MANUAL
OF
BOTANY,
ADAPTED TO THE PRODUCTION
OF THE SOUTHERN STATES.
IN TWO PARTS:
PART I.—Vegetable Anatomy and Physiology.
PART II.—Descriptive Botany.
ARRANGED ON THE NATURAL SYSTEM,
PRECEDED BY AN ANALYSIS.

BY JOHN DARBY, A M
Professor of Chemistry and Natural Philosophy, in the College of

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BY JOHN DARBY, A. M.
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PREFACE.

No department of nature has higher claims on our attention, than the vegetable kingdom. It yields us the every-day necessities of life. It affords us the indespensible articles for food, clothing, shelter and warmth; and without its constant ministrations, with our present constitution, existence would be impossible. But besides the benefits of which all are constant partakers, it lays other claims to our regard. The study and culture of the exquisitely beautiful objects which it presents, exert the happiest influence on all our social and moral feelings. So clearly has this been evinced to observation, that it has become a trite saying, that to the stranger, the flower pots in the cottage window of the poor, or about the dwellings of the wealthy, are almost sure indications of purity and social happiness within. On no page of creation, can be found more distinctly written, the wisdom, benevolence and love of the Creator, than on that which exhibits the structure and adaptation of organization to circumstances, of the humblest vegetable. The various beautiful provisions made for the protection of plants in winter; the storing up of food which may nourish plants or animals; the purification of the air by vegetable respiration, with innumerable other exhibitions of Divine wisdom and benevolence. are not only subjects fitted to call for our admiration as intellectual beings, but must call forth the most devoted gratitude and love, from every heart not paralyzed in its workings, by unholy and groveling indulgences.

The vegetable kingdom is the laboratory in which Nature converts the inorganic elements into products fitted for sustaining animal existence, and it can but be a subject of prime importance to the welfare of man, that he understands the workings of the complicated apparatus she employs, that if possible, he may aid her efforts; and not, as is too often the case, embarrass her operations, by ignorance, when she is laboring for his good.

To do this, he must study her products, determine by analysis the peculiar materials she may require for the production of the different kinds, and direct his operations accordingly. He must study the affinities of the different individuals, that he may appropriate to them their proper relations, in his arrangements. He must study her organization, that he may adopt with certainty such means of improvement as knowledge thus obtained may suggest. All this demands the attention of him who would reap all the blessings the existence of these beings was intended to confer.

The means of determining the names of the individual plants of the region in which we live, is certainly a prime step in our advancement to accomplishing any of the other objects proposed. The student of Southern Botany, is met in the very outset, by a want of such means, adapted to his necessities.
There is no work which can be introduced into our classes, in but a slight degree fitted for the student’s use. The only works that have any claims on our attention for such a use, are Elliott's Sketches of the Botany of South Carolina and Georgia, and Eaton’s Manual of Botany. The former of these works, is a noble monument to the genius, untiring labor and perseverance of its distinguished author; but it is not fitted for a text book in classes, as it contains no directions, analysis, or explanation of terms, which are indispensable accompaniments to elementary works. To the advanced student, this work, although having been published twenty years, is invaluable, and we are sorry to find that it is becoming so scarce. Eaton’s Manual has been the means of much good, but on Southern plants, it is (as a Botanist recently expressed himself,) little better than a catalogue. The descriptions, brief, as they must be in an elementary work, are in very many cases, not characteristic of the plants described. In short, we have no work on Southern Botany, which occupies the place of Torrey's and Beck’s Manuals of the Botany of the Northern and Middle States. Surrounded by such circumstances, and having a strong desire that the youth of this land of flowers, should become interested in a subject in every respect calculated to elevate, refine, and please, we appealed to persons abundantly qualified for the task, to supply this hiatus in elementary works. —

We uniformly received unfavorable replies to our applications; some excusing themselves from pressure of other duties; others, from the perplexity of the task. All, however, were anxious that the work should be accomplished, and were willing to lend assistance.

Under such circumstances, although engaged in one of the most laborious, and perplexing employments, we undertook the preparation of the work ourselves; believing that an imperfect production would be better than none at all. How far we have succeeded in supplying the deficiency complained of, we leave for the public to decide.

That the work is imperfect, no one is more ready to assert, than the author is to allow. That it contains errors, is equally soon yielded; and none, but those who have learned it by experience, can be aware of the difficulty of arriving at perfect accuracy in such a production. Works that have passed through several editions, under the direct supervision of distinguished authors, are still blemished with errors. But with all its present faults, we believe it will be much better than any work extant, in the hands of the student of Southern Botany. We submit it to their use, being perfectly willing to abide by any decision that an enlightened public may pass concerning it. Should it issue from the press, and exhibit not the first living impulse, for the want of public favor, we shall conclude it deserves none, and shall solace ourselves with the reflection, that our aim was good, but we lacked the power to perform what our wishes prompted.

On the other hand, should it be received with indulgence, we pledge our constant labors to make it more worthy the approbation of the public for which it is intended.

But another point of prime importance in the study of Botany is, to group together those plants which are nearly allied by natural affinities. —
This, the Linnæan Artificial system does not do, and the two works alluded to are arranged by this system. The Natural System accomplishes this important end, and should therefore be substituted for the Artificial system, which is now so prevalent.

The Artificial System of Linnæus, operates by a constant violation of every principle of even a common sense arrangement, not to say of a strictly philosophical one. That Linnæus himself intended this arrangement as only a temporary one, is abundantly proved by his own expressions. "The artificial method," says he, "is but a substitute for the natural, to which it must in due time give place. The Natural Method is, and must be, the principal object of the science; the elucidation of which is the first and ultimate aim of Botanists." [Gray's Botany, p. 309.] It would be useless to add another remark to show the estimation in which Linnæus viewed his own system. And no one can imagine, that a Philosopher of Linnæus' sagacity, could ever have thought of fastening upon the world a system which violates every principle on which all other natural objects have been classed. As well might animals be classed by the number of their teeth, as plants by the number of their stamens; as well might birds and fishes be thrown into the same class, as grasses and forest trees. It is opposed, in fact, to our very idea of classification. Professor Lindley justly remarks, "No one has thought of first combining under the name of the animal kingdom, quadrupeds and birds, insects and fishes, reptiles and mollusca, and then of subdividing them by the aid of a few arbitrary signs, in such a way that a portion of each should be found in every group—quadrupeds among birds and fishes, reptiles among insects and mammalia; but each great natural group has been confined within its proper limits. Botany alone, of all the branches of natural history, has been treated otherwise; and this in modern times."

The limits of this Preface forbid our entering upon the comparative merits of the two methods, but that the Natural System possesses almost infinite advantages over the Linnæan Artificial System, may be most easily demonstrated. That it offers fewer obstacles to the student in gaining a real knowledge of the name, nature, and constitution of vegetables, is acknowledged by all, who are acquainted with both. One great objection to the use of the Linnæan arrangement is, that students are led by the ease of taking the first step, to suppose that they are Botanists when that is taken, when in fact, they know nothing of the subject; and when the student meets with a difficulty, he must possess the most unwearied patience to surmount it, and when this is surmounted, it aids him but little in conquering future difficulties. The reverse is true of the Natural System; every step is a decided help in taking the next.

The principal facts connected with the structure and functions of the various vegetable organs, are given in the First Part of the work, and we trust they may be found useful to the practical agriculturalist, as well as to the student.

Another feature in this work, as at first intended, was to give the principles of every department of the science. But from our space being lim-
ited to a certain number of pages, and the Second Part occupying more
of it than we had calculated, we have been compelled to leave out the
Parts on Vegetable Products, and Vegetable Chemistry, although written,
and prepared for the press. We regret this the more, as we deem Vegeta-
ble Chemistry one of the most interesting and important branches of sci-
ence. We believe much more good may be done, by giving the outlines of
a science in all its departments, in elementary works, than by treating them
almost as independent sciences, and studying them at different times, and
in connection with different subjects, as is uniformly the case with Vege-
table Chemistry; this forming a part of a chemical course, which to a cer-
tain extent is proper, but never connected with the study of Botany, from
which it ought never to be separated. Chemistry should always be consid-
ered in connection with this science, as a means by which we extend our
botanical investigations, rather than a science including one of the most
interesting departments of Botanical research. To be good Botanists, we
need first to be good Chemists. To determine the name of a plant, al-
though an absolutely necessary part to be attained, ought, by no means, to
be the ultimate or chief aim of the student. He should only be satisfied
when he is enabled to analyze a plant in all its relations; its products,
its food, the soil in which it grows, and to examine and determine its
constitution.

Our principal guide in the preparation of the First Part, has been Lind-
ley’s "Introduction to Botany." We have been aided, however, by Gray’s
"Elements of Botany," "Dutrochet’s Memoirs on Animal and Vegetable
Anatomy and Physiology;" Raspail’s "Chemic Organique," and "Physi-
ologie Vegetale;" Sir H. Davy’s "Agricultural Chemistry;" Liebig’s
Organic Chemistry." Also, articles on Botany in the Edinburgh Ency-
clopedia and Library of Useful Knowledge, besides articles and Memoirs
in the most distinguished French, English and American Scientific Journals.

In determining the plants of the Second Part, we have relied mostly on
Elliott’s "Sketches of the Botany of South Carolina and Georgia;" Nut-
tall’s Genera of North American Plants;" Linnaeus’ "System of Nature;"
Louden’s "Encyclopædia of Plants;" article “Botany,” Edinburgh Ency-
clopedia; De Candolle’s "Prodromus;" and Torrey and Gray’s "Botany,
" as far as published. On several Orders and Genera, we have been aided
by various monographs, as they have appeared in and journals pamphlets.

In the description of Orders, we have been as brief as possible, but aimed
not to omit a characteristic, within the observation of the student, neces-
ary to determining the order. For a text book for classes, it would have
been nearly useless to insert characteristics which require the aid of good
glasses to determine; and unless absolutely required, we have generally
omitted such.

The Genera and Species, have been, in a great majority of cases, de-
scribed from the plants themselves, and as much as possible, in their nat-
ural state. Under such circumstances, even in a brief description, we
may identify the plant almost as accurately as in those more extended
INTRODUCTION.

That the Second Part may be understood by the beginner, and the method of using it made easy to him, we shall devote the Introduction to the Analysis of a few common plants, on which the student may practice, and by following a similar course with other plants, he may determine, in most cases, with little difficulty, their orders, genera and species.

All plants are arranged in two great divisions; Flowering and Flowerless plants; that is, such plants as produce flowers, constituting the first division, and such as produce no flowers, the second. Of the former, are all the most common and abundant vegetables; of the latter, Ferns, Mosses, Lichens, &c. These different divisions of vegetables, which are distinctly separated from each other by nature, have received different names from different Botanists, according to the point of distinction on which they founded their classification. The plants of the first division were called Phenogamous, by Linnaeus, from having the organs of fructification visible. Those of the second, Cryptogamous, for the reason that the same organs were wanting, or inconspicuous. Jussieu called the plants belonging to the first division Cotyledonous, from the seed having cotyledons, and those of the second Acotyledonous, from the absence of these organs. Richard calls the first division Embryonate, from the circumstance that the seeds of these plants always contain a rudimentary root and stem, and the second Exembryonate, from the absence of an embryo.

De Candolle applies the terms Vascular and Cellular to the two great divisions, meaning by the former term, that the plants of the first division to which it is applied, contain a vascular system, with spiral vessels forming a part of it; and by the latter term, that the plants of the second division to which it is applied, have no such system, containing spiral vessels. Raspail makes quite a different division of plants; but, so far as we know, no Botanist has adopted his plan. He divides all plants into Nocturnal, or such as grow at night, or in the dark, and Diurnal or such as grow in the day.

Flowering plants are divided (as the student will see, by turning to the first page of the Analysis, at the beginning of the Second Part,) into two classes, the distinction depending on the manner of growth.

Class I. Exogens. A name given to this class from the fact that the stems of the plants of this division increase by external layers of new wood, as in our forest trees. The plants of this class may be readily known, by having a conical trunk, composed of bark, wood and pith; the wood arranged in concentric layers; leaves articulated with the stem, with the veins branching and reticulated. Examples: Trees, Shrubs, Beans, Potatoes, Pinks, Roses, &c.
Class II. *Endogens.* Including such plants as increase by the deposition of matter internally. Stem cylindrical, destitute of bark; wood not arranged in concentric layers; leaves not articulated with the stem; veins parallel, usually running from the base to the apex of the leaf. Examples. Corn, Grasses, Grains, Palmetto, &c.

The student will seldom find any difficulty in determining to which of the classes a plant belongs, although there are a few exceptions to the above descriptions. By observing the Table at the beginning of the Analysis, he will observe that the class *Exogens* is sub-divided into four *Sub-Classes,* in reference to the flowers.

Sub-Class 1. *Polypetalae*—Corolla composed of several distinct pieces.
Examples: Rose, Poppy, Violet, Apples, &c.

Sub-Class 2. *Monopetalae*—Corolla consisting of one piece.
Examples: Sage, Honeysuckle, Trumpet-flower, &c.

Sub-Class 3. *Apetalae.*—Plants having a calyx, but no corolla.
Examples: Maple, Sassafras, Nettle, &c.

Sub-Class 4. *Achlamydeae.*—Flowers destitute of calyx or corolla.
Examples: Willow, Birch, Poplar, &c.

The Second Class, *Endogens,* is divided into two Sub-Classes.

Sub-Class 1. *Petaloidae:*—Including such plants plants of this class as have regular petals; as the Lily, Orchis, Iris, Palmetto, &c.

Sub-Class 2. *Glumaceae:* Flowers having glumes, instead of petals, which are arranged alternately, instead of in whorls, as in the Grasses, Grains, &c.

If the student should commence the study in early Spring, one of the plants with which he will be most likely to meet, is the Anemone, which he will readily distinguish by its delicate white flowers and compound leaves, and from its root bearing numerous small tubers. By an examination of the leaves, he finds that it belongs to the First Class, or *Exogens,* and from its several distinct petals, he determines that it belongs to the first Sub-Class, *Polypetalae;* and by the numeral placed after this word, he will observe that the polypetalous orders commence on the first page of the Analysis. Under *Polypetalae,* near the bottom of the page, he finds:

"Section 1st. *Thalamiflorae,* meaning that the orders included in this section have the stamens hypogynous, or beneath the ovary or seed vessel. The orders of this section are sub-divided into several groups, marked by *italics.*

a. "Flowers perfect; stamens numerous; herbaceous plants." Our plant agrees with this description. First Order, *Ranunculaceae.* In which he finds "Sepals 3 to 6, usually 5." This plant has no calyx. He therefore proceeds to the next order, and he finds "Calyx 2-leaved;" and so on through the several orders of this group, and all the plants have a calyx, but his has none.

Here, at the first setting out, he meets with a difficulty which may discourage his efforts, and induce him to lay aside his book; but with a little reflection and patience, he may, perhaps, surmount the difficulty. Perhaps the calyx is caducous, and has fallen off; he finds one not yet expanded, but no calyx is present. Either he has made some mistake at
starting, or there is some irregularity. He retraces his steps, and is sure his procedure has been correct. Let him begin again at Ranunculaceæ, and not regard the calyx. He then finds "Petals 2-15; carpels usually numerous." This he finds so, and the whole of Ranunculaceæ will correspond to this plant. He may therefore conclude that his plant belongs to this order; but of this he is not yet certain. Under Ranunculaceæ, he finds five sub-orders, and in the description of Anemoneæ, he finds that the flowers have no petals, but that the sepals or leaves of the calyx, are petaloid, or like petals; but the Achenia, or seeds, as he would call them, have appendages, or tails, but those of his plant have none.

The next two sub-orders have petals and sepals; his plant has but one kind of floral envelop. The fourth sub-order will be found to include the plant. By turning to the pages in the description of genera and species, indicated by the figures after the genera, under the sub-order Cimicifugææ, he will find no difficulty in determining this plant to be the Thalictrum Anemoidææ.

The student may ask, if the plant has no petals, why is it put among the Polypetalæ? And why is it not to be found among the Apetalæ? — The answer is, that it has nothing in common with any of the Apetalæ, but the absence of the petals, while it agrees in constitution in every other respect with the Ranunculaceæ. The more important points of agreement determine its position. The mere presence or absence of petals is of small moment compared with the general construction and properties of the plant. This example exhibits one of the worst cases with which the student will meet, and it is on this account that I have taken it, that he may know at the outset the nature of the difficulties he will have occasionally to encounter, and it will be only in the beginning of his course that such variations will embarrass him. Patience, perseverance and hard thought will accomplish all, and without them, little can be expected on any subject.

Another plant the student will be likely to find in blossom at this season, is the Dog-tooth Violet. By examining the leaves, he finds the veins running from the base to the apex; he at once concludes it belongs to the class Endogens. It has petals; it therefore belongs to the sub-class Petaloideæ, and by turning to page xvi. of the Analysis, he finds the orders of this sub-class divided into groups, according to the number of petals. The first group, marked A. is distinguished by the plants of this group having "Corolla and Calyx distinct; Petals 3." In our specimen, there is no distinction of corolla and calyx, all the leaves composing the floral envelop having the same appearance, and in such cases the corolla and calyx are said to be confounded. We pass, then, to the group B., "Sepals and Petals confounded, usually 6, colored." This is the case with the plant we are analyzing. This group is sub-divided by arranging all the orders together, the plants of which have the perianth superior, marked a.; those in which it is inferior, marked b. Our plant plainly does not belong to the division a., since
we shall readily perceive that the perianth has its origin below the seed vessel. We pass, then, to b., on page xviii. With the first order of this group it does not agree, in not having a glumaceous perianth, or being "grass-like." With Melanthaceae, in not having "3 styles." With Pontederiaceae, in not having a spathe. With Asphodelaceae, in the form of the leaves and the testa of the seed. With Smilaceae, in the fruit not being baccate. The next order is Liliaceae, with which our plant will be found to agree. Under this order, there are three genera, and by noticing the figures after the first genus, Lilium, we turn to page 257, and by examining the plant in relation to Lilium, Yucca and Erythronium, we shall find no difficulty in determining our plant to be the Erythronium Americanum.

Let us now take an example which will bloom later in the season. The Primrose may be found every where, and is known to every body by its large, conspicuous, yellow flowers. The stem is about 12–18 inches high, with narrow and somewhat hairy leaves. We at once determine it to belong to the Class Exogens, from its leaves, and its having bark; and its four petals show it to belong to the sub-class Polypetalae. With Section I. under this sub-class, it plainly does not agree, since the stamens, so far from coming from below the ovary, are inserted into the top of the tube of the calyx, which is itself on the summit of the ovary. We pass, then, to Section II. page vi., Calyciflorae. "Stamens and petals perigynous;" that is, the stamens and petals have their origin from the calyx; this is so. Group A., "Calyx superior;" this is the case with our plant. This division is sub-divided, and distinguished by small italic letters. "a., Stamens 5."—This is not so. The stamens are 8. We proceed to "b., Stamens 8; Herbaceous plants." This is so; but it does not necessarily follow that this plant falls in this section, because it may belong to an order in which the stamens vary in number. We may soon determine by reading over Melastomaceae; and we find that the plants of this order have opposite ribbed leaves, which our specimen has not. It is not a Rhizophoraceae, for they are trees. It must, then, come in the division c. It is not in the order Saxifragaceae, for the ovaria of this order have parietal placentae, whereas the placentae of our specimen are central. The next order is Onagraceae; with this order it agrees. It also agrees with the first sub-order which contains the genera Epilobium. Œnotheca, Gaura, Jussicé, and Ludwigia, to one of which it must belong. We now notice that the first genus, Epilobium is described on page 89. We turn to this page, and by reading the description that the leaves are opposite; flowers purple; and that the plant grows among the mountains; all of which characteristics are obviously opposed by our specimen. With the Œnotheca we find it agrees, and by applying the descriptions of the species to it, we shall find it to belong to the Œ. Linearis. Some of the species of this genus are found in blossom, from spring to autumn and are very common. For these reasons we have chosen this example.

As another example, let us take the Tread Softly, or Horse Nettle—a
very common plant, with prickly stems and leaves, and white or blue flowers. This we shall find, like the last example, to belong to Exogens; but when we come to the sub-class, we find the corolla to consist of a single piece, having the appearance of being formed of five petals united. This, then, belongs to Monopetala, the second sub-class. The orders of this sub-class, we find by the numerals after the word Monopetala, commence on page ix. of the Analysis. We turn to page ix., and find that the orders of this sub-class are divided into groups, according as they agree in certain obvious particulars. The first group is marked a., the orders of which agree in having the ovary inferior; that is, below the calyx; and the corolla regular; that is, the border of the corolla is equally divided and equally expanded in all directions. The ovary of our plant is not inferior. We therefore proceed to b., the orders of which agree in having the ovary superior, corolla regular, and stamens 5. Our plant agrees with these particulars. It must therefore be found in this group of orders. We proceed then to apply the description of each order to our plant. With Boragineae it does not agree in not having "4 distinct nuts," or "Flowers in succund spikes or racemes." With Apocynaceae, in not having folliculæ fruit; with Plumbagineæ in not having 5 stigmas or or a 10 toothed calyx. We thus proceed, and shall easily exclude it from all the orders, till we come to Solanaceæ, with which we shall find it to agree. From the number following the first genus under this order, we find that the genera and species are described, commencing on page 230. We turn to that page, and find it to agree with the Solanum; and by applying the specific description, we shall determine that it is the Solanum Carolinense.

In the same manner may the majority of plants be analyzed; but the student must expect difficulties. These difficulties may arise from various causes; the variations of structure to which plants are liable; the difficulty in many cases of determining what the real structure is, without experience; and sometimes mistaking one organ for another. But by patient application these may be surmounted, and the gratification attendant on such conquests, will richly repay all the toil.

The student should not pass a term in the descriptions, that he does not understand, without looking for it in the Vocabulary, page 337, where he will find it defined, or the page referred to, in the text where it is described.

A very serious objection to the study of Botany, in the minds of many, is the hard names, as they are termed, with which the science abounds. — The same objection lies against every department of natural science, and this objection has its origin in the ignorance of the circumstances of the case. No one, certainly, will object to each object's having a name; this, all must admit is necessary. And all must allow, that in most cases the name is entirely arbitrary, and it matters but little what the name is by which a child, at least, is made to know an object. It will remember Ulmus, as well as Whahoo; Quercus Nigra, as well as Blackjack; Cornus Floridus, as well as Dogwood; Hepatica, as well as Liverwort; Datura Stramonium,
as well as Thornapple, or Jimpson weed. Now the first of these names is the one by which these plants are known all over the world by Botanists, and the latter is a provincial term, applied to them in this section only. In other sections of our own country, even, some of them are known by entirely different names; and the above common names are applied to entirely different plants. The Dogwood in New England, is the Acer Striatum, and what we call Dogwood here, is Boxwood there, and so of many others.—No one can fail to see at once, the utter confusion it would make, to attempt to apply the prevailing common names, in naming plants in Botany. And it is equally plain, that by introducing this study into our primary institutions of learning, that the time will soon come when there will be no difference in the Botanical and common names of plants.

But the technical terms used in the description of plants, are also objected to; but the reasons for their use, where any thing like accuracy is required, are, if possible, more absolute in requiring their continuance, than those for the uniform names of plants. The terms used are applicable to every department of science, as far as required, and are definite in their meaning, and are adopted in a greater or less degree in all countries and languages, where the sciences are cultivated.

The abbreviations used in this work, are only such as are common, with the exception of the following characters:

- Meaning that the plant is annual.
- biennial.
- " perennial, herbaceous.
- " shrubs or trees.
PART I.

VEGETABLE PHYSIOLOGY.

1. Botany is that science, which treats of plants, and in its most extensive application makes us acquainted with the structure, vital action, classification, uses and distribution of vegetables.

2. A plant is an organized being, receiving its nourishment, which is always fluid, by absorption, generally through roots, and elaborating it by exposure to the combined action of air and light, on the surface of leaves or stem, and afterwards assimilating it to its own substance.

To the common observer it is not difficult to make a distinction, between a plant and an animal on the one hand, or a plant and a mineral on the other. But however unlike the three great kingdoms of nature, Animal, Vegetable and Mineral, may be, in their common forms, yet they approach each other by almost insensible gradations, and in certain objects it is difficult, for even the most accurate observer, to draw unerringly the line of demarcation. We see the Porifera* covering the rocks of the ocean, hanging in living festoons from the arches of caves, and clothing the otherwise naked cliffs, exposed to the alternate action of winds and waves, and firmly fixed to their several locations, and at the same time, perhaps, observe the floating Algæ, apparently destitute of roots, absorbing its nourishment through its whole surface, and in some degree endowed with the power of locomotion. In what respect does our definition exclude the porifera from the vegetable kingdom and embrace the Algæ in it? The manner in these cases in which the food is elaborated decides to which kingdom the individual belongs. The immoveable, and vegetable-like Porifera, has an internal organization,

* Sponges.
which prepares its food for nutrition, while the Algae has no such apparatus, but does it by means of exposure on the stem. The distinction between the vegetable and mineral kingdoms, is generally more easily made, the transition is more apparent. Minerals are unorganized, and receive no nourishment, and of course destitute of the power of assimilation; but increase if at all by external layers. Yet there are substances which have been referred, at different times, both to the vegetable and mineral kingdoms, from the difficulty of determining to which they belong, which has been the case with some cryptogamæ.

3. The science of Botany is generally divided into several subjects for separate investigation:

1. The structure of vegetables, or vegetable anatomy, consisting of a description of the various vegetable tissues, and the organs which these tissues compose.

2. Vegetable Physiology, or that branch of the science, which has for its object the investigation of the functions of vegetable organs; or of all that belongs to vegetables as living beings.

3. The examination of vegetable products. First, as to their constitution forming vegetable chemistry. Second, as to materials administering to the wants of men and animals.

4. Systematic Botany, or the grouping together the various beings composing the vegetable kingdom, in a manner best suited for studying them, and at the same time affording a correct idea of the peculiar organization of an individual by the group in which it is included.

We shall not strictly adhere to the above divisions; but shall include, under one head, much that is properly included in the first two divisions, instead of following the more philosophical course above laid down. The interest of the student will not be sacrificed, but rather promoted by this course, as the knowledge of the constitution of an organ and its uses will be associated.

CHAPTER I.

ELEMENTARY ORGANS.

5. Vegetables are composed of solids and fluids. The solids are composed of an extremely delicate, elementary, membrane, of an elementary fibre of extreme fineness, and of organic mucus. From one or all of these are formed five classes of tissue, well defined in their characters, viz.: 1. Cellular tis-
sue, or parenchyma; 2. Pitted tissue, or Bothrenchyma; 3. Woody tissue, or Pleureenchyma; 4. Vascular tissue, or Tracheenchyma; 5. Lactiferous tissue, or Cimenchyma.

6. Membrane is certainly the most important of the three primitive conditions of vegetable substance. It enters into the composition of all the various tissues, and no doubt, forms the great mass of vegetables. Till very recently, it was a point of dispute whether any other existed, but recent investigation seems to have set the subject at rest, as to the real existence of fibre in many cases, and the researches of Mohl and others, have established the existence of organic mucus as a distinct form of vegetable matter, and perhaps a constant one. With respect to the constitution of vegetable membrane, two opinions have been held; one that it is an inorganic substance, destitute of fibres, like the fine film composing a soap bubble; another that it is organized. Du Hammell asserted that it was composed of small organic fibres united by a glutinous substance. More recently Lindley and Purkinje have shown—*the one* that it splits more readily in one direction than another—the other that it tears with a ragged edge. Both facts showing that its molecules are arranged in such a manner that they adhere more strongly in one direction than the other. Membrane, in its early stage, is extremely thin, but becomes thick by the deposition of other matter. It is entirely destitute of visible pores, nevertheless, is permeable to fluids under certain circumstances. Pores have been described as existing in the membrane, as it composes the tissues, but they have more recently been shown to be an optical illusion, except in an instance hereafter to be described. The apparent pores being pits within the membrane, making some parts transparent and thinner than others: that this is the case, has been proved by chemical action of substances making the membrane opaque when the pores ceased to be discoverable, and all the membrane of a uniform appearance.

7. Elementary Fibre exists in various parts of plants usually united with membranous vessels, and generally assuming a spiral direction. It has not been satisfactorily determined whether it is a simple fibre, or whether it is tubular. Most Botanists, however, consider it a simple, solid fibre. Its extreme fineness would lead us to this opinion, since the largest kind does not exceed 1.7000 of an inch. It is not always coiled: sometimes it is straight, at others curved, and sometimes forming a single line; at others anastomosing, and forming a reticulated tissue, and at others, branching. It in-
creases in size by the deposition of foreign matter, and by this means, attains a size much greater than its original dimensions. The elementary fibre of some of the lower orders of vegetables assumes a different and more varied arrangement than is generally the case in the higher orders. We cannot better give an idea of this arrangement, than by quoting from a memoir of Montagne, read before the Academy of Sciences, of Paris, in 1837, on the structure of the Caulerpa Webbiana: "In examining, by a compound microscope, a thin slice obtained by a transverse section of the creeping stem of the Caulerpa Webbiana, I saw that there sprung from the internal face of the tube a great number of flexuous filaments, transparent, continuous, slightly swelled at their origin.—These directed at first transversely anastomosing among themselves, and with those of the neighboring inferior and superior layers, in a manner to form an inextricable network. The network is not confined to the creeping root or to the principal frond, but continues to the highest branches. The filaments are smaller the farther they extend from the main body of the plant. In the extremities they do not exceed 1.30,000 of an inch in diameter, while at their origin they are three times as large." According to Schleiden, the formation of fibre never takes place independently of membrane.

8. Organic Mucus is a substance which has but recently assumed a place among the elementary forms of vegetable matter. But from the various researches of Mohl, Brongniart, and others, it has been demonstrated to be in many cases, a primitive condition of vegetable substance. It exists in the form of a thin homogeneous membrane, covering the cuticle of many plants, and forming a lining to the intercellular passages, or filling them up. It probably exists in all plants, in some form, if in no other than forming the cement by which the tissues are made to cohere. In the young shoot of the Sambucus nigra it is readily observed. Meyen considers the intercellular mucus a secretion of the cells themselves. The subject is of recent date, and more investigations will no doubt establish the true nature and functions of the Organic Mucus.

Section 1.—Cellular Tissue.

9. In its most common form it is composed of minute cells or little bladders, and in the living plant in a state of greater or less adhesion, and although the walls of the cells, when cut through, appear to be simple membrane, yet, in some cases,
they may be separated and individual cells be exhibited unconnected. If the pith of the elder be cut through by a sharp knife, the cut surface, even under a moderate magnifier, has the appearance of fine honey-comb; but if a piece be boiled in a weak solution of potash and water, and then gently rubbed, the cells will separate, which they could not do were the walls of simple membrane, and appear in the form of exceedingly minute vessels, as in fig. 1. These were the cells that gave the honey-comb appearance to the pith when cut, before boiling. The pressure of the cells on each other caused the hexagonal appearance, and when freed from pressure, they assumed their natural form, that of minute spheroidal bodies. This form of the cellular tissue composes the pith of all plants, all the succulent part of fruits, as of apples, melons, peaches, cucumbers, &c. The soft part of leaves and bark and, a large part of the stems of annual plants; and in general, all the soft parts of the vegetable structure, are composed of these minute simple vessels, assuming generally, more or less the hexagonal appearance when cut, as seen in fig. 2, from the slight pressure to which they are subjected.

10. When the cells fit together by their plane faces like geometrical solids forming the pulpy substances, as in the above cases, it is called parenchyma, but when the vessels are elongated and tapering, the ends lying over each other, they form proceneyhyma, (fig. 3,) of which the hardest part of the bark is composed, and a part at least of the wood and perhaps all of it.

11. The cellular tissue, besides the above common forms, assumes a great variety of appearances varying with the circumstances in which it is placed. In the stalks of some leaves the cells are in the form of cylinders, (fig. 4.) being forced only in one direction, by rapid growth. In the medullary processes they assume the form of regular thin parallelopipeds. In some cases they are lobed, owing, undoubtedly, to unequal pressure in the early stage of their growth; this frequently happens on the under side of leaves. There are other kinds of cellular tissue differently constituted from any of the preceding.

12. First, the fibro-membraneous cellular tissue consists of the usual cells with a fibre coiled spirally within them, (fig. 5.)
In some cases there are two fibres coiled in opposite directions. This variety is found in the skin of winged seeds. It constitutes the entire substance of some of the mosses, as the sphagnum. Second; Fibrous cellular tissue, consists of cells entirely formed of fibre twisted spirally, with no exterior membrane. This curious variety may be found in the lining of anthers; also on the surface of the seeds of the collomia linearia; by moistening them, the seed will soon be covered by a coating of the most delicate gauze. This gauze is the fibre of the cells uncoiled, (as seen in fig. 6.) This form is no doubt of the regular structure, in its earliest stage, but by growth, the membrane is torn into threads, corresponding to the internal fibre; or that the membrane is absorbed in the progress of development. Mirbel found the cells which line the anther of the gourd to be composed of continuous membrane, before the time of flowering. The fibres which form the cells assume a great variety of appearances, when they are broken, after the disappearance of the membrane. Lindley has noticed four varieties:

1. "Short, straight and radiating fibres, so as to form little star-like appearances, found in the lining of the anthers of the Polygala, by Purkinji.

2. "Fibres originating in a circle curving upwards into a sort of dome, and uniting at the summit, observed by the same anatomist, in the anthers of the Veronica perfoliata.

3. "Fibres standing in rows, each distinct from its neighbor, and having its point hooked so that the whole has some resemblance to the teeth of curry-comb, in the anthers of the Campanula.

4. "Fibres forming complete arches, as seen in the anthers of the Linaria cymbalaria."

13. We have given in the above paragraphs the appearance of those parts of the vegetable tissue which all allow to be of the cellular variety, and although varying so much in appearance, and constitution, yet we believe they all have originally the same organization. Their development under different circumstances, and the different functions they perform, have caused their diversity of constitution and appearance in a state of maturity.

14. The cellular tissue has been assigned to the same place in the vegetable economy, that the flesh occupies in the animal, and we have no hesitation in yielding to it in every re-
spect the importance this comparison will assign it. It constitutes the basis, physically considered, of the vegetable kingdom.

15. The cells of common cellular tissue are without visible pores, yet the walls are permeable to fluids, as is proved by their being sometimes full, and at others empty. This may also be shown by taking a piece of the pith of the elder and letting a part of it communicate with water and the whole mass will become saturated with it; and it is a fact well understood at the present day, that animal and vegetable membrane, even when not under the influence of vital power, is permeable to fluids under certain circumstances; that is when opposite sides of the membrane are exposed to fluids of different density. Although all cells have been considered perfectly closed, and in the great mass of cases this is no doubt true. Professor Roeper has recently made some important observations on the cells of the Sphagnum, and has demonstrated most satisfactorily, the existence of apertures in these cells, and that too, of quite large dimensions. He first proved their presence by the passage of the amylaceous grains of the nymphacalutea into cells which had been previously examined, and found free from any thing of the kind, but by immersion in water containing these grains, they were found to have entered the cells. During his examination of the elongated cells of the Sphagnum obtusifolium, he unexpectedly observed in some of the cells animalcules, and some of them making apparent efforts to escape; and after watching the attempts of one for several hours, he was gratified by seeing it issue from the cell; but instead of issuing into the water in which the cells, for examination, were placed, he entered another cell lying contiguous to the opening through which he passed, and Roeper remarks that the posterior part of its body was engaged in the first cell, while the anterior part had possession of its new dwelling, de sa nouvelle demeure!

16. The cellular tissue possesses the hygrometrical property in a high degree, and this power is applied in the economy of vegetation to most important purposes. The anthers burst by the exercise of this property; most of them in dry weather by the contraction of the cells on one side while those on the other remain distended. The bursting of capsules is the effect of the same cause, and one may convince himself of the truth of this assertion by closely inspecting the bursting of the common "Touch-me-not," the inner cells have become in maturity compressed firmer and smaller, while the outer ones are in moist weather turged and elastic, and by slight agita-
tion, the cohesive resistance of the valves is overcome and a sudden bursting of the capsules is the consequence; the equilibrium of the pressure being produced by the coiling up of the valves. The opening and shutting of flowers at certain hours of the day is undoubtedly another effect of the same cause. If we examine a plant, which opens and shuts during the day, we may readily observe a contraction of the cellular tissue on one side of the flexure, and a turgessence of the cells on the other side.

17. The cellular tissue is endowed with the power of reproducing itself. This is abundantly proved by the existence of vegetables consisting entirely of these cells, and the extreme rapidity with which they are sometimes generated, is strikingly illustrated by an example given by Prof. Lindley, of a mushroom, the cells of which he estimated to be produced at the rate of four billions per hour.

18. This tissue, at first soft and mucilaginous, becomes, by age, of a very different consistence, varying remarkably in its composition in different vegetables, and in different parts of the same vegetable. It always commences its existence, as we before remarked, possessed of the same organization, but in its maturity it may become the white, thin, transparent vesicle of the pith of the elder, or the hardened, thickened, unyielding prosenchyma of the wood and the liber. These changes are produced by several circumstances. In the elder all the substance of the cell except the exterior vesicle becomes the food of the plant. The consistence of a cell may be increased in several ways. First, by the generation of new cells internally, which of course would increase the density as the number is multiplied. Second, by the diminution of the aqueous part, and consequently proportional augmentation of the carbonaceous part. Third, by the combination of the organic substance with an inorganic, earthy, or metallic base which solidifies and transforms the almost mucilaginous incipient cellular tissue, into the firm, elastic, resisting prosenchyma. Fourth, by the deposition of resins, which have little or no affinity for water, and of course increase the hardness of the tissue in which they are deposited. We see this hardening of the cellular tissue strikingly illustrated in the hard gritty cells of the Quince and Pear. These gritty grains are occasioned by depositions within the cells, and are of the same nature as those that constitute the stone of the Cherry and Peach.

19. The parenchymous tissue is in general the depository of all the materials which in vegetables administer to the sus-
tenance of man. 'Tis here we find deposited the material that forms our bread, from whatever grain it may be manufactured. 'Tis the cellular tissue filled with an amylaceous substance that composes the edible part of the roots that are brought to our tables. The mealliness of potatoes as it is vulgarly called, is but the swollen and comparatively dry cells, which compose this important vegetable; the beet, carrot, and turnip, owe their value so far as they are suited for food, to the abundance of this tissue, developed in the cellular integument of the bark of the roots, and just in proportion as the other forms are developed, they become useless. The tough, fibrous form these roots sometimes assume in dry seasons, or poor soil and uncultivated state, is owing to the diminished quantity of the cellular tissue proper, and the abundance of the prosenchymous or woody form. Starch, arrow-root, &c. are but forms of the same substance. The various fruits are composed of cells filled with the various juices peculiar to each species. In the lemon we find the vessicles filled with an acid of considerable intensity. In the orange, and pine apple our taste is gratified by the mild yet delicious flavor of their contents. In the melon we meet with a fluid of a blandness, and insipidity, almost equaling fountain water. The various coloring materials drawn from the vegetable kingdom, used in the arts, have their locality in the same tissue. The coloring matter which produces the great variety of hues that elicit our admiration by their brilliancy and variety, is deposited in transparent cells. The satiny appearance exhibited by many highly coloured flowers, depends (according to Lindley,) on the highly colored fluid within the cell gleaming through the white shining membrane of the tissue. These subjects we shall notice more particularly hereafter.

18. The cellular tissue has of late occupied the attention of the most distinguished physiologists. In common plants, the opacity of the vegetable substance and the minuteness of the cells preclude all examination of their functions; hence the more simple plants have generally been the objects of investigation. The Chara Fragilis has long been a subject of notice. As early as 1774, Corti, an Italian physician of Lucca, discovered the circulation in the tube of the Chara. Fontana, also an Italian, published in 1776 a repetition of Corti's experiments, and the discovery of a similar circulation in other plants. These curious observations were neglected till 1807, when Treviranus observed the same phenomena, being ignorant of the previous discoveries. In 1818, M. Amici of Modena, published his observations on the circulation of
the Chara Vulgaris, and afterwards on that of other species. Pouchet and Meyen have extended their observations to other plants and succeeded in detecting a circulation in the Valens-
eria, Stratiotis, Potamogeton and in the hairs of the Impatiens balsamina, Vicia faba, (common bean) Cucumus sati-
vus, (cucumber) and many others. More recently the Chara has been most minutely and laboriously examined by Dutro-
chet, and the result of his experiments was read before the Academy of Science on the 4th of December 1837, and pub-
lished in January 1838. We deem some points of his ob-
servations important in this place, that the student may have a true idea of the constitution of a class of the cellular tissue. The Chara is an aqua-
tic plant of the tribe Muscoidiæ, consisting of slender stems with a central tube sur-
rounded by numerous small cortical tubes, all filled with a fluid with small globules floating in it. The roots also are of the same construction, and contain the same kind of fluid, suspending like globules. The tubes of the stem are lined on their inside with innumerable green elliptical globules placed end to end, which are disposed as seen in fig. 8, in a highly magnified stem of the Chara, the spiral series being attached to the membranous tube by a very slight cohe-
sion. Figure 9, gives a transverse section of the Chara high-
ly magnified, in which the cortical tubes are seen arranged in a circle around the central tube, generally eighteen in number. By removing the cortical tubes with care and applying the microscope, we observe the floating globules follow-
ing with perfect regularity the direc-
tion of the spirally arranged globules attached to the tube. The ascending current when it arrives near the node, turns and forms a descending current on the opposite side following with equal regularity the green globules. Between these two currents there is a line destitute of green globules, and under which the fluid does not circu-
late, and which is called the line of repose. Figure 8 will give the student an accurate idea of these appearances. If the green globules make accidentally any sinuosities the float-
ing globules follow these sinuosities. If the green globules
are removed in any part, the current is arrested at this point and the floating globules accumulate there, until finally they are deflected from their course and return by the opposite current, as seen at fig. 8, a. These phenomena occur in perfection only in the young internodes. As the parts become old, the globules become detached in spots, the current becomes irregular in proportion. In more advanced age they often become entirely removed from the surface of the cell and float in the contained fluid, which ceases to circulate. At other times they entirely disappear.

21. Any cause, which will accelerate or retard vegetation, accelerates or retards this circulation. Within certain limits heat will accelerate the movement, and cold retard it. Excess of either will destroy it entirely, as it does the life of the plant. Light and atmospheric air are necessary for its continued motion. Poisons act variously on the circulation and the motion of the intercellular fluid is a true index of its effect, as its change is the first indication of their influence. This plant has been made the means of determining what substances are poisonous and their mode of action, and is said to be the most delicate test for a poisonous substance, and is called by Raspail a Toxicometre.

From these observations it is evident that the propelling power resides in the green globules. It is by no means necessary, however, that the globules should be green, as the same arrangement is found in the roots and the same circulation takes place, and the globules are white. To observe this circulation two conditions are absolutely necessary. First, that the vessicle should be transparent. Second, that it should have globules floating in it by which its movements may be detected. Should the walls of the cell be transparent with a uniformly dense fluid circulating within it, it would be impossible to distinguish its motion.

22. To discover the immediate cause of this circulation has exercised the ingenuity of many philosophers. Amici advanced the idea that the motion of the fluid in the cells was owing to an impulse given by the young globules, acting as a galvanic pile; but M. Becquerel and Dutrochet made various experiments on the subject, and from the result concluded that the force, which produced the rotary motion of the fluid within the vessicle, is not electricity. Electricity, by the battery, would suspend the movement when of sufficient intensity, but exerted no other influence on it. This effect was without doubt mechanical, as it made no difference how the poles were arranged in reference to the rotatory movement of the
globules. This phenomenon, then, in the present state of our knowledge, must be placed among those facts, which can receive no other solution than that of referring them to a vital force as their cause. That we need seek for no physical cause, seems to me evident from the numerous researches and experiments of Dutrochet. In all cases where suspension or acceleration was produced by any agent, reaction took place sooner or later where life was not destroyed, which would not take place did its movement depend on a physical power, so far as we are acquainted with the operation of physical forces. Reaction of such kind never takes place but under the control of vital power. From the above facts it seems we are warranted in the assertion that the seat of vitality in plants resides in the globules attached to the internal walls of the cells.

Those who are desirous of examining the subject in all its bearing will find abundance in the original memoirs of Slack, Pouchet, Mayen, Mirbel, Raspail, and Dutrochet; most of them published in the Annales des Sciences Naturelles, also in Lindley’s Introduction to Botany, Raspail’s Physiologie Vegetale, and in his Chimie Organique.

23. The above description of a cell and its circulation, applies to all the cells of the lower orders of plants at least; but in the higher orders, we have a somewhat different arrangement.

In some cells comprising the tissue of leaves, the hairs of plants, and the ovule before impregnation, a body has been observed for some time past: but which has received but little notice till quite recently. We are indebted to Schleiden for a more minute examination into the constitution and functions of these nuclei. He calls them Cytoblasts, which are of a roundish or lenticular form, and of a white or yellow color. The Cytoblast is usually of a granular structure, and of various degrees of consistence—sometimes soft, and at others of sufficient hardness to resist considerable pressure. The origin of the cytoblast is said to be from a minute body, around which the other parts of the cytoblast are formed. "If the gum which is found in the youngest albumen of a plant be examined, it will be found turbid with molecules of extreme minuteness. Of these, some acquire a larger size, and a more definite outline than others; and by degrees, Cytoblasts appear, which seem to be a granular coagulation round each molecule. As soon as the cytoblast has attained its full size, there appears upon it a fine transparent vesicle. This is a young cell which continues to swell out, and its lining becomes formed of jelly, with the exception of the cytoblast,
which soon becomes a part of its wall. The cells keep increasing in size, till at last the cytoblast is only a minute body, imbedded in the side of the cavity, or sometimes loose in the cavity. The cytoblast is sometimes absorbed after the growth of the cell, and at others is permanent as in the hairs of the Tradescantia."

The cytoblast seems to exercise the same influence on the circulation in the cells, which contain them, as the green globules do in those of the Chara, and like constructed cells. This may be beautifully seen in the hairs of the Tradescantia and Cucumis. The currents receive their impulse from the cytoblast, and return to it; as the cytoblast in time becomes absorbed, the current ceases.

These two classes of circulation are well established, and we are led by the most conclusive evidence that every vegetable cell in its earliest state has for its type the construction of the Chara, or that of the cell with the cytoblast; and the cytoblast seems to perform the same functions as the green globules.

**Section 2.—Pitted Tissue.**

_Dotted Ducts, or Bothrenchyma_ (fig. 7) is formed of a series of short cylindrical cells, placed end to end, and in their young state may be separated into the individual cells which compose the tubes; but as they advance in age the separating membrane closing the ends of the cylinders is ruptured, thus forming a continuous tube; this may be distinctly seen, under favorable circumstances, in the hickory or oak, where the membrane may be seen ruptured in some cases on one side, leaving the membrane attached to the other side, assuming somewhat the appearance of a valve; in others it is ruptured in the center—the membrane cohering to the sides of the tube. They are the largest of the vessels and are scarcely found in any other situation than the wood. They are very distinct in the beach, oak and hickory, being the largest pores observed on a transverse section of these several kinds of wood; but in the pine, and trees of the same family, we believe they are never found. This form of tissue derives its name from rows of dots regularly arranged on its inner surface which are supposed to be grains of amylaceous substance.

24. Under this form of tissue is usually arranged a variety found mostly in the roots of plants, which appear to be spiral
vessels with the fibre broken into short pieces, and attached to the tube and is called Continuous Bothrenchyma, differing from the one above described in having no interruptions caused by the adherence of the cells.

**Section 3.—Woody Tissue.**

25. The woody tissue consists of elongated vessels tapering at each end to a very fine point, (fig. 10.) It is customary to consider this tissue as a distinct variety, yet, although it is convenient to consider it by itself, we believe it is only another form of the cellular tissue. Several objections are urged by different botanists against its being considered a form of this tissue. First, its toughness, but this property it acquires by deposition of foreign matter, and by the number of fibres found associated together. Second, its length; but this is not a valid objection, since we know no reason why a cell may not be developed indefinitely in any direction. Third, its tapering extremity; but we find cells not unfrequently attached to each other by a slanting, pointed termination. Our reasons for believing it a modification of the common cellular tissue are, First, in many instances they run imperceptibly into each other, and in their young state cannot be distinguished. Their constitution, and arrangement of the parts in their early stage, are also the same. The tubular form of the fibre having a pointed termination at both ends, is admitted by all, and this is the form a cell would necessarily take if developed only in length.

26. It is the fine shining fibres, which are readily distinguished in wood, and which are composed of many woody fibres, formed into bundles. So minute are the individual fibres, that the finest filament of flax, which is composed of woody fibre, is made up of a great number of these fibres joined together; their fine tapering extremities being spliced to like fibres, as seen in fig. 10, which go to make up the long fibre extending through the whole plant. Cotton is of the common cellular formation. A modification of the woody fibre occurs in the coniferous plants; the individual fibres are larger in this family, and are marked by glandular dots regularly arranged as seen in fig. 11, and these may be easily seen in the thin longitudinal slice of the pine placed in water and viewed through a microscope.
27. It is this form of tissue that gives strength to vegetables. Without it the stems of trees would be unable to bear their own weight, much less could they be used, as they now are, as materials of great strength. The branches of the oak, or hickory, destitute of the woody fibre, would break as easily as the mushroom. Besides forming a part of the wood, it is found in the bark and midrib of leaves. It protects other, and more delicate portions, and gives form to the plant, appearing to occupy the same place in the vegetable economy as that of bones in the animal. In its early stages it is endowed with the vital power in a high degree; but in the progress of development the fibres receive large additions of solid matter, and their density increases until their hardness and rigidity unfit them for vital action, but make them a support for the plant, and prepare them as materials, for the use of man. It is more than probable that the woody fibre is capable, at some stages of its existence, of conveying fluids, but the minuteness of the fibres has as yet presented an insuperable difficulty in determining whether the fluid passes between the fibres or through them.

