6 single-seeded little stones. Solitary calyx hanging from the top of each cell. Solitary stamens 4 - 6, or united into one. Flowers white.

NYMPHÆA, CANADENSIS, sometimes called MOUNTAIN HOLY. shrub with slender petals and large dull red berries, in cold woods or bogs N., is the only representative besides the species of
1. **FLEXI, HOLLY.** (Ancient Latin name, which however belonged rather to an Oak than to Holly.) Fr. early summer; fruit autumn.

§ 1. **True Holly,** with thick and rigid evergreen leaves, red berries, and petals of the flowers in fours, carried none in June or August.

1. **Aquifolium, American Holly,** is occasionally planted, not quite hardy N. S.: tree with more graceful and spiny leaves, and brighter red berries than

1. **Spina, American H.** Low ground, from E. New England S.; tree 20°-40° high, smooth, with gray bark, and leaves waxy-margined and spiny-toothed.

1. **Dalbion, Steer's H.** Shrubs or small trees, of low pine-barrens from Eastern Virginia S., a little downy, with oblong or oblong-linear short-pointed leaves sparingly nerved above the middle, oft. var. **MULTIFOLIA,** with narrower leaves longer; 1° long and mostly smooth.

1. **Casino, Tomb H.** Shrubs on the sandy coast S., with oblong or lanceolate crested leaves only 1° long, and flowers in sessile clusters. Leaves used for TOPPINS.

§ 2. **Prinos, S., shrubs with deliberata mostly thin leaves, and red berries.

* Parts of the flower 4, 3, rarely 6: solitary axile on the back.

1. **decidua.** Wet grounds S. & W., with wedge-oblong or lanceolate obtusely serrate leaves downy on the margins beneath. Old group above, and with some calyx-lounces.

1. **ambigua.** Wet grounds S.; with the thin oval or oblong-pointed leaves smooth or somewhat and sharply serrate, and obtuse or acute calyx lobes.

1. **mollius.** Study grounds along the Alleghenies from Penn. S.; like the last, but soft-downy, and fertile petals very short.

* * * Parts of the flower 6 (or sometimes 5-9) in the fertile, 4-6 in the sterile flowers; petals of the lower smooth and oval.

1. **verticillata,** Common Winteruya or Black Holly. Common in low grounds; with obtuse or wedge-oblong serrate leaves 1°-2° long, ovate or pointed at both ends, the lower surface often downy. Very short-petalled flowers mostly clustered, and very bright, shining red berries ripening late in autumn. There is nothing shrived in the leaves or flowers, so that the name is rather misleading.

1. **hawthorn, native W.** Wet grounds along the coast of New England to Virginia; low shrub and improves naturally serrate leaves glossy above, long-petalled umbel flowers, and larger less bright berries ripening earlier.

§ 3. **Inermis:** shrubs with thick evergreen leaves glossy, often blackish dotted beneath, petals of the flower 6, or rarely 7-9, and with black stipitate berries, the calyx smooth and oval.

1. **glabra, Common Inkberry.** Along sandy coast from Mass. S., 20°-40° high; with wedge-shaped few-nervedcalyx, the apex. Flowers several on the sterile, solitary on the fertile peduncle.

1. **coriacea.** Wet soil from Carolina S.; 40°-80° high, with larger oblong-obovate or oval leaves entire or with scattered sharp teeth.

66. **EBENACEAE,** EBONY FAMILY.

Trees, with hard wood, no milky juice, alternate entire leaves, from 2 to 4 times as many stamens as there are petals in the corolla, several-celled ovary, with a single ovule hanging in each cell, and berry with large hard-coated seeds. Represented only by

1. **DIOSPYROS, Persimmon, Date-Plum.** (Ancient Greek name.) Flowers polygamous or function, the former with single in each set of leaves, the latter smaller and often discolored. Calyx and corolla each 4-6 lobed. Stamens about 80 in the corolla, imperfect ones in the fertile flowers.
in and on the tube of the and: airmeh tord joined: 'Bo' 7-811 inslo when very ripe, plum-like, globular, unopened at base by the persistent thin-13 calyx. F. white oval.

**D. Virginiana**, Downing P. Southern New England to Illinois and S. : tree 10-20' high, with very hard, thick, dark brown, very short peduncles; 4-5 parted calyx, pale yellow 4-wings, narrow; 4 styles, 2-lobed at tip, 3-lobed ovary, and plum-like fruit green and very aexy, but yellow, sweet, and edible after frost.

67. **SAPOTACEAE**, **SAPPDILLA FAMILY**.

Mainly tropical trees or shrubs, with hard wood, and in other respects also resembling the last family, but mostly with milky juice, perfect flowers, anthers turned outward, erect ovules, and bony-coated seeds. Represented S. by a few species of

1. **DUMELIA**. (Abstract name of 2 kind of Ash, transmitted to this genus.) Flowers small, white or yellow, in clusters in the axils of the leaves. Calyx 4-parted. Corolla white, and with a pair of internal appendages between the lobes. 2 good samara borne there, and as many petal-like united leaves of fruits alternating. Sepals 4 -5 parted, hairy, style 1, bearded. Fruit cherry-like, containing a single large hard-seeded seed. Small trees or shrubs, with branches often spiny, and it abundant, but thin leaves entire. E. summer:

2. **B. Virginiana**, from Virginia to Illinois and S. ; has leaves early-baby or woolly beneath, and short white anthers.

68. **STYRACACEAE**, **STORAX FAMILY**.

Shrubs or trees, with alternate simple leaves, perfect flowers with 4 - 8 petals more or less united at the base, and bearing twigs as many or indefinitely numerous partly monadelphous or polyadelphous stamens, only one style, and a 1 - 3-celled 1 - 5-seeded fruit. Ovules as many as 2 in each cell. Calyx in ours coherent more or less with the 2 - 4-celled ovary.

1. **STYRAX**. Flowers from the axils of the leaves, white, cherry, or drooping peduncles. Calyx 5-celled, 5-toothed, its base colored gray with the base of the stamens many-seeded ovary. Corolla open bell-shaped, nearly bell-shaped, rather dense outside. Stamens as many as the lobes of the calyx, with the filaments monadelphous or monadelphous, and linear anthers. Fruit dry, Lenticular, with only the pedicel hard-coated at its base.

2. **HOSTELLER**. Flowers in clusters on hanging peduncles from the axils of the deciduous leaves of the preceding year, white, white. Calyx 8-10 parted, the tube wholly coherent with the 8 -10-celled ovary. Stamens 5-10-celled, united into a bell-shaped corolla. Stamens 4-10-celled, monadelphous at the base, stamens coherent. Ovules 4 in each cell. Fruit large and dry, 2-3-celled, within bony or woody and 1-celled, a single seed filling each shorter cell.

3. **SYMPLECTOS**. Flowers yellow, in the axils of the deciduous leaves, not drooping. Calyx boat-shaped, unopened with the lower part of the bell-shaped ovary. Stamens as many as the calyx, one -celled, attached in the base of each pedicel filaments unite, filaments very short. Fruit 1-celled, F. woody, small and dry.
1. *STYRAX*, STYRAX. (The ancient Greek name.) Leaves, 6c, with some scarlet or yellow down. Shrub, in low pine woods or barren, from Virginia S. to late spring.

2. *PORTIA*, SUGAR. (Named for Ptolemy I, king of Assyria.) Leaves, 6c, with some scarlet or yellow down, and flowers tiny, white, in spring; and berries, small, black.

3. *SYMPLOCO*, SYMPLOCO. (A tree,) Leaves, 6c, with some scarlet or yellow down, and flowers white, in spring; and berries, small, black.

4. *HUESIA*, HUESIA. (Named for Heues, a king of Assyria.) Leaves, 6c, with some scarlet or yellow down, and flowers white, in spring; and berries, small, black.

5. *PLANTAGO*, PLANTAIN. (The old Latin name.) Flowers, 6c, with some scarlet or yellow down, and berries, small, black.
70. PLUMBAGINACEAE, LEADWORT FAMILY.

Known by the flowers with parts five throughout, viz. 5-lobed plaited calyx, 5 stamens opposite as many petals or lobes of the corolla and almost separate from them, 5 styles or 5 stigmas, and the free ovary 1-celled, containing a single ovule hanging on a slender stalk which rises from its base; the fruit a small capsule.

§ 1. Low hardy herbs, with leaves all from the root, and flowers on scapes, having a fringed and serrated edge, nervous or quite separate petals tapering at base, and 5-celled or quite separate styles.

1. ARMERIA. Tufted plants with creeping very narrow and entire leaves, simple scape bearing a head of rose-colored flowers, and style plumose-hairy towards the base.

2. STATICE. Branch-leafed herbs, with scapes branching into a panicle, bearing 8-bracted flowers or cistula; styles smooth.

§ 2. Plants of warm regions, with branching nearly naked stems bearing alternate entire leaves, and corymb or booms of terminal flowers, bearing a tubular calyx and corolla, one style bearing 5 stigmas.

3. PLUMBAGO. Calyx 8-lobed at the apex, glandular along the 6 ribs or angles. Corolla silver-form, with long tube.

1. ARMERIA, THRIFT. (Old Celtic name latinized.) Fl. summer. 2/3

A. vulgaris (also called A. maritima), COMMON THRIFT, wild on shores of Europe, &c., used in gardens for edgings, &c., with short spreading leaves and scape 3'-6' high.

2. STATICE. (Ancient Greek, meaning astringent, the roots used in popular medicine.) A little scented, in gardens, but not common. 2/3

S. Limonium, SEA-LAYF, or MARSH-ROSEMARY. Along the coast in salt-marshes, with oblong or oblanceolate thick and pale leaves on slender pedicels, scapes 1'-2' high, bearing lavender-colored flowers all summer.

3. PLUMBAGO, LEADWORT (which the Latin name denotes). The following are cult. in meadow-arts, or turned out to flower all summer.

P. Capensis, CAPE L., with somewhat climbing angled stems, oblong spatulate leaves, and large pale or lead-blue corolla, the tube 1'/2 long.

P. cocinea, RED-FLOWERING L., of the East Indies, in more binder, with deep red flowers.

P. Zeylanica, WHITE-FLOWERING L., of the East Indies, with smaller white flowers.

71. PRIMULACEAE, PRIMROSE FAMILY.

Herbs with regular perfect flowers, the stamens borne on the corolla, and as many as its divisions and opposite them, one style and stigma, and many or sometimes few ovules on a free central placenta of the one-celled ovary, in fruit a pod.

§ 1. With leaves all from the root and simple, the flowers on a scape, a From a thesis-stalked stem or roset. 2/3

1. PRIMULA. Calyx 4-lobed or 4-ted, often angled. Corolla silver-shaped or dumb-shaped with 5 spreading lobes; the stamens included in its tube.

P. spinulosa, CORKHEART, or hairless, with short papery leafy stems and very much smaller flowers than the others.

P. DODECATHEON. Calyx 4-parted, reflexed. Corolla 4-parted, the divisions lanceolate, mostly reflexed. Stamens consisting in a long slender cone, the linear anthere very much longer than the short partly monadelphous stamens. Pod splitting into 4 valves. Flowers in an umbel.
2. **DODECATHEON.** (Fanciful name, from Greek for ten gods.)  

D. Meadia, called Smooth-flowered at the West, or sometimes American Cowslip, on rich open woods from Penn. (and especially W.) and curls for ornament; smooth, with a cluster of oblong or spatulate leaves around the base.
3. CYCLAMEN. (Classical name for the wild plant of Europe called Sowbread.) Cult. in this country as house-plants for winter-flowering. Prostrate rose-colored, pink, or white, mounding on the apex of the stalk, the reflexed lobes turned upwards.

C. Europaeum, Common C. Corn 1'-2' in diameter, setting up heart-shaped thick sometimes angled leaves, often marked with white above and crimson-purple or 'red' beneath, on slender peduncles, and flowers with open throat and oral or oblong divisions, the flower-stalks coiled up after flowering so as to bring the pod to the ground to ripen.

C. Persicum, Persian C., is more tender, with longer and lanceolate divisions and less open throat to the corolla, the flower-stalks not coiling after blooming.

4. TRIDENTALIS, CHICKWEED-WINTERGREEN. (From Latin for the third part of a foot, the usual height of the European species.) In open low woods, especially N., a pretty plant, the stem bearing a few scales below, and at top a wheel of long-lanceolate leaves spirering to both ends, also 2 or 3 slender-stalked delicate flowers with taper-pointed petals, in spring.

5. LYSIMACHIA, LOOSESTRIFE (which the name means in Greek). Fl. summer.

§ 1. Wild species of the country, in low or wet grounds: corolla yellow.

L. thyrsiflora. Wet swamps N.: smooth, with simple stem leaves at base, above with lanceolate sessile leaves, in the axils of one or two of them a short-peduncled oblong spike or cluster of small flowers, having slender filaments and lance-linear mostly separate purplish-dotted petals, and as many little teeth between them.

L. stricta. Common N. & S.: smooth, very leafy, branching, with mostly opposite lanceolate-ovate dark-colored leaves tapering to each end, flowers on slender pedicels in a terminal long raceme leafy at base, unequal filaments monadelphous, and lance-oblanceolate lobes of corolla black-striped.

L. quadrifolia. Sandy moist ground: rather hairy, with ovate-lanceolate sessile leaves 4 (or 3-6) in a whorl, slender pedicels in the axil of the upper one, and ovate-oblong lobes of corolla dark-striped.

L. ciliosa. Low thickets; with erect stems 2'-3' high, opposite dentate leaves lanceolate with rounded or heart-shaped ciliate base and on fringed pedicels, flowers nodding on slender pedicels from the upper ½ of light yellow corolla not streaked nor dotted, the lobes round-ovate and wavy-margined or denticate, little longer than the sepals.

L. radicans, from Virginia S. W., resembles the foregoing, but stems or branches reclined and rooting, and leaves and flowers smaller by half.

L. lanceolata, common W. & S., is similar, but with oblong or linear leaves mostly narrowed into short and margined pedicels.

L. longifolia, from Western New York W., has similar but deeper yellow flowers, and sessile linear linear linear-linear leaves of thicker texture.

§ 2. European species in cultivated grounds, &c.

L. vulgaris, Common L. of Europe: a rather stout downy plant, 2'-3' high, with oblong or lanceolate leaves 2 or 3 in a whorl, flowers in panicles, and monadelphous filaments.

L. nummularia, Moneywort: trailing and creeping in damp garden-grounds, or running wild sometimes: smooth, with opposite small rivet leaves, and solitary flowers in their axils on short pedicels. (Linnaeus, p. 37, fig. 100.)
6. Anagallis, Pimpernel. (Old Greek name, meaning delightful.)

Lep herbs of the Old World, flowering all season.

A. arvensis, Common P. or Pooh Man’s Weather-glass, the small red, purple, or white flowers nod to close at the approach of rain; in gardens and serving will be scarce litter; spreading on the ground, with pale rose leaves shorter than the petals, and dilated prts tinged with minute glaucous teeth.

A. carthlic. Blue P. of the gardens, a stiffer mostly larger form of the preceding, with larger blue flowers.

7. Samolus, Water-pimpernel, Brooke-weeds. (Old name, of unknown meaning.) F1 late summer.

S. palustris, AmERICAN. H. along efs and wet places; spreading, 6-10 ft. high, with alternate leaves, and very small flowers on slender pedicels, which bear a bractlet at the middle, but no bract at base.

8. Buttonia, Water violet or Featherfoil. (Named for Prof. Button of Holland.) F1, summer.

B. incisus. A stately plant in pools and ditches, stolon, with stems and branches which infxnfl at the joint, bearing finely toothed pinnate leaves; flowers white.

72. Lentibularaceae, Bladderwort Family.

Aquatic or marsh herbs, with the ovary and pod as in Primrose Family, but with irregular bilabiate flowers bearing a spur or sac underneath, and only 2 staminodes.—represented by the two following genera.

1. Utricularia, Bladderwort. (Utriculus, a little bladder.) F1 all summer. The following are the commonest species.

a. Floating, branching, bladder-bearing; corolla white-purple.

U. purpurea. Only E. & S., with 2-4 flowers on the peduncle, and a rather short spur opposed to the blunted lower lip of corolla.

b. Floating, branching, bladder-bearing; corolla violet-purple.

U. inflata. Only E. & S.: swimming free, the petals of the wheel of leaves around base of the 3-12-flowered scape intubed into oblong bladders, besides little bladders on the thread-like divisions of the leaves.

U. vulgaris, Lanceol. B. Common in still or slow water; the stems 1-20 long and very blade-bearing on the thread-like many-paired leaves; flowers 6-12 in raceme, large, with spur rather shorter than lower lip.

U. intermedia. Chiefly N. in shallow water, with stems 3-6 long, bearing rather rigid leaves with linear-oblong shaped divisions, and no bladders, those being on separate slender branches, the slender racemose flowered; spur nearly equalling the very broad lower lip.

U. gibba. Chiefly Middle States; small, with short branches bearing species thread-like leaves and some bladders, 1-3-flowered panicles only 3-6 high, and bent-closing spur shorter than lower lip.
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U. biflora, from N. Jersey. In wet sand. Very slender, 3'-5' high, with 8 or more very small, slender pedicelled flowers.

U. corollata, in老乡, with 2-4 large flowers crowded together on short pedicels, or 8 with 4-8 more scattered and smaller flowers.

2. PINGUICULA, BUTTERWORT. (Name from Latin, pinguis, fat.

Both names come from the fatty or greasy-looking leaves, which in our species are more or less glossy-pubescent.)

- Corolla violet-purple; the upper lip bilabiate, lower II-shaped.

P. vulgaris, is more on wet rocks near our northern borders; scape 2'-3' high, bearing 2-4 large flowers on long pedicels, with bluish-purple spots; S. summer.

P. pumila, in woods, from Georgia N. & W. has rather large flower on scape 2'-3' high, with bluish-purple spots; S. spring.

P. clausa, bears, of ponds from N. Carolina N. has scape near 1' high, and large corolla (1' wide) with bluish spots; S. summer.

- Corolla yellow, more bilabiate, less distinctly 2-lobed, the 3 lips often cleft.

P. lutea, with whole plant yellowish, with nodding flower (1' or more wide) on scape 1'-3' high, in spring.

73. BIGNONIACEAE, BIGNONIA FAMILY.

Woody plants, or a few herbs, with more or less bilabiate flowers, diandrous or didynamous stamens (often with rudiments of the wanting ones), 2-lipped stigma, free variously 1-4-celled ovary, and fruit, usually a pod, containing many large mostly flat and winged seeds, filled with the large embryo: no albumen.

I. BIGNONIA FAMILY: almost all woody plants, with opposite leaves, 1-2-celled pods and flat winged seeds. (Lessons, p. 135, fig. 16.)

4. Glabrescent, with compound leaves and 4-fertile stamens in two pairs.

- Barely mostly or herbaceous: ovary and pod one-celled with 2 parietal placentae.


- Woody-stemmed: ovary and pod 3-celled, but the placentae parallel: valvets of pod fusing near the partition; seeds with a broad thin wing.


3. TEMOANA. Calyx 5-lobed. Corolla funnel-shaped, tubular, or bell-shaped, 5-lobed. Pod flattened or flattened connate to the partition, the edge of which separate from the middle of the valves. Leaves in ours odd-plumose.

The hardy species climb by roots.

§ 3. Trees, with simple leaves and 3 or rarely 4 fertile stamens.

4. CUVIERIA. Calyx deeply divided. Corolla tubular, tubular, the 5-lobed border more or less fringed and wavy. Pod very long and slender, hanging: the partition connate to the valves. Narrow wings of the seed lanceolate-fringed. (For corolla and stamens, see Lessons, p. 30, fig. 196.)
II. SESAMUM FAMILY, &c.; herbs, with simple leaves, some of the upper ones alternate, and 4-celled ovary and fruit (but the stigmas of only 2 lips or lobes), containing flat but thick-coated wingless seeds.

5. SESAMUM. Cylind. 5-sept., short. Corolla tubular bell-shaped, 5-lobed; the 2 lobes of the upper lip shorter than the others. Sesamum 4. Basic an eeling thinly 4-seeded pod, 5-valved. Flowers solitary to the axis of the plant.

6. MARTYNIA. Cylindrical, 1-seeded, cleft down one side. Flowers large, in terminal or axillary racemes.

1. ECCREMOCARPUS. (Name, from the Greek, means hanging fruit.)

E. robustus, or Calyptropis Scaber, from Chili, cult. in gardens and conservatories; tender, climbs by branched tendrils at the end of the true pinnate leaves; leaves roughish or smoothish, thin, ovate or heart-shaped; flowers in loose drooping racemes; corolla bifid-chiselled shaped and gibbous, orange-red, about 1" long.

2. BIGNONIA. (Named for the French Abbé Bignon.) Our only true native BIGNONIA is

B. capreolata. Climbing trees from S. Virg. to Ill. and S.; smooth, leaves evergreen at the south, with a short petiole and often what seems like a pair of stipules in the axil, a single pair of lance-oblong, leathery heart-shaped at base, and a branched tendril between them: flowers several in the axils, the corolla 3 long, orange-red outside, yellow within, in spring.

3. TECOMA, TRUMPET-FLOWER. (Mexican name abridged.) Formerly under BIGNONIA, which name the species still bear in cultivation.

T. radicans, Wild T. or Trumpet-Tree. Wild from Pens and Ill. N., planted farther N.; climbing freely by roots; leaves of 5-11 ovate or lance-oblong taper-pointed and toothed leaves; flowers embroidered; orange-yellow and scarlet corolla funnel-shaped.

T. grandiflora, GREAT-FLOWERED T. Cult. from Japan and China, not quite hardy N., climbing freely, with narrower leaves, and 3-cleft only rarely equaling, the size of the corolla, which is bell-shaped, 3' long and broad, much wider than in the foregoing.

T. Capensis, Cape T. of conservatories, has smaller and rounder leaves, naked-pelleted cluster of flowers, long-cylindrical and curving orange-colored corolla 3' long, and masses proclued.

T. jasminoides. A fine greenhouse species, from Australia, twining, very smooth, with lance-ovate entire bright green leaves, and white corolla pink-purple in & throat.

4. CATALPA, or INDIAN BEAN. (Aboriginal name; the popular name alludes to the shape of the pods.)

C. bignonioides, COMMON CATALPA. Tree wild S. W., and widely planted; with large heart-shaped pointed leaves downy beneath, open pinnate (in summer) of white flowers (1' long) variegated and dotted within with some yellow and purple, and pods 1' long.

C. Kempferii, of Japan, beginning to be planted, has smooth leaves, many of them 5-toothed or angled, and flowers one half smaller.

5. SESAMUM, SESAME. (The Greek name, from the Arabic.)
6. **MARTYNIA. UNICORN-PLANT.** (Named by Linnaeus for Prof. Martyn.) Creeping, prostrate and heavy-stemmed weak herbs, with long-petalled round and oblong, heart-shaped, wavy-margined leaves, and large flowers, in autumn. 

M. **proboscidiana**, Cowman U. Wild. S. W., and cult. in gardens; stems, with short, curling leaves, large corolla which has some purple and yellow spots, and long-beaked fruit.

M. **fragrans**, Nutt. U. Cult. from Mexico; has coarse and curly leaves, with somewhat bladed or subterete Ireashed leaves, and short, yellowish, wavy-margined flowers.

74. **GESNERIACEÆ, GESNERIA FAMILY.**

Tropical plants, with 2-lipped or somewhat irregular corollas, didymous stamens, a one-celled ovary with two parietal many-seeded placentas;—therefore botanically like the next family; but with green herbage, and not parasitic; and the common cultivated species have the tube of the calyx coherent at least with the base of the ovary. Many, and some very showy, plants of this order are in choice conservatories; the commonest are the following.

**Gloxinia speciosa.** An almost stemless herb, with ovate and crenate toothed leaves and 1-flowered waxy-like panicles; the detached corolla 2 long, ventricose, between bell-shaped and trumpet-form, gibbous, with a short and spreading somewhat unequal 5-lobed border, violet with a deeper-colored throat, in one variety white.

**Gesneria zebra.** Stems tall, leafy; leaves pedate, entire, velutine, papillose-nerved; a terminal raceme of showy flowers nothing on erect pedicels; corolla tubular-ventricose, with a small bladed and somewhat 2-lipped border, glaucous, scarlet, with the under side and inside yellow and dark-spotted. — There are several other species.

**Achimenes longiflora.** Stems leafy; flowers in the axils of oblong or ovate hairy leaves, which they exceed; tube of the oblong to bell-shaped corolla over an inch long, narrow, the very flat 4-lobed limb; 2 or more broad, violet-tinted lobes;—also a white variety. Propagated by alyce holdfasts from the root.

75. **OROBANCHACEÆ, BROOM-RAPE FAMILY.**

Low, root-parasitic perennials, destitute of green herbage, and with yellowish or brownish scales in place of leaves, the monopetalous corolla more or less 2-lipped or irregular, 4 didymous stamens, and one-celled ovary and pod with the 2 or 4 parietal placentas covered with innumerable small seeds. Ours occur in woods, and mostly parasitic on the roots of trees.

1. **LATHIAGUS.** Stems slender and loosely-branched, with small and scattered scales and few sets of flowers, scattered in loose spikes or racemes, with minute bracts. Uppers flowers concolorous, but seldom ripening fruit, with tubular 4-toothed corolla and long filaments and style; lower flowers small and short, without opening, but fertilized in the bud.

2. **OONOPHILUS.** Stems thick, covered with fleshy overlapping scales, each of the upper ones with a flower or in its cell, forming a spike. Uppers 4-4-flowered, and split down on the lower side. Corolla short, strongly 4-toothed; upper lip united and nodose; lower one spreading and 5-crested. Stamens pro-traditional.

8. **Afrotrichion.** Stems are chiefly slender, followed upward from a suckering, mostly subteretum base. Calyx 2-flowered. Corolla long-curved tubular, and spreading slightly 2-lipped or irregularly 2-lipped border. Basal leaves all nearly alike. Stamens included in the tube.
1. EPIPHYSIS, BEECH-BRANCHES, CANCER-ROOT. (Name in Greek means on the Branch, the plant chiefly found parasitic on the roots of that tree.) One species.

E. Virginiana. Stem, about 1½ high, with purplish flowers ½ or more long, in late summer and autumn.

2. CONOPHOLUS, SQUEAK-ROOT, CANCER-ROOT. (The name is Greek for squaking, the root having the aspect of a slender bil-cone when old.) One species.

C. Amplexicaulis. Not widely common. In oak woods, forming clusters among fallen trunks, ½-2½ high, as thick as the thistle, yellowish-brown, and furry.

3. APERYLLON, NAKED BROOM-RAPES or ONE-FLOWERED CANCER-ROOT. (Name in Greek signifies an empty flower.) One species.

A. unicocular. Open woods or thickets, slightly clavate-preterite, with 1-3 branches (½-⅚ high) from a stipitate-pauciflorous, scale-based, leafless-oval-shaped calyx-lobes half the length of the sides, purplish, concave.

A. hicculculatum, the other species, occurs only from Northern Michigan W; has scales from a scaly base rising out of the ground, and short triangular calyx-lobes.

76. SCROPHULARIACEAE, FIGWORT FAMILY.

Known on the whole by the 2-lipped or at least more or less irregular monopetalous corolla, 2 or 4 didynamous stamens, single style, entire or 2-lobed stigma, and 2-celled ovary and pod containing several or many seeds on the placenta in the axis; these with a small embryo in copious albumen. But some are few-seeded, a few have the corolla almost regular, and one or two have 5 stamens, either complete or incomplete. A large family, chiefly herbs, some shrubby, and one species is a small tree.

§ 1. Intermediate between this family and the Nighthead Family: the flowers terminal or lateral, more rarely from the nodes of the branch or its axis; the corolla hardly if at all nodding 2-lipped, sometimes almost regular, the lobes plumose in the bud: stigma exserted, often 2-lipped. All garden escapes.

• With 4 stamens only, included within the narrow throat of the upper-shaped corolla: leaves alternate and entire.

1. BRUENFELIA. Shrubs, with glowy oblong leaves. Corolla with 4 rounded and about equal lobes, two of them, however, a little more united. Authors all alike. Fruit shiny.

2. BROWALLIA. Herbs, mostly a little pubescent and glumous. Corolla with somewhat acuminate 4-lobed border, the lobes with a broad notch. Two of the authors shorter and only 1-celled. Fruit a dry pod.

• With 4 calyx-tearing stamens and 6 staminal filament: corolla with side tooth.

3. SALSIGLOSSIS. Herbs, with cut-toothed or pinnately cut alternate leaves. Corolla honoured, with very open throat, a little oblique or irregular, the lobes all with a deep notch at the end. Pod oblong.

• Corolla labellate and the pistil in the bud: the smaller by 2-petalled; the larger bilobed, and the lobes again 2-cleft deeply notched. Flowers terminal, panicled.

2. Schizastachys. Calyx 5-petalled, the divisions purple. Corolla with the divisions smaller than the divisions, which appear as if cut off, the middle lobe of the corolla flushed, either with veined blue, or with a white line on the back. Stamens with persistent filaments, 3 or 4 others small and abortive. Stigma minute. Leaves alternate, pilose, or panoseous.
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§ 2. Corolla with lobe dilatated and not pointed at the end, either 3-lobed or more or less triangular, the divisions or laves at base. Peduncle from the side of leaves or bracts, no flower ever really terminating the main axis or branch.

* Free, with large and opposite Gladiolus-like bases.

5. PAULOWNIA. Calyx very downy, deeply 5-lobed. Corolla terminated with a cylindrical or funnel-form tube, and an elongated oblong or obovate lobe of 5 rounded lobes. Stamens 2, included. Pod turbid, thick, filled with very numerous winged seeds.

6. VERBASCUM. Flowers in a long terminal raceme or spike. Calyx 6-parted. Corolla with 6 broad and rounded only slightly unequal lobes. All the filaments of 2 of them woolly. Style expanding at base and apex. Pod globose, many-seeded. Leaves alternate.

7. CELSIA. Like Verbaunci, but with only 4 stamens, those of 2 sorts.

8. LONICERA. Calyx 4-parted. Corolla very unequal, turned upside down by the twisting of the pedicel, so that the much larger lower lobe appears to be the upper and the two short upper laves the lower. Stamens 4. Pod many-seeded. Lower leaves opposite or in threes.

9. VERONICA. Calyx 4-parted, nearly 2-lobed. Corolla wheel-shaped, or sometimes salver-shaped, with 4 or rarely 6 unequal lobes, one or two of them usually rather smaller. Stamens 2, with long slender filaments. Pod flat or flattened, 2-many-seeded. At least the lower leaves opposite or sometimes wheeled.

10. CHRYSANTHEMUM. With almost regular 4-lobed border: flowers in a terminal spike. Here one species of No. 2 could be sought.


12. CAMPANULA. Calyx 5-lobed, 2-3-1ipped, or 3-1ipped, tubular, or bell-shaped. Corolla 5-1ipped nearly to the base, the 2 lips monocarped, or the outer larger one 1ipped-shaped: stamens only 2, or very rarely 4, and no nectaries of more.

13. CALICOARIA. Calyx 3-1ipped. The two 1ipped-shaped or 3-1ipped-shaped divisions of the corolla entire or nearly so. Pod many-seeded. Leaves chief opposite, and flowers in very broad clusters.

14. CORNUS. Calyx 6-1ipped, the middle lobe of the lower lip folded backward to form a flat pouch which encloses the 4 stamens and the style.

15. COLLINSIA. Calyx deeply 5-1ipped. Corolla turned down; its short tube laterally flattened, strongly bulging on the upper side; up, by Beech and turned back; the lower one larger and 3-1ipped, its middle and laterally flattened, pocket-shaped, lobe covered above by the two lateral ones. At a little distance from the 5th stamens present. Pod globular, with few or several seeds. Flowers on pedicels single or mostly clustered in the axils of the upper opposite (very slender) leaves, which are gradually reduced to bracts, forming no internodal intervein.

16. CORYDALIS. Calyx not 3-1ipped nor salver-shaped, but with a tube of some length in proportion to the 3-1ipped or more or less triangular (nearly regular) 4-1ipped border, and

* With a pair or pairs-like projection at the base of the lower side, and a projecting pocket in the upper lip, which commonly clasps the throat or nearly so: stamens 4, and no obvious nectaries.

17. LINARIUM. Calyx 3-lobed. Corolla persistent, and with a spur at base. (Lessons, p. 292, fig. 210.) Pod many-seeded, opening by a hole or chink which occurs below the summit of each cell.

18. ANTHEMIS. Calyx 2-4-5-lobed. Corolla persistent, and with a spur at base. (Lessons, p. 292, fig. 210.) Pod many-seeded, opening by a hole or chink which occurs below the summit of each cell.

19. ACHILLEA. Calyx 5-lobed, but no spur or salver-like projection at the base of the lower side, and no projecting pocket in the upper lip, which commonly clasps the throat or nearly so: stamens 4, and no obvious nectaries.
18. **GERARIA.** Herbs with billowing spires, and a short spreading or reflexed lateral stem outgrowth in the bud. Pod 3-valved, many-seeded.

19. **SEYMIEJA.** Herbs, like 17; but corolla with a short and broad bell-shaped tube, not longer than the ovary or enclosing nearly equal spreading lobes; and the stamens almost equal, their anthers bent at base.

20. **MIMULUS.** Herbs, with opposite leaves, and single flowers in the axils of the upper ones. Calyx pinnate, with 5 projecting angles, 3-toothed. Corolla tubular or funnelform, 2-lipped, the upper lip of 2 rounded and recurved lobes, the lower of 3 rounded spreading lobes. Stems included. Sigma of 2 flat lips. Pod 2-valved, many-seeded.

21. **TOREnia.** Trailing herbs, with opposite leaves and auxiliary flowers. Calyx pinnate, with sharp angles. Filamented at summit, the lips 3-toothed and 3-lobed. Corolla short-tubed or tubular with inflated throat, 4-lipped, the upper lip sometimes slightly notched outgrowth in the bud. Filaments united and their anthers brought together in pairs under the upper one; the longer pair almost equaling the upper kali and bearing a short tubular branch or appendage at base; the shorter pair simple and included. Sigma included. Pod many-seeded.

22. **Strobus with good anthers only 2.** A pair of verticils near or adjacent filaments generally parallel ones; flowers small; calyx tubular; corolla 2-lipped; lower lip opposite, with simple flowers in the axils of the upper ones: pedicels simple or bracteolate.

23. **ILYANTHES.** Spreading little herbs. Upper lip of the short corolla erect and 3-toothed; the lower longer, spreading, 3-lobed. Upper pair of stamens with good anthers, included in the tube of the corolla; lower pair borne in the throat, and protruded, 3-toothed, without anthers. Sigma included. Pod many-seeded.

24. **GRATIIOL.** Low herbs. Upper lip of the corolla either entire or 2-toothed; lower 3-lobed. Stems included (the upper pair with good anthers; the lower pair with rudiment of anthers or a more naked filament, or none at all. Sigma included. Pods many-seeded. A pair of bracts at the base of the calyx.

25. **Stamens with anthers 6.** The fifth stamen present in a hermaphrodite or a male: corolla 4- or 5-parted, or 6-lobed, filaments simple; leaves chiefly opposite; flowers in the axils of the upper leaves, or near them. Sigma included. Pod many-seeded; or the one-flowered bearing a pair of bracteoles, from the axils of which flowers may spring; pod many-seeded.

26. **SCHROPHULARIA.** Homely and rank erect herbs. Corolla small, with a globular or oval tube, and a short barbate composed of a short erect stile and one (the lower) spreading or reflexed. Fertile stamens short and included; the rudiment which occurs in the fifth is a little spike at the summit of the tube of the corolla.
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FIGWORT-FAMILY.

24. CHELONE. Low upright smooth herbs, with flowers in spikes or clusters in the axils of the upper leaves, and accompanied by closely interwoven coarse roundish leaves and bracts. Corolla short-tubular and inflated, columnum inserted, with 2 broad lips; the upper lip, keeled in the middle, marginated at the apex; the lower lip, oblong, bearded in the throat and dilated at the end. Filaments and anthers woolly; corolla filaments shorter than the others. Seeds winged.

25. PENTSTEMON. Herbs (or a few shrub-like at base), with mostly upright stems branching only from the base, and painted or almost rounded flowers. Corolla tubular, bisected, variously-form, more or less 2-lipped, emarginated. Seedle disk-like, prominently shown as long as the other-bearing one. Seeds wingless.

26. BRUNFELSLA. Rather shrub-like spreading plants, or with pendulous angular branches; flowers loosely pointed or recurved. Corolla tubular with 5 short spreading lobes, the 2 upper a little more united. Nectar flanked small and interspersed near the base of the corolla. Seeds wingless.

27. CASTELLA. Herbs with simple stems, alternate leaves, some of the upper, with flowers, chiefly scoloid in their axils, reduced like petals, and more 2-leaf than the corolla. Tribe tubular, flattened bilaterally, 2-lobed. Corolla tubular with a long and narrow, conic-plicate; or crested up, and a very short 2-fluted lower lip. Cells of the position unequal. Pod many-seeded.

28. PERNICULARES. Herbs with simple stems, nearly pinnate leaves and spiky flowers. Corolla tubular with a strongly arched or flattened bilaterally shaped upper lip, and the lower segment at base, fringed short and 3-lobed. Seeds armed in each cell.

29. MILAMUIM. Low herbs with branching stems, opposite leaves, and flowers in their axils, or the upper rounded in a bracteate spike. Tribe bilaterally, 2-lobed, the lower nearly-pointed. Corolla tubular, reduced above, with the lower lip nearly expanding the upper one and its filaments united so as to make the author's tubularly pointed at base. Pod common, with only 2 seeds in each cell.

1. BRUNFELSIA. (Named for the old heliopolitan, Otto Brunnfels, a Conventorium master, friend of Linnaeus.) Conventorium master, Otto Brunnfels, 1636, and editor of the name of Palatinus; with chalybeate flowers, blue or violet turning purple.

2. LATIFOLIA. A very shrub-like, with oval or oblong leaves, and flowers at the end of the branches 15' across.

3. HOPEANA. With foot-length leaves 2' long, and flower only 1 wide.

2. BROWALLIA. (Named for Dr. Browall, of Sweden, first a friend, later a bitter opponent of Linnaeus.)

2. DOROTHY (Synonym of B. excisa.) When the plant and the name was named for the nephew, from S. America; cult. in the gardens, 1' to 2' high, beauty-branched, with scarlet leaves and handsome bright scarlet-blue flowers (1' or less across, as length as in Bermuda) produced all summer.

3. SALPIGLOOSIS. (Greek for trumpet-flower, from the current apex of the style with dilated stigma likened to the end of a trumpet.)

4. SCHIZANTHUS. (Greek for cut flower, the corolla long as if cut into strips.) Cult. for ornament, from Chili; 6. summer.

8. PINNATUM, the common species, of several varieties; slender, 1 to 2' high, pale green, with foot-length leaves and handsome bright scarlet-blue flowers (1' or less across), as length as in Bermuda) produced all summer.
5. PAULOWNIA. (Named for a Russian Princess.) Only one species.
F. imperialis, of Japan, cult. for ornament, scarcely hardy; for N.: the heart-shaped very ample leaves resembling those of Catalpa but much more downy, flowers in large terminal panicles, in spring, the violet corolla 1½-2½ long.

6. VERBASCUM, MULLEIN (Ancient Latin name.) Natives of the Old World, hardy biennials, often hybridizing: fl. summer. 2 filaments.
V. Thapsus, Couch M. Fields: densely woolly, the tall simple stem winged from the bases of the oblong leaves, bearing a long dense spike of yellow (curly white) flowers.
V. Lychnites, White M. Wane places, rather scarce: whitened with thin powdery woolliness, the stem not winged, ovate leaves greenish above, and spikes of yellow or purplish-white flowers partially.
V. Blattaria, More M. Roundish; green and smooth, ½-2½ high, slender, with ovate toothed or sometimes cut leaves, and loose raceme of yellow or else white and purplish-tinted flowers.

7. CELSIA. (Named for O. Celsius, a Swedish Orientalist.) Pl. summer.
C. Crinita, cult. from the Mediterranean region; 2½-3½ high, rather hairy, or the raceme creamy, with lower leaves pilose, upper toothed and clasping at base, corolla orange-yellow with some purple (½-3½ across), lower pair of filaments naked, the upper pair short and woolly-branched. 2 filaments.

8. ALONSOA. (Named for Alonso Zavalı, a Spanish botanist.) Cult. as annuals, from South America: fl. all summer.
A. incisaefolia, also called CRITALYFOLIA: smooth, branching, ½-2½ high, with lanceolate or oblong sharply cut-toothed leaves, and orange-scarlet corolla less than ½ wide; several varieties.

9. VERÓNICA, SPEEDWELL. (Name of doubtful derivation, perhaps referring to St. Veronica.) Fl. summer.
§ 1. Slender, tender, very leafy species, from New Zealand, with entire and glabrous smooth and nearly sessile corollas leaves, all opposite, dense unnecessary, flowers from the axils, and woolly peduncles.
V. speciosa, is smooth throughout, with shorter or oblong blunt or truncate thick leaves, and very dense spike-like racemes of violet-purple flowers.
V. salicifolia, has lanceolate acutum leaves, and longer clammy-pubescent stems of blue flowers.
V. Lindleyana, has oblong-lanceolate pale leaves, and racemes of pale blue flowers.
§ 2. Herbs, growing wild, or those of the first subdivision cultivated in gardens.
* Spikes or dense spikelike racemes terminating the erect stems or branches and often clustered.

V. spicata, and sometimes V. pseudocaroliniana, or hybrids between them, are cult. for ornament, from Equ.: ½-2½ high, with opposite lanceolate toothed leaves, lobes of mostly blue corolla much longer than the distinct tube, and pod brown at the end.
V. Virginica, Chevallier’s mock. Wild in rich woods, from Vermont W. & S.: remarkable for the tube of the small white corolla longer than the entire lobes and much longer than the calyx; entire same ½-3½ high, bearing spikes of lanceolate or lanceoellate densely serrate leaves, spikes dense and clustered.
**FJGWORT FAMILY.**

* In the axil of the opposite leaves; stems creeping or procumbent at base, but those ascending: corolla, as in all the following, scarcely four-lobed.

1. **V. Racemosas** or **BRONZELINE**, in water or wet ground, smooth and by pale blue (sometimes darker striped) flowers on slender spreading pedicels.

V. **Anagallis**. In water N.; leaves heart-shaped, sessile by a heart-shaped base, 2–3½ long; pod slightly notched, many-seeded.

V. **Americana**. In brooks, much more common; leaves mostly petiolated, veins or obtuse, serrate; flowers on more slender pedicels; and pod more tardy than in the foregoing.

V. **serrulata**. In logs N.; slender, with linear slightly toothed sessile leaves, only 1 or 2 very slender stipules; few long-pedicellated pale flowers; and very flat pod deeply notched at both ends, broader than long, few-seeded.

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In dry ground, palustral, with light blue flowers in spike-like racemes.

V. **officinalis**, COMMON SPATHEWORT. Spreading or creeping, low; leaves wedge-shaped or oblongate, serrate, short-petiolated; petals shorter than calyx; pod wedge-obovate, several-seeded.

**B.** Racemosum, terminating the leafy last stem or branch, or the small flowers in the axils of the gradually decreasing leaves.

V. **serpyllifolia**, TUSKWEED. N. Creeping or spreading on the ground; with simple flowering stems ascending 2–4; smooth; leaves roundish, small, almost entire; corolla pale blue or whitish with darker stripes, longer than the calyx.

V. **peregrina**, NECKWEED or PURSBLANE—S. Common weed in waste or cultivated ground; smooth, erect, brash, with lower leaves oval or obovate, to toothed, the upper oblong-lanceolate, and entire, inconspicuous flowers short-peduncled, and pod obcordate.

10. **BUCHNERA**, BLUE-HEARTS. (Named for one Buchner, an early German botanist.) Flowers summer. 2.

**B. Americana**. Sandy or gravelly plains, from New York W. & S.; rough-hairy, turning blackish in drying; with slender stem 1½–3½ high, very hairy leaves mostly few-toothed, the lowest ovalate, middle ones oblong, uppermost lance-linear, flowers scattered in the slender spike, and corolla deep purple.

11. **CALCEROLARIA**. (From Latin calculus, a stone or slipper.) Tender South American herbs or shrubs, with curious and handsome flowers, erect as house and holding places. The common cultivated species are now for the most part too much mixed and crossed for botanical analysis.

C. **integrifolia** (also called **rocula** and **saltzvollia**) is the commonest woody-stemmed species, with oblong leaves arranged in the manner of Garden Sage, and small yellow or orange flowers in crowded clusters.

C. **coronaria**, herbaceous, hairy or clammy-petoscent, with ovate clammy-toothed leaves nearly all at the root, and loose corollas or cymes of yellow flowers, the purple-spotted mouth considerably open.

C. **crassifolia**, a fertile parent of many of the more showy herbaceous garden sorts, with more solid stems and larger flowers, their surface rounder and smaller, the hanging lower lip or the V or more long, more oblate and flat, somewhat 3-lobed as it were towards the end, and variously spotted with purple, brown, or crimson.

C. **sambusifolia** is a delicate annual, with pleasantly divided slightly hairy leaves, on pedicles dilated and continue at base, and lose small pale yellow flowers with globular lower lip about ½ wide.
FROWON.T.'A nLY'.

12. COLLINIA. (Named by Nuttall for the late Zechariah Collins of Philadelphia.) Flowers handsome, mostly hybrid.

C. veris. Wild from Western New York W. slender, 6" - 20" high, with ovate or lanceolate and toothed leaves, the upper clasping heart-shaped, and slender-peduncled flowers in early spring, lower lip blue, upper white.

C. bicolor, of California, and a handsome garden annual, is stouter, with crowded flowers as if whirled, pedicles shorter than calyx, yellow lip of corolla violet, the upper pale or white, or in our variety both white.

13. LINARIA, TOAD-FLAX. (Name from Latin, Flux, from resemblance in the leaves of the commoner species.) FL summer.

L. Canadensis, WILD T. Gravelly and sandy ground, with scattered linear leaves on the slender flowering stems, or in pairs or threes in prostrate shoots, and very small blue flowers. 2' - 3'.

L. Vulgaris, Common L. KNMTED, BUTTER-AND-EASE. A showy but trashy western European weed, of fields and roadsides, 1' - 3' high, with alternate crowded linear or lanceolate pale leaves, and a dense raceme of yellow flowers (1' long) with paler tips. 2'

L. triornithophora. Cult. from Europe: glaucous, 2' - 3' high, with ovate-lanceolate leaves in whorls, and rather large slender-peduncled long-spurred flowers, violet and purple-striped. 2'


L. Ellitine. Nat. in gravelly or sandy soil: hairy, with ovate and halberd-shaped short-petioled leaves, the lower ones opposite. 2'

L. Cymbalaria. Cult. as a delicate little trailing ornamental plant: very smooth, pale, with rooting branches, and thickish almost kidney-shaped 3 - lobed leaves on long petioles. 2'

14. ANTIRRHINUM, SNAPDRAGON. (Name from Greek, compares the flower with the snout or muzzle of an animal.) Nat. and cult. from Europe: FL summer.

A. Majus, LARGE S. Of the gardens; with stems 1' - 3' high, oblong or lanceolate entire smooth leaves, and glandular-downy racemes of showy flowers, the calyx, purple, white, or variegated corolla over 1' long. 2'

A. Oenopion, SMALL S. Wood in some old gardens and cult. grounds; low, slender, with linear leaves, and white or purplish axillary flowers 1' long. 1'

A. maurandioideae. Cult. from Texas and Mexico, as MAA M RIA (Antirrhinum); smooth, with triangular-halberd-shaped leaves, or some of them heart-shaped, and showy flowers in their axils, the violet or purple corolla 1' or more long. 2'

15. MAURANDIA. (Named for Prof. Maurand.) Excluding the last preceding species, which has the flower of Snapdragons, and including Lophophorum, which has wing-margined seeds. Mexican climbers, with triangular and heart-shaped or halberd-shaped and obscurely lobed leaves, tender, cult. for ornament: FL all summer.

M. Barclayana. Stems and leaves smooth; entire glandular-hairy. Cult.

M. Maurandia major, rather obviously cheloped. 2'

M. Barbata. Stems and leaves smooth; entire glandular-hairy. Cult.
M. *sempervirens*, has lanceolate smooth calyx-division, and smaller rose-purple or violet corolla.


M. *cris者は*, somewhat soft-pubescent, with irregularly toothed leaves, rose-pink flowers, 20-25 mm., and scented-calyx, rather hair-like petals.

M. *sandii*, not less common and not so showy, is less pubescent, and has smaller less-tubular deeper purple corolla, and lance-shaped petals.

16. **DIGITALIS**, **FOXGLOVE**. (Latin name, from shape of the corolla, likened to the finger of a glove, to the common species.)

D. *purpurea*, Prap. F., of which varieties with corolla white or pale and more or less strongly spotted, corolla, an common, 2° long, the lobes rather oblong; leaves ragged, somewhat downy. Cult. from E. summer. 2°

17. **GERARDIA**. (Named for the herbalist, Gerard.) Handsome, but unornamentable plants: E. late summer and autumn. The following are the commonest wild species: mostly of gravelly or sandy soil.

§ 1. Corolla purple or rose-color, somewhat bell-shaped; calyx-tube short; leaves all with, nearly pinnate at base; lower narrow, linear or thread-shaped, entire; lower branching, nearly 2 annular, except the first.

G. *limifolia*. Fine-branches S.: with erect branches, and erect linear leaves about the length of the peduncle, truncate calyx, and corolla 1° long.

G. *tenuifolia*. N. & S.; with opposite pedicels equaling the linear spreading leaves, broadly awl-shaped calyx-teeth, and corolla 1°-1½ long.

G. *filiformis*. N.; with alternate pedicels twice the length of the rather flexuous thread-shaped or slightly club-shaped leaves; corolla ½ long.

G. *aphylla*. N. with short pedicels alternate along one side of the flowering branches, and minute calyx-teeth, and corolla ½ long.

G. *purpurea*. N. & S. in low ground; with stout pedicels not longer than the corollas; bilobed calyx, opposite spreading rather broad linear leaves, and corolla ½-1° long.

G. *maritima*. Not matches N. & S., lower than the preceding, and with flaly branched leaves, the pedicels so long as the upper ones and as the oblong 5-toothed calyx, and corolla ½-1° long.

§ 2. Corolla purple or sometimes white; color deepening and usually belted; leaves pinnate, those of the shorter pairs much smaller; leaves rather broad.

G. *auriculata*. Low grounds, from Penn. S. & W.; rough-hairy, with usually simple stems, lanceolate or oblong, leaves entire, or the lower with a lobe on each side of the base; flowers sessile in the upper axis; corolla 1° long.

§ 3. Corolla yellow and with a longer tube, the inside mostly, or are the filaments and anthers; the latter rather projecting, yellowish at base; color belted; taller herbs, with leaves on some of them pinnatifid or toothed.

a. Stems nearly simple; flowers in a bottle cyme; corolla more tuberous.

G. *flava*, Downy Fall Pock. Open dry woods; 20°-40° high, minutely awdowy; upper leaves lanceolate or oblong and entire, lower linear or pinnatifid; pedicels very short; corolla ½ long.

G. *querocolla*, Smooth F. Rich woods, commoner S. & W.; 30°-60° high, smooth and glaucous; upper leaves often entire, lower some or twice; pinnatifid; pedicels as long as calyx; corolla 1° long.

G. *integrofolia*. Barrens, from Penn. S. & W.; 1°-2° high, smooth, not glaucous; leaves lanceolate, entire; corolla 1° long.

a. Stems bud-tube-sheathed; calyx-tube toothed or pinnatifid; leaves mostly cut-lobed.

G. *grandiflora*. Oak openings from Wisconsin S.; 20°-40° high, minutely downy; leaves ovate-lanceolate, coarsely cut-toothed, the lower pinnatifid; pedicels shorter than the hairy toothed calyx-tubes; corolla 2° long.
G. poderculata. Contrast N & S.; slightly pubescent, 2'-3' high, very badly leaves all pinnatifid and the hubs cut-toothed; pedicels opposite and longer than the hairy sepal 5-calyx-lobes; corolla 1½ long.

G. proctori. Sandy barrens N.; more hairy than the foregoing, with finer divided leaves; alternate pedicels shorter than pinnatifid calyx; lobes; corolla 1½ long and 1½ long.

15. SEYMERIA. (Named for Henry Seymour.) Wild plants S. & W., very near Gerilla; flowers yellow, in season and autumn.

S. macrophylla, Miller. Oxalis. Shade stone-banks W.; 4' - 5' high, with large leaves, so twice or thrice pinnately divided or cut, the upper lanceolate and toothed; curved corolla woolly inside, also the filaments; style short.

S. pectinata. Sandy ground S.; about 1½ high, lanceolate-pinnatifid leaves with oblong-linear lobes; corolla 1½ long.

S. tenella. Low sandy grounds N.; 3' - 4' high, with long slender branches; leaves pinnately divided into thread-shaped divisions; corolla hardly 1½ long.

19. MIMULUS, MONKEY-FLOWER. (From Greek for an ape, from the grinning corolla.) FL. all summer.

- Wild in wet places, with erect square stems 1' - 2' high, sticky feather-fringed serrate leaves, and white-purple corolla (1½ in length).

M. ringens, the commonest, with chapping leaves, pedicels longer than the flower, and taper-painted calyx-stalk.

M. alatus, not rare near S., has leaves tapering into a petiole, pedicel shorter than calyx and short-toothed, and sharp wing-like angles to stem; whence the name.

- Cult. for ornament, chiefly in conservatories, from Western N. America.

M. glutinosus, admirable conservatory plant from California, glutinos- pinnatifid, with oblong or lanceolate leaves, and large yellow or brick- red flower.

M. cardinalis. Erect, clayey-pubescent; leaves wedge-shaped, partly clasping, several-nerved; flowers large, brick-red.

M. luteus. Erect, smooth; leaves ovate or cordate-clasping, several-nerve; flowers showy, yellow, often spotted with rose or brown; of many varieties.

M. monchotus, Moss-plant. Weak and diffuse, rooting, clump-y, but, standing, strong of musk; leaves ovate or oblong; flower small, pale yellow.

20. TORENIA. (Named for G. Torens, an obscure Swedish botanist.)

T. asiatica, cult. from India, a handsome houseplant, with lance-obate serrate leaves, wing-angled calyx, and corolla over 1' long, pale violet or purple with the tube and the end of the 3 rounded lower lobes dark violet.

21. ILYSANTHES, FALSE PIMPINEL. (From Greek words for nine and flower, alluding to the station.) FL. all summer.

I. gracilis. Common in wet places, a smooth diffuse little plant, 4' - 6' high, with rounded or oblong leaves, and small purple or bluish flowers.

22. GATIOLA, HEDGE-HYSSOP. (Old name, from Latin young, green.) Rather insignificant plants, in low or wet places: flowering all summer.

G. virginiana, Rather clump, with lanceolate leaves and slender peduncle.
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G. spherocephala. Chiefly S. and S. to N. breeds, with lance-ovate leaves, pedicels densely shorter than the peduncles, and white flowers.

G. viscosa. Chiefly S. and N. breeds, with lance-oval leaves, pedicels scarcely longer than the peduncles, and golden yellow flowers.

23. SCROPHULARIA, PIGWORT. (Plants a supposed remedy for scrofula.) These humble and insignificant plants hardly ought to have given the name to this large and important family.

S. nodosa. Damp shady ground; smooth, with 4-sided stem 3°-4° high, even or oblong withered leaves, and small yellow flowers in loose cymes, all summer.

24. CHELONE, TURTLE-HEAD (to which the name, from the Greek, refers). SNAIL-HEAD, BALMOWY.

C. glabra, the common species, of wet places; 1°-2° high, with lanceolate or lance-oblong leaves on very short peduncle, white or pale purple corolla 1° or more long, all summer.

25. PENTSTEMON. (Name, from the Greek, meaning 5 stems, refers to the presence of the 5 stamens, which, however, has no authority.) Showy North American and a few Mexican plants, chiefly Western; two or three are wild E.; several are in choice cultivation, but few are yet common here. Spring and summer.

P. pubescens. Somewhat clammy-pubescent, or smooth except the peduncle, 1°-2° high, variable; stem-leaves lanceolate; flowers nodding; the petals 2-lipped corolla 1° long; with gradually enlarging tube concave on the lower convex on the upper side, a sort of palate almost closing the mouth; sterile filament yellow-bead long one side.

P. Digitatia. Virginia to Ill. & S.; taller (3°-4°), smooth up to the nodal points, with wider more entire leaves; corolla not slightly 2-lipped, open, abruptly inflated bell-shaped above from a narrow tube; sterile filament sparingly bearded on one side.

P. grandiflorus. Plains from Fall's of St. Anthony W. & S. W.; very rugged, pale and glaucous, 1°-2° high, with thick ovate leaves (1°-2° long) closely smooth and entire, the upper ones rounded, short-pedicilled flowers recurved, blue-purple oblong-bell-shaped corolla 3°-4° long and almost equally broad, the sterile filaments nearly smooth.

P. glaber. Plains from Nebraska, S.; 1°-2° high, stout, with ovate often dentilicate thick leaves, a slightly clammy four-flowered paniculate or racemes, pale purplish or whitish corolla about 2° long and abruptly much inflated above the narrow base, the border clipped, but the oblong lobes similar; the sterile filaments bearded.
ACANTHACEAE, ACANTHUS FAMILY.

* * * Further Western species, cultivated and Hardy in the garden.

P. owatton, of Oregon, is an early bloomed species, smooth, with loose ovate-ovate serrate leaves, and open panicle of small flowers.

P. barbatus, supposed to come from Mexico, longoval, in the garden; smooth, with slender wand-like stems 3'-4' high, lanceolate and entire, pale lavender, long and loose tresses or panicle of drooping flowers, narrow triangular scarlet corolla over 1' long, with two longer filaments and slightly flared, the lower partly into 3 raised or spreading oblong lobes, some here in the throat, and sterile filament naked. Var. THERAVI, from New Mexico and Rocky Mountains, is taller, the brighter red corolla with little or no beard in the throat.