Section 4.—Vascular Tissue.

28. This tissue consists of a tube formed by an external membrane, with an elastic fibre closely coiled within it, (fig. 12 a.) Sometimes there are two fibres coiled in opposite directions, as seen in fig. 12, b; at others there are several fibres forming something like a ribbon, as seen in fig. 13, a.

The above defines the normal form of this tissue, but the variations are numerous, owing to situation and development. This form of tissue may be easily seen by taking a tender branch of the Poke-weed, and cutting one side just through the outer layer, and then bending it so as to make the edges separate, and there will be seen a coil of the spiral vessel connecting the two surfaces. Other young branches will answer the same purpose, some equally
well with the one named, as the Asparagus, Strawberry, Currant, Dogwood, &c. In the above cases the vessels are not seen in their natural state, since they are seen uncoiled. In the stem, the fibre that we see uncoiled when pulled apart, forms a complete tube by its edges coming in contact in coiling. But if either the Poke-weed or Asparagus be boiled, they may then be found in their natural state, having a conical termination, as exhibited in fig. 13, b.

29. The spiral vessels are found in exogens in a layer surrounding the pith called the medullary sheath, from which they pass into the leaves and form a part of the ribs of those organs. They are found in the sepals, petals, stamens, and pistils, which are modifications of leaves. In endogens they occupy the central portion of every bundle of woody matter. In acrogens the true spiral is not found, but a modification of it is found in all the Ferns, Equisetaceæ, and it varies in some cases but very little from the true spiral in the last named family. More extended observations are needed to settle this question.

30. The office of the spiral vessels in the vegetable economy is far from being determined. They derived the name soon after their discovery, (by Grew, I believe) of Tracheæ, from the supposition, that they perform the same office in vegetables, that the organs of the same name perform in insects, but their true function is yet unsettled. Many experiments have been adduced to prove that they contain air only, and many also to prove that their original function is to convey fluids to the recently developed vegetable tissue. Both perhaps are true. In their earliest stage they certainly contain fluids, and in the more advanced stages, it is equally certain they contain air; as may be shown by cutting a stem under water, and bubbles will be seen to form at the mouths of the spiral tubes. Bischoff has obtained the air and analyzed it, and found it to contain six or seven per cent. more of oxygen than common air.

31. We think we may safely conclude that the true spiral vessels perform different functions in different ages of the plant, and the more important of the two, and for which this tissue is peculiarly adapted, is that of the earliest stage. We find it in the earliest development of the plant. The extreme point of formation where the matter seems to be just passing from mucilage to organic substance, we find the spiral vessel. It seems to me that in this case we find an adaptation peculiarly fitted to accomplish a given end, and it would require not a very great stretch of imagination in con-
ceiving the design of nature in giving to this tube the form she has. It is the only kind fitted to convey nourishment, and give support to the tenderest shoot as it protrudes to light.—If a common cylindrical tube were used, the great flexures made by such tender parts, under the influence of wind and rain, would be very liable to crush the tube on one side or tear it asunder on the other, as it is well known that a tube cannot be bent without injury, and it is equally well known that a coil may be bent in any direction, and return to its first position uninjured. Here nature in her wisdom, has adapted organs to the necessity of the case, and she only uses this kind where the above circumstances seem to demand it, as they are never found in any circumstances where they are not terminated with the organ.

32. The varieties of this tissue as exhibited by the microscope are numerous, but we shall notice only a single kind of its variations. Annular ducts, as they are called, are tubes in which the spires are apparently broken into rings and joined at their extremities. Sometimes the rings lie in regular order and in contact with each other, having the appearance of the true spiral vessel, as seen in fig. 14, a. At another time the rings appear separated and irregular, and are detached from the tube and lying lengthwise in it, as seen in fig. 14, b. These appearances may be seen in the stem of the Impatiens, and other forms will be readily detected in the same plant. We deem it inexpedient to occupy space in describing varieties of vegetable tissue, which are reducible, by the least sagacity, to a primitive form.

Section 5.—Cinenchyma, or Lactiferous Tissue.

33. Cinenchyma is a class of tissue but recently demonstrated by Professor Schultz. It consists of minute tubes anastimosing with each other, and arranged in no definite direction, in reference to the other tissues. The tubes are of very different diameter in different parts. The vessels generally take a waving direction, seldom proceeding in a straight line. The tubes become thickened in age by the deposition of new matter. The Cinenchyma is found in greatest abundance in the liber of the bark, across the parenchyma of the leaves; but, no doubt, exists in almost every part of Flowering plants. It has been detected in
the pith, in the bark of the roots, in connection with the
spiral vessels, and it is said, in the cells of hairs. We have
readily detected this tissue in the liber of a vigorous fig, in
which the vessels were distended with fluid. We failed in
many attempts, in distinguishing the cinenchyma, until we
adopted the following course: by applying a ligature to a
branch of fig so tight as to prevent circulation, we then cut
the branch below the ligature, and with care, removed half of
the bark and all the wood of an internode, and by carefully
reducing a portion of the bark to a sufficient thinness, and
removing the exuded sap, we brought the thin portion under
the microscope, and saw, in the most distinct manner, the
tubes distended with fluid, and the vigorous circulation made
visible by the numerous globules floating in the enclosed fluid.
This circulation is denominated Cyclosis, of which we shall
speak hereafter. This tissue is called the Lactiferous, from
the circumstance of its containing the milky juices of plants.
When the Fig, Lettuce, Asclepias, and Euphorbia are wound-
ed, a milky juice immediately issues; this proceeds from the
severed vessels of the cinenchyma. Although in these cases the latex (the name of the fluid contained in this system of
vessels) is white, in others it is colorless, and in some yellow.
It is the most highly elaborated juice of the plant, and the sap
seems, in this system of vessels, to be prepared for the nour-
ishment of the plant.

34. We have given above the forms of tissue which go to
make up every vegetable, from the humblest plant to the lar-
gest tree of the forest. However various their forms and ap-
pearances, they are all composed of one or more of the above
varieties. It becomes a subject of prime interest to the inqui-
ing Botanist, to trace the origin of these several tissues.—
Much labor has been bestowed on this subject, and much dis-
cussion has been occasioned by the different views of differ-
ent individuals. There are two prevailing opinions on the
subject. Some believe that there are several primitive forms of
tissue, formed directly from the vegetable membrane as before
described. Others are of the opinion that cells only are form-
ed from this membrane, and that all the other tissues are vari-
tations of the cellular. We have already expressed our belief
that the woody fibre is a modification of the cellular tissue.
We are equally convinced that the spiral vessels and ci-
renchyma have the same origin. The following are some of
the considerations which have led us to this conclusion.—
First, in the earliest stage of the embryo, nothing but cells
are to be discovered, by the most powerful instruments. Se-
cond, the spiral vessel is terminated by a conical extremity, and of course may be considered an elongated cell. Third, there is no difference in their constitution, their only difference being in their length, and in their earliest stage are said to be undistinguishable from a cell. The difference of length cannot in the present state of our knowledge constitute a sufficient distinction, for Mirbel, as well as others, have seen a cell develop itself into a tube terminated by a point. Mr. Quickett has shown that the spiral vessels are developed in the same manner as the cellular tissue, as described in 23—that it is at first very difficult to distinguish the spiral vessel from the cell; but that soon the vessicle, destined to become a spiral tube, elongates, and the cytoblast disappears. The contained fluid becomes filled with minute granules, which increase slightly in size, and begin to arrange themselves on the internal surface of the tube, in a regular and determinate manner, according to the spire formed. After the arrangement of these molecules, matter is deposited to fill up the spaces between them, and thus the spire becomes formed. The above are the most important points applicable to the subject, taken from a paper recently published by Mr. Quickett, and certainly they give a most beautiful exhibition of nature's workmanship. Raspail, although, in many respects, singular in his hypothesis, asserts that cells have the power of producing vessels both from their internal and external surfaces, and that those produced by the internal surface are globular, and form the true cellular tissue, while those generated on the external surface are produced in length only, and form every other kind of tissue.

We are attached to no theory on the subject, and we have simply stated our conclusions drawn from the various facts observed by ourselves and those recorded by others, and the above opinions we would readily yield, should future discoveries prove them untrue. The only object at which we aim is the inculcation of truth. Nature is our theme, and he that would enter on an investigation of her works with any other spirit than that of humility, accompanied with a desire to take her as she presents herself in all her varied forms of harmony and beauty, profanes her sacred temple and forfeits, by a sacrilegious spirit, all claims as her votary. Our limits forbid our introducing here, numerous experiments or advancing many arguments; these must be left for more extended treatises, and the lecture room. The writings above quoted may be consulted, where all that is at present known on this intricate and interesting subject may be found.
INTERCELLULAR PASSAGES.

35. In the placing together the various tissues, which are either globular or cylindrical, spaces are necessarily left between the walls of adjacent cells or tubes, which are called intercellular passages. The appearance on a large scale may be illustrated by the spaces, that would be seen in a pile of bladders which would exhibit these passages in the cellular tissue, and the space seen in a bunch of cylindrical rods bound together, would exhibit those seen in the vascular tissue. These spaces are always filled with fluid, and are supposed to afford an important channel for the transmission of sap from one part of the plant to another. The proper juices of plants often collect in those cavities, and by its pressure, they become enlarged, and afford receptacles which contain large quantities of the peculiar juices of plants; such is the case with the cavities in the bark of the pine and balsam; in the latter they are very large, and also in the rind of the lemon, and orange, in which are deposited the peculiar secretions of these plants. Air-cells, are cavities built up by cellular tissue in the leaf or stem for the purpose of enabling the plant to float on water. They occur in the leaves of the aquatic varieties of the Ranunculus and Duckweed.

CHAPTER II.

ORGANS OF PLANTS.

36. In the preceding chapter we have described in a brief manner the various tissues which enter into the composition of vegetables. Our next object will be to describe in the same manner the various organs these tissues compose. An organ is a part of a living body, the form and limits of which we can describe with precision, but to determine all its functions is not in some cases so readily accomplished. It is the center of a special action, but not independent of the other organs which go to make up the being to which it belongs. It may be composed of other organs more simple than itself. Thus the leaf, which is an organ, and the center of a special action is, at the same time composed of more simple organs, as cells and vessels, which are called elementary organs, and the leaf a compound organ. In describing the various vegetable organs, we will take for an object of demonstration and comparison, one of the most complicated and most perfectly devel-
oped vegetables. If we take a tree for instance, we find it composed of various well defined parts; and to describe a tree, taking it part by part, we shall describe all the compound organs which go to form the whole vegetable kingdom. We find it in the first place, covered in its earliest stage at least, by a thin membrane extending over the whole surface from the deepest root to the highest leaf, called the cuticle. Within this covering we find another distinct zone, called the bark; within the bark we find the main axis of the plant called the wood, which is composed of two portions, one ascending, and called the stem, the other descending, and termed the root. Within the stem we find a soft spongy substance, denominated the pith. To the root and stem are attached branches, and to those of the stem are attached leaves, flowers and fruit.

We shall describe the above organs in the order laid down.

**Section 1.—Cuticle.**

37. The cuticle is composed of flattened cells, adhering to each other by their edges, and forming a continuous covering over the whole plant, except the stigmatic surface, spongioles and parts growing under water, and is generally composed of a single layer of cells, but sometimes in succulent plants of two or more layers. The cuticle of the Oleander is composed of three or four layers of thick sided cells. The joining lines of the cells may be seen on the leaves of plants by the microscope, presenting, generally, hexagonal figures more or less regular. Sometimes, however, the lines produce irregular figures, assignable to no geometrical form. The cuticle may be easily separated from the subjacent layer of the leaves of the iris or lily, by means of a sharp knife, and examined in water by the microscope. If the microscope be good, the cellular cavities will be easily seen, otherwise the flattened surface only can be distinguished. It seems to be pretty well established at the present time, that over the cuticle there is a covering of organic mucus, extending over not only the cuticle proper, but over its most minute appendages, the finest hairs. It has been demonstrated in many instances, and no doubt is an universal fact.

38. On the lines which separate the cells that compose the cuticle, small oval spaces are observed, which are called stomates, in allusion to the function they are supposed to perform, that of mouths through which the plant respires. These stomates are curiously constructed, generally consisting of two
oblong cells, placed parallel to each other on opposite sides of the aperture, as seen in fig. 34, and have the power of expanding, and thus shutting the orifice, and at others of contracting and curving outwards, and thereby opening it; thus the respiration and evaporation of the plant is controlled by these little cells. Of these we shall speak more particularly when describing the functions of the leaves. With regard to the origin of stomates, considerable discussion has been carried on, but no very satisfactory conclusion has been arrived at. Schleiden and Link are supporters of different opinions. The former supposes that the stomates result from the limit of development of cytoblasts; that two internal cells are developed, and by the absorption of the parent cells, the space between them becomes the stomata, and that the cells forming the stomatic sphincter differs in no respect from the other cells. The latter believes the stomates are secreting glands, and not mere openings in the cuticle for the transmission of air and gases.

39. The cuticle gives rise to various little organs which are classed under the heads of Hairs, Glandular hairs, Stings, Prickles, Scurf and Lenticels.

1. Hairs are short acicular bodies found on the surface of many plants, and almost as various in their form as the plants on which they are found. To examine their structure, a good microscope is absolutely necessary. In the spider wort, (Tradescantia,) the hair is composed of cells placed end to end, and has the appearance of the antennæ of insects, and in these cells a circulation is distinctly visible. The sides of these cells are double, although the wall of a cell under common circumstances, appears of simple membrane. That this is not the fact, is proved by permitting the cell to dry on the field of the microscope, and the membranes will separate, and a space is observed between the membranes. It is in this space, that the cinenchyma is located, and in which tissue the observed circulation goes on.

2. Glandular hairs, are such as possess the power of secreting various substances which give the peculiar odor to some plants. They are terminated at the top by an enlargement of the hair sometimes containing cavities in which the secretion is deposited before being set free, at others by a cup-like cavity, answering a similar purpose.

3. Stings are sharp stiff pointed hairs, which take their rise from the summits of conical reservoirs composed of many separate cells, which are filled with a poisonous fluid secreted by these organs. The sting has an orifice at its summit,
connected with the cells containing the acrid secretion; and by the force required to pierce the skin it presses upon the cavities which propels the fluid up the tube, and injects it into the wound made by the point. It is this poison which causes the severe pain occasioned by the sting of the nettle.

4. Prickles are hard, sharp pointed, stiff productions of the cuticle, often hooked at the extremities. When the prickles have acquired their full growth, they are quite firmly attached to the stem; but as the stem advances in size, the prickles, remaining of the same dimensions, become loosened at their base and fall off. Hence, old stems are seldom covered with prickles, while the younger ones are prickly.

5. Scurf, or Lepides, appearing to the naked eye like a mealy substance on some leaves, are scales attached to the stem by their center, and seem to be formed by the cohesion of many hairs having the same point in the cuticle for their origin.

6. Lenticels are brown spots appearing on the stems of many trees and shrubs, at first nearly round, but as the stem increases in size, they assume a linear form, and produce transverse spots on the surface of the stem, as may be seen in the cherry, willow, birch, and other trees and shrubs. By a closer examination, we find the Lenticels to consist of a corky substance apparently projecting through apertures in the cuticle and being divided into two lips by a medial slit. By cutting through one of these lenticels transversely, and examining it by a microscope, the student will find that they are placed on the external layer of the bark, between it and the cuticle, and that it has no connection with the bark, much less with the wood. Hugo Muhl has demonstrated that these productions, generally at least, have their origin in cells lying between the cuticle and bark, and arranged in regular series perpendicular to the axis of the stem; and that they are smaller than the cells of the subjacent parenchymous layer of the bark, and that by an opening in the cuticle they become exposed to the air, and develop themselves in the dry, brown, corky mass, denominated lenticels.

40. From the above description, one would not expect that they could form a subject of much interest, but it would require volumes to contain the discussions of the learned on the functions of lenticels. De Candolle has asserted that they are the origin of adventitious roots. This opinion was founded on the fact that when a piece of willow was placed in water, the root protruded, through the lenticels, but it has
been most conclusively proved by Hugo Muhl, and Professor Unger, that there is no necessary connection between the lenticell and root; and moreover that adventitious roots are made to spring from parts where a lenticel was never seen. The student would be little benefited by the numerous views taken of these products when in reality they probably have no function at all, as lenticels, or at most serve only as passages for air beneath the cuticle.

Section 2.—The Bark.

41. The bark, which lies immediately beneath the cuticle, consists of an external layer of green spongy substance, as seen in fig. 15, b, and an internal layer of fibres interlaced with each other, and the interstices filled with cellular tissue as seen in fig. 15, c. The first is called the Cellular Integument, and the second the Liber. The cuticle, cellular integment, and liber, may be very readily examined in a branch of the cherry of one year’s growth. The cuticle will readily peal off, tearing transversely. The cellular integment may then be easily separated from the subjacent liber. The two layers of the bark are each formed every year, and of course the thick bark of old trees is made up of alternate layers of cellular integment and liber. From the enlargement of the stem, and the internal formation of bark, the outer layers become distended and broken, and thereby produce the rugged appearance of some old trees, and the annual peeling off of the bark of the sycamore, which, from the slight cohesion of the different layers, falls off as soon as broken, not forming the longitudinal ridges like those of the oak and pine. An examination of the bark of an old pine will give the student a correct idea of the effects produced by the constant enlargement of the stem, and the yearly deposition of the bark. Instead of finding regular layers of bark, he will observe, that the bark consists of irregular plates, each being composed of two lamena, one thin and membranous, the other thicker and of more consistence; but in most cases, exactly corresponding to each other in form. These two lamina correspond to the cellar integument and liber, and the cause of their existing in irregular plates instead of layers, is their distension until the layers become torn, and the parts separated. It not unfrequently entirely decays, thus showing that it is necessary only in the early stages of the plant.
40. The liber is composed of woody fibre and cylindrical vessels, a modification, undoubtedly, of the spiral. These together form the strong fibres, which compose the net work of this part of the bark. The fibres of the liber, from their tenacity and interlacing, are often made materials for use. The bark of the flax and hemp consists of these fibres, and when twisted together constitute the cordage, thread, and cloth, which are manufactured from these plants. The fibres are sometimes so closely and firmly interwoven as to be used as a substitute for manufactured fabrics for clothing, with no other preparation than that of separating and flattening the layers. Jamaica and the Sandwich Islands afford examples of these productions. A beautiful lace is obtained by the natives of the Pacific and West India Islands, from the liber of different trees of the Mezerium tribe. Cordage also is manufactured from the liber of trees of the same family; and our own Dirca, did it grow to sufficient magnitude, might afford beautiful examples of the same kind of nature's manufacture. From the liber of the Daphne bohlna of Nepal, a very soft, beautiful paper is said to be manufactured. The liber of trees, before the invention of paper or parchment, was stripped into layers, flattened and cemented into leaves which formed books; and it is from this circumstance that it derives its name. The Russians also manufacture mats, which bear their name from a species of the Tillia, (Linden tree.)

41. The cellular integument is not without its uses, deriving its value, too, from its peculiar structure. It is the immense development of this integument, that forms cork, so extensively employed for various useful purposes: and as we have before remarked in paragraph 17, it is the development of the same material in this part of the bark, that constitutes the value of many of the garden vegetables, which in their primitive, uncultivated state, are as unfit for food as any other kind of root; but the effect of cultivation in good soil, is to increase the cellular integument without increasing the liber; thus fitting the roots for becoming food for men and animals.

42. In a great number of trees, the bark is made the depository of important articles. Tannin is found in the bark of several species of the Quercus, or Oak, and in the Pinus Canadensis, or Hemlock, by which raw hides are converted into leather. Gum is also an abundant product of the bark, and is scarcely found in the wood. Coloring matter is often found deposited in this organ, though not so generally as in the wood. Medicinal substances of every grade, from the
mildest mucilage of the Ulmus fulva and Bene plant, to the most powerful poisons of the Daphne Mezerium, and of those yielding the Hydrocyanic or Prussic Acid. Numerous examples might be added of the important productions of this organ, but they will be reserved for a future section.

43. The functions of the bark taken as a whole, seem to be the protection of the newly formed wood, the secreting of various products, and forming a channel through which the descending elaborated sap may pass to the various parts of the stem. The functions of the cellular integument and liber separately considered have not been determined. There appears to be plausibility in the conjecture, that the cellular part of the bark, being deposited first, acts the same part in the formation of the liber, that the pith performs in a newly formed branch, that of affording nourishment, if it does not act some part in generating the fibres themselves. If, as has been supposed, the cellular system is the generating apparatus of vegetables—and that it is in some cases, we have the best evidence—will it not afford a probable reason for the alternate layers of the cellular and vascular tissues by supposing that the cellular tissue being first deposited, then acts as the generator of the fibrous tissue of the liber!

SECTION 3.—The Stem.

44. The Stem is the ascending axis of the plant. The descriptions given in the preceding sections on the cuticle and bark, will apply to them in all cases where these organs are found; but no such general description can be given of the stem. There are three distinct types of this organ, each of which necessarily requires a distinct description. First, Exogenous stems which increase by external layers of woody substance, and are covered with bark, and enclose a pith in their center. The term is derived from two Greek words, Exo outwardly, and Geno I produce. The term was given by De Candolle to designate all those plants, which increase in diameter by the addition of external layers, and includes all the trees and shrubs of the Temperate zone, and all plants which have true bark and reticulately veined leaves, whether woody or not. If we take a stem of the oak, for instance, and make a transverse section of it, we observe that the woody part of it is composed of concentric layers of hard woody substance, which consists of vascular tissue and woody fibre, closely united. These layers are partially separated from each other by a more porous, and of course, less dense layer,
which consists of tubes and sometimes of cellular tissue. If we commence our observation from the pith, we shall observe immediately surrounding it a very thin greenish layer, called the medullary sheath, represented in Fig. 15, f. Immediately in contact with this is a zone of cellular substance and tubes, as seen in Fig. 15, g. Next to this a dense woody zone as seen Fig. 15, h. The last two layers are deposited annually, and always in the order laid down; so that if we begin to reckon from the medullary sheath, we find first the cellular substance and then the woody layer, and so on to the bark; the cellular always commencing and the woody layer always ending the series.

45. The medullary sheath is composed of spiral vessels and woody fibre connected by cellular tissue. It precedes every other formation except the cellular, in the elongation of branches. The leaves derive their origin from the medullary sheath. The true spiral vessels are found in the stem of exogenous plants only in the medullary sheath. In paragraph 25 we gave our opinion as to the reason for spiral vessels being found only in this organ. They are certainly required in the earliest development of the vegetable, and no increase in length of vascular vegetables ever takes place in which this form of the elementary organs, does not enter into its formation. And we very well know, that every function, except what its physical properties enable it to perform, is performed by other varieties of tissue; and to our mind there is not a more beautiful instance of adaptation and design, or a clearer illustration of Infinite wisdom in the constitution of the vegetable kingdom, than is exhibited in the structure of the organ under consideration.

46. If we examine our transverse section again, we shall perceive that the woody part is separated apparently into numerous wedge shaped portions, their bases terminating in the bark, and their apices in the pith, as seen in Fig. 15. By a longitudinal section made in the direction of these lines, we shall find that they are plates of substance proceeding from the pith and terminating in the bark. They are called medullary processes, or medullary rays, and are composed of cells in the form of thin parallelopipeds. In the embryo, and in the earliest development of the stem, the cellular substance of the bark and pith, are in contact, but immediately vascular and woody fibres are sent down, which pierce the cellular substance, dividing the mass of the pith from the parenchyma
of the bark, but leaving them connected by the medullary processes; so that parts, which were in contact in the early stages, become separated, sometimes by several feet, yet a communication is preserved by the medullary rays, which continues as long as life lasts.

47. Each of the layers of wood, as we before remarked, is the product of a single year, and by counting these layers the age of the tree at the point of section is readily determined, and by finding the difference in the number of layers between any two points of section, will determine the time that the tree was growing the distance between the sections. For instance, if we should count the layers of a stick of timber, and find the number twenty at one end, and ten at the other, it would show that ten years were required for the tree to increase in length the distance between these points. From these facts, we readily perceive, that trees must be composed of concentric conical sheaths; the product of the first year forming such a sheath around the pith, and that of the second year forming a layer around the product of the first year and the pith; the pith extending through the whole cone. We also observe, that the mode of increase is inverse to that of the bark, for the bark we found increased by an internal layer of cellular integument and liber, and we now find that the wood increases generally by an external layer of cellular matter and woody fibre, the layer of woody fibre and liber always being in contact when the layers are completed. We may readily convince ourselves of the inverse growth of the bark and wood, by inserting two wires, one through the bark, but not so as to touch the wood, and in time this wire will fall off, having no deposit made exterior to it; but by inserting the other wire, so that it shall pass through a slight portion of the wood, instead of falling off, it will become buried deeper and deeper every year by the layers of wood that are formed over it—thus proving most clearly the order in which the wood and bark are formed.

A remarkable case of the deposition of external layers of exogenous stems is related of the Boabab tree (Adansonia digitata) of the Cape de Verde Islands. In the year 1400, Grew cut his name on two of these trees, and in 1749 (three hundred and forty-nine years afterwards) Adanson examined the same trees and found the names, with more than three hundred layers of wood deposited over them. If we examine a transverse section of a trunk of a tree we observe, that the wood near the pith and that near the bark present very different appearances; the latter being white and soft, and more
or less juicy, and is called the alburnum or sap-wood; the former, being darker colored and hard, is called the heart-wood. The vessels of the alburnum are always filled with sap, and no doubt form the channel through which this fluid ascends. This is shown most conclusively in the process of girdling trees. If the sap wood is cut completely through all round, the tree dies immediately; but, if a part of this is left, the tree may linger through the summer, and perhaps longer, the continuance of life being in proportion to the amount of sap wood left uncut. In the young tree all the wood is alburnum, but as it increases in age we may notice the time in which the innermost layer is converted into heart wood. This change from alburnum to perfect wood, is no doubt occasioned in a great measure, by the deposition of foreign matter, which prevents the tissue from any longer performing vital functions, increases its density, and of course it becomes more firm and compact. The time required for the conversion of alburnum into perfect wood, differs considerably in different trees, and it is also different in trees of the same species, owing to situation; even on opposite sides of the same tree, the number of layers of alburnum is often different. In trees of the same species exposed to the same influences, the number of layers of alburnum, is remarkably uniform. In some cases there is a striking contrast in the appearance of the alburnum and perfect wood. In the Ebony, the alburnum is white, while the perfect wood is nearly black. In the Camb.wood, the alburnum is also white, and the perfect wood a deep red. There seems to be a certain fitness required in the vegetable tissues before they are capable of receiving the coloring matter, for otherwise we should suppose the change would be more gradual; but the line of demarkation is often perfect; the black external layer of the perfect wood being surrounded by a perfectly white layer of alburnum, thus showing that the transition is performed at once, and not gradually as is generally supposed. The formation of wood will more properly be noticed after the functions of leaves have been given.

48. The pith is the central portion of the stem commencing at its base and extending through it and through every branch, terminating in the buds. It is composed of loose cellular substance, varying considerably in size, form and appearance in different plants. In some plants it forms a large portion of the stem as in the Elder; in others but a small part, and in trees, becomes compressed into a mere line, as in the Oak. It never increases in quantity in the same part
of the stem. Its only function seems to be that of nourishing the young buds. During its early stages it is filled with fluid and performs, undoubtedly, the first vital functions; but after the young shoot has become organized so as to derive nourishment from other sources, the now useless pith becomes dry; being exhausted of its fluids and often torn and variously divided by the growth of the stem. It not unfrequently entirely decays, thus showing that it is necessary only in the early stages of the plant.

There are frequently to be found in the bark of several trees, particularly of the Beach, small conical bodies composed of wood, pith and medullary rays, which are called nodules. They are generally, in their early stage at least, not connected with the subjacent wood. Dutrochet believes nodules to be adventitious buds, which generally do not acquire force sufficient for their development into branches; but in some cases they do produce branches which are of a weakly character.

49. Endogenous Stems, are such as are formed by bundles of vascular tissue and woody fibre imbedded irregularly in cellular substances, and they increase by the deposition of vegetable substance internally. They differ from those above described in not having bark, pith, or medullary rays. The above definition of endogenous stems will apply in general to this division of vegetables, but there are three varieties of them, which will require our separate notice. First, such as are uniform in their structure throughout their length, and grow to be trees. We may take as a type of this structure, the Yucca gloriosa, or the Chamaerops palmetto. If we make a transverse section of one of these stems, we find a cylinder of spongy substance with numerous strong, large bundles made up of woody fibre and vascular tissue imbedded in it. This cylinder is surrounded by three distinct zones. The outer one consists of the basis of the leaves which clothed the stem. Within this is a zone of cellular substance, which may be seen in fig. 16, a. The next zone (b,) is composed of materials like the liber of the bark, and they have the same arrangement. This zone is considered by Botanists as of the same construction as the internal cylinder, but we believe this is not correct, since it may be separated into layers whereas the fibres of the central part, traverse the pulpy substance in every direction, and nothing approaching a regular arrangement can be discovered. We believe
the economy of Endogenous stems, of this variety particularly, is far from being rightly understood. We have made many observations and experiments on them, and have been led to very different conclusions from those universally advanced by Botanists; but, before we would advance opinions opposed to those of all writers of the highest distinction, we would be sure that no error in observation, has led us to wrong conclusions; and we make these remarks to direct attention as far as we are able to the discovery of the true organization of these stems, and the functions of the various organs of this interesting class of vegetables. We shall content ourselves at present with describing their structure, without attempting to unfold the peculiarities of their physiological organization. If we take a part of the stem of the yuca and digest it in diluted nitric acid it will be easy to discover the arrangement of its various parts. The zone composed of the basis of the leaves will be found to consist of fibres proceeding from the leaves and cellular tissue. These fibres pass down this layer at different distances, and then pass nearly perpendicularly through the cellular and fibrous layers into the central cylinder. It is usual to describe those different layers as too closely united to be separated, but we believe the only mean by which they are united is the fibres proceeding through them from the base of the leaves; for by careful dissection after digestion in diluted nitric acid we have, by merely severing these fibres, obtained the layers perfectly separate, forming as even a surface as those of the bark and stem of Exogens, and these fibres may be traced from within the leaf to the center of the stem forming no more a part of the cellular and fibrous layers, than the medullary processes form a part of the layers of Exogenous stems. If we examine more closely the fibrous layer, we shall find it to consist of materials arranged in all respects like the liber of the bark. The fibres are interlaced in a lateral direction only, as it may be divided into thin layers, but it cannot be torn in strips. The central cylinder, as we before remarked, consists of a large quantity of cellular substance with the fibres probably proceeding from the under surface of the leaves imbedded in it. These fibres consist of spiral vessels in the center, and woody fibre surrounding them. They are arranged in no order. The central substance will split in no direction, and in making a longitudinal section, it must be cut or torn, as well as in making a transverse one. From the manner in which the new substance is deposited in Endogens, it is impossible that the stems should increase indifferently in diameter, although they are not so absolutely restricted in this respect as Botanists generally pretend. We
have seen stems of this kind increase several times their original diameter. Generally they are nearly cylindrical and the trees high, compared with their diameters, having their foliage entirely at their summit. Perhaps no circumstance strikes the beholder as more singular in a grove of these trees, than the columnar appearance of the stems, and the rich foliage of their tops, presenting an appearance of an immense arbor supported by lofty columns.

50. The second variety of Endogenous stems are such as have nodes at certain intervals, and with fistular internodes, as seen in fig. 17, which represents a transverse section of the cane, and fig. 18, a longitudinal section of a node of the same plant. The cane is a good type of this variety, which includes the grasses and grains. If we examine a cane, we find it composed of a thin, and an exceedingly hard, siliceous-like cuticle. It is generally supposed, however, that the silex lies beneath the cuticle, and does not form a part of it. By cutting into the stem, we find it composed of cellular substance with fibres imbedded in it, the fibres being more numerous, and the substance harder the nearer it is to the circumference. That part of the cylinder lying next the cavity consists almost entirely of cellular tissue. The nodes are formed by the accumulation of cellular substance between the fibres, and form a firm basis, forcing them asunder, and filling up the cavity for the attachment of leaves and branches, when circumstances induce their development. The fibres of this variety of stems are not interlaced as in the preceding, as may be seen by the splitting of the stem either into layers or strips. The leaves have their origin only at the nodes, while every part of the stem in the preceding variety becomes the origin of leaves. The nodes have been considered by some Botanists as separating the plant into as many distinct individuals as there were nodes; but there is no reason in our opinion for such a hypothesis, since we may easily trace the fibres through the nodes, and the nodes differ in no respect from any other part of the stem excepting the accumulation and hardening of cellular substance, and this apparently for the purpose of forming a situation for the leaves.

51. The third variety are such as have solid stems, and some of them with nodes, and others with branches. The smilax affords a good example of the former variety, and it approaches nearer in appearance, both by its stem and leaves,
than either of the other varieties to the exogenous stems. The herbaceous species of the Smilax and the Asparagus afford examples of branching conical Endogenous stems, and from the delicateness of the fibres and the abundance of the cellular tissue, they would hardly be recognized as belonging to this class of stems.

52. Acrogens are such plants as increase by the elongation of their axis without increasing in diameter. The Ferns present a type of this class of stems. While the Exogens increase by external layers, and Endogens by internal deposition, these seem to increase, as the term Acrogens indicates, by additions to their summit, that is, by the simple elongation of their parts. By examining the stem of a Fern we find it composed of cellular substance, and vessels generally bearing in some species a very close resemblance to a variety of spiral vessels, but more observations are necessary to determine the true constitution of this class of plants. There is another variety of formation of Acrogens sometimes called the centrifugal formation, as exhibited by fungi and lichens, in which the formation proceeds from a center, the substance being generated nearly upon the same plan. Lichens may often be seen with their centers dead, while the circumference is alive and growing. Fairy rings are the result of this formation.

Section IV.—Root.

53. The root is that part of the axis of the plant, which descends in its elongation, and is the organ through which the plant receives most of its nourishment, and by which it is attached to the place of its growth. The root in its general appearance resembles the stem; and when taken together they have been, not unaptly, compared to two cones united by their bases. Both taking their origin from the same vital points, and under the influence of the vital power they seem to be endowed with opposite propensities, one growing upwards, seeking light and air, the other with an equal impulse forcing its way downwards and burying itself in the earth. We may consider the plant as endowed with opposite polarities. One pole uniformly taking the direction of gravity, the other as uniformly the opposite direction. The surface of the earth may, in general, be considered the equator of this living magnet, and the zenith and nadir its poles. Although we speak of Root and Stem being joined at a point called the neck, still there is no line of demarcation
drawn by nature by which we may determine the precise point where the stem ends and the root begins. The fibres extend from one to the other, and the union is made by a gradual conversion of the one into the other. The seat of vitality has been supposed to be in the neck, but numerous examples will readily occur to the student disproving such a hypothesis. The neck in many plants may be removed and the roots and stems will still survive by proper attention; proving not only that the neck is not the seat of vitality, but that there is no such single point which if destroyed, the plant necessarily perishes.

The principal differences between the root and stem are, 1st, that the root is destitute of pith, and 2d, the true spiral vessels are not developed in it; 3d, there are generally no regular buds formed on the roots; yet they are capable of putting them forth under favorable circumstances, as may be seen in the shoots that spring from the roots of the Peach, Plumb, Cherry, and Poplar; 4th, Stomates are not found in the bark of the roots.

In other respects the root does not differ from the stem, and we have no doubt that the differences above noticed are in a great degree owing to the situation of the root. The moist, resisting medium in which it is placed produces the variation rather than any real difference of organization. Stems when exposed to different influences change their type of organization to fit themselves to the different circumstances in which they are placed.

The most important distinction on which our idea of the root and stem should be founded, is contained in the first part of our definition, that the root is the descending part of the axis of a plant. If it descends it is a root, and if it ascends it is a stem; we mean, of course, when they meet with no physical impediment.

54. The forms of roots are various, and receive different names in the descriptions of plants, which it will be our next object to point out and explain. Although various divisions have been made by different Botanists, yet great discrepancy exist among them. We shall describe those only, which we think most important, and the most common forms.

1st. Branching Root, or Radix ramosa. Fig. 19. These roots are such as subdivide in the earth in a manner
similar to the divisions of the stem, and are found exhibited in the forest trees and shrubs. This variety forms the true type of roots; and is the one from which our ideas of this organ are formed, as distinguishing it from the other organs of the plant.

2nd. The Fibrous Root or *Radix fibrosa*. This variety consists of numerous fibres proceeding from the neck of the plant, and may be seen in most grasses and grains. Fig. 20.

3rd. *Fasciculated roots*. When the fibres of roots become enlarged by the deposition of starch, they form this variety of root as is exhibited by the Dahlia, Peony, &c. fig. 21.

4. The *Tap root*, or conical root, when the root sinks perpendicularly into the earth, and tapers regularly from the base to the apex with very few fibrous radicles, as in the Beet, Parsnip, &c., Fig. 22. This variety contains some of the most important garden vegetables, and it is seldom found of natural growth, being almost uniformly produced by cultivation.

5. The *Fusiform Root*, or *Radix fusiformis*, where the root tapers toward each extremity, as seen in the Radish, it is known by the above name. Fig. 23.

6. The *Napiform Root* is that variety which is very large at the base, but tapers abruptly as in the turnip, Fig. 24.

The three preceding varieties are generally called in distinction from the other varieties, simple roots, the most of the root being confined to the main axis, and sending off few small fibres.

7. The *Filiform Root* consists of a single filament, and is the root of some floating plants, as the Lemna.
8. *Didymous Roots* are those which produce a tubercle each year, and when the tubercle of one year arrives at nearly the dimensions of the one of the preceding year, they answer to the form indicated by the term applied to them; that is, double or twin roots. The *Orchis* affords examples of this variety, Fig. 25.

9. The *Palmated Roots* are such as differ from the preceding only in having the lobes divided, giving them somewhat the appearance of a hand. The *Orchis* affords examples of this variety, Fig. 26.

The following varieties are generally classed as either stems or buds, but are, in common parlance, called roots, and we know of no disadvantage in complying with the popular arrangement by describing them under this organ.

10. The *Rhizoma* or *Rootstock* grows in nearly a horizontal direction, emitting roots from its under side, increasing by one extremity only, at which it puts forth leaves and flower-stems, and gradually dying at the other. Its surface is generally marked by irregular ridges formed by the bases of decayed leaves. The *Calamus*, *Iris*, *Lily*, and some of the grasses afford good examples of this variety, Fig. 27. The scaly roots come under the same variety, as is exhibited in the *Hydrophyllum canadense*.

11. The *Carmus* Fig. 28. is that variety which increases beneath the earth by the development of buds in the axils of the scales, but retains its globular figure, and propagates itself in no particular direction. The *Tulip*, *Arum*, *Gladiolus*, &c. afford examples.
12. The *tuber* is an irregular fleshy body produced at the ends of the fibres sent out from the root. They consist in the potatoe, which is the best example of this variety, of buds, imbedded in cellular substance consisting principally of starch, which is to become the food for the development of the buds. The buds are what are commonly called the eyes of the potatoe, and they form that part of it which is used by the farmer for propagating this useful vegetable. Fig. 29 represents the form and general arrangement of tubers.

55. It is not unfrequently the case that variations from the above types occur; but the student will readily, by carefully observing the above definitions, determine to which they belong.

13. The *bulb*, is a leaf bud enclosed in scales or concentric layers, and is found either at the base or summit of the stem, or in the axils of the leaves; and differs in no respect from the buds hereafter to be described, but in separating itself from the parent and forming an independent individual. The Onion and Lily form examples of this variety. Fig. 30, gives an illustration of the bulb. The tree onion, as it is called, bears bulbs on the summit of its stem. The buttons, as gardeners term them, are of this character. Some species of the lily bear them in the axils of the leaves, and they separate from the stem and fall to the earth, and become plants bearing bulbs in their turn. Bulbs are sometimes distinguished into scaly, being covered with scales as in the lily, and tunicated, being formed of concentric coats, as in the onion.

56. At the extremities and sides of the fibres of roots, small bodies are observed composed of lax cellular tissue, called *spongioles* from their resemblance to sponge, (see fig. 31.) It is through the spongioles that all the nourishment of the plant enters, that enters by the root. Duhamel, a long time since, observed that trees ex.
haust the soil at the extremities of the roots only, but it was reserved for Sennebier to demonstrate by a very simple experiment, that the spongioles alone absorbed fluids from the earth. This he did by taking two carrots of equal size, and immersed the whole of one in water, and the extremities of the roots of another, and he found, that they both absorbed an equal quantity; but by immersing the whole body of a third, keeping only the spongioles out of the water, none of the fluid was absorbed. When the spongiole is destitute of fluid, it contracts, and lies close to the fibre to which it is attached, and hence is not easily discovered in pulling up a root; but by immersing it in a tumbler of water, they become turgid, and are easily observed.

Section 5.—Buds.

55. In the axil of the leaf of an exogenous tree or shrub, we may observe in the early part of the summer a small protuberance, which will continue to increase until autumn; when it will have assumed the form of a conical body composed apparently of scales. This is the bud which is destined in the following year to produce a branch, or flowers and fruit. These small bodies found in the axils of leaves, are vital points, in which seems to be deposited the vital power during the season of repose, and from which development commences as the season of vegetation returns. That they are important organs, and demand our strictest observation, will be apparent from the fact of their being, in many instances in the vegetable economy, the seat of vitality; and it is from this circumstance, that we are enabled to divide individual trees indefinitely by grafting, budding, and by layers. The Leaf Bud may be defined to be the rudiment of a branch, which in its development it always produces. Buds are distinguished by different names, according to the point from which they spring. If they originate in the axils of the leaves they are called regular; if from any other part of the plant they are called adventitious.

The regular, or leaf bud has its origin in the pith and medullary sheath. The earliest view of the regular leaf bud, we can obtain by dissection, is in the form of an exceedingly minute green body surrounded by a nearly transparent cellular substance situated in the stem immediately below the axil of the leaf. If we examine the buds of the same tree through the season, we shall find that the cellular part becomes opaque, and its place is occupied by scales, and the central
Part increases and becomes the apex of the bud, and by a longitudinal section of the bud and stem at this stage, the rudiment of a branch may be distinctly traced under the microscope; the greenish medullary sheath and pith being separated by a white deposit from the greenish portion, which is to become the bark. There is a bud on the extremity of the branch called the terminal bud, similarly constituted to the axillary ones above described. The scales, by which the rudimentary branch is enclosed, appear to be formed for this express purpose, but they are indurated, partially developed leaves, as one may readily convince himself by taking in the spring the bud of the Buckeye, and he will find the outer scale hard, dry, and with a uniform margin, but by removing one after another he will find them gradually becoming soft, delicate, and lobed, being the miniature leaves of the plant. The leaves first developed are sacrificed for the protection of the remainder during the cold of winter. Plants of the torrid zone and annuals have no such covering, as from the nature of the case they need none. The one growing in a climate where the cold of winter is not felt, the other existing only through a period favorable for vegetation. The buds are not only enclosed in scales, but they are often provided with means which render their covering much more effectual in resisting outward influences. A resin is not unfrequently secreted by which the scales are attached to each other, and rendered proof against the action of water, as in the Balm of Gilead, and Poplars, &c. In others a coating of soft down is produced on the surface of the scales, which affords an additional protection in the colds of winter, as in the Willow, and many others.

56. Buds, we remarked, were the rudiments of branches, but it sometimes happens from some cause that these branches are not developed at all; at others, they are only partly developed, receiving a check in their growth, and becoming thorns and spines. The student may readily convince himself of the fact, that thorns are partially developed branches, by observing almost any thorny bush at different times. The Plumb often presents striking examples of it, on which the student may find the branch in every state of development, and the thorn of one year may receive an additional impulse the next, and become a branch.

57. Since the development of buds produces branches, it is plain that the arrangement of branches will be the same as that of buds; and as buds have their origin at the base of leaves, it is equally plain, that the branches of trees follow
the same arrangement as the leaves. If the leaves be alternate, the branches will be so; if opposite, the branches will have the same arrangement. It happens, however, that by the nondevelopment of some of the buds, or unequal elongation of the stem, the branches exhibit some diversity; but the reason for any deviation may readily be seen, having as they will, their foundation in the above facts.

58. Adventitious buds may have their origin in any point where there is an anastamosis of woody fibre. (Lindley.) Perhaps no subject in Botany has excited more interest, or has more completely eluded the research of philosophers than the origin of adventitious buds. It is entirely removed from our observation. Every part of a plant from the root to the flowers seems to be endowed with the power, under certain circumstances, of developing buds; yet to determine the conditions on which their development depends, has as yet, baffled every effort. I have now before me a plant of the Bryophyllum, (a present from A. W. Hammond, Esq.) and from a fallen leaf of which, there are putting forth ten buds from the angles of the serratures of the leaf. The leaf lies as it fell upon the moist soil in its natural position as to surface. Duhamel supposed that they had their origin from preorganized germs, which are deposited by the proper juice in its descent from the leaves, and of course pervade every part of the plant. This is mere hypothesis with not a fact to establish its truth, and as Mr. Nuttall remarks it is impossible to prove its falsity. Mr. Knight believed, that they have their origin in the alburnous vessels, which he supposed possessed the power of generating central vessels, by which he means vessels of the medullary sheath. His hypothesis is founded on no better basis than that of Duhamel. Mr. Nuttall believes, that buds are preorganized germs, but that they have their origin in the first development of the stem or branch on which they put forth. There are decided objections to this theory, but our space forbids our entering into a discussion on the subject or even fully stating the theories alluded to.

59. The structure of the adventitious buds is, in all respects like the normal or axillary buds, having pith in their center surrounded by spiral vessels and enclosed by woody fibre and cellular integument. From the existence of spiral vessels in adventitious buds which arise from the root, it seems to us a very strong argument in favor of the existence of spiral vessels in this organ under a very slightly modified form; and from this and various other circumstances, we are led to believe that the constitution of the root and the stem
are essentially the same, the difference observed being occasioned by the medium in which they are developed. We have seen the common red plum in the loose earth of a garden put forth buds from a root with as much regularity as from the branches.

The buds seem to possess in some respects the nature of seeds, although in others they differ. The seed produces the species or original type, while the bud perpetuates the variety; hence the practice of grafting choice fruit. The bud will continue the characters of the individual variety, while the seed would produce merely the species, with perhaps none of the peculiarities of the plant from the fruit of which the seed was taken.

60. The manner, in which the rudimentary leaves are folded up within the buds, is a subject of much curiosity and interest. Although the arrangement in different plants is very unlike, yet in the same species there is a remarkable uniformity. This subject has been termed, *vernation*, or *germination*, or *prefoliation*.

1. *Appressed*; in which the surfaces of the leaves are applied to each other without being rolled, as in the Misseltoe, fig. 32. *a*.

2. *Conuplicate*; when the leaves are folded inwardly upon themselves & placed side by side as in the rose, fig. 32. *b*.

3. *Imbricate*; where they lie over each other, breaking joints, if we may use the expression, that is, when the middle of one leaf corresponds to the margin of the two within it, as in the Lilac, *c*. 
4. **Equitant**; when the leaves are folded around each other with the midrib, of one corresponding to the margin of the one contiguous to it as in the Iris, d.

5. **Obvolute**; when one margin of a leaf encloses the margin of a leaf opposite, and the remaining margin of each being outward, as in the sage, e.

6. **Plaited**; folded like a fan, as in the vine, f.

7. **Involute**; when the margins of the leaves rolled inwards as in the violet, g.

8. **Revolute**; where the margins are rolled outwards, as in the willow, h.

9. **Convolute**; where one leaf is rolled within another, as in the cherry, i.

10. **Cercinate**; where it is rolled from the apex downwards as in the sundew, (Drosera) k.

**Section 6.—Leaves.**

61. **Leaves** are organs arising at regular intervals along the main axis or branches, having their origin at a node. They are expansions of the parenchymous portion of the bark, with the spiral vessels and woody fibre of the medullary sheath traversing it. The leaves are connected to the center of the stem by the woody fibre, spiral vessels on the one hand, and with the bark by the parenchymous portion on the other. A leaf consists generally of a petiole and lamina. The **petiole**, which is the support of the lamina, (fig. 33, a) consists of cellular and vascular tissue, and woody fibre. The vascular tissue and woody fibre are formed into bundles, the spiral vessels occupying the center of the bundle, and the woody fibre, forming a sheath around them. The bundles are imbedded in the cellular tissue, as may easily be seen by observing a transverse section of the petiole of a leaf. The dots observed on the cut surface are these bundles.—

The **lamina** (fig. 33, b) of the leaf consists of the expansion of the petiole, the materials of its composition being of course, the same, but differently arranged. When the bundles of vascular tissue enter the lamina, they divide and proceed in various directions in different plants, but always in the same manner in the same species, forming the veins (fig. 33, c) of the leaves. The continuation of the petiole forms the middle and largest vein of the leaf, called the **midrib**, (fig. 33 d.) Those veins arising from the midrib are called **primary**, the
branches of the primary are called secondary, and the further subdivisions of the veins are called veinlets.

Every leaf is by no means constructed with all the above parts. The petiole is often wanting, when the leaf is said to be sessile and the midrib is often undistinguishable from the veins, but the above gives the general type of leaves and the variations will be noticed in their proper places.