* * * Common garden species from Mexico, but not hardy N., are forms of

P. Hartwegii. Smooth, leaves lanceolate, entire, the upper broader at the base and clasping; pedicels cyathiform. 3-flowered; corolla 1' long, deep red or red purple, the border almost equally 5-tooth; sterile filament naked.

P. campanulatus. Smooth, leaves lanceolate, acuminate, sharply serrate, the base clasping; flowers in a racemose one-sided panicle; corolla vermilion above, reddish-purple or non-colored; sterile filament bearded. Various greatly in cultivation.

26. RUSSELLIA. (Named for Dr. Alexander Russell of Scotland.)

R. jucunda, of Mexico, a showy bush and bedding plant; very smooth, with small lanceolate-oblong or linear, or else reduced to little warts on the veins; long and rush-like green hanging branches and Bracteoles; corolla 1' long, narrow, bright carmine red.

27. CASTILLEIA, PAINTED-CUP. (Named for Castilea, a Spanish beaten.) There are several showy species on the plains from beyond the Mississippi to the Pacific. In all late spring and summer.

C. coccinea. SCARLET P. Simply low plants; pubescent, simple-stemmed, 3'-5' high, with stem leaves oblanceolate, these first the flowers 3-tooth, their dilated and exscissed lobes brilliant scarlet, while the 5-tooth calyx is yellowish and the narrow corolla pale yellow.

28. PEDICULARIS, LOUISEWORT (which the name denotes). P. Canadensis, our only species, common in open woodlands; 6'-12' high, with lanceolate leaves, the upper ones entire or somewhat reticulate, the scattered flowers pale yellow, 2-lobed leafy-calyx calyx, and ovoid pod; in late summer.

29. MELAMPYRUM, COW-WHEAT. (The name in Greek means thick grass, from the ears of the seeds.)

M. Americana, our only species, common in open woodlands; 6'-12' high, with lanceolate leaves, the upper ones entire or somewhat reticulate at base and with a few bristled teeth, the scattered flowers pale yellowish or almost white, sometimes purplish-tinted; produced all summer.

77. ACANTHACEAE, ACANTHUS FAMILY.

Plants with opposite simple leaves, 3-lobed or otherwise irregular or even regular monopetalous corolla, 4 didynamous or else only 2 stamens, 2-seeded oval and pod, and few seeds, distinguished from the related order by the seeds without albumen and bore on look-like projections of the placenta, or on a sort of cup. Chiefly a tropical family; many in chic conservative, here omitted.
ACANTHUS FAMILY.

§ 1. Pincing tropical herbs (or cult, as herbs), with mostly regular 3-lobed corolla, and glomerular seeds supported by a conspicuous ring of shallow tube.

1. THUNBERGIA. Flowers upward in bud by a pair of large bud-like bracteate leaves below the short capillose extra. Corolla with a mostly somewhat curved tube and an distinctly wide-spreading broader of 3-mandibulate tube, connected in the bud. Stamina 4, included. Pod glabrous, tipped with a long and conspicuous flattened beak, 4-4-seeded. Pedaliferous rarely, 2-flowered.

§ 3. Erect or spreading: all the following very herbs, with flat leaves borne on budlike processes (stipules) or collet 4-, parted, mostly 3-segmented.

2. ACANTHUS. Corolla of one 3-lobed lip, the upper lip wanting. Stamina 4, with one-seeded filiform anthers. Leaves pinnatifid. Flowers in spikelike racemes. A. mollis, one of the classical species, from S. E. E., is occasionally cult., not hardly N.; the broad stipules and deeply pinnatifid leaves mostly from the root, hardly at all prickly; flowers on a short scape, dull-colored.

3. RUILLIA. [Named for the herbalist Ruelle.] Ours are wild herbs, chiefly southern, with purple or blue showy flowers, mostly in clusters, produced all summer.

4. DICLIPTERA. (Greek words for shoot, shoot, from the 3-valved pod.) D. brachytera, of low banks, is nearly smooth, with tinged stem bearing many branches, thin calyx-lobed pointed leaves on slender petiole, and interrupted, clasping branches of small purple flowers each with a pair of conspicuous flat bracts.
DIANTHREA. (From Greek for double rather, alluding to the two protracted cells on each filament.) Fl. all summer.

D. ovata. Muddy banks of streams 8.; 4-8 high, smooth, with lanceolate short-pointed leaves longer than the 3-4-flowered pedicels in their axils, and small pale purple flowers.

D. Americana. Wet borders of streams: 2½ high, smooth, with long linear-lanceolate leaves, and long peduncles (4-6) long bearing an elongated spike of pale purple flowers.

78. VERBENACEAE, VERVAIN FAMILY.

Plants with opposite (or sometimes whorled) leaves, differing from the other orders with irregular monopetalous and didynamous or terranemoous flowers by the ovary not 4-lobed and with a single ovule in each of its (1-4) cells, the fruit either fleshy or when dry at length splitting into as many 1-celled indehiscent seeds.

Besides the following some species of Chlorodendron are cultivated, in choice conservatories.

§ 1. Flowers in heads, spikes, or cymes, the flowers ascending from below upwards.

1. Phryma. Flowers in slender head spikes. Calyx imbricated, 2-lipped, the upper lip of 3-lobed-petalled teeth, the lower short and bisected. Corolla tubular, 2-lipped, the upper lip notched, lower larger and 3-lobed. Stamens included. Ovary 2-celled, forming a single stigma in the calyx. Herb.

2. Verbena. Flowers in spikes or heads. Calyx tubular or sometimes bistubular and plaited. Corolla suberecti, the tube often curved, the border rather spirally cleft. Stamens included: upper pair sometimes wanting the anthers. Ovary 2-celled, at maturity splitting into 4 dry achenes or nutlets. Herb.

3. Lepota. Flowers in heads, spikes, or cymes, Calyx tubular, 2-4-toothed. Corolla tubular, with 4-toothed 2-lipped border, the lower 3-lobed lip larger. Stamens included. Ovary not dry Fruit 2-celled, 2-lobed.


§ 2. Flowers nearly regular, in cymes from the axils of the simple leaves: shrubs.


§ 3. Flowers irregular, in cymes or clusters from the axils of the compound digitate leaves or of the upper ones reduced to bracteate axils or spires.

6. Vitex. Calyx 5-toothed. Corolla tubular, with a spreading 2-lipped border, the lower lip dentated and rather larger than the 3-toothed upper lip. Stamina 4, protruded, as in the style. Ovary 4-celled, becoming berry-like in the fruit, which contains a single 4-celled stone.

1. Phryma, LOPSEED. (Name of unknown meaning.) One species.

P. Leptostachya. Cymes, &c.; 2½-3½ high, with coarsely-toothed ovate thin leaves, and branches terminated by the slender spikes of very small purplish flowers, in summer, the petals reflexed in fruit.

2. Verbena, VERVAIN. (Latin name of some sacred herbs.) Fl. all summer. — Genus of difficult analysis on account of numerous hybrids, both wild and in cultivation.

1. Verbena native to the country, or growing as wild weeds, mostly in waste or cultivated ground; the flowers insignificant, in slender spikes, all appen
dant at the nodes... All but the last with upright stems... 2

V. angustifolia, NARROW-LEAVED V. Stems 6'-10' high; leaves nar-
row lanceolate, sessile, roughish, slightly nodose; spikes few, thickly, crowded with purple flowers.

V. striata, Hoary V. Barrows W. & H.; whitish-hairy, 1½-3° high; leaves oblong or oblongate-serrate, sessile; spikes thick and dense; flowers blue, larger than in the others.

V. hastata, Black V. Stem 4½-6° high; leaves lanceolate, some of the larger with short side lobes at base, cut-serrate, petiolate; spikes densely flowered, ovate-oblong or petiolate: flowers blue.

V. urticifolia, Netted-Ground or White V. Stem 4½-6° high; leaves ovate or obovate-serrate, coarsely serrate, petiolate; spikes of small white flowers slender and loose.

V. officinalis, European V. Net. by mounds, at least 6. Stems 1½-3½° high, branched; leaves sessile, ±-left and mostly pinnatifid into narrow outstretched lobes; small purplish flowers in very slender petiolate spikes.

V. procumbens, from Wisconsin N.; hairy, spreading or procumbent; leaves wedge-shaped or lanceolate, cut-pinnatifid or -left, short-petiolate; small purple flowers in solitary loose spikes, the lower ones leaf-like.

§ 2. Verbenas of the garden and with creeping or spreading stems, and dense spikes of larger or showy flowers: members of the larger flowers with a gland-like tip. \( \Box \)

V. Aubletia. Wild from Ill. and Carolina W. & S.; has cut-pinnatifid leaves, and a long-peduncled spike of purple flowers, minutely bearded in the throat.—This and the several following species from South Brazil, Buenos Ayres, &c., are variously and greatly mixed, make up the Verbenas which adorn our gardens in summer.

V. chamadrisfolia, the original Scarlet V., with obovate-lanceolate nearly serrate leaves, nearly all sessile, and most intense red or scarlet flowers, in a flat cluster.

V. phlomifolia, also named Tsnemen. More upright; the leaves deciduous petiolate; the flowers inclined to form an oblong spike, and crimson, varying to rose, but not to scarlet.

V. incisa, differs from the last in the pinnatifid-cut lobes, the petiolate ones, with a heart-shaped base; flowers in a flat cluster, rose-colored or purple.

V. teucroides, with ovate-oblong and indeed sessile leaves, and a long-peduncled spike of white or pale rose flowers, sweet-scented, especially at nightfall.

V. erinoides, or Wallflora. Dwarf and much creeping, rough-hairy, with leaves pinnatifid into linear divisions, and originally with violet, purple flowers, and

V. pulchella, or Tsnema, with equally finely cut leaves, and much larger originally rose-violet flowers, are part parents of the smaller races.

3. LIPPIA. (Named for A. Lippi, an Italian botanist.) FL. late summer.

L. lanceolata, Foot-V. A creeping woody herb, saddling river-banks from Penn. N. & W., with wedge-oblong or obovate-serrate leaves surmounted above the middle, and slender pedicelates from the axis bearing a head of bluish small flowers.

L. nitrocaris (or A. lippii), the Lemos-scented or Sweet Verbena of the gardens; shrub from Chili, with whorls of linear-lanceolate fragrant leaves, rosethini with glandular dots, and small white and bluish flowers in slender spikes.

4. LANTANA. (Origin of name obscure.) Tropical or subtropical, mostly shrubby plants, planted out in summer, when they flower freely until from rooms; often given much prickly, herbage and flowers odorose, in some pleasing, others not so. The species are much mixed.

L. chlorantha, from Tropical America, has flowers deep yellow, turning first in orange, then to red.

L. mixta, from Brazil, has flowers opening white, soon changing to yellow, orange, and finally to red.
L. nivea, from Brazil, has the pleasant-scented flowers white and unchanging; or, in L. mutabilis, changing to bluish.

L. involucrata, of West Indies, has small oblong and prominently veined leaves, more or less downy beneath, and heads of blue-purple flowers, involucrata by the outer leaves.

L. sellowiana, of Southern Brazil, is low and spreading with wedge-shaped or ovate strongly veined leaves, long peduncles, and heads of reddish-purple flowers lengthening somewhat with age.

5. Calliandra. (From Greek for beautiful fruit.) Fl. early summer.

C. Americana, French Mulberry. Rich soil from Virginia S. shrub 30’-60’ high, with some scaly down, especially on the lower faces of the ovate-oblong toothed leaves, and the clusters of bluish flowers; fruits violet-blue and showy.

6. Vitex, Chaste-Tree. (The ancient Latin name.)

V. Agnus-castus, Chaste-Tree, of Mediterranean region, has 5-7 lanceolate entire leaves whitened underneath, and bluish flowers in cymose clusters forming an interposed spike at the end of the branches; barely hardy.

V. incisa, of Northern China, barely hardy in garden N. has 5-7 leaves lanceolate and toothed, and the clusters of bluish flowers peduncled.

70. Labiatae, Mint Family.

Chiefly herbs, with aromatic herbage, square stems, opposite simple leaves, more or less 2-lipped corollas (whereas the name of the order), either 4 didymous or only 3 stamens, 2-lipped stigmas, and at once distinguished from all the related families by the deeply 4-parted ovary (as if 4 ovaries around the base of a common style), ripening into as many seed-like nutlets, or alornes, each containing a single seed. Embryo usually filling the seed. As in all these families, there are 2 lobes belonging to the upper and 3 to the lower lip of the corolla. Flowers from the axis of the leaves or bracts, usually in cymose clusters, or running into terminal racemes or spikes.

1. Scutellaria, parallel and racemose, and projecting from a notch on the upper side of the corolla. Nutlets reticulated and pitted, obliquely fluted by the inner side near the base.


4. Balsamita. Calyx bell-shaped, equally lobed, enlarging after flowering. Corolla only little longer than the calyx, bell-shaped, with 8 equal spreading lobes.

5. Scutellaria, growing on the lower lip of the corolla, or the outer or inner pair longer; andrenes present. Corolla usually small or changing. Nutlets smooth or roughish, fixed by their base, as in all the following divisions.

6. Conostema. Calyx bell-shaped, mostly toothed, the upper tooth or lobes much broader and sometimes wing-margined. Corolla short, the upper lip so it

7. Scutellaria, growing on the lower lip of the corolla, or the outer or inner pair longer; andrenes present. Corolla usually small or changing. Nutlets smooth or roughish, fixed by their base, as in all the following divisions.
5. CORUSUS. Calyx in No. 4. Curulea similar, but the lower lip longer and
rounded or heart-shaped, enclosing the stamens and styles: filaments
oblong-obovate.
6. HYPERIS. Calyx with 5 or 6 unequal or equal teeth. Curulea of 4 short
similar upper lobes, and a longer slightly drooping median lobe: lower
lobes ovate.
7. LAVANDULA. Calyx not deflexed, 5-lobed, the upper tooth
nearly larger. Curulea with base larger than the calyx, regularly 2-lobed,
1 or 2 upper lip lobed, lower 2-lobed, the lobes all equally spreading.
Stamens included, but declined towards the lower lobe of the corolla.
§ 2. Staminea 1 (in the corolla or outer pair longer) or 2, straight and distant or
diverging; stamens 5 or 6-celled, not connivent in pairs. Lobes of the
lower lip or the corolla flat and spreading, or the upper erect but not
arched.
1. Corolla short and rather bell-shaped, rarely of 4 lobes, the 4 or rarely 6
lobes nearly equal and all spreading.
8. PERILLA. Calyx in lower half, in fruit constricting and oblonging,
becoming 2-lobed. Corolla 4 or 5-lobed, the lower lobe a little longer. Staminea 4, nearly
equal, conischen.
9. LAVINIA. Calyx 5-lobed. Corolla with 4 about equal lobes. Stamina 4:
the upper pair, if any, without anthers.
** Corulea pendant or 2-lobed, but all the lobes of nearly equal breadth, the upper lip
erect and nearly divided; the lower spreading and arching, the lobe not exposed
within: staminea with anthers only 2.
10. CUNILA. Calyx equally 2-lobed, ovoid, very hairy in the throat, one half
denser than the corolla. Stamina 2, long and protruding: an rudiments
of the other pair.
11. BEDRORMA. Calyx 5-lobed, glabrous on the lower side near the base, hairy
in the throat. Curulea short. Stamina 2, with anthers scarcely protruded,
and 2 corolla short lobes or 2-lobed and a little bend in place of anther.
** Curulea elongated and irregular: the lower lobe or lip much the larger,
pointed, not toothed or fringed, the calyx nearly equal and entire.
12. COLLINSIA. Calyx erect, emerging and turned down after flowering,
5-lobed, the upper lip flabellate and rounded, the lower filiform. Calyx of the
upper part conischen.
** Corulea pendulous, 2-lobed, short, the upper lip erect or somewhat spreading
and nearly entire or notched, the lower spreading or 2-lobed: stamina with
anthers only 1.
13. HYSSOPUS. Calyx tubular, 5-lobed, equally 2-lobed, naked in the throat.
Curulea with the middle lobe of the lower lip larger and 2-lobed. Stamina
very long and protruding.
14. PYRAMIDICULUS. Calyx oblong or short-ovate, about 5-lobed, equally
2-lobed or somewhat 4-lobed, naked in the throat. Curulea with the lobes
of the lower lip entire and saucer-shaped. Flowers crowded in heads or dense
globose.
15. ORACH. Calyx in the throat, about 5-lobed. Lower lip of the
curulea of 3 similar lobes. Flowers gathered into spike-like clusters and dor
minated with bristly often colored leaves.
16. TREMUS. Calyx rotate, hairy in the throat, 15-lobed, 2-lobed; the upper
lip 2-lobed and spreading, the lower lip 2-lobed and spreading the lower
lips also 2-lobed or entire. Corolla not straight 2-lobed, the upper lip
spreading the 3 lobes of the lower lip notched at the apex. Stamina mostly
straight.
17. Satureja. Calyx bell-shaped, naked in the throat, 15-lobed, equally
2-lobed. Curulea with lower lip of 4 nearly entire distinct lobes. Stamina
shorter, spreading. Leaves narrow.
§ 4. Stamina 2 (the lower or outer pair longer), spreading or curved and with
the phyllary 2-lobed or toothed or semipersistent to connivent in pairs under the throat
and the corolla 4 and 6-celled, not arching.
18. CAlanmena. Calyx not divided. Curulea straight, with flattened throat,
and 2-lobed lower lip spreading, the spreading lower lip oblong, the middle lobe entire
or slightly notched.
20. *Nerina*—Calyx with 3-toothed upper lip flat. Corolla more or less curved and ascending. Filaments arched and bringing the anthers together in pairs. Otherwise as 19.

§ 6. Stamines only 2, parnall and curving under the erect or somewhat variously-shaded entire or heavily veined upper lip of the corolla. Androecium, either strictly as or by conjunction of the 3 veins at end to end.

21. *SALVIA*. Calyx 2-lipped, the upper lip 2-toothed or entire, the lower 3-toothed, fringed and hairy. Corolla deeply 2-lipped: the lower lip spreading or hanging, 4-toothed, the middle lip larger and sometimes notched at the end. Filaments as it were compressed, the proper filaments short and bearing on its apex an elongated thread-like or linear body (the connective, in fact) attached to its middle, one and of which ascending under the upper lip bears a lower 1-toothed anther, the other descending bears the other smaller and imperfect cell, or a mere vestige of it, or is naked. Flowers usually large or showy.

22. *BONARIANA*. Calyx and corolla nearly as in *Nerina*, but the lateral lobes of the lower lip of the corolla erect and somewhat contorted (as in *Nerina* apically). Staminodia resembling those of *Monarda* and punctuated, but with a short central filament. Flowers white or rosy.

23. *MONARDA*. Calyx tubular, compressed, 5-toothed, nearly equally 3-toothed, somewhat hairy in the throat. Corolla deeply 2-lipped, narrow in the throat, the outer or lower lip about equal in length, the lower lipped at the apex, its narrowed middle lobe slightly notched. Flowers yellow and simple, numerous on the upper lip of the corolla, its filaments bearing directly on its apex a linear anther. Flowers rather large, sometimes with the lower lip of the corolla somewhat contorted, others with a linear auricle.

24. *BLUMENIIA*. Calyx short-tubular, naked in the throat, 2-lipped, the upper lip with 3 nerves, the lower with 3 nearly blunt teeth. Corolla with a more expanded throat, bluish. Otherwise like *Monarda*, but flowers smaller.

§ 6. Staminodia diverging or ascending: the upper or lower pair longer. Uppers lip of the corolla erect or a little arching, lower spreading.

25. *LOPHANTHUS*. Calyx rather unequal, 3-toothed. Upper lip of corolla slightly 2-lipped, the lower somewhat spreading, its middle lobe somewhat thread-like. Staminodia not paired, the lower and shorter ones more or less ascending, the upper lipped and not diverging and descending, so as to form the lower lip with flowers clustered in pendant spikes.

26. *NUCELLA*. Calyx obliquely 3-toothed. Staminodia parallel and ascending, and their anthers apposed in pairs under the upper lip of the corolla, their calyx divisions from each other. Middle lobe of lower lip of corolla considerably larger.

27. *CEMODONIA*. Flowers nearly like those of *Nuella*: but the cells of the anthers parallel.

28. *PHILEMIA*. Of the next section, might from the staminodia be sought for here.

§ 7. Stomates 3, the lower or entire pair longer, curving and parallel, their anthers in pairs mostly under the concave or arched upper lip of the corolla. Plants not accoumcted, none of them latero-contrariem.

*Corolla oblong, fleshy, rather short, with bitumen, it.

29. *PHYMOSTEOA*. Upper lip of the corolla shallow and a little arching, entire; lower 3-toothed and somewhat spreading, short-hairs. Smooth and sometimes hairy, with darkish and corolla oblong or oblong-lanceolate.

*Corolla deciduous, 2-lipped: calyx oblong, irregular, channeled.

30. *BRUNELLA*. Calyx tubular 2-toothed, compressed, flattened on the upper side: the upper lip 3-toothed, flat, 3-toothed; the lower 2-toothed. Tube of the corolla dilated on the lower side just before the lower rounded margin; upper lip arching and entire, lower wide spreading, with linear lobes oblong, the corolla oblong with rounded lobes. Filaments 2-toothed at the apex, the lower teeth bearing the flowers. Flowers in a terminal cyme and short spike.

31. *SOUTELARA*. Calyx short, with the very short and somewhat obtuse teeth and a large bump on the upper side, the whole being large: the upper lip of quite hanging away when the fruit is ripe. Corolla with rather long slender tubular 2-toothed; the lower lip of the corolla oblong and somewhat or oval-shaped; the upper lip toothed, the middle lip broader and spreading, or oblong-lanceolate; the lower lip toothed, the lower lip 3-toothed. Flowers small in the axil of each leaf or leaf.
2. **Coccinia deciduosa** 2-lipped: corolla 2-mouthed, regular, or sometimes subrostrally 2-tipped, not closing in fruit; the teeth commonly awl-shaped or triangular, often rigid or spinose-tipped.

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22. **GALEOPSIS**. Calyx tubular bell-shaped, spurred, with spinose-tipped teeth. Corolla enlarged in the throat, the lower and upper upper lip thickened, the middle lobe of spreading lower lip decordate. Flowers in axillary whorl-like clusters.

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28. **STACHYS**. Calyx mostly tubular bell-shaped, the teeth triangular or awl-shaped, sometimes rigid or even purpur. Corolla not enlarged in the throat, the upper lip entire or nearly so, the lower flabellate with the middle lobe nearly smooth. Stamina deciduous, or the outer pair turned down after discharging their pollen. Nutlets obtuse, but not transversely 2-angled, in which most of these commonly approximate in a terminal raceme or spike.

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26. **TEUCRIUM, GERMANDER**. (Named for Teucer, king of Troy.) 2

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2. **TRICHOSTEMA, BLUE CURLS**. (Name from the Greek, means "hair-like stamens.") Our species branching loosely-flowered rather clanny low herbs, with entire leaves, and small flowers as if it were bluish, or changing to purple, in summer and autumn.

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3. **ISANTHUS, FALSE PENNYROYAL**. (Name in Greek means "false" flower, i.e. parts of corolla regular.)

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1. **T. Canadenses**, our only species, in low grounds, 1-3' high, downy, with ovate-obovate serrate leaves downy beneath, and pale-purple or rarely white flowers collected in a long spike, in late summer.

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2. **T. dichotomum**, COMMON B. or BASTARD PENNYROYAL. Sandy fields E & S: 6'—12' high, with mostly lance-ovate short-petioled leaves.

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3. **T. lineare**, from New Jersey S., has linear or lance-linear smooth or hairless leaves.
4. OCIMUM, SWEET BASIL. (Greek name, referring to the odor, the
herbage sweet-scented.)
O. basilicum, Sweet Basil. Low sweet-herb, of kitchen-gardens, from
India, with wavy somewhat toothed leaves, little peduncles and calyx, and
milk-white rounded flowers, in summer.

5. COLEUS. (Name from the Greek word meaning narrow.)
C. Blumei, of Java, especially its var. Vincencii, the showy spe-
cies of ornamental gardens in summer, planted for its richly-colored oval peti-
ately toothed leaves, either blushed with crimson of hawthorn-red, or almost
wholly colored; the inconspicuous flowers blue or bluish and racemose.

6. HYPTIS. (From a Greek word meaning narrow.) Fl. late summer.
H. radiata. Low ground, North Carolina & S.; stems 2-4 ft. high;
leaves lanceolate, toothed; flowers white or purple-dotted, small, crowded in
peduncled whitish-violet lanceolate heads.

7. LAVANDULA, LAVENDER. (From Latin less, to love, for which
Lavender-water is used.)
L. vera, Garden L. Cult. from S. Europe: a low subshrub, barely
hardy, with linear-linear leaves, and slender spikes of bluish small
flowers, on long terminal peduncles, in summer.

8. PERILLA. (Name unexplained.) Natives of China and Japan.
P. ocimoides, var. crispa, or P. Xanthium of the gardens, a bald-
man-hearted much-branched herb, cult. for its flowers, the oval-petioled leaves
in this variety dark purple or violet-tinted, hound-purple above, the
margins very and deeply cut-toothed; the insignificant rounded or whitish
flowers in painted spike-like racemes, in late summer.

9. MENTHA, MINT. (Ancient Greek and Latin name.) One native
and two very common naturalized European species, mostly spreading rap-
idly by running rootstocks; leaves toothed; the showy flower, purplish-
blue or almost white, in summer.
M. viridis, SPEARMINT. Nearly smooth, with oblong or lance-ovate
winkelvelved oval leaves, and flowers in narrow terminal spikes.

M. piperita, PEPPERMINT. Smooth, with oval entire petiolated leaves, and
whorled clusters of flowers forming loose interrupted spikes.
M. Canadensis, WILD MINT. Along shaded brooks, with ovate lance-ovate or
pointed leaves on short petioles, and whorls of flowers in the axil of some of
the middle pairs.

10. LYCOPUS, WATER-HORSEFOOT. (Name in Greek means swift’s
foam.) Resembling the Wild Mint, but bitter, and not aromatic, commonly
producing slender sometimes tuber-bearing runners from the base, smooth, the
tiny small white flowers close-dissected in the axil of the leaves, in summer.
Wild in shady nooks. 

L. Virginica, BUCKWHEAT. Common N.; stems blunt-angled, 6-18
ft.; leaves mostly lance-ovate and merely toothed; calyx-teeth 5, ovate and
bluntish. Used in medicine.
L. Europaeus, under several varieties: common N. & S., is taller, with
sharply-angled stems, ovate-oblanceolate leaves either toothed or pin-
tattled, many flowers in the clusters or whorls, and 5 calyx-teeth right and
charred.
11. CUNILIA, DITTANY. (An old Greek name of unknown meaning.)

C. Mariana, Mariana, Dittany. Thrives through the Middle States, mostly smooth, 1½ ft. high, everywhere much branched, with oblong-ovate, almost sessile leaves (1½ in. long), and peduncled loose cymes of purplish flowers, in summer. 2

12. HEDYOMA. (Turned from a Greek name of a sort of Mint, refers to the scent.) Low and fragrant-scented, growing in dry and open sites in sterile grounds, with small flowers in loose auxiliary clusters, all summer.

H. pulegioides, American Pennyroyal, the purgant aromatic scent, and taste being like that of the English Pennyroyal or Mentha Pulegium; very common, ½ to 1 ft. high, hairy, branching, with oblong-acute pointed leaves, the flower cymes, and branch calyx scarcely exceeding the calyx. 3

H. hacunda, is common from Western Illinois S. W. to the Ohio, with needle linear leaves, and briefly-ciliate calyx. 3

13. COLLINSÔNIA, HEDINGHALLM. (Named for Peter Collinson of London, who corresponded with Bentham and Lindhaus.) Rather tall and large-leaved strong-scented plants; in summer.

C. Canadensis, the only common species, in rich moist woods; smooth, 3 to 5 ft. high, with ovate leaves; ½ to 1 ft. long and on long peduncles, and pale yellow lemon-scented flowers on slender pedicels in pulvinate racemes. 2

14. HYSSÔPSUS, HYSSOP. (The ancient Greek name of the plant, from the Hebrew.) 2

H. officinalis, the only species, cult. in gardens from the Old World; much running wild; smooth tinted simple stems or branches to 2 ft. high; leaves lance-linear and entire; small clusters of blue flowers crowded in a terminal spike, in summer.

15. PYCANTHÉMUM, MOUND MINT or BASIL. (Name from Greek, μούντα, mountain; flowes, flowers.) Several species, all aromatic-scented, 1½ to 3 ft. high, in open fields or gravelly or sandy soil; flowers with pale corolla often purplish, in late summer and autumn. 2

P. incanum. Leaves pelted, entire or oblanceolate, usually coarsely, finely crenately serrulate above and white-gray beneath, those near the open flat cymes whitened both sides; bracts and calyx-teeth somewhat serulate.

P. multiflorum. Minutely crenately but hardly whitened, rather long, loosely-branched; leaves nearly lanceolate and entire, with crenate or slightly toothed (toothed) base, finely and sharply-toothed, rather rigid; flowers in loose or dense clusters; calyx-teeth and inner bracts rather long.

P. pilosum. Only from W. Penn. W. to downy with longer soft hairs; the broadleaf lancedolate leaves acute at both ends and nearly entire; whorled leaves at the end of the branches; the calyx-teeth and bracts lanceolate and acute.

P. aristatum. Only from New Jersey S. in pine-barrens; minutely sub-pubescent; leaves lance-oblong or broadly linear, rigid, almost entire; flowers in heads, with the narrow and sharp-pointed bracts and calyx-teeth as long as the corolla.

P. lanceolatum. Smoothish, not hairy, very leafy, bushy-branched; leaves small and clasped, narrow lanceolate or lance-linear, rigid, entire, digitate at base; flowers small, in numerous globose dense heads which are crowded in terminal axillary; calyx-teeth and bracts short, triangular; lips of the corolla very short.

P. linifolium. Like the last, less common N. S. smooth, with lance-linear leaves, and narrower sharp-pointed bracts and calyx-teeth.
16. ORIGANUM, MARJORAM. (Old Greek name, used to mean sweet or aromatic.) Natives of the Old World; sweet herbs. Fl. summer. 2.
O. vulgare, Wild Marjoram. Old gardens, and wild on some roadsides. 1½ – 2½ ft. high, with many opposite entire leaves, on short petioles, and purplish flowers in corymbous-petioled clusters or short spikes; calyx equally 5-lobed.
O. Majorana, Sweet Marjoram. Cult. in kitchen-gardens as an (3); leaves small and loosely soft-downy; the branches not colored; flowers white or purplish, with calyx hardly tubular but cloth nearly down on the lower side.

17. THYMUS, THYME. (Ancient Greek and Latin name.) Low or creeping slightly woody-stemmed sweet-scented plants of the Old World; fl. small, in summer. Leaves in the common species entire, small, from ½ to near 1¼ long, ovate, oblong or obovate with tapering base. 2.
T. Serpyllum, Creeping Thyme. Cult. as a sweet herb, rarely a little spicate; creeping, forming broad flat perennial turf; leaves green; whorls of purplish or flesh-colored flowers crowded or somewhat spiked at the ends of the flowering branches.
T. vulgare, Common Thyme. Hardy cult., more upright and bushy than the others, pale and rather hairy; flowers in shorter clusters.

18. SATURÉIA, SAVORY. (The ancient Latin name.) Aromatic. Fl. summer. 2.
S. hortensis, Sweet Savory. Low and loosely sweet herb of the gardens, sparingly wild. 3½ ft. with oblong-linear leaves tapering at base, and pale or purplish small flowers clustered in their axils, or turning into panicled spikes at the ends of the branches.

19. CALAMATHA, CALAMINTH. (Greek for beautiful Mint.) Fl. summer. 2.
§ 1. Flowers base in the axils, or loose tufts of flowers or panicles.
C. glabellá, A delicate native but uncommon species, only from Niagara Falls W. smooth, with weak stems 3½ – 20½ ft. long; with creeping runners, elong or almost linear leaves, or creeping, the loose purple flowers about 1¼ long.
C. Néptea, Basil-Thyme. Nat. from Eu. from Virginia S. soft-downy, branching, 1½ – 2½ ft. high, with obovate or ovate-oblong leaves, small and loose purple flowers, and calyx hairy in the throat.
§ 2. Flowers in terminal heads or head-like whorls, crowded with nearly globular bracts.
C. Clinopodiurn, Basil. Whorls of very small and nearly circular leaves, with rather simple stems 1½ – 2½ ft. long, ovate and nearly entire prismatic leaves, and pale purplish small corymb.

20. MELISSA, Balm-Bee-Balm. (Old name from Greek for bee.) Old-world sweet herbs. Fl. summer. 2.
M. officinalis, Common Balm. (Bees, sparingly wintering wild; rather hairy, branched, lemon-scented with ovate or oblong heart-shaped leaves, and yellowish or golden white flowers in small loose axillary clusters.

21. SALVIA, Sage. (From the Latin name, to save, from its reputed healing qualities.) 2.
§ 1. Wild Sav. of the country, all with blue or purplish white flowers.
S. lyra, Sandy soil from New Jersey to N. & S. 3½ – 2½ ft. high, rather hairy, with leaves mostly at the root and abscise or (in-shaped, and a smaller pair on the stems; whorls of flowers forming an interrupted cyme, capitellum hardly "U" long.


**MINT FAMILY.**

* S. urticifolia. Woodlands from Maryland S.: 1'–2' high, leafy, somewhat clamy-downy; leaves rhombic-ovate; racemes slender, the blue and white corolla only 1' long.

* S. azures. Sandy soil S. & S. W.: nearly smooth and green, with rather simple stems, 3'–5' high; leaves lance-oblong with sparing base, obsolete, or the lower acute; the showy azure-blue flowers (less than 1' long) numerous in a spike-like raceme.

* S. Pitcheri, from Kansas to Texas, is very like the foregoing, but minutely soft-hairy; occasionally cultivated, as is also

* S. farinosa, of Texas, with more pubescent oblong-lanceolate leaves, the spikes, calyx, &c., white-hairy, in contrast with the light blue corolla.

**2. GARDEN SAGE, cultivated for ornament, or the first species for its showy foliage.** Perennials, but more cult. as annuals, several yearly at base.

* Flowers blue.

* S. officinalis, Common SAGE, from S. Eu.: low, minutely hoary-pubescent, with oblong-lanceolate leaves finely reticulated-rugose and the margins crenulate, spiked flower-sheaths, and short corolla.

* S. patens, from Mexico: 2'–3' high, rather hairy, with crenate triangular-ovate or hallered-leaved, or the uppermost sessile ones oral, loose-petioled flowers, showy deep blue corolla over 2' long, the lips widely gaping and the stamens exerted.

* Flowers scarlet.

* S. splendens, Scarlet SAGE, of Brazil: smooth, with branching stems, acute pointed leaves, the floral ones and calyx as well as the corolla (P or more long) and with short lower lips bright maroon.

* S. fulgens, CARNIVAL or Mexican Red S., from Mexico: tall, pubescent, with crenate ovate or oral (few) heart-shaped at base and somewhat rugose, green calyx, and long-tubed downy deep seated corolla over 2' long, the style plumose.

* S. cocinea, from Tropical America: somewhat downy or soft-hairy, with praeate heart-shaped acute crenate leaves, oblong lanceolate, green or purple calyx, and smooth red corolla 1' or more with lower lip much longer than the upper one.

* S. pseudo-coccinea, from Trop. Amer.: like the last, but with tristy-hairy stems, less heart-shaped leaves, and corolla more or less pubescent.

* Flowers white.

* S. argentea, from the Mediterranean regions: cult. for its silver-white foliage, finely; the very large round-ovate root leaves clothed with long white wool; flowering stem and its sessile leaves, as well as calyx, &c. clamy-hairy; the white corolla with white-throated upper lip 1'/3 long and a very short tube.

**22. ROSEMARY. ROSEMANY.** (Old Latin name for the rose.)

* S. officinalis, from S. Eu.: not hardly N.; leaves evergreen, linear, crenate, with crenate margins, white hoary beneath, the upper with pale blue flowers in their axis.

**23. MONÁRDA, HORSE-MINT or BALM.** (Named for an early Spanish writer on the medicinal plants of the New World, Monardes.) Fl. summer.

* S. officinalis, from S. Eu.:: not hardly N.; leaves evergreen, linear, crenate, with crenate margins, white hoary beneath, the upper with pale blue flowers in their axis.

* M. didyma, Oswego Tea or Bee BALM. Wet ground N., and cult.; leaves petiolate; the floral ones tinged with red; calyx naked in the throat; corolla height red.

* M. didyma, Wild BERGAMOT. Rocky grounds; soft-hairy or smoothish; leaves petiolate; the floral ones often whitish; calyx very hairy or theConv. cont. rose-colored, purple, or white.
M. Bradburiana. From Ohio W., differs from the preceding in the angle leaves suffrutitious beneath, calyx continued above, and shorter corolla.

§ 2. Stamens not longer than the purple-spotted nectariferous upper lip of the short corolla, the tube of which is nearly enclosed in the ovary. 0 3

M. pinnatifida, House-Mint. Dry sandy ground, from New York to Ill. and S.; strong-spined and pungent, slightly hairy; leaves lanceolate, the floral leaves and bracts tinged yellow and purple; calyx-ear long and awn-like; corolla yellowish.

M. aurata. Plants from Missouri S. W., have only a few leaves below the throat and with awn-like teeth, the floral leaves and bracts conspicuously awn-tipped.

24. BLEPHILIA. (From Greek for splash, the bracts strongly dilate, the outer ones over.) Fl. summer.

B. ciliata. Dry ground, from Penn. N. & W.; leaves almost entire, ovate or obovate, white-downy beneath; outer leaves large, acute; corolla hairy.

B. nepetaloides. Low shady grounds N. & W.; hairy all over; leaves lanceolate sometimes heart-shaped in base on distinct pedicels; bracts smaller and very slender-pointed; corolla smooth, purple-spotted.

25. LOPHANTHRUS, GIANT HYSSOP. (Name from Greek for reed and flower, not very aromatic.) Wild in rich soil, chiefly N. & W., with ovate and toothed leaves; E. summer.

L. nepetaloides. Smooth, round, not sweet-scented; stem 4-6 ft high and sharply 4-angled; calyx-downy entire, bluish, almost equalling the dull yellowish corolla.

L. eucopharalis-Bioline. Resembling the preceding, but the oblong linear-angled stem and sharp-toothed leaves rather palish, the lanceolate acuminate calyx shorter than the purplish corolla.

L. anisatus. Wild from Wisconsin to N. W. and rare in cultivation; slender, with smooth-scented leaves white beneath, and calyx much shorter than the lavender-blue corolla.

26. NEPETA, CAT-MINT. (Latin name, from the city Nepeta.)

N. Cataria, CAT-MINT. Wet nat. from Eu., around dwellings and gardens: soft-downy, with oblong heart-shaped leaves deeply veined, and white flowers crowded in terminal clusters or spikes, in late summer.

N. Glechoma, GLECHOMA BAUERI, GIILL. Wet nat. from Eu. to waste or cult., shaded ground; creeping and spreading, with smoothish, rounded Hobbs-shaped scented leaves on slender pedicles, and light blue flowers in their axils, each pair of anther cells approaching and forming a little cross x 4. All spring and summer.

27. CEDELONELLA. (From Greek name of all of odor, alluding to the sweet aromatic smell of the foliage of the first species.) The cultivated species not hardy N.; 4. summer.

C. triphylla, BLOMED-GILDA of the English garden, here rarely cult., from Malta; very 3-serrate leaf of it usually alternate leaves; flowers purplish.

C. mexicana, from New Mexico, has simple lanceo-ovate leaves with heart-shaped base, over stems, and handsome rose-colored flowers in close clusters.

C. cordata, wild in shady groves from W. Punjab, S. S., but even here; less hairy, with long hairy runners, heart-shaped leaves, and scattered flowers, the Purpillar Corolla 1½ ft long, its throat inflamed.

28. PHYSOSTEGIA, FALSE DRAGON-HEAD. (Name from Greek words for inflated or blossoming of y.) Fl. all summer.

P. Virginiana. Wet banks of streams, from New York W. & S., in several varieties; 1½-4 ft high; leaves mostly semicordate, seldom either extended or rather dilated in the spikes; corolla pale rose-purple, 1½ or more long.
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29. BRUNELLA, SELF-HEAL or HEAL-ALL. (Latinized from the old German name.) Fl. all summer.

B. vulgaris. Low fields and copses. Low, spreading, with ovoid or oblong-pointed leaves, and 8 flowers under each of the broad and round purplish bracts of the head; corolla bright-purple or rarely white.

30. SCUTELLARIA, SKULL-CAP. (Name from Latin scutellum, a dish.) Fl. in summer, in species ours blue or violet.

§ 1. Flowers in racemes or spires, terminating the stem and branches.

S. versicolor. River-banks, from Penn. W. & S.: stem stout, 15–20 high, soft-pubescent, as are the heart-shaped very veiny and rugose remote and bluish-fungus-petioled leaves; spike-like racemes cymose-pubescent; corolla almost 1 long, the lower lip purple-spotted.

S. canadensis. From Penn. S. & W.: stem branching, 20–40 high; leaves petiolated, ovate or lanceolate, or some of them heart-shaped at base, the lower surface as also the nerves, and flowers white with very fine soft down, otherwise smooth; corolla 1/2 long.

S. pilosa. Pubescent with spreading hairs; stem nearly simple, 15–20 high, bearing rather distant pairs of roundish or oblong-ovate velvety leaves, the lower sometimes heart-shaped, upper on short-margined peduncles; nerves short, the leaves prostrate; corolla 1/2 long.

S. integrifolia. Along thickets: minutely hairy, 10–15 high; leaves lanceolate or linear, suberect, nearly entire, very short-petiolated; nerves short; corolla 1/2 long, much enlarged upwards.

§ 2. Flowers short-peduncled in the tails of some of the smaller leaves.

S. nervosa. Most ground from New York S. W.: smooth, 15–20 high, slender; leaves roundish or ovate, sparingly toothed, 1/2 long, those subtending the flowers ovate-lanceolate and entire, the racemose main veins prominent beneath; flowers 1/2 long.

S. parvula. Dry banks and shores, commoner W. & S.: low and spreading, 5–8 high; with roundish or lanceolate and slightly heart-shaped leaves 1/2 or more long, and flowers 1/2 long.

S. galericulata. Wet ground. S.: smooth; the slender simple stems 10–20 high; leaves ovate-lanceolate, sometimes with a heart-shaped base, acute, serrate; flowers 1/2 long, with arched upper lip.

§ 3. Flowers in axillary or near terminal one-celled racemes.

S. intermedia. Wet shady places: smooth, branching, 10–20 high, with lanceolate or oblong acute or roundish serrate leaves on slender peduncles; racemes rather leafy-branched; flowers 1/2 long.

31. MARRUBIUM, HOREHOUND. (Late Latin name, from Hebrew word for bitter.) Fl. late summer.

M. vulgare, Common H., from Europe, in gardens and waste places: branching, spreading, hoary-downy, with roundish ovate-lanceolate leaves on peduncles, and small white corollas.

Black Horehound, BALDOTA IBATA, of Europe, and naturalized in a few places N., is not hoary, and has purple flowers with a spreading hoary-edged border to the calyx.

32. GALEOPSIS, HEMP-NETTLE. (Name in Greek means like a weed: the likeness not at all obvious.) Fl. summer.

G. Tetraphila, Common H. Dry waste and clift grounds, nat. from Est.: a common weed, rather bristly-hairy, with stem swollen below each joint, leaves ovate and coarsely serrate, and corolla purple or variegated.

33. LAMUMLIUM, DEAD-NETTLE. (Name from Greek word for drown.) Low spreading herbs from Old World: Fl. spring and summer.
Ligulifolium. in nuce...J

L. purpureum. not so...but there is no obvious resemblance.)...Fl. late summer.

L. Cardiaca, Common M. Nat from Eu. in cult. and write grounds; tall; with palmately cloth long-petioled leaves, the lower rounded, the upper wedge-shaped at base; upper lip of pale purple corolla bearded. 2

S. lanata, from Europe: low, tufted; the stamina, oblong Malto-like leaves, densely tufted spike wholly covered with thick and silvery white wool, and very short dull purple corollas.

S. coccinea, Scarlet S., from Mexico, with ovate-oblong and heart-shaped palmate-leaves, and whorled flowers with bright red corolla, its tube often 1' long.

S. officinalis, WOOL B., from Europe, in many small crowded oblong spikes.

P. tuberosa., from E. Eu.: cultivated in old gardens; with stem 1'-2' high, flowers in capitate clusters, purple corollas 1' long.

B. officinalis, WOOL B., from Europe, has flowers many times smaller, in a more crowded oblong spike.

PI. tuberosa., from E. Eu.: cultivated in old gardens, sparingly run wild; stems 3'-5' high; leaves ovate or ovate-oblong and heart-shaped, crested, rough, smooth; flowers in remote and dense whorls; upper lip of the purple corolla white-hairy inside.
BORRAGINACEÆ, BORAGE FAMILY.

Mostly rough or rough-hairy plants, known from all related monocotyledons by having a deeply 4-lobed ovary, or apparently 4 ovaries around the base of a common style, each 1-ovuled, ripening into achenes or nutlets, along with regular flowers (Kniphofia excepted), stamens as many as the lobes of the corolla (3) and alternate with them, and alternate (mostly entire) leaves. In the Heliotrope tribe, however, the ovary is not lobed, but the fruit at maturity separates into 2 or 4 nutlets. Stigmas 1 or 2. Embryo filling the seed: no albumen. Flowers disposed to be on one side of the stem or branches, or of the branches of cymes, the raceme-like clusters coiled at the end and straightening as the flowers expand. Herbage not aromatic; juice commonly bitterish, often somewhat mucilaginous. Roots of several are red and used for dye.

I. BORAGE FAMILY PROPER, having the deeply 4-parted ovary as above. Our all herbs.

1. ECHIUM. Two of the spreading lobes of the corolla shorter than the others. Stamina aestivated, more or less protruding: Stamens and style long and slender. Stigmas 2. Nutlets erect, leathery, rough-wrinkled.

2. BORRAGO. Flowers, as in all the following, perfectly regular. A blunt scale at the base of each lobe of the dejected corolla, alternating with the conspicuous stamens. Filaments very short, broad, and with a cartilaginous, projecting, orifice behind the linear pointed naure. Nutlets erect.

3. MYOSOTIS, and O. HEMPHILLOIDES, from the short tube to the corolla may be sought for here.

4. BORRAGO. Corolla tubular, funneliform, or sub-tubular, sometimes almost wheel-shaped.

5. SERPENTARIA. Corolla very short, in the bud; the tube only about the length of the tube. Nutlets smooth and hard, fixed by their base. Low and small, mostly smooth, hairy plants, the small scattered flowers commonly flaccid.

6. SERPENTARIA. Scale or appendages of the corolla, compound one before the base of each lobe, and clawing or nearly clawing the orifice.

7. OPHIOPHORUS. Corolla with tube shorter than the rounded lobes. Nutlets smooth, depressed, and with a tawny hair-like top. Flowers singly or clustered: no bracts. Low smooth or smooth-hairy herbs.
1. **ECHINOSPERMUM.** Corolla with tube as short as the rounded lobes, the throat closed with short rounded scales. Nutlets erect, fixed to the central column or base of the style, triangular, roughened, and bearing one or more marginal rows of barb-tipped prickles, forming small bars. Cluster weak, with leafy-bracted racemose flowers.

2. **CYNAMATHIUM.** Corolla between short funnelform and wheel-shaped, the tube about the length of the rounded lobes; throat closed by the blanched scales. Nutlets oblong, oblique on the expanded base of the style, to which they are fixed by their apex, roughened all over with short barbed of hooked prickles. Corolla and winged-ribbed plants, with racemose flowers, the lower sometimes botant, and otherwise prussic.

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10. **LYCOPSIS.** Corolla with a curved tube, slightly oblique 4-lobed, and bristly-dairy scales in the throat. Stamina included in the tube. Nutlets rough-branched, erect, fixed by a broadened base. Corolla, rough-tomentose.

11. **SYMPHUTTUM.** Corolla straight, tubular-campanulate, with short spreading lobes which are somewhat longer than the large axil-shaped scales and the linear or lanceolate nutlets. Style slender, commonly protruding. Nutlets smooth, obtuse, fixed by a broadened base. Corolla bright, branching and leafy, with thickened or tuberous roots, the flowers usually fragrant and bluish, used in popular medicine. Flowers nodding in raceme-like often forked clusters, either naked or only-bracted at base.

### II. HELIOTROPE FAMILY

12. **HELIOTRITIUM.** Corolla short, constricted light yellow, the throat. Style very short, fruit conical-shaped, splitting at maturity into 2 nutlets each 2-valved. Otherwise as in Heliotrinius.

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1. **ECCHIUM, VIPER’S BUGLOSS.** (Name from Greek word for snake.)

**E. vulgare, COMMON V. or BLUEWEED.** Cult. from Eu. in old gardens, and a weed in fields. Penn. to Virginia. 1½–2½ ft. high, very rough-branched, with lanceolate sessile leaves, and showy flowers in racemose clusters, the purple corolla changing to bright blue, in summer.

2. **BORRAGO, BORAGE.** (Old Latin, supposed corruption of ore apo, from imagined capital properties.)

**B. officinalis, COMMON B.** Cult. from Eu. in old gardens, spreading, branched, with sharp and white spreading bristles; leaves oval or oblong-lanceolate; flowers loosely racemose, handsome, blue or purple, with dark anthers, in summer.

3. **MERTENSIA.** (Named for a Prof. Merten, of Germany.)

**M. Virginica, VIRGINIAN or SOUTHERN LEMONWORT.** Alkaloid soil. W. & S., and cult. for ornament: a very smooth and pale leafy plant, 1½–2½ ft. high, with aberrant entire leaves, those of the root long-peduncled, handsome flowers spreading or hanging on slender pedicles in loose racemose-like clusters, the light blue or at first purple corolla 1½ long; S. spring.

4. **ONAGROMÖDIIUM, FALSE GROMWELL.** (Name means false grom- me, an European genus of this family.) With plants of the country, mostly in rich soil, in dry or alkaloidal ground: flowers leafy-bracted, greenish or yellowish-white, in summer.
O. Virginianum. Clothed with hard, but appressed short bristles, 19—20 high, with oblong leaves, and lance-shaped-shaped lobes of narrow corolla sparsely hairy outside.

O. Carolinianum. From New York W. & N. shaggy with rough and spreading bristles, 25—40 high, with lanceolate or oblong-spatulate leaves, and tubes of rather broad corolla triangular and thickly hairy.

O. melle. Only W. hairy with softer and whitish appressed hairs, the oblong-cylindrical leaves strongly reduced, and lobes of the triangular-pointed lobes of the narrow corolla thicly hairy outside.

5. LITHOSPERMUM, GROMWELL, PEECOON. (Name from Greek, means many seed.) Flowers in late spring and summer, at length scented or so if-split, leafy-branched.

§ 1. Corolla white or only yellowish in the wholly naked throat, nearly longer than the corolla: petals rough-wrinkled and pulled, gray and short.

L. arvense. Ours, Gromwell. Not from Eu. in white dry soil, 6—12 high, roughish-hairy, with lanceolate or linear leaves and inconspicuous flowers.

§ 2. Corolla short, rather short, with little hairy scales or male petals in the throat; petals smooth or with a few pores, often ivory-white.


L. latifolium. From W. New York W. & S.: larger and rougher than the last, ornate and lanceolate pointed leaves 2—4 high and prominently pilose, those from the root larger and unibund; corolla shorter than calyx.

§ 3. Corolla bright orange-yellow, shaggy, longer than calyx, almost valve-shaped, with little appendages in the throat exserted; petals smooth, usually ivory-white.

L. hirtum. Hay Peecoon. Dry ground, chiefly S. & W.; 10—20 high, roughish-brightly, with lanceolate or linear leaves, of those next the flowers ovate-oblong and brightly-white, the crowded flowers pedunculed, tube of the corolla scarcely longer than the breadth of the border (1—17) and woolly-haired at base inside.

L. canadense, Hayley P. Mostly N. & W.: softer-hairy and somewhat hairy, 6—10 high, smaller-flowered than the preceding, and tube of corolla smooth at base inside.

L. longiflorum, only on prairies N. W., has linear leaves, and tube of corolla 11 or more long, many times longer than the croaked-soothed lobes.

S. MYOSOTIS, FOUGÉT-ME-NOT or SCORPION-GRASS. (Name in Greek means mouse-ear, from the short soft leaves of small species.) Fl. spring and summer.

M. palustris, True F., in gardens and some waste places, with loosely branched stems ascending from a creeping base, roughish-squaw-like, leaves, mostly 4—5 leafy shorter than the spreading peduncles, in hairs not looked nor glandular, and its leaves longer in fruit; corolla light blue with a yellow eye. — Var. laxa, wild in wet places N. has smaller flowers and still longer pedicels.

M. arvensis. Not rare in fields, &c., biennial, with lance-oblong squaw-like leaves, racemes naked at base and stalked, small blue corolla, pedicels spreading its fruit and longer than the 4—5 inch leaf, the leaves of which are closed in fruit, and the tube beak with some hooked or glandular-dipped hairs. ③

M. vernus. Dry hills: biennial-biennia, 6—10 high, branched from base, with obovate and blunt leaves, racemes leafy at base, very small mostly whitish corolla, pedicles in fruit erect and appressed at base, but oblong-beat outside and a new, and rather shorter than the unequal very badly-toka, some of the leaves hooked or glandular at their tip. ③
7. **OMPHALÔDES**.  (Name from the Greek, refers to the navel-shaped depression on the upper face of the fruit.)  Cult. from Eu. for ornament.

O. *spp.*.  Blue or Spring Navarret.  Spreading by buff runners; leaves ovate or somewhat heart-shaped, 2'-3' long, pointed, green; flowers antennate, blue, in spring.

8. **C. *spp.***.  Little N. Ever, 6'-12' high, loosely branched, very pale green, with broadly lanceolate leaves sparingly ciliate, the upper white, or bright flowers, and purplish nuts torted around the margin of the ovary.

9. **ECHINOSPERMUM, STRICKSEED.**  (Name of two Greek words meaning hedgehog seed, from the nutlets.)

E. *Convolvulus*.  Wild Comfrey.  Rich wood; bristly-hairy, 1'-6' high, with lanceolate leaves, small blue flowers, and nutlets with rough-tubercled back and thickly-grooved margins; F. all summer.  1)

C. officinalis, Comon H.  Common Shrub from Europe, common in pastures and woodlands: leafy, soft-hairy, with spatulate or lanceolate leaves, the upper ones closely sessile, crimson-purple, and flat somewhat margined nutlets.  2)

C. Virginicus, Wild Comfrey.  Rich wood: bristly-hairy; with simple stem leaves above and bearing a few convoluted naked terminals of blue flowers, the stem leaves lance-oblong with heart-shaped clasping base, the nutlets very convex.

C. Morisoni, Bagot's Lined.  Thicker and open woods: a common weed, 3'-6' high, with slender widely spreading branches, thin oblong-cuneate leaves tapering to both ends, furking and diverging terminals of very small white or bluish flowers on pedicels reduced in fruit, and convex barbted-pointed small nutlets.

D. officinale, Comon C.  Soft-hairy; the leaves winged by the decurrent bases of the oblong-lanceolate leaves; corolla yellowish-white.  Naturalized springing in moist grounds.

D. saméstricum, Bagot C.  Cult. in some gardens: stem and widely spreading branches exscently rough with short and somewhat revolved little prickles, not winged; calyx lobes short; corolla reddish purple in bud changing to blue.

10. **LYCÓPSIS, BUCKHOLLY.**  (Name of Greek words for self and face or aspect.)  European woods.  F. summer.  1)

L. *Arvense*, Field or Small Buckh.  Very rough-bristly weed, about 12" high, in sandy fields; 1'; with lanceolate leaves, and small blue corolla little exceeding the calyx.

L. *arvense*, Field or Small Buckh.  Very rough-bristly weed, about 12" high, in sandy fields; 1'; with lanceolate leaves, and small blue corolla little exceeding the calyx.

11. **SYMPHYTON, COMFREY.**  (From Greek word meaning to grow better or more, alluding probably to supposed healing properties.)  Cult. from Old World; F. summer.  2)

S. officinalis, Common C.  Soft-hairy; the leaves winged by the decurrent bases of the oblong-lanceolate leaves; corolla yellowish-white.

S. saméstricum, Bagot C.  Cult. in some gardens: stem and widely spreading branches exscently rough with short and somewhat revolved little prickles, not winged; calyx lobes short; corolla reddish purple in bud changing to blue.

12. **HELIOTRÓPIUM, HELIOTROPE (i.e., in Greek, turning to the sun).**  F. all summer.

H. *spp.*.  Spike only in pairs, or the lateral ones solitary; flowers white.  1)

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WATERLEAF FAMILY.

§ 1. Style 2-cleft: ovary and pod 2-celled, with two parietal placenta.
- These flowers and so loud that they line the ovary, and enclose the (usually 4) ovules and seeds: corolla usually consists in the bud, commonly with 5 or 10 folds, scales, or other appendages down the inside of the tube.

1. HYDROLYPHYLLUM. Calyx 4-petalled, sometimes with small appendages at the stamens, not enlarged in fruit. Corolla bell-shaped. Style and mostly hairy filaments prolonged; nanny lower. Pod small, glabrous, ripening into a small spherical seed. Flowers in crowded cymes or clusters. Leaves alternate, slender-compound.

2. NEMOPHILA. Calyx 4-petalled, with a reflexed appendage in each sinus, somewhat enrolling in fruit. Corolla open bell-shaped or wheel-shaped, longer than the stamens. Flowers solitary and intermixed. Leaves mostly opposite, at least the lower ones.
- Placentae narrow, adherent directly to the walls, or else borne on an incomplete partition and projecting into the cell, where they sometimes meet: tube of the corolla indurated in the bud.

3. PIACELIA. Calyx 4-parted, the divisions narrower; no appendages at the stamens. Corolla open bell-shaped, approaching wheel-shaped. Stigma and style often purplish. Pod 4-8-many-seeded. Leaves alternate. Flowers in unbranched racemes-like clusters or syconia.

4. WHITELAVIA. Corolla much bell-shaped or slightly contracted at the throat, the 4 short and broad lobes slightly and widely spreading. (Pod many-seeded.) Otherwise as the last section of Piacelia.

§ 2. Style 2 (rarely 3), opposite or in pairs to the base: ovary and pod 1-celled; seeds minute and very numerous.

5. HYDROLEA. Calyx 4-parted. Corolla open bell-shaped or approaching wheel-shaped, rather shorter than the stamens: filaments enlarged at base. Styles, or segments slightly, with entire leaves and often spines in their slips.

6. WIGANDIA, from South America, with very large rounded leaves and sharp or erect spines, is of late planted out as an ornamental herbaceous, but is in part-wooden.
1. HYDROPHYLLUM, WATERLEAF, is a translation of the name from the Greek, the application being to Plants of rich woods, i.e. Flowers white or bluish-tinted, in early summer.  

* Caryophyllaceae (Greek) from the Greek, the application of the name to Plants of rich woods, i.e. Flowers white or bluish-tinted, in early summer.

** H. macrophyllum. From Ohio W. & S. W.: rough-hairy, with leaves pinnately divided into 9–13 cut-toothed divisions or leaflets; a globular cluster of flowers on a very long pedicle.

** H. Virginicum. Very common N. & W.: smooth or smoothhairy, with ovate leaves, the lowest pair parted, and calyx-holes bistratified.

** H. appendiculatum. From New York W.: pubescent or hairy, with rounded leaves, once or twice pinnately divided, rather loose flower-clusters, and blyth-hairy calyx.

2. NEMOPHILA. (From the Greek, means "shining") Low spreading plants cultivated for ornament; all but the first from California:  

* N. macrophylla. From Arkansas S., and sparingly cult.; with somewhat stems 18–20 long, alternate leaves pinnately parted into 3–9 oblong entire-divisions, and purplish-blue flowers 1½ long.

* N. insignis. Smaller, pubescent, with lobes of the pinnate leaves entomological, and more blue nodules 1½ bread.

* N. moschata. Prolific, with leaves all opposite and mostly sessile, the leaves lance-pinnatifid, upper sparingly toothed, and white corolla with voice pitch on each lobe.

* N. atropurpurea. Prolific, leaves opposite, pinnatifid; corolla smaller, white spotted with brownish-brown spots.

3. PHACELIA. (From Greek work for a cluster.) Several species cult. for ornament:  

* Phacelia tanacetifolia, from Texas, &c.: slender, 1½ high, blue flowers in smaller clusters, and slender pedicels; corolla light blue or whitish, ½ bread.  

* Phacelia tanacetifolia, from California; taller, bristly-hairy, with narrower pinnatifid leaves, larger flowers in longer dense spikes, and longer stems.

* Phacelia tansy-leaf, from California; taller, bristly-hairy, with leaves twice pinnatifid divided into oblong teeth, flowers slender pedicelled in long loose masses, violet-blue corolla ½ or more long.

4. COMANTEUS, with 4 or 5 whole and seeds: lobe of corolla entire.  

* P. Parshii. Shady soil from Penn. S. W. & N., and cult. under the name of the next: slender, ½–1½ high: leaves of pinnatifid leaves several, lance-oblong: scent: flowers of the raceme numerous, on slender pedicels; corolla light blue or white, ½ bread; petals hairy below.

* P. T. T. Tansy-leaf, wild flowers on slender pedicels, bluish corolla less than ½ wide, and few seeds.

5. ETOCA, with seeds or at least seeds several or many: corolla-tubes entire.  

* P. parvisepala. Shaded banks from Penn. to N. Carolina, deephairy, little plant, ½–2½ high, with pinnately divided or cloth-leaved; a mass of five flowers on slender pedicels, bluish corolla less than ½ wide, and few seeds.
POLEMONIUM FAMILY.

P. viscosa, cult. from California as Ectera viridis; slender all over with dark glandular hairs, rather coarse; leaves ovate,齿状全缘, short-petioled, fascicles single, bracteolate at the bases; cymell deep blue, 1 of the wisps; pod many seeded.

2. WHITELAVIA. (Named by the lamented Professor Harvey for his friend Dr. Whitten.) Fl. summer.

W. grandiflora, cult. for ornament, from California: racemose flowers, slightly pubescent, the longer petals; racemose, ovary 1 or more locules; calyx 3-lobed, calyx teeth acute, rather slender, pubescent all over; stamens and style very slender and protruding.

3. HYDROLEA. (Named from Greek word for water: the plants aquatic in soil plant.) Fl. summer.

H. quadrivalvis, of R. E. State, has short petioles, oval leaves, tapetum, 10 to 15 long-follicles, ovary open with 2 valves, but the 2 mericarpels included, Ovary ovoid, with only one seed in each cell. Leaves entire and mostly smooth, the lower all opposite, upper often alternate.

H. affinis, of riverbanks, from S. Illinois N., is serrate, with short-petioled lanceolate leaves, and ovate seeds as long as the calyx.

H. ovata, of S. W. State, has whitish stems, oval leaves, slenderer, and numerous villous sepals.

82. POLEMONIACEAE, POLEMONIUM FAMILY.

Chiefly herbs, with regular flowers, persistent 5-lobed calyx, the 5 lobes of the monopetalous corolla convolute in the bud, 3-lobed style, 3-celled ovary and pod: the single, few, or many seeds in each cell borne on the thick axis. Embryo straight in the axis of alburn. Insipid and innocent plants, the juice watery. Nearly all are N. American plants, many cult. for ornament.

§ 1. Erect or diffuse herbs, not climbing, and with making convolute sepals.

1. PHLOX. Calyx ovate, persistent or divided, linear or oblong. Corolla silvery-purplish, with a long tube (Lessing, p. 104, fig. 86), in which the 5 short and nearly united stamens are included. Ovary often with 3 or 5 carpels, but the short petioles with only one seed in each cell. Leaves entire and mostly smooth, the lower all opposite, upper often alternate.

2. GILIA. Calyx tubular or bell-shaped, 5-lobed. Corolla of various shapes. Stamens equally inserted and projecting from the base of the corolla, and in the throat of Gilia, rather long and broad. Style with a short stigma. Ovary usually open, with 2 ovules in each cell. Leaves either entire, cut, or divided.

5. POLEMONIUM. Calyx bell-shaped. Corolla open, bell-shaped or short-dented form. Stamens shorter, like those of Gilia, but declinate, hairy-appressed at the base. Leaves pinnate, alternate.

§ 2. Tall-climbing by compound tendrils on the primary leaves: larger leaflets close to the stem, unlike the others, containing phlox.

4. CORLEA. Calyx of 5 large leaf-like divisions, the margins of which, applied each to each, appear like 5 winged sepals. Corolla bell-shaped, with short and broad spreading lobes. Stamens none. A short disk around the base of the ovary. Seeds numerous in each cell of the pod, winged. Peduncles axillary, 1-flowered, linear-branched near the base, naked above. Leaves alternate.

1. PHLOX. (Greek for flower, anciently applied to Ephedra, and transferred to these North American plants.)

§ 1. Cultivated for ornament from Texas: fl. all summer.

3. Drummondii. From this come all the annual Phloxes of the garden: rather low, branching and spreading, somewhat cuneiform-pubescent, with cymes of purple, crimson, rose-colored, or even white, showy flowers.
Polemoniaceae

\[22\] Wild in nearly dry or rocky ground, also common in gardens, where the species are much crowded and varied.

*Stems erect; flowers in whorls or compound panicles, with short peduncles and involucre; leaves of cordate, entire, pub-pubescent, and with white marginal

Wild from Pennsylvania S. and W.; \(\text{fl. summer.}\)

**P. paniculata.** Smooth, or some varieties roughish or soft hairy, 2-3 ft. high, erect; leaves oblong or oval-lanceolate and mostly with tapering base; paniculate; calyx-teeth sharp-pointed.

- **Stems ascending or erect, but often with a prostrate base, 3-5 ft. high; whole plant smooth, not clearing near the ground; flowers corollate; leaf of corolla rounded and entire.** Wild chiefly W. and N., seldom E.; \(\text{fl. summer.}\)

**P. Carolina.** Leaves varying from lanceolate to ovate, or the upper heart-shaped; flowers creamed, short-pubescent, pink; calyx-teeth acute.

**P. gloriosus.** Stems; leaves often linear-lanceolate, 3-4 ft. long; flowers few and loose, pink or white; calyx-teeth sharp-pointed.

- **Flowers in a long corymb, or in the first year, low, terminated by a low corymb, which is always-pubescent more or less, or as well as the main leaves; flowers mainly pedicellate; calyx-teeth very slender; \(\text{fl. late spring.}\)

**P. pilosa.** From N. Jersey to Wisconsin & S.; mostly hairy; erect; stems 1-2 ft. high; leaves heart-shaped or linear and tapering at a point (1-2 in. long); flowers loose, with spreading awn-pubescent calyx-teeth; leaves of pink, rose, or rarely white corolla oblong and entire.

**P. amethystina.** Barrens from Vt. to Ill. & S.; pubescent, spreading from the base, 1-1½ ft. high, leaves lanceolate, or broadly oblong or ovate on short stems, short; flowers in a crowded simple-stemmed corymb, with straight awn-pubescent calyx-teeth; corolla purple, pink, or nearly white.

**P. reptans.** Moist woods from N. and Kentucky S.; spreading by long runners, which bear woolly-awned or smooth-ciliated leaves, those of the low flowering stems oblong or ovate (about 1 in. long); flowers few but crowded; leaves of the deep pink-purple corolla round-obovate, large (1½ broad).

**P. divaricata.** Moist woods from N. New York W. & N.; soft-pubescent; stems loosely spreading; leaves ovate-oblong or broad-lanceolate (1½-2 in. long); flowers loosely corymbed and pubescent; corolla large, pale blue, blueish, or bluish-violet, the lobes wedge-obovate or commonly lacerately heart-shaped and as long as the tube.

- **a** Stems creeping and turbid, roots little above the ground, almost woody, perennial, as are the rigid and corymbose peduncle-pubescent leaves; flowers flat in the terminal clusters, in early spring.

**P. subulata.** (Desert or Moss Pink.) Wild on rocky hills W. & S. of New England, and sometimes in gardens, forming broad blades; leaves and-shaped of lanceolate, at most 5 in.; corolla pink-purple, rose with a darker eye, or varying to white, the wedge-obovate lobes generally notched at the end.

2. **GILIA.** (Named for one Gil, a Spanish botanist.) Species abound from Texas and Kansas to California. Several are choice annuals of the gardens \(\text{fl. summer.}\)

**G. coronopifolia, or Primrose, called Cypress Gilia.** From the foliage resembling that of Cypress-Vine: wild S. and N., has erect wand-liking stem 2½-3 ft. high, closely clothed with alternate crowded leaves pinately divided into thread-like lobes, and very long and narrow linear-lanceolate pinnate or linear flowers; the corolla tubular-siphoniform, light scarlet with white spots on the lobes inside, 1½ in. long. (Laurentius, p. 140, Fig. 393.)

**G. andromeda, or Lepidopus Andromedas, of California:** low and slender, with opposite leaves palmately divided into 5-8 narrow linear-divided lobes; flowers very long and slender but small salver-shaped corolla, light or white, with a dark eye. 

G. subulata.
G. tricolor, of California, with branching stems; about 1½ high, scattered alternate leaves 2-3 times pinnately dissected into short linear divisions, flowers pendant at the end of the branches, short funnel-shaped corolla with lilac-purple or white lobes, brown-purple throat, and yellow tubes.

G. capitata, of California and Oregon: 1½-2½ high, with alternate leaves twice pinnately divided into small linear or thread-like leaflets or lobes, and numerous small blue flowers crowded in heads at the end of naked branches; the corolla narrow funneled-form with lamellate lobes.

3. POLEMONIUM, GREEK VALERIAN, JACOB'S LADDER. (Ancient name, from the Greek word for war, or in honor of a philosopher or king named Philo.) F. early summer. 2

P. reptans. Weeks of Middle States, also erect: smooth, weak and spreading (not tapering) stems 6'-10' long, 7-11 alternate or opposite leaflets, small eyewash of nodding light blue flowers, and slender and style not longer than the calyx.

P. carolinum. Cult. in gardens from Eu., also rarely wild. N.: smooth or semi-matted; with erect stems 1½-2½ high, 2-7 mostly lamellate and crowded leaves, clusters of bright blue flowers collected in a long panicle, and stamens and style longer than the lobes of the corolla, which is 1½ broad.

4. COBREA. (Named for one Coba, a Spanish priest in Mexico, from whom the common species was introduced into cultivation.) 2

C. scandens. Smooth, tall, or long by its much branching tendrils; leaves ovate: dull purple or greenish corolla 2½ or more long, long filament-dangling sparsely when old; fr. small, usually erect, as an annual.

83. CONVOLVULACEAE, CONVOLVULUS FAMILY. Twining, trailing, or rarely erect plants, (very herb.) commonly with some milky juice, alternate leaves, no stipules; regular monopetalous flowers with 5 (rarely 4) imbricated sepals, as many separate stamens, corolla convolute or twisted in the bud, a 2-4-celled ovary and pod with only 1 or 2 ovules erect from the base of each cell, becoming large, seedlings with a curved or curled cleft-bicrested embryo in some mucilaginous (or when dry, harder) albumen.

I. CONVOLVULUS FAMILY PROPER; with ordinary foliage, axillary peduncles bearing one or more usually showy flowers, and embryos with broad leaf-like cotyledons folded and crumpled in the seed. (Lessons, p. 14, fig. 25-28.) Calyx of 5 separate sepals. § 1. Style simple and entire: stigma 1-3.

• Calyx united, i.e. not enclosed by a pair of leafy bracts.

1. QuAMOULIT. Corolla nearly salver-shaped or trumpet-shaped, with a long tube, the border not twisted in the bud. Stamina and style commonly produced. Stigma capitate, more or less 2-lobed. Ped 4-seeded: cells 1-seeded. (Lessons, p. 190, fig. 256, 257.)

2. RONDA. Corolla various, more commonly funnelform, the border twisted in the bud. Stamina mostly included. Stigma capitate, commonly 2-3-lobed. Ped 2-4-seeded.


• Calyx surrounled and enclosed by a pair of large leafy heart-shaped bracts.

4. CAltINTDEGI. Corolla open funnel-form, the wide-expanding border obscurely 3-lobed or entire. Stamina included. Style bearing 3 linear or obovate stigmas. Ped 4-seeded. Polunecn 1-flowered.
CONVOLVULUS FAMILY.

§ 2. Styles 3-cleft or 3 separate styles, rarely 5. Spreading or twisting, not twining.
5. BOLANIA. Like Convolvulus, but the styles 2 or sometimes 3, or in some species 4-cleft, and stigmas separate. Pedicellus 1-2-flowered.
6. CONVOLVULUS. Corolla short and open funnel-form, usually 3-cleft or 4-cleft.

II. DODDER FAMILY; slender parasitic twines, without green foliage and with only some minute scales in place of leaves; bybrob slender and spirally pitted in the seed, destitute of cotyledons.
1. CUNICULTA. Calyx 4-5-cleft, or 5 separate sepals. Corolla short, 4-5-cleft. Stamina with a slight disk nearly fringed appendage at their base. Styles 3, in our species. Ovary 3-celled; cells 2-ovuliferous. Pod commonly 4-ovuliferous.

1. QUAMOCIT. (Aboriginal Mexican name.) Twines, with small flowers red or crimson, and with pale or white cultivated varieties, at summer, open through the day.
Q. vulgaris, CYPRESS VINE. Greek—vulgaris. Calyx from Mexico; leaves pinately parted into slender almost thread-shaped divisions; pedicellus 1-flowered; border of the stamens corolla lobed. Q. cocinea. Differ from preceding. Ovary 2-celled; cells 2-ovuliferous; Pod commonly 4-ovuliferous.

1. IFOMBRÆA, MORNING GLORY. (Greek-made name.) Fl. summer.
§ 1. Ovary and pod 2-celled (or accidentally 4-celled), with 2 seeds in each cell; stygops more or less thickened; corolla funnel-form, opening in early morning for a few hours; stem twining freely, hairy, the hairs more or less retrorse.
Q. purpurea, CONVOLVULUS. Calyx from Trapa Amur and wild around dwellings; with heart-shaped painted entire leaves, 3-4-flowered peduncles, and purple sometimes verringed or nearly white corolla, 2-3 long.
Q. NEL. Cult. or rare wild N.: with heart-shaped 3-lobed leaves, 1-3-flowered peduncles, slender-pointed sepals, and blue-purple or sometimes white corolla 1-2½ long. Q. limbatia or albo-marginata, perhaps a var. of the preceding; a tender species, with leaves little lobed, angulated or entire, and larger corolla with deep violet border, edged with white 2½ broad. Q. Lecardii, from S. America: tender, less hairy, with heart-shaped and some deeply 3-lobed leaves, many flowers crowded on the summit of the peduncle, and deep violet-blue corolla, 3½ long and border 2½ wide.

§ 2. Ovary and pod 2-celled, the cells 2-seeded, or sometimes each cell divided by a partition making 4 one-seeded cells; tube of the stamens if any only 2.
1. Bous-Néx, or CAGANSTOON SPECIES. Calyx, also wild for 8; leaf-stem, very smooth, but stems often bear with soft almost pricky projections; leaves heart-shaped, 3½-cleft, or angled; peduncles long; 1-low-flowered; corolla salver-form with a slender tube 2½-4½ long and the border still broader, white, opening at evening.
1. RHOZALIS, Sweet Potato. Calyx, from East Indies; creeping, seldom twining, smooth, producing the large thinly edible roots for which the plant is cultivated; leaves variously heart-shaped, halfheart-shaped, or triangular, somewhat estipulated; pedicellus bearing 3 or 4 flowers; corolla funnel-form, purple, 1½ long; pod with 4 one-seeded cells.

1. Michauxii. Light soil along the coast S.; creeping or twining, with heart-shaped or triangular somewhat lobed leaves downy beneath; flowers downy; corolla purplish-white with purple eye, 3½-4½ long; opening at night; pod partly 4-celled, with silky seeds; root extremely large and fleshy.
1. panduraria, Wild Pine-vine or Man-of-the-Earth. Seeds on gravelly soil.Conn. to III. & S.; trailing or twining. Stem smooth, with heart-shaped and sometimes fiddle-shaped or hairless-tubed leaves, 1-3-flowered polyanthous, small hearts, and open funnel-form white corolla with deep purple eye, 2-3" long; zone very hairy and deep.  

2. pocillum. Semi-tropical, from North Carolina S.; smooth, with stems trailing 2'-3" high, or trailing, narrow lanceolate or linear-long-acuminate leaves, 1-3-flowered club-shaped polyanthous, and the bright purple funnel-form corolla 1-2" long.  

3. jacquemontia. Low ground, Penn. to Ill. and S.; trailing, nearly smooth, with heart-shaped nearly entire leaves, short 1-3-flowered polyanthous, small white-tubed corolla about 1" long and twice the length of the painted ciliate sepals, and slightly hairy pod.  

4. communis. Low grounds S. & W.; rather hairy, trailing; with thin heart-shaped and sometimes angled or 3-5-lobed leaves, 4-angular 1-5-flowered polyanthous about the length of the slender peduncles; purple corolla 1-2" long and 4-5 times the length of the painted ciliate sepals; pod hairy.

3. CONVOLVULUS, BOUND. (From Latin convolvere, to roll around or unwind.) Fl. summer.  

C. arvensis. Field Bindweed of Eu., is a weed on the coast S.; spreading and low-twining, smooth; leaves ovate-oblong and narrowshaped; peduncle 1-flowered; corolla white and reddish, less than 1" long.  

5. CALYSTEGIA, BRACTED BOUND. (From Greek words denoting the odor current, that is, by the breeze.) Fl. summer.  

C. sepium. Wildflower B. Wild in low grounds, also planted; trailing freely, sometimes also trailing, spreading by running rootstocks; smooth, also a downy variety; leaves triangular and bilobed-shaped or arrow-shaped, with the lobes at base obtusely truncate and sometimes toothed or serrate; peduncles 4-angular; corolla white or light rose-colored, 1-2" long.  

6. BONAMIA. (Named for F. Bonamy.) Low, small-flowered; corolla more or less silky or hairy outside; Fl. summer; chiefly S.  

B. humistrata. Dry past barrens from Vigin. S.; scarcely hairy or smoothish, leaves varying from along with heart-shaped base to linear; sepals smooth; corolla white, almost 1" long; filaments hairy; style united at base.  

7. BOVOLVULUS. (From Latin for swirl, that is, it does not twine.) Low and diminutive small-flowered plants, only S. Fl. summer.  

B. trivialis. Dry ground from Missouri S.; twined from a woody base, 5'-7' high, wholly woody all over, broadly lanceolate leaves crowded, mostly hairy at and near the flowers in their axils; corolla purple; 7' long.  

8. EQUATION. Dry ground S. & W.; smaller-scaled, silky, with few stipitate hairs, except the upper line of the membranous lanceolate leaves, corolla white or bluish, not 7' long.
7. **CUSCUTA, Dodder**. (Old name, of uncertain derivation.) Plants resemble threads of yarn, yellowish or redish, spreading over herbs and low shrubs, clinging around their branches, which they adhere to and rob of their juices. Flowers small, mostly white, cinerarian.

§ 1. **Stipagna slender**; pod opening by a transverse division all around near the base, leaving the portions behind. **Nettle of Europe**; fl. early summer.

**C. Epilimium, Plant Dodder.** Growing on flex, which it injures; occasionally found in our flax-fields; flowers globular, in scattered heads; corolla 5-petalled.

§ 2. **Stipagna erecta**; pods bursting irregularly if at all; wild species of the country, mostly in rich or low ground; fl. summer and autumn.  
- Flowers in rather loose clusters, mostly short-pedicelled, the style bristles fine and scattered; corolla 6-petalled.  

- Corolla with cylindrical tube, in fruit covering the top of the pod.

**C. tenuiflora.** On shrubs and tall herbs from N. Jersey W. & S.; in seashore: pair; tube of the corolla twice the length of its ovate acute spreading lobes and of the ovate blunt calyx-lobes.

**C. infula.** On shrubs and tall herbs in prairies and barrens W. & S.; corolla fleshy, mostly 4-leaved, its tube no longer than the ovate crenate crenulate or incised lobes of the corolla and the acute keeled calyx-lobes.

**C. decorata.** Wet prairies S. W.; with larger flowers, the corolla broadly bell-shaped, its 5 lobes lance-ovate and acute.

- - Corolla bell-shaped, remaining at the base of the ripe pod.

**C. arrénáris.** On low herbs, in fields and barrens from New York to Ill. A. N. W.; flowers earliest (June, July) and smallest; tube of corolla shorter than its 5 lanceolate pointed spreading lobes, much longer than the stamens.

**C. chlorocarpa.** On low herbs, in wet soil, from Delaware W. & S.; corolla-xerocarp; open bell-shaped corolla with lobes about the length of the mostly 4 acute lobes and the stamens; pod large, depressed greenish-yellow.

**C. Gronovii.** The commonest E. & W. and the only one N. E.; on meadow herbs and low shrubs in wet places; bell-shaped corolla with tube usually longer than its 5 (rarely 4) ovate blunt spreading lobes; its internal scales large and copiously fringed.

- - Flowers sessile in compact mostly continuous clusters, making large bunches or loose matted coils, when old crawling Open shaped about the stems of coarse herba or herbs.: edge of separate sepals narrowed by similar curved bracts: remains of the corolla borne on the top of the ripe pod.

**C. composita.** On shrubs, from N. York S. W.; bracts (3 – 5) and sepals round and appressed; tube of corolla cylindrical.

**C. glomerata.** On golden rod and other coarse Compositae, from Ohio W. & S. W.; the numerous oblong scarious bracts closely incrustated with recurved tips; sepals similar, shorter than the cylindrical tube of the corolla.

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**84. SOLANACEAE, Nightshade Family.**

Plants with rank-scented herbs (the and the fruit more commonly nark-capsaicin, colorless juice), alternate leaves (but apt to be in pairs and unequal), regular flowers with the parts usually in fives, but the calyx mostly 2-celled, the many-seeded placenta to the axis. The seeds have a shallow usually covered embryo in jelly albumen. (Liown, p. 15, fig. 34, 35.) The order runs on the one hand into Sierophyllaceae, which a few species approach in a somewhat irregular corolla, but their stamens are as many as the lobes. On the other hand the Nolana group is appended, which differs from all in its separate ovaries around a common style.
I. NOLANA FAMILY, with few or many separate ovaries collected in a circle or head around the base of a single style. Low and spreading plants.

1. NOILANA, Calyx 3-cleft, foliaceous. Corolla short and open funnel-form, planted in the back. Stamens 5: Style 1: Sepals capitate or elliptical-ovate. Ovaries 2-4-angled, becoming 1-angled in fruit or nutlets, each cell 1-seeded.

II. NIGHTSHADE FAMILY, proper, with only one 2-celled or sometimes 3- to 5-celled ovary as well as style, the many-seeded placenta in the axis, usually much projecting into the cell.

1. Corolla short, sessile, or parted into 5 or sometimes more divisions, peltate and rotate or the corolla turned outward in the bud: flowers short: anthers surrounding the style: fruit a berry.

2. LYOPOERISCOM. Like Solanum, except that the anthers are united by a membrane at their tips and the cells open lengthwise. Leaves prickly serrated.

3. SOLANUM. Stamens with anthers equalling or longer than the very short filaments, usually not united; the cells opening by a hole at the apex. (Lesson, p. 101, fig. 205, 206.) Leaves simple or pinnate.

4. CAPSICUM. Stamens with slender filaments much longer than the short and acute occasionally beak-shaped anther, their cells opening lengthwise. Berry sometimes dry and inflated, then becoming 1-seeded.

§ 1. Corolla between short and funnel-form, plaited in the bud, the border very amorphous, if at all lobed: anthers opposite; opening lengthwise: edge bladdery-enfolded after flowering, enclosing the globular berry.

5. PHYALIS. Calyx 5-cleft. Corolla mostly somewhat lobed. (Lesson, p. 200, fig. 206.) Stamens erect. Fruit a juicy, oblong edible, 3-celled berry.

6. NICANOA. Calyx 5-cleft and angulated, the divisions somewhat stream-lined. Corolla with widely-spread border entire. Fruit a dry 2-celled berry.


6. LYONICTUS. Calyx lobed, the spreading border becoming retrorse, encrusting the 2-celled pod, which opens by the tip falling off as a life. Corolla short funnel-form, with the plaited border more or less elliptical and unequal. Stamens declinate.

7. HYSTRICHOSUS. Calyx 5-cleft, the spreading border becoming retrorse, encrusting the 2-celled pod, which opens by the tip falling off as a life. Corolla short funnel-form, with the plaited border more or less elliptical and unequal. Stamens declinate.

8. ATROPA. Calyx with outer divisions, in fruit elongating and spreading under the glossy purple berry. Corolla between bell-shaped and funnel-form, with 3- or 5-lobed ovate lobes. Stamens and style somewhat declinate, slender.

9. PETUNTIA. Calyx with narrow somewhat arcuate lobes much shorter than the tube. Corolla funnel-form or somewhat tubular-shaped, the lobed border commonly a little unequal. Stamens included in the tube, unequal. Pod 2-celled, 2-valved.

10. HEMEROCALIS. Corolla with very slender thread-like tube (2-3 long), strongly expanded at the narrow throat into a narrow-shaped or almost wheel-shaped 5-lobed border. Stamens 5 or more, borne on the throat. Stamens united or somewhat 2-joined. Flowers scented.

11. NICOTIANA. Corolla with a regular 5-lobed border. Stamens inserted on the tube, included: filaments straight. Stamens capitulate. Pod 2-celled from the apex. Flowers more or less rounded or ovoid.

12. DROSA. Corolla funnel-form, strongly plaited in the bud, and with 3 or more pointed teeth. (Lesson, p. 100, fig. 210; p. 110, fig. 226.) Filaments
shrub. Stigma somewhat 2-lobed or 2-lobed. Pod globular, is the common species prickly and 2-lobed, but the leaves not becoming or falsely prominent. Flowers terminal or in the forks.

11. CENTRUM. Corolla tubular or club-shaped, the lobes folded or plaited longitudinally in the bud. Numerous included. Stigmas ovate. Drupes with few seeds in each cell. Berries few-seeded, red or reddish. Flowers solitary or compound, lateral.

12. LUCIFER. Parts of the flower often in fours. Corolla funnel-shaped, bilobed or tubular, the lobes imbricated in the bud. Stigmas capitate. Berries many-seeded, red or reddish. Flowers solitary or compound, lateral.

13. NOLANA. (From Latin nolana, little bell.) Cult. for ornament, from coast of Peru and Chile; the following proliferous and spreading, rather fleshy-leaved, smooth except some scattered hairs on the stalks, the showy blue flowers solitary on axillary or lateral peduncles, opening in sunshine, all summer.

14. SOLANDRIUM. Nigtshade, &c. (Derivation uncertain.) Flowers mostly in corymb or racemose-like clusters, in sunshine.

§ 1. More or less prickly herbs, with acute or acuminate lanceolate leaves.

1. Very prickly, nectar resembling the dry berry; rather pricky, waxy, one of the most handsome of the wild roses, and usually winter hardy. 1

2. ROSTRATUM. Wild on plains W. of Mississippi, and becoming a weed in some gardens, has yellow flowers, 1½-1½ in diameter.

3. P. leucanthum. Wild S. W. beyond the Mississippi, sometimes cult. for ornament, has violet-blue flowers, and the more divided leaves resemble those of American bullrush, but are very prickly.

4. A very much smaller prickly but not excluding the fruits; authors nearly equal.

5. Carolinenses, Horse-Nettle. Wild weed in sandy soil from Conn. and Virginia, 8½ high, with ovaries with stippled or smutted-leaved leaves, yellowish prickles, and pale blue or white flowers almost 1½ wide. 2

6. Scutellatiimum. Weed in India, into waste places 8½-8½, ½-½, ½-½, nearly smooth, with ovate waxy-lobed or smooth leaves, very small white flowers, and glabrous black berries said to be poisonous. 3

§ 2. Plants not at all prickly; authors listed.

7. nigra, Black or Common Nightshade. Low weed of shady places, much branched, nearly smooth, with ovate waxy-lobed or smooth leaves, very small white flowers, and globose black berries said to be poisonous. 4
S. tuberosum, POTATO. Cult. from Chilli for the edible tubers; leaves pinnate; of several distinct leaves and some minute ones intermixed; flowers rose or white; berries round, green.

S. Dalmarka, HIBBERTWORT. Not, from Eu. in moist cult. and waste grounds; smoothish, with tall stems woody at base and disposed to climb, orange and heart-shaped leaves; some of the upper ones backward-spatulate, or with two or three pairs of smaller leaves or lobes at base, corolla yellow-purple with a pair of greenish spots on the base of each lobe, and red red berries.

S. Jasminoides. Woody-stemmed houseplant from Brazil, tall-climbing by its stems, very smooth, with oblong, ovate or slightly heart-shaped entire leaves, or some of them divided into 3 leaves, and clusters of white or bluish flowers.

S. Pseudo-Capsicum, JERUSALEM CHERNY. Shrubby houseplant from Madagascar, cult. for the ornamental bright red berries, resembling cherrys; smooth, with lance-shaped entire leaves and small white flowers.

4. CAPSICUM, CAJANEO or RED PEPPER. (Named from the capsicum fruit, either bright red or yellow; stem pubescent, white.

P. Alkekengi, STRAWBERRY TOMATO. Cult. from S. Eu., and running wild. B., rather downy; leaves angular-oblong, pointed; corolla greenish-white, whole, not spotted; flowering calyx ovate, turning red; berry red.

P. Pennsylvanica. Smooth or somewhat hairy, but not downy; nerves varying from ovate or lanceolate (var. lanceolata), entire or sparsely wavy-toothed; corolla yellowish with a darker throat and slightly 5-toothed border; flowering calyx sunken at the base; berry red.

P. virosa. Clasping-pubescent, much branched, bushy; leaves ovate or heart-shaped and mostly toothed; corolla light yellow with dark brown center; flowering calyx truncate or slightly conic at base, sharply 3-toothed; berry orange or reddish, glabrous.

5. PHYSALIS, GROUND CHERRY. (Greek name for mildew, from the mildewed flowering calyx.) Fl. summer.

S. Physalodes, CALYX an red PEPPER. (Named from the capsicum fruit, either bright red or yellow; stem pubescent, white.

P. Dulcis, JUJUBE, or CHERRY PLUM. Cult. from W. Eu., and running wild. B., rather downy; leaves angular-oblong, pointed; corolla greenish-white, whole, not spotted; flowering calyx ovate, turning red; berry red.

P. angulata. Nearly round or obovate, angular-toothed; corolla brown-spotted in the throat; sharply 3-toothed flowering calyx, loosely enclosing the yellow or greenish berry.

P. angulata. Nearly round or obovate, angular-toothed; corolla light yellow with dark brown center; flowering calyx 16-toothed, loose, at length filled by the greenish yellow berry.

P. mileflorina. Almost smooth, erect; leaves ovate or oblong and oblong at base, slightly toothed or angular; corolla dark colored in the throat, over with; flowering calyx globe-shaped, completely filled by the large reddish or purple edible berry, and open at the mouth.

6. NICANDRA, APPLE-OF-PERU. (Named from the poet, Nicander.)

Only one species: Fl. summer.

N. physalodes. Tall smooth wood from Peru, wild in moist waste grounds; with ovate angulate or subovate-toothed leaves, and subglobose pods, bearing a rather large pale blue flower.
7. HYOSCYamus, BENEMAN. (Name of the Greek words for low and harm.) Fl. summer. \( \text{L. nar} \), Black Henbane, of Europe, cult. in old gardens, and a weed in waste places; clamyxy-two-part, strongly-angled, narcotic-poisonous; with deep-clefted, two-part, oval leaves, purple flowers in one-sided leaf-axillary spike, and dull yellowish corolla semi-ovate with purple.

8. ATROPA, BELLODONA. (Name after one of the Farn.) A. Belladonna, the only species, sparingly cult. from Europe: low and spreading, mostly smooth, with white or purple painted leaves, flowers single or in pairs nodding on lateral peduncles, dull-purple corolla, and handsome purple berry; whole plant poisonous, used in medicine.

9. PETUNIA. (Pete is an aboriginal name of Tobacco.) Cultivated as garden-annuals, from South America. The common Petunias are of the two following species and their hybrids: herbage clammy-pubescent, flowers large and showy, in summer.

P. nictitans, with originally white corolla, the long narrow tube 3 or 4 times the length of the calyx.

P. violacea, with much the more common, with weaker stems, and violet-purple or rose-colored corolla, the broader and ventricose tube hardly twice the length of the calyx.

10. NIEREMBERGIA. (Named for J. Niehemey, a priest and botanical collector in Buenos Ayres, whence the common species comes.) \( \text{L. gracilis} \), Cult. for ornament under many varieties, low, with slender bushy branches, small linear or spatulate-linear leaves, and scented flowers produced all summer, white or violet-tinted with purple.

11. NICOTIANA, TOBACCO. (Named for John Nicol, one of the introducers of Tobacco into Europe.) Rank, aerial-narcotic, mostly clammy-pubescent plants, chiefly of America; leaves entire or merely wavy-margined. Fl. summer.

N. Tabacum, COMMON T., the principal species cult. for the foliage: 4'-6' high, with lanceo-valve deciduous leaves 1'-3' long, or the upper lanceolate, pubescent flowers, and rose-purple fringed corolla 3' long, with somewhat inflated throat and short lobes.

N. rustica, a weed in some places, is a low handsome plant, with ovate and pointed leaves 3'-5' long, and green tubed-form corolla 1' long, contained under the short round lobes.

N. langsdorfii, in slender, 3'-5' high, cult. for its handsome white flowers, which open toward evening; corolla silver-shaped, the green tube 4' and the bluish-green wide lobes 3' long; leaves lanceolate, undulate.

N. noctiflora, its handsome white flowers also opening at evening (as the same genus), is similar to last, but with ovate-lanceolate pointed leaves, tuft of corolla only 2'-3' long, and its roundish lobes much at the end.

12. DATURA, THORN-APPLE, STRamonIUM, etc. (Name altered from the Arabic.) Rank-seated, mostly large-flowered, narcotic-poisonous weeds, or some ornamental in cultivation. Fl. summer.

D. stramonium, COMMON T. or Jamestown's-Weed. Waste grounds: smooth, with green stems and white flowers (3' long); leaves ovate, suddenly-toothed.

D. pulchra, PURPLE T.: A weed very like the last, but rather taller, with purple stem and pale violet-purple flowers.
GENTIAN FAMILY.

§ 2. Pod swelling on the short recurved pedicels, entire or hirsute, herbage irregularly, otherwise as in the foregoing section; flowers large, showy. Call flowers nearly round for ornament. § 2.

D. Métel. Clamyde-pubescent; leaves lanceolate or obtuse and angular-pointed; corolla white, the 10-toothed border 4 wide.

D. meteloides. Cult. from New Mexico; (sometimes under the name D. Whitei); like the other, but pale, almost smooth, the flower long-pointed, and the corolla with more expanded 5-toothed border 3–4 wide, white or pale violet.

§ 3. Flower and smooth 2-toothed ped hanging, the former very long, 6–10 long; regular petals when broadest after flowering. Tropical American treelike shrubs, cult. in conservatories: flowers mountain showy.

D. arboreus. Has ovate or lance-shaped entire or angled pubescent leaves, long teeth to the corolla, and unmodified anthers.

D. suaveolens. Has mostly entire and smooth leaves, short teeth to the corolla, and the anthers sticking together.

18. CÉSTRUM. (Name given by the Greeks to some different plant, the derivation obscure.) Shrubs of warm climates, chiefly American; a few cult. in conservatories.

C. elegans, or HAUROTIES‘ ET.1L0ANS, from Mexico, in the botanical and lower fi.ee of the "wily-"or-out going pointed leaves, downy-pubescent leaves, terminal corollas, and rose-purple club-shaped corollas less than 1 long.

C. nocturnum, from W. Ind.; with smooth ovate leaves, and subulaceous clusters of yellowish green slender flowers, very sweet-scented at night.

C. Parqui, from Chili; has incomplete smooth leaves very acute at both ends, and a terminal panicle of crowded spike or mass of violet-tealetform or partly club-shaped dull-yellow flowers, fragrant at night.

14. LYCIUM. (Named from the country of the original species, Lyric.) Twining, climbing, or low spreading shrub, usually spiny, with small leaves, often clustered on lateral spines, and small flowers, in spring and summer.

L. vulgare, MATRIMOY VINE. From the Mediterranean region; planted, and sparingly running wild in some places, slightly toothy, with very long and little recurved or almost climbing branches, subulaceous-leaved, slender stalked flowers clustered in the axils, and pale greenish-purple bell-shaped corolla about equalling the 5 stamens.

L. Carolinianum. Wild in salt marshes; low, spiny, with finely thickened almost club-shaped leaves, scattered small flowers, and 4-clawed purple corolla shorter than the 4 stamens.

85. GENTIANACEE, GENTIAN FAMILY.

Known generally from the other monopetalous plants with free ovary by the 1-celled ovary and pod with 2 parietal placenta covered with small seeds, along with regular flowers, their stamens as many as the lobes of the corolla and alternate with them, and the leaves opposite, simple, entire, and sessile, without stipules. The exceptions are that in some cases the ovules cover the whole inner face of the ovary, and in one group the leaves are alternate and even compound. They are nearly all very smooth and bitter-tasting plants, with colorless juice, the only persistent. Our herbs, none in common cultivation.

§ 1. Leaves opposite or whorled and entire, sessile. Corolla with the lobes mostly rounded in the bud, sometimes still pointed in the flowers.

—Style slender, divided from the pod; anthers nearly covering.

1. SABBATIA, AMERICAN CENTURY. (Named for Sabin, an Italian botanist.) chiefly in sandy and low or wet grounds, along the coast (with one or two exceptions): flowers white or pink, usually hand-shaped, in summer.

- Flowers white, 5-petalled, numerous in vases or corollas, without or 1/2 bread.

2. paniculata. Low grounds. S. 3. stem 1-2 high, with 4 sharp wing-like angles; leaves linear or oblong, nearly 1-served; lobes of the corolla little larger than the narrow-oblong calyx-lobes.

3. lanolacata. From New Jersey S. taller, larger-flowered, with lance-oval 3-served leaves, or the upper ones lanceolate and distant, acute; lobes of corolla much exceeding the trident-shaped calyx-lobes.

4. macrophylla. Only S. 20-25 high, glabrous, with more stem, thickish lanceolate 3-5-served leaves, and lobes of smaller corolla very much exceeding the bristle-like calyx-lobes.

- Flowers rose-pink, very bright, with petaloids or greenish eyes, 5-petalled, in paniculose clusters, 1-2 or more bread. In rather dry ground, much branched above; 10-30 high, the only species which extend W. to Illinois, etc.

5. brevifolia, echinate S. has slightly angled stems, linear or narrow-oblong leaves, and larger flowers only 1/2 bread.

6. angularis, from New York S. & W., has wing-like angles to the stem, ovate or heart-shaped 3-served leaves, and corolla 1/2 bread.

- Flowers rose-purple or white, 3-6-petalled, 1/2 or less bread, scattered singly or in loose peduncles; stems slender 2-30 high, commonly forked, nearly triangular. All grow in swamps or near the coast.

7. calylocha. Only from Virg. S. has oblong pale leaves narrowed at base, and lance-oval-oblong calyx-lobes longer than the narrowly white corolla.

8. stellaris. From Mass. S. has lance-oblong leaves or the upper linear, and linear calyx-lobes shorter than the rose-purple yellowish red corolla.

- Flowers bright rose-color or white, 7-12-petalled, very hand-some, 1/2-1 bread; stems simple or sparingly branched, 20-25 high.

9. chlorides. Among sandy ponds, from Plymouth, Mass. S. broad lanceolate; peduncle 1-served, slender; calyx-lobes linear.

- Flowers short-petalled or sessile, clustered.
2. FRASERA, AMERICAN COLUMBO. (Named for John Fower.)

F. Carolinensis. Rich wooded ground W. & S.; root strong, bitter (used in medicine as a substitute for Columbo); stem 30°–80° high; leaves mostly in layers, lanceolate; corolla 1° wide, greenish yellow or whish, and dark dotted. 2

3. GENTIANA, GENTIAN. (Old name, from Gentius, king of Illyria.)

Chiefly in woods and damp ground: flowering chiefly in autumn, and in summer.

§ 1. Corolla without plaits at the sinuses; anthers separate; seeds wingless.

G. quinqueflora. Breastingly: leaves crass-lanceolate or slightly heart-shaped at base; flowers pointed, hardly 1° long, the 3 lobes of the pale blue corolla triangular-ovate, blister-pointed.

G. crinita, FERNLEAF GENTIAN. Low grounds N. & S.; leaves laminata or broader, with rounded or heart-shaped base; flowers solitary on long peduncles terminating the stem or simple branches; calyx with 4 unequal lobes; corolla sky-blue, slender, 2° long, four-angled, the 4 wedge-lanceolate lobes with margins cut into a long and delicate fringe.

G. ditsoniana, takes the place of the preceding species N. W., and is perhaps a variety of it: has longer leaves and less fringe to the corolla (to which the name alludes), often none at the top of the lobes.

§ 2. Corolla noded, 1½–2° long, with plaits at the sinuses, which project more or less into both or the intermediate lobes; pod stalked in the corolla.

• Stems low, bearing 1–3 decuss-peduncled flowers: with wingless.

G. angustifolia. Pine barrens from N. Jersey S.: 6'–15' high, with linear leaves and open funnel-form azure-blue corolla 2' long, its lobes oval; another separate;

• Stems 10–20 h(lq nl, year's c{ltcstped or rare 2-blotedjolO fr8 at the summit qf thc ci!fi; stem, alld qflell il/ the "1'/0' ev:i/s .. "0.

Corolla between bell-shaped and short funnel-form or oblong, mostly open, with acute lobes exceeding the usually twisted appendages of the placenta.

G. ochroleuca. Chiefly from in dry ground: leaves ovate or spatulate-lanceolate, narrow at the base; calyx-lobes linear; corolla greenish-white with green and purplish stripes inside, somewhat bell-shaped; anthers separate; seeds wingless.

G. Alba. Along the Alleghenies and N. W.: flowering at midsummer; leaves lanceolate from a partly heart-shaped base, tapering thence to a point; calyx-lobes ovate, short; corolla yellowish-white, with short and broad lobes; anthers conning; seeds broadly winged.

G. puberula. Dry barrens and prairies W. & S.: low, roughish, or minutely pubescent, with lance-olung, ovate, or linear rough-emarginated leaves only 1–2° long; calyx-lobes intestinate; corolla bright blue, open, its spreading ovate lobes 2 or 3 times longer than the cut-s Shed intermediat appendages; seeds not covering the walls of the pod, as they do in the related species.

G. lapponica, SOURWORT G. Low woods, chiefly N. and along the Alleghenies; leaves lanceolate, oblong, or ovate, or in a northern variety linear, narrowed at base; calyx-lobes linear or spatulate; corolla light blue or verging to white, little open, its short and broad lobes longer than the conspicuous 2-fold intermediate appendages; anthers conning or united; seeds narrowly-winged.

— — Corolla more club-shaped and wider open, trunnent, with no proper lobes.

G. Andrewsii, LEAF-CLAWED G. Woods especially N.: leaves lanceolate or lance-oblong with a narrowed base; calyx-lobes ovate or oblong, short; corolla blue (rarely a white variety), its proper lobes if any shorten thin the wide and more conspicuous winged-appendages and notched appendages which terminate the folds; anthers connected; seeds broadly winged.
LOGANIA FAMILY.

4. DARTONIA. (Named for Prof. B. S. Darton, of Philadelphia.) In- significant herbs, with ovate-shaped leaves, and a few pale yellowish-white flowers.

D. tanella. Leaves: 9" - 10" high, with branches or peduncles 1 - 3-flowered; lobes of corolla oblong, tubular; ovary 4-angled; 8. summer.

D. verta. Leaves, only 8; smaller, less branched, 1 - few disunited; flowers larger, in early spring; lobes of corolla sprinkled, obscure; ovary flat.

5. MENYANTHES, BUCKBEAN. (Named from Greek words for mouth and flower; application yet obscure. The popular name from the leaves, somewhat resembling those of the Horsembeam.)

M. trifoliata. Cold wet banks; lilac late spring; corolla white or tinged with pink; scape hardly 1" high.

6. LIMNANTHEMUM, FLOATING-HEART. (Name derived of Greek words for vegetable and flower.) But our species grow in water, and produce through the summer the small white flowers, accompanied by spear-like thick leaves, probably of the nature of roots.

L. lacunosum, is common E. & N.: leaves 1" - 2" long, on very slender pedicles, entire; lobes of corolla broadly oval; seeds smooth and even.

L. trachyphyllum, in deeper water, from Maryland S.: leaves rounded, 2" - 4" broad, very-margined, roughish or dark-pitted beneath; peduncles slender; seeds roughened.

86. LOGANIACEAE, LOGANIA FAMILY.

Known among monopetalous plants by having opposite leaves with stipules or a stipular line between their bases, along with a free ovary; the flower regular or nearly so, and stamina as many as the lobes of the corolla and alternate with them.

§ 1. Woody-twining climber, with reed-like stems and apex flowers.

1. GELSEMIUM. Clyps 6-merous. Corolla open funnel-shaped, the 6 lobes broad and intertwined in the bud. Stamens 6, united into a tube, 2-ribbed, fused, and corona lobes lanceolate. Pod oval, flattened, coarsely tined in the partition, brown, many-seeded. Seeds winged.

§ 2. Herb, not climbing.

2. SPIGELIA. Clyps 4-merous, the lobes narrow, corolla tubular and somewhat involute at the base. Stamens 4, united into an ovate tube in the bud. Style 1, slender, hairy above, jointed near the middle. Pod short, 2-ribbed, brown, thin, ribs separating across near the base which is soft behind, and splitting for a calyx.

MITRIFOLIUM, of the Bombay, comprises a couple of quite inconspicuous words, and POLYDOCHUS, also S. is a common weedy plant; both wholly insignificant, as well in the herbage as in the minute white flowers.

1. GELSEMIUM, YELLOW JASMINE of the South, the name as Italian one for Jasminum, but of a different order from true Jasmine.

G. sempervirens, our only spec., low grounds from E. Virg. S., climbing trees, bearing shining lustrous small leaves (evergreen for S.), and a profusion of axillary clusters of bright yellow very fragrant handsome flowers (V or more long), in early spring.

S. SPIGELIA, FINE-ROOT or WORM-GRASS. (Named for Adrian Spiegel, botanist.) Fl. summer.

8. MARILAMBICA, MARYLAND P. Rich woods, from Penn. W. & S., nearly smooth, 1" - 10" high; leaves oval, lanceolate, semi-stout, stems: flowers simple or forked spike-like clusters terminating the stem or branches; corolla 13" long, slender, handsome; pod linear, yellow within, the lobes lanceolate; root used in a vermicelli.
87. APOCYNACEAE. DOGBANE FAMILY.

Herbaceous or woody plants, known mainly by the milky acid juice, opposite (sometimes whorled) simple and entire leaves, without stipules, and regular imperfect flowers with 5 in the calyx, corolla, and stamens, the lobes of the corolla convolute or twisted in the bud, the anthers coiling around the stigma or often adhering somewhat to it, ordinary pollen, filaments separate, the 2 free ovaries commonly separate, but often the styles and always the stigmas united into one. The ovaries also are often united into one, the juice in several (as of Periwinkle and Oleander) is not at all or slightly milky, and one of our genera has alternate leaves. Some are ornamental in cultivation, many are poisionous. There is commonly a ring, membrane, or other appendage on the style below the stigma, to which the anthers are apt to adhere.

§ 1. Herbs or shrubs, for ornament, natives of warm climates: leaves of flower-stalk.

3. ALLAMANDA. Corolla large, yellow, with short tube abruptly expanded into cylindrical bell-shaped or funnel-form, the 5 lobes broad and rounded. Stamens at the summit of the proper tube or throat, alternate and coiling with as many 2-petaled narrow scales. Ovary one and bivexile, with 2 partial placentae, bearing a prickly pod. Style slender. Seeds small.

5. NEUROCAUM. Corolla scarlet or crimson or the long tube narrow funnel-form, the throat convolute with 3 slender-tubed scales. Stamens on the middle of the tube: anthers 2-crenate at base and tapering at the apex into a long hairy twisted appendage. Style 1. Ovaries 2, becoming pods. Seeds tufted.

§ 2. More or less woody-stemmed twiners, with opposite leaves.

8. ECHITIS. Corolla funnel-form or salver-shaped, naked in the throat. Filaments very short. Style 1. (Waratah) 2, becoming 2 long bearded pods. Seeds ovate or subulate.

4. FORSTERONIA. Corolla funnel-form, nearly as in Echites, but the flower small, and filaments slender.

§ 3. Herb. (or more or less woody plants, not twiners: look usually ascending with tough foliage: flower 4-5.)

6. VINCA. Corolla salver-shaped or the tube funnel-form, the throat narrow and naked. Stamen inserted on the upper part or middle of the tube: filaments short. Style 1, slender. Pods oblong at each end, thickened at the margin, the hard species tuberous or cormous. Seeds with a long tuft of silky hairs at one end. Upright or sprawling herbs, with small pale or white flowers in terminal cymes or corymbs, and very tough fibrous bark. (Echites.)

7. AMSONIA. Corolla salver-shaped or the tube somewhat funnel-form, hairy inside, without appendages at the throat, the lobes long and linear. Stamens inserted on and included in the tube: anthers glabrous at both ends. Style 1, slender. Pods long (4-6) and slender. Seeds cylindrical, smooth at both ends, with no tuft. Upright herbs, with terminal金字塔-shaped of bluish flowers.

1. ALLAMANDA. (Named for Dr. F. Allaman, who discovered the unknown species in Guinea.)

1. A. cathartica. A woody shrub of the conservatories, with bright green elongate thin-foliate leaves, and golden-yellow flowers 2½ - 3 long. (Named for Dr. F. Allaman, who discovered the unknown species in Guinea.)
2. NERIUM, OLEANDER. (The ancient Greek and Latin name.) Leaves profusely, rigid, closely and transversely sinous. Flowers showy, in terminal cymes, in summer, deep rose-color, or with white varieties, either single or double.

N. Oleander, the OLEANDER of common horticulture, from the Levant: leaves lanceolate; appendage surrounding the anthers scarcely protruding; flowers large, scented.

N. odoratum, Sweet O. law. cells. from India; more tender; leaves linear-lanceolate; appendage of the anthers protruding; flowers fragrant.

3. ECHIANTHES. (Name from Greek word for a trip.) Plants from the warm parts of America, one not rare as a conservatory climber, viz.

E. quadrifolium, or MANTELLE, PRUINOSA, Catti, shrubs, slender woody-stemmed tall twiner, with thin shining or caudate heart-shaped pointed leaves, and slender peduncles bearing a few roundish very fragrant flowers, the white corolla with amply 2-lobe shaped, if broad.

4. FORSTERONIA. (Named for an English botanist, T. F. FORSTER.) F. diffusus, in law. genus from Virginia S. & W., is a lowly woody twiner, the flowering branches herbaceous and showy; leaves thin, oval-lanceolate, pointed, or sometimes linear, narrowed into a petiole; flowers 1' long, in cyms, greenish-yellow, all summer.

5. VINCA, PERIWINKLE. (Latin name, from a word meaning to bind, from the thread-like stems.)

V. minor, COMMON PERIWINKLE, in all country-gardens, spreading freely by the creeping succulent stems, winged, with crevices taking-ovate shining leaves basally 13 long, and almost twining velvety-shaped flatly in the corolla; 8. early spring.

V. major, LARK F., not quite hardy N., a variety with variegated leaves is most cultivated, larger than the first species and leaves wider, the lobes of the corolla more equal.

V. herbacea: not evergreen; stems reclining and rooting; leaves lanceolate, bases of the more purple-like corolla oblong-obovate; 8. late spring.

V. rosea, house and heading plant from West Indies, with oblong-petioled very juicy, and short corolla with slender tube and very narrow corolla, rose-purple, or white, with or without a pink eye.

6. APOCYNUM, DOGANE. (In which the name in Greek refers, to the hedges.)

A. andromedifolium, spreading to branching, mostly N.: branches branching and widely spreading; leaves ovate, petioled; corolla open bilabiate with spreading lobes.

A. cannabinum, COMMON INDIA HEMP. Gravely or wet banks of streams: branches more erect; leaves oblong, lance-oblong; corolla, or slightly heart-shaped; flowers more crowded and erect; bases of the corolla little spreading.

7. AMSONIA. (Named for Mr. Charles Amson.) Low ground-climber.

A. taberimensana, Leaves varying from erect or lanceolate, not at each end, pale beneath.

A. elegans, Leaves linear or lanceolate-lanceolate, the margins and mostly the stems less with some scattered shrubs.
MILKWED FAMILY.

88. ASCLEPIADACEAE, MILKWEED FAMILY.

Plants with milky juice, leaves, pistils, fruits, and seeds nearly as in the preceding family, but the anthers more connected with the stigma, their pollen collected into firm waxy or granular masses (usually 5), the short filaments (monadophous except in the last genus) commonly bear curious appendages behind the anthers forming what is called a crown, and the corolla more commonly valvate in the bud. The flowers are rather, too difficult for the beginner readily to understand throughout. For a particular study of them, the Manual must be used.

§ 1. Erect herbs, with ordinary foliage, and deeply 5-lobed repressed calyx and corolla. Flowers in simple waxy, fruit a pair of pods ( follicles) containing numerous flat seeds narrowed with a coma (Lawson, p. 139, fig. 497) or long leafy shoot arms at each end.

1. ASCLEPIAS. Stems with their short filaments monadophous in a ring or tube, bearing behind each anther a curious erect and broad-like or ear-like appendage, with a bend projecting out of the inside of it the broad anthers closely surrounding and partly adhering to the very thick stigma, a membranous appendage at their tip infected over it. Each of the 5 cells of the anther has a firm waxy-pear-shaped pollen-mass in it, and the two adjacent masses from two contiguous anthers are appended by a stalk from a dark gland; these 5 glands, borne on the margin of the flat top of the stigma, stick to the legs, or of in ex, and are carried off each gland being with it 2 pollen masses, the whole somewhat resembling a pair of middle-bugs. A

2. ACERATIS. Like Asclepias, but no horn in the hood or corolla appendages, and the flowers always greenish.

§ 2. Twining plants with ordinary foliage; pods and seeds nearly as in Asclepias.

7. EULALEIA. Calyx and corolla 5-parted, the divisions lanceolate and nearly erect. The 5 appendages of the filaments are in the form of numerous numerous matters, each bearing a pair of seeds on their truncate tip, Herb.

8. VRONTOCOCHIA. Corolla 5-parted, wheel-shaped. A flat and flabby 3-lobed disk or crown in place of the heads of Asclepias. Herb.

7. GONIOLEUCA. Corolla wheel-shaped: a tooth and warty-edged ring or crown in its throat.

7. The 10 pollen-masses horizontal, fixed in pairs to 5 glands of the stigma.

7. GONIOLEUCA. Corolla wheel-shaped: a tooth and warty-edged ring or crown in its throat.

7. The 10 short pollen-masses fixed by their bases in pairs to 5 glands of the stigma, and erect. Developing glands of tropical regions.

7. HOTA. Corolla 5-parted, 3-lobed, thick and wax-like in appearance. Crown of 6 thick and depressed flabby appendages remaining from the central column.

7. STEPHANOTIS. Corolla salver-shaped, the tube including the stamens, crown, &c., in its somewhat swollen base, the 5 crease lines converging in the bud. Crown of 3 thin erect appendages. Stigma connate.

7. The 5 pollen-masses each composed of 6 small pellucid masses united, and exiled directly to the glands of the stigma without any stalk. Wheatear twiner.