61. The arrangement of the leaves on the stem is various but in the same species it is uniform; a beautiful symmetry is established in every variety. Sometimes they are arranged in opposite pairs, with one pair at right angles with the pair above or below it; at others they alternate, with one above the other, on nearly opposite sides of the stem. The alternate leaves, however, are generally arranged in a spiral form. They are not on exactly opposite sides of the stem. The student will observe, that by taking any leaf on a branch on which the leaves are arranged alternately, he will notice the second leaf above or below the one observed, does not come immediately above or below it; but he must pass several pairs before he will find one corresponding exactly with the one first noticed. On the cherry, or Althea, for instance, he will pass two pairs before he will find one exactly over the one observed. Here two turns of the spire take place before the generating point corresponds with the one below it. Opposite leaves sometimes become alternate, but we believe, that they are always exactly on the opposite parts of the stem, never forming the spiral arrangement of common alternate leaves; and the cause of this alternation is undoubtedly the unequal development of the two sides of the stem. It sometimes happens that several opposite pairs are developed on the same horizontal section of the stem and are called verticilate, but the basis of the leaves of any whorl are not immediately under the basis of the leaves of the next whorl above it, but those of the second whorl correspond with them, so that of four whorls the basis of the first and third correspond, and the second and fourth and so on. The Pine presents a striking example of the spiral arrangement of organs. If we examine the extremity of a branch covered with leaves, we shall readily discover, that they are arranged spirally; and by cutting off the leaves composing one spire, we shall find, that they do not form a single spire, but a compound one consisting of three or four spires running parallel to each other. The above are the different arrangements of leaves, but there seems a tendency in opposite and verticilate leaves to assume the spiral arrangement, without, however, varying
their relative lateral position; and this is true of all modification of leaves. Did we know, what concurrent circumstances were required for the development of a leaf, we might then perhaps find a reason for these variations. But there is not only a disposition of the leaves, but of all vegetable productions to assume a spiral arrangement. The stems of plants take, in almost all cases, more or less of the spiral growth however straight the stem may be. We may see this also in the epidermis of various trees and more particularly in the stems of twining plants as the hop and ivy.

The spiral arrangement of leaves has excited much interest recently; and Braun, a German Naturalist has applied Mathematical formula to express the elements of the spires in different species, and for determining their constitution. The most simple parts only of his memoir are admissible to an elementary work, and we shall state a few of his principles as quoted by Lindley. "All the spires depend upon the position of a fundamental series, from which the others are deviations. The nature of the fundamental series is expressed by a fraction, of which the numerator indicates the whole number of turns required to complete one spire, and the denominator the number of scales or parts that constitute it. Thus $8-21$ indicates that eight turns are made round the axis before any scale or part is exactly vertical to that, which was first formed, and the number of scales or parts that intervene before this coincidence takes place is $21$," which occurs in the Corylus, Plantago lanceolata. 2-5 expresses that the leaves, buds or scales make two turns, before a leaf, scale, or bud is exactly above the one from which we start and that there are five of them. This is the most common variety. Cherry, Althea, Potatoe, Peach, &c. are of this variety. $\frac{1}{2}$ includes the spikes of the grains. 3-8 includes the Bay, Holly, &c. Prof. Lindly remarks that, "it does not, however, appear that this enquiry has led to any thing beyond the establishment of the fact that beginning from the cotyledons the whole of the appendages of the axis of plants—leaves, calyx, corolla, stamens and carpels—form an uninterrupted spire, governed by laws which are nearly constant."

Conjectures have been made, as to the cause of the uniform arrangement of leaves on the stem, and why they take one form in any given species rather than another, but they are so completely conjectural that we shall not occupy space in stating them. Our own observations have not afforded us the least clue to the solution of the problem.

62. Leaves usually present surfaces of different appearance,
the upper, smooth, green and shining, the under surface gene-

erally with the ribs prominent, of a lighter green, often hairy,

and abounding in stomas or pores. The particular position,

which a leaf assumes, is necessary to its properly performing

its functions, and even to its existence; for if a leaf be inver-
ted it withers and dies. The deeper tint, of the upper surface
of leaves, is supposed to be owing to the greater compactness
of the parenchyma.

63. The first organs, that appear in dicotyledons after
germination, are the cotyledons themselves, or the lobes of the
seed, which supply the young plant with food, till it becomes
furnished with organs for obtaining it from other sources.
Before the cotyledons become exhausted, leaves are produced,
which are called *seminal* or seed leaves, which are capable
in some degree of elaborating the sap drawn up by the roots.
Next come the Primordial leaves which seem to possess an
organization a degree more elevated. These leaves often dif-
fer materially from the succeeding true leaves of the plant,
and seem to form a kind of medium between the cotyledon and
true leaves. A similar course is followed by Monocotyledons
but as the cotyledon does not arise above the earth, this organ
is not observed. When leaves have their origin at, or below
the surface of the earth, seeming to come from the root, they
are called *radical* leaves, although it is not strictly a correct
term; as it seems to imply, that the leaves originate from the
root, which is not the case, the root under ordinary circum-
stances not producing leaves. Leaves having their origin
on the main stem, are called *Cauline*; these arising from
branches are distinguished by the term, *rameal*; when leaves
are found among the flowers or on flower bearing branches,
they are called *floral* leaves.

64. The structure of the leaf demands our careful attention,
both from the singularly curious arrangement of its parts and
the manifest design exhibited in fitting it for the various func-
tions, it is found to perform. Although to the common ob-
server the leaf appears a very simple organ, composed of sim-
ple fibrous veins, and cellular substance; yet by the aid of the
microscope it is found to be one of the most complicated of the
vegetable organs. The leaf is covered like the other parts of
the plant by a cuticle, except such as are submerged in water,
and is furnished with pores or stomates. These pores in most
plants, are more numerous on the under, than on the upper
surface. In leaves which grow nearly perpendicularly, the
pores are more equally distributed on both surfaces, as in the
Iris. These leaves which lie upon the water, have no pores on
the under surface; the upper surface performing the functions usually belonging to the under side. The Parenchyma appears to the unassisted eye a mass of irregularly arranged cells, but by careful examination, aided by the microscope, we find a remarkable regularity in the arrangement of the cells. If we take a thin slice, made by a vertical section of the leaf of an Apple or Peach tree, and observe it by a good magnifier we shall find that immediately beneath the cuticle which consists of a single row of cells, two or three layers of cylindrical cells arranged perpendicularly to the surface, with very small intercellular cavities. Between them and the under surface are four or five rows of similar cells, but differently arranged touching each other by their ends and lying inclined to the surface of the leaf forming comparatively large cavities, particularly immediately beneath the stomates. Fig. 34, a, exhibits a type of the arrangement of dicotyledons.

That side of the leaf which is furnished with stomates being cavernous, and the opposite side more compact. Those leaves, which have the stomates equally distributed on both surfaces, and those also which have no stomates, have cells of the parenchyma of the two surfaces similarly arranged. Our space forbids our recording here the numerous discoveries of Mirbel, Mohl, Brongniart and others in this interesting department of vegetable anatomy. The example above given will give the student an idea of the arrangement made for the purposes of digestion, respiration and perspiration in the plant, which functions we shall notice in another place.

65. The veins of the leaf, which ramify in every direction through the Parenchyma, are composed as we before observed, of vessels enclosed by a sheath of woody fibre. These veins serve two purposes, that of giving form and support to the Parenchyma and affording channels for the circulation of the sap to the various parts of the leaf, and returning it to the stem. The veins are largest where they enter the leaf, and decrease as they proceed and ramify till they are lost to our observation in the cellular tissue. There seems to be two separate venous systems in the leaf, one over the other con-
The leaves of trees have a general position, nearly parallel with the earth. The upper side, exposed to the direct action of the sun's rays, lest evaporation should take place too rapidly, under such circumstances, has few or no pores and the cells being of a cylindrical form are arranged with their ends towards the surface, thus presenting the least surface of each cell to the influence of the solar rays, by this arrangement limiting their influence. Here we observe three precautions taken evidently to prevent excessive evaporation. Again, those leaves whose sides are equally exposed to the action of the sun's rays, are equally furnished with these evaporating pores; the number in this case determining the evaporation. In leaves floating upon the surface of the water, it is evident, that pores on the under surface would avail nothing in evaporation, and perhaps be destructive to the organ; but the upper surface in this case, is furnished with numerous exceedingly minute pores connected with deep narrow cavities next the surface, and these are connected with larger ones in the interior so that by this arrangement evaporation can take place, but slowly. Nature using these precautions where she seems obliged to use the upper surface to perform an indispensable function, which without such precaution, would endanger the safety of the plant.

65. Forms of Leaves.—By the arrangement and development of the venous and parenchymous systems of leaves, every variety of form, which leaves assume, may be reduced to a few very simple principles.

1. Fork-reined leaves are those leaves in which the primary veins divide into two, nearly equal, secondary veins, forming a fork, and these sub-divided in the same manner. The
veins always proceed directly from their origin to the margin of the leaf without forming any meshes or net work, as is exhibited by a leaflet of the Aspidium Acrurtichoides (fig. 35.) This variety of venation belongs to the ferns, and is a distinguishing characteristic of this class of plants.

2. Parallel veined leaves are those in which the veins proceed from their origin to their termination without any subdivision; the veins being connected by minute, parallel, straight veinlets, passing perpendicularly from one to the other. The veins of this variety either run from the base of the leaf to the apex, as in Corn, Lily, Grains, and as seen in fig. 36, a; or from the midrib to the margin, as in the Cazna and Arum Walteri, &c. (fig. 36, b.) Of this latter variety there are comparatively few specimens in temperate climates, becoming more abundant as we approach the equatorial regions. Parallel veined leaves are characteristic of Endogens.

3. Reticulated or netted veined leaves are those when veins branch and ramify in all directions, and by anastomosing with each other form a complete network. This variety of leaves is characteristic of Exogenous plants, and they are the most varied in their forms, and comprise the greatest proportion of leaves of temperate climates.

From the above remarks we observe that the three great classes of vegetables are characterised by distinct modes of venation. Flowerless plants, or Acrogens, so far as they fall within this subject, are characterised by the forked veined leaves. Endogens are, with few exceptions, as in the Trillium and Smilax, distinguished by the parallel, and Exogens by the reticulated veined leaves. These are important distinctions for the student to bear in mind, as they may be of much importance to him in many cases, when all other characteristics of these divisions may be absent, or obscure at the time of examination.

67. We now proceed to point out the different varieties of simple leaves, occasioned by the course of the veins. There are two varieties of venation in the reticulated leaves, occa-
vised by the origin of the primary veins. If the veins take their rise along the midrib and proceed to the margin, giving the leaf, in structure, a resemblance to a feather, it is called the Feather veined, as seen in fig. 37, which represents the leaf of the Chestnut. The form of the leaves of this variety, depends on the direction and relative length of the veins. If, as in the chestnut, the veins make an acute angle with the midrib, and proceed straight forward to the margin, the leaf is proportionally lengthened, and takes the name of lanceolate. If the midrib and veins near the apex are considerably elongated its apex is said to be acuminate. If the primary veins are short and of nearly equal length, the leaf will be narrow and elongated, and is denominated linear. (fig. 38.) If the veins that proceed from the middle of the midrib are larger than those of the apex or base, it assumes the form of fig. 39, a, or some similar outline, and form the varieties oblong, oval, elliptic, or in some cases approaching orbicular (fig 39, b.) If the veins springing from the base are larger than the rest, and proceed from the midrib at a greater angle, the leaf assumes the oval form. (fig. 40,) but if the reverse takes place with the veins, that is, if the veins above the middle be the longest, the shape of the leaf will be reversed and we shall have the obovate leaf, (fig. 41.) It not unfrequently happens, that the veins that originate at the base of the midrib are nearly as large as the midrib itself, and run in nearly a parallel direction with it, as in the Cornus, (fig 42.—These are called ribbed leaves, and the student must be careful not to confound this variety with parallel veined leaves from which he may in most cases, ca-
sily distinguish them by observing the net work arrangement between the ribs.—*Falsely* ribbed leaves, are those whose primary veins unite near the margin and form what appears to be a true vein, but in reality consists only of an accumulation of the extremities of the primary veins. The other forms of simple reticulated leaves, are those which have generally no midrib distinguishable from the other veins, but the veins as they enter the lamina of the leaf radiate from their point of entrance at the margin of the leaf in every direction, and thus constitute the radiated form of reticulated leaves. The leaf of the *Heuchera Americana* forms a good example of this variety, (fig. 43.) It is sometimes the case that the petiole supports the lamina by being attached to its center, and the veins radiate from this point in every direction, forming the *Peltate* leaf, as exhibited in *Hydrocotyle* and *Nasturtion*, (fig. 44.) Professor Gray well remarks that the secondary veins of radiated leaves are always disposed according to the feather-veined method; so that we may assume the latter as the type of the venation in Exogenous plants, and conceive a radiated leaf to result from the union of several feather-veined ones.

68. The above are the most common forms assumed by leaves when the spaces between the veins are perfectly filled by the development of the Parenchyma; but it often happens that the parenchyma is not sufficient to occupy all the frame work of the leaf, and leaves assume a great variety of forms from this cause. Let us suppose that in a leaf like the *Heuchera*, no more parenchymous substance had been developed than was sufficient to cover the veins themselves and we should have the leaf of the *Ranunculus Panthorix*, (fig. 45.) Should the leaf have the same venation as in the pre-
If we take the type represented by the Nasturtium and Hydrocotyle and a development of the parenchyma only sufficient to cover the veins attached to each rib and we have the palmate leaf of the Podophyllum peltatum, fig. 48.) We have a striking confirmation of the above theory of the origin of lobed leaves, in the Hydrogeton fenestralis, a plant peculiar to the island of Madagascar. It is an aquatic plant bearing leaves having the appearance of latticework, It is a skeleton leaf, the parenchyma being only sufficient to cover the veins. The veins are fully developed and regularly arranged like other leaves of the same variety, but no parenchyma is generated to fill up the spaces between the veinlets.

69. It not unfrequently happens, both in reticulated and parallel veined leaves, that the first veins after entering the lamina curve downwards, and if they assume afterwards the upward direction they form by these flexures the cordate variety of leaves, as in the Smilax (fig. 49) among the parallel veined leaves, and in some species of Poplar (fig. 50) in the reticulated. If the veins continue downwards, they form the Sagittate leaves as in the
Sagittaria (fig. 51) and Asarum (fig. 52.) The former an Endogens the latter an Exogens. From the above remarks the student will readily determine the causes of every variety of form of simple leaves which may fall under his observation; arising, as the diversity does, either from the arrangement of the veins, or the development of the parenchyma. The non-development of parenchyma seems, by examination of some leaves, not to be the cause in all cases of lobed leaves, but in some instances the non-development of the veins; for the undulating margin of such leaves shows an excess of parenchymous substance, and yet the leaves are lobed. Example of this formation may be found in different varieties of the oak, as the Quercus alba, Lyrata, &c. The student will observe that the spaces between the lobes, particularly in the Lyrata, are very sparingly supplied with veins, showing that it was a want of development of veins that caused the lobed form of the leaf.

70. Compound leaves are those which have the lamina articulated to a common petiole; and this fact must be borne in mind as the real distinction between simple and compound leaves. No matter how much the lamina may be divided, if the divisions are not articulated to a common petiole, the leaf is simple; and if the lamina is not divided at all, but articulated to the petiole, the leaf is compound, as in the Orange (fig. 53.) The principle of formation of this class of leaves will be readily understood by the above explanation of simple leaves.

All compound leaves may be reduced to two varieties corresponding to the Feather veined and radiated forms of reticulated leaves. If we recur to the chestnut leaf given above, and conceive each of the primary veins with the secondary veins belonging to it, to form a distinct lamina, we should have a true
type of the *Pinnate* leaf, as exhibited in the *Vicia*, Pea, &c., and by the continuation of the petiole we have the *tendril* (fig. 54) and by continuing our supposed dissection of the chestnut and conceiving not only each primary vein as being independent of the others, but each secondary one forming a lamina, and the primary vein becoming a common petiole for them, we then shall have the type of the bi- *pinnate* leaf, as exhibited in fig. 55, a. We may conceive this division to go on still farther and form the tripinnate leaf, as in the *Thalictrum*, (fig. 55, b) and it even exceeds this subdivision when the term *supradecompound* is applied to them, no matter how far the divisions may extend. The radiated form of reticulated leaves, often assume the compound structure, as in the *Áesculus*, *Lupinus*, Clover, &c. (fig. 56) but the student will find no difficulty in detecting the principle on which they are constructed from the above remarks, without a description.

71. Besides the preceding varieties of leaves, which may be considered their common forms, they often assume a variety of modifications which deserve a special attention. These variations arise from a variety of causes, which will be noticed under the several examples which we shall adduce. A cohesion of parts, not unfrequently creates a variation from the usual form. The bases of the upper leaves of the *Caprifolium Sem.*
pervirens are brought in contact from the unusual development of both systems of the leaf, and they grow together, forming a perfoliate leaf, (fig. 57.) The same takes place in many other plants, and the occurrence differs in no respect from what happens in the production of twin apples, and other similar formations except in its uniformity, which DeCandolle denominated constant accidents. Why it should uniformly occur, and only in the upper leaves, we are unable to explain, by any secondary cause with which we are acquainted; but by examination of the leaves, we are irresistibly led to the conclusion, that the slight variation in the direction of the veins and the great development of the parenchyma are the causes of the phenomena. The other leaves are of the oval lanceolate form, with the veins forming acute angles with the midrib, but in the perfoliate leaves the veins pass off at nearly right angles with a much more abundant production of the parenchyma, thus uniformly accomplishing in this case what occasionally happens in other vegetables; perfoliate leaves occur from the same cause in the alternate varieties by the union of the lobes, of what would otherwise form a cordate leaf, as in the Uvularia perfoliata, fig. 58. But the most singular variations produced by the operation of this cause, occurs in the pitcher like leaves. Our common Sarracena (Side-saddle flower) is produced by the cohesion of the edges of the leaf, or as is most generally supposed of the petiole only, and the expansion at the top of the cup is thought to be the real lamina, which is probably the case, (fig. 59.) The Nepenthes or Pitcher plant of India, presents a still more striking instance of variation, and partly from the cause under consideration. This singular leaf, exhibited in fig. 60, is described as arising from the stem with a round common petiole, like most other leaves, which soon expands into a lamina and afterwards becomes round, long and slender, resembling a tendril. At
the extremity of this tendril is developed the pitcher with a lid closely fitting its orifice. The whole of this curious production, except the lid, is supposed to be the petiole which at first assumes the common form, and afterwards becomes a *Phyllodium* (as a leaf like expansion of the petiole is called,) and is succeeded by the tendril, and finally by the cohering of its edges, forms the pitcher, whose lid is the lamina of the leaf.

72. An unusual development of certain parts often produces great variations from the regular form. The petiole is the part of the leaf that experiences most frequent changes from this cause. In the *Dionaea Muscipula* (fig. 61,) we find the petiole expanded into a phyllodium and terminated by the lamina bearing much less the appearance of this part of the organ than the petiole. The orange also has an expanded petiole with the lamina articulated to its extremity. We have described, by authors, foreign plants exhibiting remarkable variations from any regular type, in some of which the petiole is developed apparently at the expense of the lamina, which is either entirely wanting or but imperfectly developed. The leaves of the onion are supposed to be a development of the petiole with no lamina, and many of the leaves of the *Endogens* are supposed to be of the same nature, as the *Iris, Calamus,* &c. The excessive development of the cellular substance in leaves, often causes great diversity in appearance as in the various species of the *Mesembryanthemums,* (*Ice plant,) this cause operates to produce the singular forms observed in the different species of this genus. In the *Begonia,* the parenchymous development on one side of the midrib
much greater than on the other, thus producing the oblique or one sided leaf, (fig. 62.)

A want of development and hardening of the parts often produces deviations from the usual forms. The existence of spines at the extremities of the lobes of the Holly, is owing to these causes, and in some radiated leaves the veins seem to be converted unto spines, and in a species of the Prospolis "one half of the leaflets contract into a spine while the other half remains leafy. But the most singular instance of this kind of deviation occurs in a palm called the Desmoncus, in which the upper leaflets of its pinnated leaves contract and curve into scythe shaped hooks by which the desmoncus climbs, while the lower leaflets retain the usual appearance of leaves."

73. The Petiole is sometimes entirely wanting, but at others excessively developed. In sessile leaves it is absent, but in the Nymphaea odorata, a water lily, it is even six or eight feet long. In the Palm, Palmetto and other tropical plants, it is much longer, and assumes more the appearance of a branch than a petiole. The lamina varies also from the size of the minute scale-like leaves of the Moss to prodigious dimensions on some tropical leaves. These organs in general bear no proportions in size to the plants on which they are found.—On some species of the Oak, of the most sturdy kind, the leaves are small, but feebly corresponding with the gigantic tree itself, while the leaves of the Rheum Rhaponticum (Pie plant,) are exceedingly large, the plant itself, divested of its leaves, is comparatively, in size, an insignificant plant.

74. The duration of leaves is various. In some they fall almost as soon as developed, and are then said to be fugacious, at others they remain till the end of the summer and fall with the cessation of vegetation, when they are called caduceous. In others they remain during the winter, and are denominated persistent, and produce the various evergreens of our forest. Various hypotheses have been formed to account for the fall of the leaf, but the most satisfactory one to our mind, is that given by Professor Lindly, which is, that while the stem and leaf are both increasing in size, there is an exact adaptation of the base of the leaf to the stem and no interruption takes place; but when the leaf becomes perfectly developed and is susceptible of no further increase, the stem continues to enlarge by the deposition of new matter from the leaves above, which breaks the joining vessels, and the leaf of course falls. The breaking of the vessels may be easily observed in the
leaves of the Magnolia Heterophylla, hence the reason for the fall of leaves on the lower part of a stem first. It would seem from the above, that the duration of leaves depends upon the time that they are capable of adapting themselves to the stem on which they grow. Some can exist only for a few days, others through the summer, while the evergreens are so constructed as not to be dislodged but by the growth of the wood of the succeeding year.

Section 7.—Stipules and Tendrils.

75. At the base of many leaves we meet with two leaf-like organs, separated by the substance of the base of the petiole, which are called Stipules. Stipules frequently fall off upon the development of the leaf, when they are called caducous, at others they remain as long as the leaf, and are called persistent. In the former they are attached only by their base to the stem, in the latter they are connected with the petiole and fall only with it. In opposite leaved plants the stipules corresponding to the two leaves are generally united, forming but two stipules instead of four. The hop affords an example of this kind. The stipules are in many respects analogous to leaves, and even have buds in their axils, as in the Peach, and in some instances are very much like them in appearance, as in the Pea, (fig. 63.) In others they bear no resemblance to the leaves but are simple membranous appendages, as in the Hickory, or fine bristles as in the Cherry. They assume a great variety of appearances, by various modifications of structure and attachment. In the rose they are attached to the petiole forming a leaf-like margin to that organ. In the Polygonum and Rhubarb they form a sheath round the stem by the union of their edges, and are then called ochrea, (fig. 64.) In some plants they become hardened and conical and form spines. In climbing plants they often lengthen into a slender thread-like appendage, and become the organ by which the plant attaches itself to objects over which it climbs, thus forming for the plant the means of support. But however various may be their appearances, and however unlike in structure, yet if they originate from the base of a leaf they are stipules.
76. Tendrils are thread-like organs by which the plant attaches itself to neighboring objects. Whatever may be their origin, if they correspond to the above definition, they are denominated tendrils. In some plants they are modifications of branches, as in the Vine, in others they are the extension of the midrib of the leaf, as in the Vicia and Pea, in others modifications of the Stipule, as above noticed. 'Tis said that the petals sometimes become tendrils and support the plant, as in the genus Strophanthes, an African plant.

CHAPTER III.

77. The Organs of Reproduction compose the flower, which consists generally of the Calyx, Corolla, Stamens and Pistils. Although all of these organs enter into the composition of most flowers, yet it is by no means necessary, that they should all be present. A perfect flower is one that has stamens and pistils, without reference to the presence of the calyx or corolla. When these latter organs are wanting and the stamens and pistils have no envelops the flowers are said to be achlamydeous or destitute of covering, as the word signifies, at others they have a single envelop and are said to be monochlamydeous, or having a single covering and this envelop is called the calyx; at other times, they have a double envelop and are called dichlamydeous, or having a double covering, in this last case the outer envelop is called the calyx, and the inner the corolla. By strictly adhering to the above definitions, all flowers, which do not have a double envelop, have no corollas whatever may be the appearance of the envelop which is present. The Lily, Anemone and many other showy flowers, have correctly speaking no corolla. It is not unfrequently the case, that there are several rows of envelops and so nearly of the same constitution and appearance as to be undistinguishable from each other, in such cases the calyx and corolla are said to be confounded, that is, they cannot be distinguished as in the Calycanthisus and the whole is called in such cases a perianth.

78. The word calyx is derived from a Greek word (calux,) which signifies a covering, and is a generic term applied to designate every form of the external envelop which surrounds the stamens and pistils. The general distinguishing characteristics of the calyx are: that it is the outer covering of the flower, green, smaller than the corolla more firmly attached
to the plant, and having more the appearance of leaves. Although the above may be considered as designating this organ in most plants, yet there are numerous exceptions to it. The first part of the definition, that it is the outer covering, is the only characteristic that never varies. It is sometimes even more brilliant in its colors, and larger than the corolla itself, and instead of being more permanent, in some species of plant, it falls even before the corolla expands, but these are exceptions to a general fact.

79. When the calyx consists of a single piece it is said to be gamosepalous, a term invented to indicate the union of several sepals in forming the calyx. When it is composed of several distinct leaves, it is called Polysepalous. In the gamosepalous calyx, that portion formed by the union of the sepals is called the tube fig. 65, a the expansion at the top (b) is called the limb. If the calyx takes its rise below the ovary or seed vessel, it is said to be inferior, if from the summit of the ovary, it is said to be superior.

The origin of the calyx in both cases is undoubtedly the same, that is, from beneath the ovary; but in the superior calyx it becomes firmly united to the ovary and forms a part of it, as in the Apple. The Rose and a few other plants form exceptions to the above, as what appears to be the cup-like calyx of the Rose is now considered, and correctly too, as an expansion or hollowing out of the summit of the pedicel, in which the calyx is situated.

80. Corolla.—As we above remarked, when there are two whorls of floral envelops, the interior is called the Corolla. The divisions of the corolla are always alternate with those of the calyx, a necessary consequence of the law laid down in par. 76, that the bases of contiguous whorls of leaves are alternate. The individual leaves of which the corolla is composed are called petals, and if the petals are united by their margins forming a tube, the corolla is said to be gamopetalous, if they are distinct it is called polypetalous.—The orifice of the tube is called the throat.

81. The forms assumed by gamopetalous corollas are various and have received characteristic names, the principal of which are the following:

1. **Rotate** having a very short tube with a spreading limb, as in
2. Hypocrateriform, with a border like the preceding, but with a long tube, (fig. 67.)

3. Infundibuliform, (fig. 68,) or Funnel shaped, having a regularly expanding tube, as in the Convolvulus.

4. Campanulate (fig. 69) with the tube swelling at the base and then gradually expanding into a limb.

5. Labiate. When the corolla is separated into two unequal divisions called the anterior, or lower and posterior or upper lips, (fig. 70,) as in the Mint. The Personate corolla differs from the Labiate only in having the throat closed by a projection of the lower lip (fig. 71.)

6. Urceolate or pitcher-shaped, the same as campanulate, but with the orifice contracted and an erect limb (fig. 72.)

Many other terms have been applied to various modifications of forms of the gamopetalous corolla, but our space forbids our extending the list beyond the most common and therefore most important forms.

82. In Polypetalous Corollas each petal consists of a limb or lamina and unguis or claw. The claw is the narrow part of the petal by which it is attached to its support, and corresponds to that part in the gamopetalous corolla, which forms the tube and is the petiole of the leaf. The limb is the dilated portion of the petal supported by the claw, and is the lamina of the leaf. The claw is not always present; when it is present the petal is said to be unguiculate.

83. The terms applied to the different forms of the polypetalous corolla, are

1. Rosaceous when there are several spreading petals without claws as in the Rose or Apple, (fig. 73.)

2. Lilliacceous when the petals stand side by side with the claw
gradually expanding into a limb, (fig. 74.)

3. Caryophillous, with long slender claws protected by a tubular calyx with an expanding limb, as in the Pink (fig. 75) When the claws are short the flowers are called alsinaceous.

4. Cruciform are such as consist of 4 petals arranged opposite, or at right angles to each other, as the Turnip, Cabbage, &c. (fig. 76.)

5. Papilionaceous consist of 5 petals of which the upper is erect, more dilated than the others, and is called the vexillum, (77, a) the two lateral are at right angles with the vexillum and of course parallel with each other and are called the wings or alae. (fig. 77, b,) the two lower are shaped like the wings and parallel with them, and cohere by their lower margin and form the keel or carina, (fig. 77. c.)

This form of the corolla is peculiar to the order Leguminaceae, including the Pea, Bean, &c.

84. It very frequently happens that we find in examining flowers, parts which we can refer to no organ with which we have become acquainted. They appear to be distinct from the calyx, corolla, stamens or pistils, and can be comprehended under none of these organs, although situated among them and attached perhaps to them. All such parts are called appendages, and, from the variety of form they assume, much confusion has been created in their description, from the want of uniform terms applied to them.

They have their origin either from the corolla or stamens. Every appendage arising from the corolla is called a paracorolla, and if consisting of several pieces a lamella. When one arises from the stamen, it is called a parastemon.
The appendages of the *Passiflora incarnata*, *Narcissus tarenta*, and the several species of the *Silene*, are undoubtedly modified petals, while many appendages found among the Asclepiadaceae are as plainly modified Stamens. The term *corona* is most commonly used by writers to designate every appendage which appears regularly around the centre of the flower, whatever may be its origin. An appendage originating from stamens is generally fleshy, and has bundles of vessels corresponding to the number of stamens of which the corona is composed. This fleshy part of the appendage has received the name of *orbicularis*; horn-like processes arising from its summit are called *cornua*, the upper end of them is the *beak* or *rostrum*; and the back, if it is dilated and compressed, is the *ala* or *appendix*; horns proceeding from the base of the orbiculus are called *ligulae*; the circular space in the middle of the top of the orbiculus is called the *scutum*.

The small appendage at the base of the petals of the *Ranunculus*, Prof. Lindly thinks, is "a barren stamen united to the base of the petal."

The *Spur*, *Calcar* or *nectarotheca*, is a hollow horn-like appendage developed on the back and near the base of the petal opening on the anterior face. Raspail considers this appendage as later in its formation than the petal, and hence concludes that it is rather an accidental organ, and that in cases wherever it is not developed the petal is in its normal condition, as sometimes happens in the *Aquilegia*.

Most of the above forms were considered by the earlier Botanists as *nectaries*, but with manifest improbity, since but few, if any, of them secrete honey.

*Bracts.*

85. There are often to be found organs situated between the true leaves and the calyx, varying from them in outline, color and size, which are called *bracts*. Many varieties of bracts have been, till very recently, classed as varieties of the calyx; and some Botanists, even at the present day, adopt this arrangement. The bract seems to occupy a space between the leaf and calyx, not only by collocation on the plant, but in constitution and functions. They appear to perform the same office in many cases as the calyx, and in others seem not to differ in this respect from the true leaves.

Their position and form, have given them various names, of which the following are the most common.

When they appear as simple scales on the peduncle, or at
its base, they take only the general term bract, as in the
Heart's ease and Veronica agrestis.
When they are verticillate and surround several flowers,
they constitute an involucre, as in the Umbelliferae. In
Compositae the involucre assumes the appearance of a calyx,
enclosing many flowers, but each floret has a calyx more or
less developed enclosing the seed and appearing on its sum-
mit in the form of egret, scales or an elevated margin. At
the base of this involucre there are often bracts, not constitu-
ing a part of it; these are called bractlets, and the involucre
is said to be bracteolate. In the Cupuliferae the involucre as-
sumes a more singular appearance, forming in the Oaks the
hard cup shaped organ enclosing the base of the acorn, and
in the Chestnut constituting what is well known by the name of
Bur. The real calyx in these cases exists in a rudimenta-
ry form immediately surrounding the pistils, as may be read-
ily observed in the pistillate flower of the chestnut. In the
Cornus or Dogwood the involucre consists of the four large,
white, showy leaves which one, not a Botanist, would take for
the corolla. In the Euphorbia the involucre is composed of
two rows of united leaves, forming what might be easily mis-
taken for a calyx and corolla, as the outer part is green, while
the inner is colored. In the Beach it resembles a pericarp.

The bracts of the Catkin are usually called squamae or
scales, a term usually applied to any scaly appearance, and
the organ on which such scales appear is said to be squamose.

The chaff on the receptacle of the compositaceae is another
form of the bract and they are called paleae.

The Spathe is a bract which encloses the aggregated florets
of a spadix, as in the Arums.

86. The kind of bracts which demands the most careful at-
tention of the student, if he expects to encounter with success
the large family of plants to which it belongs, is the form they
assume in the grasses. We believe the great and discourag-
ing difficulties which are encountered by the student in his
very first efforts to analyze the plants of this important and
interesting family of vegetables, is owing, more than to any
thing else, to the failure in obtaining distinct ideas of the
terms used in their decription and of their application.

Let the student take the Crab-grass Digitaria sanguinalis,
as a specimen for examination. I mention this, because it may
be found in all places included in this treatise, and in bloom
through the summer, and known by every body. Other speci-
mens might be taken, which would answer our purpose better
in some respects, but the student might be unable to discover
to what grass we alluded, or it might not be found in all sections, but by carefully applying the following description to a specimen, the student will be enabled to apply his knowledge, by a little patience and perseverance, to other genera. Let us take a specimen of the Crab-grass. We find it consisting of three spikes of flowers. The flowers of each of these spikes we find arranged on one side of a common support called rachis, in two rows. If we take one of these spikes and bend it, we see the flowers, which before lay so closely to the stem, separate from it and exhibit themselves as little spikelets of about a half an inch long. By examination we find that each of these spikelets is composed of two flowers. One of these flowers we will take for examination. Instead of commencing with the outer envelops, as is common with other flowers, we will commence at the centre. We find at the centre the ovary, stamens and pistils; and immediately surrounding the ovary we find two opposite membranous bracts which we shall call Palea, as the highest authority of the present time gives them this name. Elliott calls them the corolla, and by different authors they have the names of calyx, perianthium, gluma interior, perigonium and gluma. Within the Paleæ of some grasses, as the Bromus, there are two small hypogynous, fleshy, colorless scales, which are called squamulae. Elliott calls them nectaries; and in other cases, instead of the squamulae are found bristles, as in the Cyperaceæ, called hypogynous setæ. Without the paleæ of our specimen of Digitaria, we find two bracts enclosing the others, which are called glumes; the calyx, gluma exterior and tegmen of authors. The glumes do not always enclose a single flower, but most generally are at the base of the spikelet, and enclose many flowers, as in some of the Panicums there are two, and in the Bromus several. In some instances there are many glumes with no flowers, as in the Schoenus, the lower ones being empty. The student may adopt as a general rule that those bracts immediately surrounding the stamens and pistils are Paleæ, and all others Glumes.

Inflorescence.

87. The manner in which flowers are arranged on the flower-bearing stem or branch is termed Inflorescence. From the fact that all floral organs are modifications of leaves, and have the same origin, it follows, of course, that primarily they have the same arrangement, however modified this arrangement may become in the course of development. By observation
we may easily reduce all the various forms of inflorescence to two primitive types, the *determinate* and *indeterminate* arrangements.

By *determinate* arrangement is meant that kind of inflorescence which occurs when the primary axis of the plant is terminated by a flower; (meaning by the *primary* axis the stem arising from the root.)

The most simple case of this kind is when the stem bears a single flower; there being no secondary axes.

When the secondary axes are developed, the lower being proportionally longer, so that all rise to the same height with the central flower, we have a Corymb, (fig. 78;) but if neither the primary nor secondary axes lengthen but become crowded together around the same point, we have the *Capitulum* or head, as in the compound flowers, (fig. 79.)

Each little flower comprising a capitulum is called a *floret*. The florets are often very different in appearance, some consisting of a ligulate or flattened limb arranged around the circumference like the petals of other flowers, and are called *ray florets* as are seen in the *sun flower*, while the central are usually tubular and inconspicuous and are called *disk florets*. The ray and disk florets often differ in respect to the organs they contain. Sometimes they are both perfect, that is, both containing stamens and pistils, when they are said to be *homogamous*; at others the ray florets may be destitute of either stamens or pistils, or contain pistils only, and the disk contain only stamens; in any of these cases the capitulum is said to be *heterogamous*.

But if like the capitulum in other respects the axes are lengthened in proportion to the distance from the center, we have the *umbel*, (fig. 80.) in which the pedicels all originate from the same point; and if the second axes develop tertiary axes in the same manner as the primary develop the secondary, we shall have a compound umbel, as in fig. 81.

The whole taken together is called the *universal umbel*, while those supported by the secondary axes are *partial umbels*. 
These axes themselves are called *radii*.

The preceding varieties follow the *centripetal* order of flowering, that is, the flowers farthest from the centre expand first.

But there are others of the *determinate* form which follow the centripetal order of flowering, that is, the central or upper ones expand first, and the external or lower ones last. When the secondary axes start from the same point, as in the umbel, but these dichotomizing producing tertiary branches, with a flower in the axil, we have a *cyme*, (fig. 82.)

A *glomerule* is similar to a capitulum, but differs from it as a simple umbel does from a compound one, that is, it is composed of numerous capitula, enclosed in a common involucre as in the *Echinops* or *Globe Thistle*.

A *Fascicle* is of the centrifugal order of expansion, and is, in other respects, similar in appearance to the umbel, but has the arrangement of the cyme with the flowers more compact and branches shorter. The *Pink tribe* affords examples.

**Indeterminate Inflorescence.**

83. This form of inflorescence is characterized by the continued growth of the primary axis, while the secondary and tertiary are arrested.

The *Spike* is of this form and is supposed to be produced by the continued elongation of the primary axis, while the secondary, having no power of elongation, produces sessile flowers along a common axis, which constitutes the *spike*, (fig. 83,) as in the Plantains.

When sessile flowers are arranged on a filiform rachis, which falls off after flowering, it is called an *ament*.
or catkin, as in the Willow, Hazle, &c. (fig. 84.) When a fleshy axis is densely covered with flowers enclosed in a spathe, it is called a spadix, as in the Arum, (fig. 85.)

If the secondary axes are equally developed around the primary, as in the Currant and Hyacinth, we have the raceme, (fig. 87.) The raceme differing in no respect from the spike, but in having pedicilate flowers.

If the secondary axes develop tertiary ones a panicle is formed, (fig. 88,) as in the Poa. The term deliquescent

panicle is applied to that variety of the panicle, when the rachis is lost in its irregular divisions and does not continue direct through the inflorescence. The ramification of the axes may proceed further, forming compound panicles. A very dense panicle, with the lower branches shorter than the middle ones, is called a thyrsus, as in the Lilac.

89. The preceding arrangement is that given by the writer of the treatise on Botany, in the Library of Useful knowledge, and it seems to offer a much more simple exhibition of the various forms of inflorescence than has fallen under our observation. It founds it on hypotheses which are simple and always applicable; so that by a few moments labor the student may gain principles which he can readily apply in arranging the various forms of inflorescence with which he may meet.

An entirely new theory has been proposed by the continental Botanists of Europe, but it is much too difficult to be comprehended by beginners in Botany or to be applied to any practical purposes, in any state, in which we have seen it, and our limits forbid our giving even an outline of it.
There are various parts about a flower which need to be noticed before we pass from this subject. The small branch which bears a single flower or bunch of flowers, is called the peduncle. When the peduncle bears many flowers the little organ that supports each flower is called a pedicel. Sometimes the peduncle is itself divided and its divisions are called branches.

When the peduncle rises from the earth and bears the flower, it is called a scape. A rachis is a peduncle that proceeds through the center of the inflorescence from the base to the apex. It is also called the axis.

When the part that bears the flower instead of being lengthened into a rachis forms an enlarged and flattened surface at its extremity, on which the flowers are arranged, it is called a receptacle.

Stamens.

90. Immediately within the corolla are situated a row of organs called stamens. The stamens, like the calyx and corolla, are modifications of leaves. They usually consist of three parts, filament, anther and pollen. The filament is the thread-like organ which supports the anther (fig. 89, b.) This is not necessary to the functions of the stamens any more than a petiole is necessary to a leaf. The anther is the knob, usually yellow or brown, situated on the summit of the filament, (fig. 89, a,) or if the filament be absent, it sits upon the receptacle. The pollen is the yellow dust-like substance contained within the anther, and is necessary in the vegetable economy to the perfection of the seed.

91. The arrangement of the stamens is usually alternate with the petals or their segments, and of course opposite those of the calyx. It was on this circumstance that Linnaeus founded his test for the distinction of calyx and corolla. If the stamens were opposite the segments of the floral envelop, he called it a calyx; if alternate, it was to be called a corolla. When but one row of each is developed this is no doubt an undeviating criterion; but it may happen, supposing the real corolla to be present, that the whorl of stamens next above it is suppressed and the second whorl only developed; in such cases, the stamens would necessarily be opposite the segment, but by the application of Linnaeus’ criterion the inner envelop would be a calyx and the outer the corolla, as in the whole
order of Primulacea, in which the regular calyx is present. This arrangement may easily be accounted for upon the above supposition; and it receives confirmation from the fact, that some plants having twice as many stamens as petals, and having the appearance of being in a single row, yet half of them are alternately longer than the other half. This occurs in the Oxalis giving probability to the supposition that the five short stamens of the Oxalis were prevented from being developed as perfectly as the other five, and had they been entirely prevented we should thus have had an arrangement similar to the Lysimachia with the opposite stamens.

The number of stamens is generally the same as the petals or lobes of the corolla, or a multiple of the number.

92. Whatever may be the apparent origin of the stamen its real origin is always the same, that is, between the base of the petals and that of the ovarium. Their apparent origin varies remarkably, sometimes appearing to rise from the calyx or corolla, (fig. 90,) when they are said to be perigynous; at others they arise from the pistil (fig. 91) itself and are said to be epigynous, or from under the pistil. their true origin, and called hypogynous. (fig. 92.)

93. Stamens are often united by their filaments, forming a tube, as in the Malvea, when they are said to be monadelphous, (fig. 93.) or in one brotherhood. In other cases into two sets, when they are said to be diadelphous (fig. 94.) as in the Pea. If into several sets the term polydelphous is applied, (fig. 95.) as in some Hypericums.

If the stamens project beyond the corolla, they are said to be exserted, and included when shorter than the corolla.
When the stamens all turn to one side of the corolla they are said to be *diclinate*. When a flower has four stamens, two of which are longer than the other two, they are *didynamous*, (fig. 96.) If there are six with four the longest, then they are *tetradynamous*, (fig. 97.)

94. The *filament* is generally, as its name implies, a slender thread-like organ, having a bundle of vessels in its centre composed of woody fibre and spiral vessels, and corresponds undoubtedly to the petiole of the leaf. It assumes a variety of forms. Its normal form is found in the *Rose*, *Apple* and *Lily*. In the *Canina* the filament resembles so much a petal that it would be undistinguishable from one, but for its bearing an anther (fig. 98 a.) In the *Water lily* it is found in every degree of development from its common form to a petal, showing the true nature of the stamen, that it is a modification of leaves. In the *Campanula* the lower part of the filament assumes the form of a fleshy scale (fig. 98 b.) Although generally smooth, still in some plants, as in the *Tradescantia*, it becomes in some parts covered with hairs, (fig. 98, c.) In the *Thalictrum* it is thickest at its summit, and is said to be *clavate*, (fig. 99.) Sometimes the filaments are united together with the style into a solid column under the name of *columna* or *gynostemium*, (fig. 100.)

95. The *anther* is generally composed entirely of cellular tissue and consists of two *lobes*, united by a *connectivum* filled with pollen. The *connectivum* corresponds to the midrib of
the leaf, while the lobes are formed by its lamina, folded so as to form its cells. The variations in form of the anther, are very numerous; but by strict observation every variety of appearance it may assume, may be accounted for on the principle that it consists, in its normal state, of two parallel cells, formed by the folding of the lamina of the leaf; and these cells connected as in the leaf, by the midrib. The true type of the anther, then, is two lengthened parallel cells, (connected together,) opening by a longitudinal suture corresponding to the margin of the leaf of which the anther is composed. It sometimes happens that the septum is absorbed or not developed, when it is one celled, as seen in fig. 101, a; at other times one half of the lamina seems not to be developed, and a one celled anther is the result, as in the Canna. Sometimes the connectivum spreads out at its summit, the lobes instead of being parallel assume every degree of inclination. In the Monarda they are at right angles, and should the points of the lobes grow together, as in the Mallora, we have a one celled anther from this cause. In the Sage but one side of the connectivum bears an anther, the other side being very differently developed, and assumes the appearance represented in fig. 101, c.

It sometimes happens that the anther is more than two celled. This is occasioned, in some cases, by the folding inwards of the sutures, so as to form a union with the back of the cell, as in the Ash.

The Cucurbitaceae presents a curious modification of the anther, in which they are long, narrow and sinuous and folded back upon themselves, (fig. 101, d.)

When the anthers are attached by their base to the summit of the style, they are said to be innate, when by their back adnate. When they seem to be balanced on the top of the style they are said to be versatile. The anthers of grasses are versatile. When the anthers are turned inwards, they are said to be introrse, and when turned outwards extrorse.
The connectivum often appears under modified forms. Some of these we have already noticed, as in the *sage*. In the *Asclepias* also the little horns observed in the flowers of these plants, are developments of the connectivum. Sometimes it is very much enlarged, as in fig. 102; at others forked, as in fig. 103, at others forming a crest, and again forming a cup-like body articulated with the apex. The position it occupies in these and other cases, will enable the observer to determine to what organ it is to be referred.

Pollen.

96. The *pollen* consists of exceedingly minute grains, which, under the microscope, appear of various forms. In some they are smooth and spherical, as in the *Marvel of Peru*; in others with an equatorial whorl of conical papillae, as in the *Hibiscus grandiflorus*; in others angular, some nearly square and of every variety of geometrical figure. It would be useless to specify the great variety of forms under which this substance appears, as it has, as yet, been made of little practical importance in arranging plants, although so far as we have made observations on this subject, we believe it might in some cases be made a good specific character, and in others a generic one of much importance. We have never found a variation of form in the same species and in some extensive genera, so far as we have examined them, the form is invariable.

The student can scarcely find a field for more curious observation, if he has a good microscope, than is presented by the pollen. The variety of beautiful forms it assumes, in different species, and the curious structure of the pollen grain itself, present subjects of much interest.

97. The term *gemule* has been applied to the pollen grains. They enclose a fluid of molecular matter essential to the production of the seed. The molecular formation may be beautifully observed by sprinkling some pollen on the port-object of the microscope, and dropping on it some diluted sulphuric acid. The coats of some of the grains immediately burst, and the contents of the grain are projected into the fluid, and the molecules may be distinctly seen. The pollen has been determined, by the most accurate observers, to consist of two coats, at least, the outer and thicker one called the *extine*, the
inner the intine, which is very extensible and exceedingly thin. This may be exhibited by placing some pollen in very dilute sulphuric acid and instead of bursting as in the case mentioned in the preceding paragraph, projections will be seen to arise from the surface of the grain and extend into the fluid. These lengthen till the contents of the granule are exhausted and consist of the intine projecting through the coat of the ex-
tine. By the sulphuric acid many tubes are projected from the same grain, naturally only one or two. Two other coats have been detected in particular plants, but have not yet been de-
monstrated as a common structure; the one next the extine, but interior in respect to it is called the intexine as in the Ona-
gracea, the other between this and the intine is called the ex-
tine, and is found in the Cupressus.

Raspail asserts, and we think with very good reason, that the pollen is a production of the internal surface of cells within the theca, to which the grains are attached by a funicle. Chimie Organique tome ii. p. 172. This is denied by other Botanists.

98. The color of pollen is generally yellow; but it assumes in different plants almost every color except green. The matter contained within the pollen cells is called forilla, which we before remarked consists of minute molecules, mea-
suring, according to Lindley, from the 4000th to the 30000th of an inch in length, and are of two kinds, one larger than the other. The larger are proved to be starch, from the blue color given by the action of iodine; the others are by Mohl and Fritzsche considered to be minute drops of oil. When a pol-
len cell bursts in a fluid, these molecules are observed to possess a regular rapid motion on their axes, and the larger undergo a kind of "spasmodic contraction of the side." Much spec-
ulation has been elicited in explaining the constitution and function of these molecules; but as yet very little has been settled as to their nature by any investigations yet published. Brongniart some years since published the singular opinion that the molecules, which issued on the bursting of the pollen, were spermatic animalcules. He described the form, dimen-
sions, and movements upon which he based this opinion. This announcement called forth much discussion, and the oppo-
nents of B. thought their conquest now complete, when they proved that, infusions known to be fatal to all animalcules, did not arrest the movements of that issuing from the pollen cell. But the distinguished Professor Mayen, of Berlin, in a letter to the Academy of Sciences of Paris, in 1838, says that the molecules are not the animalcules, but that they occupy the
interior of these cells, and produce the molecular motion by their interior action. The point as to their existence is as far from being settled as ever. Some botanists, speak of them as though there was no doubt of it, while others treat the subject quite cavalierly, by applying to it the not very scientific term, "ce roman!"

99. The larger particles of the fovilla, have been considered as the necessary organs of impregnation. It is conjectured that they make their way into the ovule, and through their agency acting as potential organs, the embryo is produced. This needs confirmation. Schleiden and Endlicher take entirely different views of the subject. They believe that the incipient embryo is in the pollen tube which makes its way into the ovule merely for finding a proper location for its development. These are some of the notions prevalent on this highly interesting and important part of the vegetable economy. Which, or whether any of them, will ever be established as true, remains for future discoveries. We shall notice some points more fully in the article on Fertilization.

Pistil.

100. The pistil is the center of the flower, and forms the summit of the axis of growth. It is like the other floral organs, a modification of the leaves. The pistil is divided into three parts, the germ, (which becomes the ovary,) style and stigma.

The stigma, fig. 104, c, is the summit of the pistil, and is the extremity of the midrib of the leaf which composes the pistil. It is the only part except the spongioles, that is not covered with the cuticle. It is generally glutinous and moist, thus causing the pollen grains to adhere to it, and at the same time yielding enough moisture to make them put forth the pollen tubes. It is covered with papillae which are undoubtedly the cells of the parenchymous substance of which it is composed, and is the channel through which, in all cases, the fecundating matter is transmitted to the ovule. It varies much in form, or if with some botanists, we consider the stigma only a surface fitted for the reception of the pollen and transmission of the fertilizing substance, the variety of forms of stigma usually described by botanists would properly come under the style. Lindley remarks that nothing, properly speaking, is a stigma except the secreting surface of the style. This surface is usually on the expand-
ed summit of the style, but it frequently occupies other situations. In the Iris it is a line on the back of the trifid petal-like style; in some it occupies the side of the pistil; in others no point can be detected, by observation, that corresponds in appearance to the stigmatic surface. The central part of the stigma consists of a more lax tissue which leads directly to the ovary, and is called the conducting tissue.

101. The style, fig. 104, b, is a vascular organ, varying in length, supported by the ovary, and supporting the stigma. It is generally considered an unessential organ; but Raspail says that the style penetrates the ovary and becomes the placenta, which would render its presence always necessary; but this is in opposition to all other botanists, so far as we know, the placenta being considered the union of the edges of the folded leaves composing the ovary. The style is sometimes articulated to the summit of the ovary, at others forms a continuation of it. Although the style usually rises from the summit of the ovary, yet in some cases it does not. In the Labiatae it comes from the base, and in others from the side. These apparent variations are produced by the unequal development of the parts of the ovary; one side being extended more than the other, would, of course, turn the summit to the least developed side.

102. The Ovary, fig. 104, a, is the thickened base of the pistil, and is that part of the organ containing the ovules, and becomes the fruit in maturity, whatever may be its form. The ovary, when the pistil is composed of a single leaf, is formed by the folding of the leaf with the upper surface inwards and united by its edges, the lamina of the leaf forming the ovary. This arrangement is well exhibited by the Peach. The furrow, which is always seen running from the apex to the base of this fruit, on one side, is the united margins. The midrib on the opposite side is undistinguishable on the surface, but by dissection the vessels will be found larger on that side, and running more directly from the base to the apex.

103. The Placenta is the union of the two margin of the carpels, and bears the ovules which in maturity become the seed. By carefully breaking the stone of the Peach, we shall find the kernel attached to that side of the cavity which corresponds to the depressed line on the surface, showing that the kernel or nucleus derived its origin and support from that side which is formed by the margin of the leaf. The Cherry is another example of a monocarpelous pistil, Fig. 105.
Although some plants, like those above noticed, have their pistils of one leaf, yet in most cases they consist of several carpels, assuming a great variety of forms. It is of the first importance, that the student study carefully all that relates to the fruit, as it is from it that the most important distinctions in classification are derived. It will be the most difficult as well as the most important subject to which his attention will be called. By perseveringly applying the principles laid down, he will soon acquire a facility in examining, one of the most beautiful fields of nature, which will abundantly reward him for all his toil.

104. When the ovary is composed of several carpels, the carpels are arranged with the midrib placed outwardly, and the margins turned inward towards the center, as seen in the transverse section of the Hibiscus, fig. 106, which is composed of five carpels, with their margins meeting in the center, forming a central placenta, to which the seeds are attached. The divisions, which form the cells of the ovary, are called dissepiments, and are of course, from what we have before remarked, the inflected laminae of the leaves; and as each carpel is naturally independent of the others, which compose the ovary, it follows that the dissepiments, however thin and membranous they may be in some cases, are in reality double. All true dissepiments are necessarily vertical, and never horizontal, since the inflected margins of leaves could not unite in such a manner. The number of dissepiments is always equal to the number of carpels of which the ovary is composed, and the dissepiments are always alternate with the stigmas. A simple ovary can have no dissepiment. Should any fruit be observed with dissepiment not reconcilable to the above principles, they are called spurious dissepiments. The only common one of this character with which students will meet is that occurring in cruciferous plants, as the Cabbage, Turnip, &c., in which the expansion of the placenta forms a spurious dissepiment, stretching from one side of the ovary to the other. In some cases in which the ovary is composed of several carpels, there exists no dissepiment. This arises from one of two causes. In one case the edges of the carpels are united without being inflected much, if at all, as in the Corydalis and Viola fig. 107, where the
placenta is said to be parietal. In the other case the dissepiments exist in the very early stage of the ovary, but by the enlargement of the ovary without the corresponding development of the dissepiments, they become torn and obliterated with the placenta remaining alone as in the *Cerastium*. In this case it is called a free central placenta, fig. 108.

It is frequently the case that there are numerous carpels, but they contract no union with each other as in the *Strawberry, Ranunculus* and *Anemone*.

When the carpels are united as in the *Poppy, Hibiscus* &c., they are said to be Syncarpos. When they are free as in the *Ranunculus, Strawberry,* &c., they are called apocarpous.

105. It follows from the assertion, that the pistil consists of a whorl of leaves, immediately superior to those composing the stamens, that they should be alternate with them in their usual position. This is the fact in cases in which we are able to determine in regard to it.

If in fig. 110, *a, a, a, a, a, b, b, b, a, a,* represent five stamens, and *b, b, as many carpels, it will be observed that the stamens occupy alternate positions in respect to the carpels.—This is undoubtedly the fact in all cases which are not altered by non-development or unusual modifications. When the carpels consist of several whorls on the same plane, the individuals of contiguous whorls follow the same law of alternation, as is exhibited in fig. 111, in which *a* represents the axis, *b, b, the whorl contiguous to it, and c, c, the exterior whorl.
In some cases the receptacle is either convex as in the Strawberry, fig. 112, or concave as in the Rose, fig. 113. In the former case the outer series \(a, a\) will be the lowermost whorl, and in the latter, the upper whorl will be in reality, the lowermost in point of development, becoming the most elevated contrary to its true position by the peculiar development of the receptacle.

106. From the above remarks, it will be easy for the student to reduce to known principles most of the forms of fruit with which he will meet, but there are cases which it is difficult to reduce to the principles laid down. These structures have received various solutions from different Botanists. Some endeavor to reduce them by the above principles, others adopt other principles for explaining them. In the Orobanche, the placentae instead of being placed at the section formed by the union of the carpels, are placed in pairs on the face of each carpel and at some distance from the margin. There are several anomalies of this character, and in reference to them Lindley remarks, that the position of the placentae with regard to the margin of the carpels is reducible to no certain rule, but depends on specific organization. That a vast majority of cases are reducible to the foregoing principles, it is admitted by all, and that some cases considered as anomalies are reducible to the same principles, we have little doubt. The Orobanche it seems to me, may be easily explained by supposing the margin of the carpels inflected on themselves from a union of surface, instead of being directed to the center, when of course, the placentae would be apparently on the face of the famina instead of its margin. The close resemblance of buds and ovules, and their supposed and probable identity of origin, is adduced as proof of the placenta not necessarily originating
in the margin of the carpels. It is admitted that the margins of leaves usually give rise to buds as in the *Bryophyllum*, when they produce them at all, yet in a single case mentioned by Turpin, they were found issuing from all parts of the surface; it is therefore concluded, that in all cases where the placenta is on the surface of the carpel, it corresponds to the case of the *Ornithogalum*, mentioned by Turpin.

Schleiden rejects the theory of the margin of carpels giving rise to the placenta, but considers the placenta an elongation of the axis. In cases of parietal placenta he considers them as the result of a branching axis. Raspail says that the style penetrates into the ovary and forms the placenta.

Our space forbids adducing the arguments by which these hypotheses are supported. That each is true in certain cases is possible, but we do not believe it is often the case.

The extremity of the axis, which supports the carpels is called the receptacle. In some cases it is merely the end of the flower bearing branches without having undergone any modification; at others, it is an expanded disk and is called a torus. When it rises from the basis of the calyx, bearing the stamens as in the *Magnolia*, it is called Gynophore. When it is succulent bearing many ovaries as in the Strawberry, it is called Polypore. We have the Gynobase when a fleshy receptacle has but a single row of carpels inclined towards the center.

**Ovule.**

107. The *Ovule* is the seed in its incipient state. It is always attached to the placenta, from which it arises and receives its nourishment. In its earliest state it is a mere tubercular homogeneous projection from the placenta, semi-transparent and pulpy, exhibiting few marks of what it becomes in the course of development. The cord by which the ovule is attached to the placenta is called the Funiculus, fig. 114, a, which exhibits an ovule of the *Lepidium*, and the point of the ovule to which it is attached is called the hilum. The base of the ovule is the point where the funiculus is attached, and the opposite point the axis is its apex. As the ovule advances in growth it consists of several parts, a central, fleshy, pointed body, called the nucleus, fig. 114, c. which is enclosed in
two sacs. The outer one is called primine, the inner one is called secundine. These sacs are very much open in the early stage of the ovule, and in fact in some plants are not unlike two tea cups, one within the other, with the nucleus in the inner cup as seen in fig. 115, where a is the primine, b the secundine, and c the nucleus. These sacs increase in size and contract their orifice, till the secundine closes over the nucleus entirely, with the exception of a very small orifice, called a foramen, fig. 114, b; and the foramen of the secundine is called by Mirbel endostome. The primine in its growth encloses the secundine and nucleus, with the exception of a foramen corresponding to that of the secundine and called the exostome. These terms are not in general use, and it is doubted whether the importance of the distinction demands their application. It is true that in some cases the foramen of the secundine does not exactly correspond to that of the primine. The simple term foramen however, answers all practical purposes. There are three other coverings of the nucleus described by some Botanists named tercine, quartine and quintine, but much uncertainty exists in reference to them, and great difference in opinion, even among the most distinguished philosophers, some even denying their existence. We deem it inexpedient to occupy our space with the discussion of a subject concerning which, from our own observation, we have been unable to come to any satisfactory conclusion. The figure to which our illustration is applied, the student will perceive, exhibits the nucleus and its coverings in a curved position; this is its true position in a perfect state in many plants, but not in its early stage; in the progress of development, it assumes this position. The ovules of different plants, although the relative position of the parts are nearly the same in their early stage, yet in their growth, assume several different positions reducible to four different types.

108. When no change of position takes place, but the base of the ovule remains next to the placenta with the axis straight and the foramen at its extremity, it is said to be Orthotropus as in fig. 116, which is the case in the nettle. But it frequently happens that one side of the ovule only is developed and the axis becomes doubled on itself, so that the foramen is contiguous to the base or hilum, as in fig. 117, which is called Campylotropus.

In other cases the whole ovule becomes inverted so that the foramen points towards the placenta
with the hilum opposite to it; this form of the ovule is called Anatropus, fig. 118. The apple affords an example and it is very common. A bundle of vessels runs along the ovule from the placenta, and unites with it on its opposite end; this bundle of vessels is called a Raphe, fig. 118. a. and the place where it unites is called the Chalaza, fig. 118, b. In other cases the ovule seems to have made but one fourth of a revolution, so that the line joining the chalaza and foramen is at right angles to the funiculus; this form is called Amphitropus, fig. 119. In other cases the raphe instead of adhering to the ovule through its course, is attached to it only in the last half of its length, this is called Semianatropus, fig. 120, and the ovule is parallel with the funiculus.

109. The position of the ovule in the ovary is of importance. When it grows from the base of the ovary it is called erect, when from a little above the base ascending, when it hangs from the summit of the cavity it is pendulous, and when from a little below the summit it is suspended.

Fruit.

110. The fruit is defined, in Botany, to be the pistil or ovary arrived at maturity, including, sometimes, accessory parts. This definition plainly gives greater extension to the term than it has in common language, as it includes every kind of product which has the mature ovary as a component.

The normal form of fruit and the type to which all varieties should be reduced, would seem to be that in which the seeds are contained in a pericarp with the carpels leaf-like in their constitution and appearance, as the Hibiscus, Bean, Cabbage, &c. In these cases it requires no great stretch of the imagination to conceive the ovary composed of leaves slightly modified, but from this type there are remarkable variations caused by one or more of the following causes. The suppression or hardening of parts in some, their unusual development in others, and by the union of other organs with the ovary, are the principle causes of variation. By carefully noticing these occasional modifications, every variety of fruit may be reduced to these simple principles.

Before applying these principles to the explanation of par.
ticular cases, it will be necessary to define some terms used in the description of fruit.

111. The pericarp is the covering of the seed whatever may be its form or dimensions. It includes the ovary and whatever may be attached to it which goes to make up the seed vessel. It varies in dimensions from the covering of the minute seeds of grasses to the large fleshy pericarps of the Cucurbitaceae, which sometimes attain to several feet in diameter. Its composition is not less various, from the finest and most delicate membranes to the coarsest and roughest of vegetable productions, from the softest pulp to the hard, bony covering of the kernel of the peach.

The pericarp consists of three parts; the epicarp, which is the outer covering and corresponds to the skin; the sarcocarp is the middle portion which constitutes the flesh, and endocarp or putamen the inner coat or shell. By the various modifications which these several parts undergo in the course of development, most of the fruits, however widely they may differ in appearance, may be easily conceived to originate from a common type.

In the Peach, for example, the skin, which in many cases may be easily removed, is undoubtedly the epicarp in its natural state; the fleshy portion which is eaten, is the sarcocarp, which is the parenchymous portion of the leaf excessively developed; the stone of the peach is the endocarp remarkably condensed and hardened. The Cherry and similar fruit are reducible on the same principles. The Apple is a little differently constructed; the epicarp is in its natural state, but the sarcocarp consists of the parenchymous portion of the calyx and ovary united. By making a transverse section of an apple the outlines of the ovary may be seen distinguished by points, which are the cords formed by the vessels and woody fibre of the midrib of the leaves which compose the carpels. The hard layer, which immediately surrounds the seed, is the endocarp.

112. The fruit being the perfected ovary, it of course ought to bear the mark of the style or stigma, and it is of importance, that the student bear this in mind, as it will often enable him to distinguish seed from fruit, as there are many examples which the common observer would call a seed, but which in reality are fruits, consisting of pericarps and a seed within it, as in the Umbelliferae and Compositae.

There are cases in which suppression of ovules causes a variation in the fruit from what might be expected from an examination of the ovary in its early stage. If an ovary
of the Chestnut be examined before or soon after impreg-
nation, it will be found to contain fourteen ovules in seven
cells; but in the progress of development it becomes one-
celled, and thirteen of the ovules are obliterated. The ova-
ry of the Oak is originally three-celled, with six ovules; 
but when perfected it is one-celled and one-seeded. There
are many cases of this kind. The reverse of this takes place
in some cases, which would be inexplicable, were not the ova-
ries examined in their earliest state. A one-celled ovary
becomes a two or more celled tuit: in the Cruciferae by the
enlargement of the placenta; in the Astragalus by the ex-
pansion of the suture, in other cases by the dilations of the
lining of the pericarps which form horizontal dissepiments.
The Pomegranate presents a remarkable variation from the
true type.

113. When the fruit arrives at maturity the pericarp ei-
ther bursts or it remains closed; if the latter, it is said to be
indehiscent, as in the apple, hazle-nut, &c. If it bursts it is
said to be dehiscent, and it follows invariably the same course
in the same species; hence it is important to notice the va-
rieties. In some cases the dehiscence takes place by dividing
the dissepiments, that is the carpels separate into their origi-
nal leaves, as in the Delphinum, and this is called septicidal
dehiscence. Fig. 121 represents this kind in which a represents the axis, d the dis-
sempent, and v the valves. In other ca-

\[121\]

\[122\]

\[123\]

The Plantago has a transverse dehiscence. Besides the above modes of opening, the pericarp is often ruptured, produced by a contraction of a portion of it, and
holes thus formed for the emission of the seed, as in Campanula. An aril is an enlargement of the placenta, occurring after the impregnation of the ovule, and forming, in some cases, an additional envelop for the seed, as in the Euonymus. Mace is an aril surrounding the Nutmeg. When the two sutures separate from the valves they form a kind of frame called replum.

114. The subject of carpology, or the classification of fruit is in a very confused state. Not less than six or eight systems have been proposed to the world since the days of Linnaeus. Very little care is manifested by many botanists in their descriptions of plants in using carpological terms. No definite idea seems to be attached to them in numerous cases, and they are often applied in a manner by no means appropriate, and of which the authors seem not to be aware of their real meaning or extension. It seems to us of prime importance, that some system should be adopted, and that it should be universally used by Descriptive Botanists. The system proposed by Professor Lindley seems to us least objectionable, as it is an improvement on all preceding systems, and old terms are strictly defined and limited. Coming from such a source, it will no doubt receive the approval of all who have no other object than that of Botany to advance by their efforts in this field. It seems certainly to be founded on fixed principles, and little more can be expected than what is now accomplished in this interesting department of Botany, and to get it introduced with accuracy is all that is to be desired.

Professor Lindley divides fruit into four classes.

Class 1. APOCARPI. Fruit simple.

Ovaria strictly simple; a single series only produced by each flower.

1. Ulriculus, one celled, one or few-seeded, superior, membranous, frequently dehiscent by a transverse incision.

Examples. Amaranthus, Chenopodium.

2. Achaenium one-seeded, one-celled, superior, indehiscent, hard and dry with the integuments of the seed distinct from it.

Examples. Lithospermum, Borago.

124. 3. Drupa one celled, one or two seeded, superior, indehiscent, the outer coat soft and fleshy, separable from the endocarp, which is hard and bony, proceeding from an ovary, which is perfectly simple, fig. 124.

Examples. Peach, Plum, Apricot.
4. *Foliculus*, one-celled, one or many seeded, one valved, superior, dehiscing by a suture along its face, and bearing its seeds at the base, or on each margin of the suture, fig. 125.

*Example.* *Paeonia.*

5. *Legumen*, one-celled, one or many seeded, two valved, superior, dehiscing by a suture along both its face and its back, and bearing its seeds on each margin of the ventral suture, fig. 126.

*Examples.* Bean, Pea, &c.

6. *Lomentum* differs from the legumen in being contracted in the space between each seed, and then separating into distinct pieces, fig. 127.

*Example.* *Hedysarum.*

Class 2. **AGGREGATI.**

*Fruit Aggregate.* Ovaria strictly simple; more than a single series produced by each flower.

7. *Eterio*, ovaries distinct; pericarp indehiscent, either dry upon a dry receptacle, as Strawberry, or fleshy upon a dry receptacle as *Rhus*, fig. 128.

8. *Syncarpium*, ovaries cohering into a solid mass, with a slender receptacle.

*Example.* *Magnolia.*


*Examples.* *Rosa,* *Calycanthus.*

Class 3. **SYNCARPI.**

*Fruit compound.* Ovaria compound.

Sec. 1. **Fruit Superior.**

A. *Pericarpium dry.*

10. *Caryopsis*, one celled, one seeded, superior, indehiscent,
dry, with the integuments of the seed cohering inseparably with the endocarpium, so that the two are undistinguishable.

**Examples.** Wheat, Barley, Maize.

11. *Regma*, three or more celled, few seeded, superior, dry, the cells bursting from the axis with elasticity into two valves. The outer coat is frequently softer than the endocarp, and separates from it when ripe; such *regmæ* are drupaceous. The cells of this kind of fruit are called *cocci*.

**Example.** Euphorbia.

12. *Carcerulus*. Many celled, superior; cells dry, indehiscent, few seeded, cohering by a common style round a common axis.

**Examples.** Tilia, Tropæolum, Malva.

13. *Samara*. Two or more celled, superior; cells few seeded, indehiscent, dry, elongated into a wing-like expansion, fig. 130.

**Examples.** Fraxinus, Acer, Ulmus.

14. *Pyxidium*. One celled, many seeded superior or nearly so; dry, often of a thin texture, indehiscent, by a transverse incision, so that when ripe the seed and their placenta appear as if seated in a cup covered with a lid, fig. 131.

**Example.** Anagallis.

15. *Conceptaculum*. Two celled, many seeded, superior, separating into two portions, the seeds which do not adhere to marginal placenta, but separate from their placenta, and lie loose in the cavity of each cell.

**Examples.** Asclepias. Echites, fig. 132.

16. *Siliqua*. One or two celled, many seeded superior, linear, dehiscent by two valves separating from the replum; seeds attached to two placenta adhering to the replum, and opposite to the lobes of the stigma, fig. 133.

17. *Silicula*, this differs from the latter in nothing but its figure, and in containing fewer seeds. it being short and broad.

**Examples.** Thalspi, Lepidium.
18. *Ceratium*, one celled, many seeded, superior, linear, dehiscent by two valves, separating from the replum; seeds attached to two spongy placenta, adhering to the replum, and alternate with the lobes of the stigma.

*Example.* Corydals.

19. *Capsula*, one or many celled, many seeded, superior, dry, dehiscent by valves, always proceeding from a compound ovarium. The valves are variable in their nature; usually they are at the top of the fruit, and equal in number to the cells; sometimes twice the number; occasionally they resemble little pores or holes below the summit, fig. 134 represents two forms of the capsula.

20. *Amphisarca*, many celled, many seeded, superior indehiscent; indurated or woody externally, pulpy internally.

*B. Pericarpium fleshy.*

21. *Tryma*, superior, by abortion, one celled, one seeded, with a two valved indehiscent endocarp, and a coriaceous, or fleshy valveless sarcocarp.

*Example.* Juglans.

22. *Nuculanium*. Two or more celled, few or many seeded, superior, indehiscent, fleshy, of the same texture throughout, containing several seeds.

*Example.* Grapes.

23. *Hesperidium*, many celled, few seeded, superior, indehiscent, covered by a spongy separable rind, the cells easily separable from each other, and containing a mass of pulp, in which the seeds are imbedded.

*Example.* Orange.

**Sec. 2. Fruit Inferior.**

*A. Pericarpium dry.*

24. *Glans*, one celled, one or few seeded, inferior, indehiscent, hard, dry, proceeding from an ovarium containing several cells, and several seeds, all of which are abortive, but one or two, seated in that kind of an involucrum called a cupule, fig. 135.

*Examples.* Quercus. Castanea.

25. *Cypsela*. One seeded, one celled, indehiscent with the integuments of the seed not coher-
ing with the endocarp; in its ovary state evincing its compound nature by two stigmas; nevertheless unilocular and having but one ovulum.

*Examples.* Compositae, fig. 137.

26. *Cremocarpium,* two to five celled, inferior; cells one seeded, indehiscent, dry, perfectly close at all times; when ripe separating from a common axis.

*Example.* Umbelliferae,

27. *Diplotegia,* one or many celled, many seeded, inferior, dry, usually bursting, either by pores or valves.

*Example.* *Campanula.*

### B. Pericarpium fleshy.

28. *Pomum,* two or more celled, few seeded, inferior, indehiscent, fleshy; the seeds distinctly enclosed in dry cells, with a bony or cartilaginous lining.

*Examples.* Apple, *Crategus,* fig. 139.

29. *Pepo,* one celled, many seeded, inferior, indehiscent, fleshy; the seeds attached to parietal, pulpy placentae. This fruit has its cavity frequently filled at maturity with pulp, in which the seeds are imbedded, their point of attachment however is never lost.


30. *Bacca,* many celled, many seeded, inferior, indehiscent, pulpy, the attachment of the seeds lost at maturity, when they become scattered in the substance of the pulpy.

*Example.* *Ribes,* fig. 140.

31. *Balausta,* many celled, many seeded, inferior, indehiscent, the seeds with a pulpy coat, and attached distinctly to their placentae.

*Example.* *Pomegranate.*

### Class 4. ANTHOCARPI.

**Collective fruits.**

*Fruit of which the principle characters are derived from the thickened floral envelopes.*

32. *Diclesium,* Pericarpium indehiscent, one seeded, enclosed in an indurated perianth,
Examples. Mirabilis and Salsola.
33. Sphalerocarpum, Pericarpium indehiscent, one seeded, enclosed within a fleshy perianth.

Example. Taxus, Blitum.

34. Syconus, a fleshy rachis, having the form of a flattened disk, or of a hollow receptacle, with distinct flowers and dry pericarpia.

Example. Ficus.

35. Strobilus, an amentum, the carpellae of which are scale-like, spread open, and bear naked seeds; sometimes the scales are thin with little cohesion; but they often are woody, and cohere into a single tuberculated mass.

Example. Pinus, fig. 141.

36. Sorosis, a spike or raceme converted into a fleshy fruit by the cohesion in a single mass of the ovaria and floral envelopes.

Example. Morus.

Seed.

115. The seed is a perfected, impregnated ovule. No sooner has the influence of the pollen been felt by the ovule, than various changes commence; the foramen closes up, the integuments harden, the heretofore pulpy substance becomes consolidated. The most material change that takes place, however, is the appearance of a new body, called the embryo.

The face of a seed is that part of it parallel with the placenta, or when the chalaza is present, this organ with only few exceptions, runs over the face. The opposite surface is the back.

116. The parts of the seed demanding our attention are the covering, hilum, raphe, chalaza, embryo, and albumen.

The integuments or coverings of the seed are subjects of much discussion, both as to their number and constitution. The diversity of opinion on the subject, originates, no doubt in a great measure from the change they undergo, from the transformation of the ovule into a seed. One would naturally suppose that the integuments of the seed would be the same as those of the ovules. But this is certainly not the case in many instances. Three have been named by different writers, corresponding to the three layers of the ovule: but the
coats of the seed are not always the same as those that covered the ovule. The outer covering is called by De Candolle, the testa, the second the sarcodermis the inner the endopleura. Much might be said of the origin of these integuments, and the changes they undergo in development, but it would be of little interest to the student commencing the subject. The testa presents a great variety of appearances in different plants. In some cases it is smooth and polished, in others rough and irregular, marked by dots and projecting points, in some, it is covered with hair as in the cotton and Epilobium, which it is called coma, in others it is furnished with wings, as in the Gladiolus and Bignonia. In some it is ribbed, in others it is pitted and marked by irregular depressed lines.

117. The hilum is the point by which the seed is attached to the placenta; it is frequently distinguishable by being of a different color, and having the appearance of a scar. The hilum is always the base of the seed.

118. The terms raphe and chalaza have the same application in the seed as in the ovule. In orthotropous and campulitropous seeds, these parts are not observable, since the chalaza is coincident with the hilum, and as the raphe is the bundle of vessels conveying nourishment from the hilum to the chalaza, the necessity of its development is superseded by the contact of these parts. The raphe is easily observed on the seeds of the Apple and Orange, being an elevated ridge on one side, and in the orange the situation of the chalaza is distinctly marked by a small dark colored spot. The raphe does not always consist of a single bundle of vessels, but ramifies on the surface of the seed, as may be seen by the veins on the surface of the Almond, which are ramifications of the raphe.

119. The embryo is the product of the action of the pollen. If the ovule be dissected soon after impregnation, there will be found within the nucleus and contiguous to the foramen a minute speck, opaque and yellowish, which enlarges by the absorption of the surrounding fluid; this fluid is the amnios. The minute speck becomes in its enlargement a distinctly organized body, and assumes in time the form of an embryo plant. The embryo consists of three parts, the radicle, plumula, and cotyledon, some add a fourth a cauliculus or neck. The radicle becomes by development the root or descending axis of the plant, and the plumula the ascending axis or stem. The cotyledons are to be the earliest leaves of the plant. The cauliculus or neck is the imaginary point of separation of the plumula from the radicle. Fig. 142, represents an embryo
of a dicotyledon, \( a \) the plumula, \( b \) the radicle, \( c \) \( c \) the cotyledons, \( e \) the caudiculus or neck. Lindley gives the following account of the germination of the monocotyledonous seed. In germination the upper end swells and remains within the testa, the lower lengthens and opens at the point, and emits one or more radicles; and a thread-like green body is protruded from the upper part of the portion which is lengthened beyond the testa. Here the portion remaining within the testa is a single cotyledon, fig. 143, \( b \), the body which lengthens producing radicles from within its point is the caudiculus and the thread-like protruded green part is the plumula, fig. 143, \( c \).

120. This mode of germination it will be readily observed is very different, from what takes place in dicotyledons. In these the radicle appears directly from the surface, and the cotyledons are outwardly developed, while in the monocotyledons the radicles are "emitted from within the substance of the radicular extremity," and the cotyledon remains within the testa. The radicle of the monocotyledon, is enclosed within a sheath which it perforates in its elongation, and issues from between its lips as seen in fig. 143, \( e \). \( d \) being the radicle. This sheath Mirbel called a *coleorhiza*, and Richard proposed to substitute *Endorhiza*, for monocotyledons and *Exorhiza*, for dicotyledons, thus founding the distinction of
the two great classes of flowering plants, on the fact that the radicles of one were enclosed within a sheath, while the radicles of the others were destitute of such a covering.

121. From the above description there are of course some exceptions, but all of which may be reduced to the common type. A slight variation is common, in which the plumula is distinguishable from the other parts and lies within a minute cleft near the base of the embryo, from which it issues on the commencement of germination. Fig. 144, represents an embryo of one of the grasses; a the cotyledon, b the radicle and c the fissure, in which the plumula lies.

122. The embryo instead of being surrounded by the albumen, often lies on one side near the base and in direct contact with the testa. On the side next the testa, a slit is observed like the one above described, and if this embryo be divided vertically there will be discovered within small rudimentary leaves proving this to be the plumula. That part of the embryo lying between this and the albumen, is the cotyledon and a little below this, and on the opposite side in some species, as the wheat, is another similar body which is much smaller, but it is generally admitted to be of the same nature, thus proving that plants strictly conforming in every other respects to those called monocotyledons, have two cotyledons; but in all such cases the cotyledons are alternate and never opposite. The embryo of the Pine, although reckoned among the dicotyledons, has several cotyledons; but these are opposite forming a whorl. The distinction made by this arrangement of the cotyledons, being alternate in Endogens, and opposite or verticillate in Exogens, will always be a guide in determining to which an individual should belong. An equally sure mark of distinction is the mode of germination whether of the endorhizal or exorhizal manner.

123. The albumen when present is a substance surrounding the embryo, and is supposed by some to be the solidified amnios. It varies remarkably in consistence and appearance, sometimes soft and fleshy, at others hard and bony. In size it varies from an exceedingly small quantity as in the grasses, to the amount of several ounces in the cocoanut. It is sometimes perforated by dry cellular tissue, in which state it is said to be ruminated.

To determine the several parts of the seed which we have above defined, and the position they occupy in reference to each other is of great practical importance in descriptive
botany, and constitutes one of the most important subjects of the student's attention.

124. We have above remarked that the base of the seed was its point of attachment to the placenta, or that the hilum was always the base. One would naturally suppose that the opposite point would be the apex; but this is not generally the case. In orthotropous seeds, only, does the real apex correspond with the geometrical apex. In campulitropous seeds the apex of the seed is nearly in contact with the base, the axis of the ovule having been doubled on itself, thus bringing the real apex in close proximity to the base. It is very common for the surfaces of seeds, particularly of minute ones, to be marked by lines of various kinds, sometimes barely lines of different color, at others by ridges or depressions, and in others by dots, and in some by regularly arranged tubercles. In all these cases the point of their divergence is the hilum or base, and the point of their convergence the apex, so that by this means the base and apex of the seed is often determined, when it would be difficult to do it by any other. Having determined the foramen, base, and chalaza of a seed, which may generally be done, by simple inspection, the position of the interior parts is with certainty known. It has been demonstrated that in nearly every case the radicle points towards the foramen, and the plumula towards the chalaza. In orthotropous seeds, therefore, the embryo is inverted, that is the radicle points upwards; in campulitropous the embryo is curved; in anatropous the embryo is erect, and so in all cases, the micropyle being taken for the radicle and the chalaza when present, and the hilum when the chalaza is not found for the plumula, the true position of the embryo is always determined.

125. The embryo answers most important purposes in classification, since the whole vegetable kingdom has been divided into three great classes founded on the varieties of structure of the embryo. There have been found three varieties of embryo, Monocotyledonous, Dicotyledonous, and Acoyledonous, and it has been observed that the vegetables arising from these differently constituted embryos are distinct and peculiar in their constitution and mode of growth.

126. Fig. 142 exhibits the dicotyledonous embryo, the different parts of which have been already pointed out. The growth of this kind of embryo produces our forest trees, and all vegetables having a distinct bark and pith. But, as above remarked, it has been discovered that there are vegetables with the above characteristics, whose embryos are unlike the one above described, some having numerous cotyledons, others but one,
and others none. These apparent variations have been sufficient to induce some Botanists to reject entirely this classification, but we believe on very insufficient grounds, since by careful observation nearly all these apparent discrepancies may be reduced to a common principle; and even if they could not be explained at all, the foundation of the system would be broader and firmer than any other proposed by the objectors to this. Could we expect that the many thousand different species of vegetables varying almost indefinitely in their various parts could be reduced to three actual, invariable types? It would be requiring of this system what has never been attained in any other.

127. Orders in which more than two cotyledons are found are the Coniferae, in which they vary in number from two to more than twelve; in Boragineae and Brassicaceae and some other orders there are four. In all these cases the cotyledons are opposite. In the Horse-chestnut, there is apparently but one cotyledon. Prof. Lindley says, that by dissection there is a slit which indicates the division between the two bases of a pair of opposite confluent cotyledons. Some such modification doubtless is the cause of all the variations from the common type.

128. There are other cases in which no cotyledons exist. The Cuscuta is an example of this kind, but if the cotyledons are leaves, we should not expect to find cotyledons in this genus, since it has no leaves. There are other cases in which it is said no cotyledons are discernable, but by more accurate observation the cotyledons are found to exist in a rudimentary state, the radicle seeming to be developed at their expense.

The monocotyledonous embryo is very different in its structure from the preceding. It is a homogeneous, cylindrical body, tapering at both ends, with no distinction of radicle, plumula or cotyledon.

CHAPTER IV.

FUNCTIONS OF THE ROOT AND LEAVES—ORIGIN OF WOOD.

129. In the preceding chapters we have described the various organs which compose the vegetable in its most perfect state, but we have considered them, with few exceptions, simply as they present themselves to the eye, without supposing them possessed of life, or considering them in their combined action
in performing the various operations peculiar to organized beings. We have seen that the whole vegetable kingdom, however various in form and constitution, had its origin, at least, in minute visicles. We have also seen that all the organs of reproduction and nutrition, are simple modifications of leaves. Who can fail to admire the wisdom of that Being, who could construct with materials so simple, the endless variety of vegetable organs, and make them yield products of every variety from the blandness of water to the most powerful agents; and to afford nutriment to men and animals, and deposit cotemporaneously and contiguously the most virulent poisons!

Our next object is to consider plants as living beings, and so far as possible to explain the various phenomena connected with them as such.

Section 1. The Root.

130. The first organ that appears in the germination of a seed is the root. It bends downwards, and soon commences the proper functions for which it is intended, that of absorbing nourishment from the medium which it penetrates, and giving support to the plants. These seem to be the only functions which the root performs. It lengthens by additions to its extremity, which always consists of an enlarged portion of cellular tissue, before described under the name of spongiole. Through this extremity all the nourishment of the plant which is absorbed from the soil passes, as we demonstrated in a former section.

131. The root has no power of selecting its food. This is rendered evident by making various solutions, and watering the plant with them. It absorbs them indiscriminately; the only conditions being that they do not act on vegetable substances, and that they be in a fluid state. The contrary of this has been the opinion in former times. It has been thought that the root not only had the power of selecting appropriate food for the plant, but also of searching for it. The experiment of planting a Strawberry in a sandy soil, surrounded by rich earth, but not coming in contact with it, when it was found that the roots immediately sought the rich earth, was considered conclusive on this point. But the explanation of this phenomenon is easy without having recourse to any power or instinct on the part of the root for seeking nourishment. The influence of the rich soil was felt by the roots, although not in contact, and they became stimulated
by its action. There are other cases in which roots seem to be endowed with the power of seeking nourishment. An example is mentioned by Lord Kaimes of a Plane tree standing upon a ruined wall in Ireland; and when its nourishment was exhausted it sent down roots to the earth, a distance of ten feet, and continued its existence by this act, prompted, apparently, by self preservation. We have seen vines growing in very rich, moist soil send down roots four and five feet long to the earth; but in those cases it was at a curve downwards of the stem, so that the descending fluid must rise to reach the roots. In all these cases we believe that it is the effect of gravity opposed to vital action, rather than to any voluntary or determining power of the plant. In the corn we see roots put forth from the lower nodes of the stalk, and particularly in those that are luxuriant, and in seasons of abundant moisture, proving from their origin and the circumstances under which they occur, that it is the accumulation of descending sap that causes their development.

132. Although roots do not possess the power of selecting their appropriate nourishment, or rejecting what is deleterious, yet they have the power of returning to the soil the noxious ingredients which they absorb. This is shown by an experiment of Macaire recorded by several Botanists, of a plant having half its roots immersed in a jar containing a solution of acetate of lead, and the other half of the roots in one containing pure water; in a short time acetate of lead was found in the jar of pure water, showing that the plant had taken the lead into its system, but had thrown it off again, as unfit for assimilation. It has long been known that roots give off peculiar substances, but it has not till recently been considered a universal and necessary function of plants. There is no doubt, that it is as necessary to the healthy action of the various vegetable organs that the deleterious matters, or such as are unfit for the particular species, should be ejected from the system, as that excrementitious matter should be voided by animals.

133. It has long been known to agriculturalists, that the same crop will not flourish on the same ground for many years in succession: hence they adopt the rotation of crops. The above principle is a plain reason why this is the case. Wheat for instance produces an exudation from its roots which is deleterious to this plant, and if wheat be sown year after year on the same soil it becomes impregnated with a substance injurious to wheat, and the proper nutriment becomes exhausted. This excretion of wheat may be appropriate food for cotton or tobacco, and of course these crops may flourish where
wheat would not grow; hence in transplanting trees, the above principles would guide us to seek plants of a different family from those that previously occupied the ground. It might perhaps be thought that trees would vitiate the soil in which they grow so as to become their own destroyers, but this is prevented by the arrangement, that the roots absorb only by their extremities, and these are constantly lengthening and of course changing their position and coming in contact with new earth. The nature of the excreted substances are of course as various as the families of plants. "Leguminous plants produce a substance analogous to gum with a little carbonate of lime; grains a minute quantity of matter containing certain alkaline and earthy muriates and carbonates, but very little gum;" others the bitter principle and substance resembling opium, containing tannin and other salts. Our space forbids specifying the numerous excretions of the different orders, which have been determined. The practical application of these principles is important to the Agriculturalist and Horticulturalist; it teaches the first that the greater the variety of crops he can produce on his plantation, the better they will be, and the less likely to be injured by attacks peculiar to the crop. It teaches the latter the benefit, if not the necessity, of changing the compartments of his garden in succession for different productions, and the necessity of changing the earth in pots and boxes occasionally, if he expects plants to continue to thrive.

134. We have mentioned before that the root always descends in its course of development, unless obstructed by physical impediments. Numerous experiments have been made which strikingly exhibit this vital impulse. To Dutrochet, more than to any other man, is the world indebted for placing this subject in its present interesting position. In several memoirs he has discussed the subject in its various connections, and from his numerous experiments we arrive at the conclusion that, Quantity of matter seems to exercise the most powerful influence in controlling the direction of the root. When the root has its situation naturally in the earth it descends perpendicularly to its surface. Previous to his investigations various hypotheses were abroad to account for the uniform direction of the root and stem; but all were unsatisfactory. If seeds are permitted to sprout in a box, and after the plumula and radicle are developed in their common directions the box be inverted, the root will change its direction downwards, and the plumula upwards, and if they are permitted to sprout in a tube in which they cannot turn after inversion, they will as-
sume a spiral form. The cause in these cases is made plain by a curious experiment contrived by Dutrochet. It was found that the Mistletoe had the same impulse towards the center of the branch of a tree on which it grows, that most other plants have to the center of the earth, and it was also found that the Mistletoe might be made to germinate on a thread so small that it would exercise no influence over the direction of the root. This he did, and then fixed it to a fine needle, and had it accurately balanced so as to turn like a compass needle with the slightest force. He then placed near the radicle a piece of wood and covered the whole with a glass, and in process of time the radicle was seen to turn directly towards the wood, and that too without moving the needle; showing that the quantity of matter controlled the direction of the radicle, but by the exercise of no power with which we are acquainted. It could not have been by attraction, for then it would have produced a movement of the needle. It seems to be an exercise of power over the vital energies in producing the turning of the radicle in that direction. The earth no doubt exercises its influence in the same manner. This influence, however, has been counteracted by the application of agents in an unusual manner. Prof. Schultz is said to have succeeded in reversing the growth of plants by planting them in moss, and so arranged that the light which they received was the solar rays reflected from a mirror from below upwards. Under such circumstances, it is said, the roots take their directions upwards, and the stems downwards; similar experiments have not succeeded in the hands of others.

Notwithstanding such experiments may succeed, we may nevertheless draw the conclusion, that all roots direct themselves perpendicularly to the surface of the body on which they naturally germinate; if they are parasites they will be perpendicular to the surface on which they grow.

Color seems to exercise an important influence in the direction of organs; if they are of deep color they ascend, if colorless, or of a pale color, they take a descending direction. Roots if they become green will then ascend, or turn towards the light, if placed in circumstances to have the light come to them in only one direction.

Section 2. Function of Leaves.

135. From the structure of leaves, we should be led to suppose that they perform an important part in vegetation. They
have been compared to the lungs of animals, but they perform much more for the plant, than this comparison would indicate. They are not only the organs of respiration, but also of digestion and nutrition. They perform in every respect for vegetables what are performed by the lungs and stomach, and the whole digestive apparatus, in animals. They receive the crude sap from the roots through the stem and elaborate it by exposing it to the action of the atmosphere, throwing off the superfluous moisture, decomposing water and carbonic acid, sending down the deleterious substances to be voided by the roots. They send immediately downwards the materials of the albumen and hiber, and nourish with this elaborated food the contiguous parts.

That the nutrition of a plant depends upon its leaves is abundantly proved by depriving a plant of these organs through a season, and it withers and dies. It does not die immediately, since it possesses the power of putting forth new leaves which soon come into action and supply imperfectly the places of those removed; but if it is deprived of its leaves through the season, its power of putting them forth becomes exhausted and all functions cease.

The presence of cotyledons also shows the necessity of leaves to prepare food for the embryo. If the cotyledons be removed the seed seldom germinates, and if it does, it is in a sickly state. The structure of the leaf shows its adaptation to the purposes of respiration. We now proceed to describe some other of its functions.

136. By what we have called crude sap, we do not mean that it is not changed at all in its ascent through the root and stem, but that it is unfit for assimilation, until it has passed through the leaves. Prof. Emmons published an article in the American Journal of Science, for 1834, vol. 26. p. 99, in which he argues against a double circulation in vegetables, and the effect of the leaves in elaborating the sap. From the well known talents of the Prof. and our own estimation of his exalted abilities on any subject to which he turns his attention, we have taken uncommon pains to settle this question in our own mind, and we have come, by various experiments, to the conclusion, that all the functions we have attributed to the leaves are certainly performed by them. As the Professor throws out his ideas in the form of hints, we should be gratified to know whether future observations confirmed his opinions. We have seen nothing from his pen on the subject since the article referred to above.

137. It would be an important point to determine the real state
of the sap as it enters the leaves. That it is changed in its ascent is certain; of this we have often convinced ourselves by making an incision in the spring of the year near the root of a Birch, and sap, with very little taste, will be obtained, but by making the incision several feet high the sap is bitter, and the bitterness increases with the elevation of the incision. Sugar makers (from the Maple) know that the higher they tap the trees the sweeter is the sap.

The sap in this partially altered state, which is owing to chemical changes, enters the leaves.

138. The first action of the leaves is to get rid of the superfluous water in which its food is dissolved. Whether this is any thing more than simple evaporation we are not prepared to say, yet we believe the plant has partial control, at least, over the quantity. The construction of the stomates plainly indicates this. It is influenced by the same causes which govern common evaporation. Under the direct influence of the sun's rays it is most rapid; in the diffused light of day it is less, and in the dark it almost ceases.

The quantity of fluid given out by plants is in some cases very great. We may convince ourselves of this by holding a glass near the under surface of a vigorous leaf of the vine, and it will soon be covered with moisture, and in a little while it will accumulate in drops and run off the plate. Hales found the evaporation of a sunflower to be one pound and four ounces, and a cabbage one pound and three ounces in a single day, and estimates the evaporation of plants to be seventeen times greater than that of animals.

139. The next and most important function of leaves is the decomposition of carbonic acid. It is only by the performance of this function by the leaves, that the solid parts of vegetables are deposited. Any cause which arrests this operation immediately renders the plant sickly and its peculiar secretions cease to be deposited. Light is absolutely essential to the performance of this function of the leaves. In the dark no carbon is deposited and no oxygen is liberated.

De Candolle says, "If two plants are exposed, the one to darkness and the other to the sun's rays, in a close vessel and in an atmosphere containing a known quantity of carbonic acid, and are removed at the end of twelve hours, we shall find that the first has diminished neither the quantity of oxygen nor carbonic acid; and that in the second, on the contrary, the quantity of carbonic acid has diminished, while the quantity of free oxygen has increased in the same proportion." This experiment shows beyond doubt the function
of the leaves in decomposing carbonic acid, and that the light
of the sun is necessary for its operation.

The same author instituted another ingenious experiment
to show the absorption of carbonic acid by the roots and its
subsequent decomposition. He filled a cistern, and an inverted
bell glass, with distilled water, the glass having a sprig of
mint floating in it; in the same cistern was placed another
bell glass containing carbonic acid. The surface of
the water was covered with a stratum of oil to prevent
the access of atmospheric air. The whole was then exposed
to the direct action of the sun. The carbonic acid diminu-
ished daily, while the glass containing the mint had acquired
a quantity of oxygen exactly equal to the loss of carbonic acid. A similar plant placed under similar circum-
stances with the exception of the jar of carbonic acid, disen-
gaged no oxygen, and at the end of twelve days, the time
the experiment continued, commenced to decay, while the
other one was in good health. No farther proof certainly
could be required to establish any fact than these afford in
establishing the function of the leaves in decomposing car-
bonic acid, by the aid of the sun's light.

It is a singular fact that such experiments will not succeed
unless exposed to the direct action of the sun's rays. Although
these operations take place in some degree in plants growing
in shaded places, yet when placed under circumstances for ex-
periment, they require the direct action of the sun to perform
this function.

140. That the carbon has been deposited in the plant is also
proved by exposing plants to the action of an atmosphere that
contains carbonic acid, and similar ones to an atmosphere that
contains none; the former will increase in carbon, while the
latter will not. The two principles established by these ex-
periments are of much practical importance. They teach us
that the presence of carbonic acid is absolutely necessary for
the growth of vegetables, and that if we expect the full and
perfect development of plants they must have the direct ac-
tion of the sun's light. To secrete all the peculiar products
in perfection these circumstances must conspire. The gar-
dener is well aware of these facts in practice. To prevent
the deposition of unpleasant products, which are natural to
the plant, he covers the stem of the celery, and it deposits
little except the simplest tissue, and becomes loaded with
nearly insipid fluids; the sterner juices of the plant previously
deposited becoming diluted, so that it is a healthful and agreea-
ble food. This plant, uncultivated in the manner it is, yields
substances exceeding rough and acrid, and but little correspoding to the mild, sweetish stems produced by the gardener's care. This, however, it must be observed, is an immature state of the plant; and the principle of the deposition of carbon by light is used, although empirically, in converting an otherwise useless weed to an article of delicacy. We might multiply examples, but one is sufficient to illustrate the principle, and we may make the remark, which the cultivator would do well to bear in mind, that when plants yield naturally agreeable products the more light they receive the better they will be; but when the products, in a state of too great concentration become acrid, shade will make them more palatable. Of the latter of these is the Radish, and of the former the Potatoe. Hence the potatoes are much drier and contain more nutritive matter, which have been grown on open land exposed to the sun, than those grown in orchards, which is often the case. The truth of these principles is strikingly illustrated also in the geographical distribution of plants. Those of high latitudes, growing through a summer of a few weeks or months, possess few decided properties. They yield the simplest vegetable products, possessing but few properties not common to all vegetables. But as we approach the equator, the properties become more decided, odors more varied and pungent, fruits more delicious, medicines more powerful and efficient, poisons of the most fatal character, till we arrive at the equatorial regions where all these products, in all their variety, arrive at perfection.

141. Forest trees are affected very much by the same principles. The wood of dense forests is known not to be as firm, or as durable as that of trees growing in open grounds. We see also the effect of these principles in the turning of plants towards the light when it comes to them in only one direction. The side next the light deposits its carbon, and becomes firmer, harder, and of course contracted, while the other side remains turgid with unassimilated fluid. The plant of course bends towards the light, not from any attraction it has for it, but from the influence the light exerts upon it. We see the same exemplified in the growth of forest trees. When the forest is dense, light being received entirely on their tops, trees stretch upwards. the lower branches decay, and thus forming tall, straight cylindrical trunks, with the branches near their summit. Trees in open fields never grow as tall as in forests, but they have a greater number of branches, and nearer to the earth; and the reason is plain from the foregoing remarks; they receive the direct rays of the sun at every different po-
sition it assumes through the day, thus having no propensity to development in any particular direction by the action of the light.