7. PENTOLEA. Corolla 5-parted, wheel-shaped, the divisions relying on the upper faces; alternate with stamens 5 small stalked, each bearing a broad-shaped appendage. Diametrically divided, bearing anthers of plane oval-ary appearance than in the rest of this family. Stigma hemispherical. Pods smooth.

7. Fleshy few plants. Caulescent, with very small flabby leaves or teeth in place of leaves, on the angles of the thickened stems or branches.


§ 3. Twining plants. Caulescent, with only small flabby leaves or teeth in place of leaves, on the angles of the thickened stems or branches.

1. **ASCLEPIAS, MILKWEED, SILKWOOD**. (The Greek name of *Asclepias*, father of medicine.) Flowering in summer.  
- **Flowers bright orange or red; pods smooth; leaves opposite, except in the first.**

A. *tuberose*, BUTTERFLY-WEEPl, PALLID-root. Dry hills; milky juice hardly any; stems and mostly scattered linear or lance-oblong leaves hairy; flowers bright orange.

A. *Curassavica*, Wild for S. rent, from S. America, as a house and bedding plant; nearly smooth; leaves lanceolate; umbels long-pedunated; corolla yellow-red, the hood orange.

A. *paupercula*, Wet banks from N. Jersey S.; tall, smooth, with long lance-linear leaves, one or more few-flowered umbels on long peduncles, and red corolla with bright orange hood.

A. *rubra*, Low barrens from N. Jersey S.; smooth, with lance-oblong gradually taper-pointed leaves, a few many-flowered umbels on a long peduncle, and purple-red flowers.

A. *incarnata*, SWAMP MILKWEED. Wet grounds, with very leafy branching stems, lanceolate or lance-oblong acute leaves, often slightly heart-shaped at the base; smooth or smoothish, or in var. *pulchra* palercent and the leaves very short-petioled.

- **Flowers pink or light rose-purple; leaves all opposite; pods smooth.**

A. *coronaria*, SWAMP MILKWEED. Wet grounds, with very leafy branching stems, lanceolate or lance-oblong acute leaves, often slightly heart-shaped at the base; smooth or smoothish, or in var. *pulchra* palercent and the leaves very short-petioled.

- **Flowers dull purplish, rose-purple, or white.**

A. *perennis*, Low grounds S.; nearly smooth; leaves lanceolate or lance-ovate, slender-petioled; flowers small, white; seeds mostly without a tuft.

A. glauca, leaves all opposite and closely spaced or distantly by a heart-shaped base, the upper rounded or sub-tuberculate; plant smooth, pods or flowerless.

A. obtusifolia, Sandy grounds, 2°–3° high, the rather remote broadly oblong leaves wavy; umbel mostly solitary, long-peduncled; flowers purple large, greenish-petiolate.

A. *ampelopetaloidea*, Dry barrens S.; stems reclining, 1°–2° high, very leafy; leaves ovate-acute or lanceolate; umbels several, short-peduncled; corolla subdued, the hood white.

A. *phyllaecoccs*, FORK-MILKWEED. Moss grounds N. & W.; smooth or smoothish, 2°–3° high; leaves large, pointed or acute at both ends; umbels loose, the long pedicels (1°–2°) equaling the peduncle; corolla greenish, but the more conspicuous hood white.

A. *purpurascens*, Rich ground N. & W.; 1°–3° high; leaves downy beneath, smooth above, the upper taper-pointed; pedicels of the rather loose umbel shorter than the peduncle; corolla dark dull purplish.

A. *variegata*, Dry grounds, commoner N. & W.; 1°–2° high, nearly smooth; leaves oral or oval, slightly wavy; pedicels and cymules short and downy; corolla white, the hoods purplish.

A. *quadripetala*, FOUR-PETAL M. Rocky woods mostly N.; stems 1°–2° high, nearly smooth, naked below, bearing about the middle one or two whorls of 4 ovate or lance-ovate taper-pointed pedicled leaves, and beneath or about them usually a pair of smaller ones; pedicels slender; corolla mostly tinged with pink, the hoods white.
A. verticillata. Weesanne M. Dry ground, 1°-2° high, smoothish; stems very much throughout; leaves very narrow linear or thread-shaped, in whorls of 3-6; flowers greenish-white.

2. ACERATES, GREEN MILKWEED. (Name from the Greek, means without a horn; i.e. none to the hoovedlike appendages, in which it differs from Asclepias.) Flowers green or greenish, in summer.

A. viridiflora. Dry sandy or gravelly soil: soft-down or smoothsh, 1°-2° high; leaves varying from oval to linear, mostly opposite; globular umbels nearly sessile; flowers short-pedicelled, nearly 1⁄2 long when open; heads not elevated above the base of the corolla.

A. longifolia. Low herms W. & S.: rather hairy or roughish, 1°-3° high, with very numerous mostly alternate linear leaves, flowers smaller and on slender pedicels, the umbels peduncled, heads elevated on a short ring of elements above the base of the corolla.

§ 3. In weeshe order and stiliary or racemose umbels: divisions of the corolla loosely spreading, but the large heads spreading and aipart-shaped: pods thick, often with some soft tubercle-like projections.

A. paniculata. Dry prairies and herms from Ill. S. & W.: smooth, 1° high; leaves alternate, oblong or lance-oblong; flowers 1° broad, green, the heads puberulous.

3. ENSLENIA. (Named for A. Enslen, an Austrian traveller.)

E. albida. River-banks from Ohio S. & W.: climbing; 6°-12°: smooth, with opposite heart-ovate long-petioled leaves, and small whitish flowers in raceme-like clusters on axillary peduncles, all late summer.

4. VINCETOXICUM. (Name is equivalent to Poison Perennial.)

V. nigrum, from Eu.: a low twining smooth weed, escaping from gardens E.: leaves ovate and lance-ovate; flowers small, brown-purple, rather few in axillary umbels, in summer.

5. GONÓLOBUS. (Name in Greek means angled pod.) Our are twining herbs, along river-banks, stiffly S., with opposite heart-shaped pedicled leaves, and corymb or umbels of dark or dull-colored small flowers, on pedicels between the pedicels, in summer.

G. oblongus. From Virg. in Illinois S.: smooth or only sparingly hairy, the yellow-green flowers and the longitudinally ribbed pods smooth.

G. obliquus. From Penn. S.: hairy, somewhat clummy flowers minutely downy outside, long and narrow in the bud, dull crimson-purple within, the strap-shaped or lanceolate divisions 1⁄2 long; pods ribbed, hairy.

G. hirsutus. From Virginia S.: differs from the last in its short-obate flower-buds, the oval or oblong divisions of corolla only about 1⁄2 long.

6. HOYA, WAX-PLANT. (Named for T. Hey, an English botanist.)

H. carnosa, a well-known house-plant from India; with rooting stems, thick and fleshy oval leaves, umbels of numerous flesh-colored or almost white flowers, the upper surface of corolla clothed with minute phyllis.

7. STEPHANÓTIS. (Name from Greek for crown and ear, referring to the appendages of the stamens.)

S. floridana, from Mexico: a tree in-house twiner, very smooth, with opposite oval or oblong shishkabe leaves, and lateral umbels of very showy fragrant flowers, the pure white corolla 1⁄2 in diameter, the tube 1⁄2 long.
8. PERIPLOCA. (Same, a Greek word, implies that the plant twines.)

9. STAPELIA. (Named for a Dutch instructor, De Vos Stapel.) Strange-looking fleshy plants of the Cape of Good Hope, cult. in conservatories along with Cactuses. The common is

10. Biretia. Stems 5-8-lobed, with opposite veins, mostly smooth, leaves on short petioles, and lateral venae of rather small flowers, the corolla greenish-yellow with the upper face of the valvate lobes brownish-purple; in summer.

90. OLEACEAE, OLIVE FAMILY.

Trees or shrubs, chiefly smooth, without milky juice, distinguished among monopetalous plants with free ovary by the regular flowers having stamens almost always 2, and always fewer than the 4 (sometimes 3 or more) divisions of the corolla, the ovary 2-celled and (except in Jasminum and Forsythia) with one pair of ovules in each cell: style if any only one, rarely 2-cleft. A few are nearly or quite polypetalous; others apetalous.

1. Olpe and corolla with 5-8 lobes. 4 single crest ends and end in each cell.

2. JASMINUM. Corolla salver-shaped, the lobes convolute in the bud. Stamens 5, included in the tube. Ovary and the berry-like fruit 2-seeded, 2-celled.

3. Olpe and corolla with the parts in fours, or sometimes (in Fraxinus) one or both wanting. Ovary hermaphrodite, usually a pair in each cell, many in No. 2. Leaves opposite, except accidentally.

4. Forsythia. Corolla golden yellow, bell-shaped, 4-labiate, the lobes convolute in the bud. The 2 stamens and style short. Pod ovate. Leaves deciduous.

5. SYRINGA. Corolla salver-form, the lobes valvate in the bud, the tube much longer than the calyx or calyx-lobes. Fruit a pod, 4-seeded, flattened contrary to the narrow partition, 4-valved, the valves almost conspicuous. Seeds oblong, reniform, stellate, with a tuft of tufted hairs; in several species. Leaves 4-parted, acuminate.

6. OLSEA. Corolla short, bell-shaped, or deeply cleft into 4 spreading lobes, white. Fruit a drupe, the hard stone often becoming 4-celled and 4-seeded. Leaves deciduous.

7. FRAXINUS. Calyx small, sometimes obsolete or wholly wanting. Petals 4, 5, or more. Anthers large. Fruit a simple samara or key (Lavatera, p. 484, fig. 800), usually becoming 4-celled and 4-seeded. Leaves deciduous.
1. **OLIVE FAMILY**

1. **JASMINUM, JESSAMINE.** (From the Arabic name.) Cultivated for ornament, from the Old World, all tender and house-plants except in the Shade. Flowers fragrant.

   - *Flowers white; leaves alternate and compound.*

   **J. odoratissimum,** Common Sweet Yellow J., from Madiera: smooth, twining; buds 3 or 5, ovate; peduncle terminal, few-flowered.

   **J. revolutum,** from Himalaya or China: not twining, has mostly 3 - 7 leaves, and more numerous and fragrant flowers, 1½ wide.

   - *Flowers white; leaves alternate.*

   **J. officinale,** Common White J., from the East, has strait-angled branches scarcely twining; about 7 oblong or lanceolate leaves, a terminal cyme of very fragrant flowers and calyx-teeth slender.

   **J. grandiflorum,** from India, has its oval bas, the uppermost constant, larger and fewer flowers than the foregoing, reddish outside.

   **J. Azoricum,** from the Azores and Madiera: not twining, with 3 ovate or heart-shaped leaves, terminal cymes of very sweet-scented flowers, and very short calyx-teeth.

   **J. aemulare,** from Tropical India: scarcely climbing, pubescent; leaves simple, ovate, or heart-shaped; flowers in small close clusters; calyx-teeth about 3, slender, the rounded lobes of the corolla as many; flowers simple or double, very fragrant, especially at evening.

2. **FORSYTHIA.** (Named for W. A. Forsyth, an English botanist.) Ornamental shrubs, from China and Japan, with flowers from separate lateral buds, preceding the acute leaves, in early spring.

   **F. viridissima,** vigorous shrub, with strong and mostly erect yellowish-green branches, covered in early spring with abundant showy yellow flowers, followed by the deep green lance-oblong leaves.

   **F. suspensa,** with long and slender spreading branches hanging, or some of them creeping, to be treated as a climber; flowers still earlier, but less profuse; leaves thinner, duller, ovate.

3. **SYRINGA, LILAC.** (From Greek word for tale, alluding either to the tubular corolla or to the twigs, used for pipes.) Familiar ornamental tall shrubs, from the Old World, with scaly buds in the axils of the leaves, but hardly ever a terminal one (so that there is only a pair at the tip of a branch), entire leaves on slender pedicels, and crowded compound panicles or thyrsose of mostly fragrant flowers, in spring.

   **S. vulgaris,** Common L., from E. Europe or Persia: with many and more or less heart-shaped leaves, and loose, light-colored, spreading branches; leaves ovate or oblong-obovate, and small flowers, solitary or 3 together, in spring.

   **S. Persica,** Persia L.: more slender, with lance-ovate leaves, and looser clusters of blue-purple or pale or sometimes white flowers, borals of the corolla flat when open.

4. **LIQUITRUM, PRIVET or PRIM.** (Classical Latin name.) Shrubs of Old World, planted for ornament, with short-petioled entire leaves and panicles of small flowers, in early summer.

   **L. vulgare,** Common P., of Europe, here planted for hedges, and running wild E.; leaves small, lance-ovate or lance-oblong.

   **L. japonicum**, Celt. from Japan, not hardy W.; has long and widely spreading branches, larger ovate leaves, and larger flowers in simple panicles.

5. **OLEA, OLIVE.** (The classical Latin name.) Flowers small, and in small panicles or corystes, in spring.

   **O. Europaea, Olive of the Levant, sometimes planted for S.:** tree with lanceolate or lance-oblong pain entire leaves, which nearly imbedded, and oblong edible oil-fruit.
O. Americana, Devil-wood. Wild along the coast from Virginia S., small tree, with lanceolate and entire very smooth green leaves (3' - 8' long), and spherical fruit.

O. Fragraea, or O. Fragrans, of Japan and China (differing from above genus in the almost 4-angled vessels and 2 paired anthers, etc. in green-boxed for the exquisite fragrance of its very small flowers; the leaves shining or weak, sharply serrate, bright green, very smooth.

O. Chionanthus, Fringe-Tree. (Name of the Greek words for white and leaves, from the very light and loose panicles of drooping snow-white flowers.)

O. Virginiana, Common E. River-banks from Penn. S., and planted for ornament; thrifty or low tree, with entire oval or ovate leaves (3' - 5' long), the lower surface often rather hairy, loose panicles of flowers in late spring or early summer, petals 1' long, and fruit blue-purple with a bloom.

7. Fraxinus, Ash. [Classical Latin name: Timber-trees, with light and tough wood, dark-colored buds, and small insignificant flowers appearing in spring with or rather before the leaves of the season, from separate buds in the axils of the leaves of the preceding year.

§ 1. European Ashes, planted as shade trees, etc.: flora polycanacea.

F. Origns, Flow-Rainbow Ash, of S. Europe, the tree which furnishes mosoan, not hardy N., sometimes planted S.; this and a species like it in California have 4 petals, either distinct or slightly united, or sometimes only 2, narrow, greenish; inflorescence 5-6, lamellate or oblong; small.

F. excelsior, English or European Ash. Hardy thin tree, with bright green lanceolate leaves nearly sessile and serrate; petals none and calyx hardly any; fruit flat, linear-oblong. The Weeping Ash is a variety or sport of this.

§ 2. American Ashes, all deciduous of nutos, and diminuta or mostly so.

a. Fruit unique at the base, winged from the other end; oval minute, persistent; leaves 5' - 2', or sometimes 5, sterile, other sparsely toothed as entire.

F. Americana, White Ash. Large forest tree of low grounds, furnishing valuable timber; with ash-gray branches, smooth stamens, ovate or lanceolate pointed leaves either pale or downy beneath; and rather short fruit with a tertio marginatus body and a lamellate or wedge-linear wing.

F. pubescens, Red Ash. Common E. & S., known by its petalophyllous young shoots and leaflets, and fruitle with its fleshy 3-edged suborbiculate body. Fruits at the base, the edges gradually dilated into the larger-linear or orbiculate wing.

F. Viridis, Green Ash. Like the last, but which is seems to pass to bear in smooth, white-green bright green on both sides: a smaller tree, most common W. & S.  

* a Fruit flat and winged all round; leaves nearly green both sides and serrate.

F. sambucifolia, Black Ash. Small tree in swamps, N. & N. W. with tough wood separable in layers, used for boxes and coarse baskets; the terminal leaves with the scent of elder a smooth; leaflets 7 - 11, sessile on the main stalk, oblong-lanceolate tapering in a point; calyx none, at least in the fertile flowers; fruits linear-oblong.

F. quadrangulata, Blue Ash. Large forest tree W. yielding valuable wood, with square branches, 3 - 5 ovate ovate-lanceolate on short stalks, and narrowly oblong fruits.

W. platyptera, Carolina, Water-Ash. River-swamp S. small tree, with square branches, 3 - 5 ovate or ovate-lanceolate leaves at both ends, and broadly winged (sometimes downy) fruits, oblong or a tapering base.

S & F - 23
III. APETALOUS DIVISION. Includes the order with flowers deciduous of corolla; some are deciduous of calyx also.

**ARISTOLOCHIACEAE, BIRTHWORT FAMILY.**

Known from all other apetalous orders by the numerous ovules and seeds in a follicled ovary, to which the lower part of the calyx is adherent, the latter mostly 3-lobed, the stamens generally 6 or 12. Anthers adnate and turned outward. Calyx dull-colored, valvate in the bud. Leaves petiolate, usually heart-shaped, not serrate. Flowers solitary, perfect, commonly large. Bitter, tonic or stimulant, sometimes aromatic plants.

1. **ASARUM.** Low-stemmed herbs, with one or two leaves on long petioles, and a flower at the end of a creeping monopodial rootstock, the flower therefore close to the ground. Calyx regular, with 6 equal lobes. Stamens 12, distinct, borne on the apex of the ovary or the base of the short style, usually pointed beyond the anther. Seeds large, thickish, in a rather heavy and irregularly bincning pod.

2. **ARISTOLOCHIA.** Leaf-stemmed herbs or woody vines. Calyx tubular variously irregular, often curved. Filaments none; anthers adherent directly or by their whole inner face to the outside of the 3-lobed stigma. Seeds very flat, in a dry 2-valved pod.

**1. ASARUM, ARABABACCA, WILD GINGER.** (Ancient name, from obscure derivation.) On hillside in rich woods; 8. spring. 2

1 Filaments slender, much longer than the short anthers: style 1, thick, bearing a thick stigma; leaves a single pair with a pedunculate internode.

2 A. Canadense, CANADA WILD GINGER, sometimes called Snake-root. Common N.: a downy herb; leaves broadly obovate, subcordate at the base, somewhat narrowed at the throat, in summer.

2 A. Virginicum, VIROINIA W. Along the Alleghenies S.: leaves small, rounded heart-shaped; calyx bell-shaped but cleft down to the adherent ovary, brown-purple inside, the abruptly spreading lobes pointed.

2 A. Siphon, PIPET VINK, DUT O FULA' S PIPE (from the shape of the curved calyx). Rich woods from Penn. along the mountains S., planted for arbors; young climbing woody twiner, smooth, but the scarified heart-shaped leaves often downy beneath, these becoming 8'-12' broad; peduncles with a chalice base, drooping; calyx 1'-2' long, inflated above the ovary, tapering evenly, contracted at the throat, the flat surely brown-purple and obscurely 3-lobed; 8. late spring or summer.

**2. ARISTOLOCHIA, BIRTHWORT.** (Ancient name, from medicinal properties.) Cells of the anthers in our species 4 in a horn and row under each of the 3 lobes of the stigma, i.e. two contiguous 2-celled anthers in each cell, or 6 in all. Flowers in and above the axis.

1 A. Serpens, VIRGINIA SNAKEROOT (used in medicine). Rich woods, chiefly in Middle States and S.: low downy herb; stems clustered about 16 high; leaves ovate or oblong and heart-shaped, sometimes heart-shaped, acuminate or obtuse, entire; flowers all next the root, curved like the letter S, contracted in the middle and at the throat, in summer.

2 A. Siphon, PIPET VINK, DUT O FULAS PIPE (from the shape of the curved calyx). Rich woods from Penn. along the mountains S., planted for arbors; young climbing woody twiner, smooth, but the scarified heart-shaped leaves often downy beneath, these becoming 8'-12' broad; peduncles with a chalice base, drooping; calyx 1'-2' long, inflated above the ovary, tapering evenly, contracted at the throat, the flat surely brown-purple and obscurely 3-lobed; 8. late spring or summer.
91. NYCTAGINACEAE, FOUR-O'CLOCK FAMILY.

Represented by a few plants with tubular or funnel-form calyx colored like a corolla, and falling away from a persistent lower portion which closes completely over the 1-celled 1-ovuled ovary and seed-like fruit, forming a hard and dry covering which would be mistaken for a true pericarp. Stems 2-5, the long slender filaments hypogynous, but apt to adhere somewhat to the sides of the calyx-tube above. Embryo coiled around some mealy albumen. (Lessons, p. 15, fig. 36, 37.) Ours are herbs, with opposite simple entire or wavy leaves, and jointed stems, untid at the joints.

1. ABRONIA. Flowers small, many in a peduncled umbel-like head surrounded by an involucre of about 8 separate bracts. Calyx saucer-shaped with a shorter tube, and a corolla-like 3-leaved brider, which is plaited in the bud, the bracts generally nectarous at the end. Stamens 9 and style included.

2. OXYBAPHUS. Flowers small, a few together surrounded by a 1-leaved involucre, which unites and becomes then, transversely-cleft, fringed, and wheel-shaped after flowering. Calyx with a very short tube constructed from the ovary, expanding into a bell-shaped 3-leaved corolla-like brider, open only for a day. Stamens (mostly 5) and staminal style protruding. Fruit (persistent base of calyx) scales-like, strongly-ribbed.

3. MIRABILIS. Flower large, in the common species only a single one in the cup-shaped bracteate involucre, which thus exactly imitates a calyx, as the dimorphic funnel-shaped or almost saucer-shaped delicate calyx looks like a corolla. Staminodes, and especially the style (tipped with a saucer-shaped stigma) protruding. Fruit smooth, round and nearly even.

1. ABBRONIA. (Name from Greek word meaning difficile.) Western North American herbs, cultivated for ornament: 2 all summer.

A. umbellata, from coast of California, has prostate slender stems, scattered slender pedicelled leaves, and rose-purple flowers open by day, the involucre of small bracts.

A. fragrans, from Rocky Mountains, handy N., has ascending branching stems, lanceolate leaves, and white sweet-scented flowers opening at sunset; the involucre of inconspicuous ovate scarious and whitish bracts.

2. OXYBAPHUS. (Name from Greek word for vine-like, from the shape of the involucre.) 2 Several species on Western plains: 8 rose-purple, all summer.

O. nyctaginaceus. Rocky or gravelly soil from Wisconsin W. & S.; smooth or smoothish; leaves pedicelled, varying from ovate to lanceolate, obtuse or heart-shaped at base.

O. albida. From North Carolina S.; often hairy above; leaves insules or nearly so, entire at base, lanceolate or oblong; from more hairy.

3. MIRABILIS, FOUR-O'CLOCK or MARVEL-OF-PEEK. (Commonly called M. adiposella, which Linnaeus observed.) Native of warm parts of America: roots very large and sappy; leaves more or less heart-shaped, the lowest petiolate; flowers mostly clustered, showy, opening towards sunset, or in cloudy weather, produced all summer.

M. jalapa. Cult. for ornament in many varieties as to flower (red, yellow, white, or variegated), the tube only 2 long and slightly, stamens obverse when expanding brider; whole plant nearly smooth.

M. longiflora. Less common in cult.; tube of the sweet-scented flower 6 long and stannaceous (as well as the upper leaves); stamens shorter than its expanding white brider.

M. Wrightiana. Texas and cult.; more slender than the last, mostly smooth, tube of the smaller and more slender thinly fringed flower 4 long; the brider white tinged with rose; stamens and style much protruding.
92. PHYTOLACCACEAE, POKEWEED FAMILY.

A small family, represented here only by a single species of the principal genus.

1. PHYTOLACCA, POKE or POKEWEED. (A merged name, of the Greek word for plant prefixed to the French poke, poke, alluding to the reminiscent coloring-manner of the hirise. ) Calyx of 5 rounded point-like white sepals. Petals 5 = 8. Group of several soft, and bluish, bluing so hurry short styles, in fruit a depressed juicy berry, containing a ring of vertical seeds; these formed on the plane of those of the next family. 32

P. decaandra, COMMON POKE or OLE., S. Am. Can rise somewhat round of low growth, with large semi-parasites neat, stout stems 3-5-ft. high, alternate with-falling hosts on long pedicles, and racemes becoming leafy opposite a half its summit, ripening the dark crimson purple berries in autumn; stamens, styles, red seeds 19.

93. CHENOPODIACEAE, GOOSEFOOT FAMILY.

Represented chiefly by homely herbs, with inconspicuous greenish flowers; the 1-celled ovary has a single ovule and ripens into an akene or uricle, containing a single seed, usually with embryo coiled more or less around nearlyalbumen. Leaves chiefly alternate. Plants neither attractive nor easy to students; only the cultivated plants and commonest weeds here given.

1. Cultivated for ornament, turning post, with white flowers: calyx small-like.

1. BOUSINNIAFLATIA. Flowers in slender spikes from the axils of the leaves, perfect. Calyx 5-parted, spreading, and with one or two exterior sepals or leaves. Stamens 6, with slender filaments. Style slender: stigma 4, club-shaped. Fruit a thin sheen, painted with the persistent style.


2. SCHRAGIA. Flowers in solitary or axillary clusters; the staminate are ovoid or ovoid, consisting of a 4- or 5-cleft calyx, and as many stamens. Pistillate flowers with a tubular calyx which is 2-4-acelled, at the apex and 2-5-bermed on the sides, hardening and enclosing the shoice. Styles 4. Seed vertical.

3. Bears of cultivation, or of commonexit, fields, &c. Flowers perfect, brodiean.

3. CILIUM. Flowers in close axillary clusters or heads, which are sometimes confluent into elongated spikes. Calyx 3-parted, becoming hairy or heavy-like in fruit in the genuine species. Stamens 1-2. Styles or stigmas 2. Seed vertical in the calyx.

4. CHENOPODIUM. Flowers in small clusters collected in spikes or sometimes open, panicled. Calyx wavy toothed, not expanded to hairs. Ovary and styles 4. (Lacelet, p. 180, fig. 450.) Styles 2, mostly 3. Seed horizontal, or in S-w species occasionally vertical.

The following are common species along the coast or near salt water:—

4. ATRIPLEX PALUS, and one or two other species of GRACCE, most like Spinae, but scurfy or hairy. -

5. SALicornia hortensis, and two other species of GLASSWORT, low, hairy, branching plants, with the flowers in the flabby spikes.


7. Salsola kali, SALTWORT: bushy-branching annual, with anti-shaped
GOOSEFOOT FAMILY

1. BOUSSINGAULTIA. (Named for the traveller and agricultural chemist, Boussingault.)

2. BOLIFOLIA, of South America: high-stemmed plant, in cultivation handsome. From old seed heads resemble small potatoes; smooth, with somewhat heart-shaped succulent leaves, and slender racemes of delicately fragrant small flowers in autumn.

3. BETA, BUIT. (Latin name.) One species in cultivation, viz.:—

4. BITUM, BLITE. (Ancient Greek and Latin name of some pot-herb or of the Amaranth.) E1. summer.

5. CHENOPODIUM, GOOSEFOOT (which the name denotes in Greek). PIGWEED. &c. Words: 1. late summer and autumn.

6. C. Botrys, JERSEY-OAK or FEATHER OAK. Leaves and some ruderal: low, spreading, almost thistle-pinnate; raceme crowded; racemes loosely coriaceous; C. 

7. C. hybridum, MAPLE-LEAVED G. With the geniunse, unpleasantly scented like Siemens, bright green throughout; the widely branching spikes, 3-8 high; the thin large leaves triangular and heart-shaped, sinuate and angular, the angles extended into a few upper-pointed coarse teeth, racemes in loose and leafless peduncles; seed sharp-edged.

8. C. ambrosioides, MEXICAN TUR, WORKER. With the geniunse, similar leaflets, especially 8; rather stout, smoothish, strong-scented; leaves oblong or lanceolate, varying from entire to ragged-leaved, nearly sessile; spikes dense, leafy or leafless. This, especially the more expensive T. ARISTELENTEUS, is used as a

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94. AMARANTACEAE, AMARANTHACEAE

Weeds and some ornamental plants, chiefly herbs, essentially like the morning-glory family, but the flowers provided with dry and mostly scarious crowded persistent bracts, and the fruit sometimes several-seeded. The cultivated sorts are ornamental, like Immortelles, on account of their colored dry bracts which do not wither.

§ 1. Leaves opposite, mostly long-pointed; others 2-celled.
1. AMARANTUS. Flowers monoecious or polygamous, each with 5 bracts. Calyx of 5, or sometimes 8, equal or nearly so, smooth. Stamina 5, sometimes 1 or 8. Stigma 2 or 8. Ovule solitary, on a stalk from the base of the ovary. Fruit an achene, 2-3-pointed at apex, usually opening all around transversely, the upper part falling off as a lid (Lessons, p. 151, fig. 238), discharging the seed. Flowers in axillary or terminal spikelike clusters.
2. CELOSIA. Flowers perfect. Ornaments and seeds ornamental. Otherwise nearly as Amaranthus, but the crowded spikes intertwined with shining colored bracts. In cultivation the spikes are often changed into broad corymbs.

§ 2. Leaves opposite; others 1-celled.
2. COMPOSITA. Flowers perfect, chiefly in terminal round heads, crowded with the forms colored bracts. Calyx 6-lobed or or 6 equal. Stamina 6, imbricately below; filaments broad, anvil at summit, the middle lobe bearing a 1-celled anther (Lessons, p. 114, fig. 239). Outside feathery.

Achyranthes or Iresine Verschaffeltii is lately cult. for its red foliage, a poor substitute for Coleus, except in shade, where it has clear red stems, its oval or roundish opposite leaves strongly veined or blotched with red, or wholly crimson.

Iresine celosiotoides, a wild tall weed, with opposite leaves, and pinnate flowers, is common S. W.

Acmis canescens, is saltmarshes along the coast, is a tall annual, like an Amaranth, but poisonous, leaves inappreciable, and the flabby indehiscent fruit 2-3-angled and crested.

1. AMARANTUS, AMARANTHE. (From Greek for unfoliage. Leaves of cult. and waste grounds, and one or two cultivated for ornament; the late summer. Bracts commonly short-pointed.)

§ 1. RED AMARANTHES, the flower-clusters or the leaves tinged with red or purple.
A. candidus, Pictured Feather. Cult. from India: tall, stout; leaves ovate, bright green; spikes red, naked, long and slender, in a drooping pedicle, the terminal one forming a very long tail.
A. hypochordinus, Cult. from Mexico, &C.; stem erect, leaves光滑, often reddish-tinted; flower-clusters deep crimson-purple, short and thick, the upper making an interrupted musk spike.
A. pascuatus, Cult. weed in garden: the oblong-waxy or lacerating leaves often blotched or veined with purple; flowers in rather slender purplish-tinted spikes collected in erect terminal panicles.
A. melanochryson, Evergreen Amaranth. Cult. from China or India; rather low; stems and stalks red; the ovate thin leaves dark purple or partly green; or, in var. pictus, bright with red or violet and yellow uniformly tinted; again and sometimes only 3.

§ 2. GREEN AMARANTHES, or Pigweeds, stems and leaves green or greenish.
A. retroflexus, Common Pigweed. Broad, pinnate compound of smooth or slightly pubescent spikes crowded in a stiff pedicle, the axillary branches rigid.
A. spinosus, Thorny A. Wild green, Chicago S.; dull green leaves with a pair of spines in their axils; flowers small, yellowish-green, in round axillary clusters and in a long terminal spike.
A. bitubus. Handsome and erect, spreading over the ground, with oblong and pinnate leaves, flowers all in small clusters in their axils and covered by rigid sharp-pointed bracts; sepals 5; stamens 2 or 3.
85. POLYGONACEAE, BUCKWHEAT FAMILY.

Known by the alternate entire leaves having stipules in the form of scarious or membranaceous sheaths at the strongly marked usually tumid joints of the stem. Flowers mostly perfect, on jointed pedicels, with green or colored 4 - 6-parted usually persistent or withering calyx, 4 - 9 stamens on its base, 2 or 3 stigmas, 1-celled ovary with a single ovule rising from its base (Lessons, p. 122, fig. 2GH), forming an akene or nutlet. Embryo mostly on the outside of nearly albumen, the ridule pointing to the apex of the fruit.

Ehugnostom differs in having no obvious stipules, and the flowers from a cup-shaped involucre. There are a few species of the genus S. and S. W., and many near and beyond the Rocky Mountains.

§ 1. Carya of 6, rarely 4, more or less petal-like similar sepals, erect after flowering.

1. POLYGONUM. Flowers in racemes, spikes, or else in the axils of the leaves. 
   - Ahorn either lanceolate when there are 3 stigmas, or triangular when there are 2. Embryos curved round one side of the alabum; sometimes narrow.

2. FAGOPTERUM. Diffrer. from one section of Polygonum mainly in having an embryo in the centre of the alabum, which is divided into 3 parts by the very broad leaf-like cotyledons. The triangular sramale longer than the calyx.


3. RHUMEX. Separals all similar, petal-like, withering-persistent underneath the s-s-s-s-s-s-s fruit. Stigmas capitate or wedge-shaped. Stamen 6.

4. RHUMEX. Separals of 2 sorts: the 3 outer ones incumbent and at length spreading; the alternate inner 2 larger, somewhat colored, enlarging after fruiting, becoming very dry, often bearing a gram-like baculum on the back, and converging over the flanged akene. Stigmas a hairy tuft. Stamen 6.

I. POLYGONUM, KNOTWEEB, JOINTWEEB. (The name in Greek means jointed.) Clustered weeds; some with rather showy flowers; the following are the commonest: 8. late summer and autumn.

§ 1. Flowers along the axes, nearly obsolete in the axils of the almost sessile linear or oblong leaves, small, greenish-white; chaffie scarious, nearly oval or concave.

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4. F. atripilare, CROSS-GRAV. CROSS-GRASS, or DOUGHER. Frasenp

5. F. atripilare, CROSS-GRAV. CROSS-GRASS, or DOUGHER. Frasenp

6. F. atripilare, CROSS-GRAV. CROSS-GRASS, or DOUGHER. Frasenp

7. F. atripilare, CROSS-GRAV. CROSS-GRASS, or DOUGHER. Frasenp

8. F. atripilare, CROSS-GRAV. CROSS-GRASS, or DOUGHER. Frasenp
P. tenax. Rocky dry soil; slender, upright, with slender-like branches, along which the upper flowers form a loose, softly spicate; leaves narrow leafy, acute; at the base shining.

§ 2. Flowers collected in terminal spikes or spike-like clusters, rose-purple or flesh-color, or nearly white or greenish.
- Leaves small and slender-like or of long form; the sheaths terminate, naked, rigid; many-jointed stems with a long flower under each branch.

P.articulatum. Sandy shores and barrens; a slender, little plant, finely-branched, 1-4' high; flowers rose-colored, nodding; stamens 8; styles triangular.

- Leaves ovate, short-petioled; sheaths cylindrical, fringed-hairy; branch flowers 1-3 from each branch of the long and slender spikes, repeatedly apetalous; the 2 wings reflexed on the terminal stamens and hooked at the tip.

P. Virginiatum. Thickets; 2'-4' high, nearly smooth; leaves roughly-ciliate, 2'-6' long; flower somewhat curved; stamens 8. 

§ 3. Leaves ovate, short-petioled; sheaths cylindrical; flowers several from each branch of the spike, hypogynous. 
- Leaves mostly with an abruptly spreading filiform ciliate; a cluster of stamens falls off; tall; 2'-6' high, with dense cylindrical nodding spikes of rose-colored flowers, and flat yellow.

P. orientalis, Primrose Feather. Gardens and cultivated grounds, from India; with large ovate pointed leaves and 9 stamens.

- Leaves ovate, without a border.
- Herbage and flowers not circular nor smooth with pointed glands or dots.

- In moist soil: leaves lanceolate; petals nearly smooth. •

P. incarnatum. Tall; 2'-6' high; leaves tapering from near the base to a narrow point (4'-12' long); stems slender, smooth and naked; peduncles rough with serrated sheath glands; spikes linear, nodding; flowers flesh-colored or pale rose; the 5 stamens and 2 styles inclosed; stamens flat with reticate axils.

P. Pennsylvanicum. Stems 1'-3' high; the branches above and peduncles briefly with stalked glands; sheaths naked; spikes oblong, thick and blunt; leaves; flowers rose-purple; stamens 6, a little protruding; style 2-branched; leaf with flat edges.

- In moist soil: stems rooting below. •

P. amphium. Water P. Chieft N.; stems often simple bearing a single ovate or oblong dense spike or head of pretty large and always round-cut flowers; leaves oblong, heart-oblong, lanceolate or lanceolate, mostly long-petioled, often floating; stamens not fringed; stamens 6; style 2-branched.

- In water: stems rooting below. •

P. hydrophilum. Commonest 8. stems slender, rising out of shallow water 3'-5' high; leaves narrowly lanceolate or lance-oblong; sheaths hairy and fringed with long bristles; spikes erect, slender; flowers small, pale or white; stamens 8; style 2-branched; styles sharply trilobed.

- In water: leaves narrowly ovate or rhomboid, usually shorter than the ovate leaves; flowers round-cut, with nodding spikes. •

P. bajus. Water Smartweed. Shallow water or marsh; a stems rooting at the base; leaves 3'-4' high; leaves lanceolate or linear, taper-pointed; spikes slender; flowers white or pale flesh-colored; stamens 6; styles sharply trilobed, shining. •
P. Hydrophyllum, Common N. or Water Pepper. Low or wet grounds. N. 1-2 ft. High; leaves elliptic-subulate; petals nodding, mostly short; flowers greenish-white; stamens 6; stamens either flat or remotely triangular. ①

- Teet-Inflected. Stems with spreading branches, the angles and petioles armed with sharp, rounded prickles, by which the plant is marked almost to death: flowers in peduncled heads or short racemes, white or flesh-color. ①

P. arifolium. Low grounds; leaves halberd-shaped, long-petiolated; the petioles pubescent-brittle; stamens 6; styles 2; stamens bi-lobed. ③

P. angustatum. Low grounds: leaves arrow-shaped, short-petiolate; the petiole naked; stamens spiny; styles 2; styles 3; stamens sharply b-angled. ③

P. Convolutus. Low twigging or spreading weed from Eu., in cultivated fields, &c.: smooth; with heart-shaped and almost halberd-shaped leaves, and very small flowers. ③

P. cilindroide. Rocky sandy places; tall-growing, rather showy, a ring of reduced branches at the joints; leaves angled-heart-shaped; outer sepals hardly keeled.

F. dunstrum, Claiming False Buckwheat. Most thickets: tall-growing, smooth; joints naked; leaves heart-shaped or approaching halberd-shaped; petals yellow; outer sepals strongly keeled and in fruit irregularly winged. ②

2. FAGOPYRUM, BUCKWHEAT. (The botanical name, from the Greek, and the popular name, from the German, both denote Buck-wheat, the grain resembling a diminutive beach-nut.) Cult. from N. Asia, for the flour of its grain: summer. ①

F. esculentum, Common B. Nearly smooth; leaves triangular-heart-shaped inclining to heart-shaped or arrow-shaped, on long-petioles; stamens half-cylindrical; flowers white or nearly so in corymbous panicles; stamens 8; with so many honey-bearing glands interposed; styles 3; sepal angles triangular.

F. tataricum, Tartary or Indian Wheat. Cult. for flour on our N. E. frontiers and N.: like the other, but seeds smaller, and tinged with yellowish; grain half the size, with its less angular angles nappy.

3. RHÜM, RHUBARR. (Name said to come from the Greek, and to refer to the physic properties of the root; that of several species, of N. Asia, yield officinal rhubarb.) ②

R. Rhaponticum, Garden B. or Pre-plant; the large fleshy stalks of the ample node, leaves, filled with pleasantly acid juice, cooked in spring as a substitute for fruit; flowers white, in late spring.

4. RÜMEX, DOCK, SORREL. (Old Latin name.) The three enlarged sepals which cover the fruit are called corina. Flowers greenish, in whorls on the branches, forming panicky racemes or interrupted spikes.

- Dock. Herbaceous tissue: flowers perfumed or pleasantly nauseous, in summer.

- In whorls: stem erect, stout; leaves lanceolate or heart-shaped, flat, not wavy; valves entire or obscurely winged toothed in the first species. ②

R. orbiculatus, Great Water Dock. Common B.: 2-4 ft. high; flowers often 4-5 ft. long; flowers nodding on slender pedicels; the valves broad-based or almost orbicular, thin, finely reticulated, nearly f white, each bearing a grain.

R. Britannicus, False D. Common B.: 2-4 ft. high; petals nodding, shorter than the fruting calyx, which has broadly crenate loosely reticulated valves, one with a large grain, the other commonly naked; root yellow.
R. salicifolius. W. 14 - 20 high; pedicels short; fruiting branches shorter than the flowering spikes; flowers somewhat reflexed; valves somewhat triangular than in the foregoing and smaller, their grain very large; true white.

R. verticillatus. W. 14 - 20 high; pollen black; fruiting branches shorter than in the foregoing and small, their grain rather small; true blackish, the lowest often heart-shaped at base.

R. crispus. W. 14 - 20 high; pedicels usually curled, the lower rather truncate than heart-shaped at base; their grain usually black, their stalks nearly absent; valves narrowly oblong, obtuse; claws distinctly shorter than the valves, bearing a very large grain; true red-

R. obtusifolius. W. 14 - 20 high; pedicels very short; valves narrowly obovate, obtuse; claws distinctly shorter than the valves, bearing a very large grain; true red-

R. sanguineus. W. 14 - 20 high; pedicels usually curled, the lower rather truncate than heart-shaped at base; their grain usually black, their stalks nearly absent; valves narrowly oblong, obtuse; claws distinctly shorter than the valves, bearing a very large grain; true red-

R. oblongifolius. W. 14 - 20 high; pedicels usually curled, the lower rather truncate than heart-shaped at base; their grain usually black, their stalks nearly absent; valves narrowly oblong, obtuse; claws distinctly shorter than the valves, bearing a very large grain; true red-

R. verticillatus. W. 14 - 20 high; pollen black; fruiting branches shorter than in the foregoing and small, their grain very large; true blackish, the lowest often heart-shaped at base.

R. crispus. W. 14 - 20 high; pedicels short; fruiting branches shorter than the flowering spikes; flowers somewhat reflexed; valves somewhat triangular than in the foregoing and smaller, their grain very large; true white.

R. verticillatus. W. 14 - 20 high; pollen black; fruiting branches shorter than in the foregoing and small, their grain rather small; true blackish, the lowest often heart-shaped at base.

R. crispus. W. 14 - 20 high; pedicels usually curled, the lower rather truncate than heart-shaped at base; their grain usually black, their stalks nearly absent; valves narrowly oblong, obtuse; claws distinctly shorter than the valves, bearing a very large grain; true red-

R. obtusifolius. W. 14 - 20 high; pedicels very short; valves narrowly obovate, obtuse; claws distinctly shorter than the valves, bearing a very large grain; true red-

R. sanguineus. W. 14 - 20 high; pedicels usually curled, the lower rather truncate than heart-shaped at base; their grain usually black, their stalks nearly absent; valves narrowly oblong, obtuse; claws distinctly shorter than the valves, bearing a very large grain; true red-

R. oblongifolius. W. 14 - 20 high; pedicels usually curled, the lower rather truncate than heart-shaped at base; their grain usually black, their stalks nearly absent; valves narrowly oblong, obtuse; claws distinctly shorter than the valves, bearing a very large grain; true red-

LAUREL FAMILY.

Spicy-aromatic trees or shrubs, the alternate simple leaves (with entire margins but sometimes lobed) more or less marked with minute papillose dots; the regular flowers with a calyx of 4 or 6 sepals imbricated in two ranks in the bud, and free from the ovary; the latter is terminated by a simple style and stigma, is 1-celled with a hanging crux, and in fruit becomes a berry or drupe. The stamens (in ours 9) furnish a special character, these anthers opening by a valve in the manner of a trap-door. To this family belong the classical Laurel or Bay, the Cinnamom, the Camphor-tree, &c.

1. PERSEA. Odor fragrant, persistent at the base of the berry. Stamina 8 with others, the 5 inferior of which are turned outward, the 4 others inward; when 3 glands or sterile filaments forming an imbricated row. The two proper cells of the anther with a lower and an upper chamber, making 4 compartments, each opening by a valve in the manner of a trap-door.

2. NASASAN. Flowers in an open corymbs and peduncled cluster, with spreading 6-petalled calyx; stamens with a bluish bloom in 3 rows, the distal cells of the three lower with a pair of yellow staminal glands on the base. Anthers with 4 chambers as in the preceding. Tertiary flowers with 6 rudiments of
1. **Persea**, **Red Bay**. (Ancient of some Oriental tree.) Leaves evergreen; flowers greenish-white, in summer.

2. **Sassafras**. (The popular name of this very well-known tree.)

3. **Lindera**, **Spicebush, Feverbush**. (Named for J. Lind, a Swedish botanist.) Gum also named Benzoin.

4. **Tetranthera**. (Greek means four authors, alluding to the 4 chambers in each flower.)

5. **Thymeleaceae**, **Mezereum Family**.

6. **Daphne**. (Mythological name, the nymph transformed by Apollo into a Laurel.) The following cut for ornament from the Old World.
D. Cneorum. Busy mock-olive shrub from Eu., spreading and branching, with crooked boughs along or oblatelately evergreen leaves (less than 1” long), and a terminal cluster of small, rose-pink flowers in spring.

D. odor, Sweet Daphne. Greenhouse shrub from China, wide bright green leaves along evergreen leaves, and terminal clusters of white or pale pinkconvexed flowers, in winter.

2. DISCA, LEATHERWOOD, MOOSE-WOOD. (Classical Greek name of a celebrated bosman.)

D. palustris, the only species, in damp woods chiefly N.; shrub 6-6’ high, with tender white wood, but very tough bark, used by the Indians for clothing (wherever the popular name); the numerous branches (if joined); leaves oblong or oval, alternate, nearly smooth, deciduous; flowers before the leaves in autumn, white, yellow, to a cluster from a bud of 3 or 4 dark-hairy scales forming an involucre; berry reddish.

98. ELAEAGNACEAE, OLÉASTER FAMILY.

Silvery-curly shrubs or small trees, having often dicious inconspicuous flowers, the calyx-tube of the fertile ones itself enclosing the ovary, becoming fleshy and ripening into a sort of berry, around the silvery-like true fruit, the seed of which is erect. Otherwise much like the preceding family.

Shepherdia Canadensis, a low shrub along our northern borders, with opposite oval leaves, green green above, but silvery and with some rusty scar below beneath, opposite 4-lobed flowers, and yellow berries.

Elaeagnus argentea, Buffaloberry, shrub through the plains and mountains for W. and N. W., and planted for ornament, has alternate oblong leaves with narrowed base, silvery both sides, and silvery and red berries.

99. SANTALACEAE, SANDALWOOD FAMILY.

Represented by one or two shrubs along the Alleghenies, S., one of them as Peckiana or Peckia, the Solen or Buffalowood, — and widely by a low herb, viz.

1. Comandra umbellata. Dry ground, common S.; probably parasitic on the roots of shrubs. Known by its 5 corners with their calyx connected with the face of the white ovary-behind them by a tassel of thread-like hairs in which the name, from the Greek, signifies; tube of the calyx column below with the ovary, bearing a hard or ear-like fruit, filled by a globular seed. Some 6-18 high, with many small oblong pale leaves.

100. LORANTHACEAE, MISTLETOE FAMILY.

Parasitic on the branches of trees, represented only, through the Middle and Southern States, by

Phoradendron flavescens, American Mistletoe; with white or green, yellowish-green, thin, slightly pointed leaves, and short yellowish-brown scales in their axils, of dicious greenish flowers, the fertile ones crimson white berries.
101. SAURURACEAE, LIZARD'S-TAIL FAMILY.

A very small family, having a single Eastern North American representative in:

Saururus cernuus, Lizard's-tail. Wet swamps. 2 summer. Stem jointed, 3-5 high, branching; leaves heart-shaped, with converging ribs, pointed; flowers white, resented in a loose but slender tail-like spike, with the seed pods cylindrical, perfect, but with neither calyx nor corolla; stamina 6 or 7, with long slender white filaments; pistil 1, slightly united at base. (Lessons, p. 300.)

102. EUPHORBIAEAE, SPURGE FAMILY.

Plants with usually milky or acrid juice and numerous or showy flowers, of very various structure; the ovary and fruit commonly 3-celled and with single or at most a pair of hanging ovules and seeds in each cell.

1. Ovules and seeds only one in each cell.

2. Flowers both staminate and pistillate really consist of both of edges and corolla; a pistillate and numerous staminate surrounded by a cup-like androceum which sustains a capsule, so that the whole is borne for one perfect flower.

3. EUPHORBIUM. For the structure of the genus, which is compound, see Manual and Structural Botany, fig. 114. These plants may be known, mostly by having the 2-lobed ovary raised out of the cup, on a curved stalk, its 2 short styles each stigmas, making a stigmate. Fruit when ripe bearing many large and showy seeds, or small and concealed, discharging the seed in very hard or very soft times, seeming to be a stamine with a joined filiform in reality a staminate flower, in the case of a slender bract, consisting of a single stamen on a pedicel, the joint being the junction.

4. Flowers of both kinds provided with a distinct style.


3. ACANTHUS. Flowers in small clusters disposed in spikes, staminate above, fertile at base; or sometimes the two sorts in separate spikes. Calyx of sterile flowers 4-parted, of fertile 5-6-parted. Stamina 3-16, short, trans- dantless at base; the 2 cells of the others long and hanging. Styles 3, carinate on the upper half, red. Pod of 3 (rarely 2 or 1) boxes or cells. Fertile flower-clusters embraced by a leaf-like calash bract. Leaves alternate, palish, with stipules, serrate.

4. RICINUS. Flowers in large pendant clusters, the fertile flowers, the staminate below. Calyx 5-parted. Stamina very many, in several bundles. Styles 3, united at base, each 3-parted, red. Pod large, 3-seeded, with 3 large seeds. Leaves alternate, with stipules.

5. JATROPHE. Flowers in cymes or panicles; the fertile in the main spikes. Calyx united as a corolla, in the sterile flowers mostly sub-ovate-shaped and baccate, including 10-30 stamens, somewhat staminate in 2 or more ranks; in the fertile 8-parted. Styles 3, united below, once or twice forked at the apex. Pod 3-seeded, 3-seeded. Leaves alternate, long-petiolate, with stipules.

6. BUXUS. Flowers in small sessile hooded clusters in the axils of the thick and evergreen entire opposite leaves. Shrubs or trees.

7. FUCHSIAEAE. Flowers in naked lateral spikes, sessile above, few fertile flowers at base. Filaments long, white, red, white, red. Anthers brownish, few, tubular leaves laxly evergreen, alternate, commonly few- toed.
1. **EUPHORBIA.** Flawful. ( Said to be named for Euphorbus, physician to King John.) Flowers commonly in late summer.

§ 1. Straggly species of the conterminous winter-flowering, with red bracts or leaves.

**E. pulcherrima,** or Prostrata, of Mexico: unarmed stout stalk, with ovate or oblong and angled or sinuously few-toothed leaves, rather downy beneath. These latter the flowers mostly entire (4-7' long) and of the brightest vermilion-red; flowers in globular greenish involucres bearing a great yellow gland at the top on one side.

**E. splendens,** of the Mauritius: smooth with thick and horribly prickly stems, oblong-ovate-linear leaves, and slender clanny peduncles bearing a cyme of several deep-red apparently 2-petalled flowers; but the seeming petals are bracts around the cuplike involucre of the real flowers.

**E. fulgens,** or Jacquin, of Mexico: unarmed, smooth, with slender recurved branches and broadly lanceolate leaves, few-flowered; peduncles shorter than the pedicels, what appears like a 5-cleft corolla are the bright red lobes of the involucre.

§ 2. Herbs native of or naturalized in the country, the first and last and sometimes a foot of the others tall; in flowers: A. late summer.

* The leaves which are crowded next the flower-caps or involucres have their margins or a part of the leaves colored (white or red): stem erect, 1°-3° high. 3

**E. marginata.** Wild on the plains W. of the Mississippi, and cult. for ornament: leaves pale, ovate or oval, sessile, the lower alternate, uppermost in threes or pairs and broadly white-margined; flower-cap with 5 white petal-like appendages behind as many source-shaped glands.

**E. heterophylla.** Rocky banks S. W.; leaves alternate, ovate and sinuate-teethed, or fiddle-shaped, or some of them lanceolate or linear and entire; the upper with red base; no petal-like appendages in the flower-cap and only 1 or 2 sessile glands.

**E. caput.** Black soil from Penn. S. W.: hairy, only the lower leaves alternate, the upper opposite, varying from ovate to linear, uppermost paler or whitish at base, and the few glands of the flower-cap short-stalked.

* * * The leaves none of them colored: but the flower-cap with 5 bright-white conspicuous appendages, imitating a 5-cleft corolla. 2

**E. corollata.** Gravelly or sandy soil, from New York S. & W.; 2°-3° high; leaves varying from ovate to linear, entire, the lower alternate, upper whorled and opposite; flower-cap umbellate, long-stalked.

* * * Leaves all alike and opposite, green, or with a brown-red spot, short-stalked, with warty or fimbriated stipules; stems two-storied or prostrate, repentantly forked; in small flower-caps in each fork, bearing 4 glands, each bordered with a more or less petal-like white or crimson margin or appendage. Of these there are several species, inspersified weeds: these two are the commonest everywhere in sandy or gravelly open places.

**E. maculata.** Prostrate; leaves oblong-linear, very elliptical at base, serrate above, blended in the center; pods sharp-angled, very small.

**E. hypericiflora.** Ascending 10°-20° high; leaves ovate-oblong to linear-oblong, serrate, often with red spot or margins; pod brown-angled; seeds wrinkled.

* * * * * Leaves without stipule, none with colored margins or spots: the flower-caps also green or greenish, umbellate, their glands wholly distichiate of any petal-like appendages.

**E. lancea of the conterminous erect stem alternate or serrate, those of the umbellate flower-caps of opposite and of different lengths, usually roundish; glands of the flower-cap mostly 4; seeds or appendages.

**E. platyphylla.** Nat. from Europe N.; upper stem-hairs linear-oblong, acute, minutely serrate; opposite heart-shaped; lateral ones triangular-oblong and heart-shaped, glanded; glands large and sessile; pod blunt with depressed warts; seed smooth.
E. obtusata. Native W. & S. like preceding, but taller; 16-30 high; side-leaves oblong-lanceolate and smooth, the upper heart-shaped; floral ones cordate-base; umbel 3 or 4-rayed, then 2-rayed; glands of flower-cup short-tailed; pods long, awnless.

E. dicyocephala. Open ground S. W. Bloom on the preceding, but slender; leaves loosely serrate; glands small, almost round; seeds delicately reticulated.

E. Helioscopi. Wood from Europe in waste places N.; with shorter ascending stems 6-12 high; leaves all opposite and rounded or notched at the end, the lower wedge-shaped, finely serrate; umbel first 3-rayed, then 5, and as length with 3 rays; glands orbicular and stalked; pods smooth and even; seeds with honeycomb-like surface.

E. Pepinis. Waste places, from Eu.; stems erect; leaves parted, entire, round-opposite, the upper floral ones ovate; umbel first 3-rayed, afterwards forked; pod 2-seeded on each lobe.

E. commutata. Wild from Wisconsin and Virginia S. W., on shady slopes; stems with drooping base; leaves obscure, the upper sessile; the rounded floral ones broader than long; umbel 3-rayed; pod erect; blade entire.

E. Pepinis var. commutata: as above, but with round-oblong, notched, the upper flornl ovate; umbel 3-rayed, the lower forked; pod 2-angled on each lobe.

E. commutata. Wild from Wisconsin and Virginia S. W., on shady slopes; stems with drooping base; leaves obscure, the upper sessile; the rounded floral ones broader than long; umbel 3-rayed; pod erect; blade entire.

E. Helioscopi var. commutata: as above, but with round-oblong, notched, the upper flowers ovate; umbel 3-rayed, the lower forked; pod 2-angled on each lobe.

E. Pepinis var. commutata: as above, but with round-oblong, notched, the upper flowers ovate; umbel 3-rayed, the lower forked; pod 2-angled on each lobe.

E. Pascaliana. Var. from Eu.; stems erect; leaves parted, entire, round-opposite, the upper floral ones ovate; umbel first 3-rayed, afterwards forked; pod 2-seeded on each lobe.

E. commutata. Wild from Wisconsin and Virginia S. W., on shady slopes; stems with drooping base; leaves obscure, the upper sessile; the rounded floral ones broader than long; umbel 3-rayed; pod erect; blade entire.

E. Helioscopi var. commutata: as above, but with round-oblong, notched, the upper flowers ovate; umbel 3-rayed, the lower forked; pod 2-angled on each lobe.

E. Pepinis var. commutata: as above, but with round-oblong, notched, the upper flowers ovate; umbel 3-rayed, the lower forked; pod 2-angled on each lobe.

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E. Pepinis var. commutata: as above, but with round-oblong, notched, the upper flowers ovate; umbel 3-rayed, the lower forked; pod 2-angled on each lobe.
5. **JATROPHA.** (Derivation of name obscure.) Chiefly tropical plants; one is a woody plant with S., via J. tram, var. stimulosa (or J. stimulosa), *Treach-Sellow or Spurge-Nettle*, names referring to its stinging bristly hairs, which are like those of *Nettle*: dry sandy soil, branching, 6'-18' high; leaves rounded heart-shaped, 3'-6' bladed or variously cloth or parted; figures slender, white; stamens 16, their filaments almost separate.

6. **BUXUS**, BOX. (Ancient Latin, from the Greek name of the Box-tree.) *B. sempervirens*, TREAJ: and its more common var. NAI:... Dwarf-Box, with much smaller leaves, from the Mediterranean, are planted North chiefly for borders, especially the Dwarf Box.

7. **PACHYSANDRA.** (The name in Greek means thick-stemmed.) *P. procumbens*. Horky WOOD, West slope of the Alpines, and in some gardens; developing its numerous spikes from the base of the short procumbent densely-tufted stems, in early spring.

103. **URTICACEAE, NETTLE FAMILY.**

This family, taken in the largest sense, includes very various apetalous plants, with monocious or dioecious flowers (except in the Elm Family), having a distinct calyx free from the 1-seeded fruit. Inner bark generally tough. Leaves with stipules, which are sometimes early deciduous. There are four suborders.