142. Another function of the leaves is that of absorbing and giving out oxygen. That plants yield oxygen to the atmosphere has long been known, and that they absorb oxygen during the night is not a very recent discovery. Our preceding remarks render it unnecessary to add much to our observations on plants giving out oxygen in respiration, as it results mostly from the decomposition of carbonic acid; but we are unable to account for the constitution of various vegetable products without supposing the decomposition of water, from which the vegetable derives the hydrogen used in the formation of these substances. Oil for instance, is composed of 1 atom of oxygen, 11 of hydrogen, and 10 of carbon. Now no substance, that enters as food into the plant can yield this great amount of hydrogen but water. This decomposition of water, no doubt, in a great measure, takes place in the leaves, for volatile oils are very commonly found in these organs, and when they are not found in the leaves, they often exist in cavities with apparently no secreting bodies for their formation in the situations in which we find them. In many cases, at least, it seems probable, from these considerations, that they are generated in the leaves, or in parts performing the same functions. The bark, in certain states, is capable of performing the same operations as the leaves.

143. The absorption of oxygen takes place in the night. We may convince ourselves of this by confining a plant during night in atmospheric air, and the oxygen will be perceptibly diminished. This oxygen unites chemically with substances contained within the leaves, and probably with carbonaceous food not in the form of carbonic acid, and it would seem that only in this state is it fitted for assimilation. The oxygen is immediately given back to the atmosphere on the return of day. The quantity of oxygen absorbed by plants is too small to have any effect on the health of animals by its abstraction.

144 Besides absorbing and giving off oxygen, plants constantly, in healthy action, give off a small quantity of carbonic acid, both day and night. It has been supposed that this was the true and only effect of vegetable respiration on the atmosphere, and that the absorbing and giving off oxygen and decomposing carbonic acid and water, belonged to digestion. This we are disposed to believe is the true state of the case. From this it would result that the respiration of vegetables vitiates the atmosphere as does that of animals; but the effects of their di-
gestion abundantly compensates not only for the carbonic acid, which they yield to the atmosphere, but also for the vast amount constantly given out by animals, and that produced by combustion. They not only yield oxygen, but they take the noxious gas and decompose it, and retain the carbon and return to animals the vital air. Thus the two great kingdoms of animated nature mutually yield to each other its vital fluid. Were it not for this compensative arrangement we see no other result, constituted as the beings of this globe now are, that could happen, but that the atmosphere would become so vitiated as to be unfit for the support of animal existence. How beautifully they now operate. The expelled carbonic acid, which is poisonous to the animals, which throw it off in vast quantities, is taken up by the vegetation as the most healthful and appropriate food for them, and the oxygen which they do not require by their constitution gives life to man.

That very important operations take place in the leaves is conclusively proved by many observations on the leaves of different plants at different periods of the day. Hayne found the Bryophyllum calcynum to be acid in the morning, tasteless at noon, and bitter in the evening. The same is true of many other leaves, and some will even redden litmus paper in the morning, but produce no effect upon it at any other part of the day.

**Section 3. Origin of the Wood.**

145. We might occupy pages in the various discussions which have been carried on concerning the origin of the wood. From the time of Linnaeus to the present, various theories have been formed and advocated with spirit; but the discovery of new facts has compelled, in some cases, the authors to yield their favorite opinions and fall in with views more in accordance with what at least appears to be nature's operation. We shall not occupy our space on exploded theories, but proceed directly to lay before the student the one which seems to bid fair to supplant all others.

This theory supposes two distinct simultaneous systems of growth: the cellular and fibro-vascular, of which the former is horizontal, and the latter vertical. The cellular gives rise to the pith, medullary rays, and the remaining cellular substance of the wood and bark. The fibro-vascular system gives rise to the vascular portion of the plant. All the woody portion of the trunk are the roots of leaves imbedded in the cellular system by which they are confined. The buds differ from the
seed in no important respect. They send up the ascending axis in the form of a branch, and the descending axis in the form of vascular fibres, which united, form the stem and terminate in the earth, modified in some respect, by the cellular system, forming what, taken as a whole, is called the wood. The various varieties of wood are produced by the action of the cellular system. Of this we may be convinced by removing a ring of bark of one tree and supplying the place of the removed portion by a ring from a different tree, and the wood formed under the strange portion will be of the same kind as the tree from which it was taken, but the wood above and below will remain unaltered. The same is the case with grafts. The graft will always remain unaltered, while the wood of the stock remains unaffected by the graft.

146. The truth of the assertion that the wood is composed of roots of leaves is abundantly shown by all endogenous trees. Each bundle of woody fibre in the Yucca or Palmetto, may be traced directly to the base of a leaf, and if a root is the descending axis, each bundle must be considered a root proceeding from a leaf, and the stems as composed of innumerable roots bound together by the cellular tissue. No theory that has ever been proposed has explained, with any degree of satisfaction, the growth of Endogens, but this theory of DuPetit Thouars explains, with perfect simplicity, every variety of vegetable production.

In exogens we find abundant evidence of its truth. If the leaves be removed from the extremity of a branch, no increase of the branch will take place, except below a leaf, and the branch will die, down to the first leaf; and on the opposite side it will die lower down if the leaves are alternate. This fact shows, beyond doubt, that the production of wood depends on depositions from the leaves.

147. The case of Endogens before adduced, shows as clearly that the woody fibres are produced from the leaves downwards. Some uncommon examples are upon record, which go still farther to confirm the position. In the Pandanus the stem near the ground is extremely slender; higher up it is thicker and gives out aerial roots, which act as props to the plant by entering the earth obliquely. The aerial roots are beyond doubt what would have composed a part of the stem, had they remained bound by the cellular substance into one cylinder, but from some cause they separate and subtract so much from the mass of the stem near the root. Prof. Lindley describes another instructive case on this subject in the Barbacenia from Rio Janeiro, recently discovered.
It consists of a central portion similar to common endogenes, but this column is surrounded by bundles of vascular fibres, the bundles having no connexion with each other, corresponding, in the opinion of the Professor, to the aerial roots of the Pandanus. We know of no other theory, which explains the putting forth of roots from buds when planted, as in the case of the Multicaulis. These will put forth roots immediately from the bud, and in all essential points agree exactly with the germination of the seed. A complete bud of a Multicaulis will germinate, when all the substance of wood and bark is removed, which does not enter into the composition of the bud. The vitality of most buds seems to be much less, and in some cases cannot be made to germinate at all when removed from the parent stock. Whence, we would ask, come the roots from a bud if they are not the direct production of the bud? We can conceive of no other solution to the phenomenon, and when the bud is removed from the parent, the fibres it would otherwise have sent through the trunk become proper roots at once. From the above theory we are cautioned against excessive pruning, where we wish to obtain substantial stocks; for all other things being equal, the growth of the body of a tree will be in direct proportion to the leaves, which of course, will be in proportion to the branches. If these are removed to a great extent, the growth of the tree is retarded, if not otherwise injured.

148. The duration of vegetables is exceedingly various. Some come forth during the darkness of a single night, and wither and die on the approach of day; others go through their different stages of growth to perfection in a few days, and disappear. Some require the length of several months for the same operation, and others of two years, while others still come to perfection only after several years, and then are continued in existence for indefinite periods. The latter is the case with forest trees. We see nothing, theoretically considered, opposed to the unlimited duration of Exogenous trees. Each year's growth may be considered a distinct individual having in itself all the elements for the production of a similar individual, which, when produced, has no necessary dependence upon its progenitor; since each layer of any tree has been endowed during its time with all the productive functions of the individual. But to this unlimited duration of vegetables, nature offers impassible barriers. The action of the elements, the attacks of insects and larger animals, the exhaustion of the soil by other vegeta-
bles, the constant lengthening of the roots, making the circulation too extensive, are all causes constantly operating to prevent the duration of the most of forest trees beyond one or two centuries. But there are cases in which favorable circumstances have conspired to lengthen out the lives of particular individuals to as many thousands. Some trees of great age have become subjects of history. The celebrated Chestnut of Mount Etna has a circumference of 160 feet, and is called castagno di cento cavalli, the Chestnut of a hundred cavaliers, as it is said that when the Queen of Arragon was on her way to Naples she desired to visit Etna, and ascended the mountain with a hundred cavaliers—a storm coming upon them, they were all sheltered by the foliage of this collossal tree. This tree has been said to be several trees united, but more recent and accurate observations have proved it to have but a single root, and of course it is a single tree. Its age by any calculation must be that of many centuries. Some of the oldest Cedars of Lebanon are supposed to have an age of two thousand years. The Baobab trees of Africa, and the Dragon tree of Orotava are said to be even six thousand years old. Pliny believes there were trees in his time as old as the world, as he says they were, "intacta avis et congenita mundo, untouched by age and brought forth with the world."

Means have been devised for the determining the ages of trees by the diameters, but they are so liable to error, that that they are unworthy of repetition.

CHAPTER V.

Section 1. Fertilization.

149. The subject of fertilization is one of much interest, from the singularity of the operations by which it is in some cases carried on, and the beautiful adaptation of the means to bring about this indispensable end.

All plants possess some apparatus for the production of seed, or of bodies which, independent of the parent will vegetate and produce the species. From the most simple Conserae, with stems scarcely larger than films of silk, to the most perfect plants. The fact that some plants possessed two systems by whose conjoined action the fruit and seed were perfected, has been long known. The ancients were
acquainted with this fact in reference to the Date Palm. They discerned that in the blossom of one tree, rudiments of fruit existed, while in that of others no such rudimentary fruit was produced, but that the powder produced by the flower of the latter, must be sprinkled in the flowers of the other in order to the perfection of the fruit. The above and similar facts constituted all the knowledge of the ancients on the subject of fertilization; and it was not till the latter part of the seventeenth century that any thing like proper notions began to prevail. Ray, in England, and Malpighi, in Italy, were among the first who placed the subject in its true light. Their investigations led them to the conclusion that the "pollen was endowed with prolific power, and served to fertilize the seeds."

Within the last few years this subject has received the particular attention of the most distinguished philosophers, and the important facts which they have disclosed, constitute a proud triumph of their skill and sagacity, over the most hidden operations of nature.

150. The anther and its contents, the pollen, and the various parts comprising the pistil, we have already described. It will now be our object to trace the operations of nature in accomplishing the end intended by the production of these various parts.

The anther in its early stage, together with the pollen, forms a compact and moist body. After the flower expands, the anther matures; the pollen absorbs the fluid from the cells lining the anthers. These cells as we have before remarked, were proved by Purkinje to consist of the fibrous cellular tissue, and this tissue, when deprived of moisture, becomes exceedingly elastic, and the fibres then act as springs in bursting the anther. Now, Mirbel has demonstrated that during the perfection of the pollen, the fluid of this tissue is drawn by the endosmose of the pollen from it. The presence of this fluid is necessary to the perfection of the pollen and it is equally necessary that it should be drawn from the fibrous tissue, that it may perform its appropriate and necessary function of bursting the anther. What a beautiful provision for ensuring the due preparation of all parts, so that none might be prematurely or tardily performed! Under this organization the anther cannot burst till the pollen has drawn its perfecting nourishment; on the other hand the pollen cannot mature only by a means which ensures its immediate escape when perfected.

During this preparation of the pollen the pistil is under-
going important changes. The stigmatic surface assumes an irregular, granular appearance, becoming more lax in its texture, and secreting a viscid fluid, all of which is accomplished by the time the pollen is perfected. The pollen then falls upon the stigma, is made to cohere by this viscidity, and moistened by the secreted fluid.

151. After the grains of pollen have remained upon the moist stigmatic surface for several hours, the extine bursts at one or more points, and through the apertures the entire is protruded containing the contents of the pollen grain. These pollen tubes penetrate the lax tissue of the stigma, and make their way through the whole length of the style, to the ovule, and reach, and probably in all cases enter, the foramen. The remarkable exhibitions of design for accomplishing this object, are unsurpassed by any phenomena in nature, and the researches of Brown, Amici, and Brogniart, have laid open a field which cannot be viewed by a lover of nature, with any other feelings, than those of unmingled delight.

152. We have found the Hibiscus grandiflora the best example for tracing the pollen tubes of any plant, which we have examined in this respect. By examining the plant during the day of the expansion of the flower, the pollen will be found in abundance on the stigmas, of which there are five, and tubes will be found to have projected from some of them, perhaps one only from some grains, and none from others. By the following day the tubes will have entered the stigma, and have passed down the conducting tissue of the style, and entered the placenta. The ovule of the Hibiscus is of the campulitropical kind, so that the foramen is of course brought round near to the placenta; and that the pollen tubes may have access to the foramen, the funiculus is extended beyond the hilum, so as to pass over the foramen, and thus afford a passage for the pollen tubes into it. Owing to the imperfections of our instruments during the flowering of the Hibiscus, we could not satisfy ourselves in tracing the tubes farther than to the placenta, though we believe we could discover them at the entrance of the foramen, at a short distance in which they were lost to our observation. We are obliged on this subject to give the observations of others, not having been able to verify in many points, the facts recorded, from not having in season possessed a microscope of sufficient accuracy and power, to exhibit the parts with satisfactory distinctness. Of the passage of the tubes to the placenta, and the molecular constitution of their contents, we can speak with confidence, but as to their course and modifications afterwards, we trust to the
observation of others. All botanists, who have investigated
this subject, agree that the pollen tubes enter the ovule and
come in contact with the sac of the amnios. The result pro-
duced by this contact, is thus given by Mr. Griffith, as quoted
by Prof. Lindley, in his third Edition of the introduction to
Botany, p. 343. "The pollen tube in first coming in contact
with the sac of the amnios, in the *sandalum album* becomes
blended with it, without perforating the membrane. The
molecular matter has at this time lost its locomotivity, and
becomes aggregated into a grumous line, reaching from the
apex of the sac to its base. Then a globular vessicle, con-
taining mobile granules, appears at the apex of the sac, in
communication with the grumous molecular line. About the
same time, a distension of the base of the sac occurs, and a
central cell is formed in it; by degrees the space intervening
between the latter and the apex of the sac, becomes cellular
and changes to a *suspen sor*, having an embryo at that end
which is next the base of the sac." The above is the action
of the pollen tube in a single case, and although they may
differ in some respects, yet the important points to be noticed
and which are the necessary circumstances attending them,
are *first* that the tubes come in contact with the sac of the
amnios; *second*, that the tubes do not perforate the membrane;
and *third*, that by the action of the contents of the tubes, an
embryo is formed within the sac. These in substance, were
the opinions of the first observers of the action of the pollen
tubes, and are still those of the English, and some continental
Botanists. But there are those, who present the phenomena in
an entirely different light, and endow the different parts with
different functions. The German Botanists, Schleiden
and Endleicher, are the most prominent advocates of the fol-
lowing theory, which is an abridgement of Schleiden's views
as given by Lindley. The pollen tubes enter the ovule, and
pass through the intercellular passages of the nucleus, and
reach the embryo sac, which, being forced forward, is pressed,
indented, and becomes the cylindrical bag which constitutes
the embryo in this first stage of its development; and which
consequently consists solely of a cell of parenchyma, sup-
ported upon the summit of the axis. This bag is therefore
composed of a double membrane, (except the open radicular end,)
viz: the indented embryo sac, and the membrane of the pollen
tube itself. In Taxus, and especially in Orchis, he has suc-
cceeded in drawing out that part of the pollen tube from the em-
bryo sac, which becomes the embryo, and that too, at a con-
siderable advanced stage.
153. The student will observe from the above, that in Schleiden's view of the subject, the pollen tube becomes itself the vessel that contains the embryo, instead of the embryo being formed in the sac of the amnios; and it will also result from this view, that so far from this impregnation of the embryo sac coming from the pollen tube, the pollen tubes become themselves the subjects of this influence. This reverses entirely the order of things as they have been considered in all past times.

Schleiden advances three arguments for the proof of his position, when the tubes cannot be traced uninterruptedly from the stigma into the embryo sac. In some cases, the cellular substance of the nucleus is so firm and opaque through which the tubes pass, that the tubes cannot be traced through it; but the identity of the embryo with the pollen tube, he infers. 1. From the constantly equal diameter of the latter exterior to the embryo sac, and of the former just within it. 2. The invariable chemical similarity of their contents, shown by the reaction produced by the application of water, oil of sweet almonds, iodine, sulphuric acid and alkalis. 3. In such plants as bear several embryos, there is always precisely the same number of pollen tubes.

154. The analogy drawn from the animal kingdom, as applied to the stamens and pistils, has long appeared to us a useless and incorrect one, and we have long since ceased to make allusions of this kind in our lectures on this subject. The production of spores in cryptogamic plants, and of buds or germinating points, in all plants; it seems to us that no such apparatus is needed, and a strong presumption that no such exists.

It seems to us much more simple, and the supposition leaves the vegetable kingdom unencumbered with ideas drawn from a department of nature from which it differs so greatly, and which tends to lead to error, to suppose that the germ of the future plant is produced in the stamen, and the development of the pistil affords it a place of deposit and nourishment.

155. Some different contrivances from those already mentioned for effecting the entrance of the pollen tubes into the foramen of the ovule, should not be omitted in this place. This object is effected in the following manner, in the Armeria vulcarnis and Statice, as described in the Library of Useful Knowledge, Article Botany, p. 110.

Let the ellipse $a a$, fig. 145, A, represent a section of an ovary of this plant. From its base there arises an umbilical cord, $f f$, which curves after reaching about half the length of the cavity, and bending down upon itself again, turns partially
up, bearing an ovule at its apex. When very young the ovule is a sort of cup, the mouth of which is closed by a little cord, and is turned towards the apex of the ovary. From all access to the dome of the ovary the ovule is cut off; notwithstanding its position, by the cord which over against the aperture of the ovule, spreads into a kind of strap. It is from the point of the ovary e, that the stigma arises; and from immediately below their origin, a short cylinder projects down into the cavity of the ovary. Matters being thus arranged, the pollen falls upon the stigma, and pollen tubes are forced into its tissue and gradually find their way into the cylinder; at the same time the ovule lengthens, contracts at its aperture, and is brought near the cylinder, by the elevation of its umbilical cord; at last the strap is slipped aside, the cylinder lengthens, the ovule rises, and with its aperture embraces the point of the cylinder which is somewhat conical, and which is thus brought into contact with the nucleus. At this time the parts are in the position represented as in B, and if cut through longitudinally as at C, they will be seen to be placed in the most favorable position that can be imagined, for enabling the pollen tubes to enter the foramen of the nucleus.

156. After the discovery of pollen tubes, and the necessity of the pollen coming in contact with the moist surface of the stigma, in order to put them forth, it was thought that the impregnation of the Asclipiadeæ, and Orchideæ formed exceptions to the general manner of producing impregnation by their emission, since nature seemed to have prevented the
possibility of any such operation, but more recent discoveries show these plants to exhibit most beautiful examples of this arrangement.

In the Asclepiadaceæ, the stigma is a fleshy, five-cornered disk, having a gland on each angle. To each gland there is attached a pair of yellow bags, containing the pollen and called *pollen masses*. These do not open, and the stigma has no secreting surface. In these circumstances, the impregnation of these plants offered an important problem for solution. Ehrenberg found that through one side, that next the stigma of these pollen manes, pollen tubes were emitted, and directly entered the stigma, and made their way to the ovary, as in other cases, thus showing the perfect agreement in this case, at least, with other phanerogamous plants. It has also proved more than probable, that similar arrangements accomplish the same end in Orchidaceæ In orthotropous plants, threads in some cases hang down in the cavity of the ovary through which the pollen can pass into the foramen. In other cases, the conducting tissue elongates so as to reach the foramen during the time of fertilization. In Euphorbia, the apex of the nucleus is protruded far beyond the foramen, so as to lie within a kind of hood like expansion of the placenta.

**Section 4. Fruiting.**

157. By fruiting we understand the changes the ovary and its connected parts undergo in arriving at maturity. We have already noticed the changes which take place in the contents of the ovary. The changes of the other floral organs, in many cases, are no less prompt and distinct. The floral envelopes soon wither, unless connected with the ovary; the stamen falls off, the pistil dries up or hardens when composed in part of the axis of the plant, and all the energies of the plant seem to be directed to the perfection of the fruit or ovary. That these changes are effected by the act of fertilization, may be made manifest by preventing the access of the pollen to the pistil, and the parts will for a much longer time remain unchanged. There seem to be two different courses taken in the perfection of different fruits. In one, the ovary becomes dry, hard, membranous or woody as in the Poppy, Canna, &c. In others, the ovary becomes fleshy, affording various agreeable articles of food, as apples, pears, peaches, melons, &c. This has been supposed to depend upon the number of stomates on the surface of the ovary. In the dry one, the stomates were sufficient to permit the evaporation of all the
moisture while in the fleshy comparatively little evaporation took place from the small number of stomates on its surface. The effects of fruits, when green, on the atmosphere, are the same as those of the leaves, but generally of a more limited extent. In the night they absorb oxygen like the leaves, and return most of it during the day.

This continues during their green state, and but little change occurs in the ripe stage, only more oxygen is returned to the atmosphere, thus making it probable that the acidity and harshness of green fruit is owing to the oxygen it contains in its composition.

158. The constitution of the fruit differs materially in its ripe, from what it was in the green state. Water and lignine diminish, and sugar increases. Water diminishes from two to ten per cent in different kinds. Lignine generally in a greater proportion. Sugar increases in currants from 0.52 to 0.25, it being twelve times the quantity in a ripe from what they possessed in a green state. This, the remarkable changes in taste would lead us to suppose without analysis. The manner in which this change takes place, is as yet undetermined. In many cases we know that sugar is produced at the expense of starch, but no starch can be discovered in those fruits which generate the greatest amount of sugar, such as Currants, Apples, Peaches, &c. That it takes place at the expense of the other proximate principles aided by water, is certain, since it goes on without any increase of weight, and even when separated from the parent stock, and also in the process of cooking. It is a well known fact in chemistry, that the action of various vegetable substances on each other, aided by moderate heat, will produce the saccharine principle. The vegetable acids with gum and mucilage will produce this effect, and so will sulphuric acid by its action on lignine or starch. These principles are contained in all succulent fruits, tartaric acid, malic acid, gum and various other substances peculiar to each fruit. The act of ripening, therefore, is a chemical process, which consists in converting the various unpleasant and injurious principles of the green fruit, into one of the most nourishing and healthy of vegetable products.

159. Although the above conveys the general principles on which, we believe, the ripening of fruit proceeds, yet in some cases, these substances, from which we suppose the sugar to be formed, increase at the same time; yet we believe that in all cases, either the acid or the other principles diminish, and never both increase or remain stationary in the same
fruit. If the acid increases, the other principles diminish. If the other principles increase the acid diminishes.

For these processes to go on, an atmosphere containing oxygen is necessary; showing that this active agent is required in these operations, and performs some necessary office in the conversion of the crude material of green fruit into the palatable ones of the ripe.

Section 5. Germination.

160. By germination we understand the commencement of the vital action which produces a development of the embryo of the seed. The necessary conditions of germination are the presence of water, heat and oxygen gas. The last is usually supplied by the air.

161. Germination cannot take place in the absence of any one of these agents, and in the absence of water, no effect is produced towards germination by the exposure to both of the other agents. With it they act promptly. The water enters the seed by the hilum, and passes to the perisperm by the cha-laza, from the perisperm to the embryo through its point of attachment. This is the direct course of the fluid through appropriate vessels; but in some cases, as in the Beans and Peas, it will penetrate the testa and enter the embryo directly through its substance, when the vessels of the hilum are obstructed, by being covered with wax or other substances impermeable to water, but germination goes on much more tardy. In others the obstruction of the vessels proceeding from the hilum, prevent germination entirely as in Wheat, Oats, &c. This difference may very readily be imagined to arise from the fact, that the wheat is not only covered by a testa, but also with the pericarp, which is fitted to resist the action of external agents, as other pericarps are; while the bean is covered only by the testa, its pericarp having discharged its contents at maturity. The wheat being deprived of its pericarp, germinates promptly when its hilum is obstructed and the seed immersed in water, as the testa is but a thin mucilaginous tissue.

162. Seeds will not germinate in a vacuum, nor in any gas except oxygen; nor in distilled or recently boiled water, but by the presence of 0.3 of oxygen in any of these cases, germination will commence. The action of the oxygen seems to be in combining with the carbon of the seed, and forming carbonic acid; producing as Raspail says, fermentation; a part of the acid is thrown off, and a part no doubt elaborated by the increasing embryo. It has been recently proved by
Edwards and Collin, that the oxygen which the plant uses, does not all come from the air, but that the embryo possesses the power of decomposing water, and using the oxygen and hydrogen for different operations in developing the plant.—It would seem, however, that a small quantity of oxygen was necessary to produce a commencement of the vital action, to give the first impulse to vitality. By numerous experiments, it has been proved, that the best proportion of oxygen with other gases is as one to four, the very ratio found in nature in the constitution of the atmosphere.

163. Heat is another necessary condition, on which germination depends. Germination cannot take place in a temperature, unless some degrees above freezing, and it may take place in a temperature, which would be entirely inadequate to the perfection of its growth. If the temperature is too high, the seeds may germinate, but unhealthy action is produced, and the plant perishes by over action, produced by this powerful agent.

164. It has been found that Wheat, Barley and Rye, would germinate at 44 degrees Fahr. which is about the lowest point it would take place. These grains being composed in a great degree of starch, and at the expense of which germination probably proceeds, it was thought that these seeds would sustain any temperature as high as starch would, without bursting its integuments. Under ordinary circumstances this takes place at a little above 167°, but this temperature was found sufficient to destroy the vitality of the various grains, Beans, Peas, and like seeds. Many lost their vitality at 125° and some as low as 113°, temperatures which the surface of our soil often exceeds. These facts teach us the necessity of shading, or of planting our flowers and delicate garden seeds in cool places, when it is done after the warm days of our spring come on. We vainly endeavored for two or three years to obtain plants from various seeds, by the utmost care in preparation of the soil, and in planting, but the seeds would not germinate. We then sowed them in boxes in the shade, and they germinated readily, and by transplanting accomplished our desires. Much of the vituperation against seedmen would be saved by a similar course. Many of our common garden seeds require similar treatment.

165. When the three agents above noticed, are brought to act upon the seed in due proportion, it begins to swell, bursts its integuments generally by the protrusion of a radicle; which takes its direction downwards, and soon after the plumula or stem makes its appearance and takes its course up-
wards. During germination, considerable heat is generated, no doubt the effect of the action of the oxygen on the carbon of the seed. This may be witnessed in the germination of large masses of Barley. The most important change produced in germination on the contents of the seed, is the conversion of the amylaceous portion into sugar, which is what is mostly produced by the action of the oxygen, which takes away a part of the carbon from the starch, and thereby converts it into sugar; the starch containing 43.55 per cent of carbon, and sugar but 28 per cent, the other elements being in nearly the same proportion in both. The abstraction of 15.55 per cent of carbon from starch, therefore, converts it into sugar, the appropriate nourishment of the embryo plant.

166. The conversion of starch into sugar, is through the action of a recently discovered substance, called Diastase. This substance is produced at the commencement of germination, and the sole object of its production seems to be the conversion of starch into sugar, for the use of the embryo plant.

It does this with the greatest promptness; even when artificially obtained it will convert two thousand times of its own weight of starch into sugar. It is perfectly inert in relation to any other vegetable product. Its situation in the grain, would lead us to suppose that its operation was of the character above assigned to it. It does not exist in the radicle, or in the cotyledons of the seed, but immediately in the passage from the cotyledons to the germ. It also exists in tubers, as the potatoe, and in them it is not distributed throughout the substance, but only at the very origin of the eyes, precisely at the place where one would conceive it to be placed to dissolve the amylaceous substance for the nourishment of the growing organs. This is an exceedingly important discovery in relation to vegetation, as it carries us one step farther into the mysterious operations of nature, as exhibited in the nourishment and growth of vegetables.

167. The time required for germination is very different, in different species of plants, and even of the same species. Much influence also is exercised over this operation by soil, climate, localities as to moisture and exposure.

Under favorable circumstances, Wheat, Oats, Rye and Millet, will germinate in one day. Spinage, Bean, Turnip, Radish, Mustard in three days—Lettuce in four days—Mellon, Cucumber &c. in five days. Horse radish in six—Barley in seven—Parselane in nine—Cabbage and Hyssop, in ten—Parsely, in fourteen or fifteen—Almond, Peach, Peony a year—Rose, Hawthorn two years. These results will vary
from the age of the seed before exposure to the agents that produce germination, and the influences to which it has been exposed, whether its vitality may have been injured by moisture, heat or light, all of which exercise a deleterious influence on seeds.

168. The time through which seeds will retain their vitality, is very different in different species, when exposed to the same influence. We believe, however, more depends on the action of elements of the atmosphere and light, than upon the necessarily limited time of suspension of vitality in the seed itself. We have known seeds, which are generally considered as losing their vitality at the end of one year, readily germinate after being kept for several years in a dry atmosphere, and of nearly uniform temperature, and protected from the light. Seeds which are generally considered as retaining their vitality only one year, have been known to germinate at the end of one hundred years, and cases are often recorded of seeds germinating after lying buried in the earth beyond the reach of the atmosphere, for at least seventeen hundred years. Any table on this subject, therefore, is necessarily a very imperfect guide, unless it should be based on some specified manner of keeping the seeds. The best course to follow in the preservation of seeds, is to keep them as much as possible in a temperate and dry atmosphere, protected from the action of the light. In the purchase of seeds, kept in the usual manner, fresh ones should always be required.

Section 6. Food of Plants.

169. The principal food of plants is water and carbonic acid, which are received through the roots in a liquid state, and through the leaves in a gaseous form. Besides these nitrogen and various salts enter in a greater or less degree into the composition of vegetables.

Carbonic acid seems to be the most essential article of nourishment for vegetables; since they will not thrive in a soil or medium in which this gas is not found or generated, and just in proportion as this gas is furnished to the roots, in the same proportion does the plant become vigorous and thriving; hence articles, which produce or undergo fermentation, are the most powerful manures, hence yeast is said to be the most efficient manure that can be applied. This results from its power of creating fermentation in the organic substances found in the soil, and thereby yielding carbonic acid. Carbon in its uncombined state, seems unfitted for nourishing the
plant. Sir H. Davy, placed a plant in water, containing carbon in an impalpable powder, and not a particle entered the roots. Lindley says, "the carbonic acid enters the root, being decomposed to a certain extent as it passes along, and giving apparently its oxygen to the spiral vessels, which convey it into the other parts of the system; when it reaches the leaves, it liberates its oxygen completely, and leaves its carbon to unite with the tissue of vegetation, or to enter into new combinations with water, atmospheric air, or other elements it finds itself in contact with; whence proceed the gummy, amylaceous, resinous, oily, and other products, peculiar to the vegetable kingdom.

170. Water also is a necessary and important substance in the economy of vegetables. Some have considered it almost the only article of nourishment of the plant; while others have assigned it no other importance than that of forming a medium, by which the appropriate food is enabled to pass into the plant. Both we believe are wrong. It does form a medium for the passage of other food, and that a part, that enters the plant, becomes food also, has been abundantly proved, but not to the extent perhaps, that some would seem to suppose. Theodore de Saussure remarks, that if we calculate with the utmost care all the weight which a plant can gain by fixing carbon, by depositing earthly, saline, alkaline, and metallic matters, which it borrows from the soil, by respiring oxygen, or from the soluble matter of the soil, we shall not be able to account for more than one twentieth part of the real weight of such a plant. The other nineteen twentieths must therefore be fixed water. This may be an over estimate, and probably is, but that water is decomposed and solidified, is placed beyond a doubt when the composition of vegetable products is considered; for from no other source could the plant obtain the elements of its various products, but from the decomposition of this fluid. The large amount of Hydrogen, found in the various volatile and essential oils, must come from the decomposition of water. But besides the water which is decomposed in vegetable digestion, much of it is, no doubt, solidified without decomposition. The elements, Oxygen and Hydrogen, of Sugar, Starch, Gum &c., are in that exact proportion in which these elements unite to form water. The atomic composition of these substances seems to indicate the simple union of carbon directly with water, and the conversion of one into the other, by the simple loss of carbon confirms this supposition, and we are unable to see the force of the arguments, which have been offered to support a contrary opinion.
171. Nitrogen has generally been considered as performing an unimportant part in vegetation, entering into the composition of some vegetables, but not into all. Boussingault in a memoir published in the tenth volume of the "Annales des sciences naturelles" proves that nitrogen is a constant and necessary element of perfect vegetation. That in cases where vegetables were made to grow by excluding it from the roots only, the seeds were not perfected. In an experiment on 1586 grains of Trefoil seeds containing when the experiment commenced .114 of a grain of nitrogen, the agency of nitrogen is abundantly established. These were made to germinate and grow in silicious sand, previously heated to redness, to destroy all organic substances, and watered with distilled water, and at the end of three months the nitrogen had increased to 156 of a grain, thus gaining from the atmosphere .042 of a grain of nitrogen; thus proving beyond a doubt that nitrogen is taken into the plant as a part of its food. These experiments were performed with the utmost precaution, that nothing but pure atmospheric air should have access to the plants. Different experiments were continued during different times, and the accession of nitrogen was in proportion to the length of the time the experiment continued, under similar circumstances.

172. From various considerations, Boussingault comes to the conclusion that nitrogen forms an important part in vegetation. It is admitted, he says that the force of vegetation is in proportion to the nourishing saps, which are met with in the earth, understanding by nourishing saps, those parts of manure capable of being absorbed by the spongiole of the root; that, in a word, which constitutes the fertility of the soil. Thaer has shown, that those manures procure for lands the greatest fertility, which contain the greatest proportion of animal matter, and he (B.) has shown, that those are most nutritive, which contain the greatest quantity of nitrogen, and that those plants empower the soil most, which contain the most nitrogen. Hence concluding that the exhaustion of the soil is occasioned by the abstraction of azotic matter, which makes a part of the nourishing saps, and that, to restore to the soil the degree of fertility, which it possessed before cultivation, it is necessary to introduce by manure an equivalent quantity of this same azotic matter. Some crops, he says, (and it is well known) increase the fertility of soils, such as grasses, which are cut while green, since the greatest amount of nitrogen is required in perfecting the seed, and in this case this exhaustion is saved; now, the roots remaining
in the soil, together with what is derived from the atmosphere, more than compensates for the stalk, which is taken away; that is, the soil has received more vegetable food from the atmosphere and the roots, than it has yielded to man. But Boussingault takes a more extensive view of the subject. He supposes a farm devoted to the cultivation of grain, possessing of course, a sufficient amount of stock; one knows by experience what quantity of manure is indispensable, therefore the relation which ought to exist between the surface cultivated in ferage, and that devoted to the cultivation of merchantable produce. Each year they will export grain, cheese, and some animals. Thus there will be a constant export of azotic products, without any importation of similar matter, and during all this time the fertility of the soil is not impaired. The organic material constantly exported, will be replaced by the culture of ameliorating plants or by fallowing; and the art of agriculture consists in adopting the rotation which best favors the most prompt transition of the elements of the atmosphere into the soil.

173. The above is a true representation of the course pursued on numerous farms, where there is a constant exportation of products, but no importation of manure, and yet the farms are increasing in richness; but we are sorry to remark that the soil of many other farms within our acquaintance which export more, by carelessness and mismanagement, is becoming exhausted. The latter class of farmers are inflicting serious injury on posterity, as it will require a long series of years to bring back an exhausted plantation to a state of fertility, although it requires but little proper management to keep a good plantation good for ages.

174. But besides the above named elements, various other substances enter into the composition of vegetable food, which act in hardening the tissue, and some of them probably as stimulants to the vegetable functions. Some plants require the presence of silex in order to form their appropriate tissues, as the cane, corn and grains generally. The various salts of lime enter into the composition of vegetables, as the phosphate in the Phytolacca, the oxalate in the Iris and Rhubarb. Potash enters into the composition of all plants not exposed to the action of salt water, and those that are thus exposed, contain soda. From the ashes of the former, the potash, and from those of the latter the soda, of commerce, are obtained.

175. From this constitution of vegetables, different plants require different soils for their production in the highest de-
gree of perfection. Some require silicious soils, others a soil containing lime, and others argillaceous or clay soil; for each plant will be but imperfectly developed in a soil, when it does not find the necessary materials for its organization. Raspail remarks, that "for the reason that a plant would die in a vacuum, for the same reason, would it die in a soil destitute of the bases which were necessary for its organic constitution. This would be asphyxia for want of soil, as the other is asphyxia for want of air; for to live is to combine, and without elements no combination would be possible." But in most soils all the necessary elements are found in a greater or less degree. To these facts, the eye of the agriculturist should be open, and the constitution of his soil should be known, that he may be enabled, as much as is in his power, to supply the deficient element, necessary for the crop he wishes to produce. It is a common complaint in almost every section of country, that some plants uniformly degenerate. In some places it will be one kind, in others another. Now Raspail has shown, that although a soil might be rich in every other respect, but not containing the necessary salt for the particular species, the plant uniformly degenerates, and finally ceases to produce seed. The gardener, being aware of this fact, should make such application as the general nature of his soil seems to indicate.

176. We should be glad in this place, to extend our observations on manures, drawn from the writings of De Candolle, Raspail, Dutrotchet, Davy, Boussingault, Thaer, and various authors of our own country, but our space forbids it. The subject would afford matter for a treatise by itself.

Section 7. Circulation of the Sap.

177. Within the last few years much has been accomplished in this department of vegetable physiology. The circulation in the cellular tissue, we noticed under the description of that tissue, and it will be unnecessary to notice it farther in this place. That is called the circulation of Rotation. There are two well distinguished kinds of circulation, General and Special. The one above noticed, is of the latter kind.

178. That there is a general circulation from the roots to the leaves, is plainly indicated by the rapid evaporation which is constantly going on from the surface of those organs. How soon does a vigorous plant wither and diminish sensibly in weight, when cut in the mid day sun? And plainly for no other reason, than that the source of its supply of fluid is cut
off. Hales many years ago, made some interesting experiments, not only proving this general circulation, but determining the force, with which the fluid moved forward.

179. By the aid of a glass tube, containing mercury, attached to the stalk of a vine cut off two feet and nine inches from the ground, the force of the sap at its maximum raised the mercury 32½ inches, which was on the twelfth day after the experiment commenced, April 18, at 7 A. M., which force was sufficient to raise water 36 feet.

"In another like mercurial guage, fixed near the bottom of a vine which ran 20 feet high, the mercury was raised by the force of the sap, 38 inches, equal to 43 feet 3 inches height of water, which force is more than five times greater than the force of the blood, in the great crural artery of the horse, seven times greater than the force of the blood in the like artery of the dog; and eight times greater than the blood's force in the same artery of a fallow doe."

180. These experiments show not only circulation, but that it is carried on with great force. The force with which the sap moves in vegetables varies with the seasons and the hours of the day. It is most powerful in the spring, and in the morning of the day, and under the direct action of the sun after a rain. The course which the sap takes in its general circulation, is from the roots through the alburnum to the leaves, and downwards through the bark, and laterally by the medullary processes. These facts may be shown by cutting in early spring into the sugar maple, and we shall find the sap running from the alburnum only, and mostly from the lower surface of the wound, showing the upward course of the sap is through this part of the stem. If the same tree be cut in mid summer, there will be little or no issue from the alburnum, but the bark will now give out a fluid from the upper edge of the wound, proving that the downward current is through the bark. The reason that has been assigned for little or no sap issuing from the cut alburnum in summer, is that the draft made upon it by the evaporation, prevents the vessels from holding enough sap to issue from the cut ends.

181. That the sap, before elaboration, ascends within the wood, and that most of it after this process, descends within the bark, is proved by tying a ligature very tight round a branch in spring, and the branch will greatly increase above the ligature, and but very little below it; thus showing that the sap was not obstructed in its ascent, but was obstructed in its descent. This operation will very much increase the size of fruit on any branch, for a single year, but it injures
the tree for succeeding years; since the proper amount of alburnum is not deposited in the trunk, and from the hardening of the previous alburnum, the sap for the succeeding year is obstructed in its course.

182. The cause of the ascent of the sap has been attributed to the evaporation of the leaves, to capillary attraction, aided by the motion of the stem produced by the wind, to endosmose, and to vital action. We believe it is generally not due to any one of these, but to all of them, and we believe more is due to vital action than to any other cause. That it was wholly owing to vital action, in the first experiment quoted from Hales, is evident from the facts, that none of the other alleged causes could act. Evaporation from the leaves could not have produced it, for he states that there were no branches on the stem subjected to experiment. Evaporation or Endosmose cannot produce a force exterior to the body in which they act. To vital action alone, then, we must ascribe the principal force with which the sap is propelled. It seems remarkable to us, that so much pains should be taken to explain phenomena on mechanical principles, which are wholly impotent, when applied to the circumstances under consideration. We are gravely told, and I quote high authority, that, "when a young bud is first excited to growth in the spring, the fluids it contains are increased in density by evaporation; endosmose immediately takes place between it and the tissue below it, which latter parts with the thinnest portion of its contents, and then acts by endosmose upon the tissue below, and thus the whole cord of vegetation is set in vibration. It may be supposed that the mere effect of gravitation will carry downwards the sap, in its densest state, after it has ceased to obey the attraction of the leaves, and that it will descend by simple filtration till it reaches the roots; but how we are to account for its lateral transmission, through the medullary rays, is still unknown."

183. The first phenomenon quoted, is that by evaporation, the fluids in the leaves are made more dense, which puts in action endosmose. Now we are acquainted with no experiment on the action of endosmose, where it ever separates the fluids under its influence. We have no particular objection to resorting to this new agent in putting the sap in motion, but we should like to know how this dense fluid, in the cell into which the lighter fluid is entering by this power, is to be discharged from the cell? We have been unable, either from our own experiments, or those recorded by others, to devise any method. Endosmose, or Exosmose will not do it, for if
we resort to exosmose it can only pass out into the ascending current, and by becoming lighter by dilution, is drawn by Endosmose immediately back again. But our author solves the difficulty, by saving that gravity will carry the denser sap downwards! True, but how comes the denser sap separated from the lighter? and why does it not return in the same vessels in which it ascends?

184. How does gravity operate in carrying the denser fluid upwards, as in many cases in which the extremities of branches are lower than the point of insertion? We know of no solution to these questions, and we are compelled to say that they are facts of which we can only refer to the action of that mysterious principle which we call life. The action of this principle, is of course, modified by circumstances. It requires the action of external agents to call it into operation, and its force is increased or retarded by the same. Heat and moisture exercise great influence over it in circulation. In the cold of winter it is nearly suspended, but the warmth of spring calls it into action. After its action has commenced with some vigor, a cold night seems to retard or suspend its operations for the succeeding day. This is seen in the Sugar-Maple. The sap commences to flow from the incisions, when the warm days and cold nights of spring come on. But if several successive nights, are so warm that it does not freeze, the sap ceases to flow, and for the same reason that it does not flow in the summer, viz.: vital action commences in the buds, and the sap is directed to them; but when it freezes again at night, the sap will flow the next day, as the vitality of the buds is checked or suspended in its action by the cold.

Section 8. Cyclosis.

185. In the cinenchyma, there has recently been discovered a circulation distinct from the two we have noticed, and called cyclosis, the term we presume derived from Kuklos a circle. The only intelligible account we have seen of this circulation is from Prof. Lindley. The cinenchyma, as we have before described it, has its arrangements in no regular order, but lies imbedded in the other tissues, running in every direction. In this tissue the cyclosis takes place; the circulating fluid being generally, though not always a milky substance, and is called latex. The latex which conveys granular matter, circulates through a plexus of reticulated vessels in all directions; when the vessels are parallel, and near each other, the currents rise in some, and fall in others, but, in connecting or lateral vessels, the
Cyclosis.

currents are directed from right to left, or the reverse, according to no apparent rule. The contiguous rows of vessels anastomose from place to place, which produces a permanent interruption of the rising and falling currents. In order to enable the circulating motion to take place, it is necessary that the system of vessels should be reticulated. It often happens, that when strong currents are formed, weak ones disappear. In cases when the cyclosis cannot be actually seen in the vessels, it may be inferred from the following fact. When the two ends of a stem containing milk are cut through, the latex is seen to run out at both ends of the fragment, which proves that there must be both an ascending and descending current; the same phenomenon is visible in plants, having a colorless latex, therefore there must be a motion of ascent and descent in them also.

156. "Cyclosis occurs in the greater part of monocotyledonous, and dicotyledonous plants, and the vessels in which it takes place, are so generally in connexion with spiral vessels, that the presence or absence of the one is usually accompanied by that of the other. The situation of the vessels in which it is found is in the root, stem, petiole, peduncle, flower, &c."

157. The latex is a highly elaborated, and highly organized juice. It is usually viscid, insoluble in water, often opaque, colored white, yellow, brown, red, and is also transparent and colorless, differences that result from the nature of the organized globules it contains, which, according to Mr. Schultz, constitute the living part of the latex. These globules have an oscillating motion, and like the globules of the blood, they coagulate and the liquid part becomes transparent. Upon exposure to the air, the latex separates into a coagulum of a tenaceous elastic quality and a serum; the former being somewhat analogous to caoutchouc. This property is not found in any other vegetable secretion. If we consider the organization of the latex, the globules it contains, its property of coagulation, and separating into serum and a sort of fibrin, we are tempted to believe that there exist a considerable analogy between it and the blood of animals.

158. The latex itself originates in the sap, which rises by the tissue of the wood, and introduces itself into the foliaceous organs, thence after being elaborated, passing into the bark where it is deposited in the vessels in its mature form. The function of the latex is to nourish the tissue among which it is found. The loss of only a small quantity of latex, injures a plant very much. It is the phenomenon of autosyncrisis and autodiaecrisis, (attraction and repulsion of the globules) which
produces assimilation and nutrition. In consequence of the latter force, the molecules of the latex, escape through the sides of the vessels, to be conveyed to the parts requiring nutrient; while on the contrary autosyncrasis, brings about the assimilation of the nutritious matter.

189. "Cyclosis is analogous to the motion of the blood in lower animals, or in the fœtus of a fowl before the heart is formed, when as Malpighi and Wolfe have shown, the blood moves spontaneously in the vascular apparatus."

190. We have thus extracted from Prof. Lindley's late work, the most important points on the subject of cyclosis, and we confess that at present we are unable to decide as to several positions assumed on this subject.

191. The power which plants possess of accumulating sap, and drawing on this store, as food for future use, is a subject of much interest, and of much practical importance. Striking examples of this kind, we see exhibited in the Radish, Turnip, Beet, &c. In these cases the energies of the plant are spent in the first period of their existence, in laying in stores of food in the form of large succulent roots, which is to be used when the plant requires large supplies of nourishment in the perfection of its seed. But plants which do not so obviously provide this accumulation of food, nevertheless, require a fit state of development before they can perfect their fruit. The gardener is well acquainted with this fact, since he knows that Melons and like fruits, which set early, either uniformly fall off, or are diminutive and useless, but if they are not permitted to set till the vine is well developed, and filled with sap, they then grow rapidly and come to perfection, having a full supply of food laid in store for their use. It is a well known fact, also, that when a fruit tree is prevented from bearing one year, that the fruit for the next year is much better than the ordinary fruit of the tree; the tree having accumulated food during the year of rest, which contributes to the abundance and perfection of the fruit. Trees also, sometimes cease to bear only every other year, either from age, or from want of sufficient nourishment in the soil, in which they grow; they cannot bear the exhaustion attendant on the perfection of a yearly crop of fruit.

192. The fleshy receptacles also of many plants, afford nourishment during the perfection of the seed. In some of the grasses, when they grow in moist soils, they become tuberous, laying up food in the tubers, for times of drought.
193. The vitality of plants is often exhibited by various spontaneous motions; by the sensible effects produced by the actions of external agents, all of which phenomena are attributed to irritability.

Of the former of these phenomena, the most common is what is generally called the sleep of plants. In plants with compound leaves, the leaflets often close on the approach of darkness, and expand again on the return of day. Many flowers also undergo the same changes. Some flowers, however, are unable to sustain the light for the whole day, and close their flowers under the direct rays of the sun. In some cases also, the calyx and floral leaves embrace the flower, seemingly for the purpose of protecting it from the action of the cold and moisture of the night. Most of the preceding phenomena are, no doubt, due to the action of the light, since they may be made to take place by artificial arrangements, for the production of light and darkness.—Lamp light will make some plants unfold their petals, which have been closed for the night.

194. In some cases there are constant movements of leaves or petals. We have upon record, remarkable examples of this kind. In the Megaclinium falcatum, the labellum is in constant motion. In the Pterostylis, there is a kind of convulsive action of the labellum. The filaments of the Oscillatorias are continually writhing like worms in pain. The Hedysarum gynans is the most remarkable instance of this character. This plant has ternate leaves, the terminal leaflet, which is larger than those at the side, does not move except to sleep; but the lateral, especially in warm weather, are in continual motion, both day and night, even when the terminal leaflet is asleep. External stimuli produce no effect. The motions are very irregular, the leaflets rise or fall, more or less quickly, and retain their position for uncertain periods. Cold water poured upon it stops the motion, but it is immediately renewed by warm vapor.

195. Movements produced by the action of external agents are various. The common sensitive plant, offers a familiar example; by touching one of the leaflets, the whole closes, and the petiole bends downwards to the stem. The touching the base of the stamens of the Cassia, causes it to fly up against the pistil. The Dionea Muscipula, is a case very much in point, but not very common. The lamina of the leaf is surrounded by long stiff bristles, and if the upper surface of the
leaf is touched, the sides collapse, the bristles passing each other like the teeth of a steel trap, thus effectually holding any insect that may light upon its surface, and the more the insect struggles for liberty, the more closely the leaf contracts.

196. The effect of poison on plants is exhibited, by movements indicating their action.

A solution of the oxyde of Arsenic, killed Beans, Roses, Lilacs, &c., after an action of a few hours in the former case, and in some days in the latter cases. Corrosive Sublimate, and various other mineral poisons produced similar effects, but salts that are harmless to animals are so to vegetables. Vegetable poisons, such as Alcohol, Prussic acid, Belladonna, Laurelwater, and the like destroy the life of vegetables, as they do that of animals.

197. From numerous experiments of the most distinguished physiologists, it is thought that the action of poisons operates on vegetables, through a system similar in its organization to that of animals. Any one, seeing the effect of vegetable poisons, on various plants, throwing them into apparent convulsions, and producing immediate death, without any disorganization of the tissue, must confess that there is an endowment of plants, which the physiologist has as yet been unable satisfactorily to attach to any appropriate apparatus.

Section 10. Color.

198. The products of no department of nature have been more admired for the beauty of their colorings, and the variety of their tints, than those of vegetables. Flowers have ever been the noted examples of nature’s penciling, and from their beauty in this respect they have been the subjects of the poets strains.

“Who can paint
Like nature? Can imagination boast
Amid her gay creation, hues like hers?
Or can she mix them with that matchless skill,
And lose them in each other, as appears
In every bud that blows?”

Our Savior with unequalled beauty, in his allusion to the Lilies of the field, yields his assent to the same sentiment.

199. The various colors are supposed to have their origin in a substance, called Chromule, and that the great variety of hues presented in the vegetable kingdom, are produced by the action of acids and alkalis on the chromule.

Chromule in its natural state is green, and by maceration may be readily separated from the tissue, to which it gives coloring. The grains of chromule are of an irregular
shape, rather approaching the sphere, but somewhat angular, and consist of a semi fluid, gelatinous mass, not enclosed in a sac. It is affirmed by some to contain iron and manganese, to which the varieties of color are owing, produced by the accession of these different substances, as it is well known that almost every hue may be produced by these two metals. But the quantity of chromule which exists in plants is exceedingly small; Berzelius estimated the quantity in the leaves of a large tree not to exceed three and a half ounces.

200. To enable plants to deposit chromule, light in most cases, is absolutely necessary. This is abundantly shown by the fact, that plants growing in the dark become blanched; not that the chromule already deposited becomes less, but that it is surrounded by the deposition of substances containing no chromule, and of course becomes less observable. There are examples however, of plants, growing in deep mines, having never enjoyed the light of day, which, nevertheless are green.

201. Green is considered the natural color of vegetation, and when it is not of this hue in the language of Botany, it is said to be colored.

202. The change of color produced on chromule, has been referred to different causes. The two most deserving of notice, are the one of Schubler, and Funck of Tubingen, and the other of Macquart.

Both theories consider green as the original color, but the means by which the variations are produced, are accounted for on very different principles by the supporters of the two theories. Schubler and Funck maintain that all variations from green are produced by acid, or alkaline secretions. The green chromule acted on by these substances assumes every variety of hue. The hues assumed by the flowers, are determined by the different agents by which they are produced, with the exception of red; this is common to both. Those produced by the action of the alkaline secretions, from green, are

Greenish blue, Violet-blue, Violet-red,

Blue, Violet, Red.

This is called the Blue, Cyanic or Disoxydized series, and any variation of color from one of these hues, will always be by passing into some other of the same series.

Those colors produced by the acid secretions are

Yellow-green, Orange-yellow, Orange-red,

Yellow, Orange, Red.

These constitute what is called the yellow, xanthic or oxydized series.
This theory has been attacked by the most able physiologists, and they have considered themselves successful in pointing out errors in experiments and observations which are sufficient to invalidate this extensively received theory. Mohls, in a memoir in the Annales des Sciences Naturelles, Vol. ix. p. 212, examines various theories on this subject, with apparent impartiality, and gives his decided preference to the following theory of Macquart, although it does not receive his unqualified approbation.

203. Macquart admits that the various colors are owing to the various modifications of Chlorophyll, but denies that it is owing to its being oxidized by acids, or disoxygenized by alkaline. But that it is converted into two distinct substances, by the addition and abstraction of water. By the loss of water it is converted into a blue substance, called anthocyan, which is soluble in water, but not in alcohol. By the addition of water, the chlorophyll is converted into a yellow substance, called anthoxanthine, which is partly soluble in alcohol, and partly in water. These two substances form the basis of the two series of colors above given. They both sometimes exist in the same flower, but occupy different cells; the anthoxanthine being situated in the inferior cells, while the anthocyan occupies the superficial ones; this gives a great variety of tints, according as the color of the inferior cells are more or less distinctly exhibited through the superior layers. By the action of acid and alkaline secretions, these substances assume every variety of hue ascribed to the action of the same agents on chromole.

204. The outward circumstances, which tend to change the color of vegetable organs, are various. The action of light is one of the most efficient agents in the production and change of colors; and it is not a little singular, that the power, which is absolutely necessary to the production of color, in the great majority of cases, should be the most powerful agent in destroying it. We are all acquainted with the influence of light in blanching vegetable substances when dead. The change of the color of leaves in autumn, of fruit when ripening, of some ever green leaves during the winter, are phenomena whose explanation, has as yet baffled the most acute observers. The memoir of Mohl, above quoted, leads us one step farther than had before been taken in the explanation of these common phenomena.

205. We can only give in few words, the results to which his extended observations have led him. He concludes that these various changes are owing to a derangement or suspen-
sion of functions, of the organs of nutrition. This point he strengthens by the consideration, that the puncture of an insect will cause an organ to pass through all the steps to maturity, giving all the hues belonging to its species, whether of fruit or leaves. Also, the cold of autumn and winter, produces a similar derangement; although the agent is different, yet the result is the same. Many ever green leaves become tinged with red in winter, from the influence of cold, but with the return of summer, assume their accustomed greenness; also, the leaves of the extremities of the branches being most exposed to atmospheric influences are changed to red, while those nearer the trunk continue green. If one half of a leaf be protected from the cold, it will remain green while the other half will change to red. But in the case of fruit, heat is the agent, in producing similar effects to those above ascribed to mechanical injury and cold.

Section 11 Odors.

206. Much of the importance attached to flowers by people, generally, is owing to the odors they exhale. The rose has long been cultivated by amateurs, no less for its grateful fragrance, than for its beauties of form and color; and those, which combine these properties, are the most favored objects of the Florist's care. The cause of the odors of Plants, is no doubt, the disengagement of a volatile oil, which, in some cases is easily obtained, and made subservient to the use of man, in others it entirely eludes every effort, to confine or preserve it, being as evanescent as the light, which is the agent of its production.

207. Odors are distinguished into permanent, fugitive, and intermittent. Permanent odors are such, as are enclosed in the tissues of the wood and bark of plants, in a concentrated form; and either from being but slightly volatile, or contained in close vesicles, which prevent exhalation, they remain for a long time, giving to the organs in which they are contained their peculiar odor. There is probably no part of a vegetable absolutely destitute of permanent odor. Every variety of wood, under certain circumstances, exhibits it. Some, nearly scentless otherwise, become strongly odorous, when rubbed or heated. The Pine, Oak and Beech, are examples of this kind. Others are odorous for a long time after being cut, under ordinary circumstances; of this kind, are the Rosewood of Teneriffe, the Cedar and Sandal wood (Santalum Album) of India, so highly esteemed in Eastern Asia for its fragrance.
The slight volatility of the oil, to which these species owe their odors, and the compactness of the wood, enable them constantly to yield their fragrance for an indefinite length of time.

208. Others are fragrant when first cut, but lose this property in a very short time, as is the case with the Cinnamon and Cassia, the fragrant substances being volatile, and the wood porous, both causes concurring to render the wood in a short time scentless.

209 Fugitive odors are such as belong to organs of short duration, as the leaves and flowers, and we meet with them in the greatest abundance, and most frequently in the latter. All are aware, that the flower is the source whence flows the delightful fragrance of the flower garden; and during the season of bloom of our Magnolias, the woods and swamps are perfumed by the odor of their flowers. It must have been remarked also, by the most heedless observer, that the odor of the garden, or forest of Magnolias, is much more pungent at some parts of the day, than at others. During the direct action of the mid day sun, little or no perfume is perceptible from either; but as the sun sinks to the horizon, and the dews begin to settle on the leaves, the evening air becomes scented with their fragrance. The odor accumulates during the night, and as the dew begins to exhale with the rising sun, it is borne on the air in much greater abundance, than at any other hour. Thus these silent worshipers pour forth their incense in a morning sacrifice to Him, who extends to them, as to all, his kind regards.

A shower produces similar effects. Who has not enjoyed the grateful odor, exhaled from the flowers of the field or garden after a summer’s shower?

210. The causes of these apparently great emissions of odor, under the circumstances mentioned, and the apparent suspension of their emission, have not been satisfactorily determined. It has been supposed, that the heat of mid day, under the direct action of the sun’s rays, produces so much evaporation, as to empty, in a great measure, the cells, and that the stomates close, and prevent the emission of the odorous substance; again, it is thought that the excessive evaporation would carry off more of the odors than the plant could generate, and thus the supply becomes exhausted during these hours of heat, and it requires the coolness of evenings, when aqueous evaporation is nearly suspended, for the plant to regain its supply; but a more probable reason (were we disposed to attribute it to any one alone) we conceive to be, that the exces-
sive heat of mid day producing upward currents of vapor, the
odorous emissions are carried with them beyond our notice,
but as night comes on, the currents cease, and the fragrant
exhalations accumulate near the earth. A shower plainly
would produce the same effect, cooling the surface of the earth,
and reversing in some degree, the atmospheric currents. In
the production of odors, the direct light of the sun is necessa-
ry, hence, after long rains, flowers become comparatively scent-
less, and this circumstance adds weight to the reason given
above, and shows that the emission, so far from depending on
the absence of light, as would seem at first view, from the fact
of their becoming more sensible at the approach of night, and
ceasing as the light becomes more intense: a long continuance
of even cloudy weather prevents the emission entirely, showing
that the generation of the fragrant fluid, is dependent, as above
observed, on the direct action of the sun's rays. And it is
well known, that most of the secretions of Phenogamous vege-
tables require the same action, and the more volatile products
especially. From the extreme volatility of the substances
producing fugitive smells, and the necessity of the direct solar
rays, for their secretion, we could not be led to suppose that
any loss of the secretions could take place under the influence
of the mid day sun, or that they could be detained in tissues,
which were continually emitting watery exhalations.

211. Intermittent odors are such as are given off at partic-
ular times, and the plants which yield them, are entirely des-
titute of such odors at other times. Many Orchidaceae are
perfectly scentless, during the day, but during the night are
fragrant. A remarkable example of this class of odors, is ex-
hibited by the cacalia septentrionalis, which, when exposed
to the direct rays of the sun, emits a strong aromatic odor,
but by merely interposing a screen between it and the sun,
its fragrance vanishes. The Cereus gives out flashes or puffs
of perfume, as its intermittent odors are called. " Morren ob-
served in one case of a cut flower, that it gave off puffs of odor
every half hour, from 8 to 12 P. M., when it faded, and the smell
became very slight. On another occasion, when the flower was
left on the plant, it began to expand at 6 P. M., when the first
fragrance was perceptible in the green house. A quarter of an
hour afterwards, the first puff of odor took place, after a rapid mo-
tion of the calyx; in rather less than a second quarter of an
hour, another powerful emanation of fragrance took place.
by 35 minutes past 6, the flower was completely open; and
at a quarter to 7, the odor of the calyx was the strongest, but
modified by the petals; after this time the emanations of odor took place at the same periods as before."

212. Many other cases might be cited of singular phenomena, properly coming under this head. The odors in these cases are certainly developed or emitted on different principles, in the different cases under this variety. The explanations are entirely beyond our reach. There seems to be a specific action of the organs for the production of the odors, as there can be no glands discovered by which the odorous fluid is secreted. That the odorous fluid is emitted as it is generated, which of course must be periodically, is rendered probable by the fact, that emission of carbonic acid took place in the same manner from the flower of the Cereus.

213. Odors have also been classed from their similarity of effect on the human system into aromatic, stimulating, penetrating and sweet, but the difficulty of fixing definite limits to the application of these terms, renders the classification of little use.

CHAPTER VI.

INFLUENCE OF EXTERNAL AGENTS ON VEGETATION.

The influences, to which we shall direct our attention as exercising a decided influence on vegetation, are light, heat, water and earth. Many of the influences exerted by these agents on plants, have already been incidentally noticed under the description of organs, and their functions, in the preceding chapters; but we deem it expedient to give a more connected view of the subject in a separate chapter.

The concurrent influence of all these agents is absolutely required for the perfection of vegetable products; and according as some of them exist in excess, or in diminished quantity, is the functional operation of the vegetable organs injured or destroyed.

Section 1. Light.

214. We have made several remarks on the effects of light, in the section of the function of the leaves, to which the student is referred, in connection with what is stated here.

The most obvious effect of light on vegetation, is the production of colors, and this it effects by decomposing car-
bonic acid, and depositing the carbonaceous matter. In most cases, certainly, light is absolutely necessary for the deposition of the green coloring matter, since most plants become perfectly colorless by growing in situations in which they are deprived of light. There are cases, however, in which plants deposit the green chromule, when excluded from the light. Green vegetables have been found in caves of the earth, from which the light of day was excluded, and we have seen the cotyledons of the Mustard, and the Impatiens balsamina green, when the seeds have germinated within the perfectly closed pericarp; and I have now before me a large onion in which several of the central layers are as green as the leaves, while the parts above and around them are perfectly white. That these are exceptions to a general rule, is manifest from innumerable examples to the contrary, constantly occurring within the observation of every one. If a board lies upon the grass for a short time, the grass becomes blanched; Plants growing in a dark cellar are colorless; the interior of the cabbage is white, while the other leaves are green, and if these are removed, those that are exposed soon become green. Plants which in their natural situation are white, by accidental exposure become green; the side of a potatoe from which the soil has been by chance removed, soon changes its color from white to green. It may then be laid down as a general principle, that light is the great agent in the production of vegetable colors.

215. Light, Raspail says, influences plants to produce vascular tissue, and to make them combine with earthy bases; while in darkness, they produce the cellular tissue, and combine with ammoniacal bases. That light exercises an important agency over the growth of vegetables, and their secretions, cannot be doubted. An equal amount of light and darkness seems to be the proportion in which the greatest amount of vegetable vigor is attained. This is seen exhibited in the equatorial regions, where the days are uniformly twelve hours long, and the nights of equal length, and there we find the most luxuriant vegetation.

216. If according to the hypothesis, light acts in producing the firmer and more compact parts of vegetables, and in its absence, the more yielding and succulent parts are generated, we should be led to suppose, that where these periods were equal, the perfection of vegetable products would be found; and if the light is in much greater proportion than that of equality, just in the same proportion should we expect to find the products of such regions, harder, smaller, and less symmetrical. This is the exact state of vegetable products in high
latitudes. Trees become harder, smaller, and less luxuriant the higher the latitude, for during the period of their growth, the sun is a great part of the time above the horizon. That this is owing to the action of light, is proved by the fact, that by transporting vegetables into high latitudes, from equatorial regions, and keeping them in an atmosphere, at the tempera-
ture of their natural situations, by means of the hot-house, they flourish during the summer, but during the short days, and long nights of winter, they droop, exhibiting their suffering from the due influence of the solar rays.

217. Raspail’s theory above noticed, receives confirmation from the fact, that those vegetables which consist entirely of cellular substance, are produced only in the absence of the light of the sun, such as mushrooms; their growth ceasing at the coming of light. And it is a common notion among gardeners (whether true or not, I will not pretend to say,) that melons, cucumbers, and like pulpy fruits, increase much more at night than during the day. Although Fungi grow only in darkness, they will never produce spores capable of germination, without the action of the sun’s light, and it is said, that in cases where the light of day never enters, there may be Fungi, but they never increase or perpetuate themselves by the production of spores, but only by spreading.

218. It is during the direct action of the sun’s rays, and by their agency, that the most important vegetable products are generated. It is by their influence, that water and carbonic acid are decomposed, the oxygen being mostly liberated, and the elements combining in other proportions, for the formation of the various oils, resins, &c., including the most im-
portant and abundant of the vegetable products. What is gen-
erally termed the sleep of plants, that is, the folding up of compound leaves, and the closing of flowers, is no doubt in most instances, occasioned by the want of the stimulating ac-
tion of the solar rays; for we see leaves and flowers, that were folded up during the night, expand with the first rays of the morning sun.

219. We have upon record, many instances of the singular phenomenon of flowers during twilight, emitting flashes of light. It is said the daughter of Linnaeus first observed this emission, exhibited by the *Tropaeolum Majus* or Garden Nas-
turtium. The flashes occur only during twilight, in the morning or evening; those of the evening being much the most brilliant. The plants, from whose flowers these flashes have been observed to issue most frequently, are the Marigold, *Calendula officinalis*, Orange Lily, *Lilium Bulbiferum*, Af-
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American Marigold, Tagetes Patula, and Sunflower, Hilianthus Annuus, but Mr. Trimmer, in an article in the 2d vol. of "Paxton's Magazine of Botany," p. 193, observes that he had observed it in many other flowers.

220. The cause is supposed to be electrical, as the flashes are more brilliant, when the atmosphere is most highly charged with electricity. In walking in my garden, says Mr. Trimmer, in which was a considerable quantity of Nasturtium in bloom, not at all thinking of the flashing of plants, I was struck with the very vivid flashes that proceeded from them; the scintillations were the most brilliant that I had ever observed, at the same time the sky was overcast with a thunder cloud; and he further remarks, that he always found them most brilliant under such circumstances.

Section 2. Heat.

221. Heat is the most obviously necessary, of any external agent, to the existence and growth of vegetables; without a considerable degree of it, no vegetation takes place. We observe amid the colds of winter, vegetable life is suspended, and as the warmth of spring comes on, vegetation commences, and as the heat increases, plants become more vigorous, in the same proportion.

222. The beautiful arrangement in the vegetable economy, for the adaptation of vegetables, to this season of repose, can but afford matter for the most agreeable contemplation. In equatorial regions, where heat is constant, a great proportion of the vegetables, are of a peculiar organization, not yielding their leaves, not covered with bark, and producing no coverings to the buds; while in higher latitudes we find our forest trees expressly adapted to a season of repose, or a kind of hibernation. The leaves at the approach of summer come forth in immense profusion, perform with energy their functions, during the heat of summer, and at the approach of autumn, disengage themselves, by their own depositions, from the parent stock. We find also our forest trees, covered with a thick bark, composed of materials possessing the least power for conducting caloric; and the buds, the rudiments for the perfection of which the succeeding year's energies are to be devoted, enclosed in scales, nicely fitted for the protection and preservation of their important contents. The equatorial regions are emphatically the regions of monocotyledons, destitute of bark, and always in verdure. The temperate regions, with the year distinctly marked by the four seasons, is as
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emphatically the region of the dicotyledons, clothed with transient verdure, and covered by thick non conducting bark. Herbaceous annual plants, seem in their economy to have been constituted, in reference to their preservation, during a season in which they could not flourish. The annuals of temperate regions, produce seed, fitted to withstand the various influences of a period entirely unsuited to vegetable growth. They are composed of materials the least affected by atmospheric influences, being capable of resisting, uninjured, the utmost intensity of cold; and it is a remarkable fact, that the seeds of tropical annals which are peculiar to that region, are much less able to resist the changes of temperature, and retain their vitality, generally, but for a very short time. In the former case, the very continuance of the species depends on their producing seeds, that will retain their vitality, through considerable periods, and at the same time, resist the influence of rigorous climates, while in the latter there is not the same necessity for the same provisions, and in many instances, at least, these provisions are not made, while they are uniformly provided in the other.

223. Plants, like animals, seem to possess the power in some degree, of preserving a uniform temperature; whether this is owing in part to the action of vital power, or entirely to physical causes is doubtful. The uniform temperature of the earth, from which they derive their food, the non conducting power of the covering, which in a great measure, excludes both the heat of summer and cold of winter, and the evaporation in hot weather, and its suspension in cold, are causes, perhaps sufficient to account for their uniform temperature. Cases, however, are mentioned, of plants growing in soil, in the vicinity of hot springs, receiving their food through a medium, but little less than boiling water, and at the same time their temperature was but little affected by these circumstances.

224. Although plants may preserve their temperature to a certain extent, yet it is well known, that excess of heat, or cold will destroy them. The temperature they will bear without injury, is very different in different species. While our forest trees will bear uninjured, the most intense cold of our winters, others will perish in an atmosphere of thirty two degrees, and annuals are destroyed by the first frost of autumn. The manner in which cold operates in the destruction of vegetables, has of late excited considerable interest. The long prevalent opinion has been, that the well known phenomenon, that water at the moment of its conversion into ice, expands,
was the cause of their destruction. The tissues being filled with sap, it was supposed that when this was frozen, the consequent expansion ruptured the tissues, and unfitted them for any longer performing their functions. This very plausible theory, it seems has been entirely set aside by some, but by others it is still considered a concurrent cause in the destruction of some vegetables at least.

The following is compiled from an article in the 39th vol. of Silliman's American Journal of Science, from the pen of Prof. Lindley.

225. "Mr. Gæppert, denies that the laceration of tissue, takes place in freezing, and asserts that cold operates in destroying the vitality of plants, which is followed by a change in the chemical constitution of their juices."

Prof. Morren has given the following conclusions as the result of his inquiries.

1. "That no organ whatever, is torn by the action of frost, except in very rare cases, when the vesicles of cellular tissue give way, but that the vesicles of plants are separated from each other without laceration. 2. That neither the chlorophyll, the nucleus of cells, elementary fibre, amylaceous matter, raphides, nor the various crystals contained in vegetable tissue, undergo any alteration, unless perhaps in the case of amylaceous substances, which, in some cases are converted into sugar, no doubt in consequence of the action of some acid, formed by the decomposition of the organic parts. 3. That the action of frost, operates separately upon each individual elementary organ, so that a frozen plant contains as many icicles, as there are cavities containing fluid; the dilatation thus produced not being sufficient to burst the sides of the cavities. 4. That such dilatation is principally owing to the separation of the air contained in the water. 5. That this disengagement of air from water, during the act of congelation, is the most injurious of all the phenomena attendant upon freezing; introducing gaseous matter into organs not intended to elaborate it, and bringing about the first stage in a decomposition, of the sap and the matter it precipitates; so that with a thaw, commences a new chemical action, destructive of vegetable life. 6. That the expansion of the cells and aquiferous organs, drives a great quantity of water into the air cells and air vessels, so that the apparatus intended to convey liquid only, contains water and air, while that which is naturally a vehicle for air, conveys water. Such an inversion of functions, must necessarily be destructive to vegetable life, even if death were not produced in frozen plants, by the decomposition of their
juices, the loss of their excitability, and the chemical disturbance of all their contents."

226. Prof. Lindley's conclusions on this subject, coincide in many respects with the conclusions of Prof. Morren, but in some important points they differ, Prof. Lindley remarks, that in the most succulent species of plants, he did not find the vessels of the cellular tissue, separable from each other; and that in several instances he found them lacerated, as if by the distention of the fluid they had contained. He also gives as one of his conclusions: "A chemical decomposition of the tissue and its contents, especially the chlorophyll," which is at variance with the second conclusion of Prof. M. above.

227. The displacement of the fluids by freezing, is one of the most curious and interesting phenomena connected with this subject; and it would appear one of the most important. Prof. L. supposes, that the difference in the effect produced by freezing, when frozen plants are thawed suddenly, or by degrees, is owing to the gradual return of the fluids to their appropriate vessels, when gradually thawed, and that when heat is suddenly applied, the air is expanded, and increases the disturbance already produced by its expulsion from the air cavities. We are all well aware of the fact, that it makes a great difference in the effects of a frost on vegetables, whether they are suddenly or gradually thawed. The gardener often preserves plants, which would otherwise inevitably perish, though perhaps not completely frozen, in such cases, by watering them sometime before sun rise on a frosty morning, with well or spring water; by the application of a temperature, but a few degrees above freezing, the plant thaws gradually, and permits the air "to retract by degrees from its new situation, without producing additional derangement of the tissue." But if permitted to remain till the rays of the sun come upon them, destruction is inevitable. Apples and Potatoes also, if immersed in well water while frozen, are injured less by the frost, than they would be if permitted to be thawed by a more elevated temperature.

228. The effect of frost in converting starch into sugar, is well exhibited in the potatoe. This tuber when frozen, is decidedly sweet, and the starch which it before possessed in great quantities, has in a great measure disappeared.

229. "Finally" says Prof. L. "it appears that frost exercises a specific action upon the latex, destroying the power of motion. If as Prof. Shultz supposes, this is the vital fluid of plants, such a fact alone would account for the fatal effects
of a low temperature. In all the cases I have observed, frost coagulates this fluid, collecting it into amorphous masses."

230. It has been observed, that the most succulent plants suffer most readily and most severely by frost. This is thought to be owing to the conducting power of the tissue, saturated with sap. Hence plants that remain uninjured in dry soils, are very liable to be destroyed by frosts, if raised in damp and shaded situations. It may be adopted by the cultivator as a fact, that whatever tends to render tissue moist, will increase its power of conducting heat, and consequently augment the susceptibility of plants to the influence of frost; and whatever tends to diminish their humidity, will also diminish their conducting power, and with it their susceptibility.

231. The disengagement of caloric during the flowering of plants, is a subject of considerable interest, and might, perhaps, with equal propriety, have been noticed under fertilization; but as the phenomenon is as yet of doubtful origin, we thought it proper to notice it here.

The rise of the thermometer when applied to the spadix of the Arums at the time of flowering, has long been known. Senebier found the temperature 7° higher than the surrounding atmosphere. Hubert in experiments on the Arum cordifolium, in the Isle of France, found the thermometer rise from 66°, the temperature of the surrounding atmosphere; to 111° when placed in the center of the spadix, and in others to 121°, thus indicating a difference in one case of 45°, and in others of 55°. The greatest difference was observed to be in the morning. The accurate experiments of Brongniart have rendered it more than probable, that in all cases of flowering, heat is liberated, although from the structure, or size of the flower, it may be impossible to detect it by instruments. It is well known that during the flowering of plants, oxygen is absorbed, and in some cases this absorption has amounted to thirty times the volume of the subject of experiment in twenty-four hours; during this time carbonic acid is given off. These phenomena plainly indicate the cause of the heat during the period of fertilization. An enquiry of interest suggests itself from these facts, as to the changes effected on the flower by these operations. The disk and petals are now supposed to act an important part in the process of fertilization, and that the process of fertilization is the same as that of germination. The following conclusion confirms this hypothesis. In both cases oxygen is absorbed, and an equal quantity of carbonic acid given off. In both cases amylaceous
substances disappear, and a saccharine substance is generated. Heat also is alike generated in both cases. The constitutions of the disk and petals have been found to be similar to the nourishing parts of the seed. From these facts it has been concluded that the most important function of the disk and petals is to afford nourishment to the pollen and ovule, and the greatest vigor of these organs, is exhibited during the process of fertilization. After this effect has been accomplished, these organs wither. The honey which is found in such abundance in flowers, is the excess of the saccharine production over what was required for the perfection of the pollen, and the nourishment of the ovule. This excess serves for the support of numerous insects, and yields the store laid up by the Bee, which is gathered without injury to the plant.

Section 3. Water.

We have already had occasion to remark on the importance of water in vegetation, it being the only vehicle by which the plant receives its nourishment, and by its decomposition and solidification constituting a considerable part of vegetable products. It only remains for us to notice a few other points connected with the operations of this agent. This element as it exists in the earth, holds in solution various earths and alkalis, and vegetable and animal substances, and on this account determines in a great measure the habitat of particular families of plants. Those waters which contain much vegetable substance, nourish those vegetables whose tissues abound in carbon, as our forest trees. The cruciferous plants, into whose composition nitrogen enters as an element, seek localities in which the waters may be more or less impregnated with animal substances. Some families of monocotyledons, which contain more or less of silex, flourish but in those situations where the water by which they are nourished passes through silicious soils. Leguminous plants are decidedly partial to those waters which contain lime in greater or less abundance. But the most decided influence exerted on vegetables is that of saltwater. Many species of vegetables cannot flourish when supplied with water which does not hold salt in solution. These plants are such as have soda as a necessary ingredient in their composition.

Water also varies very much the texture of plants according to the quantity which enters into the tissues. Those vegetables which have leaves with few pores are succulent,
with loose distended cellular tissue, as in the mesembryanthemum, while in those furnished with abundant pores, the tissues are more compact and rigid.

Some plants will live only in moist situations, while others will avoid such localities and flourish in dry sandy situations. The Fungi requiring moisture are sent forth in profusion under circumstances in which the Arenarias would perish from the abundance of moisture.

END OF PART I.
**ANALYSIS.**

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**CLASS I. EXOGENS.**

Plants with bark, wood and pith distinct. *Leaves* and *Floral envelopes* with reticulated veins.

**DIVISION I. DICHLAMYDEÆ.**

Plants having two distinct floral envelopes; the outer one called the *Calyx*; the inner one the *Corolla*.

*Exceptions.* Clematis, Thalictrum, Anemone, Hydrastis, Trautvetteria.

**SUB-CLASS I. POLYPETALÆ.**

Corolla consisting of several distinct pieces; each piece being called a *petal*.

**SECTION I. THALAMIFLORÆ.**

Stamens hypogynous, very seldom adhering to the ovary.

(a) *Flowers perfect; stamens numerous, occasionally but few.* *Herbaceous plants.*

Order I. *Ranunculaceæ.* Sepals 3-6, usually 5, deciduous. Petals 3-15
Carpels usually numerous; sometimes few or solitary. Fruit dry, achenia folicular, or baccate. Herbaceous plants or somewhat shrubby climbing vines, with a transparent acrid juice. Page 1.

Sub-Order 1. **Anemoneae**. Achenia numerous, with plumose tails, or terminated with a subulate style. Petals none. Sepals petaloid. Involucre sometimes very much resembling sepals.


Sub-Order 3. **Helloboreae**. Petals irregular, or wanting. Calyx petaloid. Fruit folicular, with several seeds. Herbaceous plants.


Sub-Order 4. **Cimicifugeae**. Sepals petaloid caducous. Petals very small, or none. Carpels few, or solitary, folicular or baccate, sometimes 1-seeded and indehiscent. Herbaceous plants with the leaves compound, or more or less divided.


**Genus.** Hydrastis p. 4.


Order 9. **Nymphaeaceae**. Sepals 5-6. Petals numerous, imbricate. Filaments petaloid. Fruit many celled, many seeded. Aquatic plants with large white or yellow flowers, floating on the surface of ponds or still waters.


Order 10. **Sarraceniaceae**. Sepals 5. Petals 5, unguiculate. Stigma very large, petaloid, forming a shelter for the stamens. Leaves all radical, pitcher shaped. Herbaceous plants, growing in wet places.

**Genus.** Sarracenia. p. 17.

Order 31. **Malvacceae**. Sepals 5, more or less united. Petals equal the number of sepals. Stamens numerous, monadelphous. Anthers reniform. Fruit capsular. Herbaceous plants with alternate leaves.


Order 18. **Cistaceae**. Sepals 5, unequal, the 2 outer ones smallest of wanting. Petals 5, with a twisted aestivation. Stamens distinct, usually numerous. Herbaceous plants, with white or yellow flowers.

**Genera.** Helianthemum p. 32. Lechea p. 38.

Order 8. **Nelumbiaceae**. Sepals 4-6. Petals numerous, from the outside of the disk. Stamens numerous, filaments petaloid. Disk large, with the ovaries lodged in small cavities in its substance. Aquatic plants, growing in deep waters, with very large, pale yellow flowers, p. 15.

**Genus.** Nelumbium p. 15.

(b) Flowers perfect. Stamens numerous. Herbaceous plants, or small shrubs.


**Genera.** Ascyrum p. 34. Hypericum p. 34. Elodea p. 36.


(c) Flowers perfect. Stamens numerous, except sometimes in Corchorus. Usually large trees, sometimes small trees and shrubs.

Order 2. Magnoliaceæ. Sepals 3-6, deciduous. Petals 3-30, in several rows. Stamens numerous, with short filaments. Carpels in one or several rows. Trees and shrubs with alternate entire, coriaceous leaves. Flowers generally large and fragrant.


   Genus. Asimina p. 11.

Order 32. Tiliaceæ. Sepals 4-5. Petals 4-5. Stamens numerous, distinct. Ovary consisting of from 4-10 united carpels, with as many stigmas. Trees, except Corchorus, which is nearly herbaceous, with alternate leaves and axillary flowers.


(d) Flowers perfect. Stamens usually 5. Herbaceous plants.


Order 25. Balsaminaceæ. Sepals 5, but by the union of the two upper ones apparently only 4 or 2, lower one spurred. Petals by union apparently but 2. Stamens 5, with subulate filaments. Ovary 5-celled, with central placenta. Stamens 5. Succulent herbaceous plants, with yellow axillary flowers.

   Genus. Impatiens p. 43.


   Genus. Lithum p. 42.


(e) Flowers perfect. Stamens 6-8, or a multiple of 6.

Order 36. Hippocastanaceæ. Sepals 5, united into a campanulate, or tubular 5-located calyx. Petals 4-5, unguiculate, irregular. Stamens 6-8, unequal. Ovary 3-celled. Style 1, filiform. Fruit coriaceous 1 to 3-cell ed. Shrubs, with opposite, palmately compound leaves. Flowers showy.


Order 14. Caparidaceæ. Sepals 4, deciduous, united, forming a tube. Petals 4, cruciate, or irregular, sometimes wanting. Stamens 4-6-12 or nu-
merous. Ovary composed of two united carpels, stipitate. Fruit a 1-celled, pod-shaped capsule, many seeded. Herbaceous plants, with compound alternate leaves.


Order 12. Fumariaceae. Sepals 2, deciduous, small. Petals 4, cruciata, one or both of the outer ones spurred or saccate at the base, the two inner ones cohering at the apex, and enclosing the anthers. Stamens 6, in two parcels. Ovary 1-celled, 2-valved. Style 1, filiform. Fruit a nut or capsule, if the former 2-seeded, if the latter many seeded. Herbaceous plants, with alternate, ternately, or pinnately divided leaves. Flowers in cymes or racemes.


Order 13. Cruciferæ. Sepals 4, deciduous, cruciata. Petals 4, cruciata, alternate with the sepals. Stamens 6, tetradynamous, the two lateral ones shortest, inserted lower than the others. Fruit a silique, or silicle, 2-celled from a spurious dissepiment. Herbaceous plants with alternate leaves often divided. Flowers in terminal racemes or corymbs.


Order 15. Polygalaceæ. Sepals 5, persistent, irregular, the three exterior ones smallest, the two interior and lateral ones petaloid and larger. Stamens 6–8, monadelphous. Petals 3, irregular, somewhat papilinaceous, with the keel crested. Ovary 2-celled, with a solitary pendulous ovule in each cell. Herbaceous plants, with entire leaves.


Order 6. Berberidaceæ. Sepals in two rows 3–4–6 often surrounded by petaloid scales. Petals equal or double the number of sepals, and opposite them, generally appendaged at the base. Stamens usually 6, or a multiple of that number. Ovary solitary, 1-celled. Style lateral. Fruit baccate or capsular. Shrubs, or herbaceous plants.


Genus. Geranium p. 43.


(g) Flowers polygamous, monocious or dioecious.


Order 35. Acraceae. Sepals 5, united at the base, colored. Petals as many as the sepals or wanting. Stamens usually 8, varying from 3-12. Ovary composed of two united carpels. Fruit a samara, with the lower margin of the wing thickened. Trees or shrubs, with opposite, palmately lobed, or pinnately compound leaves. Flowers frequently polygamous, or dioecious.

Genus. Asey p. 53.

Order 4. SCHIZANDRACEE. Flowers monocious. Sepals and petals combined, 9-12. Stamens 5, with the anthers connate, nearly sessile. Carpels aggregate when not mature, but scattered on the elongated torus in maturity. A trailing shrub, with entire or dentate leaves. Flowers axillary.


Order 31. Vitaceae. Flowers dioecious, polygamous or perfect. Calyx minute, 5-toothed, or entire. Petals 4 or 5, caducous. Stamens 4 or 5, opposite the petals, inserted with them on the surface of an annular disk. Fruit pulpy, one or few seeded. Climbing shrubs. Lower leaves opposite, upper leaves alternate, or palmately divided.


Order 23. Zanthoxylacee. Flowers dioecious, polygamous, or perfect. Sepals 3-9. Petals as many as the sepals, or wanting. Stamens as many, or twice as many as the petals. Ovules equal in number to the sepals. Distinct or united. Styles distinct. Fruit 2-5-celled. Trees or shrubs. Leaves pinnately divided.

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SECTION II. CALYCFIORÆ.

STAMENS AND PETALS PERIGYNOS.

A. Calyx superior.

(a) Stamens 5. Herbaceous plants with the exception of Aralia.


Order 54. Umbelliferæ. Calyx a hering to the ovary, with the limb 5-toothed, or entire. Petals 5. Stamens 5. Ovary consisting of 2 united carpels. Styles 2. Fruit marked with longitudinal ribs. Herbaceous plants, usually with fustular stems. Leaves usually more or less divided. Flowers in umbels.


(b) Stamens 8. Herbaceous plants.


Genus: Rhexia p. 85.


Genus: Rhizophora p. 88.

(c) Stamens varying in number.

1. Pomaceæ and Cornaceæ, see page vii.

Order 2. Saxifragaceæ. Sepals 4-5, united or distinct. Petals as many as the sepals. Stamens usually as many as the sepals, or double the number. Ovary free or cohering with the calyx, 1-celled, with parietal placentæ, or several celled, with central placentæ.

Sub-Order 1. Saxifragaceæ. Capsule usually beaked, opening along the inner suture, or with septical dehiscence. Herbaceous plants.


Sub-Order 3. Hydrangeæ. Capsule dehiscing between the styles when they are not united, otherwise the dehiscence is irregular. Shrubs and vines with opposite leaves.


Order 56. ONAGRACEAE. Sepals united into a tubular calyx, with the limb 3-4-6-parted. Petals equal in number to the segments, or wanting. Stamens varying in number from 2-10. Pollen triangular. Ovary cohering to the calyx, generally 2-4-celled. Placentae central. Fruit usually capsular, indehiscent, or with a loculicidal dehiscence. Herbaceous plants, with simple, entire, or toothed leaves.

Sub-Order 1. Onagreæ. Calyx usually 4-daubed, sometimes 6. Stamens and petals equal, halved, or double the number of the segments, regular. Fruit capsular, occasionally dry and indehiscent. Herbaceous plants.


Sub-Order 2. Haloragæ. Calyx 3-4 parted. Petals 3-4, or wanting. Stamens 3-4-8. Ovary 3-4 celled, with a solitary ovule in each cell. Styles none. Stamens equal the number of cells. Aquatic herbaceous plants, with alternate, opposite, or verticillate leaves. Flowers small, axillary, sessile, sometimes monocious, or dioecious.


Order 53. Hamamelaceæ. Calyx 4-5-cleft, or with 5-7 obscure teeth. Petals 4-5, spiral, sometimes none. Stamens 4-8, or numerous. Styles 2. Capsule 2 celled, opening at the apex, 1 seed in each cell. Shrubs with leathery veined leaves. Flowers sometimes polygamous.


Genus. Cactus p. 95.

B. Calyx inferior.

Order 50. Illecebrææ. Sepals 5, persistent. Petals 5, or none, or minute. Stamens 2-5. Ovary 1-celled, or imperfectly 2-5 celled. Styles 2-5. Fruit 1-seeded, 1 or many seeded. Herbaceous plants, with opposite entire leaves.

Sub-Order 1. Illecebrææ. Petals wanting, or resembling sterile filaments. Styles or stigmas 2. Fruit 1-seeded. Leaves opposite, often crowded and fasicled.


Sub-Order 2. Spergulææ. Petals distinct or wanting. Styles or stigmas 3-5. Capsule 1-celled many seeded, with a central placenta.


Genus. Rhus p. 46.


Genus. Passiflora p. 94.


Genus. Turnera p. 95.


Order 40. **Leguminosae.** Calyx 5-toothed or 5-cleft, often unequal. Petals 5 or fewer, irregular. Stamens definite, perigynous or hypogynous, distinct, monadelphous or diadelphous. Fruit usually a legume. Herbs, shrubs and trees. Leaves alternate, generally compound.


Order 41. **Rosaceæ.** Sepals usually 5, persistent. Petals 5, regular, occasionally wanting. Stamens numerous, or very rarely few. Herbaceous plants, shrubs and trees. Leaves alternate. Flowers occasionally polygamous, or dioecious.

Sub-Order 1. **Chrysobalanaceæ.** Ovary free. Petals and stamens irregular. Fruit a drupe. Small shrubs, with prostrate slender stems.

*Genus.* Chrysobalanus p. 77.

Sub-Order 2. **Amygdalaceæ.** Ovary free, with 2 suspended ovules. Fruit a drupe. Seed solitary. Trees or shrubs, with simple leaves. Bark yielding gum.

*Genus.* Prunus p. 77. Cerasus p. 78.

Sub-Order 3. **Rosaceæ.** Ovaries solitary, or several. Fruit folioar, 1-to 10-seeded, or 1-seeded achene. Herbs or shrubs, with simple or compound leaves.


Sub-Order 4. **Pomace.** Ovaries 2-5, cohering with the calyx and sometimes with each other, with 2 ascending ovules. Styles terminal. Fruit a pome, 1-5-celled. Trees or shrubs.

*Genus.* Cranegus p. 82. Pyrus p. 84. Amelanchier p. 84.

(b) **Capsules usually more than 1-celled.**

Order 42. **Lythraceæ.** Calyx 4-6-lobed or toothed, sometimes with as many small accessory teeth or processes. Petals as many as the lobes of the calyx or wanting. Stamens as many as the petals or some multiple of the number. Ovary 2-4-celled, the disepiments sometimes becoming obliterated and the capsule 1 celled. Herbaceous plants, growing usually in wet soils, with 4-sided branches.


Sub-Order 3. **Celastraceæ.** Sepals 4-5 united at the base. Petals and stamens equaling them in number; the latter inserted into a broad disk at the bottom of the calyx. Fruit 2-5-celled, or by abortion 1-celled. Shrubs.


(c) **Calyx partly superior.**

Order 55. **Cornaceæ.** Calyx adhering to the ovary, 4-toothed. Petals 4, oblong. Fruit baccate, crowned by the calyx. Small trees and shrubs, with astringent bark. Flowers in cymes.

(d) **Flowers monocious or diocious.**

Order 57 **LORANTHACEÆ.** A shrubby parasite, growing on the branches of trees, with evergreen leaves. *Misseltoe.*

**Genus.** *Viscum* p. 108.

**Sub-Class II. MONOPETALÆ, OR GAMOPETALÆ.**

Flowers in which the petals are united forming a tube of greater or less length.

The following genera are uniformly, or frequently polyetalous, *Mylocarrium, Clethra, Cyrilla, Bejaria, Halesia, Statice, Monotropa,* and sometimes apetalous as in *Fraxinus.*

(a) **Ovary inferior. Corolla regular.**

Order 75 **COMPOSITE.** Flowers collected into a dense head, surrounded by an involucre. Stamens 5, united by their anthers. Stigmas 2, distinct or united.

In the arrangement of this large family of plants, we have adopted in our analysis the plan of De Candolle, as given in the 5th 6th and 7th volumes of his *Prodrumes.* When the Order *Composite* was written we gave preference to a different arrangement; but from more experience, we deem this the best adapted to aid the student in the analysis of this difficult Order.

**Tribe 1. Vernoninae.** Flowers discoid, perfect. Style cylindrical below, equally divided above, longitudinally hispid, the divisions generally long, subulate.

*Corolla 5-cleft, usually regular, sometimes obscurely bilabiate. Pollen globose. Capitulum few or many flowered. Flowers blue or purple.*


**Tribe 2. Eupatorineae.** Florets perfect, discoid. Style cylindrical below, divided above, with the divisions long, terete, or clavate, exserted.

*Corolla regular, 5-cleft, with the segments erect. Pollen globose, echanate. Capitulum few or many flowered. Pappus setaceous, seaboars or plumose. Flowers blue or purple.*


**Tribe 3. Astereideae.** Capitula usually heterogamous, seldom homogamous or diocious. Style cylindrical below, bifid; divisions long, linear, usually acuminate, puberulent. Staminate florets tubular regularly toothed.

(a) **Receptacle naked.** Flowers radiate, with the ray florets in one series, blue or purple. Pappus pilose, in several series.

**Genus.** *Aster* p. 173.

(b) **Ray florets in several series, fertile.** Pappus pilose, in one series. Receptacle naked.

**Genus.** *Erigeron* p. 181.

(c) **Ray florets in one series, fertile, white, or pale purple.** Pappus paleaceous.


(d) **Ray florets in one series or more, when present, pistillate, yellow.** Pappus pilose, in one series.

**Genus.** *Solidago* p. 177. *Chrysocoma* p. 173.

(e) **Capitulum many flowered.** Florets all tubular; the several outer series pistillate, yellow, disk florets 5-toothed, sterile. Involutec in many series. Pappus pilose, in one series.

**Genus.** *Conyza* p. 169.

(f) **Capitulum many flowered, diocious.** Corolla tubular, 5-cleft.

**Genus.** *Baccharis* p. 163.
ANALYSIS.

(g) Capitulum many flowered. Florets all tubular, outer ones fertile, slender; inner ones stamineate, or perfect, 5-toothed.


(h) Capitulum many flowered. Ray florets ligulate, pistillate.


(i) Capitulum many flowered. Ray florets in one series, pistillate, disk florets tubular, 4-toothed, perfect. Pappus usually none. Leaves opposite.

Tribe 4. Senecioneae. Style cylindrical at the apex. In perfect flowers bifid, with the divisions elongated, linear, penicillate, sometimes truncate, at others produced beyond the pencil into a short cone or narrow, hispid appendix. Stigmatic surface broad, and prominent, extending to the pencil, or to the origin of the cone or appendix. Corolla of the disk pellucid, regular. Pollen globose, echinate.


Sub-Tribe 2. Heliantheae. Capitula either heterogamous and radiate, or perfect and discoid. Receptacle all chaffy, or only the margin. Lobes of the perfect flowers thick. Pappus none, a margin or awns. Anthers blackish, not acuminate. Leaves often opposite.


Sub-Tribe 3. Heleneae. Capitula often heterogamous, radiate. Ray florets ligulate, pistillate, or neutral, in one series. Disk florets usually perfect. Anthers often dark colored, with the base somewhat produced, not acuminate. Branches of the style sometimes truncate at the summit, at others extended by a cone or appendix above the hairs. Pappus paleaceous, many leaved, in one series, scarious; sometimes by abortion wanting.


Sub-Tribe 4. Anthemideae. Capitula usually heterogamous, never dioecious. Ray florets usually in one series, pistillate or neutral, ligulate, or if tubular, bilabiate. Disk florets tubular, 4–5-toothed, usually perfect. Branches of the style bearded, and truncate at the summit, in a few cases extended into a cone. Pappus usually wanting, or a margin. Leaves usually alternate.


Sub-Tribe 5. Capitula homogamous, or heterogamous. Corolla tubular, 5–toothed, dioecious, or with the exterior florets pistillate, and the central ones perfect. Anthers acuminate. Pappus pilose, or setaceous, sometimes ciliate. Plants usually covered with a soft pubescence.


Tribe 5. Cardueae, or Cynarae. Florets all tubular, perfect, or with the ray florets pistillate, and of the disk stamineate. Receptacle chaffy. Sigma articulated. Leaves alternate, often spiny.


Tribe 7. *Chicoraceae.* Flowers all ligulate and perfect. Corolla split on one side, thus making it ligulate, 5-toothed, 5-nerved. Pollen multilingual, scabrous. Milky plants with alternate leaves.


Order 76. **Dipsacaceae.** Flowers collected into an ovate or roundish head. Corolla 4-cleft, stamens 4 distinct. *Teasel.*

*Genera.* Dipsacus p. 201.

Order 72. **Cinchonaceae.** Calyx superior 2–4–5 parted, with connate bracts at the base. Corolla superior, tubular, with as many divisions as the calyx. Stamens 4–5. Fruit a capsule, usually 2-celled, 1 or 2 seeds in each cell; or a succulent berry 4-seeded. Herbs or shrubs with opposite entire leaves with intermediate stipule.


Order 74. **Stellateae.** Calyx 4 lobed. Corolla rotate or tubular. Stamens style 1. Fruit didymous, 2-seeded. Herbaceous plants with angular stems and verticillate leaves. Flowers minute.


Order 73. **Capriflloaceae.** Calyx superior 5-cleft or 5 toothed. Corolla varying in every respect in the different genera. Stamens 5. Style 1; Stigma 1–3. Fruit indehiscent, usually fleshy, 1–5 celled, crowned by the calyx. Shrubs, often climbing, with opposite leaves.


*Genus.* Campanula, p. 130.

Order 60. **Vaccinaceae.** Calyx 4–5 toothed. Corolla with as many segments as the calyx. Urecolate or campanulate. Stamens 8–10; anthers turn mid at the base. Fruit succulent. Shrubs, with alternate leaves.


(b) **Oearium superior.** Corolla regular. Stamens 5.


Order 83. **Apoceilae.** Calyx 5-cleft, persistent Corolla 5 lobed, with twisted stivation. Stamens 5. Ovaries 2. Stigma 1. Fruit foliaceous, long, slender. Plants usually with a milky juice, and entire leaves. Herbaceous plants or a shrubby vine.


Order 92. **Heliotropaceae.** Calyx 5-parted, persistent. Ovary 4-celled, with a solitary ovule in each cell. Style 1. Fruit drupaceous, easily divided. Herbaceous plants, with alternate simple leaves. Flowers in spikes.

*Genus.* Heliotropium p. 229.