I. **ELM FAMILY.** Trees, the juice not milky. Leaves alternate, 2-ranked, simple; stipules small and falling early. Flowers monocious or polyamous, many of them perfect, with the filaments not infixed in the bud, and 2 diverging styles or long stigmas. Ovary 1-2-celled, with 1 or 2 hanging ovules, in fruit always 1-celled and 1-seeded.

1. **ULMUS.** Calyx 5-parted, the 5-cleft. Stamens 4-9; Stamens long and slender. Ovary mostly 2-celled, becoming a 1-celled thin sacculus or key-fruit winged all round (Lavatera, p. 151, fig. 181). Flowers in clusters in axils of last year's leaves, in early spring, before the leaves of the season, purplish or yellowish-green. Leaves straight-lobed, serrated.

2. **PLANE.** Like Elm, but flowers more polyamous, appearing with the leaves in small axillary clusters; the leaves of this calyx that stamens only 4 or 5; the 1-celled 1-seeded every forming a wingless nut-like fruit.

... Fruit dry, winged or nut-like. *Anther turned outward.

I. **FIG FAMILY.** Trees with milky exuded clear or poisonous juice. Leaves alternate. Flowers strictly monocious or dioecious. Styles or stigmas commonly 2.

4. **FICUS.** Oenocarpus in which the flowers are somet imes borne in the axil of the leaves. Abose seed-like. Stipulas large, successively enveloping the seeds issues in the bud, falling off as the leaves expand.
17. **Ulmus**, L. 

Stam, with tough reddish wood, well-known "cry like scpal'embrn ing tbe omry and akene. 'ugtOw! or hairy tyl two, long.

8. **Tilia**, L. Erect h erb. dam n l6, drooping. Fertile like those of Mulberry; the fertile in globular heads, mixed with little briefly union, their calyx tube-shaped and 1-4-toothed, out of which the ripened easy protrudes and forms a date-shaped rather fruity. Style single.

7. **Malus**, C. Fertile densely clustered in a large spherical head, its calyx of 4 tepal sepals, its fruit enclosing the small akene; the whole head ripening into a fresh yellow mass, resembling an orange with a roughish surface.

**III. NETTLE FAMILY.** Herbs, as to our wild species, with bland watery juice and tough fibrous bark; many are armed with stinging hairs. Flowers monocous or dioecious, greenish. Filaments transversely wrinkled and infolded in the bud, straightening elastically when the calyx opens. Fruit an akene: style or stigmas one and simple. — All ours worthy of notice belong to the three following genera.

6. **Ceratocarya.** Flowers in rounded, pointed, or head-like clusters; the calyx in both a sort of 4 separate sepals. Stamens 4. Stigmas a sessile globular head. Above flat, green, straight and erect, enclosed between the larger pair of sepals. Herbage best with stinging hairs; leaves opposite.

5. **Daphne.** Flowers in loose erect cyms, the upper chiefly fertile and lower sterile; the latter with 4 sepals and stamens; the former of 4 very unequal sepals, the two outer or one of them minute. Stigmas slender and shaped, hairy down one side, persistent on the ovary, the bright yellow head, which is seen refracted on the wing-margined pedicel. Herbage best with stinging hairs; leaves opposite, alternate.

4. **Daphne.** Flowers either double or intermixed, oblong in spikes; the stamens in 4, the fertile with a tubular or urn-shaped calyx barely twisted at the apex, enclosing the ovary and closely investing the blooming filaments. No stigmas.

**IV. HEMP FAMILY.** Rough herbs, with watery juice and tough fibrous bark. Leaves mostly opposite and palmately lobed or compound. Flowers dioecious, greenish; the sterile in axillary loose compound racemes or panicles, the furlina in close clusters or cactias: calyx of the former with 5 sepals, of the latter one scale-like sepals encircling the ovary and akene. Stigmas or hairy styles two, long.

11. **Cannabis.** Erect herb. Stems 4, drooping. Fertile flowers in irregular solitary clusters. Leaves of 3-7 lanceolate irregularly toothed, leathery.

12. **Humulus.** Tall climbing. Stamens once. Fertile flowers in solitary short stalks or spikes, 2 flowers under each of the broad thin leaves which makes the scales of the strobile or hop-fruit.

**1. **Ulmus**, L. (The classical Latin name.) Fine trees in deep moist or alluvial soil. Fl. early spring; fr. in early summer.

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6. **Ulmus**, L. (The classical Latin name.) Fine trees in deep moist or alluvial soil. Fl. early spring; fr. in early summer.
rusty-downy buds; leaves 4'-6' long, doubly serrate, very rough above; these and the flowers sweet-scented in drying; calyx-lobes and stamina 7-9; fruit much less than 1' long, the seed-bearing cone subsessile.

U. montana, Witch or Scotch Elm. Planted from Eu.: leaves smaller and less rough; buds not downy; calyx-lobes and stamina about 3; fruit 1' long, smooth.

§ 2. Leaves smooth above, smaller: note at the summit of the fruit reaching nearly to the seed-bearing cell: fruit only about ½ long.

- European species occasionally planted: flowers in close clusters; petals very short or hardly any: stamina 4 or 5; fruit smooth, roundish.

U. campestris (or Ulmus), ENGLISH Elm. Large tree with rather short horizontal or ascending branches; leaves 2'-4' long, mostly or even smooth.

U. suberosa, EUROPEAN Cork-Elm. Probably a more variety of the preceding, with thick plates of cork on the branches.

- Wild species, with the flowers soon hanging in slender stigmas, which are pointed above the calyx: fruit ovate or oval, with 2 sharp teeth at apex, the twigs downy-ciliate at least when young.

U. americana, American or White Elm. Well known large tree, with long ascending branches gradually spreading, drooping slender branches, which are smooth as well as the buds, not corky; the abruptly pointed leaves 2'-4' long; flowers in close clusters, with normally 7-9 calyx-lobes and stamina; fruit smooth except the margins, its incurved points closing the notch.

U. pumila, CORK White Elm. Resembles the foregoing, but with downy-ciliate bud-scales; branches becoming corky, young branches somewhat pubescent, leaves with straggling veins, and flowers scattered.

U. alata, WASHO or WIMPED Elm. Virginia to Ill. and S.: small tree, with bud-scales and branches nearly smooth, winged plates of cork on the branches, and small thickish leaves (1½'-2') almost resultant.

2. PLANERA, PLANTER-TREE. (Named for J. J. Planer, a German Botanist.) Flowers greenish, appearing with the leaves in early spring.

U. aquatica, AMERICAN P. River swamps, from Kentucky S.: small tree, leaves ovate-oblong, smooth; fruit stalked in the calyx, beset with irregular warts or crests.

3. CELTIS, BACKBERRY or NETTLE-TREE. (Ancient Greek name for the Laurel-berry, produced by the European species.) Flowers in autumn, sterile.

U. occidentalis, American or B. Mall or middle-sized tree of rich low grounds, with compound ovate and taper-pointed serrate or entire leaves, oblong or partly heart-shaped at base, sweet thin-fleshed fruit as large as a pea. Var. pumila, a struggling bush, chiefly S., only 4'-6' high.

4. FICUS, FIG. (The Latin, altered from the Greek name of the Fig.) Flowers in autumn, sterile.

U. carica, Common Fig. Cult. from the Levant, as a house-plant: leaves broad, A.-sagittate, roughish above, rather downy beneath; fig single in the axils, pear-shaped, succulent.

U. elastica, INDOPLANTER-TREE of E. Indies (not that of S. America): tree cult. in conservatories for its beautiful leaves, 6'-10' long, oval-oblong, entire, thick, smooth, bright green, glossy above.

U. repens, from China, a delicate creeping species, fixing itself firmly by means of creeping roots in conservatories; leaves ½' or less long, oblong-ovate, with unequal partly heart-shaped base.

5. MORUS, MULBERRY. (Old Greek and Latin names.) Leaves heart-shaped or ovate, mostly serrate, often palmately lobed; short catkin-like spikes axillary or lateral; 6. spring: fruit in abundance, notable.

M. rubra, Red Mulberry. Low tree, wild in rich woods or along streams; leaves rough above, downy beneath, pointed; spikes often decisioned; fruit cylindrical, red, turning dark purple.
M. nigra. BLACK M. Small tree, planted and partially wild from the Lesbian ; leaves rough ; spikes short and short-peduncled; fruit short-oblong or oblong, red, turning black, pleasant-scented.

M. alba. White M. Small tree, planted from China: the leaves feed silkworms, these are smooth and mostly oblanceolate at base; spikes slender-peduncled, in fruit oval or oblong, white or pale rose-pink, rather fragrant.

6. BROUSSONETIA, PAPER-MULBERRY. (Named for Broussonet, a French naturalist.)

B. papyrifera, of Japan. Cult. as a shade-tree from New York S.; spreading by suckers, with a very thorny bark; leaves rough above, downy below, serrate, some of them ovate or slightly heart-shaped, others 3- to 5-lobed or variously lobed; flowering in spring.

7. MACLURA, OSAGE-ORANGE. (Named for the late Mr. Macura, founder of the Academy of Natural Science, Philadelphia.)

M. aurantiaca, Common O., or Buck-orange (Buck-orange, the tough yellow wood used for bows by the Indians). Low bushy tree from Arkansas, etc.: multiplying rapidly by its running roots; planted for hedges, especially W.; armed with slender and very sharp spines; leaves lanceolate, entire, very glossy: fl. spring.

8. URTICA, NETTLE. (The classical Latin name.) Common in waste grounds and near dwellings: f. summer.

* Flower-clusters in branching pointed spikes: often dioecious.

U. dioica, Cockspur N. A weed from Eu., full of stings, 2-5' high, with heart-keeled very deeply serrate leaves downy beneath.

U. gracilis. Fence-w, 0. : 2-5' high, with ovate-lanceolate less deeply serrate leaves, larger petals, rather low stings, and slender spikes.

* * Flower-clusters thin the petiole, mostly 2 in the same axil, containing both sexes of flowers: stings multimed.


U. tenuis, Small N. Weed from Eu., not common: 6-12' high, with ovate leaves deeply cut into long spreading teeth; flower-clusters small, broad.

9. LAPORTEA, WOOD-NetTLE. (Named for one Laporta.) 2l

L. Canadensis. Moist and rich woods: 2-5' high; ovate leaves 4-7 long and long-petioled, a single 2-toothed stipule in the axil: f. all summer.

10. BOHMÉRIA, FALSE-NetTLE. (Named for Prof. Bihore of Germany.) 2l

B. cylindrica. Moist shady woods, 1-3' high, smooth leaf: leaves mostly opposite, ovate or lanceolate, 3-toothed, serrate, long-petioled; flower-clusters crowded in long narrow interrupted spikes, in summer.

B. spheric, Illinois, or the Grass-Clover Plant of China, etc.: 2-4' high, with ovate leaves white-downy beneath, is readily planted S. W. for its very valuable textile fibers.

11. CANNABIS, HEMP. (The ancient name.) Fl. all summer.

C. sativa, Common Hemp. Tall coarse plant from the Old World; cult. for the fibre of its stem.

12. HUMULUS, HOP. (Name said to be a diminutive of hōpō, the ground, the application not apparent.) Fl. summer.

H. lupulus, Common Hop. Wild in alkali soil N. & W.; also cult. from Eu. for hops: the aromatic bitterresides in the yellow resinous glands which comprise the flowering calyxes, oblong, etc.: stems almost prickly downy, leaves heart-shaped and strongly 3-lobed.
104. PLATANACEAE, PLANE-TREE FAMILY.

This order, if it may be so called, consists merely of the small genus

1. PLATANUS, PLANE-TREE. (The ancient name of the Oriental species, from the Greek word for broad, alluding either to the base or the with-sprawling branches.) Flowers monocious, in separate naked heads hanging on slender peduncles; the profile of many short stems with club-shaped little scales interspersed; the fertile of club-shaped or inversely pyramidal ovaries mixed with little scales and tipped with a slender Club-shaped simple style, rising into a sort of stamen with a short hairy contracted base. No evident calyx. Leaves alternate, palmately lobed or shaped, the hollowed base of the petiole covering and surrounding the auxiliary bud (Lessons, p. 22, fig. 80): stipules scurfy, like those of the Polygala Family.

P. occidentalis, AMERICAN PLANE, SYCAMORE, or BUTTONWOOD. A well-known American tree by riverbanks, with white close bark separated in thin brittle planks; leaves truncate or heart-shaped at base, rather scurfy down, until old, the short lobes sharp-pointed, and fertile heads solitary.

P. orientalis, ORIENTAL PLANE, especially its variety ACERIFOLIA, seldom planted in this country, is very like one, but has leaves more cut and sooner smooth, the heads larger.

105. JUGLANDACEAE, WALNUT FAMILY.

Trees with alternate pinnate leaves, no stipules, and monocious flowers; the sterile ones in caskets with an irregular calyx and several stamens; the fertile single or 2 or more in a cluster, with a 3-5-lobed calyx, the tube of which is adherent to the ovary. The latter is incompletely 2-4-celled, but has only a single ovule, exerted from its base, and ripens into a large fruit, the bony inner part of which forms the nut, the fleshly at length dry outer part the husk. Seed 4-lobed, filled with the leathery and oily embryo, the large and separated cotyledons deeply two-lobed and crumpled or corrugated.

1. JUGLANS. Sterile flowers in solitary caskets from the wood of the preceding year, each with 25-40 stamens on very short filaments. Fertile flowers on a terminal peduncle, with a 4-lobed calyx, 4 little green petals, and 2 club-shaped and fringed connate stigmas. Husk of the fruit drying up without splitting. Bark and shoots resinous-aromatic and strongly scented. Buds several, one near the other, the uppermost far above the soil (Lessons, p. 27, fig. 50). Pith in plates. Leaves incrustate.

2. CARYA. Sterile flowers in clustered lateral caskets, with 4-10 almost stalkless anthers. Fertile flowers 2-5 in a cluster on a terminal peduncle no petals; stigmas 3 or 4, large. Husk of the fruit splitting into 4 valves and falling away from the smooth nut. Valuable timber and nut trees, with very hard and tough wood, and nearly hard single (Lessons, p. 22, fig. 44), from which are usually put forth both kinds of flowers, the sterile below and the sterile above the leaves.

1. JUGLANS, WALNUT. (Name from Jesse plenum, the nut of Jupiters.)

2. spring: fruit ripens in autumn. Seed sweet and edible.

- a Plant from the Old World; bark fissured, separating when dry from the smooth and smoothish thick-shelled nut.

2. *Carya*, HICKORY. (Greek name of the Walnut, applied to these North American trees.) Fl. in earlier half-spring; fr. fall in autumn.

- a Sterile orchard in a wide clusor; leaves 13-15, short-sharlicd; not edible.

3. *Carya*, Pecan nut. Among rivers, from Illinois S.; leaves oblong-lanceolate, taper-pointed; nut cylindrical-oblong, olive-shaped, the seed delicious.

- a Sterile orchard 3 or more together on a common peduncle; leaves more or nearly so, of 5-9 or rarely 11-13 leaves; not glandular or short-oval.

- a Note sauce-bearing and edible (the hucky-wants of the world); the bark splitting into 4 thick and hard classes; buds large, of about 10 scales.

C. *Alnus*, BLACK-WALNUT or BLACK-BARK. Comm. E.: bark of old trunks very shaggy, separating in tender stripes; inner bark-scales becoming very large and conspicuous on the young shoot; leaves 3, the 3 upper much larger and large-ovate; not white.

C. *Suillus*, WESTERN SHELL-BARK H. From Pern. W. & S., differs from the foregoing in lighter-colored heart-wood, 7-9 leaves more downy beneath, fruit with very thick bark-ribbed above the middle, and larger yellowish or dull-white not sometimes 2' long; mostly with a point at both ends.

C. *Mamillaria*, BUCKEYE or WHITE-BARK. Comm. E. & S.: bark rough, but not splitting off in strips; shoots and lower surface of the leaves mostly-downy when young; leaves 7-9, lance-oblong, or the lower lanceolate; fruit with very thick hard bark, and globular nut (not latticed on the sills); brownish, very thick-shelled, hardly fit to eat.

- a Note bitter, in a rather thin and flexible bud, which splits only at the top, or rarely near to the base: bark on the tree clusor; bud scales falling early.

C. *Porcina*, BROWN H. or POINSET. Comm. N.: bark of trunk rough; buds-scales about 1', small; shoots and leaves nearly smooth; leaves 5-7, ovate-lanceolate; fruit pear-shaped; nut oval, hard-shelled, and at first erect, then bisected.

C. *Amara*, BITTER-NUT. Moist or low grounds: bark of trunk smooth and very thick; yellowish-brown-scales about 6'; shoots and leaves persistent when young; leaves 7-11, lanceolate or lance-oblong; fruit and white thin-shelled and darker nut globular; seed at first green, then very bitter.

C. *Quercus*, WATERS H. River-water-wasp. S. Small tree, with rough bark; bud-scales in the last; leaves 9-15, lanceolate, smooth; nut thin-shelled, angular, flatish; seed very bitter.

106. *Cupulifer*, OAK FAMILY.

- Trees or shrubs, with alternate and simple straight-veined leaves, very deciduous stipules, and monocious flowers; the stamens in slender catkins (except in the Beech); the fertile solitary, clustered, or sometimes paired, and furnished with an involucre which forms a cup or covering to the 1-seeded nut. This nut comes from an acorn with 2 or many cells having one or two ovules hanging from the summit of each; but all except one cell and one ovule are abortive. There is a calyx adhering to the ovary, as it falls down by the minute teeth, crossing its summit. Seed filled by the embryo, which has thick and fleshy cotyledons.
Sterile flowers clustered in slender catkins: their bracts inconspicuous or deciduous.

1. **QUERCUS**. Stanmore 8-12. Fertile flowers 1 or 2 in a fertile branchlet, which becomes a nut cup. Nilgret (Bladd.) 
   
2. **FAGUS**. Selfs 8-16. Fertile flowers few (ordinarily 2) in each involucre, one or more opening; bracts mostly 4 or 5, bracteate. 
   
3. **CORYLUS**. Selfs 8-20. Fertile flowers few in a clump of 4 to 8 in each involucre, each with 1 or 2 bracts, forming a false cup or false flower in the bud. 
   
4. **CASTANEA**, Selfs 8-20. Fertile flowers few (ordinarily 2) in each involucre, each with 1 or 2 bracts, forming a false cup or false flower in the bud. 
   
5. **QUERCUS, OAK.** (The classical Latin name.) Flowers in spring; acorns ripe in autumn. All best of the following species are natives of the country.

1. **QUERCUS**, White Oak (the classical Latin name.) Flowers in spring; acorns ripe in autumn. All best of the following species are natives of the country.

<table>
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<tr>
<th>Name</th>
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<tr>
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**Notes:**
- Sterile flowers in small heads or drooping panicles. 
- **QUERCUS**, White Oak: (the classical Latin name.) Flowers in spring; acorns ripe in autumn. All best of the following species are natives of the country.

**Notes (cont.):**
- **FAGUS**: Selfs 8-16. Fertile flowers few (ordinarily 2) in each involucre, one or more opening; bracts mostly 4 or 5, bracteate.
- **CORYLUS**: Selfs 8-20. Fertile flowers few in a clump of 4 to 8 in each involucre, each with 1 or 2 bracts, forming a false cup or false flower in the bud.
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OAK FAMILY.

Q. imbricaria, LAURUS or SCIONE-OAK.—Rather small tree, from New Jersey W. & S. W.; a middle-sized tree, with hand-like lance-oval leaves glossy above, more or less downy beneath.

--- Leaves widening upwards, where they are sometimes uncrinkled 3-5 lobed; margins glabrous, smooth, small.

Q. aquatica, WATER OAK. Wet ground from Maryland S. a small tree, with very smooth and glossy oblong-obovate-oblongate oblanceolate or wedge-shaped leaves long tapering at base; cup scars-shaped.

--- Leaves beneath even when mature: cup scars-shaped with top-shaped base.

Q. ilicifolia, BEAR or BLACK SCRUB-OAK. Stiffly hirsute and berry

--- Leaves beneath even when mature: cup scars-shaped with top-shaped base.

Q. nigra, BLACK-JACK or BARREN OAK. Barrens, from New York S. & W.; low tree (15°-20° high), with wedge-shaped leaves widely dilated and mostly bladed at summit, but when rounded at the narrow base, rusty-downy beneath, smooth and glossy above; cup top-shaped, coarse-scaly.

--- Leaves beneath even when mature: cup scars-shaped with top-shaped base.

Q. Catesbaei, TOonet of BARRENS SCRUB-OAK. Small tree in pine, barrens S.; leaves deeply pinnatifid or 1-3-lobed; the long and narrow or unequally lobed leaves somewhat acutely-shaped and often nearly sessile; cup very thick and of coarse scales, 1 or less broad, half encroaching the acorn test.

--- Leaves nearly rounded or oblong at the base, distinctly-pinnate, thinner.

Q. coofmam, SCARLET OAK. Dry or barely moist soil: large tree, with gray bark, the interior reddish, rather thin barks more or less glossy above and deeply pinnatifid; cup coarse-scaly, top-shaped and hemispherical with a central scaly base, covering half or more of the roundish acorn (this 1°-2" long).

Q. tinctoria, QUEENSTON, YELLOW-BARKED, or BLACK BARK. Bark of trunk darker-colored, thicker, tougher, internally orange (speculate), and much more valuable to the tanner and dyer; cup less top-shaped; leaves less pinnatifid or of them barely minutic, thinner, less glossy, and more like those of the next.

Q. rubra, Red OAK. Common in rich and poor soil: ridge tree, with dark gray somewhat bark, very coarse reddish wood, and tiniest moderately pinnatifid leaves; cup summer-shaped, sessile or on a short and abrupt narrow stem, of thin close sessile, very much shorter than the nearly oblong acorn (this 1° or less in length).

Q. palustris, SWAMP SCRUB or PIN OAK. Low ground, only N.; middle-sized tree, with less coarse wood, deeply pinnatifid leaves with their divergent lobes separated by broad and rounded sinuses; cup flat-bottomed with a short acorn base or stalk, of fine scales, very much shorter than the roundish acorn, which is barby 4" in length.

2. CASTANEA, CHESTNUT. (Classical name, taken from that of a town in Thessaly). Evergreen in summer, appearing here than the plumpest, strongly straight-veined and nearly sericeous leaves.

Q. crenata, GROUSE CHESTNUT: seldom planted: large tree, with oblong-lanceolate pinnatifid leaves with coarse sharp-pointed teeth, where margins smooth and green both sides; nuts 2 or 3 in each involucrum.
SWEET-GALE FAMILY.

Var. Americana. American Chestnut: large tree in hilly woods, from Canada to Florida, distinguishable from the European only by leaves acute at the base, and fruits sweeter and smaller.

C. pumila, SEROTINE. Sandy dry and stony S. & E. shrub or small tree, with five-lobed leaves which grow downy beneath, and very sweet nut solitary in the involucre, therefore rare.

3. Fagus, BEECH. (Classical Latin name, from the Greek, alluding to the nuts being good to eat.) Flowers appearing with the (straight-toothed and serrate) leaves, in spring.

F. sylvatica, EUROPEAN BEECH. Forest tree, commonest N., with fine-\_toothed stems and smooth light gray bark, and light horizontal splay; the leaves oblong-ovate and taper-pointed, distinctly toothed, thin, their silky hirsute-softness, the very straight veins all radiating in the saucer tooth.

F. sylvatica, EUROPEAN BEECH. Occasionally planted as a shade-tree, is distinguished by broader and shorter, firmer, more hairy, and more-motted leaves, some of the main veins tending to the stones. Copper Beech is a variety with crimson-purple foliage.

4. Corylus, HAZEL-NUT. FILBERT. (Classical Latin name.) Shrubs, with flowers in early spring, providing the rounded-heart-shaped, doubly-serrate, at first downy leaves. Edible nuts ripe in autumn.

C. avellana, EUROPEAN HAZEL. Occasionally planted: 60-100 high, with briefly-shooted, and smoothish deeply-cleft involucre about the length of the 11' long! oval nut.

C. americana, AMERICAN H. Thickets: 4-8° high, with more downy shoots, leaves, and involucre, the latter open down to the smaller globular nut in the form of a pair of broad-out-matted leaf-leaves.

C. rostrata, BEAKED H. Thickets and hedges, mostly N.: 3°-5° high, with more ovated and severely heart-shaped leaves, the densely-brevipetale involucre presented in a narrow curved tube much beyond the broad nut.

5. Ostrya, HOP-BRONZBEAM. (Classical name.) Slender tree, with very hard wood: flowers appearing with the (broad-like) leaves, in spring.

O. virginiana, AMERICAN H. BROWN-WOOD or LEAF-WOOD. Rich woods: tree 30°-60° high, with smoothish rough bark, and oblong-ovate taper pointed sharply doubly serrate leaves downy beneath, the same of the fruit briefly at base.

6. Carpinus, HORNBEAM, IRON-WOOD. (Ancient Latin name.) Rare tree or small shrub, with backward-arching and very hard wood, the thin dark bark and small leaves resembling those of the Beech; flowers with the leaves, in spring.

C. americana, AMERICAN H., also called BEECH or Water Beech. Banks of streams: 10°-20° high; with ovate-elongated doubly-serrate leaves, becoming smooth, and half-rounded leaves of the involucre.

107. MYRICA, SWEET-GALE FAMILY.

Shrubs, with red-blossomed often fragrant simple leaves, and monocious or dioecious flowers, both kinds in short, broad catkins or heads, and desicate of any proper calyx, like 1-seeded fruit a flaky little drupe or 1 length dry nut, commonly coated with wax.

1. Myrica. Flowers mostly dioecious, the catkins from lateral leaf-buds; each

- flower under a semi-spherical fruit; and with a pair of bracts; the sterile of

2-3 in a cluster: the sterile of an ovary bearing 3 slender stigma and surround-

ed by a few yellow scales.

2. Comptonia. Flowers mostly monoecond, the sterile in cylindrical catkins; the fruit in glosso-ovoid-shape heads. Grows surrounded by long very-long

scapes which penetrate the smooth little nut.
1. **MYRICA**, BAYBERRY, SWEET GALE. (Ancient name of some aromatic shrubs.) Evergreen, with or without than the leaves.

2. **COMPTONIA**, SWEET-FERN. (Named for Henry Compton, a bishop of London.) Flowers rather than than the leaves, in spring. Willows (or 5-6-8 cm long, with fragrant lance-shaped or lanceolate mostly entire leaves, becoming glossy above, the serrated leaflets thickly invested with greenish or white lines and appearing like berries.

**108. BETULACEAE, BIRCH FAMILY.**

Trees or shrubs, often resinous-sprinkled and aromatic, with alternate, simple, mostly straight-ribbed leaves, commonly deciduous stipules, and monoecious flowers, both kinds in single cymes, and 2 or 3 under each bract. Oval 2-seeded and 2-valved, but the fruit (a little nut or acorn often surrounded by the wing like a samara) 1-seeded and 1-valved. Stigmas 2, thread-like.

1. **BETULA**, Birch. (The ancient Latin name.) Trees with slender sprays (or a few long slender), more or less, spiny-aromatic twigs, sessile body, flowers in early spring along with the leaves; the sterile cattins golden yellow; the fertile ones mostly terminating very short 2-valved branches of the season. The following are all native trees.

- *Trunk with green or yellow-gray bark, the inner and the outer alike; kidney; when flat, about 0.5 cm; when thin, more persistent; fruit with narrow wing.*

2. **Betula nigra**, Sweet Birch, or Cherry Birch. Moss woods mostly N.; a rather large tree, with fine-grained yellowish or dark brown color bark on the trunk (not peeling in thin layers) and brownish-red twigs, very aromatic; leaves oblong-ovate and somewhat heart-shaped, slightly dull, entire, the lower side covered with scales; axillary stamens, 1 cm long, with nearly glossy and almost smooth; fruiting cattins oblanceolatrical.

3. **Betula lutea**, Yellow Birch or Gray Birch. With the other and more northward; less aromatic; back of trunk yellowish-green and somewhat silvery, separating in autumn; leaves duller, more silvery, and rarely at all heart-shaped; fruiting cattins shorter-oval.

4. **Betula papyracea**, American Birch. Small tree in low woods, with downy gray bark; flowers in umbrellalike clusters; oval, black; fruiting cattins shorter-oval.

5. **Betula nigra**, Sweet Birch. Moss woods mostly N.; a rather large tree, with fine-grained yellowish or dark brown color bark on the trunk (not peeling in thin layers) and brownish-red twigs, very aromatic; leaves oblong-ovate and somewhat heart-shaped, slightly dull, entire, the lower side covered with scales; axillary stamens, 1 cm long, with nearly glossy and almost smooth; fruiting cattins oblanceolatrical.

6. **Betula lutea**, Yellow Birch or Gray Birch. With the other and more northward; less aromatic; back of trunk yellowish-green and somewhat silvery, separating in autumn; leaves duller, more silvery, and rarely at all heart-shaped; fruiting cattins shorter-oval.
length, and even dark green along), and more papery bark than in White
willow, separating in scaly strips.
A. excelsa: with greyish-brown bark, hardly scaling in layers, reddish twigs
like aspen, and yellow during early spring; wings of fruit broad.
B. nigra, RAYNE or RED BIRCH. Middle-sized tree of low river-banks,
commonest S.: bears smooth-barked, whitish and mostly downy beneath.

2. ALNUS, ALDER. (Ancient Latin name.) Small trees or shrubs, with
broad leathery, or very few leaves, and even smaller, and cattails mostly
clumped or crowded on flat-topped bulbs or peduncles.
§ 1. Flowers in the leaves in the early winter, with small or no leaves,
while the fertile cattails were enclosed in a swamp bud.
A. viridis, GREEN or MOUNTAIN ALDER. Only native S., and on
mountains: 30'-60' high; leaves round-oval or ovate, glaucous; fruit with
a broad thin wing.
§ 2. Flowers separate, or before the leaves, both sexes from cattails
which have remained closed over winter; wing of fruit narrow and pointed.
A. serrulata, SCARLET or ALDER. Common, especially N., 8'-10' high,
with smooth or smoothish leaves green both sides and sharply serrate.
A. incana, COMMON ALDER. Common N., along streams: 4'-15' high;
with broadly oval or scale leaves rounded at base, acute and often
covered with white, whitish and commonly downy leaves.

103. SALICACEAE, WILLOW FAMILY.
Trees or shrubs, with bitter bark, soft light wood, alternate undivided
leaves, either persistent or deciduous stipules, and discolorous
flowers; both kinds in cattails, one flower under each bract or scale,
the staminate of naked stamens only; the fertile of 1-seeded ovary
which becomes a 2-valved pod with 2 parietal or basal placenta,
having numerous seeds furnished with a tuft of long cottony down at
both ends.
1. SALIX, WILLOW. ORER. (The classical Latin name.) The Wil-
lowes, especially the numerous wild ones, are much too diflicult for the
botanist to understand. For their study the Manual must be used.
The following are the common ones plagiarized from the Old World, with some of
the most tree-like wild ones.
§ 1. Stems 2, but their filaments and often the stamens also united into one.
A. purpurea, of Eu.: known by the reddish or olive-colored twigs, lateral
cattails before the leaves; and with dark scales, red stamens, and smooth downy
buds.
§ 2. Stems 1 and separate.
A. virgata, ALTHEA or OAK, of Eu.: the twigs best for basket-work;
has leaves-leaflets entire slender-pointed leaves 2'-3' long and usually white
underneath,
S. cordata. A common wild species along streams, badly named, as the leaves are seldom heart-shaped at base and generally lanceolate, often tapering to both ends, sharply serrate, smooth, pale or whitish beneath; stipules on young shoots conspicuous, ovate or kidney-shaped; every slender-tapered, tapering, smooth.

§ 2. FLOWERS in June Collinsia sprouts leafy fresh shoots of the season, therefore later than the leaves, in late spring or early summer.

S. longifolia, Lansing Star. Wild on river-banks; low shrub or low tree, with very long linear-linearly lanceolate leaves, grayish-hairy when young; catkins with narrow yellowish scales; the stamens silky-haired; every bearing large stigmas.

S. Babykaonica, Wapato W. Planted from the Orient: a familiar tree, with very slender drooping branches, and lanceolate-lanceolate leaves white beneath; in the meanest variety called annucaulis, toward W., curved into a ring.

S. alba, White W., commonly the true v. vitellina, with yellow stigmas; planted from Eu.: a familiar tree; leaves lanceolate, serrate, white-milky underneath; stipules lanceolate; every nearly sessile and smooth.

S. fragilis, Houlette W. from Eu. (so called because the twigs, used for basket-work, etc., break off readily from the base, as in several other species); large tree, with lanceolate taper-pointed leaves, white but smooth beneath, half heart-shaped stipules, and nearly sessile smooth stamens.

§ 3. Stems 3–5 or more, separate; catkins late-flowering, terminating leaf branches of the season as in the preceding species; stamens hairy; every smooth: scales deciduous; leaves serrate, smooth.

S. nigra, Black W. Low river-banks; wild tree, with rough black bark, narrow-lanceolate taper-pointed leaves, 3–6 stamens, and short-cateate pods.

S. pentandra, Bay W. A handsome tree, planted from Eu. for the deep green very glossy lanceolate taper-pointed leaves, of the same hue both sides, the large sternate catkins of golden yellow flowers also handsome; stamens 4–12, commonly 8; pods tapering.

S. linoida, American Bay W. Wild in wet ground: very like the last, but a shrub, with shorter catkins on a less leafy short branch.

2. POPULUS, POPUL, ASPIE. (Classical Latin name.) Fl spring.

§ 1. Buds not glutinous: leaves falling, at least hirsute, even white add.

P. alba, Aspen or White P. Tree planted from Eu., with spreading branches, most slightly heart-shaped waxy-leathery or leathery leaves, not green above, very white-custard beneath; expands incessantly by the root.

§ 2. Buds not glutinous: leaves rotted, but age smooth and green both sides; bark smooth and close, green-white.

P. tremuloides, American Aspen. Small tree, common in woods N.; with small roundish-heart-shaped leaves bent with small regular prickles; scales of the catkins cut into 3 or 6 linear lobes, fringed with long hairs.

P. grandidentata, Labrador American Aspen. Middle-sized tree, common in woods: the larger roundish-oval leaves with coarse and irregular teeth; scales unequally 3–6-fid, slightly fringed.

P. heterophylla, Downy Poplar. Wet grounds, common only W. & S.; tree 40–60 ft. high; leaves roundly-ovate or heart-shaped with the rims closed by the overlapping lobes, obtuse, serrate with improved teeth, W. 3–5 long, white wood deciduous only with age, having means on the veins beneath making the petals; fruiting catkins smooth.

§ 3. Buds glutinous with aromatic veins or halos: leaves smooth from the first.

P. deltata, Lombardy P. Stiff spry tree, with closely appressed branches, and small broadly triangular pointed leaves, formerly much planted, from the Old World, — thought to be a remarkable state
P. nigra, Black P. of Eu., which is occasionally planted, and has spreading branches, larger leaves, more glistening buds, etc.

P. monilifera, Cottonwood or Necklace P. Along the Great Lakes and streets, from L. Champlain W. and N. W. large tree, with young branches somewhat angled; leaves distantly triangular or slightly heart-shaped; spines with cartilaginous incurved teeth and prominent lateral veins; fruits in c. very long and interrupted; scales coniferous; spines very large, tined.

P. balsamifera, Balsam or Taxamar. Middle-sized tree, wild along our Southern borders and N. W. has round or scarcely angled branches, very glistening and pleasantly hemispheric strong-scented bud scales, and ovate or inmost gradually tapering leaves.

Var. obscuriora, Balsam or Balsam P.: planted around dwellings as a shade tree, wild in some places, spreading inversely from the root, appears to be a variety of the Balsam Poplar, with broader ovate and often heart-shaped leaves, lighter-colored beneath.

Subclass II. GYMNOSPERMOS: no closed ovary, style, or stigma, but ovules and seeds naked on a scale or some other sort of transformed leaf, or in Yew at the end of a scale-bracted stalk; the mouth of the ovule receiving the pollen directly. (Lessons, p. 121, fig. 264–266; p. 133, fig. 312–314.) Leaves not netted-veined.

Cycas revoluta (Lessons, p. 19, fig. 47), from the southern part of Japan, a palm-like low tree of conservatories, wrongly called Sagol Palm, and Zamia integrafolia, the Country of Florida, the cone-like trunk of which does not rise above ground, and furnishes a kind of flour called Florida Arrowroot, represent the order CYCADACE.

III. CONIFERÆ, PINE FAMILY.*

Trees or shrubs, with wood of homogeneous fibre (no ducts), resinous juice, commonly needle-shaped or awl-shaped leaves, and monocious or sometimes dioecious flowers destitute of both calyx and corolla, and in c. or the like. (See Lessons, as above.)

1. PINE FAMILY PROPER. These are true Coniferæ, or cone-bearing trees, the fertile flowers being in a scale c. which becomes a sterile or scaly cone. The scales are each in the axil of a bract (which is sometimes evident and projecting, but often concealed in the full-grown cone), and bear a pair of ovules adhering to their inner face next the base, the ovule downwards, and the two winged seeds peel off the scale as the latter expands at maturity. They all have scaly buds. All the common and hardy trees of the family belong in the following.

1. PINUS. Leaves persistent, long in needle-shaped, 2, 3, or 5 in a cluster from the axil of dry leaf-scales, developed after the scaly shoot of the season lengthens. Needle c. furnished at the base of the shoot of the season; each stamen answers to a flower, reduced to a staminal mother, with hardly any filaments. Cone woody, mostly large, maturing in the autumn of the second year. Cotyledons of the embryo several. (See Lessons, p. 18, fig. 40, 41; p. 72, fig. 191; p. 106, 144; fig. 412–414.)

* For a particular account of the numerous tree of this noble family now planted or beginning to be planned for ornament or veteran works should be consulted, such, especially, as the recent "Book of Evergreens" by Mr. Hayes. We give here only the principal species of the country, such as the Mississippi, and the well-established imported species, mainly stilt to be fully hardy North.
2. ARBUS. Leaves persistent, linear or short needle-shaped, borne directly on the shoots of the stems, over which they are thickly and uniformly scattered.

3. LARIX. Leaves deciduous in autumn, soft, short needle-shaped, in spring developed very many in other clusters from axillary buds of the previous summer. Fertile stamens solitary, maturing in the autumn of the same year; their scales thin and even, never prickly-bearing.

4. CYPRESS. Leaves as in Larix, but rigid and persistent. Cones globular, large, of very few thin scales, which at length fall away from the axis.

II. CYPRESS FAMILY. These have both kinds of flowers in short often globular catkins of few scales; the fertile making a globular or ovate small cone, which is often fleshy when young, sometimes imitating a berry. The branches appear and the shoots grow without the intervention of any scaly buds. Leaves often opposite or whorled, sometimes scale-like and adnate to the branch.

2. Cryptomeria. Cone terminating a leafy branch, the curved tip of the branch and scale-shaped base of the top of the scales projecting.

3. Taxodium. Two kinds of flowers on the same branch; the sterile catkin roughly papillated, of few stamens; the fertile in small clusters. Cone globular, firmly closed till mature, of several very thick-shapped and angular shield-shaped scales, a pair of stern bunched scales on their stalk.

4. Sequoia. Catkins globular, the scales of the fertile ones bearing several stamens. Cone wood; the shield-shaped scales close without overlapping, and bearing 2-5 flat wing-margined seeds hanging from the upper part of their stalk-like base.

5. Cryptomeria. Cone terminating a leafy branch, the curved tip of the branch and scale-shaped base of the top of the scales projecting.

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9. Taxodium. Two kinds of flowers on the same branch; the sterile catkin roughly papillated, of few stamens; the fertile in small clusters. Cone globular, firmly closed till mature, of several very thick-shapped and angular shield-shaped scales, a pair of stern bunched scales on their stalk.

10. Juniperus. Catkins very small, lateral; the fertile of 6-8 fleshy scales growing together, and ripening into a sort of globular berry, containing 1-8 bony seeds. Leaves evergreen, opaque or whitened.

III. YEW FAMILY. Distinguished by having the fertile catkin, if it may be so called, reduced to a single terminal flower, consisting of an ovule only, surrounded by some bracts, ripening into a nut-like or drupe-like seed; cotyledons only 2. There is nothing answering to the scales of a pine-cone. Leaves only as in the true Pine Family. Flowers mostly discoid, axillary.

11. Taxus. Leaves linear, appearing more or less branched, green both sides. Both kinds of catkins, if such they may be called, are small axillary buds.
PINE FAMILY.

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imbibed with persistent scales, bearing at the apex, one a few naked
staminodes, each with 3-8 staminodes under a somewhat shield-shaped
apex, the other an ovate scale. This is fruit inverses a nut-like blackish seed,

noting in the bottom of a berry-like red cup.

15. TORRIDA. Leaves, rhombic, acute, nearly so in Texas. Stamina more

shielded at top, each bearing 8 hanging staminal scale. Nudate seed resembling

a thin flashed drupe when dry but, with no apex several, as large as a

sumpkin, which 3-8 seeded stamens in the bristly-like leaves.

15. AUSPHAERIA. Leaves wedge-shaped and fan-shaped, deeply 4-6-lobed and the

leaves very much-tipped and somewhat curled at the pointed terminal end, traversed

with straight simple or forked nerves, or veins, like a Fern. Flowers and

often seen. Stalk uprights slender and loose. Seed needle-like, and with a

hairy clipeal tag adhering to base.

POHUS. One or two species in choice conservatories and two half

harden in the Middle States as low shrubs. — the genus so called because

this fleshy seed is tapered on a soft of stick, — bearing a nut. The leaves are

sometimes much unlike those of other Coniferae. Large, heavy, leaves,

lanceolate in two states, and thorny, except the midrib.

1. PINUS. PINE. (The classical Latin name.) Flowers in late spring.

§ 1. Pitch-Pines and their relatives, with leaves only 2 or 3 in the cluster,

notched at the base; leaves exquis.

- Cone lateral and scarred on the top branch long after shedding the wood, the scales

blackened at the end, often tipped with a carp or spine; leaves rigid.

- Leaves 3 in the cluster. All native, but the last Californian.

P. australis. Long-leafed, in Southern Yellow Pines. Left striking tree, of

pine-harvest from N. Car. S.; with leaves 6'-13' long, very narrow

wood, and cones 8'-10' long; the scales tipped with a reflexed short spine.

P. timba, Longleaf or Old-field P. Smaller tree, the same wood, from

Virginia, with few masses wood, dark green leaves 6'-10' long, and solitary

cones 3'-5' long, the scales tipped with a short straight of curved spine.

P. rigida, Northern Pitch P. Sandy or thin rocky soil, abounding

along the coast N. and in the upper country; a short tree, with dark green

leaves 3'-5' long from short sheaths, clustered ovate-conical cones 2'-3' long,

the scales tipped with a restricted point or prickly.

P. serotina. Powd P. Small tree in wet ground from N. Car. S.; with

valuable wood, leaves 4'-6' long, and mostly opposite ovate-ovate cones 2'-3'

long, their scales tipped with a very small and weak prickly.

P. ponderosa (or Balsam P.): planted from California, where it is a

characteristic tree, with heavy wood, dark green leaves 6'-10' long, and

clustered cones about 3' long, reflexed on a short spiky.

- Leaves only 2 in the sheath, or a few of them sometimes in three.

- Planted from Europe.

P. sylvestris, Scotch Pines (a quaintly called Scotch Pk), the common

Pine of N. Europe; middle-sized tree, known by the bluish-white of

its fine leaves (2'-4' long), red-tinted on the trunk, and narrow tapering

cone; the scales with tuft-like tips.

P. Austrocarpina, Australian P., a probably variety of P. Laricoid, or

Conica P. of S. E. A.; a fast-growing massive tree, with very rough branches,

dark green slender but rigid leaves 4'-6' long, and conical cones 2'-3' long.

- Wild species of the country.

P. pangens, Table-Mountain or Phegky Pk. Along the Alle

aphylaxis from Penn. N. Car.; middle-sized tree; with dark-bluish-green

leaves only about 2' long: but the heavy and clustered cones fully 3' long,

thick, and the scales armed with a very strong somewhat hooked spine.

P. mitta, Yellow Pk of the North, Short-leafed Yellow Pke. Along the Alle

aphylaxis from Penn. N. Car.; middle-sized tree in sandy or dry soil, with firm-bluish-green

leaves (not rarely in thorns) 3'-5' long, and mostly solitary ovate or obovate

cones barely 2' long, the scales tipped with a minute weak prickly.
P. INOPS, JERSEY SCRUB P. Low struggling tree of barren and sterile hills, from New Jersey S. & W.; with drooping branches, leaves 1'-3' long, and solitary or whorled cones 3'-5' long, reflexed on a short stalk, the scales tipped with an awl-shaped prickles.

P. Banksiana, GRAY'S NORTHERN SCRUB P. Along our northern borders and extending N., on rocky banks; struggling shoots or trees, 5'-20' high; with oblique or contracted leaves 1' long, curved cones barely 2' long, and blunt scales.

* * Comes at the apex of the branch and falling after shedding the seed, their scales singly thickened at the root and without any prickly point; leaves only 2 in the cluster and with a long sheath, slender.

P. resinosa, RED PINE, and widely called NORWAY PINE: the Latin name not a good one, as the tree is not especially resinous; dry woods N. from N. England to Wisconsin; 30'-80' high, with reddish and smooth bark, compact wood, dark green leaves 5'-6' long and not right, and unarrowed smooth cones about 2' long.

§ 2. White Pines, with softer leaves, 5 in the cluster, their short and the male and smooth early developed; cone long, cylindrical, brazen, keeled, falling after shedding the seeds, their inner bark if at all thickened at the end, punctate, and thin-skinned and stripped.

P. strobus, WHITE PINE. Tall tree in low or fertile soil N. and along the mountains, with soft white wood invaluable for lumber, smooth greenish bark on young trunks and branches, pales or glossy slender leaves 3'-4' long, and narrow cones 1' to 1½' long.

P. exfolians, BIODON or HIMALAYAN WHITE P. Ornamental tree hardly hardy for N.; with drooping and white leaves and the cones nearly twice the length of those of White Pine.

P. Lambertiana, LAMBERT'S or SUGAR P. One of the tallest trees of Oregon and California, beginning to be planted; has leaves as rigid as in many Pitch Pines, 3' to 4' long, bright green, the cones also at first erect, when fully grown 12' to 20' long.

§ 3. Nut Pines, both leaves, fc., as in the preceding notion, but short thick cones of f ever and dark purple scales, and large hard-skinned white seeds sterile of a wing.

P. Cembra, CEMBRA or SWISS STONE P. of the higher Alps: multi, slow-growing, very hardy ornamental tree, with green and slender leaves 9'-12' long and nearly covered on the crust branches; cones narrow-cylindrical, 2½' long, the round seeds as large as peas.

2. ABIES, SPRUCE. FIR. (Classical Latin name.—The names Abies and Picea, for Spruce and Fir, are just incapacitated used by different authors. Linnaeus employed the former for Nyphoe, the latter for Fic, and to do some justice. The unceases need the names just the other way, and the latter bearded mostly follow them.) Vi. late spring.

§ 1. Spruce. Comes hugging or nodding on the end of a branch, their scales penicillate, rolls of the mother opening laminae in the midribs and braided leaves pointin every way.

A. exfolians, NORWAY SPRUCE: the most common and most vigorous species planted, from Europe; pin large tree, with stout branches, deep green leaves larger than in the next, the mature hanging cones 3'-6' long.

A. picea, BLACK or DOUBLE SPRUCE. Cold woods and swamps N. and along the mountains S.; medium-sized tree, with leaves 1½' long; dark green, and a glaucous-whitish variety; its small cones resting on short branches, 1½'-2½' long, persistent for several years, thin rigid scales with thin skin exuded edge.

A. Alba, WHITE SPRUCE. Widely along our northern borders and N.; when planted a very handsome tree, with pale glossy leaves; cylindrical nodding cones about 3' long, falling the first winter, the thinner scales with a firm even edge.
3. LARIX, T. ARCH. (The Ilncient name.) Trees planted for ornamental, most prickly-pointed, silvery-white beneath, cones about 3' long, cylindrical, soft, their scales thrum-like, thin and pale.

§ 2. HOLOKENDRIC. (Tiehelia). Close bushes on dissected branches of the preceding year, small, persistent, and their scales persistent - sterile catkins very small and staminal, of a few anthers which open across leaves at, leaves flat, on distinct little pedicels, most of them spreading right and left as to appear crossed on the branch.

A. Canadensis, HoLOKENDRIC. Common on hills X. and planted for ornament: large tree, with coarse wood, light and spreading sprays, broad-disked and blunt leaves only 3' long, green above and white beneath, and oval cones only 2' or 3' long, their bases very short and hidden.

A. Douglasii, HoLOKENDRIC, one of the tall trees from Rocky Mountains and W. to the Pacific, planted but proves not quite hardy enough X., of this section: it has shorter leaves 2' or more long, light green, indistinctly 2-3' long; cones 2' or 3' long, those with pointed toothed bracts advertising beyond the scales.

A. Fin. Close set rigidly set on the upper side of spreading branches of the preceding year, their scales and commonly conspicuous bracts falling away with the scales where rise from the persistent slender axes, with remains, unequal irregularly lanceolate leaves flat, white beneath, each side of the prominent midrib, those on horizontal branches continued to spread right and left as to appear crossed.

§ 2. Firs. Close set rigidly set on the upper side of spreading branches of the preceding year, their scales and commonly conspicuous bracts falling away with the scales; where rise from the persistent slender axes, with remains, unequal irregularly lanceolate leaves flat, white beneath, each side of the prominent midrib, those on horizontal branches continued to spread right and left as to appear crossed.

8. Balsam Fir, native tree: back yielding Canada balsam from waters, etc.

A. balkeanum. Common B. Small tree of cold or wet grounds X., handsome when young, best shrubbed, with worthless wood, narrow linear leaves 3' or less than 1' long and much crooked, its balsamic-variegated cones 2' - 4' long and 1' 2' long, their bases with only the lateral slender pestle projecting.

A. Fraxinifolia, Fraxinif. or Northern B. Along the higher Alleghenies: small tree, like the preceding; but the small cones (only 1' - 2' long) elongated, with the short-pointed upper part of the bracts conspicuously projecting and reflexed.

8. Silver Fir, &c. Very choice ornamental tree, only the first at all common.

= Leaves blunt.

A. pectinata, European Silver F. Large tree with wood, its horizontal branches with narrow leaves (commonly above than in Balsam F., nearly as wide beneath and 1' long) forming a flat spray; cones 6' - 8' long, with similar projecting points in the bracts.

A. Nordmanniana, from the Crimea and N. Asia: with thicker-set and broader leaves than the foregoing, linear, curved, 1' long, deep green above and whitened beneath; cones large and ovate.

A. Fichtia, Northern Silver F. With thicker-set leaves than those of European Silver F., dark green above and less white beneath; cones only 3' long, their short bracts concealed under the scales.

A. grandis, Great Silver F. of Oregon and California: resembles a firm Balsam F. on a large scale, with broader leaves notched at the end, about 1' long, and thicker cones with concealed bracts.

= Leaves acute or pointed, especially on main shoots, rigid, widely and about equally spreading on all sides.

A. Cephalonica, Cephalonian Silver F. Remarkable for its very sickle and almost prickly-pointed, squarrose leaf dark green above, white beneath.

A. Pinus, Western Silver F. resembles the last, but not so harshly, leaves less pointed, and the bracts of the cones are concealed.

3. LARIX, LARCH. (The ancient name.) Trees planted for ornament and valuable for timber: branches slender, the young ones pendulous: flowers in earliest spring, much before the leaves appear:巴基从后-
sper or broad bode; the sterile globular, yellow: the fertile ovary, columnar, being the color of the hearts.

L. Europiilis, European Larch, the one generally planted: a fine fast-growing tree, with leaves about 1" long, and lovely cones of numerous scales.

L. Americana, American L., Timanick or Hacknather. Swampy in N., slender true wales absent and paler leaves, and smaller cones of few scales, only 1 1/2 or 1 1/2 long.

4. CEDRUS, CEDAR, i. e. of Lebanon. (Ancient Greek name.) Wood reddish, fragrant. Cult. for ornament, not precarious in this climate.

C. Libani, C. Libani: with dark foliage and soft horizontal branches, the terminal shoot erect; not hardy E. of New York.

C. Deodara, C. Deodara: with lighter drooping spurs on young trees, and whitish foliage: seems unlikely to flourish in this country.

5. CRYPTOMERIA. (Name, from the Greek, means concealed seeds or cones.) Evergreen tree from Japan.

C. Japonica, not hardy N. but often in nurseries; leaves crowded, awn-shaped, many-branched, edgewise and downcast on the stem.

6. TAXODIUM, BALD-CYPRESS. (Name, from the Greek, means 1. bald; the resemblance is only in the shape of the leaves.) Pl. before the leaves, in earliest spring.

T distichum, American B. or Southern Cypress. Large tree in Asia N., and planted, even N.: branches slender, many of them falling in autumn like leafstalks; leaves light green, 1 1/2 long; narrow-linear, bracted, on some flower-bearing shoots awn-shaped and flaccid; cones 1 1/2 or less thick.

7. SEQUOIA, REDWOOD. (Name for the Cherokees Half-breed Indian Sequoyah, who invented an alphabet for his nation.) A very celebrated, gigantic, Californian tree, with fibrous bark, not unlike that of Taxodium, and soft, fine, different wood. Neither species is hardy in New England, or safe in the Middle States; but the second is disposed to stand.

S. sempervirens, Common Redwood of the coast ranges of California: with flat and linear acute leaves bracted on the branches, but small awn-shaped and scattered ones on the erect or leading shoots, and small globose cones (barely 1" long).

S. gigantea, Giant Redwood (in England called Wellingtonia) of the Sierra Nevada; with all the leaves awn-shaped and distributed along the branch; cones ovoid, 1 1/2-2" long.

8. CUPRESSUS, CYPRESS. Classical name of the Oriental Cypress, namely.

C. sempervirens, planted only for S.; stiff narrow tree, with slender erect branches, dark foliage, and cones 1 1/2 diameter, each scale many-seeded.

C. thyoides, White Cedar. Tree of few genera: B. & E., with white valuable wood, slender spire, and pale glossy-green triangular-awn-shaped leaves much finer than in Arbor Vitae: cones hardly 1 1/2 wide, with few seeds to each scale, and these almost wingless.

C. Lewisiiana, of S. California, recently much planted, and if fully hardy promising to be very ornamental; has thickly set and plum-like flat spire, of bluish-green hue, and cones scarcely above 1" in thickness, their scales bearing 2-4 scales and opening 2 or 3 seeds.

C. pisifera, or Extremadura Perperea (of which C. obtusa is seemingly a form with the scale-shaped leaf blunter and cone larger), is a scarcely hardy species, introduced from Japan, the cones only as large as peas (to which the specific name refers), a single pair of broad-winged seeds to each scale.

C. squarrosa, or Incus, from Japan, is perfectly hardy N., perhaps a variety of the last, but of strikingly different appearance, bearing only leaves and awn-shaped leaves.
9. THOUS, ARBOR VITAE. (A common name of some wind-bearing evergreens.) The twelve plants in collections are very consommate; the following are the principal natural types, by many taken for greens.

**T. occidentalis**, American Arbor Vitae, or White Cedar of the North. Common tree N., in swamps and cool moist woods, much planted, especially for hedges and screens; leaves mostly of the scale-shaped sort; blunt at either end; those sibling, rather soft, the whole scale-pointed, and bearing 2 thin winged seeds. Many more varieties, some of which, especially var. **Dr. Frenmeyer's** A., have the loose and shaped sort of leaves.

**T. orientalis**, or **Red Oak**. The Chinese A., not fully hardy for N.; small tree, with very scale-shaped leaves acute, cone larger, with thicker scale, tipped with a recurving horn-like apex or appendage, such A. needed, and the seeds hard-rolled and wingless. — Var. **EUROPEA**, the Gallas A. is dwarf and very dense, with yellow-green or partly golden-shaped foliage. Var. **TARANTA**, is a more barely glossy-green variety, the leaves scale-shaped. Var. **BABUSCI**, one with only loose and oval-shaped leaves. Even the slender-stemmed and weeping **T. pendula** is an extreme variety.

**T. dolabrata**, or **Japanese Cedar**. Japan. Remarkable for its very flat spray, broad and very blunt large leaves (sometimes 2½ long) green above and white beneath; the cones with thick and rounded scales, each with 5 wing-margined seeds.

10. JUNIPERUS, JUNIPER. (Classical Latin name.) Fr. late spring.

§ 1. Leaves (scale-like and oval-shaped, small, the former not minute and very durable) like those of Cypress and Arbor Vitae.

**J. virginiana**, Red Cedar or SAVIN. A familiar shrub and small or large tree, with most durable and valuable reddish orange wood; the small fruit dark, with a white bloom, on the short supporting branchlet.

**J. sabina**, var. **procumbens**, Rock'y banks, trailing over the ground along northern fences, with the scale-shaped leaves less acute, and the fruit nodding on the short peduncle-like recurved branchlets.

§ 2. Leaves all of one sort, in which ½, placed with the stem, linear with an oval-shaped prickly point, the middle prominent, also the riblike venes.

**J. communis**, Common Juniper. Erect or spreading shrub; with very sharp-pointed leaves green below and white on the upper face; berries large and smooth. The wild, low, much spreading variety is common N. in Steele or rock ground. Var. **HERBACEA**, very erect tree-like shrubs, forming a narrow column, is most planted for ornament, from Es.

11. TAXUS, YEW. (Classical name, from the Greek for a tooth, the tough wood was chosen for ones.) Fr. early spring.

**T. baccata**, European Yew. Low tree, with thick upright trunk, spreading short branchlets, and pointed dark green leaves about 1½ long; when planted in this country forms only a shrub.

Var. **fastigiata**, Spearing Yew; a singular form, making a narrow column, the branches spreading; the leaves shorter, broader, and scarcely in two ranks.

Var. **Canadensis**, American Yew or Grocer's Hedge; shaddy cold banks and woods; the stems spreading over the ground.