Order 63. **Sapotaceae.** Calyx 5-cleft. Corolla 5-cleft, salver-form. Style 1. Fruit baccate, 1-seeded. Trees or shrubs, generally with spiny branches—
Leaves alternate, entire, coriaceous. Flowers clustered, inconspicuous.

**Genus.** Bumelia p. 120.

Order 67. **CONVOLVULACEÆ.** Calyx 5-parted, persistent. Corolla 5-lobed, plaited. Capsule 1-4-celled, with the seeds borne at the base of the placentae. Twining or creeping plants, with alternate, ex-stipulate leaves.


Order 69. **ASCLEPIADÆ.** Calyx 5-cleft. Corolla 5 lobed, contorted. Staminads 5: filaments connate; pollen waxy, adhering to the processes of the stigma. Fruit a follicle, single or double. Plants with a milky juice, sometimes climbing.


Order 69. **HYDROLEÆ.** Calyx 5 parted, aestivation imbricate. Corolla campanulate. Ovary 2-celled, surrounded by an annular disk. Flowers numerous, axillary and terminal. In wet places.

**Genera.** Hydrolea p. 128. Diapensia p. 129.

Order 93. **HYDROPHTYLÆ.** Calyx 5-cleft, persistent. Corolla campanulate, 5-lobed with 2 lamellae at the base of each lobe. Fruit 1-2-celled, 2-valved, 1-4-seeded. Herbaceous plants, hispid, with divided leaves.


Order 77. **SPIGELIÆ.** Calyx 5-parted. Corolla tubular, long, ventricose, 5-lobed. Capsule 2-celled. Herbaceous plants, with opposite entire leaves. Flowers in a second spike, red.

**Genus.** Spigelia p. 222.

(c) Stamens varying in number. Corolla sometimes irregular.

Order 65. **STYRACEÆ.** Calyx 4-5-cleft. Corolla 4-5-petalled, or 4-petaled. Stamens 8-10-12, somewhat monadelphous. Fruit 1-8-celled. Shrubs, with alternate, exstipulate leaves. Flowers axillary, white.


Order 61. **PRIMULÆ.** Calyx 4-cleft. Corolla 4-5-cleft. Stamens inserted upon the corolla opposite the segments, 2-4-5. Style 1. Capsule 1-celled, many seeded, with central placenta. Herbaceous plants with opposite, or whorled leaves. Flowers yellow, white or red.


Order 90. **OLEACEÆ.** Flowers perfect or dioecious. Calyx usually 4-toothed or wanting. Corolla usually 4-cleft, 4-petaled, or wanting, sometimes the lobes very long. Trees and shrubs, with opposite leaves.


Order 77. **PLANTAGINÆ.** Calyx 4-parted, persistent Corolla 4-cleft. Stamens 4. Style 1. Stigma hispid. Herbaceous plants, with the flowers in spikes, inconspicuous, white or yellowish, and leaves all radical.

**Genus.** Plantago p. 201, and p. 328.

Order 64. **EBENACEÆ.** Flowers dioecious. Calyx 4-6-cleft. Corolla urceolate. Stamens 8-16. Stigmas 4-5 in the fertile flowers. Trees and shrubs, with alternate leaves.

**Persimmon.**

**Genus.** Diospyros. p. 121.

Order 59. **ERICÆ.** Calyx 4-5-cleft. Corolla 4-5-cleft, regular or irregular, often polypetalous. Stamens most commonly 10, but varying from 5-8-14...
Style 1, straight. Fruit capsular or baccate. Shrubs or under shrubs. Leaves usually evergreen, entire, whorled or opposite.


Order 56. Gentianaceae. Calyx 2-4-5-10 cleft. Corolla tubular 4-5-10-cleft, often somewhat irregular. Stamens equal in number to the segments of the corolla included. Stigmas 1-2. Capsule 1-celled, many seeded. Herbaaceous plants, with opposite, sessile, entire leaves. Flowers terminal or axillary


(c) Flowers irregular. Exc. Ruellia, Elytraria.

Order 70. Labiatae. Calyx tubular, 5-10-toothed, inferior. Corolla bilabiate; the upper lip entire or bifid, the lower 3-cleft. Stamens 4, didynamous, sometimes but 2. Ovary 4-lobed. Style 1, arising from the base of the lobes. Fruit 1-4 small nuts. Herbaaceous plants, with 4-angled stems, and opposite leaves.


Genus: Lobelia p. 129.


Genus: Bignonia 212. Catalpa 212.


Genus: Martynia p. 212.


Order 75. Acanthaceae. Calyx 4-5 cleft, with equal or unequal segments. Corolla hypogynous with a regular or irregular border. Stamens 2-4, or 5 when didynamous or nearly equal. Style 1. Capsule 2 celled, few or many seeded, dissepiments opposite the valves. Herbaceous plants with opposite simple leaves.


Order 84. Scrophulariaceae. Calyx divided, unequal. Corolla bilabiate. Stamens usually 4, didynamous sometimes but 2. Style 1; stigma simple or 2 lobed.
Fruit a superior 2 celled capsule, except Buchnera with central placenta.—Seeds numerous. Herbaceous plants, with opposite, or alternate leaves.


SUR-CLASS III. APETALÆ.

Flowers with a simple perianth, or without any floral envelope.

DIVISION II. MONOCHLAMYDEOUS.

Flowers with a simple perinth.

(a) Stamens perigynous.

Order 123. Laurinæ. Flowers perfect, polygamous, or dioecious. Perianth inferior, 4-6 cleft. Stamens opposite the segments of the perianth, usually 9, the three inner ones sterile. Anthers adnate. Style simple. Fruit a 1 seed celled drupe, shrubs or small trees. Leaves alternate. Flowers in panicles or umbels

Genus. Laurus p. 300.

Order 131. Santalaceæ. Calyx superior, 4 or 5 cleft, partly coloured—Stamens 4 or 5, opposite the segments, inserted into their bases. Style 1.—Stigma often lobed. Fruit drupaceous, 1 seeded. Trees or shrubs, or herbaceous plants. Flowers dioecious, polygamous and perfect.


Genus. Dirca p. 301.


Order 141. Amentacæ. Flowers monoeious or dioecious. Sterile florets in aments, with scales. Stamens inserted into the scales; anthers 2 celled. Fertile florets aggregated, adnate, or solitary. Stigmas several. Fruit a drupe or a bony, membranaceous capsule. Albumen none. Trees or shrubs, with alternate leaves.

Genera. Salix 312. Populus 313.


Sub-Order 3. Betulineae. Flowers monoeceous, the sterile flowers sometimes with a lobed, membranaceous calyx. Stamens usually distinct. Ovary superior, 2-celled, but by abortion the fruit is but 1-celled. Stigmas 2 Seeds pendulous.


Sub-Order 4. Cutulinaceae. Flowers monoeceous, amentaceous. Stamens 5-20, inserted into the base of the scales, or a membranaceous calyx. Fertile florets; ovaries crowned by the rudiments of a calyx; seated within a variously formed involucre, stigmas several. Fruit a bony or coriaceous nut 1-celled, more or less inclosed in the involucre.


Order 131. Euphorbiaceae. Flowers monoeceous or dioecious. Calyx lobed, inferior, with various internal appendages. Sterile flowers; stamens few or numerous; anthers 2-celled. Fertile flowers; ovary superior sessile or stiped. Fruit usually consisting of 3 dehiscent cells. Plants usually abounding with milky juice. Flowers axillary and terminal.


Order 132. Chenopodeae. Perianth deeply divided, persistent, sometimes tubular at the base. Stamens inserted into the base of the calyx; 1-5 opposite the segments. Ovary single with 1 ovule attached to the base of the cavity. Style usually divided. Fruit membranaceous or baccate, not valvular. Herbaceous plants, with small flowers.


Poke weed.

Genera. Phytolacca p. 298.


(a) Stamens hypogynous.


Order 123. Amaranthaceae. Flowers monoeceous, dioecious or perfect.
Analysis.

Saururus is a genus of flowering plants in the family Asparagaceae, commonly known as the fringed ceremonial lily or fringed lily. It is native to North America, particularly in the eastern United States and Canada. The genus contains several species, all of which are terrestrial herbs with long, slender leaves and small, fragrant flowers. The flowers are typically arranged in racemes or panicles, with each flower having six sepals, six petals, and six stamens. The fruit is a capsule containing numerous small seeds. Saururus is commonly found in wet, marshy areas, such as seepage areas, streamsides, and floodplains.


Order 124. Nyctagineae. Calyx tubular, somewhat curved, contracted in the middle, limb entire or toothed. Stamens definite, 2-4 hypogynous. Ovary superior with a single erect ovule. Style 1. Fruit a utricle, inclosed in the calyx. Herbaceous plants, with opposite and usually unequal leaves. Flowers terminal or terminal, clustered or solitary.


(c) Stamens epigynous.

Order 132. Aristolochiaceae. Flowers perfect. Perianth superior tubular, 3-4-crested, regular or unequal. Stamens 6-19, epigynous distinct or adhering to the style and stigmas. Ovary inferior 3-6-celled ovules numerous; style simple, stigmas radiating. Herbaceous plants and shrubs, the latter usually climbing. Flowers axillary, solitary of a dull color.


Division III. ACHLAMYDEAE.

Sub-Order Myriaceae
Sub-Order Salicinaceae
Sub-Order Betulineae
Sub-Order Platanaceae


Order 138. Podostemaceae. Flowers naked, perfect. Stamens hypogynous, 2 or more, distinct, or monadelphous. Anthers oblong, 2 celled. Ovary 2 or 3 celled, with many ovules. Stigmas 2, sessile. Herbaceous, floating plants with capillary leaves. Flowers axillary or terminal, solitary, minute.

Genus. Podostemon p. 311.

Order 140. Saururaceae. Flowers naked, perfect, seated upon a scale 2 cm in diameter, 6 perianth, 2 or more, distinct, or monadelphous. Stamens 6, hypogynous, clavate, persistent. Anthers oblong, 2 celled. Ovary 6 perianth, 2 or more, distinct, or monadelphous, collected in a catkin. Anthers 2, or many lobed, bursting outwardly. Fertile flowers usually in spicules or cones, sometimes solitary. Ovary ovary, or open, resembling a scale, destitute of style or stigma. Ovules naked. Fruit a naked seed. Trees or shrubs abounding in resin. Leaves with parallel veins.


Class II. ENDOGENAE, OR MONOCOTYLEDONAE.

Trunk usually cylindrical, with no distinction of bark, wood and pith. Leaves with simple parallel veins, not reticulated, usually alternate.

Sub-Class I. PETALOIDAE.

Stamens and pistils naked, or enclosed in a regular perianth.
A. TRIPETALÆ.

Calyx and Corolla distinct. Petals 3.


Order 100. BROMELIÆ. Calyx tubular, persistent Petals 3. Stamens 6. Style 1. Capsule 3 celled, many seeded. Plants usually without stems, either hanging from the branches of trees, or with a tall scape, and fleshy radical leaves. Flowers purple or greenish white.

Genus. Tillandsia p. 238.

B. HEXAPETALÆ.

Sepals and petals confounded, usually 6, colored.

(a) Perianth superior.


Genus. Hypoxis p 239.

Order 102. BURMANNIÆ. Perianth 6-parted, tubular, superior, with the 3 alternate segments small. Stamens 3. Style 1. Stigma 3-lobed, petaloid Capsule inferior, 3-celled, many seeded. Herbaceous plants, with minute, subulate, tufted, radical leaves, and blue or white flowers.

Genus. Burmannia p. 239.

Order 103. HEMODORÆ. Perianth petaloid, superior, more or less woolly. Stamens 3-6, arising from the perianth. Style 1, simple. Capsule 3-celled, many seeded. Herbaceous plants, with equitant leaves, and showy, yellow flowers.


Order 104. AMARYLLIDÆ. Perianth superior, regular, the outer segments overlapping the inner. Stamens 6 arising from the perianth. Style 1. Stigma 3-lobed. Capsule 3-valved, 3-celled, many seeded. Herbaceous plants with ensiform leaves. Flowers white or tinged with red.


Order 105. IRIDÆ. Perianth with the divisions partly cohering or separate, irregular, the outer ones largest. Stamens 3, arising from the base of the outer segments, free or monadelphous. Style 1. Stigmas 3; in the Iris petaloid Capsule 3-valved, 3-celled, many seeded. Herbaceous plants with equitant leaves. Flowers with spathes, mostly blue.


Order 106. ORCHIDÆ. Perianth superior, ringent. Sepals 3, colored, the odd one uppermost. Petals 3, with the odd one lowermost, often lobed and
ANALYSIS.

Fruit perigynous, the Styles theers.


Order 107. MARANTACEE. Sepals 3, superior, short. Corolla tubular, irregular, with the segments in two whorls; the outer 3 parted, nearly equal; the inner very irregular. Stamens 3, petaloid, one only being fertile. Style petaloid or swollen. Fruit a 2–3-celled capsule. Herbaceous plants, with simple sheathing leaves, and yellow or purple flowers.


Order 113. DIOSCOREE. Flowers dicouss. Perianth superior, 6-cleft, equal Stamens 6, inserted into the base of the perianth. Style deeply 3-parted Fruit a thin compressed capsule. Twining plants, with reticulately veined leaves. Flowers small.

Genus. Dioscorea 256.

(b) Perianth inferior.

Order 108. JUNCEE. Perianth 6-parted, more or less glumaceous. Stamens 6. Styles 1. Stigmas generally 3. Capsule 3-celled, 3-valved, many seeded Herbaceous, grass-like plants, with fistular, or flat channeled leaves. Flowers yellowish, brown or green.

Genera. Juncus p. 248. Pleea p. 249. This last genus belongs to the succeeding order.


Order 110. Pontederiee. Perianth tubular, colored, 6-parted, more or less irregular, with a circinate aestivation. Stamens 3–6, unequal, perigynous Style 1. Stigma simple. Capsule 3-celled, 3-valved, many seeded. Aquatic or marsh plants, with leaves sheathing at the base. Flowers spatheaceous blue or white.


Order 111. Asphodeliee. Perianth petaloid, 6-parted, regular. Stamens 6, often unlike. Style 1. Fruit usually a 3-celled capsule, with loculicidal dehiscence. Seeds black with a crustaceous testa. Herbaceous plants with simple, and usually linear leaves.


Order 112. SMILACIEE. Flowers dioecious, or perfect. Perianth petaloid, 4–6-parted. Stamens 4–6, inserted into the base of the perianth. Style usually 3-parted. Fruit baccate. Herbs or shrubs, and often climbing. Leaves sometimes reticulated. Flowers inconspicuous.


Order 114. LILIACEE. Perianth colored, regular, deeply 6 parted. Stamens 6 perigynous, opposite the segments. Style 1. Fruit capsular, 3-celled, 3-valved, many seeded, with loculicidal dehiscence. Seeds in 1 or 2 rows Herbaceous plants, generally with scaly bulbs. Flowers white red or yellow.


Order 115. PALMEE. Flowers perfect, or polygamous. Perianth 6-parted, in two series. Stamens 6, opposite the segments of the perianth. Fruit a drupe or berry, 1–3-seeded. Herbaceous plants or trees, with fan-like leaves.


Order 116. RESTIACEE. Flowers monocious. Perianth 4-parted, the 2 in-
terior segments cohering. Stamens 4–6, attached to the base of the perianth. Fruit capsular. Herbaceous plants, growing in wet soils, with the stems often naked, or covered with split sheaths. Leaves when present linear. Flowers in heads, very small.

**Genus.** Erioculinon p. 259.


**Genus.** Triglochin p. 263.

Order 121. Pistacæ. Flowers 2, enclosed in a spathe. Stamens 2–7. Style 1, short. Fruit indehiscent 1, or more seeded. Floating plants, with cellular, lenticular or lobed stems and leaves.

**Genus.** Limna 263. Pista 263.

**Sub-Class III. GLUMACEÆ.**

Flowers destitute of a true perianth; the floral envelopes, consisting of imbricated bracts, which are alternate instead of verticillate.

Order 122. Gramineæ. Flowers usually perfect, sometimes monoecious or polygamous. Glumes usually 2, alternate, generally unequal, sometimes single. Paleæ 2, alternate. Stamens hypogynous, 1–6. Anthers versatile. Styles 2, occasionally 1 or 3. Culms cylinadic, with a silecious crust. Leaves alternate, with a split sheath. Flowers in small spikes, the spikes arranged in racemes or panicles.


Order 123 Cyperaceæ. Flowers perfect or monœcious, consisting of imbricated solitary bracts. Stamens hypogynous, 1–12. Anthers fixed by their base. Style 1, divided. Stems usually angular. Leaves with the sheaths entire.

PART II.

DESCRIPTIVE BOTANY.

CLASS. I. EXOGENS OR DICOTYLODONS.

Trunk consisting of bark, wood, and pith distinct, more or less conical, increasing by an annual deposit of new wood and cortical substance between the wood and bark. Leaves attached to the stem by articulation, their veins, and those of the floral envelops reticulated. Embryo with two or more opposite cotyledons. Seeds anatropous.

(Students will readily distinguish the plants of this class by the reticulated veins of the leaves, sepals and petals; by the presence of bark and pith. It includes all our shrubs and forest trees.)

SUBCLASS I. POLYPETALAE.

Flowers generally dichlamydeous. Calyx consisting of several distinct sepals. Petals several, distinct, hypogynous, rarely uniting, sometimes wanting.

ORDER I. RANUNCULACEÆ. (Crow-foot tribe.)

Sepals 3 to 6, usually 5, deciduous, aestivation imbricate (except clematis, which is valvate). Petals 3 to 15. Anthers adnate. Carpels numerous, or united into a single pistil. Seeds anatropous, erect or pendulous. Embryo minute. Albumen large, corneous. Plants generally with acrid, transparent juice.

GENUS I. CLEMATIS.

Coral none. Calyx 4 to 6 leaved, colored. Anthers linear, extrorse. Fruit an achenium, with long plumose tails, except in Crispa.

PART II. 1


2. C. Catesbeyana. Stem climbing, pubescent, similar to the preceding species. Leaves ternate; leaflets subcordate, 3-lobed, lobes entire, acuminate. Panicle divaricate, dichotomous. Flowers small, the pistillate florets bearing abortive stamens. Sepals 4, oblong, downy on the outer surface.


3. C. Holocerica. Climbing, the whole plant silky. Flowers diocious in paniculate corymbs, trichotomous, few flowers. Leaves pubescent, pubescent on both sides, leaflets oblong-lanceolate, entire. Sepals linear. Tails of the carpels long, feathered.


5. C. Walteri differs from the preceding in having the leaflets linear-lanceolate.


6. C. Linearloba. Stem terete, slender, glabrous. Leaves pinnate, 3-4 pair, smooth, leaflets entire or 3-parted, lobes linear. Peduncles 1-flowered, terminal, solitary. Sepals acute, pubescent along the margins, twice as long as the stamens.

Perhaps the above is a variety of Cylindrica.

7. C. Viorna. Stem climbing. Leaves glabrous, pinnately divided, segments oval, lanceolate, entire or 3-lobed. Floral leaves entire. Peduncles 1-flowered, occasionally 2 or 3-flowered. Sepals coriaceous about one inch long, flowers nodding.

Purple. 12. Penn. to Geo.

8. C. Reticulata climbing. Leaves coriaceous, glabrous, pinnate, leaflets three or four pairs, petiolate, entire or variously lobed, sometimes obtuse, at other times acute and mucronate, strongly veined on both sides. Carpels with plumose tails.

Dull purple. 12. Middle Car. and Geo. May to Aug.

9. C. Crispa. Stem climbing, pubescent. Leaves pinnate ternate, or 3-lobed, generally glabrous. Flowers solitary, on the summit of small branches, campanulate. Sepals coriaceous, rugose, the apex reflexed, margin crisped. Stamens very numerous, half the length of the sepal. Carpels numerous tormentose with short tails.


Yellowish. 12. Mountains. 12 in.


12. C. Baldwinii. Stem crect, somewhat branching, slender, slightly pubescent. Leaves varying from oblong to linear-lanceolate, entire, or 3-cleft, or lobed; the lobes linear, often laciniate. Peduncle terminal, elongated, 1-flowered. Flowers cylindrical—campanulate. Sepals woolly on the margin. Carpels with very long plumose tails. (Torrey & Gray.)

Purplish. 12 to 18 in. Florida.

Remarks.—The above genus contains no plants used for any other purpose as or.
THALACTRUM—ANEMONE.

3

nameless. Some of them secrete an exceedingly acrid juice, which produces blisters, and the C. erecta and flammula are used, it is said, by the beggars on the continent of Europe for the production of ulcers, to excite the compassion of the public.

GENUS II. THALICTRUM.

Sepals 4 or 5. Petals none. Stamens numerous, very long. Anthers innate. Carpels 4 to 15, without tails, striate. Flowers in corymbs or panicles. Often dioecious or polygamous.

1. T. Cornuti. Stem slender, erect, glabrous. Leaves ternately decom-pound. Leaflets roundish obovate or elliptical, 3-lobed or entire, glaucous beneath, slightly rugose on the upper surface, margin revolute when old. (The leaves of this species vary from the common type in almost every respect.) Paniéle terminal, compound. Sepals oblong, small. Filaments clavate. Anthers oblong, pointed. Carpels glabrous.

White. ½. Can. to Geo. June to August.


White. ½. May to July. Mountains.


Remarks.—The Thalictriums are easy of cultivation, and quite ornamental, from their bright green and decomposed leaves and delicate flowers. They possess, in a slight degree, the acrid properties characteristic of the order, but are applied to no use except medicinal.

GENUS III. ANEMONE.

Involucres 3-leaved, variously divided, remote from the flow-er. Sepals petaloid, 5 to 15. Petals none. Carpels numerous, mucronate. Herbs, perennial, with radical leaves.

1. A. Caroliniana. scape 10 to 16 inches high, pubescent, particularly towards the summit. Leaves ternate, leaflets notched and serrated. Involucrum 3-leaved near the middle of the scape, leaflets 3-cleft, sessile. Sepals 16 to 20, the exterior oblong, oval, thick, and sprinkled with purple specks, the inner thin, petal-like, and sometimes almost linear. Carpels in an oblong cylindrical head, covered with a silky down.

White. ½. March. Geo. and Car. 18 in.

2. A. Nemorosa. Stem 8 to 12 inches high. Leaves ternate, leaflets lobed, toothed, acute, 1-flowered, corolla 5 or 6 petaled, seeds ovate, with a short hooked point. 6-8 in.


3. A. Virginiana. Stem 2 to 3 feet high, simple, pubescent. Leaves ternate, rugose, hairy, segments 3-cleft, acuminate, serrate. Involucrum similar, petiolate. Sepals 5, pubescent on the outer surface, coriaceous, the 2 exterior green, lanceolate, acute, the interior elliptical. Carpels in an oblong ovate capitulum, woolly. Peduncles one-flowered, 3 to 4 from each involu-
cr um.

Yellowish green. ½. Car. and Geo. July to August. 18 in.

Remarks.—Many beautiful foreign species of this genus are cultivated, which are
very showy, varying in color through the series from blue to red, but of our own species, no care has been taken for their improvement by cultivation, which would richly repay the Florist’s care.

**Genus IV. Hepatica.**

*Involucrum* 3-leaved, resembling a calyx, near the flower. *Sepals* petaloid 6 to 9, arranged in 2 or 3 rows. *Petals* none. *Achenia* numerous, without tails.

1. **H. Triloba.** *Leaves* cordate, 3-lobed, entire, thick, coriaceous. *Scape*, petioles and involucrem villous. *Rose* colored. ①. Common. Feb. *Liverwort*. 5 in. *Remarks.*—This plant has enjoyed great celebrity, both in this country and Europe. It has been deemed almost a specific in hepatic or liver affections, and, not many years since, was highly extolled as a certain cure for chronic coughs. It is a mild tonic and astringent, and may be taken in any quantities, by infusion in water.

**Genus V. Hydrastis.**


**Genus VI. Ranunculus.**

*Sepals* 5. *Petals* 5, with a scale on the inside of the base of the petals. *Stamens* generally numerous. *Achenia* ovate, pointed, compressed, smooth, striated or tuberculated, arranged in a cylindrical or globose head.


(a.) *Leaves undivided, flowers yellow, carpels smooth.*


(b.) *Leaves divided.*

4. **R. Abortivus.** *Stem* glabrous, simple or branching. *Radical leaves*
on petioles, cordate, reniform, or broadly ovate, sometimes 3-parted, crenate. 
Cauline ones 3 to 5 parted, with long, entire, linear lobes. *Sepals* glabrous, 
reflected, longer than the petals. *Flowers* small, scale large. *Carpels* in a 
globose head.


5. R. *Scleratus*. Root fibrous. *Stem* 1 to 2 feet high, fistulose, thick, 
leafy. *Leaves* on petioles, lower ones with petioles 4 or 5 inches long, sheathing, 
3-parted, radical ones with the divisions 3-lobed and obtusely incised, 
upper ones with oblong linear entire lobes. *Sepals* reflexed, colored. *Flowers* 
small, solitary, generally opposite the leaf; petals longer than the sepals, 
shining. *Stamens* 12 to 15, shorter than the petals. *Carpels* small, numerous, 
in a cylindrical head.

12. Common in the low country. May:

6. R. *Purshii*. Submerged leaves, filiformly 2 or 3-chotimously dissected, 
with segments flat; emerged ones reniform, 3 to 5 parted, the lobes variously divided. *Petals* twice as large as the reflexed sepals. *Carpels* in 
globose heads, smooth, with a short and straight ensiform style.

In ponds and muddy places. N. Car. and Lou. Torrey and Gray.

trifoliate, segments cuneate, 3-lobed, incised toothed, middle one petioled. 
*Calyx* spreading. *Carpels* with a straight point. This plant is very variable: sometimes villose, at others glabrous. *Flowers* vary in size, and number 
of petals, from 5 to 8. The R. Nitidus of Elliott, I believe, is only a variety of this, as I have seen it assuming all the peculiarities of that plant, with 
good reason to believe it was the one described.

In wet grounds, very common in Middle Geo.

8. R. *Palma tus Carolinianus*. *Stem* erect, 12 to 18 inches high, 
hairy, hair above appressed, below spreading; branches long, 1-flowered. 
*Leaves* all petioled, radical ones palmately 3-parted, lobes toothed, the upper 
3-leafed, with the lobes nearly entire, linear-lanceolate. *Flowers* opposite the 
leaves, on long slender peduncles. *Carpels* compressed, margined, with beak 
broad, nearly straight.

May. Swamps. Car. and Geo.

9. R. *Hispidus*. *Stem* erect, branching 12 to 18 inches high. *Leaves* 3- 
leafed or 3-parted, segments oval, acute, toothed. *Petioles* covered with dense 
expanding hair. Radicle leaves, with segments generally separate, hairy. *Flowers* 
generally on long peduncles, covered with appressed hair. *Petals* much larger than the calyx, ovate. *Carpels* with a short straight point.

Rich, shaded soil. May to June.

10. R. *Recurvatus*. *Stem* erect, 12 to 18 inches high, clothed with spreading 
hairs. *Leaves* 3-parted, but not to the base, villous, sometimes nearly glabrous, 
hair appressed, segments broad, ovate, acutely serrate, lateral ones, 2- 
lobed. *Flowers* small, on long peduncles, calyx reflexed, petals narrowly-oblong, smaller than the sepals. *Carpels* in a globose head, with a hooked point.


11. R. *Pennsylvaniaicus*. *Stem* erect, strong, branching, 1 to 2 feet high, 
hispid, with stiff spreading hairs. *Leaves* ternate, villous, hairs appressed, 
petioles covered like the stem, lower ones on long petioles, leaflets petiolate, 
lanceolate, incised. *Flowers* small, calyx reflexed, sepals much larger than the 
petals. *Carpels* compressed in an ovate head, smooth, with a sharp point.

July. In the upper districts of Geo. and Car.

12. R. *Tomentosus*. *Stem* short, ascending at the summit, covered with dense soft expanding hair, 1 or 2-flowered. *Leaves* 3-parted, segments 3- 
lobed, ovate, dentate, tomentose, hair appressed, upper leaves sessile, ovate 
entire. *Petals* obovate. *Sepals* villous, nearly as large as the petals.

Upper districts of Car. and Geo.

C. *Carpels* tubercled or prickly.

13. R. *Municatus*. *Stem* erect or procumbent, 12 to 18 in. high, branch-
DICOTYLEDONOUS.

ing, succulent, pilose. Leaves glabrous, petiolate, sometimes entire, sometimes 3-cleft even to the base, lobes toothed, floral ones oblong or lanceolate, entire, lower ones slightly cordate, shining, toothed. Peduncles opposite the leaves, about 1 inch long. Petals obovate, longer than the calyx. Sepals reflexed, lanceolate. Carpels with a thick margin, tuberculate, aculeate, with a straight or slightly hooked beak.

(5) In cultivated land. March to May.

14. R. PARVIIFLORUS. Stem erect or slightly decumbent, 12 to 15 inches high, slender, villous. Leaves orbicular, 3-lobed or ternate, notched, pubescent. Peduncles opposite the leaves, short. Flowers small. Petals 3 to 5, equal to the sepals. Sepals reflexed. Carpels with thin margin, tubercled, with a hooked point.

May.

Remarks.—The Ranunculi are distinguished for an exceedingly acid juice, which is so volatile that drying or infusion in water, renders plants, which otherwise act as a powerful epispastics, perfectly inert. Some of these plants have been used for drawing blisters, and for the want of the Spanish flies, may be used with advantage, although, from their powerful action, should be used with care. The R. Sceleratus will produce a blister in an hour and a half.

GENUS VII. CALTHA.


Yellow. h. 8 to 12 in. Swamps.

Remarks.—The Caltha possesses the same acid properties as the Ranunculus, but by boiling is rendered harmless, and is prepared for food in early Spring.

GENUS VIII. AQUILEGIA.

Sepals 5, deciduous, colored. Petals 5, somewhat bilabiate, each petal being produced into a spur, projecting between the sepals. Capsules 5, many-seeded, terminated by a style.

1. A. CANADENSIS. Stem 12 to 18 inches high. Leaves on long 3-cleft footstalks, ternate and biternate, leaflets lobed and crenate, glaucous. Flowers pendulous, spurs straight, stamens exert, numerous, disposed in several parcels.

Scarlet, tinged with yellow. 7. Mountains. May.

Remarks.—Aquilegia affords beautiful ornaments for the Flower gardens, and as such, several species are cultivated.

GENUS IX. DELPHINUM.

Sepals 5, deciduous, irregular, petaloid, the upper one produced downward into a long spur. Petals 4, irregular, two upper ones horned. Capsules mostly 3, many-seeded. Flowers in terminal racemes.


Blue. N. Car. and Vir. Introduced.
2. **D. Tricori.** Root tuberous. Stem 8 to 12 in. high, glabrous. Leaves 5-parted, with the divisions 3–5 cleft. Petioles slightly dilated at the base, 2 to 4 inches, glabrous, lobes linear, acute. Flowers in loose terminal racemes, large, 6 to 12-flowered, hairy on the outside. Spur straight, as long as the calyx. Carpels 3, ovate.

Blue. b. Mountains. May.

3. **D. Azereum.** Stem 3 to 5 feet high, pubescent. Leaves on short petioles, 3 to 5-parted, middle segments linear, pubescent. Flowers in long racemes, on short peduncles, petals bearded at the apex, shorter than the sepals, lower ones deeply 2-cleft, claw hispid on one side, the other with a spur like process at its base.

Blue, large. b. Middle Geo. May.

4. **D. Exaltatum.** Stem 2 to 4 feet high, pubescent towards the summit, branching. Leaves flat 3 to 5 cleft below the middle, lobes wedge-shaped, 3-cleft at the summit, acuminate. Lateral ones often 2-lobed. Racemes erect, petals pubescent, on the outer surface, the lower petals fringed. Spur straight, as long as the calyx.

Bright blue. b. Mountains.

5. **D. Virescens.** Stem 8 to 12 inches high, pubescent. Leaves 3 to 5-parted, the middle division generally entire, lateral lobes 2–3-cleft; lobes lanceolate, petioles slightly dilated. Flowers in a loose few-flowered raceme, slightly pubescent, pedicles longer than the flowers. Sepals oblong or lanceolate, marked with a spot near the apex, longer than the petal; lower petals deeply 2-cleft, densely pubescent, capsules 3.

Flowers large, yellowish or greenish white. b. June.

6. **D. Vimicium.** Petioles scarcely dilated at the base. Leaves flat, 3-parted, segments cuneiform, obtuse, 3-lobed, mucronate, uppermost ones linear, undivided or 3-parted, racemes loose, velvet, limbs of the inferior petals bifid at the summit, spur straight, as long as the sepal, ovary silky—Torrey & Gray.

Azure. Texas.

**Remarks.**—A beautiful genus with every variety of hue through the blue series; much cultivated as a border flower. The D. consolida has been used in medicine. The flowers are bitter and acrid, and have been used in healing wounds. Attincture of an ounce of seeds in a pint of alcohol is said to be useful in asthma, and dropsy; ten drops a dose. The root possesses the same properties.

**Genus X. ACONITUM.**

Sepals petaloid, irregular, deciduous, upper one concave, shield-like. Petals 5, three lower ones minute, often wanting, the two upper on long claws, concealed under the upper sepal. Follicles 3 to 5, many-seeded.

1. **A. Uncinatum.** Stem twining, branching, slender, pubescent when young. Leaves 3 to 5-lobed, coriaceous, coarsely toothed, truncate at the base. Lobes 3-ribbed, lateral segments, often 2-lobed. Flowers in a loose panicle, galea large, tapering to an obuse beak, spur thick, inclined.

Blue. b. Mountains. 2 ft. Monk's Hood.

**Remarks.**—The same powerful, volatile principle noticed under Ranunculus exists in the Aconitum in a state of much greater concentration. Another principle of a narcotic character is found in the different species of this genus called Aconitin. The leaves of this Aconitin act powerfully on the human system, producing in large doses the usual effects of the most violent poisons. In small doses of one or two grains of the powdered leaves, it has been employed in rheumatism, (in which it has produced most salutary effects) gout, scrofula, cancer, &c. It acts most powerfully on the nervous system, producing delirium in over doses. The A. uncinatum is cultivated as an ornament of the flower garden.
Genus XI. Actaea:


1. A. Alba. Stem 2 to 3 feet high. Leaves ternately decompound, leaflets acutely serrate, notched, slightly pubescent. Raceme oblong, pedicels very thick when the fruit is matured, flowers crowded. Fruit white. Mountains. April. Necklace weed.

Genus XII. Cimicifuga.


2. C. Americana. Stem 2 to 4 feet high, glabrous. Leaves decompound, triterinate, segments ovate, the terminal 3-parted or 3-cleft, incisely lobed, cuneiform or subcordate at the base. Flowers in racemes, on short bracteate pedicels. Sepals 5, ovate. Ovaries 2 to 5, siipitate, smooth, compressed, generally fewer in the upper than in the lower flowers. Mountains. Aug. and Sept.

3. C. Cordifolia. Resembles the two preceding. Leaves, biterminal. Leaflets 3-5-7-lobed, cordate. Ovaries 2 to 3, glabrous, sessile. Mountains. July. Remark.—The C. Racemosa has long been used in medicine; in families as a remedy for rheumatism, dropsy, hysteria and affections of the lungs; and by physicians with decided success in cases of chorea, St. Vitus' dance. The decoction of the root is the form in which it is usually administered.

Genus XIII. Trautvetteria.


Genus XIV. Myosurus.

Sepals 5, produced downward at the base beyond their in-
Petals 5, the claw filiform and tubular. Stamens generally numerous, 5-20. Achenia triquetroius, spicate, on an elongated torus. Seeds suspended.


Genus XV. ZANTHO RHIZA.

Sepals 5. Nectaries 5, on pedicels. Ovaries 5-10, with 2-3 ovules. Follicles small, mostly 1-seeded, seed suspended.


Remarks.—The root of this plant is exceedingly bitter, and is used as a tonic. It is also used in coloring yellow. It possesses decided properties, and we doubt not might be applied to useful purposes.

Genus XVI. ADONIS.

Sepals 5. Petals 5-15, emarginate, concave, connivent, without the nectariferous pores. Achenia spicate, terminated by the short style. Leaves cauleine, tripinnaie, segments linear and numerous. Flowers solitary, on the extremity of the stem or branches.


Remarks.—A beautiful plant of easy culture. Derives its name from the supposition, that it sprang from the blood of Adonis, when wounded by a Bear.

Order II. MAGNOLIACEÆ, (Including Winteraceæ.)

Sepals, 3 to 6, deciduous. Petals 3 to 30 hypogynous, in several rows; aestivation imbricate. Stamens numerous, hypogynous; anthers adnate, intorse, bursting by a longitudinal slit; filaments short. Carpella, few in a single row, or numerous in several rows. Seeds anatropous, suspended, or ascending. Embryo minute; albumens fleshy. Leaves alternate, entire, coriaceous, with caduceus stipules, minutely punctate. Flowers generally large, and fragrant. Trees and shrubs.

Genus I. ILLICIIUM.


1. I. Preiflorum. Leaves, smooth, perennial, on short petioles, oblong.—
Flowers small, axillary, nodding; petals 6-12, ovate or roundish, concave.—
Dull yellow. 5. May. Flor. and lower districts of Geo. 6-10 feet.

2. I. Floridanum. Leaves accumulate. Petals 27-30, the exterior oblong, the interior ligulate. Flowers larger than the preceding.
Remarks.—In this country, the Illiciums are used only as ornaments, but they are used in other countries as aromatics, and stimulants, and carminatives. In China, they are burnt in the temples. In Europe they are used in giving a peculiar flavor to certain liquors. They are easily propagated by layers.

Genus II. MAGNOLIA.


Trees.

White. 4. June. Geo. to the Miss. A large tree.

2. M. Glauca. Leaves deciduous, alternate, acute, oval, glaucous underneath, pubescent when young, the upper surface shining. Flowers terminal, solitary, fragrant. Sepals membranous, as long as the petals. Petals 9-12 obovate, narrowed at the base.

Dull yellow, tinged with blue. 4. June and July. Geo. 50-60 feet.

4. M. Tripetala. Leaves large, deciduous, cuneate, lanceolate, acute, silky when young, crowded at the extremity of the branches, 15-20 inches long, 6-8 wide. Sepals 3, reflexed. Petals 9 oval lanceolate, acute, odor of the flowers disagreeable. Fruit oval, red, 3-4 inches long.
Umbrella tree.

Yellowish, faintly streaked with red. 4. Mountains. May. 45-50 ft.

6. M. Auriculata. Leaves deciduous, spatulate-ovate, acute, auriculate at the base, glabrous on both sides, 8-12 inches long. Sepals 3, spreading.—Petals 9 oblong-lanceolate, attenuate at the base, 2-3 inches long.
White, fragrant. 4. May. Mountains. 34-40 feet.

7. M. Macrophylla. Stem smooth with fragile branches, bark white.—Leaves deciduous, alternate, very large, 1-3 feet long, and 6-8 inches wide, crowded near the summits of the branches. Flowers large; petals 4-5 inches long, ovate.
Remarks.—The individuals of this interesting genus, present subjects of much interest among the trees of their native forests. The majestic and noble appearance of the Grandiflora, the enormous leaves of the Auriculata and Macrophylla and the abundant odor of the Glauca during its season of flowering, perfuming the atmosphere of the sections of its growth, render the species of this genus conspicuous objects wherever they are found. The Glauca and Acuminata have been used in medicine, and an infusion of the bark or fruit in brandy is a popular remedy in rheumatism.
For cultivation, they require moist, rich soil, and much care is required to continue in vigor the growth of the larger leaved species.
Genus III. Liriodendron.

Sepals 3, concave. Petals 6, obovate, lanceolate, campanulate. Fruit composed of densely imbricated carpels 1-2-seeded, the apices produced into lanceolate wings.

1. L. Tulipifera. Leaves 3-lobed, the middle lobe truncate, glabrous. White wood.

Remarks.—The Liriodendron is one of the largest trees of our forests, sometimes attaining the size of 8-9 feet in diameter, and 120-150 feet in height. It possesses similar properties to magnolia. It has been used as a substitute for the Peruvian bark, in intermittents. The powdered bark is said to be most efficient in its operation.

Order III. Anonaceae.

Sepals 3-4. Petals 6, coriaceous, with a valvular aestivation, arranged in two rows, hypogogenous. Stamens indefinite; filaments short, angular; anthers adnate. Ovaries numerous, closely packed; styles short, or none; stigma simple. Fruit succulent, or dry, composed of carpels separate, or united, 1 or many seeded. Seeds anatropous. Albumen ruminated. Embryo small. Leaves alternate, entire. Flowers axillary.

Genus I. Asimina.

(Syn. Uvaria, Anona, Porcellia and Orchidocarpum.)

Sepals 3, sometimes united at the base. Petals 6, the three outer ones larger. Carpels oblong, pulpy within, several seeded. Trees or shrubs.

1. A. Pauriflora. A small shrub with a few branches near the summit. Leaves alternate, obovate, cuneate, mucronate, on short petioles. Branches covered with a brownish pubescence Flowers solitary. Calyx deciduous, pubescent. Petals 6, the 3 exterior ones twice as large as the calyx, pubescent. Fruit 1 in. long, fleshy. Greenish purple. 4. May. On the coast of Car. and Geo. 2-3 feet.


3. A. Grandisflora. Leaves cuneate, obtuse, with the under surface and branches covered with a ferruginous pubescence. Flowers few, large; the outer petals obovate, 2-3 inches long. Yellowish white. 4. April. Middle Car. and Geo. 1-2 feet.

4. A. Pygmaea. Leaves coriaceous, long, 4-6 inches, cuneate, obtuse, oblong, obovate or elliptical, variable in size and form. Petals obovate-oblong, outer ones 1 inch long. Reddish brown. 4. April. Geo. and Flor. 6-18 inches.

Order IV. Schirandraceae.

Flowers monocious; staminate flowers 5-sepaled, 5 petal-
ed, anthers sessile; pistillate flowers, ovaries numerous, on a conical torus, which in maturity becomes elongated. Carpels baccate, 1 seeded, in maturity forming a loose spike on the elongated torus. Albumen fleshy, cotyledons ovate.

**Genus I. Schirandra.**

*Sepals, and petals confounded, roundish, concave. Anthers connate. Before the fruit ripens the carpels are aggregated, as in the Rubus, but as it matures the torus lengthens and the carpels separate and do not form a mass as in the Rubus, but become detached and scattered.*


**Order V.—Menispermaceae.**

*Flowers dioecious, small, in racemes or panicles. Sepals and petals often confounded, hypogynous, deciduous. Stamens monadelphous, or separate, generally equal the petals in number, and opposite them, sometimes three or four times as many. Anthers adnate or innate, 4 lobed. Ovaries several, distinct. Drupes baccate, 1-seeded, incurved. Seed heterotropous. Embryo curved. Climbing shrubs or suffrutescent plants. Leaves alternate, simple, palmately veined.*

**Genus I, Cocculus.**

*(Sym. Wendlandia, Menispermum.)*


1. *C. Carolinus.* Stem slender sarmentose, minutely pubescent. Leaves variable, cordate or ovate, or nearly orbicular, commonly with several obtuse lobes, mucronate, pubescent underneath, frequently coriaceous when mature. Petals with two inflexed auricles at the base of each. Drupe compressed, red; nut curved, forming nearly a ring. White. ½ June. Georgia to Mississippi.

**Genus II. Menispermum.**

*Flower dioecious. Sepals 4—8 in a double series. Petals 4—8, sometimes none. Stamens numerous, distinct; anthers*
4-lobed, 2-celled, adnate. Ovaries 2—4; drupes usually solitary, nut woody, globose reniform. Racemes axillary. Staminate and pistillate flowers often dissimilar.

1. M. Canadensis. Stem climbing, slender, herbaceous or suffrutescent. Leaves sub-cordate, with 3–5 lobes, peltate, petiole obusely angled, inserted near the base. Flowers small, sterile ones in paniculate supra-axillary compound racemes. Sepals 4–7, larger than the petals, obovate. Petals 6–7, orbicular, obusely cuneate. Drupes black, when mature, curved so that the style is brought near the base; nut compound, forming nearly a ring.

Greenish Yellow. Common on banks of streams—8–12 feet.


Order VI.—Berberidaceae.

Sepals in two rows, 3–4–6, deciduous, often surrounded by petaloid scales. Petals hypogynous, equal or double the number of sepals, and opposite them, generally with an appendage at the base. Stamens equal or double the number of petals, and opposite them. Ovary solitary, 1-celled, style lateral, stigma orbicular. Fruit baccate or capsular. Seeds 1–2–3, attached to the bottom of the cell, or numerous, attached to the ventral suture.

Genus I. Berberis.

Sepals 6, generally bracteolate. Petals 6, with 2 glands at the base of each. Stamens 6, irritabile, flying up on being touched at the base. Stigma sessile, orbicular, depressed. Fruit a berry, 1–9 seeded.

1. B. Canadensis. Branches thickly dotted, numerous, angular, when young, yellow, glabrous. Leaves simple, obovate, with remote spine-like appurtenances, obtuse, inerorate, cuneate at the base, glabrous, by pairs on young shoots, clustered on the summits of the last year's buds. Flowers in racemes, 6–8 flowered. Sepals ovate, acute. Petals ovate, emarginate, with 2 purple glands. Berry oval, red, acid.

Yellow. 4. Apr. S. Can. 3–5 feet.

Remarks.—The Berberis of the gardens (which is the European variety) differs in some respects from the B. Canadensis above described. The berries are larger and sweeter. It is cultivated for the berries and bark, the former are sour, and are used for the preparation of a decoction. They are used in preparations for helminth diseases and in the making of an emetic. The bark is used in medicine for jaundice and in the composition of a diuretic. The colouring matter is a crystallizable substance called berberin.

Genus II. Leontice. (Syn. Caulophyllum.)

Sepals 6. Petals 6, opposite the calyx, bearing a reniform

Part II.
scale within. *Carpel* stipitate, 2–4 seeded; seeds erect, globose.


**Genus III. DIPHYLLEIA.**


**Genus IV. JEFFERSONIA.**


Remarks.—There are two varieties of this species; a, leaves obscurely sinuate or nearly entire, b, leaflets incisely 5–7 lobed.

**Genus VI. PODOPHYLLUM.**


1. **P. Peltatum.** *Rhizoma* horizontal; stem simple, terminated by 2-leaves and 1-flower. *Leaves* peltate, 5–7 parted; lobes toothed or cleft at the apex. *Flowers* arising from between the leaves, large, nodding.


Remarks.—The root of the Podophyllum is an important medicine. It is among the most powerful cathartics, and is said to resemble Jalap in its operations, and has been used as a substitute for that article in connexion with calomel. In bilious complaints it is said to act very favorably. In minute doses it produces relief from distressing coughs in consumptions and catarrh. Full dose 20 grains of powdered root.
Order VII. CABOMBACEÆ. (Syn. Hydroptilideæ.)

Sepals 3, petaloid. Petals 3, alternate with the Sepals. Stamens 6–18–36 hypogynous; anthers innate. Ovaries 3–18. Carpel 1–2 seeded, terminated by the permanent style. Seeds orthotropic, globular, pendulous. Embryo minute; albumen fleshy, with the embryo at its base. Plants growing in the water, with floating, peltate leaves, the submersed leaves, with filiform lobes.

Genus I. CABOMBA. (Nectris.)


I. C. CAROLINIANA. Stem branching. Leaves floating and submersed, the floating ones elliptical or oblong, about an inch long, submersed ones filiformly dissected. Petals oval, obtuse, with two yellow spots at the base. Sometimes only 2 sepals and 2 petals.

White. 4. May. From N. C. to Lou.

Genus II. BRASENIA. (Syn. Hydroptilis)

Sepals 3–4, persistent, petaloid. Petals 3–4, longer than the sepals. Stamens numerous. Carpels numerous, somewhat oblong, 1–2 seeded. All the submersed parts of the plant covered with a transparent, gelatinous substance.

I. B. PELTATA. Stem long, slender, of a purplish color, no part of the plant being green but the upper surface of the leaves. Leaves alternate, the floating ones peltate, entire, elliptical. Peduncles 1-flowered, solitary. Grows in still water.

Brownish purple. 4. July. Canada to Geo. 1–10 feet.

Order VIII. NELUMBIACEÆ.

Sepals 4–6, petaloid. Petals numerous, from the outside of the disk. Stamens numerous, in several rows; filaments petaloid; anthers introrse. Disk remarkably developed, with the ovaries lodged in separate cavities of its substance. Fruit a nut, abundant, crowned with the persistent style. Seed orthotropic without albumen. Embryo very large, with two fleshy cotyledons. Herbaceous plants growing in deep water.

Genus I. NELUMBIUM. (Nymphaea, Cyamus.)

I. N. LUTEUM. Peduncles arising from a rhizoma. Leaves large, 1–2 feet in diameter, peltate, orbicular. Flowers large. Sacred Bean.

Pale yellow. 4. N. Y. to Lou. June.

Remarks.—This is one of the most splendid aquatic plants of North America. It yields a milky juice when wounded. The root bears tubers which are very farinaceous.
and are used as food by the Indians. The flowers are the largest of any North American plant except the Magnolia Macrophylla. (Nuttall.)

**Order IX. Nymphæaceæ.**

**Sepals** persistent 5–6. **Petals** numerous, imbricate. **Stamens** numerous in several rows, some of the filaments petaloid. **Anthers** adnate, introrse. **Fruit** many celled, fleshy, many seeded. **Seeds** anatropous, containing farinaceous albumen. **Embryo** minute. Aquatic plants, herbaceous.