12. TORREYA. (Named for our Dr. T. Torrey.) Flowers in spring.

**T. taxifolia**, Woods in Florida; a handsome tree, but with the wood and foliage ill-scented; leaves like those of Yew but longer and tapering to a sharp point; hardy as a shrub in far north as New York. — **T. CALIFORNICA**, in the California Nutmeg-Tree. T. Nootka, from Japan, in another species.

13. SALISBURY, GINKGO-TREE. (Named for R. A. Salisbury.)

**S. elegans**, the same denotes the likeness of the leaves to those of the Japanese **J. JENKINS**, or GIN-KO, a short magnificent tree, planted from Japan, hardy even north; N.; branches spreading; the fan-shaped autumn leaves with their slender silky 3½ or 4 lobes.
CLASS II. MONOCOTYLEDONOUS or ENDOGENOUS PLANTS: Distinguished by having the woody matter of the stem in distinct bundles scattered without obvious order throughout its whole breadth, never so arranged as all to come in a circle, when abundant enough to form proper wood as in Palms and the like, this is hardest and the bundles most crowded toward the circumference. Embryo with a single cotyledon; the first leaves in germination alternate. Leaves mostly, but not always, parallel-veined. Parts of the flower almost always in threes, never in fives. See Lesson, p. 117, and for style of vegetation, p. 19, fig. 47.

The plants of this class may be arranged under three generally well-marked divisions.

I. SPADICIOUS DIVISION. Flowers either naked, i.e. de-stature of calyx and corolla, or these if present, not brightly colored, collected in the sort of spike called a spadix, which is subsheathed or subtended by the kind of developing bract termed a spathe. The most familiar examples of this division are offered by the Arum Family. To it also belong on one hand the Palms, on the other the Pondweeds—here merely mentioned, as follows:—

Sabal Palmetto, Cushage Palmetto, of the sandy coast from N. Carolina S., our only true of the clan, with
S. serrulata, Saw Palmetto, of the Southern coast, the trunk of which creeps on the ground, and the short pistils are spoon-shaped, whence the popular name,
S. Adansonii, Dwarf Palmetto, the leaves of which, rising from a stem underground, are subterranean, and
Chamompepy Hystrix, Bee Palmetto of S. Carolina &c., with erect or creeping trunks only 2’—3’ long, and pair or glaucous leaves 3’—4’ high;—these represented with us the Palm Family.
Potamogeton natans, and other species of Potamogeton abundant in ponds and streams, and represent the Najadeae or Pondweed Family,—plants of various forms but of little interest,—in fresh water.
Zostera marina, Grass-Wrack or El-Grease of salt water, with its long ribbon-like bright green leaves, and flowers hidden in their upper sheaths, represents the same family in shallow bays of the ocean.

Lemna polyrhiza, Duckweed, consisting of little green grains, about 1’—3’ long, floating on stagnant water, producing a sort of hanging roots from their lower face, never have been found in bloom.
L. minor, still smaller and with only a single root,—and the less common
L. triatica, which is oblong-lanceolate from a stalk-like base,—all propagating freely by budding from the side and separating,—are greatly simplified little plants representing the Lemnaceae or Duckweed Family, their minute flower rarely seen. See Manual; also Structural Botany, p. 76, fig. 302.
119. ARACEÆ, ARUM FAMILY.

Plants with pungent or acid watery juice, leaves mostly with veins resubcised so as to resemble those of the first class, flowers in the flabby head or spike called a spadix, usually furnished with the colored or peculiar enclosing bract called a spathe.

There are several Close-plants of the family now rather common in choice collections, mostly species and varieties of Caladium, cultured for their colored and variegated foliage.

1. ARESÉM, Leaves compound, only one or two, with stalks sheathing the ultimate veins, which ensheath a flabby corn, and terminate in a long spadix bearing flowers usual in base, where it is enveloped by the common lower half of the greenish or purplish spathe. Mosaic flowers above the fertile, each of a few whorls smaller; the fertile each a terminal 8-ribbed ovary, in fruit becoming a smooth berry commonly brownish, the stamens being borne in one plane, the petals obsolete in the other.

2. COLOM'BIA, Leaves simple, peltate, and with a notch at the base. Spathe carmine, subelliptic, much longer than the spadix; the latter covered with scales at base, above with some obsolete indument, still higher colored and with shorter scales, below with scales spreading, the spadix is foliaceous, the flowers green, the petals wanting.

3. DÉLL'INDE, Leaves arrow-shaped; these and the scape from a tufted stem, mostly. Spathe pinched at the point, young green, becoming purplish. Spadix long and tapering, covered completely with flowers, i.e., above with naked short-conical scales each of 6 or 8 sides, opening by a hole at the top, below with spathaceous scales bearing several erect ovary, in fruit a 1-celled oblong spadix. Seeds black, surrounded by a transversal jelly.

4. DÉLINDRA. Leaves arrow-shaped; these and the scape from a short tubercle-stalked, the base broad, spreading scales, bright white, eminence at base causing the sterile cylindrical spadix, which is deeply covered above with yellow scales, below with scales, each incompletely keeled, and sometimes bearing several hanging ovary.

5. CALLA. Leaves heart-shaped, on long pedicels; these and the peduncles from a propping rootstock. Spadix open, the upper face bright white, spreading widely at the base of the club-shaped spadix, which is wholly covered with flowers; the lower stamens perfect, having a stamens around a terminal ovary; the upper stamens of stamens only. Berries red, containing a few seedlings, surrounded with jelly.

6. SYM'ONÀCARBUS. Leaves entire, very large and veiny, short-petioled, appearing much later than the flowers from a flabby-stemmed corn or short tubercle. Spadix short-ovate, ends, intervalll xcll, hardly raised out of ground, enclosing the globular spadix, in which the flowers are so as to were merely maturated. Each flower has 4 foliaceous, 4 spadix with foliaceous indument turned outwards and a terminal 8-ribbed ovary tipped with a short arn epithelial style; the fruit is the elongated caper spadix, under the rough surface of which are included large seedlings. Seeds black, pop-like, sericeous spadix appearing lateral.

7. ACORUS. Spadix cylindrical, naked, emerging from the side of a flabby simple scape resembling the Aresém, bracteate covered with perfect flowers. Sepals 6, ovate, 6-nerved, 6 with linear lanceolate and keeled-stipitate scale. Ovary 2-locular, with several hanging ovules in each cell, becoming dry in fruit, ripening only one or two small seeds.

ARISÉM, INDIAN TURNIP, 6c. (Name altered from Arum, so which these plants were formerly referred.) Wind plants of rich woods, &c., in spring, very handsome, their umbilicated form forsaken, but imbued with an intensely pungent juice, which is dissipated in drying.

2. A. tripliciflum, Indian Ternipt. In rich woods; leaves mostly 3, each of a club-shaped footed; stalks and spadix either green or variegated with whitish and dark-purple stripes or spots; the latter with broad or flat summit recurved over the top of the club-shaped and blunted spadix.
A. Typhaontium, DRAGON-AW. DRAGON-LILY, or GREEN DRAGON. Low growing; leaf mostly solitary, its petiole 1°-2° long, bearing 2-11 pointed lanceolate pointed leaves; the greenish spike wholly rolled into a tube with a short, slender point, very much shorter than the long and tapering tail-like spathe.

2. COLOCASIA. (The ancient Greek name of the common species.) 2 C. antiquorum, one variety called C. ScuLeata: rare in the hot parts of the world for its enormous thick potato-like roots (which are excellent when the seed principle is driven off by heat, as also the leaves), and in gardens for its magnificent foliage, the pale ovate-ovate-shaped leaves being 2°-3° long when well grown; the stalk attached much below the middle, the note not deep.

3. PELTANDRA, ARROW-ARUM. (Name of Greek words meaning arrow-shaped stems, from the form of the authors.) Fl. summer. 2 P. Virginica. Shallow water: 1°-2° high; leaves pale; the fine transverse nerves running from the margin and reflected with 2 or 3 longitudinal ones near the margin; spathes in fruit; no lobes; the spadix and spathe not rising, leaving the short flabby base firmly embracing the globular cluster of green berries.

4. RICHARDIA. (Named for the French botanist, L. C. Richard.) 2 R. Africana, the AFRICAN or EGYPTIAN CALLA, of common house-culture, but not native of the Cape of Good Hope and not a true Calla.—too familiar to need fuller description.

5. CALLA, WATER ARUM. (An ancient name.) Fl. early summer. 2 C. palustris. Cold and wet woods from Peru: a low and small, rather hard-some plant; leaves 3°-4° long; filaments slender; arches thickened.

6. SYMPLOCARPUS, SKUNK CABBAGE. (Name of Greek words for fruit grows together.) 2 S. foetidus, the only species, in swampy and wet woods, mostly: sending up, in earliest spring, its purplish-tipped or striped spadix enclosing the head of flowers, and later the large leaves, when full grown 1°-2° long, in a cabbage-like leaf; the fruit 2'-3' in diameter, the hard bullet-like seeds almost 1' wide, ripe in autumn.

7. ACORUS, SWEET FLAG or CALAMUS. (Ancient name, from the Greek, said to refer to the use as a remedy for sore eyes.) 2 A. Calamus, COMMON SWEET-FLAG: in wet woods; setting up the 3-edged sword-shaped leaves, 2° more high, from the horizontal pungent aromatic rootstock; fl. early summer.

113. TYPHACEAE, CAT-TAIL FAMILY.

Marsh herbs, or some truly aquatic, with linear and straight-nerved erect (unless floating) long leaves, sheathing at base, and numerous flowers on a dry spadix, composed of calyx and corolla; the fruit dry and nut-like, 1-seeded, rarely 2-seeded.

Near to this belongs PARAGNUS, outro., for its foliage in some conservatories, with prickly toothed leaves crowded on woody stems.

1. TYPHA. Flowers inflorescence, in a dense cylindric spike terminating the long and simple stem-like leaf; the upper part of stamens only, mixed with long hairs; the lower and thicker part of staminal filaments tapering into a wider and broader surrounded by numerous club-shaped bristles, which form the top of theawn of the fruit.

2. SPARGANUM. Flowers collected in separate dense heads, scattered along the summit of the leafy stem, the upper ones of stamens only with some
WATER-PLANTAIN FAMILY.

1. TYPHA, CAT-TAIL, FLAG. (From Greek word for flag, in which these plants abound.) Fl. early summer.

T. latifolia, Common C. or Red-Mace; with flat leaves, these and the stem 6'-10' high; a median slit between the sterile and fertile part of the spike.

T. augustifolia, Narrow-Bladed C. Less common, smaller; leaves narrower, more clasped towards the base; commonly a space between the sterile and the fertile part of the spike.

2. SPARGANIUM, BUR-REED (Name from Greek for a file, abiding to the ribbon-shaped leaves.) Fl. summer.

S. curvatum, Gray B. Branches of peals and stems. 3'-5' high, with parallel-veined leaves; fertility to just 1 1/2 thick, the nuts broad-tipped; stigma 3; leaves 2'-2 1/2', flat on upper side, hooked and concave-edged on the other.

S. simplex, Skewer R. Only S.: in water; erect, sometimes floating. 12-32' high, mostly with a simple row of heads; leaves narrower; stigma simple, linear, as long as the style; nuts tapering to both ends and with a stalked base.

S. minimum, Skewer B. Mostly with leaves floating in shallow water (6'-10' long) and flat: heads few; stigma simple, oval; main oral, short-pouched and short-stalked.

II. PETALOIDOUS DIVISION. Flowers not on a spadix, with a perianth (calyx and corolla), all or part of it usually colored.

114. ALISMACEAE, WATER-PLANTAIN FAMILY.

March herbs, with flowers on spikes or scape-like stems, in panicles, racemes, or spikes, with distinct calyx and corolla, viz. 3 sepals and 3 petals, and from 3 to many distinct pistils; stamens on the receptacle. Juicy sometimes milky. The genuine Alismaceae have solitary ovules and seeds, and wholly separate pistils. Some outlying related plants differing in these respects are annexed.

I. ALISOW-GRASS FAMILY. Calyx and corolla colored alike (greenish). Anthers turned outwards. Ovaries 3 partly united, or a single 3-6-celled compound pistil. Leaves petiole-like, without a blade.

1. TRIGLOCHIRIUM. Flowers perfect, small, in a slender spike or raceme, branched. Calyx and corolla deciduous. Stamina 3 or 6, with oval anthers on short filaments. Ovary 3-6-celled, splitting when ripe from the central axis into as many closed and dry sessile-blanded cells: stigma minute.

2. SCHRUCHERIA. Flowers perfect, few and rather small, in a loose branched raceme. Sepals and petals oblong, persistent. Stamina 6, with linear anthers. Pistils 3, with globular 3-6-celled ovaries slightly united at base, and diverging in fruit, forming 3 angular pods. Stigma flat, sessile.

II. WATER-PLANTAIN FAMILY PROPER. Calyx of 3 persistent green sepals. Corolla of 3 deciduous white petals. Anthers turned outwards. Ovaries many, tipped with short style or stigma, 1-celled, becoming achenes in fruit. Leaves sometimes petiole-like, commonly with distinct blade, when the nerves or ribs are not to be more or less joined by cross veins or netted.

4. ECHINODORUS. Flowers perfect, in corymbose umbels. Petals imbricated in the bud. Stigmas 6 or more. Ovaries inclosed in a head, becoming winged later.

5. SAGITTARIA. Flowers mostly perfect, rarely dithecous or polymorphic; in submersed whorls, the sterile at the summit of the scoops; the lowest scapes are usually numerous. Ovaries many, hinged on the gynoecial receptacle, in fruit becoming flat and winged amentes.

II. FLOWERING-RUSH FAMILY. (Butomaceae) Differ from the preceding mainly in the few ovaries having numerous ovules distributed all over the inside.

6. LIMNOCHARIS. Flowers perfect, long-peduncled. Petals large, yellow. Stamens numerous with slender filaments, a few of the outermost without stamens; the rest with linear anthers. Ovaries 6 or more, somewhat united at base. Leaves roundish and heart-shaped, long-peduncled.

1. TRIGLOCHIN, ARROW-GRASS. (Name in Greek means arrow-headed.) Egregious rush-like plants, in masses, mostly near the water is emergent; fl. summer. 2

T. palustre. Slender, 6-18° high, with linear-club-shaped ovary and style, the 2 pieces when ripe separating from the sharp-pointed base upwards.

T. maritimum. Stout, 12'-20' high, with fruit of about 6 pieces rounded at base. — Var. euram. In bags of the interior, X, 20'-30' high, the tips of the fruit sharp-angled on the back.

T. triandrum, a small slender species along the coasts, with 3 sepals, no petals, 3 stamens, and a 3-lobed fruit.

2. SCHEUCHZERIA. (Named for the early Swiss botanist, Schleich.)

S. palustris. Fract-flags from Penn. N. : 1° high; fl. early summer. 2

3. ALISMA, WATER-PLANTAIN. (The old Greek name, of uncertain meaning.) Fl. all late summer.

A. Plantago. Shallow water: leaves long-petiolated, varying from oblong-

heart-shaped to lanceolate, 3-ribbed; panicle 1'-2' long of very many and loose small flowers. 2

4. ECHINODORUS. (Named probably from Greek words for prickly

and, the head of fruit being so it were prickly-pointed by the styles, but

hardly so in our species. The following occur in marshy or wet places, chiefly W. & S. : fl. summer; the flowering shoots or scape mostly proliferous and
creeping.

E. pâvulus: a tiny plant, 1'-3' high, with lanceolate or spatulate leaves,

few-flowered umbels; 3 stamens, and almost pointless anthers. 1

E. rostratus, with broadly heart-shaped leaves (1'-2' long; not including the petiole) shorter than the escutcheon, which bears a panicle of proliferous umbels; flower almost 6 wide; 12 anthers; anthers beaked with arched style. 1

E. radicans, with broadly heart-shaped and larger leaves (2'-8' wide)

which are very open or almost truncate at base; the creeping scape or stems becoming 1'-4' long and bearing many shoots; flowers 6-12 bract; anthers short-tubed.

5. SAGITTARIA, ARROW-HEAD. (From the Latin for arrow, from

the sagitate leaves which prevail in the genus. In shallow water; fl. all

summer. 2

a Filaments long and slender, i.e. as long as the linear-oblong anthers.

b lanceolata. Common from Virginia S. ; with the stout leaves 1'-2',

and scapes 3'-6' high, the corymbose heads of the former lance-lobed and
115. HYDROCHARIDACEAE, FROG’S-BIT FAMILY.

Water-plants, with diurnous, monoeous, or polygamous flowers on scape-like peduncles from a sort of spathe of one or two leaves, the perianths in the fertile flowers of 6 parts united into a tube which is coherent with the surface of a compound ovary. -- we have three plants, two of them very common.

a. *Frog’s-bit*, spreading annual, from June to September; black branches growing upwards; leaves long-petioled, round or heart-shaped.

b. *Linnaeum*. -- Flowers numerous or diurnous, from sessile or short-stalked leaf-like spathes, the sterile spikes of one and surrounding 3 long-petioled staminate flowers; the fertile 2-ovuled, with one short-petioled flower. Perianth of 2 outer oval lobes (calyx) and 3 narrow inner ones (petals). A cluster of 4-12 axiqual many-lobed stamens in the sterile flowers; some with 2 or 3 ovules, the others only 1. Fruit berry-like, many-seeded.

Growing under water, the sterile flowers only rising to the surface; the sterile ovules of the short spikes, and floating on the surface around the perigynous flowers.

1. *Asacharis*. Stout and branching. Fertile flowers rising from a tuber-like spadix; the perianth prolonged into an exceedingly slender stalk-like tube, bluish at top, commonly bearing 3-5 apparently good stamens; ovary usually with a few seeds in the wall; style coherent with the tube of the perianth; stigma 3, united.

2. *Vallisneria*. Stems leaves all in tufts from creeping rootstocks. Fertile flowers with a tubular spadix, raised to the surface of the water on
extremely long and slender scape; tube of the perianth not prolonged beyond the 1-celled ovary, with 3 alternate outer lobes (sepals) and 3 small linear ones (petals), and its stamens. Unites very numerous during the walls. Altman 2, ovary, 2-loculed. Fruit cylindrical, hairy-like.

1. LIMNOBIUM, FROG'S-BIT. (Name in Greek means living in pools.) Flowers whitish, the fertile ones larger, in summer. 2

L. Spongia. Floating free on still water S. & W.; has been found in bays of Lake Ontario; rooting copiously; leaves 1'-2' long, purple beneath, fringed at base with spongy air-cells.

2. ANÁCHARIS, WATER-WEED. (Name from the Greek means street of rushes.) Fl. summer. 2

A. Canadensis. Slow streams and ponds: a rather homely weed, with long branching stems, base with pairs or whorls of pellucid and viscidous 1-nerved minutely serrulate sessile leaves (1'-2' long), varying from linear to cone-shaped, the thread-like tube of the yellowish perianth often several inches long.

3. VALLISNERIA, TAP-B-GRASS, EEL-GRASS of fresh water. (Named for A. Vallisner, an early Italian botanist.) Fl. late summer. 2

V. spiralis. In clear ponds and slow streams, with bright green and grass-like linear leaves (1'-2' long), delicately moved and turned; fertile spikes rising 2'-4' long, according to the depth of the water, afterwards rolling up spirally and drawing the fruit under water to ripen. — The leaves of this and the preceding are excellent to show epiblast. (See Structural Botany, p. 31, Linnæus, p. 107.)

116. PONTEDERIACEAE, PICKEREL-WEEP F.

A few water plants, distinguished from the foregoing by having the tubular corolla-like perianth free from the ovary, and the flowers perfect. Represented by

Schöllöe gramineae, or Water Sedge-Grass; a grass-like weed growing near land or slow water, with branching stems bent with linear pellucid sessile leaves; the flower with a slender ovate-shaped pale yellow perianth, of six alternate equal divisions raised to the surface on a very slender tube, and only 3 stamens.

Heteranthera reniformis, Mud-Plantain; in mud or shallow water S. & W.; with branching reniform-shaped leaves on long petioles, and 3-5 ephemeral white flowers, from the axilating base or side of a petiole; their perianth ovate-shaped, with a slender tube, bearing 6 nearly equal divisions and 3 dissimilar stamens, one with a greenish, two with yellow anthers.

H. limosa, in mud S. & W.; distinguished by its oblong or lance-oblong leaves, and solitary blue flower. — The only widely common plant of the family belongs to

1. PONTEDERIA, PICKEREL-WEED. (For the Italian botanist Pontedera.) Flowers in a terminal spike. Perianth of 6 divisions irregularly united below in a tube, the 3 most united forming an upper lip of 2 lobes, the others more spreading and with more or less separate or slightly cohering claws forming the lower lip, open only for a day, rolling up from the apex downwards as in claives; the 6ribbed tube thickening, flaring green, and enclosing the fruit. Staminodes 6, the 3 lower in the throat, with incurved filaments; the 3 upper lower down and shorter, often imperfect. Ovary 3-celled, 2 cells empty, one with a hanging ovule. Fruit a 3-celled 1-seeded capsule.

P. cordata, Common P. Everywhere in shallow water; stem 1'-3' high, naked below, above bearing a single pointed heart-shaped and oblong or lance-oblong-shaped oblong leaf, and a spike of purplish-blue flowers; upper lobe with
117. ORCHIDACEAE, ORCHIS FAMILY.

Herbs, with flowers of peculiar structure, the perianth adherent to the one-celled ovary (which has numerous minute ovules on 3 pericarp placents), the stamens cordate-like & part. irregular, 3 in an outer set answering to sepals, 3 within and alternate with these answering to petals, one of these generally larger and always different from the others, called the labellum or lip: the stamens are gymnandrous, being borne on 3 pairs connected with the style or stigma, and are only one or two; the pollen is mostly coherent in masses of peculiar appearance. All perennials, and all depend upon insects for fertilization. Beginners will not very easily comprehend the remarkable structure of most Orchis flowers. But our more conspicuous common species may be readily identified as to genera and species.

§ 1. Epipactis or Hare-Plants. Orchis. Of these a great variety are cultivated in the choiser conservatories. We have one in the most southern states.

1. EPIDENDUM. The 3 sepals and 2 petals nearly alike and widely spreading; the old petal or lip larger and lobated, its base united with the style, which bears a fold-like sakte, containing a sticky pollen masses, over the glabrous stigma.

§ 2. TERRAFERTILIS. Orchis, growing in the soil, in woods or low grounds.

- Lip or old petal produced underneath into a free hanging horn or spur; pollen of each cell all connected with the column or style, the lower end of which is a sticky gland or disk, by adhesion to which the whole mass of pollen is dropped from the opening mouth and carried off by insects.

2. ORCHIS. The 3 sepals and 2 petals are convoluted and arched on the upper side of the flower: the lip turned downward (i.e., as the flower stands on its twisted ovary). Another erect, fix 2 petals parallel and contiguous; the 3 glands side by side just over the concave stigma, and enclosed in a sort of pouch or pocket opening at the top.

3. HABENARIA. Flower generally as in Orchis, but the lateral sepals commonly spreading; the glands attached to the pollen-masses naked and exposed.

- No spur to the lip; rather broad on the back of the style below its tip, erect or incurved: the stamens united on the front. Flowers in a spike, small, white.

4. STHERIANTHUS. Flowers alike on the ovary, all the parts of the perianth erect, or remaining the lower part of the lip involute around the style and with a calyculus on each side of the base, its narrow tip somewhat curved and crimped. Pollen-masses 1 (one in each cell), each divided into a thin plate composed of grains lightly united by delicate threads, their summit united to the back of a narrow boat-shaped sticky gland set in the beaked tip over the stigma. Leaves not corrugated.

5. GOODYERA. Flowers like Siphancus, but the lip more unequal-shaped, closely nodose, and destitute of the calyculus protrusions at base. Leaves variegated with white veining.

- No spur to the lip, or one adherent to the ovary; another inserted on the apex of the style, enormously attached by a sort of large; pollen 2 or 3 separate soft masses, not attached to a disk or gland.

- Flowers rather large; pollen-masses soft; of lightly-connected papery genus.

AEITRUSA. Flowers only one, on a naked scape 3 sepals and 2 petals lanceolate and nearly alike, all united at the base, ascending and opening over the top of the lip and somewhat winnowed style, on the petal-like top of which rests the helmet-shaped hinged anther, over a little nectary, the
HABENARIA. Flowers one or few terminating a leaf-bearing stem; the sepals and petals sepa rate: lip crested or oblong. Style club-shaped, wingless, oblique lateral. Anchor lobate, somewhat bluish; palisades 4, only one in each cell.

1. EPIDENDUM. (Name in Greek means upon a tree, i.e. an epiphyte.)

E. condensatum, one only wild (Orchidaceous Epiphyte or Air-plant, is found from South Carolina S. & W. on the boughs of Magnolias, &c., clinging to the bark by its maroon roots, its tuberculous roots-bearing thimk and firm immediate leaves (1-3 long), and scape 2"-6" long, with a raceme of small green and purple flowers, in summer. (Lessons, p. 34, 35.)

2. ORCHIS. (The ancient name, from the Greek.) We have only one true Orchis, viz.

O. spectabilis, Senna's Orchis. Rich holly wood N.; with 2 along the common gray leaves (2-3 long) from the slaty-ovus root, and a leaf-branched scape 4'-7' high, bearing in a loose spike a few pretty flowers, pink-purple, the ovate lip white: in late spring.

3. HABENARIA, popularly called ORCHIS. (Name from ca. in low, a root or thong, from the shape of the lip of the corolla in some species.) Flowers in a terminal spike, each in the axil of a leaf, in late spring or summer. In all but one species the ovary twined and the lip expands the lower or anterior side of the flower.

1. Fringed Orchis. Lip and viscid the other petals cut-fringed or cleft, shorter than the long running upper; cells of the lower more or less diverging and tapering below, the ovary gland at their lower and strongly projecting forwards. These are not broad-slabbed and Sennas; not green in base or base ground: stems leathery. 1'-2' high.

- Flowers violet-purple in summer; the lip roundish, 5-lobed nearly to the middle, and the division more or less fringed.

H. americana, Large Purple Fringed O. Wet meadows from Penn. N. E. to lower leaves oval or oblong, upper few and small; racemose-like spike oblong, with rather few large flowers in early summer; petals oblong, twisted down the side; lip almost 1' wide, hanging, cut into 6 delicate fringes.

lower face of which is the stigma. Lip broad, erect, with a recurved rounded apex and a broadened ovate down the face. Palisades 4, two in each cell of the ovary.
**Orchid Family.**

**H. psycodes, Narrow Purple Fringed O.** Common, especially N.; leaves oblong, above pressed into lance-shaped hearts; spike cylindrical, 4'-10' long, crowded with smaller and fragrant flowers; lateral petals wedge-obovate, almost entire; lip spreading, only 3' wide, cut into dense fringes.

**H. peregrina.** From Penn. W. & S. along and near the mountains; flowers of size intermediate between the two preceding; the broad wedge-shaped base of the lip moderately cut, but not fringed.

- **H. leucophylla.** From Ohio W. & S.; 2'-4' high; leaves lance-oblong; flowers rather large, the fan-shaped lip spurred; 4' long, and many-cleft to the middle into a thread-like fringe.
- **H. lacera, Rannered Fringed O.** Common N. & E.; 1'-4' high; leaves lanceolate or oblong; petals oblong-linier; entire; divisions of the slender-stalked spurred lip narrow and slightly fringed.
- **H. bolaphragni, White Fringed O.** Has leaves N., like the next, but rather smaller; 1'-4' high, the fringes of the lance-oblong lip hardly equal to the width of its body.
- **H. ciliaris, Yellow Fringed O.** Sandy banks 1'-2' high; leaves oblong or lanceolate; spike short, of many crowded, very showy flowers; petals cut-fringed at apex, the oblong lip of the fringe narrower than the copious long and fine fringe.
- **H. cristata, from Penn. S.** smaller, with narrower leaves, and flowers only a quarter the size of the preceding; the petals recurved, and the ovate lip with a narrow recurved fringe.

- **Scilla bifolia, Leaves oblong or lanceolate; flowers small; slender and nearly parallel.
- **H. integriflora.** Fine perennials from New Jersey S.; resembles H. cristata, having small bright orange-yellow flowers, but the lip is entire and entire or rarely cut.
- **H. viridicaulis.** Wet grassy, common; 10'-20' high, with a conspicuously branched at length long and broad spike of small dull-green flowers; the lip oblong; almost truncate at the apex, its base with a touch on each side and a thin callus at the base on the face; spur broad, side-shaped.
- **H. viridis, var. bracteata.** Cold damp woods; N.; 6'-12' high, with broader leaves obtuse, upper redbud to hearts of the short spike, which are much longer than the green flowers; lip truncate and 2'-3'-hooked at the tip, very much long-petalled the mar-shaped spur.
- **H. hyperborea.** Cold low woods and bogs; N.; 6'-20' high, very leafy; leaves lanceolate; spike drooping, often long; flowers greenish, the lanceolate lip like the other petals, spreading, entire, about the length of the inconspicuous spur.
- **H. dilatata.** Reminisce the last, grows in same places, but possesses more slender and with linear leaves; flowers white, less wide, open, the lanceolate lip with a ribbon-dilated base; glabrous; strap-shaped.
- **H. nivea.** Sandy bogs, from Maine S.; 1'-20' high, all the upper leaves heart-like; flowers white, in a loose cylindrical spike, very small, different from all the rest in having the (white) ovary without a touch, and the linear-oblong entire lip with its long thread-like spur therefore looking towards.

**S. dilatata, Great Green O.** Evergreen woods and hillsides, a striking plant; its white orbicular leaves 4'-6' wide, bright green, short and silvery; blooms, laying flat on the ground, some 18'-20' high, armed, bearing many large greenish-white flowers in a loose raceme; sepals roundish; lip narrow.
rowy, spathose-line and drooping; spur about 1½ long, curved, gradually thickened towards the base; lip ½ July.

H. Hookeri. Sandy woods from Penn. N.: smaller in all parts, flowers in June; the sepals leaves only 1½-3½ broad and flat on the ground; scape naked, 6'-10' high, bearing few yellowish-green flowers in a strict spike; sepals lanceolate and pointed, recurved, the other petals lance-shaped; spur slender, acute, nearly 1½ long.

4. SPIRANTHES, LADIES'-TREASURES. (Name from the Greek, denote that the flowers are spiral; they often are apparently spirally twisted in the spike.) Flowers white. The species are difficult; the following are the commonest.

* Flowers crowded in 3 ranks in a close spike; not branched or long.

S. latifolia. Only from Delaware N.: known by its oblong or lance-shaped leaves (1½-3½ long), all at the base of the scape, and narrow spike of small smooth flowers early in June.

S. Romanzoviana. Cold bogs, from N. New England W.: 9'-15' high, with oblong-lanceolate or ovate-linear leaves, a dense spike of flowers at midsummer, all 3 sepals and 2 petals consisting of a spike on upper lip.

S. cernua, Common E. and S.: 6'-20' high, with lance-linear leaves, cylindrical often beardless spike, and lower sepals not asperate but parallel with the lower petal or lip; 1½ in autumn.

* * * Flowers in one straight or often spirally twisted rank, in summer.

S. graminea. Wet meadows, from N. England N.: stem about 1½ high, towards its base and at the slightly erect bearing linear or lance-linear leaves, which mostly form during the flowering season; spike dense and much twisted, rather downy.

S. gracilis. Hills and sand plains: scape slender, 8'-10' high, bearing a slender spike; leaves all from the tuberous root, short, scater or oblong, quit to wither away before the small flowers appear in late summer.

5. GOODYERA, RATTLENASK PLANTAIN. (Named for John (Gooden, an English botanist.) Flowers small, in summer, greenish-white, spiked on a scape; the leaves all clustered at the root, ovate, small.

G. repens. Evergreen woods: N.: 9'-1½ high, slender; flowers in a loose much-flowered spike, with inflated ovate-shaped lip.

G. pubescens. Oak and pine woods E. & S.: 9'-12½ high; larger, with leaves more numerous white-oreiented, and flowers not one in the denser spike; lip globular.

G. pungens. Woods, only from New York W.: 9'-12½ high; leaves less ovate-shaped; flowers loose in the spike, narrower and pointed in the bud, the lip hardly ovate-shaped at the base and tapering to a narrow apex.

6. ARETHUSA. (Mythological name of a nymph and fountain.) Fl. late spring.

A. bulbosa. A charming little plant, in wet bogs N.: consists of a scape 8'-10' high; raising from a solid root or corm, shouldered below with one or two green bracts, and terminated with the bright rose-pink flower 1½-3½ long.

7. CALOPOGON. (Name in Greek means beautiful beard, referring to the lip.) Fl. early summer.

C. pulchellus. Wet bogs: scape about 1½ high, from a solid solid bulb, slender, bearing next the base a long linear or lanceolate many-nerved grass-like leaf, and at the summit 2-6 beautiful pink-purple flowers (1½ broad), the lip as if hinged at its base, bearded with white, yellow, and purple lily-shaped hair.

8. POGONIA. (Name in Greek means bearded, i.e. on the lip; this is hardly the case in most of our species.) We have several, but the only widely common one is

P. obtusiloboides. Wet bogs along with the Calopogs, and in bloom at the same time; stem 9'-9½ high from a root of thick three, bearing
an oval or lance-shaped, thinly sepalate leaf near the middle, and a smaller one or
bipart near the terminal flower, sometimes a second flower in its axil; flowers 1½
long, pale rose-color or whitish, sweet-scented; sepals and petals nearly alike;
lip erect, heart-shaped and fringed.

9. CORALLORHIZA, CORAL-ROOT (which the name means in Greek).

C. inutila. Low woods, mostly N.: 8–10 high, yellowish, with 5–10 very
small almost numeless flowers; lip 3-lobed or half-heart-shaped at base; 6 spring.
C. odontorrhiza. Rich woods, common only N.: 6–16 high, thickly
at base, slender or purplish, 6–20 pedicelled flowers, and lip not lobed
but rather staked at base, the spur slender.

C. multiflora. Common in dry woods. 8–20 high, purplish, stout, with
10–30 short-pedicelled flowers, lip deeply 3-lobed, and minute spur manifest.

10. APLECTRUM, PUTTY-ROOT, AHAM-AND-EVE. (Name, from the Greek, means donkey of spore).

A. hyemalis. Woods, in rich woods, mostly towards the Alleghenies and
N.: scape and dingy flowers in early summer; the large oral and placed livered
petioled leaf appears towards autumn and lasts into winter; wood breaks off
each year, connected by a slender stalk; those of at least two years long
in general resemble one of the popular names, 1½ thick, filled with strong gloomous
matter, which has been used for cement, whereas the other name.

11. CYPRIPEDIUM, LADY'S SLIPPER, MOCACASON-FLOWER. (Greek name for 3 times joined to that for a slipper or boot). Two exotic
species are not rare in conservatories; the others are among the most orna-
tmental and curious of our wild flowers: in spring and early summer. Root-
stocks very short and knotty, producing long and coarse fibrous roots.

§ 1. The three species separate: stem leafy, mono-flowered.

C. striatuum. RAM'S HEAD C. Cold bogs N.: not common; the smallest
species, with slender stems 6–10 high, elongating-t dentate leaves, and a dingy
purplish flower, the sac conical and in some positions resembling a ram's head,
one equal lanceolate, the two others and the two petals linear.

§ 2. Two of the sepals united by their edges into one make the sac or slipper, but
their very tips sometimes separate.

2. Stem 1½–2½ high, leafy in the 1–3-flowered manner; leaves lanceolate or
ovate, with many small leafy petioles, more or less parallel; sac or slipper heart-shaped, much reflexed, open by a rather large round opening.

2. Sepals and lower two-petalled petals brownish, paler, larger than the sac.

C. pubescens, YELLOW LADY'S SLIPPER. Low woods and bogs, mainly
N.: sac high yellow, higher than broad, convex above; sepals long lanceolate; flowers early summer, sessile.

C. parviflorum, SMALLER YELLOW L. In similar situations; stems and
leaves generally smaller, and flower about half the size of the other, somewhat
fragrant, the sac broader than high, deep yellow, and the lanceolate sepals brown.
C. candidum, SMALL WHITE L. Bogs and low pastures, chiefiy W.: small,
hardly 1½ high, slightly piloseculent; sac like that of preceding but white.

2. Sepals and petals broad or roundish and flat, white, not longer than the sac.

C. spectabilis, Showy L., and deserving the name, in bogs and rich
woods N., and along the mountains N.: downy, 2½ or more high, with leaves
1/4–2 long, white flowers with the globular lip (1½ long) painted with pink-
purple, in July.

2. Sepals naked, bearing a small beard and one flower at summit.

2. Wild species, with only a pair of oblong many-nerved brown leaves at the root.
C. aconitum, SWENKES L. Moist or sandy ground in the shade of over-
growns; scape 6–12 high; sepals and petals greenish or purplish, the latter
linear shorter than the rose-purple oblong-obovate drooping one, which \( \text{split down the front but nearly closed: } 8, \text{ spring.} \)

- \( \text{Enset inflorescences of the conservatory, with several thick and from hulled leaves or 3 scales at the base: } \text{see drawing, large open at top.} \)

\( \text{C. insignis, } \) has linear strap-shaped cartilaginous leaves, and yellow flower

\( \text{with some greenish and purple-spotted.} \)

\( \text{C. tropicum, with more fleshy oblong-strap-shaped pointed and spotted leaves, and purple flower with some green and yellow.} \)

I. \text{SCITAMINEAE, BANANA FAMILY.}

\( \text{Here is assembled a group of tropical or subtropical plants, with leaves having distinct petioles and blade, the latter traversed by nerves running from the midrib to the margin: flowers irregular, with a perianth of at least two ranks of divisions, below all combined into a tube which is adherent to the 3-celled ovary; the stamens } 1–6 \text{ and distinct: We have only two, by no means common, wild representatives on our southeastern borders; the cultivated ones are chiefly grown for their ornamental foliage, and most of them are rarely seen in bloom. They may therefore be simply referred to, as follows.} \)

\( \text{I. GINGER FAMILY. Seeds, rootstocks, or roots hot-aromatic. Stamens only one, with a 2-celled anther, commonly deriving the style, but not united with it.} \)

- \( \text{Holochiton gardneri, \text{GARDNER'S FLOWER,} cut. from India: } \) stems \( 6-40 \text{ high, furnished at the top with oblong-tranched leaves, terminating in a large spike of handsome light-yellow flowers, a slender tube bearing 5 divisions which may be likened to those of an Orchidaceous flower, one answer ing to the lip rather larger and broader than the 5 others, and a very long protruding reddish filament terminated by a yellow anther sheathing the style up almost to the stigma.} \)

II. \text{ARROWROOT OR INDIAN-SHOT FAMILY. No hot-aromatic properties, the thick rootstocks, &c., commonly contain much starch, from which genuine arrowroot is produced; Stamens only one with an anther, and that one-celled.} \)

- \( \text{Tithys dealbata, \text{white in mounds and pods for } } 8, \text{ is dusted over with a white powder, the heart-like long-periodic leaves all from the root, red-like scape branching above into panicked spikes of small much-bearded purple flowers.} \)

- \( \text{Moranta robusta, \text{rarely flowers, but in a showy leaf-plant in conservatories: the oblong leaves } 2 \text{ or } 3 \text{ feet long, purple beneath, the upper surface silver and with alternating stripes of deep and pale green: flowers dull purple, in a bracted head or spike near the ground on a short scape.} \)

- \( \text{Clamia indica, \text{COMMUN Indian Shot (so called from the hard shot like seeds, these several in the 3 cells of the rough-walled pod; frequent ly planted for summer flowering:} \) \text{the lanceolate or oblong pointed leaves } 6-12 \text{ long: flowers several in a simple or branching spike, about } 3 \text{ long, red varying to yellow, or variegated: stamens with petals-like filaments bearing th anchor on one side, otherwise resembling the 3 divisions of an acon carolla these probably transformed sterile stamens.} \) \text{The following, more magnificent for summer foliage, and sometimes for flowers, are choicer sorts, but much confused as to species.} \)

- \( \text{C. Warneckii, } 4-9^0 \text{ high, with mostly purplish or purple-margined pointed leaves, and crimson-red flowers.} \)
C. d'ecolor, grows 8"-10" high, with broad, purple-tipped very large leaves, and crimson or red-purple flowers.

C. glauca, especially its var. Asarai, 8"-10" high, with its glistening pale, tape-pointed leaves, and yellow or red flowers 6" long.

C. filicoides, wild in swamps from South Carolina S.; 3'-6' high, with palmate-pointed pointed leaves, and yellow flowers 2'-4' long; all the inner divisions obovate and wavy, lax, the outer or calyx reflexed.

III. BANANA FAMILY PROPER. Not aromatic or pungent. Stems 6 with 2-celled anthese, and an abortive naked filament.

Strelitzia Reginae, a large straw-colored conservatory plant, from the Cape of Good Hope, winter-flowering, with 2-ranked red leaves, their long rigid petioles bearing an orange-yellow thick blade; scape bearing at apex an oblong or horizontal and rigid conduplicate spike, from which several large and strangely-colored blossoms appear in succession; the 2 outer divisions of the perianth 2'-4' long, orange-yellow, one of them conduplicate and taper pointed, and somewhat like the two larger of the bright blue inner set, or true petals, which are united and cover the stamens, the other petal incognizable.

Musae sapientum, BANAN; cult. for foliage and for the well-known fruit; the entwining bases of the large leaves, forming a sort of tree like ensiform stem, 10'-30' high; the flower-stalk rising through the center, and developing a drooping spike, the flowers crowded in the axil of its perfoliate bracts; perianth of 3 connate or connate divisions or lips, the lowest 3-lobed at the apex and enclosing the much smaller upper one; berry oblong, by long cultivation (from offshoots) seedless. (Lesunia, p. 19, fig. 47.)

M. Cavendishii. A dwarf variety, flowering at a few feet in height, is the most manageable one, principally cultivated for fruiting.

119. BROMELIACEæ, PINE-APPLE FAMILY.

Tropical or subtropical plants, the greater part epiphytes, with dry or fleshy, mostly rigid, smooth or scurfy leaves, often prickly-edged, and perfect flowers with 6 stamens. — represented by several species of Tillandsia in Florida, a small one further north, and several of various genera in choice conservatories, not here noticed.

Ananas sativa, PINE-APPLE; cult. for its fruit, the flowers abortive, and sometimes for foliage, especially a striped-variegated variety.

Tillandsia usneoides, the Long Moss or Black Moss (so called), hanging from trees in the low country from the Dismal Swamp; gray-scurfy, with liguoid-shaped branching stem, linear-lance-shaped recurved leaves, and small scaly green flowers; the ovary free, forming a narrow spheroidal pod, filled with disk-shaped hairy-stalked seeds; 6 summer.

120. AMARYLLIDACEæ, AMARYLLIS FAMILY.

Chiefly perennial herbs, with leaves and scape from a bulb, narrow, the, the leaves arising from the base, and rarely with any distinction of blade and petiole; the perianth regular or but moderately irregular and colored, its tube adherent to the surface of the 3-seeled ovary; and 6 stamens with good anthers. Bulbs aestival, some of them poisonous. To this family belong many of the choicer bulbs of house-culture, only the commonest here noticed.

1. Scape and linear-lance leaves from a little solid bulb or corm.

1. Amaryllis. Bulb flesh-colored, nearly to the ovary, spreading, granular outside, yellow within, persistent and bittering on the pod.

S & S—55.
AMARYLLID FAMILY

§ 2. Species and nearly smooth forms from a vegetal bulb.

1. ANEMONE. Perianth with a mere or less cylindrical tube, 6 equal widely spreading divisions, and stamina of unequal length included in the cup or crown. Zones with one or more flowers, from a curious 1-leaved scapace.

2. PARASCLE. Perianth with a slender tube, 6 long and narrow divisions, and a cup to which the long stamina adhere below and from the edge of which they project. Anthers linear, fixed by the middle. Zones bearing a few flowers in a cluster, surrounded by some leaf-like or auriculate bracts.

* * *

1. HYPOXYS. STAR-GRASS. (Name from the Greek, means grass. In full double-flowered varieties the crown disappears.)

2. NARCISSUS. (Greet name, "that of the young man in the mythology who is said to have been changed into this flower.") Most of them are perfectly hardy: June, spring.

N. poeticus. Poor's N. Leaves nearly flat; zone flowered; crown of the white flower edged with pink, rarely at all projecting from the yellowish throat; in full double-flowered varieties the crown disappears.

N. polyanthus. Two-flowered N., or Primrose Phebus of the old gardens, has two white or pale straw-colored flowers, and the crown in the form of a short yellow cup.

N. polyanthus is the parent of the choice sorts of POLIANTHUS N.; flowers numerous, white, the cup also white.
N. Tacetta, POLYANTHES N. Leaves as of the preceding linear and weakly flat, glaucous; flowers numerous in an ovoid, yellow or sometimes white, with the crown a golden or orange-colored cup one third or almost one half the length of the divisions.

N. Jonquilla, JONQUIL. Leaves narrow, rush-like or half-cylindrical; flowers 2 to 6, small, yellow, as also the short cup, very fragrant.

N. Pseudo-Narcissus, DAFFODIL. Leaves flat, and 1-flowered scape short; flowers large, yellow, with a short and broad tube, and a large bell-shaped cup, having a wavy-edged or crispated margin, equaling or longer than the divisions: common double-flowered in country gardens.

3. PANCRAIUM. (Name in Greek means all powerful; no obvious reason for it.) Flowers large, showy, fragrant, especially at evening in summer. Cult. at the North; the following wild S. in wet places on and near the coast.

P. maritimum. Glaucous; leaves linear, erect; scape hardly flattish; perianth 3'/ long, its green tube ending at summit into the funnel-shaped 10-tubular cup, at the lower part of which the spreading narrow-tubecolored divisions of the perianth are united.

P. rotatum (or P. Medicum). Leaves linear-tubular, widely spreading, bright green, 2' or more wide; scape sharply 2-edged; slender tube of the perianth and its linear widely spreading divisions each about 1'/ long, the latter wholly free from the short and broadly open wavy-edged cup.

4. ORUNUM. (The Greek name for a Lily.) Showy conservatory plants, chiefly from tropical regions; one wild S.

C. angustifolia, from East Indies; the huge bulb rising into a column; leaves becoming several feet long and 3'-5' wide; flowers numerous, 6'-10' long, crimson-purple outside, pale or white within.

C. Americanum, wild in river swamps for S.; much smaller, with a globular bulb; scape 17'-30' high; flower 6'-7' long.

5. AMARYLLIS. (Derived to the nymph of this name.) One wild species S.; many in choice cultivation, and the species mixed. The following are the commonest types.

A. Atamasco, ATAMASCO LILY, wild from Virginia S. in low grounds; scape 6'-12' high, mostly shorter than the glossy leaves; flower 2'-3' long, single from a 2-script spathe, regular, funnel-shaped, white and purplish; stamens and style declined.

A. Floripoda, FLORE-US or St. James's LILY, of the section Speciosa called from South America: scape bearing a single large and deeply colored crimson-purple flower, hardly any tube, and 2-flowered as it were, three divisions curved-spreading upward, three turned downwards, those at base round, around the lower part of the detached stamens and style.

A. Regale, from South America; with 2-4 large almost regular nodding flowers crimson-purple, with hardly any tube, and the detached stamens turned upwards at the end.

A. Belladonna, from Cape of Good Hope; has elongated bulbs, channeled narrowly ovate leaves shorter than the solid stems, and several slender recurved large purple equal fragrant flowers, funnel-shaped with very short tube, the stamens pet sepals distinct.

A. speciosa, or VILLAVERDE, from Cape of Good Hope; the scarlet flowers with funnel-tubed tube rather longer than the broad ovate and nearly equal spreading divisions.

6. GALANTHUS, SNOWDROP. (Name formed of the Greek words for milk and flower, probably from the color.) Fl. earliest springing.

G. piperita, of Europe, sends up soon after the winter's snow leaves the ground a pair of linear pale leaves and a scape 3'-4' high, bearing its delicate drooping white flowers, the inner divisions tipped with green; a variety in full flower.
7. **LEUCÖIUM, SNOWFLAKE.** (Ancient Greek name means White Flower.) In gardens from Europe; much like Snowdrops on a larger scale. flowering later, the scape more leafy at base, and leaves bright green.

*L. vernum*, Spring S. Scale short, 1-2' high, mostly I-flowered, in spring; pod pear-shaped and 2-sided.

*L. albiflorum*, Winter S. Scale 3-7 high, bearing 3-7 rather broader flowers in late spring or early summer; pod rounder.

8. **ALSTREMERIA.** (Named by Linnaeus for his friend Baron Alstrem.) Plants of the conservatory, from W. South America, of mixed species.

A. *Polychroma*, Life of the Irian, from Peru. Flowers few or solitary at the end of the branches; open, rose-colored or white, blanched with pink and spotted with purple, with some yellow on the inner divisions.

A. *petasitum*. Flowers umbel-like, round in shape, the apetalous divisions more erect and close, red, tipped with green and brown-spotted.

A. *versicolor*. Flowers few, terminating the drooping spreading branches, yellow spotted with purple.

9. **POLIANTHES, TUBEROSE.** (Name from Greek word for tuber, therefore not Polyanthes. And the popular name relates to the tuberous rootstock, therefore not *Tuber-Rosum.*

P. *tuberosa*, the only species cultivated, probably originally from Mexico; the tall stems with long several-ranked leaves at base and shorter and spatulate ones towards the many-flowered spike (produced in autumn when planted out) the blossoms very fragrant, white, or slightly tinged with rose, the Chinese sorts full-double.

10. **AGAVE, AMERICAN ALOE.** (Name from Greek word for the wonderful.) Planta flower only after some years, and die after maturing the fruit.

A. *Virginica*, of sterile soil from Virginia to Ill. and S.; has heart-shape dentate and spiny-tipped leaves 6'-12' long, and scape bearing a boss simple spike of small flowers, 3'-6' high.

A. *Americana*, of Mexico, is the common CenturY PLANT or American Aloe, with very thick, spine-folded and spine-pointed leaves, 2'-4' long, pale green, or a variety yellowish-striped, the scape when developed from old plants (and to flower only after 100 years in cool climates) treelike, bearing a simple point.

121. **IRIDACEAE, IRIS FAMILY.**

Distinguished by the equitant erect leaves (Lessons, p. 68, fig. 153, 154), of course branched, and the 3 stamens with anthers facing outwards. Flowers showy, colored, mostly from a spath of two or more leaves or bracts: the tube of the perianth coherent with the 3-celled ovary and often prolonged beyond it, its divisions in two sets (answering to sepals and petals), each compound in the bud. Style 1, or rarely 3-leaf; stigma 3, opposite the 3 stamens and the outer divisions of the perianth. Fruit a 3-celled and many-seeded pod. Stems or herbage rising from a rootstock, tuber, or solid bulb (corn, Lessons, p. 43, fig. 71, 72); these are aroid, sometimes very much so. All are perennial herbs.

§ 1. Portion of 3 outer sepal or ovar; and 3 inner outer smaller ovary or inner part divisions: stamens or more properly belong to the style, petals.

J. **IRIS.** Flowers with tube slightly or much prolonged beyond the ovary, in the former case also with the style. Stamens inside the ovary, comprising the tip of the style, the others shaped like a slender, sometimes bluish or blue, style by the base. The red stigmas is a shelf or short lip on the lower face of the perianth branch of the style, and the inner surface stigmatic. Bud 3-angled.
§ 2. Perianth parted into 4 nearly equal widely spreading divisions; stamens separate or nearly so; style 5-lobed.

2. TARANTHUS. foliage and aspect of an Iris with leafy branching stem, from a rhizome; divisions of the flower-clubbing, with a narrow base. Filaments slender, much longer than the anthers. Style long, cylindrical, its simple branches tipped with a broad and lower anther. Pod pear-shaped; the valves falling away expose the centre covered with black berry-like seeds.

3. NEMASTYLIS. Stem simple or sparsely branching above, from a solid bulb like that of a Crocus. divisions of the flower-clusters. Filaments wide-shaped, much shorter than the flower-stalk. Style short; its 5-lobed part into two, bearing long and slender-like diverging stigmas. Pod truncate. Seeds dry, unripe.

§ 3. Perianth deeply 3- or parted into 4 widely spreading divisions; stamens somewhat pubescent in the tube; style 5 or 6, thread-like; flowers opening in sunshine and last one for a few hours.

4. SISTERINGHI. Stalk mostly flowers; leaves grass-like. Divisions of the flower-clusters all alike. Stigma 3, simple.

5. THYRSIS. From a solid bulb with some hard bristle coating. Leaves lanceolate, large, very much paler. Three outer divisions of the perianth very large and with a conic base; the other 6 very much smaller and filiform-shaped. Stigma 3, each 2-lobed.

§ 4. Perianth tube at base; flowers all more or less spreading; stamens opposite; style 3; stigma 3 or 6; flowers lasting for several days. Plants from solid bulbs or corms. (Lascius, p. 45, fig. 74, 75.)

6. GLADIOLUS. flowers numerous in a spike, on a rather tall leafy stem, remaining open, irregular. The short-cylindroid-shaped tube bearing somewhat curved, and for divisions more or less unequal, the flower commonly alike or as if considerably zipped. Stamens (inserted on the tube) and style ascending. Leaves sword-shaped, strongly veined.

7. GLOBUS. Stalks and narrow linear leaves rising from the bulb, the ovary and pod slender raised above ground; perianth with a long and slender tube; 4-6 oval or reniform divisions alate, or on the inner rather smaller, conical, fully spreading only in sunshine. Leaves with revolute margins.

There are besides many tender plants of the family in choice collections, the proper part confined to the conservatories, — mostly belonging to

IRIS pseudaria, of Cape of Good Hope, and others, one of that genus, now called Spreaia, Wsiniola, &c., also in Montbretia or Tigonoia, &c.

Schizonepis connivens, from South Africa, latey introduced: not very tender, with long and twisted linear leaves, and stems 30 high, bearing a spike of bright orange-red flowers 9 across, the ovate leaves all alike and widely spreading from a narrow tube; the slender style deeply 3-lobed (when the name) into 3 thread-like branches.

Moraea azurea, of the Cape; very like an Iris, as the specific name denotes; borne in 6 divisions of the perianth all nearly alike and widely spreading, with a yellow spot on the outer ones.

1. IRIS, FLOWER-DE-LUCE, BLUE FLAG. (Greek and Latin my- theological names, and name of the rainbow.) Fl. spring and early summer.

§ 1. Wild species of the country, all with creeping roots.

a. Dwarf, with simple many short stems (very leafy bulblets): 1-3 flowered in early spring, from creeping and branching tender rustules, near and there, cepa-
on darkened; flowers violet-blue, with a long slender tube, and an herb.

I. versicolor, Wsiniola Dewiana. Woody hillside, from Virginia and Kentucky: with linear grassy leaves, tube of flower about the length of its leaves equal divisions, which are on slender orange-yellow tubes, the outer ones red.

I. orianta, Chester 0. Along the Alphagmites, &c., sometimes gold; with lanceolate leaves, on the upper ovoid-lanceolate, tube of flower 3 nearly much longer than the scarcely divided stigmas, the outer ones crossed; pod sharply triangular.
mediate between the preceding groups and the next.

5. COLCHICUM. Perianth resembling that of a Crocus. Stamen born on the throat of the long-tubular perianth. Styles very long.

6. VEHATHCUL. Flowers perfect, in a simple raceme or spike; petal bicolor.

7. AMIANTHUM. Flowers perfect, mostly in a simple raceme. Perianth white, the oval or oblong spreading divisions without chaff or spots. Filaments long and slender. Seeds wingless, 1–4 in each cell. Leaves chiefly from the bulblet base of the scape-like stem, linear, broad, grass-like.

8. STEPHANTHUM. Flowers polygamous, in pedicelled racemes on a leafy stem. Perianth white, with spreading and not spotted inarticulate divisions tapering to a narrow point from a broader base, which coheres with the base of the ovary. Stamens very short. Seeds several, wingless. Leaves lanceolate, broad, grass-like.

9. VEERATHUM. Flowers polygamous, in pedicelled racemes. Perianth greenish or brownish, its inarticulate division narrowed at base, free from the ovary, not spotted. Filaments short. Seeds reniform, wing-margined. Leaves broad, many-seeded. Base of the leafy stem more or less bulblet-like, producing many long white roots.

10. MELANTHUM. Flowers polygamous, in racemes forming an open pyramidal panicule. Perianth cream-colored, turning green or brownish with age, perfectly free from the ovary; its heart-shaped or oblong and partly bell-shaped widely spreading divisions raised on a claw and marked with a pair of darker spots or glands. Filaments short, adhering to the chaff of the perianth. Ungainly seed. Seeds several in each cell, broadly winged. Leaves lanceolate or linear, mostly grass-like. Stem roughish-downy above, its base more or less bulbous.

11. ZYGDENUS. Flowers perfect or polygamous, in a terminal panicule. Perianth greenish white, its oblong or oval widely spreading divisions spotted with a pair of roundish glands or colored spots near the base or almost sessile base. Stamens free from and about the length of the perianth. Leaves linear, grass-like; stem and whole plant smooth.

III. BELLWORT FAMILY; with alternate and broad or narrow, parallel-veined leaves; stem from a rootstock or from fibrous roots, branching and leafy; style one or at the base, but 2-cleft or 2-paried. Fruit a pod, few-seeded. Antlers turned rather outwards than inwards. Perianth of 6 almost similar and wholly separate pieces, deciduous.

12. UCVLARIA. Flowers solitary or sometimes in pairs at the end or in the fork of the branching stem, drooping, yellowish; the perianth rather bell-shaped and tawny, its divisions quadrate-dentate, with a honey-bearing groove or pit at the acute narrowed base. Stamens short, one at the base of each division; anthers linear, much longer than the filaments. Pod triangular or 3-lobed, bicolorful from the top. Seeds thick and rounded.
IV. ASPARAGUS FAMILY; with parallel-veined mostly alternate leaves, branching or simple stems from a rootstock, at least there is no bulb, a single style (if erect or lobed at all only at the summit), and fruit a few-seeded berry. Pedicels very often with a joint in the middle or under the flower. Flower almost always small, and white or greenish, chiefly perfect.

§ 1. Heeds with ordinary broad leaves.
- Flowers bell-shaped, of 6 sepals and similar deciduous divisions; stamens on the receptacle or nearly so; styles turned outward.

13. CLINTONIA. Flowers erect, few or several in an umbel on a naked scape, the base of which is sheathed by the stalks of a few large oval or oblong and ciliate leaves. Filaments long and slender; anthers linear or oblong; style long. Ovary 2-chambered, becoming a baccate berry. Rostellums creeping, like those of Lili of the Valley, which the leaves also resemble.

14. PRONAETS. Flowers single or few, hanging at the end of the leafy spreading branches on slender simple stalks, yellowish. Barren of the perianth imbricate or linear. Filaments much longer than the flower-bud blunt anthers. Ovary with a pair of hanging anthers in each of the 6 cells, becoming an ovoid or oblong and pointed red berry. Rostellum short, not creeping; heage short.

15. STREPTOCIES. Flowers single or necty in pairs along the leafy and tuberous stem, just out of the axis of the ovate clamping leaves; the slender perianth imbricate; ovary with 2-3 cells, each of which bears a nutlet attached to the style. Rostellum short, not creeping; styles united.

- Flowers with perianth of one piece, but often deeply parted, the stamens on the base or tube: styles inserted near the base of the tube.

16. CONVALLARIA. Flowers nodding in a one-sided raceme, on an angled scape which rises, with the stem; two oval leaves, from a running rootstock. Perianth short bell-shaped, with 6 recurving lobes. Stamens included. Styles short. Ovary with several ovules, becoming a few-seeded red berry.

17. SMILLAENA. Flowers in a raceme or cluster of racemes terminating a leafless stem, small, white. Perianth 6-parted, in one 6-parted. Filaments slender; stamens short. Ovary 2-chambered, making a 1-seeded berry. Rostellum not creeping.

18. POLYGONUM. Flowers nodding in the axis of the leaves along a leafy and recurving simple stem, which rises from a long and thickened rootstock. Perianth greenish, cylindrical, 6-parted or notched, bearing the 6 included anthers at or above the middle of the tube. Style slender. Ovary 2-chambered, with few ovules in each cell, in fruit becoming a globular black or thin-seeded berry.

§ 2. Plants with small scales in place of leaves, from the axis of which are produced foliages; 2. flowers which by their position are seen to be of the nature of branches, but which remain and set on leaves. Perianth greenish or white, 6-parted, the stamens borne on the tube. Berry fleshy, the cells 2-seeded.


20. MUSCIPHYLLUM. Flowers 2 oval in the axis, greenish-white; the leaves along divisions of the perianth continuo, almost as long as the tube. Styles slender: stigmas 3-nerved. The 2-seeded berries long, with Stigmas propping.

V. LILY FAMILY (proper (including Asphodel Family)); distinguished by the single undivided style (or rarely a sessile stigma), and fruit a baccate pod. Perianth with all 6 parts generally cordate-like, and in all the following nearly similar. Leaves parallel-veined or ribbed, sometimes with netted-veins also. Stems or scape mostly simple.
Appendix:

1. **Liliaceae**

- **Amaryllis**. Flowers in a terminal raceme or corymb, often reddish or yellow, with 2-3 leaves at the base. Styles and stamens numerous. Seeds numerous, black, smooth, usually in a cluster.
- **Iris**. Flowers in a raceme, usually in shades of blue, purple, or yellow, with 2-3 leaves at the base. Styles and stamens numerous. Seeds numerous, black, smooth, usually in a cluster.
- **Convallaria majalis**. Flowers in a raceme, usually in shades of blue, purple, or yellow, with 2-3 leaves at the base. Styles and stamens numerous. Seeds numerous, black, smooth, usually in a cluster.
- **Tulipa**. Flowers in a raceme, usually in shades of blue, purple, or yellow, with 2-3 leaves at the base. Styles and stamens numerous. Seeds numerous, black, smooth, usually in a cluster.
- **Scilla**. Flowers in a raceme, usually in shades of blue, purple, or yellow, with 2-3 leaves at the base. Styles and stamens numerous. Seeds numerous, black, smooth, usually in a cluster.
- **Hyacinthus**. Flowers in a raceme, usually in shades of blue, purple, or yellow, with 2-3 leaves at the base. Styles and stamens numerous. Seeds numerous, black, smooth, usually in a cluster.
- **Muscaria**. Flowers in a raceme, usually in shades of blue, purple, or yellow, with 2-3 leaves at the base. Styles and stamens numerous. Seeds numerous, black, smooth, usually in a cluster.
- **Tritonaria**. Flowers in a raceme, usually in shades of blue, purple, or yellow, with 2-3 leaves at the base. Styles and stamens numerous. Seeds numerous, black, smooth, usually in a cluster.
- **Yucca**. Flowers in a terminal raceme, usually in shades of blue, purple, or yellow, with 2-3 leaves at the base. Styles and stamens numerous. Seeds numerous, black, smooth, usually in a cluster.

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300. **Liliaceae**

- **Liliaceae**. Flowers in a terminal raceme, usually in shades of blue, purple, or yellow, with 2-3 leaves at the base. Styles and stamens numerous. Seeds numerous, black, smooth, usually in a cluster.
- **Convallaria majalis**. Flowers in a raceme, usually in shades of blue, purple, or yellow, with 2-3 leaves at the base. Styles and stamens numerous. Seeds numerous, black, smooth, usually in a cluster.
- **Tulipa**. Flowers in a raceme, usually in shades of blue, purple, or yellow, with 2-3 leaves at the base. Styles and stamens numerous. Seeds numerous, black, smooth, usually in a cluster.
- **Scilla**. Flowers in a raceme, usually in shades of blue, purple, or yellow, with 2-3 leaves at the base. Styles and stamens numerous. Seeds numerous, black, smooth, usually in a cluster.
- **Hyacinthus**. Flowers in a raceme, usually in shades of blue, purple, or yellow, with 2-3 leaves at the base. Styles and stamens numerous. Seeds numerous, black, smooth, usually in a cluster.
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- **Yucca**. Flowers in a terminal raceme, usually in shades of blue, purple, or yellow, with 2-3 leaves at the base. Styles and stamens numerous. Seeds numerous, black, smooth, usually in a cluster.
Among the various cultivated plants of the choicer collections, the following are not rarely met with.

**Not halimae**.

**Phormium tenax**, **New Zealand Flax**. Nearly hardy N., but does not flower; the very frilly finely twirled linear evergreen leaves liable on pointed nodules, strongly keeled, cuneiform below, nearly flat above, yielding a very strong fiber for cordage.

**Dracaena** and **Cordyline**, **DeLago-Trees**, two or three species, ornaments of three conservatories, call for their culture.

**Aloe angusti**latra, **A. variegata**, and other ALOES, with very thick and finely frilled leaves crowded or interlaced at the ground, sending up a slender stalk, bearing a spike or tuft of tubular flowers, in conservatories.

* From rooted bulbs, sending up leaves and scapes.

**Lachenalia tricolor**; tender bulbs from Cape of Good Hope; with lavender soft blue blushed with purple, and a tuft of small, rather singular than handsome, greenish-purple and yellow flowers, its ever dividing leaves forming, the three interior longer.

**Calochortus**, **Cyclchochtria**, **Brodiaea**, and **Triteleia**, handsome flowered bulbs, chiefly from California and Oregon, hardly any quite hardy N.

1. **TRILLIUM**, **THREE-LEAVED NIGHTSHADE**, **WAKE ROBIN**, **BIRTHROOT**. (Name from Latin, tril, triple, the parts throughout being in threes.) Low stems from a short tuber-like rootstock **(Lessons, p. 42, fig. 67)**, bearing a wheel of three green compasscuously united round or thombo-lobed leaves, and a terminal flower, in spring. All grow in rich or moist woods, or at the base in bogs.

§ 1. Flower scales: petals and sepals narrow, the former spatulate, dull purple.

**T. sessile**. From Penn. W. & S.: leaves small, often blotched; petals scale, rather erect, turning greenish, long persisting.

**T. recurvatum**. Only W.: differs in having the leaves narrowed at base into a petiole, sepals reflexed, and pointed petals with a narrowed base.

§ 2. Flower raised on a peduncle: petals whitish even after flowering.

* Peduncle erect or inclined; leaves showy-crimson, murally by a somewhat curved base, abruptly taper-pointed; petals flat.

**T. grandiflorum**, **GREAT-FLOWERED WHITE T.**. From Vermont to Penn. & W.; flowering rather late: lilacous, the above-petals 2—2½ long, much larger than the sepals, gradually recurring from an erect base, pure white, in age sometimes rose-colored.

**T. erectum**, **PERFECT T. OR BIRTHROOT**. Chiefly N.: not so large as the preceding; dark dull purple petals even, widely spreading, little longer than the sepals, 1½—1½ long.

Var. album, from New York W.: has greenish white, rarely yellowish petals.

* For declinatum, from Ohio N. W., has peduncle fully half the length of the leaves and horizontally, or in fruit even reduced, petals white or pinkish.

* Peduncle recurved from the first scale the short-posted or acutum leaves, not longer than the ovary and recurved white petals.

**T. ódorum**, **ANNUAL T.**. Commonest E.: leaves rhomboid-ovate; petals oblong, ovate, acute, 1½—2½ long; styles separate.

**T. stylisum**, **Upper country T.**: leaves oblong, tinged with magenta, much longer and broader than the sepals; styles united at base.

* Peduncle short; leaves rounded at the base and short-petioled.

**T. niveum**, **DESPLENTED T.**. From Ohio N. W.: very early flowering; 1½—2½ long, leaves oval or ovate, obtuse; petals oblong; oblong, pure white, 1½ long; styles slender.
1. *T. erythrocarpum*, Painted T. Low woods or bogs N.: leaves narrow, taper-pointed; petals lanceolate, pointed, wavy, white with pink stripes at the base; berry bright red.

2. **MEDEOLA, INDIAN CUCUMBER-ROOT** (from the taste of the tuberous white and horizontal rootstock; the Latin name from Medea, the sorceress). Fl. early summer.

3. **COLCHICUM**. (Named from the country, Cälch.) Flowers in autumn, seeds up the handsome root-leaves the next spring. Sparingly cult. from Eu. for ornament.

4. **CHAMELIUM, DEVIL’S BIT**. (Name in Greek means [Ground Lily, or obvious lily].) Fl. summer.

5. **HELÖNIA**. (Name probably from the Greek for a swamp, in which the species grows.) Fl. spring.

6. **XEROPHYLLUM**. (Name means, in Greek, arid-leaved, the narrow leaves being dry and rigid.) Fl. early summer.

7. **AMIANTHIUM, FLY-PoISON**. (Name, from the Greek, alludes to the flowers distinct of the spots or plumes of Melanthium and Zygadenus.) Flowers summer, turning greenish or purplish with age.

8. **STENANTHUS**. (Name from Greek stenos narrow flower.) Fl. summer.
9. VERATRUM, FALSE HELLEDOR. (Old name, from Latin vero = other, truly black.) Mostly pubescent stout herbs; the roots yield the acrid
Veratrum viride. \[ELt. EBORE. (Old name, from Italian = thistle, truly black.
M, stout, 2°-4° high, thickly covered with the broadly oval or ovate
strongly pilose sheath-clasping leaves; panicle of spike-like racemes pyramidal;
flowers: villous or green turning green with age.
V. parviflorum, along the Alleghenies, is slender, 2°-5° high, with set-
ters-pilose or imbricate, scarlet to green, leaves below, and a long and loose pan-
icle of greenish small flowers turning dingy or brownish with age.
10. MELANTHIUM. (Name, from the Greek means black flower, the
perianth turning darker, yet not black.) Fl. summer.
M. Virginicum, BEECH-FLOWER. Moist woods, from N. New York to
S. & W.; 2°-3° high; lowest leaves sometimes 1° wide, the upper few and
smaller; flowers rather large.
11. ZYGADENUS. (Name in Greek means spiked gloads.) Fl. summer.
Z. glaberrimus. Freer barren bogs N. 1°-3° high, from a running root-
stock; leaves rather rigid, keeled, curved, taper-pointed; panicle many-flowered;
divisions of perianth 1° long; a pair of round spots above the nerved base.
Z. glaucus. Bogs along our N. bogs; 1°-3° high, from a bush; leaves
flat, pale; flowers rather few; base of perianth colored with that of the ovary,
the divisions marked with an inversely heart-shaped spot.
12. UVULARIA, BELLWORT. (Name from the Latin words, or palate;
the application obscure.) Stems 0°-2° high, naked below, leafy above; fl.
spring. All in rich woods.
\* Leaves oblong, the base clasping round the stem which means to run through the
leaves just above its base (Lessons, p. 67, fig. 131): pod 3-valved: vomstack
very short and erect.
U. grandiflora, the common one from W. New England W., with pale
greenish-yellow flower 1° long and smooth or nearly so inside.
U. porpilanta, common E. & S.; smaller, with sharper tips to the au-
thers, and the parts of the barely leafy subpetiolate granular-roughened inside.
U. flaviflora, chiefly N. E., with bright yellow flower about 1° long, and nearly
smooth inside.
\* Leaves not surrounding the stem, merely minute: vomstack creeping: pod
shortly triangular.
\* U. sessiliflora, common, especially N. 2°-12° high, with pale lance-ob-
long leaves, and whitish cream-colored flower 1° long; pod stalked.
13. CLINITONIA. (Named for In W. Clinton of New York.) Cold
moist woods: flowers early summer.
C. borealis. Only N. and along the mountains; flowers 2-7, greenish
yellow, over 1° long; berry rather many-seeded.
C. umbellata. Along the Alleghenies: flowers numerous, 1° long, white
spotted with green or purplish dots: seed only 8 in each cell.
14. PROSARTES. (Name from Greek word meaning keeping.)
P. lanuginosa. Rich woods the whole length of the Alleghany region to
Canada: branches widely spreading; leaves ovate-oblong, pointed, rounded or
slightly heart-shaped at the sessile base; flowers 1° long, greenish; style with 3
stigmas: fl. late spring.
15. STREPTOPUS, TWISTED-STALK (which the name denotes in
Greek). In cold damp or wet woods N.: flowers in late spring and early
summer, small, barely 1° long.
S. amplexifolius. Stem stout, rough at base, 2°-9° high; leaves strongly clasping, smooth, glaucous beneath; flower white, on a long stalk with acute bend above the middle; anthers slender-pointed; stigma truncate.

S. rusticus. Stem 1°-2° high; leaves green, finely ciliate, and with the few branches bent with more short and fine bony hairs; flower rose-purple, on a less bent stalk; anthers 2-pointed; stigma 3-lobed.

16. CONVALLARIA, LILY-OF-THE-VALLEY. (Name altered from the Latin Lilium consolitum, of which the English name is a translation.) Fl. late spring.

C. majus, the only true species, cult everywhere, from Europe, and wild on the higher Alleghenies; its small green-stemmed white flowers familiar.

17. SMILACINA, FALSE SOLOMON'S SEAL. (Name a diminutive of Smilia, which these plants do not resemble.) Wild in woods or low grounds; fl. late spring.

§ 1. Perianth of only 6 reduced spreading divisions; stamens 4; filaments 3-cleft.

S. bifolia. In all moist woods N.: 2°-5° high; stem bearing 2 (sometimes 3) heart-shaped leaves, and a short raceme of small flowers; berries red.

§ 2. Perianth of 6 divisions; stamens 6; filaments usually 3-cleft.

S. trifolia. Cold bogs N.: 3°-6° high, smooth, with mostly 4 oblong leaves, swelling to a clasping base; racemes few-flowered; berries black.

S. stellata. Banks spaces N.: 1°-2° high, smooth, or the 5-12 lance-oblong leaves minutely downy when young; racemes several-flowered; berries blackish.

S. racemosa. Most banks and banks, chiefly N.: 2° high, minutely downy, truly to the top; the oblong or lance-ovate leaves ciliate, pointed at each end; flowers small, racemose, in a compound raceme; the divisions of perianth narrow; berries pale red and spiky.

18. POLYGONATUM, SOLOMON'S SEAL. (Name in Greek means many-paired.) The English name is from the woodstocks: the impression of the seal being the scar left by the death and separation of the stems of a former year: (Lessons, p. 42, fig. 66.) Stem remaining or turned to one side. Fl. late spring and early summer.

P. biflorum, S. Wallis's 8. Wooded banks: 1°-2° high; the acute-oblong or lance-oblong leaves nearly sessile and glaucous or minutely whitish-downy beneath; petals 4-pointed; filaments roughened, borne on the middle of the tube.

P. giganteum, Lesson 8. Alluvial grounds N.: 3°-9° high, smooth; leaves erose, partly clasping; peduncles 4-8-pointed; filaments smooth and naked, borne on the middle of the tube.

19. ASPARAGUS. (The ancient Greek name.) Fl. early summer.

A. officinalis, Compass Asparagus. Cult. from Eu. for its excellent spring shoots, spontaneous about gardens; tall, bushy-branched, the leaves thread-shaped.

20. MYRISPHYLLUM. (The name in Greek means myrtle-leaved.)

M. asparagoides, Cape Good Hope: a very smooth delicate twiner, cult. in conservatories for winter decoration, under the name of Barilla: the bright green so-called leaves 1° or more long, glossy-green both sides, divided, set irregularly on the branch, but turning so as to present an upper and under face; the small flowers produced in winter, sweet-smelling, with reddish anthers; berries green. — That the naming leaves are of the nature of innesus is shown in Rhus, the Butcher's Broom, of Europe (here rarely cultivated), where they are rigid, spiny-tipped, and bear flowers on one face.
2. LILY FAMILY.

21. LILium, lily. (The classical Latin name, from the Greek.) All, including our four wild Lilies, more or less commonly cultivated.

§ 1. Flowers erect, orange or tangerine-red, of bell-shaped outline, the divisions widely separate and not slender claws: no bulbs in the axils of the leaves. Wild species of woody soil.

L. Philadelphicum, WILD ORANGE-RED LILY. Chiefly N. & W.: 1½-2 ft. high, with lanceolate or lance-linear leaves nearly all in whorls of 3-6; and 1-3 open-bell-shaped reddish-orange flowers, 2½-3 in long, spotted inside with dark purple.

L. Catesbaei, SOUTHERN LILY. Chiefly S.: 1½-2½ ft. high, with scattered lanceolate-linear leaves, a solitary and larger nearly scarlet flower: the slender-lancet divisions very-elongated, revolute above, 3½-4½ in long, with very slender claws, within crimson-spotted on a yellow ground.

§ 2. Flowers nodding; the slender divisions Without claws, coiling at the broad base, the upper part spreading.

L. bulbiferum, BUTTER-BEARING L. Cult. from old gardens, from Europe: 1½-2½ ft. high, producing bulbils in the axils of the lanceolate irregularly scattered leaves, and few reddish-orange flowers, the divisions 2½-3 in long, with some rough brownish projections at base inside, but hardly spotted.

§ 3. Flowers nodding; the divisions without claws, rolled back, mostly dotted inside.

• Bulbs in the axils of the leaves.

L. tigrinum, TIGER LILY. Cult. from China: stem 4½-5½ ft. high, round: leaves lanceolate, scattered; flowers panneled, numerous, very showy, orange-red, the divisions about 4 in long, black-spotted inside.

• • No bulbs in the axils.

= Wild species of the country in most swamps and bogs: flowers orange or orange-red, strongly dark-spotted inside.

L. Canadense, CANADA L. Stem 2½-3½ ft. high, bearing few or several long-petunia flowers: leaves lanceolate, all in whorls, their edges and nerves minutely rough; divisions of the flower 2½-3 in long, recurved-splaying above the middle.

L. superbum, AMERICAN TURK'S CAP L. Stem 3½-7½ ft. high, bearing few or many flowers in a pyramidal panicle: leaves lanceolate, smooth, impari- or bi-or tri-clawed or many of them scattered; divisions of the flower strongly rolled backwards, about 2½ in long.

L. Carolinae, CAROLINA L. In the low country S. appears to be a variety of the above, 2½-3½ ft. high, with broader leaves and only 1-3 flowers more variegated with yellow.

= Cultivated species from the Old World.

L. Pomeridianum, TURK'S L., of Europe: slender, with scattered and crowded lance-linear or lance-linear-linear leaves, and several small orange-red or scarlet (rarely white) flowers, their lanceolate acute divisions somewhat bearded inside. This and the next small-flowered, and not common in gardens.

L. Chalconeum, RED L. Of Palestine and throughout the East: stem thinly leafed with scattered narrow lance-linear erect leaves, their margins rough-pulvinous; flowers several, purplish or violet, the divisions bearded towards the base, not spotted.

L. Martagon, TURK'S CAP OR MARTAGON L., of Europe: 2½-3½ ft. high, with lance-linear leaves in whorls, their edges rough, and a panicle of rather small but showy light violet-purple or fuschia-color (rarely white) flowers adorned with small brown-purple spots.

L. speciosum, OF JAPAN: stem 1½-3½ ft. high; leaves scattered, lance-like or oblong, pointed, slightly pubescent; flowers few, abundant: the strongly revolute divisions about 3½ in long, white or pale rose-color, with prominent purple variegations inside: now of many varieties.

L. auratum, GOLDEN-BOWERED L., of Japan: stem 1½-2½ ft. high; leaves lanceolate, scattered; flowers 1-3, barely nodding, sweet-scented, very large.
the ovate-lanceolate divisions 6 or more long, spreading almost from the base and the tips revolute, white with a light yellow band down the middle of the upper face, which is spotted all over with prominent purple spots and rough with briefly projecting near the base. Probably a Japanese hybrid of the preceding with some other: the most showy species known.

§ 3. Flowers semi-double, white or less few-somewhat in outline: the sepals semi-circular or somewhat united below into a tube, their margins more or less spreading, but hardly recurving. All cultivated, from Asia, with scattered leaves.

L. candidum, COMMON WHITE LILY. Cult. from Persia, &c.: with lanceolate leaves, and few or several bell-shaped flowers, smooth inside, sometimes double.

L. japonicum, JAPAN WHITE LILY. Cult. from Japan: 2° high, with mostly only one flower, which is nodding and larger than in the foregoing, below convolute into a narrower tube, and above with the divisions more widely spreading.

L. longiflorum, LONG-FL. WHITE LILY of Japan: 1° high, with lanceolate leaves, and a single horizontal funnel-form flower, 5 or 6 long, the narrow tubular portion longer than the wider widely spreading portion.

22. FRITILLARIA. (Latin frilillus, a dice-box, from the shape of the flower, which differs from a Lily in its more cup-shaped outline, the divisions not spreading.) FL: spring.

F. Meleagris, GREEK-HEN'S EGG. Cult. from Eu.: 1° high, with linear alternate leaves, mostly oval; terminal flower purplish, tessellated with blue and purple or white; the lower bearing spot maroon.

F. imperialis, or FELTICUM IMPERIAL. Cult. from Asia: a neatly formed of early spring. 3°-4° high, rather thickly beset along the middle with lanceolate or lance-oblong bright green leaves more or less in whorls; flowers several hanging in a sort of umbel under the terminal crown or tuft of leaves, large, orange yellow, or sometimes almost crimson, a round hairy gland on the base of each division; pod 6 angled.

23. TULIPA, TULIP. (Name and the common species said to come from Persia.) FL: spring and early summer: all from the Old World.

T. gesneriana, COMMON TULIP, from Asia Minor, is the original of the various ordinary hardy kinds: leaves lance-oblong, glaucous, shorter than the flower-tube; divisions of the flower very obtuse.

T. suaveolens, SWEET T. of Eu., 1°; flower sweet-scented, its divisions acut, appearing very early.

24. ERYTHRONIUM, DOG-TOOTH-VIOLET. (Name from the Greek word for red, — not appropriate even for the original European species.) FL: spring.

E. dens-canis, DOG-TOOTH-VIOLET of Eu.: sometimes cult.; has broadly oblong pale leaves little spotted, and a rose-purple or almost white flower in earliest spring.

E. americanum, YELLOW B. or ARNOLD'S-TULIP. Most or few woods, very common E.: leaves oblong-lanceolate, mottled and dotted with dark-purple and white; flowers light yellow.

E. albidum, WHITE T. in N. Y. and Penn., but common W.: leaves less or not at all spotted; flower bluish-white.

25. ORNITHOGALUM, STAR OF BETHLEHEM. (Name in Greek: means bird-smell, a current expression for some marvellous thing.) FL: early summer.

O. umbellatum, COMMON S or TENOCLOKE, from Eu.: in old gardens and escaped into some low meadows; leaves long and green-like; flowers bright white within, green outside, opening in the sun, on slender stalk.
28. ALLIUM, ONION, LEEK, GARLIC, etc. (Ancient Latin name.)

§ 1. Wild species of the country, or one naturalized seed.

* Lactuca indica: flowers white, in summer; corms and seeds single in each cell.

A. triquetrum, Wild Leek. Rigid wood.; bulb small, large, pointed, sending up in spring to or a large lance-oblong flat leaves, and after they wither, in autumn, a many-flowered umbel on a naked scape.

* * * Lactuca longifolia: seeds and seeds a pair in each cell; flowers white, in summer.

A. monstru, NORSE WILD ONION. Banks, through the Alleghany region and N. W.; scape angular, 1½-2½ long; when nodding at the apex; pedicles of the base many-flowered, with a short spike; flowers white, rose-colored; leaves linear, sharply keeled on the back, channelled.

A. muscarum, COLUMBINE WILD ONION. Dry sandy soil S.; scape 1½ high, bristle, bearing an erect umbel of white flowers changing to rose-colored; leaves below, conical; bulb covered with a yellow network.

A. vulgaris, FRESH or CROW GARLIC. A weed from Eu. in gardens and does low growths; slender scape saliered to the middle by the hollow ovate-shaped leaves which are gathered down the upper side; flowers greenish-white; when their place is occupied by bulblets.

* * * Lactuca minima, gracilis: seeds and seeds single in each cell; flowers nearly white, in spring.

A. striatum. Low pine herba, Virginia to Illinois and S.; scape and leaves ½-1½ high, the latter involute and striate on the back; flowers 3-10 in the umbel.

§ 2. Cultivated from the Old World: flowers in summer.

* Lactuca fistulosa.

A. Moly, Golden Garlic. Cult. for ornament in some gardens; leaves broadly lanceolate; scape 1½ high; flowers numerous, large, golden yellow.

A. sativum, Garden Garlic. Bulbs clustered, pointed; leaves lance-like, keeled; flowers few, purple, or bulblets in their place; filaments all broad and soft.

A. Porrum, Garden Leek. Bulb elongated, single; leaves broadly linear, keeled or folded; flowers in a head, white, with some rose-colored stripes; 3 of the filaments marked.

* * * Lactuca cylindrical, bulbous: seeds globular, many-flowered.

A. Aspidotis, Sibylla. Bulb with oblong offsets; leaves awl-shaped; flowers blue-purple; 3 of the filaments marked.

A. Schoenoprasum, Chives. Low, tufted; leaves awl-shaped, equaling the scape; flowers purple-blue, its divinities lanceolate and pointed, long; filament simple.

A. Cepa, Onion. Bulb dwarfed, large; leaves much shorter than the hollow inflated scape; flowers white, or bulblets in their place.

27. SCILLA, SQUILL. (The ancient name of S. MARITIMA of S. Europe, the bulb of which is the official squill.)

S. Frisca, Wild S. called WILD HYACINTH at the W., QUAMARE. Makes banks and gardens from Ohio W. & S. W., scapes and linear-lanceolate leaves 1½ high; flowers pale blue, in a long loose raceme, in spring.

* S. amurensis, S. verna, etc. are cult. from Europe in some choice collections, for their early bright blue flowers, but are rare.

28. MUSCARI, GRAPE or GLOBE HYACINTH. (Name from the many-scented of the flowers in one species.) All from Eu.; S. spring.

M. botryoides, Common Grape-Hyacinth, of country gardens, escaping into lawns and fields: a pretty little plant, sending up in early spring
the cross-bacolate divisions 6" or more long, spreading almost from the base
and the tips revolute, white with a light yellow band down the middle of the
upper face, which is spotted over with prominent purple spots and rough
with bristly projections near the base. Probably a Japanese hybrid of the pre-
ceding with some other: the most showy species known.
§ 2. Flowers cuneiform, white, more or less fanned-in form in outline; the united involucral
divisions somewhat or successively united below into a tube, their summit
more or less spreading, but hardly recurving. All cuneiform, from Asia,
with scattered leaves.

L. candidum, COMMON WHITE LILY. Cult. from Persia, &c.; with lan-
dulate leaves, and few or several bell-shaped flowers, smooth inside, sometimes
double.
L. japonicum, JAPANESE WHITE L. Cult. from Japan: 20 high, with
mostly one, one flower, which is nodding and larger than in the foregoing, below
convex into a narrower tube, and above with the divisions more widely
spreading.
L. longiflorum, LONG-FLOWERED L., of Japan: 10 high, with lan-
dulate leaves, and a single horizontal fanned-form flower, 3" or 4" long, the narrow
lobal portion longer than the rather widely spreading portion.

22. FRITILLARIA. (Latin fritillus, a dice-box, from the shape of the
flower, which differs from a Lily in its more cup-shaped outline, the divisions
not spreading.) Fl. spring.
F. meleagris, GREEK-HEN FLOWER. Cult. from East: 10 high, with
linear alternate leaves, mostly solitary terminal flower purplish, tessellated with
blue and purple or white; the flower-bearing spat narrow.
F. imperialis, OR POTTLED IMPERIAL, CROWN IMPERIAL. Cult. from Asia:
a stately herb of early spring, 30-40 high, rather thickly beset along
the middle with lanceolate or lance-oblong bright green leaves more or less in
whorls; flowers several hanging in a sort of umbel under the terminal crown
or calf of leaves, large, orange-yellow, or sometimes almost crimson, a round
pearly gland on the base of each division; pod 4-valved.

23. TULIPA, TULIP. (Name and the common species said to come
from Persia.) Fl. spring and early summer: all from the Old World.
T. Geaneriann, COMMON T., from Asia Minor, is the original of the
various ordinary hardy kinds; leaves lance-oblong, glaucous, shorter than the
flower-stalk; divisions of the flower very obtuse.
T. susvisiens,花卉T. of East: low; flower sweet-scented, its divisions
acute, appearing very early.

24. ERYTHRONIUM, DOG-TOOTH-VIOLET. (Name from the
Greek word for red,—not appropriate even for the original European species.) Fl. spring.
E. Danae-ana, DOG-TOOTH-VIOLET of Pers.: sometimes cult.; has broadly
oblong pale leaves little spotted, and a rose-purple or almost white flower in
earlier spring.
E. Americana, YELLOW D. OR AMERICAN T. Mostly low woods, very
common E.; leaves oblong, lanceolate, mottled and dotted with
dark-purple and white; flower light yellow.
E. albideum, WHITE D. Rare in N. Y. and Penn., but common W.: leaves
less or not at all spotted; flower bluish-white.

25. ORNITHOGALUM, STAR OF BETHLEHEM. (Name in Greek,
meaning bird-foot, a current expression for some marvellous thing.) Fl.
earl y summer.
O. umbellatum, WILD S OR WILD V. OF EAST: in old gardens
and scattered into some low meadows; leaves long and greenish; flowers
white within, green outside, opening in the sun, on slender stalks.
36. **ALLIUM, ONION, LEEK, GARLIC, etc. (Ancient Latin name.)**

**Taste and odor.** Alliaceous: odorous and pungent in each cell.

A. *trigonum, Wild Leek*. Rich woods N.; bulb large, clustered, large, pointed, sending up in spring 2 or 3 large lance-oblong dark leaves, and after they wither, in autumn, a many-flowered umbel on a naked scape.

- *Latter Leek, garlicside*: odorous and pungent in each cell; flowers rosy-purple, in summer.

**A. cernuum**, **NOTING Wild Onion**. Banks, through the Alleghany region and N. W.; scape singular, 1½–2½ ft., often nodding at the apex; pedicel of the base many-flowered umbel drooping; flowers light rose-color; leaves linear; sharply keeled on the back, channelled.

**A. tuberosum**, **ONIONS or LEAKS**. Dry sandy soil S.; scape 1½ ft., broad, bearing an erect umbel of white flowers, changing to rose-color; leaves narrow, compound; bulb covered with a brown network.

**A. vulgare, FIELD or CROW GARLIC**. A weed from Eu. in gardens and lawns, and waste low grounds; stem 6–8 in. high, or wavy, or watery, or scabrous; leaves saccate at the middle by the hollow tuberous-shaped leaves, which are andrenous down the upper side; flowers greenish-white-color; when their place is occupied by bulbs.

- *Latter Narrow-leaved, garlicside*: odorous and pungent in each cell; flowers nearly white, in spring.

**A. striatum.** Low pines cumbrous and prairie, Virginia to Illinois and S.; scape and leaves 6–10 in. high, the latter involute and striate on the back; flowers 3–10 in the umbel.

**§ 2. Cultivated from the Old World; flowers in summer.**

- *Latter flat.*

**A. Mol IY, GOLDEN GARLIC.** Cult. for ornament in some gardens; leaves broadly lanceolate; scape 1½ ft. high; flowers numerous, large, golden yellow.

**A. sativum, GARDEN GARLIC.** Bulb clustered, pointed; leaves lance-linear, keeled; flowers few, purple, or bulblets in their place; filament all yellow and calyx.

**A. Porrum, GARDEN LEEK.** Bulb elongated, single; leaves broadly linear, keeled or folded; flowers in a head, white, with some rose-colored stripes; 3 of the filaments forked.

- *Latter cylindrical, hollow; umbel globular, many-flowered.*

**A. Aspidium**, **SCHLAFER.** Bulb with shining ollafts; leaves oval-shaped; flowers blue-purple; 3 of the filaments forked.

**A. Scenicoccus, CARTER.** Low, tufted; leaves oval-shaped, equaling the scape; flowers purple-red-color, in divisions lanceolate and pointed, long; filament single.

**A. Clapa, OXOE.** Bulb depressed, large; leaves much shorter than the hollow infundibulum; flowers white, or bulblets in their place.

27. **SCILLA, SQUIRREL.** (The ancient name of S. maritima of S. Europe, the bulb of which is the official syphilis.)

**S. Frisari**, **WILD HYACINTH**. Wild banks and prairies from Ohio W. & S. W.; scape and linear-leaved leaves 1½ ft. high; flowers pale blue, in a long loose raceme, in spring.

- *S. maritima, S. verna, etc., are cult. from Europe in some choice collections, for their early bright blue flowers, but rare.*

28. **MUSCARI, GRAPE or GLOBE HYACINTH.** (Name from the musky scent of the flowers in one species.) All from Eu.: 9, spring.

**M. botryoides, FLOWER GRAPE-HYACINTH, of country gardens, escaping into lawns and fields; a pretty little plant, sending up in early spring-
1. **LILY FAMILY.**

its narrow linear leaves, and a scape (8'-7' high) bearing a dense raceme of globular deep blue flowers which are barely 1' long, resembling minute grapes, scented.

**M. racemosum**, less common in gardens, is more slender, with flaccid leaves and oval family scentless flowers.

**M. moschata**, is glamous, and has larger and exquisitely iridescent musky-scented flowers, and linear-hoary scentless shorter leaves.

**M. convolvulus**, is larger, 9' high, with violet-colored oblong flowers, on longer pedicles in a loose raceme, the uppermost in a tuft and abortive: the monstrosity variety most cultivated produces, later in the season, from the tubed apex of the scape a large panicle mass of abortive, conicron, bright blue bractlets, of a striking and handsome appearance.

29. **HYACINTHUS, HYACINTH.** (Mythological name, the plant dedicated to the favorite of Apollo.)

**H. orientalis**, ('of the Levant, with its raceme of blue flowers, the parent of the numerous cultivated varieties, of divers colors, single, and double: fl. spring.

30. **AGAPANTHUS.** (Of Greek words for amiable flower.) One species, **A. umbellatus.** Cult. from Cape of Good Hope, a handsome houseplant, turned out blooms in summer; leaves large, bright-green, 1'-2' long; scape 15'-20' high, bearing an amulet of pretty large blue flowers.

31. **PUNKIA.** (Named for one Fred, a German botanist.) Ornamental, large-leaved, hardy plants, cult. from Japan and China: fl. summer. Formerly united with the Day-Lily. F. subcordata. White Day-Lily, is the species with long, white, and tubular-dumul-form flowers. F. ovata, Black D., the one with smaller, more nodding, blue or violet flowers, abruptly expanded above the narrow tube.

32. **HESPEROCALLIS, DAY-LILY.** (Name in Greek means lovely of day, the large flower spherical.) Cult. from the Old World, especially in country gardens: the first species escaped into wild-places: fl. summer.

**H. fulva, Common Day-Lily.** A familiar, rather coarse and tall plant, with broad linear leaves and tawny orange flower, the inner divisions vary and change.

**H. flavo, Yellow D.** Less coarse, with narrower leaves and light yellow flowers, the inner divisions acute.

33. **TRITOMA.** (Name in Greek means three cut, supposed to allude to the three sharp edges of the tapering apex of the leaves, viz. the two margins and the back.) Flowers unpleasantly-scented, showy, in autumn.

**T. Uvaria, from Cape of Good Hope, painted out, is ornamental in autumn, the scape rising from the thick clumps of long grassy leaves 2' or 4' high, the cylindrical spike or raceme producing a long succession of flowers, which are at first white and conical, even they hang over and change to orange and at length to greenish yellow. Roots half hardy S.

34. **YUCCA, BEAR-GRASS, SPANISH-BAYONET.** (American aboriginal name.) Wild in sandy soil S., extending into Mexico, &c. Cult. for ornament, but only the dwarf stemless species is really hardy S.: fl. summer, large, and whole plant of striking appearance. Under various names and varieties, the common one mainly belong to the following:

- **Trunk short, covered with leaves, rising only a foot or two above the ground:** flowering with acrid alkaloids: plant dry.

**Y. filamentosas, Common Bear-Grass, or Adam's Needle.** From E. Virginia S.: Leaves lanceolate, 1'-4' long, spreading, moderately rigid, tipped with a weak prickly point, the smooth edges bearing thesilicate filaments: scape 3'-6' high; flowers white or pale cream-color, sometimes tinged purplish.
Y. angustifolia, will rear the plains beyond the Mississippi, is smaller, with erect and narrow linear leaves, few sheaths on their white margins, and yellowish-white flowers.

2. *Juncus*, in this genus, the stems erect, simple, or in some cases branched, sheaths short; leaves long-linear; head usually red, brownish, with many small flowers, 1" - 2" wide; flowers white, or purplish-brown, in a short-hairy panicle.

125. JUNCACEAE, RUSH FAMILY.

Plants with the appearance and herbage of Sedges and Grasses yet with flowers of the structure of the Lily Family, having a common perianth of 6 parts, 3 outer and 3 inner, but grennish and glume-like. Stems 6 or 9, style 1: stigma 3.

1. JUNCUS, ovary and pod short, or almost destitute, many-seeded. Herbage smooth; stems often leafless, generally petioled.
2. LUCILA, ovary and pod destitute, with 3 petaloid placen, and one seed in each. Stems and leaves often soft-hairy.

1. JUNCUS, RUSH, BOG-RUSH. (The classical Latin name, from the verb meaning to kill, rushes being used for hedges.) Flowers summer. We have more than 30 species, chiefly in bogs or wet grounds, most of them dull-coloured and little interesting to the botanist. — to be studied in the Manual and in Dr. Kingdon's monograph. The following are the commonest.

§ 1. LEAFLESS RUSHES, with naked and jointed round stems, wholly leafless merely with sheaths at base, in loose tufts running rootless; flower in a lateral small panicle.

J. effusus, COMMON RUSH, in low grounds; has soft and pliant stems 2" - 6" high, panicle of many greenish flowers, 3 stamens, and very blunt pod.

J. filiformis, of bogs and swamps only, N. is slender, plant 1", 2" high with few greenish flowers, 6 stamens, and a broadly ovate blunt but short pointed pod.

J. Balduinus, of sandy shores N.: has very strong rootstocks, rigid stems 8" - 18" high, a loose panicle of large (2" long) and electrometrically greenish flowers, 6 stamens, and oblong blunt but pointed deep-brown pod.

§ 2. GLASSY-LEAVED RUSHES, with stems bearing greenish-flat or thread skied (as in brass) leaves, at least near the base: panicle terminal.

* Flowers crowded in heads on the divisions of the panicle; stem flattened; leaves flat; stigma 3.

J. marginatus. Sandy wet soil, from S. New England S. & W.: 1" - 3" high; leaves long-linear; heads several, brownish or purplish.

J. repens, Mary banks S.: spreading or soon creeping, 2" - 6" high; leaves short-linear; heads of green flowers few in a loose leafy panicle.

* * Flowers single on the ultimate branches of the panicle, or rarely clustered.

J. bufonius. Along all wet roadsides, &c.: stems low and slender, branching, 1" - 3" high; greenish flowers scattered in a loose panicle; sepals lance-linear and soft-petiolate.

J. Gerardii, BLAKE GRASS of salt marshes: in tufts, with rather rigid stems 1" - 2" high, and a contracted panicle of chestnut-brown but partly greenish flowers, the sepals blunted.
850 SPIDER WORT FAMILY.

J. tenuis. Open low grounds and fields, everywhere N.: in tufts, with wiry stems 10'-20' high, a loose panicle shorter than the slender leaves near it, and green flowers with lanceolate very acute sepals longer than the green blunt and narrowly pointed pod. 

J. dichotomus. Low sandy grounds, takes the place of the preceding N.: has more thread-like leaves, flowers more on-sided on the branches of the panicle, and greenish sepals only as long as the glandular and beak-pointed brownish pod. 

§ 3. KNOTTY-LEAVED BERNALIES, the stems (often branching above) bearing 2-4 thread-shaped or laterally flattened leaves, which are knotty as if jointed especially when grown by internal cross-pollinations; petal terminal. Of these there are many species, making those discriminations: the following are only the very common, especially the northern most. 

J. acuminatus. Very wet places: 10'-30' high; heads 3-10 flowers in a loose spreading panicle, greenish turning straw-colored or brownish; sepals lance-shaped, barely as long as the triangular sharp-pointed pod; stamens 3; seeds merely acute at both ends. It flowers in early summer.

J. nodosus. Mostly in sandy or gravelly soil; spreading by slender root-stocks which bear little tubers, 6'-12' high; heads few, crowded, chestnut-brown, each of 4-8 flowers; sepals lance-linear and awl-pointed, barely as long as the slender and tapered-pointed pod; seeds abruptly short-pointed at both ends.

J. spuria. From New York S.: stems rigid, 1'-3' high from a thick rootstock; heads spherical and dense, 15-30-flowered, dull pale green; sepals rigid, and shaped and beak-pointed, stamened; pod taper-pointed; seeds abruptly short-pointed at each end.

J. canadensis. Wet places, common in autumn, very variable, 10'-30' high; heads numerous, greenish or light brownish; 5-many-flowered; sepals lanceolate, the 3 outer shorter; stamens 3; seeds tail-pointed at both ends.

2. LUZULA, WOOD-RUSH. (Locals in Italian for the green rush.) 

L. pilosa. Shady banks N.: 6'-9' high, with lance-linear leaves, and achenes-brown flowers in an umbel, in spring.

L. campestris. Dry or moist fields and woods, 6'-12' high, with linear leaves, and 8-12 spikes or short heads, of light brown or straw-colored heads, in an umbel, in spring.

126. COMMELYNACEÆ, SPIDERWORT FAMILY.

Herbs with mulligaginous juice, jointed and mostly branching leafy stems, and perfect flowers, having a perianth of usually 3 green and persistent sepals, and three ephemerous petals (these commonly melt into jelly the night after expansion); 6 stamens, some of them often imperfect, and a free 2-3-celled ovary; style and stigma one. Pod 2-3-celled, few-seeded. Not aquatic, the greater part tropical.

1. COMMELYNA. Flowers blue, irregular. Sepals unguicled, 2 of them sometimes united by their contiguous margins. Two of the petals united and on shorter stalks, the other two shorter or shorter. Stamens 6-mononem: three of them larger, one of these bent inward: three smaller, with cross-shaped imperfect anthers: filaments naked. Leaves abruptly contracted and clasping the stem, and the appressed forming a sheath for the flower.

2. TRADESCANTIA. Flowers regular. Pedicels all alike, acute, sessile. The 6 stamens all with similar and long anthers, on bearded filaments.

1. COMMELYNA, DAY-FLOWER. (There were three Commelinas, Dutch botanists, two of whom were authors, the other published nothing. In naming this genus for them, Linnéus is understood to have designated the
YELLOW-EYED GRASS FAMILY.

2. TRADESCANTIA, SPIDERWORT. (Named for the gardener-botanist Traversandy.) Leaves sheathed at the base.  

- Wild species of moist or rich woods; our very common in gardens; with erect stems, lower or lanceolate bracted leaves, the uppermost nearly like the others.
- Umbels sessile at the end of the stem and branches between a pair of leaves, or later also in the lower leafy; flowering in summer.

T. Virginica. Common wild from W. New York W. & S., and in gardens; leaves lance-linear, tapering regularly from the base to the point; umbels terminal; flowers blue, in golden varieties purple or white.

T. pilosa. Chubby W.: 2' or more high, with angular stems, more or less pubescent leaves lanceolate; from a nutty-bean base, very thin terminal and axillary umbels of smaller and later purple-blue flowers, and hairy calyx and pedicels.

- Umbels one or two on a naked peduncle.

T. rosae. Sandy woods chiefly S. & W.: slender, 6'-12' high, smooth, with linear grass-like leaves, and rose-colored flowers ½' wide.

- Consanguine species from the tropics.

T. sobrina, the only one common, spreads by branching and rooting freely, rarely blooms, is cult. for its fringe; the lanceolate or oblong rather succulent leaves crenate dentate, and green or purplish above, variegated with two broad stripes of silvery white.

127. XYRIDACEAE, YELLOW-EYED GRASS F.

Rush-like herbs, with equivert leaves, like Sedges, or rather Bulrushes, in having flowers in a head or spike one under each firm glume-like bract, but with a regular perianth of 3 sepals and 3 colored (yellow) petals; also a 1-celled many-seeded ovary and pod with 3 partial placentae, somewhat as in the Rush Family, represented by

* Xyris flexuosa, COMMON YELLOW-EYED GRASS, of sandy bogs. Spike 4'-6' high; head cuneiform; lateral sepals glumae-like lanceolating, leaf-shaped, wingless; the anterior one larger, membranaceous, enveloping the summit in the bud and deciduous with it; petals 3, with claws, alternating with 3 sterile bearded or glumae-like filaments and bearing on their base 3 naked filaments with linear auricles; style ½' long.

* X. Carolina, the commonest of several Southern species; also N.: 4'-6' high, the scape 2-edged at top, bearing a larger head (about ½' long).

* lateral sepals winged but nearly naked on the head.

* X. umbriata, from pine barrens of New Jersey S.: 2' high, with oblong head almost ½' long, the lateral sepals fringed on the head.

Two former by the full-developed petals, the latter by the smaller or abortive petals. Our are branching perennial, or continued by rooting from the joints; in alluvial or moist shady soil: f. all summer.

C. erecta. From Penn. S. & W.: stems erect, 2'-3' high; leaves lanceolate, 3'-7' long, the margins toothed backwards, and shining fringed with bristles; spathes crowded, hooded, top-shaped in fruit; petal-like the others but smaller.

C. Virginica. From S. New York S. & W.: stems reeling and rooting at base; leaves oblong-lanceolate or narrower; spathes scattered, nodose-pubescent, round-heart-shaped when laid open; petal-like the others but smaller.
128. ERIOCAULONACEAE, PIPEWORT FAMILY.

Another small group of marsh or aquatic herbs, of Rush-like appearance, with a head of monocious white-bearded flowers, in structure somewhat like the Yellow-eyed Grass, terminating a naked scape, at the base of which is a tuft of grassy awl-shaped, linear, or lanceolate leaves of loose cellular texture, not equitant, but the upper surface concave.

Eriocaulon septangulare, in ponds or in their gravelly margins, is the common species N., with 7-angled scape 1'-2' high, or more, when the water is deeper: fl. summer.

E. graphioides, with grassy awl-shaped taper-pointed leaves, in pine bogs a few from N. Jersey N.

E. decaangulare, with similar or wider and blunt leaves, 10-20-ribbed scapes 1'-3' high, and leaves sometimes 1' wide; in similar situations S.

III. GLUMACEOUS DIVISION. Flowers enclosed or subtended by glumes or husk-like bracts; no proper calyx or corolla, except sometimes minute bristles or scales which represent the perianth. Stems of the straw-like sort, called culms.

129. CYPERACEAE, SEDGE FAMILY.

Some rush-like, others grass-like plants, with flowers in spikes or heads, one in the axil of each glume, the glume being a scale-like or husk-like bract. No calyx nor corolla, except some vestiges in the form of bristles or occasionally scales, or a scale which imitates a perianth; the 1-celled ovary in fruit an acorn. Divisions of the style 2 when the stamen is flatish or lenticular, or 3, when it is usually triangular. Leaves when present very commonly 2-ranked, and their sheaths a closed tube; the stem not hollow. A large family, to be studied in the Manual, &c., and too difficult for the beginner. Therefore passed over here.

None cultivated, except sparingly Cyperus excellens of the Mediterranean region, for its nut-like, sweet-flavored tubers, called CIPITA; only two are poisonous weeds, and that from their multiplying by similar nut-like tubers, which are hard to extirpate; these are Cyperus phytatheres, in sandy soil, but troublesome only S.; and C. rotundus, var. HYDRA, the Nut-Grass or Coco-Grass of the South. In the genus Scirpus, the tall COMMON BULRUSH, S. LAGESTRIS, or better the small one with 3-sided stems, S. PUNGENS, in the borders of ponds, is used for rush-bottomed chairs; CLADONIUM EFFUSUM, with its coarse saw-edged leaves is the Saw Grass of the South. Of Sedges proper (Carex) there are about 160 species, several of which contribute (more in bulk than value) to the hay of low coarse meadows and reclaimed bogs.
Grasses, known from other glaucous grasses by their 3-ranked leaves having open sheaths, the jointed stems commonly, but not always hollow, and the glumes in pairs, viz., a pair to each spikelet, even when it consists of a single flower (these called glumes proper), and a pair to each flower (called paletes), rarely one of them wanting. Flower, when perfect, as it more commonly is, consisting of 3 stamens (rarely 1, 2, or 5), and a pistil, with 2 styles or a 3-cleft style, and 2 either hairy or plumose-branched stigmas; ovary 1-celled, 1-ovuled, becoming a grain; the floury part is the allurne of the seed, outside of which lies the embryo (Lessons, p. 16, 17, fig. 38 - 42).

The real structure and arrangement of the flowers and spikelets of Grasses are much too difficult and recondite for a beginner. For their study the Manual must be used; in which the genera both of this and the Sedge Family are illustrated by plates. Here is offered merely a shorthand way of reaching the names of the common cultivated and meadow grasses and the cereal grasses.

A. Stems hollow, or even becoming so.

1. Spikelets in panicles, sometimes crowded but never so as to form a spike.
   * Flowers numbering the staminate and pistillate appearing in the same panicle.

Zizania aquatica, **U.S. or Water Rice**: in water, common
   - Stem 1 ft. tall and roundish stems, with leaves almost as large as those of Indian corn; the upper part of the short panicle bearing pistillate flowers on erect club-shaped spikelets, the lower bearing staminate flowers on spreading branches; each flower or spikelet with only one pair of glumes, the outer one long-pointed; grain slender, 1/2 long, collected for food by N. Indians. 12
   * Seeds one and perfect in each spikelet, not or without rudiments of others.

Oryza sativa, **Rice**: Cult. S. from Asia, in low grounds; 2-4 ft. high, will withstand almost the highest leaves, and the blades of the panicle erect; outer glumes minute, the inner coraceous, very much flattened internally, so as to be strongly bent-shaped or concentric, closing over the grain and holding with it, the latter one commonly bearing an ear.

AGRONOMIA AGRONOMIA, **U.S. Rice**: Rather low and delicate grass of meadows and pastures; with hollow spreading panicles of small purple or purplish spikelets; the lanceolate proper glumes thin but much firmer than the delicate paletes, about the length of the outer one, the upper truncate point one-half shorter. 2

A. A. alba, **FOSSIL or WHITE RICE GRASS**: Less abundant in meadows, the stems with prominent or creeping base; ligules long and much inconspicuous; paletes more divergent, greenish or slightly purplish; a valuable meadow grass. 2

Calamagrostis canadensis, **RICE-JOINT GRASS**: In all bogs N., and in reclamated low meadows, much thickened by stems; 2-3 ft. high; resembles an Aroma-

2. GRASS FAMILY.

C. arundinacea, **SEA SNAKE-HAIR** of beaches, where it serves a useful purpose in binding the sand by its long running rootstocks; has the panicle compressed into a long spike-like inflorescence, so that it would be sought in the woods division; leaves long and strong; spikelets pale, rather rigid, the bases of the panicles two thirds shorter than they.

**38 - 41.**
Phleum arundinaceum, **Harrow Canary-Grass**, the striped variety is the familiar *Harrow-Grass* of country pastures; wild in bogs and low grounds; 2–4 ft. high, with flat leaves nearly 3⁄8 in. wide; flowering in early summer, in a dense loose contracted panicle, but open when the florets expand; the whiteish glumes longer and much thinner than the bluish purplish palettes; a hairy rudiment or appendage at the base of each of the latter. 2

P. canariensis, **Canary-Grass**. Cult. from Eu. for Canary-seed, and running wild in some waste places; 10–18 in. high, with the panicle contracted into a sort of oblong spike, the glumes with wing-like keels, and a little scale or rudimentary sterile flower at the base of each panicle.

• • • Flowers several in each spikelet, all or nearly all perfect.

- Heads or Clumps of the borders of rivers and ponds.

Phragmites communis, **Common Reed**, mostly N.; 15–18 ft. high, with leaves 1–2 in. wide, the stems dying down in the base; panicle in late summer or autumn, loose; spikelets 3–5-flowered; base with white silky long hairs.

Arundinaria macrostachya, **Large Cane**, forming the cane-brakes of S.; with leafy stems 10–20 ft. high and leaves 1–2 in. wide, branching; the second year, at length flowering from the branches, in Feb. or March; the panicle of a few small masses of large many-flowered mixed-spikelets, the panicle downy.

A. tecta, **Smaller Reed**, S.; only 4–10 ft. high, and more branching.

Dactylis glomerata, **Orchard-Grass**. Nat. from Europe in meadows and woods: a tall and coarse best valuable grass for hay, &c.; flowers in shady places, 30 in. high; with broadly linear, rather rough, pale, and keeled leaves, and a dense panicle of one-sided clusters, on which the spikelets are much crowded, each 3–5-flowered, both the glumes and the laterally compressed-hillock lower palettes tapering into a short awn, rough-erect on the seed; fl. early summer.

Poa, **Meadow-Grasses**; several common species: known by the open panicle of 3–5-flowered spikelets, the glumes and palettes blunt (no awn or point to any term inating it!), the latter laterally compressed and deep heart-shaped, with sterile or white membranaceous edges, and usually some delicate cobwebby hairs tapering the base. Fl. summer. All but the first.

Poa annua, **Low Spear-Grass**. Very low weedy grass in fields, ground, waste places, paths, &c.; fl. in spring or again in summer.

P. trivialis, **Wine-Grass**. In gravelly waste soil; pale, with low very flat stems, rising obliquely from a creeping base; panicle small.

P. scrobata, **Foxtail-Meadow-Grass or Foxtail Reed-top**; an important native grass in wet meadows N.; flowers in late summer in a loose panicle, the 2–4-flowered spikelets green with dullpurple; lower palettes narrow, arachnoid.

P. pratensis, **Orchard-Meadow-Grass**. A common introduced meadow and pasture grass. N.; flowering before midsummer, with open palettes of green spikelets, those mostly 3-flowered, the lower palettes prominently 3-borded; leaves and leaves roughish; ligule oblong, acute. A white-striped variety, thinly introduced, is cult. for ornament and very pretty.

P. pratensis, **Common M. of woodward called Kentucky Blue Grass**. Dry meadows and pastures, spreading by running rootstocks, and with more crowded and often purplish palettes than the foregoing flowering in late summer, the glumes smooth, and ligule short and blunt; lower palettes hairy along the margins and the 5 nerves.

Poa anualis, **Kentucky Blue Grass**. Known from Poa by the former or even concous texture of the lower palettes, which is convex on this back, not cobwebby, and sometimes awn-tipped.

P. ovina, **Sheep’s Fescue**. Valuable pasture and lawn grass, 3–4 ft. high, turfed, with slender and involute pale leaves; 3–5-flowered spikelets in a short 1-flowered panicle, open in flowering, contracted afterwands, the lower palettes rolled up, almost awn-shaped and tipped with a sharp point or bristles-like awn.
P. olitius, TALLER MEADOW FESCUE. A rather rigid grass of meadows and pastures, nat. from Europe. 3½-4½ high, with green flat leaves, a narrow panicle with short branches opposed before and after flowering. 5-10-flowered green spikes, the lower pale, hairless, or acute, or nearly with a short awn. 2

Bromus, BROME Grass. Spikelets large in a length dressing in an open panicle, containing 3-15 or more flowers, the lower pale with a short bristle, or an awn from the blunt rounded tip or tooth, the upper pale sessile adhering to the grain. Course grasses; two or three wild species are common, and the following are woods of cultivation, from Europe, or the last collected for sodder.

B. secalinus, COMMON CROPS OR WHEAT. Too well known in wheatfields; scarce smooth; panicle open and spreading, even in fruit; spikelets terete; flowers broad imply over each other in the two ranks; lower pale convex on the back, concave within, orovis or short-awned.

B. recutitus, WINDY CROPS: like the other, but with narrower erect panicles contracted in fruit, lower pale almost-smooth, and smooth sometimes hairy. 2

B. mollis, SORRY CROPS: like the preceding, but soft-downy, with short central-corn-awned spikelets, and the long-waved lower pale acute. 2

B. unioloides, or B. Scoparius (CENCESHEAR CROPS): lately much prized for fodder, may be of European origin, from Russia: a low grass, with the hanging many-flowered erect-heart-shaped spikelets somewhat like those of Bromus, but pointed, very tufted, purplish, becoming dry and purplish, rustling in the wind. 2

B. montanus, LARGE GRASS OR RYE-BEAKED-GRASS, is sometimes tall, in gardens for ornament, from Russia: a low grass, with the hanging many-flowered erect-heart-shaped spikelets somewhat like those of Bromus, but pointed, very tufted, purplish, becoming dry and purple, rustling in the wind, whence the common name. 2

= = = Grain and Meadow-Grazes, with a slender twisted or bent stem on the back of the lower pale; flowers 2 or 3, or few in the spikelet, and mostly shorter than the glumes.

= Flower perfect or the uppermost rudimentary.

Avena sativa, CULTIVATED OAT, from Old World: soft and smooth, with a loose panicle of large drooping spikelets, the panicles inverting the grain, one flower with a long twilled awn on the back, the other awnless.

A. nuda, INK-SIZED OAT, rarely cult. from Old World: narrower roughed leaves, 3 or 4 flowers in the spikelet, and grains loose in the palea.

Arroserium, Avenecea, OAT-GRASS, or GRASS-OF-THE-ANDER. Rather coarse but soft grass, introduced from Europe into meadows and fields, and rather valuable: 2½-3½ high, with flat leaves, long and loose panicle, thin and very unequal glumes, including a stamina flower, the lower pale, of which bears a long blunt awn below its middle, above this a perfect flower with its lower pale bistris-pointed from near the tip, and above that a refinement of a third flower. 2

Holcus lanatus, Velvet-Grass, or MEADOW-SORRY-GRASS. Introduced from Russia into meadows, not very common, 1½-2½ high, well distinguished by its paleness and rotyness softness, being soft downy all over: panicle crowded; the flowers only 2½ in the spikelet small, rather distant, the lower one perfect and awned, the upper sessile and with a curved or hooked arm below the tip of its lower pale. 2

2 § B. Spikelets with alyxory rolled or in a panicle so contracted and dense as to resemble a spike. (Here would be sought one species of Calamagrostis and one of Phalaris, for which see above, p. 324, 355.)

= Also have long down on the back of one or two palea.

Anthoxanthum odoratum, Sweet-scented Vernal-Grass, nat. from Russia: the plant which gives delicious fragrance to drying hay (old hay,
GRASS FAMILY.

via. Hierochloa borstelii, Sanguine or Red-Grass, being rank; low, slender, soft and smooth; the pale brown or greenish spikes crowded in an evident spike-like panicle; each composed of a pair of thin very unequal glumes, above and within these a pair of ochreous or yellowish hairy empty spikelets, one with a bent awn from near its base, the other with a shorter awn higher up; above and within these a pair of very small smooth and roundish lights, of parchment-like texture, enclosing 2 stamens and the 2-styled pistil, finally invading the grain.

Allopectus pratensis, Meadow Foxtail. Introduced from Europe abundantly into meadows; E.: flowering in spring; stems about 2 ft high, bearing few pale soft leaves, terminated by a cylindrical soft and dense spike, or what seems to be so, for the spikelets are really borne on short side branches, not on the main rachis; these spikelets very flat contrary to the glumes, which are con- deform, united by their edges towards the base, keeled, fringed-elliptic on the back; these enclose a sinuous conuplicate lower palea (the upper one wholly wanting) which bears a long awn from below the middle of the back, and surrounds 3 stamens and the pistil.

- Scaevola, if any, from the apex of the glumes or palaea.

Phleum pratensis, Cat-tail Grass, Timothy, or Herb's Grass; introduced from Eu., a coarse but most valuable meadow grass, 2½-4½ high, with green roughish spike 3½-8½ long; the small spikelets are crowded on very short branches, and therefore the sessile spike is not a true one.

- Spikelets oblong crowded in a long perfectly cylindrical apparent spike, each spikelet sitting 4 flowered; glumes 2, keeled and mostly conuplicate, more pointed, much longer and of flower longer than the thin and truncate meadow palaea.

Elymus Indicus, Crab-Grass, Yard-Grass, Dog-tail, or Wire-Grass. Introduced only in yards or lawns N., more abundant S., where it is valuable for cattle; low, spreading over the ground, pale; glumes and palaea pointless.

Dactylolimum Egyptiacum, Egyptian Grass. Year-old and fields, chiefly a weed, S.: creeping over the ground, low; spikes dense and thickish; glumes flattened laterally and keeled, one of themawn-pointed, the strongly keeled boat-shaped lower palea also pointed.

- Spikelets spikelet alternately on opposite sides of a zigzag jointed rachis.

Lolium perenne, Dwarf, Ryegrass, or Ray Grass. Introduced from Europe; a good perennial-grass, 1½-2½ high, with loose spike 5½-6½ long, of 12 or more short flowered spikelets placed otherwise so that one row of flowers is next the glume, the other next the rachis; lower palaea short-awned or awnless.

- Glumes a pair to the single spikelet, right and left at each joint of the rachis.

Trisetum repens, Couch-Grass, Quick-or Quick-Grass, &c., belongs to the section with perennial roots; this spreads amazingly by its eigillars long running rootstocks, is a pest in cultivated fields, and is too coarse and
hard for a meadow grass; of many varieties, introduced from Europe; spikelets 4-6-flowered, lower pair either sterile or short-stemmed.

2. Griffith's Grass. Spikelets crowded, 4-5-flowered, tufted; glumes ventricose, blotched; palea either awned or awnless; grain free.

3. Spilota, Scutellaria. A grain rarely cult. in this country; spike flat, the Rachis fragile, breaking up at the joints; grain enclosed in the palea.

Sesquicole absconditum, Huds. 'Tall; spike as in wheat; spikelets with only 2 perfect flowers; glumes a little distant, slightly towards the base; lower palea ventricose, long-awned; grain brown.

Hordeum vulgare, Common Barley, from the Old World; spike shown, the 3 spikelets at each joint of the Rachis all with a fertile flower, its lower palea long-awned.

H. distichon, Two-rowed Barley, from Tartary, only one spikelet at each joint of the Rachis with a fertile flower, the two lateral spikelets being reduced to sterile rudiments, the flowers therefore two-rowed in the spike.

Sesamium, Linum. Sesame, or the Well-known corn-broom. Patches, or the First one sterile, P. capillare, Waveny; P. mioum (Digitaria) Bengaline, French; P. viridis, Green Foxtail or Bottle Grass; has less dense and green spike; lower bristles, and palea of perfect flower smooth; Kernels not aloof, pithy.

Sorghum vulgare, Indian Millet, Durra, or Doura, &c., from Africa or India; the Vie. Grass, Géna Corn, has densely contracted palea, and is cult. for the grain. Vie. Zambokut, Sweet Sorghum; Coecus, Sorghum Coecus, Durra, &c., cult. for the syrup of the stem; and Burren Corn, for the well-known corn-beans.
**Ears**

**Long white silky down with the flowers.**

*Saccharum officinarum*, True Sugar-Cane, cult. for S.; ruddy
left in flower, propagated by cuttings; stem 8-20 ft. high, 1-2 thicke. 2

*Gynostegium argenteum*, Pampas Grass. Tall reed-like grass, from
S. America, planted out for ornament; with a large soft of rigid long and
tapering recurved spreading leaves, several feet in length; the flowering stem 6
to 12 ft. high, in summer bearing an ample silver-silky panicle. 2

2. Spikelets in spikes: staminate and pistillate separate,

*In the same spike, the upper part of which is staminate, the lower pistillate.*

*Tripsacum dactyloides*, Indian Grass, Southern Grass. Wild in
most soil from Comm. S.: proposed for fodder S.; nutritious, but too coarse;
leaves almost as large as those of Indian corn; spike narrow, composed of a
row of joints which leak apart at maturity; the fertile cylindrical, the exter-
ernally cartilaginous spikelets immersed in the rachis, the sterile part thimber
and flat. 2

*In different spikes.*

*Zea Mays*, Maize, Indian Corn. Stem terminated by the clustered
shrubber spikes of staminate flowers (the male) in 2-flowered spikelets; the pis-
tillate flowers in a dense and many-rued spike borne on a short axillary branch,
two flowers within each pair of glumes, but the lower one neutral, the upper pis-
tilliate, with an extremely long style, the ach. 1)
SERIES II.

FLOWERLESS OR CRYPTOGAMOUS PLANTS:

Those which fructify without true flowers, that is, without stamens and pistils, and produce spores (simple cells) in place of seeds.

CLASS III. ÁCROGENS: the highest class of Flowerless Plants, those with a distinct axis, or stem, growing from the apex, containing woody matter and ducts, and bearing leaves, or something answering to leaves.

The account of the three following families is contributed by Professor Daniel C. Eaton, of Yale College. Figures of the indigenous genera are given in the Manual.

131. EQUISETACEÆ, HORSE-TAIL FAMILY.

Perennial flowerless plants, rising from creeping rootstocks; the stems mostly hollow, furrowed, many-jointed, with mere scales at the joints united into a sheath as place of leaves; either simple or with branched or whorled joints, the joints fructification in terminal cone-like spikes, composed of 3-angled short-stalked and shield-shaped scales, each bearing on the under surface about 6 one-celled sporangia. Contains but one genus.

1. Equisetum. Horse-tail, scouring-rush. (Name from the Latin equis, horse.) Stems grooved, the cuticle often containing silica; each joint closed at the lower end, and bearing at the upper a cylindrical sheath (a whorl of united leaves) which encloses the base of the next joint, and is with one as many narrow teeth as there are ridges in the stem. Scales (that is, spores) minute, each with four club-shaped threads, which are called about the sporos when moist, soon unveil suddenly when dried. - Of 28 species, most of them widely distributed throughout the world, four or five are common with us.

§ 1. Stems living through the winter, unbranched, or with very few branches, fading in summer.

E. hyemale, horse-tail, scouring-rush. Common on rocks, stems solitary or 2-4 together, cylindrical, 18-40 high, with many rough ridges; sheaths crinkled with one or two black rings, and divided into 11-20 narrow teeth, their points dentiform.

E. arctoides. Wooded hillsides, from Penn. N. stems in dense clumps, 3-4 high, not hallowed, very slender and wiry, entangled, about 1-infested; leaves 3-toothed.
§ 3. Stones cannot, not living through the water, branched, at least the sterile ones.


E. nevadense, Common Horsetail. Most sandy places, common N.; forma-stems unbranched, with very conspicuous sheaths, 4–6 high, appearing in early spring and soon withering; sterile stems 6–20 high, producing many sheaths of rather rigid slender and mostly simple 4-angled branches.

E. pyriforme, Woodhouse N. Along the edges of moist woods; fertile stems appearing in early spring, but lasting all summer, both those and the sterile ones producing many stems of spreading or gracefully drooping compound spathes 3–6-branched branches and branches; sheaths of the main axis curve, 8–14-branched.

132. FIPICES, FERN FAMILY.

Flowerless plants with creeping or ascending rootstocks, or even erect trunks, bearing distinct leaves (fronds), which are rolled up (coiled) in the bud (except in one group), and bear commonly on the under-surface or on the edges the simple fructification, consisting of 1-celled spore-cases (technically called sporangios) variously grouped in dots, lines, or masses, and containing but one kind of minute, 1-celled, powdery, numerous spores. A large family, most abundant in warm and moist regions, consisting of 8 suborders, 6 of which are represented with us.

[The divisions of a pinnate frond are properly called segments; of a pinnate frond, pinnae; of a 2–3–pinnate, frond, pinnae or ultimate segments. The wind of the frond is a stripe; its combustion through the frond, the sheath; its branches, partial or secondary sheaths. A sheath bordered by the leaflet portion becomes a scythe, which may be primary, secondary, etc.]

I. POLYPODIACEAE. OR TRUE FERNS: characterized by stalked spore-cases, having a vertical, incomplete, many-jointed, elastic ring, which straightens at maturity, breaking open the spore-case transversely, and so discharging the spores. Spore-cases rarely if ever on very narrow thread-like branches; the fruit-dots often covered by a scale-like involucre (the indusium).

 §1. No definite frondlets, but the spore-cases in large patches on the under surface of the fertile frond, or entirely covering the under surface: no indusium.

1. ACROSTICHUM & CHRYNODIUM. Fronds simple or dimly branched, with reticulated veins: spore-cases covering the whole under surface of the frond or of its upper divisions.

2. PLATYPODIUM. Fronds irregularly forked; veins reticulated: spore-cases in large patches on special portions of the under surface.

 §2. Spore-cases on the back of the frond, sometimes near the margin, in dots or lines (sorus) placed on the veins or at the ends of the veins, but without indusium of any kind.

3. POLYPODIUM. Fronds simple or pinnate, rarely twice pinnate; veins free or reticulated; fruit-dots round or triangular, at the ends of the veins, or at the point where several veins meet (conspicuous). Stalk stimulated to the root-stocks, and leaving a distinct scar when desiccated.

4. PASCOPTERIS. Agrees with Polypodium in most respects; but has the fruit-dots smaller, and commonly on the veins, not at their ends, and the stalk is not articulated to the stalk.

5. GINNORHAME. & CEROPHILUS. Fronds compound, revolute beneath with white or yellow powdery fruit-dots in long rows of staking lines on the veins.
5. NOTHOLENA. Fronds once or twice pinnate, wholly or partly hairy beneath; frondlets at the ends of the veins, forming a line next the margin of the divisions.

6. AQUAFOLIA. Frondlets at the ends of the veins, borne on the inner side of a reflected portion of the margin. Stalks thick and pointed, sometimes chaetiferous. Frondlets at the margins, distinctly divided or almost entire, but never deciduous on the fronds.

7. PETIOLES. Specimens described in a previous article except where within the reflexed margin, which connects the ends of the veins, and is covered by the reflected thin margins. Stalks thickened, reduced in a percurrent. Frondlets of ultimate segments adaxial to the fronds, often deciduous.

8. PULVILATA. Specimens at short intervals on the lower part of the veins, confluent in a sub-marginal band of frondulation, while within, more or less covered by the reflected and commonly thick margin. Stalks and petiolae, sometimes chaetiferous. Frondlets mostly distinct, sessile or nearly so.

4. Fruitlets oblong or linear, in rectangular, reticulating nodose, or veins near the middle and parallel to it, inclusion of the same shape on the frondlet, opening to the mouth and attached by the outer edge to the frondous cross-veinlet.

9. WOODWARDI. Fruitlets straight, oblong-linear, in chlamydine rows, partly sucent in slender canals of the under surface of the frond. Rarely large. Veins reticulated, often very much so.

10. DODDIA. Fruitlets oblong, often slightly coscent-shaped, not sucent in the frond. Existing, the narrow fronds pennate to simply palmate.

8. Fruitlets oblong or linear, in one or both sides of oblong medulla, with involucre of leaf sheath attached by a sheath to the nodose and from among the other.

11. ASPLENUM. Fruitlets single and placed on the upper side of the medulla, rarely chaetiferous and not bunched to both sides of the same veinlet. Veins mostly free.

12. SCHOLOGROSUM. Fruitlets linear, cuneate, double and placed free to face, almost equidistant veinlet, each pair thus seeming to be a single one with an inclining opening along the medulla. Fruit simple, ribbon-shaped or tongue-shaped, with free-fusing veinlets.

13. CAMPOGOGON. Fruitlets various, mostly short; those near the midrib double as in the last; the outer ones angled, curved or straight, simple as in Asplenium. Fruit simple, tapering to a long and narrow usually curving point. Veins reticulated.

5. Fruitlets on the back of the venus, rarely at the ends, round or rhomboidal, covered at least when young by a special inclination of the same general shape. Stalks and petiolae free or nearly so.

16. ASPLENUM. Indusium flat, round or kidney-shaped, fixed at or near the center, opening at one side. Mostly with large ferns, from one to three frondlets. Veins free in the native species.

17. GENTIANAE. Indusium ovate, fixed by the base partly under the frondlet, the length reduced. Small fern, with delicate two or three pinnate frondlets. Veins free.

6. Spirally fronds brevipedunculate; sterile ones with contracted and rolled up red peduncle or purple-leafed divisions; indusium very obscure, comprising indumentum placed at the base of a short receptacle in which the spore-ports are attached.

8. STRUTHIOPHYTA. Sterile fronds tall, with free fronds, growing in a crown; sterile fronds coming up much later in the season than palmate, each plant, as in the fronds, bearing a frond, which is a young frondlet, usually forming a tuft, with the fronds in a cluster near the top.

8. GONOCALA. Fronds scattered on a long creeping rhizome; sterile ones with intermittent veins; sterile ones twice pinnate, the divisions contracted, rolled up and berry-like.

8. Intermediae axile-alveolar, with brevipedunculate and red spore-leafed divisions, placed on the veins, the same division often forming a tuft, with the fronds, sterile ones twice pinnate, the divisions contracted, rolled up and berry-like.
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FERN FAMILY.

§ 9. Fruits dots separate or laterally confluent at or near the margin of the frond, borne on the ends of the veins, or on the ends of very short side veins; the inclusion attached at the base or base and sides, and opening toward the margin of the frond or portion of the frond.

20. DAVALLIA. Inclusions of a single plane, flatish or often convex and shaped like half a pocket or longitudinal. Exotic Ferns, mostly composite.

21. DICKSONIA. Inclusions united by its sides, with a little hole or tooth of the frond, forming a minute, nipped cup, at first not at times closed, opening in the spore-case entire. Large Ferns, native or exotic, some of the latter annuals.

II. CYATHACEAE, OR TREE FERNS: with erect and tree-like stems, often many feet high. Fruit dots nuted, not marginal, naked, or with an involucre placed below the stalked spore-cases, which are seated on a globose or elevated receptacle, have a somewhat oblong, complete ring and burst open transversely.

23. CYPATEA. Fruit dots on a vein or in the fork of a vein, at first enclosed in a globose involution, which opens at the top, and remains cup-shaped or entire or broken edges.

25. ALISOPILLA. Fruit dots in the last but entirely naked, or with a radiate, vesicular, incomplete rim remaining of a minute scale beneath the spore-case; velum free.

III. HYMENOPHYLLACEAE, OR FILMY FERNS: these have very delicate and thread-like fronds, the short-pedicelled spore-cases growing on a short or long thread-like receptacle, included in a pocket-shaped or 2-lipped involucre, and furnished with a complete transverse or slightly oblique ring.

24. TRICHOCEROS. Fruit dots marginal, at the end of a vein, which extends through the frond itself or pocket-shaped involucre, as a thread-like receptacle bearing the spore-cases; involucre sometimes more or less on the frond, and of the same plant-like texture.

IV. SCHIZACEAE: mostly small Ferns, or else with climbing fronds. Spore-cases ovate, sessile, having a complete transverse, articulated ring or cap at the apex, and opening by a longitudinal slit.

26. MILKMAID. Spore-case in a double row on the lower division of a pinnate or rarely pedate single spore-case of the frond, and sometimes many-forked frond.

V. OSMUNDACEAE, OR FLOWERING FERNS: the spore-cases covered with reticulated, ridged, opening longitudinally into two valves, and without ring, or a mere vestige of a transverse ring at the back.

27. OSMUNDA. Rootstock very thick, creeping, the growing and sporulating stem of tall showy Ferns. Fertile fronds or parts of fronds 3-celled, pinnately compound, the narrow often thread-like divisions densely covered with minute exilian spore-cases.
VI. OPHIOGLOSSACEAE, theadder's-tongue family: mostly rather small ferns, with seminal, glochidial, coriaceous opaque and smooth spore-cases, opening transversely into 2 valves, and wholly destinate of a ring. Ferns not rolled up in the bud, as they are in all the foregoing, rising from a very short rootstock or corn, with fleshy rosette.

28. BOTRYCHIUM. Spore-cases in pinnate or compound spikes, distinct. Sterile part of the frond compound; prime tree.

29. OPHIOGLOSSUM. Spore-cases bearing in a simple spike. Sterile part of frond simple in one species; the veins sulcate.

1. ACROSTICHUM § CHRYSTodium. {From Greek words meaning a root at the top, the application not evident.) All pinnate.

A. acrum. A large evergreen Fern, along the coast of South Florida: the fronds simply pinnate; coriaceous; pinnae 4' - 8' long, 1' - 2' wide, elliptical or oblong-lanceolate.

2. PLATYCEPHALUM. STAG-HORN FERN. {Name from the Greek, meaning broad horn.) A native of Africa, Australia, etc.: cult. in conservatories.

P. aliocerme. Sterile fronds sessile, rather thin, flat and rounded, over-lapping each other; fertile ones erect, 1' high, whitish and minutely downy beneath, 2 - 3 times forked, with divisions about 1' wide, the topmost ones fruit-lie.

3. POLYPodiUM, POLYPODIUM. {Name in Latin means many-rooted, referring to the branching rootstock.) An immense genus, found in all parts of the world.

§ 1. POLYPodium proper. Veins free: the following all native.

P. vulgare. COMMON POLYPodium. Rocky places N., small, simply pinnate, evergreen; smooth both sides, 4' - 10' high, 1' - 3' wide, the numerous divisions oblong-lanceolate; fruit-dots rather large.

P. inopinum. Shady places S., often on tree trunks; much like the last, but much smaller, and beneath grayish and scaly with paler scales; fruit-dots rather small.

§ 2. CONVOLUTum. Veins parallel, pinnate from the midrib, connected by numerous transverse irregularly arched veins, with short fruit-bearing veins proceeding from the apex.

P. Phyllitidis. HARE-TONGUE, of Tropical America: frond simple, lanceolate-lanceolate, 1' - 18' long, 1' - 2' wide, thinly coriaceous, smooth and shining; fruit-dots in 3 rows between the veins.

§ 3. Niphophila. Veins much as in the preceding, but very obscure and deeply reticulated. Fronds simple, of a thistle-like texture, covered on both sides with a close stellate down.

P. Lingua. Cult. from Japan: fronds 4' - 8' long, ovate-oblong or lanceolate, entire, at length nearly smooth above; fruit-dots exceedingly numerous, closely arranged in many rows.

§ 4. Pinnata. Veins reticulated, with free veins included in the larger veins. Fronds in 1 - 3 rows between the midrib and margin, commonly placed near one on the recurving axis of a pair of midrib.

P. aureum. A large showy Fern of Florida, and cult. from West Indies: fronds on a stout stalk, broadly ovate in outline, smooth, pale green above, glaucous beneath, pinnately parted into 5 - 9 or more oblong-lanceolate or lanceolate-pinnatifid divisions.
4. GYMNOCYMMM. (Name meaning in Greek a naked line, from the elongated fronds.) The following cult. species all have free roots, and the under surface of the fronds covered with a yellow or whitish waxy powder.

G. triangulata, California Gold-pen. Deserves more general cultivation; from 4' - 8' long, on slender and yellowish stalks; broadly 6-8-rayed, rounded, twice pinnate below, pinnate above; pinnae oblong-longs-

olate, deeply pinnatifid into obtuse lobes. Spreads and grows above, beneath of a rich golden yellow, sometimes purple; the fertile fronds at length nearly covered with brownish lines of spor-cases.

G. sulphurea, of West Indies; fronds narrowly lanceolate in outline, 1'-1½' long; midribs sparse, 2'-3' wide; pinnae midribs or thread-like, lower ones gradually smaller and very remote, pinnatifid into acute obtuse toothed or ragged lobes, the lower surface covered with sulphur-yellow powder.

G. cajete, from Tropical America, the commonest Gold and Silver form of the conservatories; much like the last, but broader and larger, the lower pinnae larger, and lobes more acute. The powder white, or in var. contraptylla golden yellow.

5. NOFHELENA. (Name from the Greek, signifying species used, the whole panicle of some species covering the marginal frondlets.) The following cult. species are small, 4'-8' high, erect in outline, mostly tri-whorled; their ultimate divisions romulicolour or oblong; distinct, united, and covered beneath with a waxy coating: stalk and branches dark brown and polished.

N. flavens, from Central America; powdery bright yellow; frond-dots extensively from the edges almost to the middle, so that it might equally well be considered a Gymnocadium.

N. nivis. Also Central American, and very like the last; but the powder snowy white, and the frond-dots closer in the margin.

6. ADiantum. MAIDEN-HAIR. (Name from the Greek, meaning smooth, the raphides not adhering to the fronds.) A large genus, most abundant in warm climates.

- Fronds simply pinnate: acute.
  A. macrophyllum. Cult. in hot-houses from West Indies; pinnate 2-3 pairs and a terminal one, nearly sessile, deltoid-ovate, 2'-3' long, nearly half as wide; frondation in long marginal rarely interrupted lines. Pinnae of sterile fronds wider and somewhat revolute and toothed.
  • Fronds 2-4 times pinnate, acute-lanceolate in general outline.
    A. Capillus-Veneris, VENUS-HAIR, as named from the shining capillary branches of the radicle; native S., often in conservatories N.; two pinnae or three pinnae at the base, the long upper part simply pinnate; pinnae about 3' broad, on very slender stalks, sharply wedge-shaped at the base, rounded at the top, or rhomboidal, commonly deeply lobed from the upper margin; frond-dots to each side; involucres kidney-shaped or transversely oblong. Plant 6'-12' high, often pendent from damp shaded rocks in the months of July, Aug., and Sept. in S. of Europe.

A. Ethyopium, as commonly seen in hot-houses, is much like the last; but has smaller pinnae not so sharply wedge-shaped, often broader than long, and less deeply lobed; frond-dots in deep-margins of the upper margin; involucres kidney-shaped or crescent-shaped.

A. cupreatum, from N. America, is a much larger plant, broadly triangular in outline, 3'-4' long; pinnae smaller and very numerous, wedge-shaped at the base, the upper edge deeply lobed; frond-dots as in the last.
  - Fronds usually forked, with elongated simply pinnate divisions springing from the upper side of the two recurved branches: midrib of the pinnate none.

A. pedatum, MAIDEN-HAIR. Native in shady forests; whole plant smooth.

15 of which include varieties.

Next slide: subterminal divisions 0'-1/2' long. 1'-1/2' wide; raphides numerous, very
FERN FAMILY.

numeroso, oblong, broadest at the base, obtuse, lobed from the upper edge; fronds at the top of the helix; division unstriped, usually oblong or linear.

A. haematomus, from Australia, &c. - commonly less symmetrical than the last, with young irregularly 3-branched; a smaller plant with finely claviiform or basally wavy and rachis; pinnules minutely hairy, nearly entire; frills often extended along the upper margin, involucre rounded kidney-shaped.

7. PTERIS, BRAKE. (The ancient Greek name for Ferns, meaning a stay, from the feather-like fronds.) Another large and widely distributed genus.

§ 1. Venae free: sinu straminea or trunnate.

* Frond simply pinnate; pinnula undivided.

F. longifolia. Culf. from warm regions, native in S. Florida: oblong, lanceolate in outline; pinnules numerous, linear and tapering from a truncate or cordate base, the upper and lower ones gradually smaller.

- * Frond pinnate, and with the lower pairs of pinnule forked or again pinnate, the divisions and upper pinnule simplicipinnate, simple.

F.昶icaria. Culf. from warm climates, native in Florida: 1 - 2" high; pinnule 1 - 4 pairs, the upper ones slightly decurrent, lower ones cleft almost to the base into 2 - 3 long linear-lanceolate acuminate divisions; sterile ones and tips of the narrower forked pinnules finely and sharply serrate. Var. Albo-ciliata has a white edge in the middle of each division.

F. aequilata. Cult. from China: 1' - 1½ high; pinnule 3 - 8 pairs, all but the lowest decurrent and forming a wing 3" wide on the main rachis; lower pairs primarily or pedally cut into several narrow linear-acuminate divisions; upper ones simple; sterile ones spinulose-acuminate.

* * * Frond pinnate, and the numerous primary divisions plumose into many lobes, the lowest ones mostly with 1 - 3 elongated similarly-shaped branches on the lower side.

F. quadriaurita. Cult. from East or West Indies, &c.; fronds 1 - 2' long, 6 - 12" wide, broadly obovate in outline; lobes of primary divisions linear-oblong, 1' - 1½ long, ½" wide, very numerous and often crowded, mostly rather oblong. Var. ocllaria has a band of white along the middle of the primary divisions; in this is added a ting of red in var. Tropicola.

* * * Fronds broadly triangular, main or those pinnate throughout; lowest primary divisions hastilatif.

F. aquilina, Common Brakte. Plentiful everywhere, 1' - 3' high, harsh to the touch; the lowest primary divisions ending obliquely forward; secondary divisions plumose with more or less large lanceolate bases; which in a fruiting frond are bordered everywhere with brown spores.

§ 2. Dorsiflexae. Fronds finely reticulated; frond pinnate, and branched; stalk thick and oblong.

F. podura. Cult. from West Indies and S. America: frond 4 - 6' long and nearly as wide, almost parted into a few primary divisions; upper ones entire, lowest pair again cleft; the lobes on the lower side much largest.

8. PELELEEE, CLIFF-BRAKE. (Name from the Greek, meaning dark-coloured, descriptive of the stalk.) Mostly small Ferns; the following species have fronds of a somewhat curvifrons texture.

F. rotundata, from New Zealand: frond narrow, 6 - 12" long, on a short, and pubescent, wavy stalk, simply pinnate; pinnule round or rounded-oblong and entire; hand of sporecases very wide and concealing the narrow involucre.

* F. airocappsoides. With, on shaded sunny parts, fronds obtuse, 6 - 10" long, 4 - 5 wide, with pubescent and sparsely downy stalks, 3-pinnate, simply pinnate towards the lower pinnules: distinct, oblong or ovate-oblong, rarely banded, simple or slightly compound; involucres rather broad, and at length hidden by the sporecases.

F. haematoidea, from South Africa: mostly larger than the last and very variable; frond ovate-lanceolate or oblong; 1 - 8-nitrate; pinnules lanceolate or
Plumefern, very often hallowed-shaped, the end ones of the primary pinnae much the largest, often 1' - 3' long and 1' - 4' broad; stalk and pinnae black and polished, smooth; sternals rather narrow.

9. WOODWARDIA, CHAIN-FERN. (Named in honor of Thomas J. Woodward, an English botanist of the last century.) A small genus of rather large Ferns, all natives of the N. temperate zone.

W. Virginica. Tall, growing in swamps N & S.; sterile and fertile fronds alike, ovate in outline, pinnate, with horizontally deeply pinnatifid pinnae; lobe oblong, obtuse; vein articulate, forming a single row of meshes along the midrib of pinnae and of lobes, the outer veinless free; fruit-dots oblong, close to the midrib.

W. angustifolia. Range, k.c. of the last, but less common: fronds 6' - 10' long, 4' - 6' broad, pinnatifid almost to the winged rhachis into 17 - 37 lobes, which are broadly lanceolate and with coarsely reticulated vein in the sterile frond, but are narrowly linear in the fertile, and with a single row of narrow meshes next the midrib; fruit-dots linear, small-ovate, one in each mesh.

10. DOODIA. (Named in honor of Samuel S. Doodie, an early English Crypto-phyta botanist.) Small Ferns, cult. from Australia and New Zealand.

D. caudata. Fronds 9' - 15' long, linear lanceolate, on dull black nearly smooth stalk; pinnate with many linear sori and nearly ciliate pinnae, which are about 1/3 long, often slightly sigmoid at base, the lower ones rather triangular, distinct; fruit-dots in a single row next the midrib.

D. aspera. Stalk black and rough with small rugose points; fronds broadly lanceolate, rather ciliate, harsh to the touch, pinnatifid in the frond; dorsal crowded, oblong-linear, spinulose-serrate, lower ones gradually smaller; fruit-dots not close to the midrib, sometimes a second row next the margin.

11. ASPLENIUM, SPLEENWORT. (Name from the Greek; refers to supposed action on the spleen.) A very large genus, the size of the species ranging from quite small up to very large and even tree-like.

§ 1. Fronds undivided, large and showy; cult. from East Indies, k.c.

A. Nidus, Bird's-nest Fern. Fronds numerous, broadly lanceolate, 2' - 4' long, 4' - 8' wide, entire, short-stalked, arranged in a crown around the central upright rootstock; fruit-dots very narrow, elongated, crowded, running from the stem midrib obliquely half-way to the margin.

§ 2. Fronds small, pinnatifid below, tapering into a long entire point, native.

A. pinnatifidum. Very rare, near Philadelphia, and sparingly W. & S., especially along the Alleghenies: fronds 3' - 6' long, 1' - 1 1/2' wide at the base; lobes roundish-ovate nearly obsolete; fruit-dots small, irregular.

§ 3. Fronds simply pinnate.

* Small Ferns, 4' - 15' high: all except the last are wild species.

A. Trichomanes. Common, forming dense tufts in crevices of shade; rocks: fronds linear, 4' - 8' long, with black and shining stalk and rhachis, sec many rounded or oblong, slightly crenated or entire pinnae, about 4' long and about half as broad; fruit-dots few in each pinna.

A. ebbenham. Common in rocky woods: fronds linear-lanceolate, nar rower at the base, 8' - 15' long, 1' - 2' wide; stalk dark and polished; pinnae many, linear-oblong, often slightly curved, finely serrate, articulated on one or both sides at the base; fruit-dots numerous.

A. Saphilobium. Cult. from Australia: lax, the rhachis often protruding and rooting at the very end, fronds linear; pinnae sharply wedge-shaped at the base, the broad and rounded end crenated; fruit-dots irregularly round

* * * Large Ferns, 15' - 30' high.

A. angustifolium. Rich woods S. and S., mainly along the mountainous fronds thin, long-lanceolate, pinnae many 3' - 4' long, linear-lanceolate, HABO
truncate or rounded base, acuminate, nearly entire; those of the fertile fronds narrowly ovate; fruit-dots slightly curved, very numerous.

§ 4. Fronds more than very pinnate.

* Fruit-dots more than one in each smallest division of the frond.

A. Rusa-muraria, WALL. On exposed cliffs of limestone, from Vermont W. & S.; fronds small, 1'-4' long, ovate, twice or three pinnate, the five divisions rather thickish, wedge-shaped or rhombic, toothed at the top; fruit-dots few, forming confluent.

A. furcatum. CULP FROM TRIP, AMERICA, N. Africa, etc.; fronds 8'-15' long, 4'-6' wide, on a somewhat hairy stalk, costate-acuminate, pinnate with lanceolate acuminate pinnae, which are again pinnately cut nearly or quite to the midrib; divisions oblong, wedge-shaped, minute, serrate, rather coriaceous, deeply toothed by the forked rachis; fruit-dots elongated, radiating from the base of the division.

A. thalpyrroides. In rich rocky woods, not rare; fronds 1'-3' high, thin in texture, broadly lanceolate, pinnae; pinnae 2'-6' long, lanceolate, deeply pinnatifid into closest oblong and obtuse minutely toothed lobes; frond 6'-12' in each loco, some of them commonly double.

A. Felix-fenestra, LADY-FERN. Common in moist woods; fronds large (2'-3' high, 1'-2' broad), growing like the last in a crown, 2'-4' pinnate; pinnae lanceolate, with a narrow border to the secondary rachis; pinnae oblong and sharply serrate, or in larger plants lanceolate and pinnatifid with incised lobes; fruit-dots short, variously curved, at length confluent.

* Smallest division of the frond narrow, entire, containing but a single rudiment and but one frondlet.

A. Bolanderi. Cult. from Malaya and Java; fronds 10'-14' high, 2'-8' wide, corrugate, pale green, as is the smooth stalk; pinnae oblong, truncate at the base, with a rounded apex, pinnatitudinously divided into numerous narrowly oblong and obtuse lobes, the upper lateral ones of such pinna 2'-3' long, the rest entire and bearing on the sole face along the main rachis a solitary elongated fruit-dot.

A. myriophyllum. Lime-caves in Javan Ce. Florida; fronds 8'-20'; almost transparent, lanceolate, 6'-9' long, 1'-2' wide, 2'-3-pinnate; smallest divisions oblong-oblong, 2'-3' long, 1' wide; fruit-dot in the lower half of each division.

A. bulbiferum. Cult. from New Zealand, etc.; fronds herbaceous, shiny, broadly lanceolate, 10'-30' long, 6'-12' wide, 2'-3-pinnate, often producing broad bases, on the upper surface; pinnae triangular-lanceolate, with a broadly winged apex; pinnae lanceolate, deeply toothed or cut into oblong-linear lobes; fruit-dots extending from the middle of the bases downward almost to the midrib of the pinnae.

12. SCOPOLPENDRUM. (Name from the Greek word for a stopper, suggested by the many oblique lines of fruit such side of the mightly.)

S. vulgaris, Hart-fohcer. Rare, among scattered rocks in Central New York and in Canada West; fronds 6'-10' long, 1'-2' wide, oblong-lanceolate with a heart-shaped base, herbaceous, the margin entire or wavy. Cultivated forms from England are clipped, rounded, many-tailed, etc.

13. CAMPTOSORUS, WALKING-LEAP. (Name from the Greek, meaning a beast leaping, referring to the curved and angled fruit-dots.) Almost the only species is

C. rhaphophyllum. Bom many rocks N. & S., mainly along the mountains; fronds 8'-12' long, appearing on a heart-shaped and revolute base 6'-12' wide, a long narrow point, which often revs at the end, and there gives rise to a new plant ready to take another step in advance.

14. PLEUROPTERIS, BEECH-FERN (which the name means in Greek, the original species often found among beeches). Chiefly resolve; but the wing are all wild species in rocky or shady woods.
9'-12' wide; pinnate oblong-rounded, broadest about the middle, and sending out

P. polyomoides, formerly POLYPODIUM PERSOPIERNERI. Common N.; fronds 4'-5' long, larger than broad, triangular-oblong, slightly hairy h以後; pinna lanceolate, the lower pair turned obliquely forwards; secondary divisions enchanted, obtuse, obtuse, entire; fruit-dots all near the margin.

P. hexagonoptera. Common N. & S.; larger than the last, which it much resembles, but the fronds to broader than long; lowest pinnae much the largest and with elongated and pinnatifid divisions; fruit-dots not exclusively near the margin.

* * *

Fronds bear their primary divisions, which are much divided, rhachis whitish.

P. Dryopteris. Common N.; fronds broadly triangular, 4'-6' wide, smooth; the three primary divisions triangular, once or twice pinnate with oblong or entire lobes; fruit-dots near the margin.

15. ASPIDIUM, SHIELD-FERN. (Greek for a little shield, referring to the indusium.) — A very large genus, inhabiting all parts of the world.

§ 1. HEXAPLOIDAE. Indusium round-sided, obovate, or nearly circular with a maximum shift from the lower side inwards toward the center.

A. Sioboldii. Cult. from Japan; fronds continuous, entire, about 10' high, with 4 or 5 pairs of side-pinnas, each 2'-3' long and nearly 1' wide, and a terminal one rather larger than the others; veins with 4-6 free parallel branches; fruit-dots large, scattered in several rows.

** A. Sieboldii. Cult. from Japan; fronds continuous, entire, about 10' high, with 4 or 5 pairs of side-pinnas, each 2'-3' long and nearly 1' wide, and a terminal one rather larger than the others; veins with 4-6 free parallel branches; fruit-dots large, scattered in several rows.

A. Thelypteris. Fronds lateral, 10'-16' long, on slender stalks, nearly smooth; pinnae lanceolate, 3'-4' long, about 1' wide, spreading or turned down, the lower pair somewhat shorter; divisions oblong, bearing scars seeming to come from the revolute margins; veins mostly forked; fruit-dots common along the rachis; indusium smooth.

A. Noveboracense. Much like the last, but hairy beneath along the rhachis and vein; fronds tapering both ways from the middle; lower pinna close to 1' long, with 4 or 5 pairs of side-pinnas, or' 1' wide, numerous, lanceolate from a broad base, lowest pair a little smaller; divisions oblong, slightly falcate, obtuse or acute; veins mostly forked; indusium slightly glandular.

A. patens. Low shady grounds, Florida and W.: fronds 4'-6' high, sparsely pinnate, ovate-oblong; pinnae 3'-6' long, 1' wide, numerous, lanceolate from a broad base, lowest pair a little smaller; divisions oblong, slightly falcate, obtuse or acute; veins mostly forked; indusium slightly glandular.

A. mollis. Cult. from tropical countries; very rare in the last, but everywhere strong and soft-berry; pinnae has deeply lobed; lobes obtuse; lower pinnae (1 or 2 pairs) united with the corresponding ones of contiguous lobes and ending out a ray-like veinlet to the sinus; indusium very hairy.

A. Gymnosporangium. Rich moist woods N.; fronds broadly ovate, 3'-4' high, 9'-12' wide; pinna oblong-lanceolate, broadest about the middle, parted to the
midrib; division very numerous, nearly 1"-long, somewhat seriate-shaped, rugose above, obscure with incurved teeth; frondlets very near the midrib.

A. cristatum. Wet places in woods, common; fronds narrowly oblong, 1½–3½"-long, ½–1½"-wide, rather rigid, erect; some triangular-shaped, base at base, division almost to the midrib, division not many, oblong or oval, entire, their surfaces the largest ones sometimes toothed or pinnatifid-based; frondlets by 6–8 between midrib and margin. — Var. cristatum, in swampy woods, N. is very much larger every wet, with frondlets nearer the midrib, and is often mistaken for A. Goldiei. — Var. fulvifrons, in wet woods N., has the lower pinnae triangular-lanceolate and sterile, but the upper ones forked, narrower and longer, with very short oblong rather distant divisions, which are discerned on the winged secondary rachises, which are

do not hallucinate.

— — Fronds imperforately serrate, twice or thrice pinnate; the division cut-topped or rounded; frondlets not near the margin; indusium rather small, withering away.

A. spinulosum. Shady woods, very common N.; fronds thin, oblong or oval; pinnae oblong-lanceolate, the lower ones broader and somewhat triangular; pinnae very numerous, oblong-ovate, pinnatifid-based, the oblong bases with triangular teeth toward the end; indusium smooth or minutely glandular at the margin. — Has several forms. — Var. otochrysum in mountainous places, N. is larger, broader in outline and commonly less many pinnae; pinnae of the lower pinnae greatly elongated. — Var. Botryum, in swampy woods N., is 2½–3½"-high, of narrow outline, rarely very pinnate, with oblong-ovate toothed pinnae, or the lower ones pinnatifid. — It runs apparently into A. cristatum.

— — Fronds fully grown, thickish, about twice-pinnate; frondlets near the margin; indusium thickish, covered, pertandent.

A. marginale. Rocky woods, common; fronds 1½–2½"-long, more or less oblong, bluish-green, the stalk very chaffy; pinnae lanceolate, 5–8½"-long; pinnae oblong, often curved, entire or obtusely toothed, attached by a broad live to the narrowly winged secondary rachises; frondlets close to the margin, rather large.

§ 2. POLYSTICHIN. Fronds arborescent, pilose, attached by the centre to a short stalk; much lacking, free; well suiting of the country.

A. acrostichoides. Rocky woods, common; fronds 1½–2½"-high, growing in crowns, with chaffy rosettes and stalks, evergreen, shining, lanceolate, simply pinnate; pinnae numerous, oblong-lanceolate from an unequal half-halfelliptical base, serrate with trilobed teeth, rarely incised, upper ones of the fertile fronds smaller and bluing coryniform eosin confluent frondlets.

§ 3. DICTYOPHOR. Indusium as in § POLYSTICHIN. Fronds more pinnate; outer pinnae from the midrib, pinnate branching, the pinnae reticulated and forming arched ovate side 1–2½"-long; entire rachises rising from the body of the arch; scaly.

A. falcatum. Collected from Japan; fronds 1½–2½" high, 5½–9½"-wide, base of stalk chaffy with large scales; pinnate thick and shining, and one large and rhomboidal or half-oblong-shaped, one or two or many, oblong-ovate, long-pointed, nearly entire, lower side of base rounded, upper side oblong or slightly narrowed; frondlets in many rows on all or nearly all the pinnate.

16. CYSTOPTERIS. (Greek for Bladder Fern, alluding to the thin, sometimes inflated indusium.) Species few, mostly Northern.

A. fragilis. shady or moist rocky places, common N.; fronds very divided, 4½–8½"-long, with shaggy scales, oblong-ovate, very pinnate; pinnae with narrowly margined rachises; pinnae oblong or oval, toothed or incised, very variable; indusium pointed at the upper end.

A. bifurcata. Wet places, often in ravines, from N Carolina N.; fronds 1½–2½"-high, 3½–5½"-wide at the base, narrowed above and much compressed, very pinnate, bearing scurred half-elliptical indusia, pinnae oblong, blunt, toothed or incised; indusia roundish, truncate on the upper side.
17. STRUTHIOPTERIS, OSTRICH-FERN (which the name means in Greek, from the large plume-like sterile fronds).

S. Germánica. Allevial grounds, N.; sterile fronds tall, 2° - 3° high, lanceolate, narrowed at the base into a short angular stalk, pinnate; pinnae very many, narrow lanceolate, pinnatifid more than half-way to the midrib; lobes not munus, oblong; fertile fronds very much shorter, blackish, standing erect after the others have withered.

18. ONOCLEA. SENSITIVE-FERN. (Name, from the Greek, meaning a closed vessel, referring to the berry-like fructification.) The only species is O. sensibilis. Common in wet places; sterile fronds of all sizes up to 2° high, broadly triangular-ovate, the blade whiplash; pinnae not many, lanceolate, entire or obscurely lobed less than half-way to the midrib; veins everywhere reticulated; fertile fronds with few closely appressed pinnae.

19. WOOD SIA. (For Joseph Wood, an English botanist.) W. obtusa. Rocky places, from Carolina N.; fronds 6° - 18° high, slightly glandular, broadly lanceolate, pinnate with ovate or oblong deeply pinnatifid or again pinnate divisions; lobes oblong, obtuse; indusium at first closed, opening into a few rugged lobes.

W. Irvinea. Exposed rocks, common N., and along the Alleghenies; fronds large; fronds 4° - 6° high, very clavate beneath, oblong-lanceolate, pinnate; divisions ovate, obscurely lobed; indusium obscure, consisting of a few pointed hairs.

20. DAVALLIA. (Named for M. Davall, a Swiss botanist.) Many tropical or subtropical species, the following cul. in conservatories.

D. Canariensis, Hahn's-Foot-Fern, from the Canaries, etc.: rootstock creeping along ground, covered with brownish scales, and lacking not unlike an animal's paw; fronds few, smooth, broadly triangular, 6° - 10° long and about as wide, 3° - 4-pinnate; pinnae cut into a few narrow lobes; those are directed upwards, bearing at or just below the end a single fruit-dot; indusium whitish, deeply half-cup-shaped.

D. tenuifolia, from India and China: rootstock creeping, crepit with short clavate bases; fronds smooth, 1° - 2° high, broadly lanceolate, 3° - 4-pinnate; smallest divisions narrowly wedge-shaped, bearing at the truncate ends one or two fruit-dots; indusium brownish, mostly broader than deep.

21. DICHEONIA. (For James Dickson, an English botanist.) The species all but one tropical or in the southern hemisphere.

D. punctûbula. Most shady places, from Carolina N.; rootstock creeping, slender; fronds scattered, thin, minutely glandular, pleasantly odor-ous, lanceolate, long-pointed, 2° - 3° high, mostly bipinnate; pinnae pinnatifid; the divisions toothed, each bearing a minute fruit-dot at the upper margin; indusium glandular.

D. antarctica. Tree-fern from New Zealand, a great ornament in large conservatories; trunk 5° - 8° thick, sometimes many feet high, bearing in a crown at the top many fronds, 6° - 8° long, 2° - 3° broad, concave, twice pinnate; pinnae oblong, acute, pinnatifid; the oblong-ciliate divisions bearing 1 - 4 rather large fruit-dots; indusium plumose, plainly two-valved.

22. CYATHEA. (Name from the Greek word for a small cup, referring to the involucres.) Tree-ferns from tropical countries.

C. arborea. Rarely cul. from W. Indies: trunk sometimes 30° high, stalk mostly light-brown, and without prickles or chaff; fronds 4° - 10° long, bipinnate; pinnae 1° - 3° long, 6° - 8° wide, lanceolate; pinnae narrowly lanceolate, spreading, pinnatifid to the midrib; lobes oblong, slightly acute, with 4 - 5 pinnules near the midrib; involucres beautifully cap-shaped, the margins entire. — Several other species, as well as one or two of the allied pinnates Ima-tria (with an imperfect involucres, veins often partly reticulated), are rarely seen in conservatories.
23. ALSOPHELA. From Greek words meaning slow-growing, the species growing in tropical forests.

A. aspera. Rarely cult. from W. Indies; trunk 6'-8' high; stolons prickly, clustered at the base with pale, narrow scales; fronds 6'-8' long, 2'-3' wide, bipinnate; rhizome hairy above; juvenile elongate-ovoid; pinnae very many, lanceolate, pinnaed almost to the middle; leaves obovate, curved, acute, obtuse; frondlets 8'-10' to a leaf; indument a thin scale on one side of the fruit-dot, often disappearing with age.

A. pruinata, from S. America, is sometimes seen; a much smaller plant; rootstock short, clustered with bright-green roots; fronds smooth, green above, pale and glaucous often almost white beneath, bipinnate; pinnae deeply toothed; frondlets solitary at the base of each tooth; spore-case mixed with wooly hairs.

24. TRICHMOMANES. An ancient Greek name of some Fern, referring to the hair-like stipes. A large group; all of the species tropical.

T. radicans. On dripping rocks, Alabama and Tennessee, very rare; fronds pinnatifid, 4'-5' high, the stalk and rhizome narrowly winged, lanceolate, pinnae with 1-2-pinnatifid ovate pinnae; laminae on short petioles, funnel-shaped, with long exserted receptacles. A larger and more compound form from Killarney, Ireland, is grown in W. Indies cases.

25. LYCODIUM, CLIMBING-FERN. Name from a Greek word meaning flax, alluding to the running and climbing fronds.

L. palmatum. Low-shady woods, rather rare; smooth, slender, and delicate, 2'-4' high, extended among herbs; pinnae broader, 1'-2' wide, deeply heart-shaped at the base, palmately 3-7-forked, upper pinnule decomposed and recurved.

L. japonicum. Conservatory plant from Japan; climbing 10'--12' high, emerald; pinnae acute, 5'-9' long, bipinnate; divisions create-lanceolate, often half-set-shaped; divisions of the upper pinnae becoming with narrow fertile lobes.

26. ANEMIA. (Name from the Greek, meaning without moving, alluding to the naked spore-cases.) Mainly tropical.

A. phyllitidis. Cult. from S. America; 12'-18' high, has the two lower pinnae long-stalked, narrowly-ellipticate, 3-4-pinnate, fertile; middle portion of the frond sterile, simply pinnate; lower lanceolate, finely serrate.

A. adaptipes, Native in Key West, Florida; with lower pinnae in the leaf, middle portion sterile, 3-4-pinnate; pinnae long-pinnate; divisions ovate-oblong-shaped, entire or serrated at the end, with five veins forked from the base.

27. SCHIZEA. (Name from the Greek verb, which means to split, referring to the many forked fronds of certain tropical species.)

S. puflata. Wet sand, in pine woods of New Jersey; sterile fronds very slender, flattened, simple and linear, 8'-9' ny; fertile ones similar, but stouter, 2'-3' high, bearing at the top the fertile portion, 2'-3' long, composed of about 3 parts of minute pinnae.

28. ORMUNDA, FLOWERING FERN. (Name of doubtful origin, possibly "Omnun Theban," which is perhaps St. Omnun, Bishop of Taliary, or "Omnun St. Christopher, patron of watermen.

O. cinerea. Low, compl. Ferns. Swamps, abundant everywhere; fronds 2'-3' high, broadly lanceolate, pinnae with many long-linear, deeply pinnatifid pinnae; fertile ones much shorter, at first waxy, soon white; spore-case bright cinnamon color.
28. **Clusia**, &c. (Name from the Greek word for a boat, from the appearance of the fructification.) Species very few, none cultivated.

**O. Claytoniana.** Wet places, common: sterile fronds much like those of the last, but more obtuse at the top; fertile ones with 2-4 pairs of contracted and fertile blackish points just below the middle.—otherwise like the sterile.

**O. regularis**, Wats. Also common in swamps and wet woods, fruiting later than the others: sterile truly bipinnate; pinnule end of pinnule acuminate, sometimes a little heart-shaped at base; or slightly arched on one side; fertile portion at the top of the frond, punctured; sporocarps light-beaked.

29. **Botrychium**, moonwort. (Name from the Greek word for a bunch of grapes, from the appearance of the fructification.) Species very few, none cultivated.

**B. tawatum.** Shaded places and hillsides: plant hairy, 6'-10' high; common with two heads; a long-stalked fertile one with two or three pinnate fructifications facing a triangular, loosely composed sterile; sterile on a longer or shorter stalk.—Has several forms: var. laminiatum has elongated kidney-shaped sterile divisions; in var. angustatum they are less acute from an oblique base; and in var. bransum, pinnaed into narrowly toothed and tinged lobes.

**B. Virginicum.** In rich woods: plant herbaceous, not fleshy, 6'-18' high; sterile portion scale on the common stalk, thin, broadly triangular, entire; the pinna two or three pinnae; divisions thin, elongated-linear, instead of pinnate; fertile portions long-stalked, twice or thrice pinnate.—Other smaller species occur rarely.

30. **Ophioglossum.** (Greek equivalent of the common name.)

**O. vulgatum.** Amen's rest. Wet meadows or hillside pastures, rare: 2'-3' high; sterile portion somewhat fleshy, ovate or elliptical, entire, 1'-2' long, make near the middle of the stalk, which supports the short twining spike. —Some rare tropical species have large and palmate, or pinnate and oblong-lanceolate fronds.

### 134. **Lycopodiaceae**, Club-moss family.

Flowerless plants, often moss-like or fern-like, with leafy, often elongated and branching stems, the spores contained in rather large solitary spore-cases borne in the axis of the simple ovate or oblong-shaped leaves.

#### § 1. Growing on land: stems more or less elongated and branching; leaves mostly less than 1' long, often minute: spore-cases in the axis of the upper (often transformed and indistinct) sterile leaves.

1. **Lycopodium.** Mostly evergreen plants: the leaves oval-shaped, in 4 or more rows; the flocculent kidney-shaped spore-cases all of one kind, containing none or minute seminiferous spores.

2. **Selaginella.** But one species reported: smaller: leaves mostly fleshy, rarely in rows, mostly in 4 rows, two rows being of smaller leaves; spore-cases of 2 kinds: one scaly and filled with minute spores, the other 4-ribbed and containing very few large spores.

#### § 2. Growing in water or mud: stems very short and corn-like: leaves radiate, elongated, with large spore-cases adhering to the upper surface of their distal bases, and not if immersed in them.

3. **Selaginella.** Stems with large cicatrised spores; inner ones with minute powdery spores.

1. **Lycopodium**, club-moss. (Name from the Greek, meaning moss-bear, probably from the short hairy branches of L. clavatum. Species about 100, in all parts of the world; the following all wild species.)
S. apus. Damp places in meadows; common, especially S.; very delicate; stems 6'-14' high; leaves nodding, oval, marked with a narrow yellow on the back, and tipped with a minute bristle point; spikes four-corrugated.

S. apus. [Damp places in meadows; common, especially S.; very delicate; stems 6'-14' high; leaves nodding, oval, marked with a narrow yellow on the back, and tipped with a minute bristle point; spikes four-corrugated.]
S. isidifolia, (Ecclesiasticium of the botanists.) Stems very long, articulate below each branch; leaves distinct, bearing a few short forked branches; leaves bright green, the larger ones oblong-ovate, acute, rounded on the upper side, nearly straight at the lower, minutely dentate; smaller ones with longer often reflexed points.

S. echinata. (Ecclesiasticium of botanists.) Stems very long, not articulate, freely branched; branches 2-3-pinnate with short crowded branchlets; leaves which live for a short time, deciduous, falling to ground when dry, very closely placed; larger ones oblong, equal-sided, obtuse, entire; smaller ones acute with smaller reflexed points.

S. Martensii. (Ecclesiasticium of botanists.) Stems 8-10' long, much branched from the base; branches articulate, with coarse branches 2'-3' or even 4' wide; larger leaves crowded, obliquely ovate, the upper side rounded; obtuse, entire; smaller ones ovate with a single reflexed point.

S. elegans, or nearly so, rising only at the very base.

S. conica. (Ecclesiasticium of botanists.) Stalk 2'-6' high, bright red, having a few closely appressed red leaves, and bearing at the top a broad frond-like stem pinnately or palmately divided into a few 2-3 times pinnate branches, with very numerous extremely crowded branchlets 1'-1½' wide; leaves closely imbricated, obliquely ovate-oblong, curved upward, entire, obtuse, entire; smaller ones ovate, with long straight points.

S. Brunii. (Ecclesiasticium of botanists.) Stalk straw-colored or pale red, shorter than the last, finely pubescent, as are the branches; frond-like stems long-obovate, 4 times pinnate, resembling an elegant fern; branchlets not crowded, about 1½' wide; leaves narrowly imbricated, ovate, obtuse, entire; smaller ones with straight points.

S. uncinata. (Ecclesiasticium of botanists.) Stems 4'-6' long, growing above, pale brown, oblong or lance-shaped, loosely pinnate; branchlets 1½' wide; leaves obliquely triangular-ovate, with long often incurved sides, bearing a narrow whitish margin, sparingly imbricated and minutely dentate; smaller ones obliquely ovate, with long slender points.

S. limpidophylla, from Lower California, &c., is the "Bird's Nest Moss," or "Limpidophylloides." It is a moss-like plant when dry, but when moist unrolls and displays the densely 2-3-pinnate frond-like branches radiating from a curled-up central stem; the leaves white-margined, closely imbricated, lanceolate, obtuse. Nearly 30 species are cultivated in Great Britain, besides those last described.

3. IOSIDES, QUILLODE. (Stems from the Greek words for equal and poor, meaning that the plant is the same at all seasons.) The species demand no special care for the beginner, and must be studied by aid of the Manual.

I. lacustris, nothing but X, and the far commoner.

I. echinospora, see the principal northern species, living under water.

I. riparia and I. Beggelmanni, with leaves 4'-6' long, live partly out of water, at least for a part of the summer.

I. melanophila, only W., lives in shallow ponds or pools which dry up in summer.
INDEX

"..." The names of the Classes, Subclasses, and Orders are in full capitals; those of the Genera &c., as well as popular names, are in roman type.

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