**Genus I. Nymphæa.**

**Sepals** 4–5 persistent. **Petals** and **Stamens** numerous and passing into each other.

1. **N. Odorata.** Rhizoma very large. **Leaves** floating, nearly orbicular or cordate, strongly veined beneath. **Stigma** sessile, with numerous rays, incurved. The leaves of this plant vary considerably in form, giving rise to several varieties. The lobes of some being much more acute than those of others; and in one variety called the **N. Rosea** the leaves are smaller and flowers rose color. **White**. **June**. Common in ponds.

*Remarks.*—A beautiful plant distinguished by the delicious odor of its large white flowers. The genus is more properly the indigenous production of the East Indies. Several species growing there, and but one on the continent of North America. The plant has been sometimes employed in medicine, but we believe has pretty much passed from use. The Egyptian Lotus is a species of this genus, the **N. Lotus**, which is said to resemble our species.

**Genus II. Nuphar.**

**Sepals** 5–6. **Petals** numerous, small, externally nectariferous, inserted with the Stamens into the base of the torus. **Fruit** fleshy, many celled, many seeded.

1. **N. Advena.** **Leaves** semi-orbicularly cordate, lobes diverging; petioles long, solitary. **Flowers** large, emerging. **Petals** and filaments nearly confounded. Cells of the fruit equal in number to the rays, and when perfectly matured separate spontaneously. **Yellow**. **Pond-lily**. **July**. Canada to Florida in deep water.

2. **N. Sagittæfolia.** **Leaves** on long sub-spiral petioles, membranaceous, nearly a foot long, sagittate, obtuse. **Petals** none; the inner sepals petaloid, the outer green. **N. C. to Geo.**

**Order X. Sarraceniaceæ.**

**Sepals** 5, persistent, aestivation imbricate, with a three leaved involucre. **Petals** 5, unguiculate, concave. **Stamens** numerous; anthers adnate, introrse. **Ovary** 5-celled, with a central placenta. **Stigma** very large, 5-angled, petaloid, peltate, covering the Stamens. **Capsules** 5-celled, 5-valved, many seeded, with loculicidal dehiscence. **Seeds** anatropous. Herbaceous plants, growing in swamps.
Genus I. SARRACENIA.

Roots fibrous. Leaves all radical, pitcher shaped, the pediole being formed into a tube generally inflated in the middle, and the lamina, which is small, generally inflected over the orifice. Scape, 1-flowered, flower nodding.


2. S. RUBRA. Leaves slender, elongated, with the wing linear, throat not contracting, lamina erect, mucronate, hairy on the inner surface, contracted at the base. Petals obovate, narrowed at the base. Dark purple. 4. May. N. C. to Geo. 1-2 ft.

3. S. FLAVA. Leaves large, with throat expanding, scarcely any wing; lamina erect, reniform, with reflected margins, base contracted, mucronate, with purple veins. Petals obovate-oblong. Stigma very large, with each angle 2-cleft. Yellow. 4. April. Middle Car. and Ga. 18 in. to 2 feet.

Croom thinks the S. Catesbeii of Elliot, is only a variety of the S. Flava. [Sill. Jour. vol. 28, p. 167.

4. S. Drummondii. Leaves very long, erect, tube dilated above, with a very narrow wing; the upper portion as well as the orbicular, erect lamina white, and strongly reticulated with purple veins, 20-30 inches long. Flower large. Croom. Purple. 4. April. Florida. 2-3 ft.

5. S. Psittacina. Leaves 3-4 inches long, decumbent, purple, spotted nearly all over with white; dorsal wing broad, lanceolate; appendix nearly closing the tube, and shaped like the head of a parrot. Grows in the wet pine barrens of Florida. [Croom, Sill. Jour. vol. 25, p. 75.


Remarks. — This genus affords a striking example of a great modification of the petiole, since there is no doubt that the tube part is the petiole, and what we called the lamina, the true lamina of the leaf. These tubes are generally filled with water, which is supposed to be secreted by the plant, and this always contains dead insects. The tube could not have been formed in a better manner to accomplish a given end, than this to catch insects. The saccharine secretion, which surrounds the orifice, decoys insects to the tube, and the water entices them in; towards the bottom of the tube there are hairs pointing downwards so as to permit an easy descent, but makes the egress difficult.

Order XI. PAPAVERACEÆ.

Sepals, 2-3, caduceous, stivation imbricate. Petals 4-6. Stamens, as many as the petals, or some multiple of their number; anthers innate. Ovary composed of 2 or more carpels. Stigma generally sessile. Fruit 1-celled, many seeded, with parietal placentæ either opposite or alternate with the stigmas. Seeds minute, anatropous, albumen oily. Plants generally with a milky, or yellow juice, often acrid and generally narcotic. Flowers all belonging to the yellow series.
Genus I. ARGEMONE.


1. A. Mexicana. Leaves alternate, pinatifid, and spiny. Flowers solitary, axillary and terminal. Calyx and capsule prickly. There seems to be several variations from the above description, which constitute varieties of this species. The flowers vary much in size and color, and in some the capsule is not prickly. We have never met with such a one. Prickly Poppy.

White. ©. From June through the summer. In cultivated places, common.

Genus II. SANGUINARIA.


Remarks.—This plant enjoys considerable reputation, both in the regular practice of medicine and in the family practice. It is a powerful medicine; and should be used by those unacquainted with it with care. It is a stimulant in small doses; in larger produces violent vomiting and much irritation. It is one of the earliest and prettiest flowers of spring, and as an early border flower, deserves the attention of the florist.

Genus III. CHELIDONIUM.


1. C. Majus. Leaves pinnate-lobed, glaucous, segments ovate, the terminal one obovate. Flowers in axillary umbels. Celandine.


Genus IV. GLAUCIUM.


Order XII. FUMARIACEÆ.

Sepals 2, deciduous. Petals 4, cruciate; one or both of the two outer ones saccate or spurred at the base; the two inner cohering at the apex, and enclosing the anthers and stigma. Stamens 6, in two parcels; anthers membranous, adnate ex-
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torse, the lateral ones of each parcel one celled, the middle one 2-celled. Ovary 1-celled, 2-valved, with parietal placenta; style filiform; stigma with 2 or more points. Fruit a nut or capsule, if a nut 2-seeded, if a capsule many seeded. Seeds arilled, atanropous. Herbaceous plants, with watery juice.

Genus I. DIELYTRA.


1. D. Formosa. Leaves 3-3 or one rising from the crown of the rhizoma. Spur short, obtuse, somewhat incurved; wings of the inner petals projecting beyond the summit. Stigma 2-horned at the apex. (Torrey & Gray.) Reddish-purple. 4. Mountains of Vir. and N. C. 8-12 inches.

Genus II. ADLUMIA.

Petals united into a spongy, persistent, monocetalous corolla, bi-gibbous at the base, 4-lobed at the apex. Capsule pod-shaped, linear-oblong, many seeded. Flowers in racemose cymes. Plant climbing, herbaceous.


Pale violet or white. \( \text{b} \). June. Canada to N. C.

Genus III. CORYDALIS.

Only one of the petals spurred. Capsule 2-valved, many or few seeded, compressed; style persistent. Racemes terminal or opposite the leaves, simple.

1. C. Aurea. Stem branching. Leaves bi-pinnate, or variously dissected, lobes oblong, linear, glaucous, alternate. Spur straight, obtuse. Flowers in terminal, supra-axillary racemes, or opposite the leaves. Pedicels bracteolate with bracts sometimes extending beyond the flower.

Yellow. \( \text{b} \). April to August. Mountains.

Genus IV. FUMARIA.

One petal only gibbous or spurred. Fruit a 1-seeded nut, indehiscent.

1. F. Officinalis. Root annual, fusiform. Stem branching, glabrous. Leaves variously dissected, glabrous, and slightly glaucous, segments many cleft. Flowers in small, dense racemes; sepals toothed; petals 4 the lower one free, the 3 upper united at the base bearing a spur. Stigma bi-lamellate.

Purple \( \text{b} \). April. Naturalized. Fumitory.

Remarks - The order Fumariaceae possesses some striking peculiarities. The general form of the flower is singular, resembling more the works of art than of nature.
The characteristic of having the different celled anthers some unilocular and others bilocular is a striking variation. Torrey & Gray remark, that "the two lateral Stamens of each parcel, having unilocular anthers, may be considered as half Stamens, formed by the division of the two Stamens which correspond to the inner petals; the true number in the order according to this view being 4, one to each petal." The situation of the anthers and stigma in the indurated summit of the petals, in which they remain firmly enclosed till after fertilization, would seem to preclude the possibility of the pollen's coming in contact with the stigma. To adapt herself to these circumstances, nature has placed two horn-like appendages to the stigma, which extend under the anther cells and by the mere contraction of the valves the pollen is conveyed to the stigmatic surface without any change in position of the organs. The different genera of this order possess nearly the same properties, and the Fumaria has been used in medicine, particularly for its action on the liver and in cutaneous eruptions.

**Order XIII. CruciferÆ.**

*Sepals* 4, deciduous, cruciate, aestivation generally imbricate. *Petals* 4, cruciate, alternating with the Sepals. *Stamens* 6, tetradynamous, the two shorter lateral, occasionally toothed, inserted lower than the others. *Disk* often with small green glands inserted between the petals and the stamens and ovary. *Ovary* one celled consisting of two carpels, with two parietal placentse, which are reflected into the cavity where they unite and form a false dissepiment. *Stigma* opposite the dissepiments (a remarkable variation.) *Fruit* a siliqua or silicle, 2-celled produced by the spurious dissepiment mentioned above, one or many seeded. *Seeds* campulotropous, attached in a single row to each side of the placenta. Herbaceous plants, with a watery and generally, with an acrid juice.

**Tribe I. ArabideÆ.**

*Fruit* a siliqua. *Septum* linear. *Seed* compressed, with the radical on the side (*Pleurohiza*) cotyledon flat.

**Genus 1. Dentina.**


1. **D. Lacinaeta.** *Rhizoma* moniliform, tubers slightly connected. *Leaves* usually 3, ternate, leaflets incised or irregularly notched, lateral ones lobed; radical leaves sometimes wanting. *Flowers* in terminal racemes, sepals lanceolate acute. *Petals* much larger than the sepals. Taste of the root pun gent, like mustard.
   Pale purple.  4†.  May to June. Mountains and Middle Ga.  4-12 in.

   Pale purple.  4†.  May to June. Mountains.

3. **D. Multiflora.** *Rhizoma* tuberous. *Leaves* 2, opposite, 2-3 inches
long variously divided; segments and lobes linear. *Flowers* in a terminal raceme. *Sepals* lanceolate. Petals much longer than the sepals.  
White. 2. N. C. Alabama. 4-6 inches.

**Genus II. CARDAMINE.**

*Silique* linear, usually dehiscing elastically, with revolute valves; valves nerveless. *Sepals* expanding at the summit. *Seeds* ovate.

White. 3. April. Mountains and Mid. Dist. of Geo. & Car. 4-6 in.

2. C. *VIRGINICA.* Stem erect glabrous. Leaves alternate, pinnate, leaflets lanceolate, with a single tooth on one or both sides. *Flowers* in terminal racemes, erect. Petals a little longer than the sepals; stigma sessile. Varies much during the summer, and in different locations, so that any description may be inapplicable under different circumstances.  
White. 4. April to June. Upper districts of Geo. Car. 4-12 inches.

*The Pennsylvanica* of Elliott, and Virginica, are supposed to be a variety of the *Hirsuta* of Linnaeus.

**Genus III. NASTURTIUM.**


1. N. *OFFICINALE.* Leaves pinnately divided; segments ovate, sub-cordate, repand. *Petals* longer than the calyx.  
White. Introduced.

Yellow. 7. South Carolina. 5-12 inches.

3. N. *PALESTRE.* Leaves pinnatifid, 2-3 inches long, clasping and ciliate at the base, lobes confluent, toothed, glabrous, oblong-lanceolate. *Flowers* very small; petals equal the sepals. *Silique* declined, ovate-oblong, a little curved.  
Yellow. 7. June to August. Wet places. 1-2 feet.

**Genus IV. ARABIS.**

*Silique* linear, generally compressed, terminated by the sessile stigma, valves 1-nerved. *Seeds* in one series, orbicular, compressed. Calyx erect.

White. 7. June. Middle Georgia.
Genus V. Leavenworthia.


Torrey & Gray.

Alabama. 2-6 inches.

Tribe II. Sisymbreæ.

Seeds with the radicle on the back, (notorhiza) never on the side, not bordered.

Genus VI. Sisymbrium.

Siliqua terete, or slightly angled, with a short beak. Stigma capitate. Sepals equal at the base, expanding. Petals expanding. Seed's ovate or oblong.


Remarks.—The latter plant possesses somewhat the pungency of mustard, and has been recommended in the treatment of chronic coughs, hoarseness, and ulceration of the mouth. The juice with sugar, or the seeds may be taken.

Genus VII. Erysimum.


Genus VIII. WAREA. (Cleome of Ell)

Silique flat, stiped, elongated, slender, curved pendulous.—
Sepals deflected, spatulate, or ligulate, colored, caduceous. Petals spreading, with long claws. With six glands at the base of the stamens. Leaves entire.

1. W. AMPLEXIFOLIA. Stem branched above, glabrous. Leaves oblong, ovate, acute. Flowers in umbel-like racemes, much crowded; petals with the limb nearly orbicular, claw longer than the limb. Silique linear, stipe filiform purplish.

Pale purple. O. Florida. 1-3 ft.

2. W. CUNEIFOLIA. Stem branched above, glabrous. Leaves nearly sessile, oblong, obtuse, upper ones oblong-linear. Racemes with the flowers clustered at the extremities of the branches. Sepals minute. Petals with the limb nearly round, supported on a long claw. Stamens longer than the petals.

Anthers linear. Stigmas sessile. Silique filiform, nearly 2 inches long.

White tinged with purple. O. June and Aug. Middle Geo. and Car. 1-2 feet.

Remarks.—The last species is a beautiful plant, and would well repay the florist’s care, if it improved none by cultivation.

Tribe III. BRASSICEÆ.

Silique dehiscent. Seeds globose with the radicle on the back. Annual and biennial herbs.

Genus IX. SINAPIS.


Yellow. O. June. Introduced.

Remarks.—The seeds of the S. Nigra, (common mustard) are too extensively known and used to demand a notice of their properties here. There are circumstances connected with the exhibition of their well known properties, which are singular and interesting. The mustard seeds in a perfectly dry state, may be pressed and made to yield an oil, possessing none of the active properties of mustard, these remaining in the seed. But if the oil be obtained by water, it is powerful in its operation, producing speedy vegetation. This latter oil it seems does not existreally formed in the seed, but is formed by the action of the water. The chemical difference of the two is probably, that the latter contains sulphur, as this is found in the white mustard in a principle called Sulpho-sinapisin, possessing the same properties as this oil, and formed by the action of the water.

Tribe IV. SELENIEÆ.

Septum broad and membranaceous. Seeds inverted.

Genus X. SELENIA

Silicle broadly oval, acute at the base, margined. Seeds orbicular, 4-6 in each cell, with a broad, thin, cartilaginous border. Sepals colored; glands 10. Petals erect.

TRIBE V. ALYSSINEÆ.

Silicle dehiscent; valves plain or convex; septum broadly oval, membranaceous. Seeds compressed, with the radicle on its side.

GENUS XI. VESICARIA.

Silicle globose or ovate, with hemispheric valves. Seeds sometimes margined, 8-12. Petals entire.


GENUS XII. DRABA.

Silicle oblong-lanceolate or oval, minutely hispid, especially along the margin, or glabrous. Seeds numerous. Calyx equal. Petals emarginate or entire.

1. D. Cuneifolia. Stem leafy at the lower part, very pubescent, slender. Leaves with few teeth; cauline ones oblong-ovate, narrowed at the base; radical ones spatulate-oblong. Flowers large; petal several the length of the calyx. White. ©. Florida. 4-8 inches.

2. D. Caroliniana. Stem leafy and hispid at the base, naked and smooth above. Leaves hispid, entire. Flowers corymbic or racemose; petals oblong twice as long as the sepals, or minute, and sometimes wanting. Silicle nearly linear, glabrous, 4-6 lines long, many seeded. White. ©. April & June. Middle Geo. 1-6 inches.

3. D. Brachycarpa. Stem simple or branched, leafy. Leaves, cauline ones linear or oblong, with 2 or 3 minute teeth or entire; radical ones roundish ovate, petioled. Flowers in racemes, many flowered; silicles oval, glabrous, cells 5-6 seeded, petals entire or slightly emarginate. Var. Fastigiata. Stem more pubescent, seldom branched; radical leaves generally 4 toothed, silicle pubescent. White. ©. March—April. Middle Georgia.

TRIBE VI. LEPIDINEÆ.

Silicle compressed opposite the narrow septum; valves boat-shaped. Radicle never turned to the side, but generally on the back.
Capparidaceæ.

Genus I. Lepidium.

Silicle cordate, emarginate, 2-seeded; valves keeled. Seeds compressed.


Tribe VII. Cakilinææ.

Silicle or Silicle separating, into several 1-celled, 1-seeded joints. Seeds with the radicle on the side, accumbent.

Genus I. Cakile.

Silicle lanceolate, somewhat 4-angled, jointed. Seed in the upper cell erect in the lower pendulous. Annual maritime herbs.

1. C. Maritima. Stem erect, with expanding branches. Leaves alternate, oblong-cuneiform, sinuately toothed, lower ones sometimes nearly hastate. Flowers in terminal corymbose racemes. Lower joint of the silicle short, the upper one with a line on each side. Seed 1 in each joint, oval glabrous.


Remarks.—This plant deserves the attention of the gardener as a culinary vegetable. It has been in some cases cultivated and has always been highly esteemed.

Order XIV. Capparidaceææ.

Sepals 4, deciduous, sometimes marcescent, aestivation imbricate, or united forming a tube. Petals 4, hypogynous, cruciate, unguiculate, sometimes a nectary at the base of the outer petal, more or less unequal. Stamens almost perigynous, 7–12, or many, seldom 4. Disk hemispherical or elongated. Ovary compressed, of 2-carposels united, stipitate, with parietal placenta, styles united, filiform, or none. Fruit a 1-celled, pod-shaped capsule, many seeded. Seeds campulitropous, reniform, albumen wanting. Embryo curved. Annual plants. Leaves alternate, stipulate.

Genus I. Cleomella.


Part II. 3

**Genus II. Gynandropsis.**


**Genus III. Polanisia.**


**Order XV. Polygalaceæ.**

*Sepals* 5, persistent, the two lateral ones introrse and large, and petaloid, the three exterior small. *Petals* 3, irregular, somewhat papilionaceous, the keel crested. *Stamens* hypogynous, from 6-8, monadelphous, with the tube split on the upper side. *Ovary* consists of two carpels, with a central placenta, 2-celled, with a solitary ovule in each cell, pendulous. *Seeds* anatropous, with much albumen. Embryo generally straight, as long as the albumen. Herbaceous, with bitter root.

**Genus I. Polygala.**

*Sepals* 5, permanent, unequal, the two lateral ones larger, colored. *Petals* 3, united to the tube of stamens. Fruit a capsule, 2-celled, compressed, obcordate, or elliptical. *Flowers* in racemes, approaching in different cases spikes or heads, more commonly the latter.

(a.) *Flowers* capitate or in spikes. *Seeds* with a 2-lobed caruncle.

2. *P. Purpurea.* Stem fastigate branched, sometimes simple, erect angular and slightly winged. Leaves alternate, linear-lanceolate 1-inch long. Flowers in oblong spikes; wings broad-ovate, green, tinged with purple; crest minute. Seeds hairy, with a caruncle, nearly as long as the seed, nearly black.


3. *P. Cruentata.* Stem erect, branching, winged. Leaves verticillate, linear, pinnate. Flowers in ovate spikes, nearly sessile; stamens short; wings delayed at the base with a purple border; crest minute. Seed obovate, slightly hirsute.

Red, with green. o. July. 8-12.

4. *P. Letea.* Stem branched or simple. Flowers in an ovate spike, nearly globular; wings broad lanceolate, acuminate, yellow; crest minute. Radical leaves spatulate, the cauline ones lanceolate, acute. Seeds hairy.

Yellow. o. June—September. Common. 8-12 inches.

5. *P. Nana.* Stem simple. Leaves cuneate, obovate, obtuse, sometimes with a long attenuated base. Flowers in a dense cylindrical spike, nearly sessile; wings, ovate acuminate, with a setaceous point, yellowish-green; crest large. Seed obovate, a little hairy.


(b.) Flowers in terminal cymes; caruncle with no or very small appendage.

6. *P. Corymbosa.* Ramosa. Stem simple, angular, terminated with a large cyme, nearly naked. Leaves spatulate, the upper ones linear and at the summit small. Flowers in a compound cyme; wings oval, long, mucronate, greenish-yellow. Seed oblong.


8. *P. Baldensis.* Stem erect, branching near the summit, leafy. Leaves, lower ones spatulate, upper ones lanceolate. Flowers in a compound cyme, sub-globose compact; wings lanceolate longer than the corolla, keel but slightly mucronate, if at all. Seeds ovate, very hairy.

Yellowish white. o. June—August. Low country of Geo. 2-3 feet.

(c.) Flowers in cylindrical spikes; caruncle spongy, cristate.


9. *P. Setacea.* Stem very small, erect, angled, generally with several slender, erect branches. Leaves very small, setaceous. Flowers in a compact spike, small; wings oblong, acuminate; limbs of the lateral petals ovate; crest conspicuous. Seeds ovate, hairy.

Rose color. o. Ju. Middle Car. & Geo. 10-12 inches.

(d.) Flowers in elongated, racemose spikes, caruncle with a 2-lobed appendage.

10. *P. Verticillata.* Stem erect, branching. Leaves verticillate, linear, acute, puberulous. Flowers in pedunculate, tapering spikes, dense; wings nearly round or obovate, longer than the corolla; lateral petals spreading; keel limbate. Seeds hirsute.

Greenish white. o. June—Aug. Old sandy fields. 6-10 inches.


White. II. Mountains and upper districts of Car. & Geo. 6-8 inches.
12. P. Boykinii. Stem branching. Leaves verticillate by fours or fives, obovate, lanceolate. Flowers in dense tapering spikes, pedicillate; wings obovate; petals obovate scarcely as long as the wing; crest minute. Seed hisrute, with appressed hairs.

O. June—September. Middle Georgia. 12-18 inches.

13. P. Chapmanii. Stem glabrous, branching from the base or summit. Leaves numerous, linear, subulate. Flowers in a loose spike; wings with a short claw, the posterior sepal very broad, obtuse; scarcely any crest; limb of the petal distinguished. Seed, black, hairy; lobes of the caruncle small. Rose color. O. Florida. 12-15 inches.

14. P. Polygama. Stem glabrous, angled, branching from the base, numerous. Leaves sessile, oblong, linear, mucronate. Flowers pedunculate, in loose racemes; wings with short claws; keel 3-lobed, middle lobe fimbriate. Radical racemes destitute of corolla or wings. Purple or reddish-purple. O. Dry lands, common. 6-12 inches.

(d.) Flowers in loose racemes; keel not cristate. Caruncle without appendages.

15. P. Grandiflora. Stem erect, pubescent, branching. Leaves oblong-lanceolate acute, pubescent, strongly veined. Flowers 12-18, the lowest more remote; pedicels recurved after flowering; wings large, nearly round, covering the other parts of the flower, when first expanded red, afterwards green. Seed villous. Red. O. May to Aug. S. C. & Georgia. Dry soils. 8-12 inches.

(e.) Flowers few, axillary or terminal.

16. P. Paucifolia. Stem simple, erect, naked at the base, leafy at the summit, rising from a branching rhizome. Leaves clustered, ovate, petioled. Flowers generally terminal, by threes, larger than those of any other species; keel fimbriate; wings, obovate, attenuate at the base. Lateral petals united with the keel nearly to the summit. Purple. O. May—July. Mountains. 3-4 inches.

Remarks—The P. Senega or Seneca snake root is the only plant of this order appropriated to any use, in this country; although several of the species are beautiful flowers, and would make ornaments of the flower garden. The root of the Senega is extensively used as a medicine, and possesses valuable properties, among the most important is its action as an expectorant; on this account it enters into the composition of most medicines for coughs, croup, asthma, and affections of the lungs. It is entirely an American medicine, being first used in Virginia. It is cathartic and is used in combination with other medicines, for this property.

Order XVI. Violaceae.

Sepals 5, persistent, aestivation imbricate, usually auricled, or elongated at the base. Petals 5, hypogynous, marcescent or deciduous, with an oblique, convolute aestivation, one spurred at the base, generally unequal. Stamens 5, alternate with the petals; anthers adnate, bilocular; filaments extending beyond the anthers, two of them appended at the base. Ovary 1-celled, with 3-parietal placenta; capsule many seeded, with a loculicidal dehiscence. Seeds anatropous, with a conspicuous calaza. Herbaceous plants.

Genus I. Viola.

Sepals 5, unequal, auricled at the base. Petals 5, irregular, with a horn at the base of one of them. Stamens 5; anthers cohering, the two lower ones with appendages on the

(a) without stems, scape and leaves arising from a rhizoma. **Stigma with a recurved beak.**

1. **V. Pedata.** Leaves pedate, 7-parted, segments entire, linear lanceolate, slightly pubescent or glabrous. **Stigma** thick, margined; **beak** short. **Peduncles** glabrous.

   Blue or nearly white. 4. April—May. Common in the middle and upper country of Georgia. 4-6 inches.

2. **V. Palmata. Rhizoma.** Leaves thick, cordate, very variable, pubescent, palmate, 5-7-lobed, lobes of various forms, toothed, the middle one the largest. **Sepals** lance-ovate, ciliate; **petals** entire, veined, white at the base, lateral petals bearded, the upper one marked with blue lines. **Early plant with almost entire leaves. A variable plant.**

   Bright blue, sometimes pale. 4. May. Common. 4-6 inches.

3. **V. Cucullata.** Leaves reniform or cordate, cucullate, serrate, generally glabrous. **Sepals** subulate, acuminate. **Petals** white at the base, lateral ones bearded, which with the upper one, marked with blue lines. **Stigma** triangular, margined.

   There have been several varieties found of this species by Botanists, but the situation and the time when observed, will account for nearly, if not quite, all the variations. In open dry places the plant is pubescent; in spring, the leaves are almost uniformly cordate, in fall as uniformly reniform; the color of spring is blue, of summer, nearly or quite white.

   Blue or purplish-blue. 4. Common. 4-6 inches.

4. **V. Septemora.** Leaves ovate-cordate, slightly succulent, glabrous, dentate, lower leaves entire, the others pedate, 7-lobed, middle lobe the largest. **Sepals** lanceolate. **Petals** entire, upper ones large, villose, lateral ones densely bearded, marked with blue lines. **Stigmas** short, obtuse.

   Blue. 4. March. **Low country of Car. & Geo.**

5. **V. Sagittata.** Leaves oblong, acute, cordate, sagittate incised at the base, pubescent, slightly ciliate. **Inferior petal** glabrous, the rest bearded. **Spur** short, obtuse.

   **Var. Ovata.** Leaves ovate, somewhat cordate; **petiole** margined.

   **Var. Bivittata.** Glabrous; **leaves** almost triangular, lacerately toothed near the base.

   Pale blue. 4. March & April. Upper districts of Geo. & Car. 6-8 in.

6. **V. Villosa.** Leaves cordate, obtuse, pubescent, appressed, toothed, with purple veins. **Sepals** acute, or obtuse. **Petals** villose, lateral ones bearded.

   Pale blue. 4. March and April. Sandy soil, common.

7. **V. Rotundifolia.** Leaves orbicular, cordate, somewhat crenate, glabrous. Petiole pubescent. **Sepals** obtuse. **Petals** sometimes ciliate, upper ones small, marked with a few brown lines. **Spur** short.

   Yellow. 4. May. Mountains.

8. **V. Primulaefolia.** Leaves oblong, somewhat cordate, serrate. **Petioles** membranous. **Petals** entire, green at the base. lateral ones bearded. **Stigma** ciliate, margined.


9. **V. Lanceolata.** Leaves lanceolate, narrow, glabrous, attenuate at the base into a long petiole, obtuse, cuneate. **Peduncles** reddish, of the length of the leaves; divisions of the calyx lanceolate, acute. **Petals** entire, green at the base, the upper one marked with blue lines; all beardless. **Stigmas** short.

   White. 4. April—May. Damp places. 3-8 inches.

(b) with stems. **Stigma convex, not margined.**

10. **V. Stricata. Stem erect, glabrous, nearly terete, branching. Leaves roundish, cordate, acute, serrate, with conspicuous stipules, ciliate.**
lanceolate acuminate, ciliate. Petals entire, upper one marked with blue lines, naked, glabrous, lateral ones bearded. Stigma tubular recurved. Yellowish-white. April—May. Common in moist places. 6-12 in.

11. V. Muhlenbergii. Stem glabrous, terete, weak, assurgent or prostrate. Leaves reniform-cordate, upper ones ovate, cruciate. Stipules lanceolate, sub-pinnate, serrate, ciliate. Sepals linear, acute, sub-ciliate. Petals without veins, lateral ones bearded, and with the upper one marked with blue lines. Stigma tubular papilllose.

Bluish-purple. April—May. Common in moist places. 6-10 inches.

12. V. Hastata. Stem simple, leafy at the summit, nearly glabrous. Leaves alternate hastate, with obtuse lobes, and deltoid-lanceolate, slightly serrate, on short petioles. Stipules ovate dentate. Sepals lance-linear; lateral petals slightly bearded. Stigma hairy on each side, with a furrow on the top.

Yellow. May. Upper districts of Georgia. First discovered by Dr. James Green. 6-12 inches.

13. V. Tripartita. Stem hirsute, simple, leafy only at the summit. Leaves deeply 3-parted, the lobes lanceolate, dentate, very hairy, sometimes ternate. Stipules villous, lanceolate. Peduncles long with 2-minute, alternate scales near the middle. Sepals acute. The upper petal streaked with purple.

Yellow. March—April. Upper districts of Geo. 8-12 inches.


Yellow. April—May. Common. 6-12 inches.


Different petals white, yellow and violet. May. Woods. 6 in. 2 ft.

c) with stems, stigma urceolate, hairy on each side.


Yellowish-blue, spotted with purple. May. Middle Geo. 10-12 in.

Remarks.—The plants of this genus have been object of regard in all ages, and the hearts case is much and justly esteemed for its modest beauty. The palmata particularly is very mucilaginous, and is used by the negroes in their soups. The roots are all emetics, and the roots of plants belonging to this order, are met with in commerce as Ipecacuanha.

**Genus II. SOLEA.**

Sepals 5, nearly equal, not auricled. Flowers irregular, the lowest petal 2-lobed, and somewhat gibbous at the base, the others emarginate. Stamens cohering; the two lowest bearing a gland above the middle. Stigma uncinate. Capsule 3-sided, surrounded at the base by a concave torus. Seeds 6-8 large.


DROSERACEÆ.

Order XVI. DROSERACEÆ.

Sepals 5. Petals 5. Stamens 5. Styles 3-5, each 2-parted or multifid. Capsules 3-5-valved, valves placentiferous to the summit. Seed numerous in several rows on each placenta; small herbs growing in wet places. Leaves alternate with circinate vernation.

Genus I. DROSERA.

Sepals 5. Petals 5. Stamens 5. Styles 3-5, each 2-parted or multifid. Capsules 3-5-valved, valves placentiferous to the summit. Seed numerous in several rows on each placenta; small herbs growing in wet places. Leaves bearing glandular hairs.

1. D. Rotundifolia. Without stem. Leaves orbicular, spreading, tapering at the base. Petiole long, hairy, appressed to the ground, covered with glandular hairs, red to purple. Scape 5-10 flowered, with the calyx and scape of nearly the same color as the leaves. Sun-dew. White. April. Common in shaded spots. 4-10 in.


3. D. Flavivora. Leaves forming a dense tuft, not more than an inch in diameter, slightly circumcissile, obtuse. Petals obovate, more than twice the length of the calyx, 2-3-flowered in a scape. Scape filiform. Styles deeply 2-parted. Rare. Florida. 3-8 inches.


Genus II. DIONEA.


Remarks—This is the most interesting plant. The "sensitiveness of its lamina," is
DICOTYLEDONOUS.

said to reside by the Rev. M. A. Curtis, "in only three or four hair-like processes of its upper surface, so placed that an insect can hardly traverse it without interfering with one of them, when the two sides suddenly collapse and enclose the prey, the fringe or hairs of the opposite sides of the leaf interlacing like the fingers of two hands clasped together." The circumscribed geographical section in which the plant has been found is remarkable. This plant is found only in the section above indicated, nor has this or any other species of the genus been found in any other quarter of the globe.

Genus III. PARNASSIA.

Sepals 5, more or less united, aestivation imbricate, united to the ovary at the base. Petals 5, nearly perigynous, persistent. Stamens 5, perigynous, alternate with the petals, with an indefinite number of ovate sterile stamens united into 5 phalanges opposite the petals; these probably consist of two series accounting for their being opposite the petals. Perennial herbs, growing in wet places.

1. P. Caroliniana. Leaves orbicular-ovate, or broad cordate, entire, glabrous, 5-7-nerved on long petioles, 2-3-inches rather coriaceous. Cauline leaves low down, clasping. Stem, 1-flowered. Sepals small 5-united at the base, ovate, 3-ribbed, with a membranaceous margin. Petals oval or ovate, with 5-7 green nerves. Sterile filaments in 5 bunches, each composed of 3 filaments, distinct nearly to the base about the length of the stamens, terminated by an awn. Anthers sagittate. Styles 4, short.


2. P. Asarifolia. Leaves reniform, the cauleine one, nearly orbicular, slightly cordate, sessile. Petals ovate, broad, obtuse, ungulate; sterile filaments separate nearly to the base, united by threes. Leaves and flowers larger than in the preceding species.


Order XVIII. CISTACEÆ.

Sepals 5, persistent, unequal, the ovate smallest or wanting, the 3-inner with an imbricate and sometimes twisted aestivation. Petals 5, hypogynous, fugitive, twisted in an opposite direction from the sepals. Stamens indefinite, hypogynous, distinct. Anthers short, innate. Ovary a 3-5-valved, 1-celled capsule, with a loculicidal dehiscence, or with the membranes bearing the placenta extending nearly to the center making it imperfectly 3-celled, and in the Lechea called 3-celled. Seeds 3 to many, orthotropous. Perennial herbaceous plants. Flowers of the whole order yellow.

Genus I. HELIANTHEMUM.

Sepals 5, unequal, the two exterior small, bract-like, and sometimes wanting. Petals 5, fugitive or occasionally wanting. Stigmas 3, large, more or less united into one. Capsule 3-valved, few or many seeded, triangular. Sun rose.

1. H. Canadensis. Stem erect, at first simple, afterwards branched, bran-
The text contains information about the genus *Lechea* and is categorized under the class *Cistaceae* and order *Hypericaceae*. It describes the characteristics of the genus, including the appearance and distribution of its parts, and provides specific details about its leaves, flowers, and fruits. The text is structured in a way that provides a clear understanding of the genus and its classification within the plant kingdom. The description is detailed, focusing on the physical characteristics and distribution of the species.
of 2–5 united carpels. **Styles** several, persistent. **Capsule** with a septicidal dehiscence, 1–2–5 celled; when 1-celled the placentae parietal; when more than 1-celled, the placentae central. **Seeds** very numerous, anatropous. Embryo straight, cylindrical. Herbs and shrubs. **Leaves** opposite entire, without stipules, dotted.

**Genus I. ASCYRUM.**

**Sepals** 4, the two exterior usually broad and foliaceous, the two interior smaller. **Petals** 4. **Stamens** usually united by their filaments into four parcels. **Capsule** oblong, 1-celled, 2-valved, with parietal placentae. **Styles** 2–3, occasionally united. Shrubby, or suffrutiucose. **Leaves** with black dots.—**Flowers** yellow.

1. A. Ccrux-Andree. **Stem** erect, much branched spreading. **Leaves** oblong-lanceolate, obtuse, sessile, dotted, small. **Flowers** solitary, axillary, and terminal. The outer sepals, cordinate, ovate, acute; the interior small, 2 small bracteal leaves at the base of the calyx. **Petals** linear-oblong. **Styles** 2. **Stigmas** single. **Capsule** 2-valved, compressed. **St. Andrew's Cross.** Yellow. 24. July. Pine woods. Car. & Geo. 8–12 inches.

2. A. Pumilum. **Stem** prostrate, much divided, slightly winged. **Leaves** linear-oval, small, obtuse, toothed, perianthial. **Flowers** solitary, axillary; exterior sepals ovate, acute, marked with dots. **Petals** ob-ovate, a little longer than the calyx. **Stamens** numerous, not distinctly united into parcels. **Style** 1, long. **Capsule** ovate. A variable plant. Yellow. 12. March. Pine barrens, Middle Geo. 6–10 inches.

3. A. Hypericoides. **Stem** erect sparingly dichotomous, branched, apical, slightly winged. **Leaves** sessile, opposite, somewhat clasping, oblong, obtuse, glaucous. **Flowers** terminal or axillary on erect peduncles, exterior, sepals large, cordinate-ovate, nearly orbicular, nerved dotted. **Petals** obovate. **Stamens** very numerous. **Styles** 2. **Capsule** triangular. **Seeds** striate. Yellow. 12. Through the summer. Damp soils.


5. A. Microsepalum. **Stem** nearly terete, much branched. **Leaves** very small, oblong-linear, crowded. **Flowers** erect, on long peduncles, large, clustered at the summit of the branches. **Sepals** nearly equal in length; the exterior ones about a third broader than the others. **Petals** more than twice as long as the sepals, one of them usually much shorter than the others. **Styles** filiform, long. Torrey & Gray. Yellow. March–April. Middle Florida. A foot or more high.

**Genus II. HYPERICUM.**

**Sepals** 5, united at the base, foliaceous. **Petals** 5, oblique. **Stamens** numerous united at the base into 3–5 parcels. **Pistils** 3–5, persistent. **Capsule** 1-celled, with parietal placentae, or 3–5-celled

1. H. Prolificum. **Stem** shrubby or suffructicose, with dichotomous, an-
HYPERICACEE.

35


Yellow. 12. June. Middle Geo. & Car. 2–3 feet.


Golden Hypericum.

Yellow. 12. June–August. On the Ocmulgee, one mile above Macon. 2–3 feet.

5. H. Myrtifolium, Glauccum. Stem terete, with a few branches near the summit. Leaves cordate-ovate, obuse, clasping, glaucous, dotted coriaceous. Flowers in fasciculate cymes, leafy. Sepals ovate, reflexed. Petals about as long as the sepals, with a tooth near the summit. Stamens nearly as long as the petals. Styles 3, at first united but separating as the fruit matures.


8. H. Oracum. Stem slender, with few opposite slender branches, nearly square, winged. Leaves narrow, oblong, sessile, punctate with minute brown dots, thick, somewhat coriaceous. Flowers in a naked cyme. Sepals oblong, or obovate, unequal. Petals very oblique, double the length of the sepals. Pistils 3, united.


9. H. Fastigiatum. Stem branching, branches ancipital. Leaves long narrow-lanceolate, acute, connate, tapering at the base, dotted, paler on the under surface. Flowers in corymbs, with solitary flowers in the lower divisions of the corymbs. Sepals lanceolate, half the length of the petals. Styles united, not separating with the maturing of the fruit.


DICOTYLEDONOUS.


Remarks. — We are not aware, with one exception, that the hypericums are used for any other purpose than ornament. Some of them bear elegant flowers. The H. Aonioeum bears a splendid flower, of the richest golden yellow, it has been gathered from the banks of our streams and transferred to gardens, and it is hardly surpassed by any exotics, in its claims on the florist's attention. The H. Perforatum an introduced species, and which covers fields in the Northern and Middle States, has long enjoyed considerable reputation in the cure of diseases, but with the faculty we believe it is pretty much abandoned, but still retains a place among the housewife's herbs. It is astringent and possesses no doubt, some of the properties of the tannin. It is used for burns and bruises, in pectoral complaints, jaundice, and as a vermitage.

GENUS III. ELODEA.


ILLEGEBRACEAE.

Order XX. Illegembraceae.

Sepals 5, persistent, distinct or united at the base. Petals 5 or none, alternate with the sepals, minute, sometimes resembling sterile filaments. Stamens equal in number to the sepals, and opposite them, perigynous, filaments distinct, anthers 2-celled. Ovary compressed, of several carpelles with the dissepiments obliterated, so as to form a pyxidium, with central placenta one or many seeded. Seeds campulitropous. Embryo more or less curved. Herbaceous plants, with opposite, entire leaves, with scabrous stipules.

Genus I. Paronychia. (Anychia.)

Sepals united at the base, cuspidate or curved at the summit; the inner portion colored, cucullate or concave at the summit. Petals resembling sterile filaments, very minute or wanting. Stamens 5, inserted into the edge of the disk that lines the base of the sepals. Stigmas 2. Styles more or less united. Pyxidium inclosed in the sepals.

1. P. dichotoma. Stem branching from a thick woody base, glabrous. Leaves opposite, subulate, mucronate, dotted; with 4 stipules at each joint. Flowers in dichotomous cymes, diffuse. Sepals yellowish, linear, 3-ribbed, lined with a whitish disk. Style filiform, cleft about one fourth its length.

2. P. angustifolia. Root fusiform. Stem, terete, jointed, branching, dichotomous, glabrous towards the summit. Leaves linear, acute, slightly hairy with 2 stipules sometimes 1, longer than the joints. Flowers in globose cymes. Sepals linear, hairy, sericeously cuspidate, the inner portion beard ed above.


4. Upper districts of South Carolina and Georgia.

Genus II. Anychia.

Sepals ovate oblong, united at the base, slightly concave, sub-saccate at the apex, sub-mucronate on the back. Corolla none. Stamens 2–5 inserted on the base of the sepals. Pistils very short. 2. Styles distinct or united. Annual plants, dichotomously divided.

1. A. canadensis. Stem erect or decumbent at the base, much branched at the summit, dichotomous, pubescent. Leaves opposite, nearly glabrous, lanceolate, dotted. Stipules generally four at each joint, membranous. Flowers solitary and terminal on each branch. Sepals somewhat hooded at the point. Stamens commonly 3, shorter than the calyx. Stigmas 2.


3. Middle Florida.

Part II.
DICOTYLEDONOUS.

Genus III. Siphonochia. (Herniaria.)

Sepals 5, cohering below into a tube, petaloid above, concave at the summit. Petals none, or subulate, filament like the petals inserted into the tube of the calyx. Stamens 5. Style filiform, about the length of the calyx.

1. S. Americana. Stem branching, diffuse, procumbent, minutely and retrorsely puberulent. Leaves, oblong-lanceolate, ciliate, slightly hairy beneath, shorter near the summit. Flowers in glomerate cymes, at the extremities of the branches, numerous. Sepals white above, minutely hispid with hooked bristles at the base.
   (J). July—August. Middle Georgia.

Genus IV. Stipulicida.


Genus V. Polycarpon.


Genus VI. Spergula.

Sepals 5, distinct. Petals 5, entire. Stamens 5-10, sometimes only 2, inserted with the petals. Pistils 3-5. Capsule 3-5 valved, many seeded. Seeds compressed, orbicular or reniform.


Pale rose color. 0. April—May. Salt marshes. 3-6 inches.

**Order XXI. CARYOPHYLLACEÆ.**

Sepals 4-5 distinct or united at the base into a tube, persistent. Petals 4-5 hypogynous, unguiculate, inserted on the pedicel of the ovary, or destitute of claws and inserted on a nearly perigynous disk. Stamens generally twice as many as the petals and inserted with them. Filaments sometimes cohering. Ovary stipitate. Pistils 2-5, with the stigmatic surface extending the whole length. Capsule 2-5 valved, 1-celled rarely 2-5 celled, dehiscence loculicidal, or by the apex, by the capsule splitting into twice as many teeth as stigmas, with a central placenta. Seeds campulitropous. Herbs, with tumid nodes. Leaves opposite.

**Genus I. SAGINA.**

1. S. Procumbens. Stem procumbent, glabrous. Leaves linear, clustered at the extremity of the branches. Flowers on solitary, axillary peduncles. Petals about half the length of the sepals, or none. Barren fields. South Carolina. 2-4 inches.

**Genus II. ARENARIA.**


White. 0. April—May. Common in dry pastures. 3-6 inches.

2. A. Squarrosa. Stem much divided near the base, glandular pubescent. Leaves short, subulate, the lower ones densely squarrose-imbricate, rather obtuse, upper ones few. Flowers in terminal panicles, few flowered. Sepals ovate, obtuse without nerves. Petals obovate, three times as long as the sepals.

White. 2. April—June. Sand-hills, common. 6-10 inches.


White. 2. May—June. Mountains. 4-6 inches.

oval, obtuse, membranaceous margin, nerves less. *Petals* obovate-oblanceolate, twice the length of the sepal.

White. 3. June—July. Mountains. 4–6 inches.

**GENUS III. STELLARIA.**

*Sepals* 5, expanding, somewhat united at the base. *Petals* 5, two parted, often perigynous. *Stamens* 10, or fewer by suppression. *Pistils* 3 or rarely 4. *Capsules* 3-valved, 1-celled, many seeded. **Chickweed.**


White. 3. March–April. Florida. 1–4 feet long.


White. 3. May. In rich soils. 6–12 inches.


White. 3. May. In the low country, swamps. 10–12 inches.


White. 3. April–June. Damp soils. 2–3 feet long, supporting itself on small plants.

**GENUS IV. CERASTIUM.**

*Sepals* 5, somewhat united at the base. *Petals* 5, 2-cleft, or emarginate. *Stamens* 10, seldom a less number. *Pistils* 5. *Capsules* 1-celled, 5-valved, dehiscing at the apex, producing 10, rarely 5 teeth, many seeded. **Chickweed.**


White. 3. April–Sept. Very common. 6–12 inches.


Genus V. SILENE.

Sepals 5, united into a tube. Petals 5, unguiculate, with long claws, crowned at the summit of the claw, limb 2-cleft. Stamens 10, inserted on the stype of the ovary. Pistils 3. Capsule 3-celled, opening at the apex with 6 teeth.


White. 4. Through the summer. So. Ca. Dry woods. 2-3 feet.


White or rose color. 4. April—June. Middle and low country. 8-10 in.


5. S. RETIA. Stem large, rigid, viscid, branched above, the lower nodes approximate swollen. Leaves ovate or ovate-lanceolate. Flowers many, in cymes. Calyx tubular long, 10-striate. Petals usually entire, broad lanceolate. Stamens and styles exserted.

Bright scarlet. 4. June—July. Louisiana. 4-5 feet.

6. S. ANTRRILLINA. Stem pubescent near the base, occasionally spotted. Lower leaves spathulate, pubescent along the midrib. Flowers in dichotomous panicles, with a flower in each division. Calyx 10-nerved. Petals sometimes wanting, small, 2-cleft. Stamens nearly as long as calyx, sometimes 5 abortive.

White. 6. March—April. Moist soil, common along rivers in middle and lower Georgia. 1-2 feet.

7. S. FIMBRIATA. Stem weak, pilose, lower leaves obovate or spatulate, ciliate, obtuse, upper leaves small, lanceolate, pubescent. Flowers in a 3-5 flowered cyme. Petals with the limb, broadly cuneiform, fimbriate.

White. 4. April. Common about Macon, Geo. 6-8 inches.

Genus VI. SAPONARIA.


White, tinged with red. 4. Through the summer. Introduced. 12-20 in.

Order XXII. PORTULACACE.E.

Sepals 2, seldom 3-5, cohering at the base. Petals generally 5, aestivation imbricate. Stamens 5 and opposite the

Genus I. CLAYTONIA.

Calyx 2-sepaled. Petals 5, hypogynous, ob-cordate, emarginate bifid, sometimes entire, unguiculate, the claws more or less connate. Stamens 5 inserted into the claws of the petals. Style 3-cleft. Capsule 3-valved, few seeded. Seeds smooth and shining. Herbs with simple stems.

1. C. CAROLINIANA. Root tuberous. Radical leaves long-petioled, spatulate, cauleine leaves ovate-lanceolate, or oval, one or two pair on a stem. Flowers in racemes on a nodding pedicel. Sepals obuse. Petals nearly round, with purple veins.
   Rose colored. 4. March. Mountains.
2. C. VIRGINICA. Radical leaves few, linear-lanceolate; cauleine ones a single pair, linear attenuate at the base, glabrous. Flowers in a simple raceme, peduncles 1-2-inches long, nodding. Sepals lanceolate acute, persistent. Petals oval, obuse, striate much longer than the sepals. Anthers erect, oblong, rose colored.

Order XXIII. LINACEÆ.


Genus I. LINUM.

There is but this genus belonging to this order, and the description of the order will suffice for the genus.

   Wild Flax. Yellow. 5. May—June. Common in Middle Car. & Geo. 18-36 in.
2. L. RIGIDUM. Stem angled, branched above. Leaves linear, acute, rigid with scabrous margins. Sepals broad-lanceolate, cuspidate, with scabrous margins, with 3 strong nerves.
   Wild Flax. Yellow. 5.

Remarks.—The Linum Usitatissimum, the common Flax has become almost naturalized in some parts of the United States, and is the only species which is appropriated to any use, but the others possess similar useful properties. The woody
Order XXIV. Geraniaceae.

Sepals 5, persistent, with an imbricated aestivation, ribbed, one sometimes spurred or succate. Petals 5, hypogynous, unguiculate, distinct. Stamens hypogynous, monadelphous, 10. Ovary composed of 5 carpels arranged around the extended axis. Styles 5, cohering round the axis, the stigmatic surface within the summit. Carpels distinct in fruit, each 1 or 2-seeded, dehiscing by the inner suture. Seeds pendulous, anatropous, without albumen. Embryo curved, cotyledons plaited. Stems tumid and separate at the joints.

Genus I. Geranium.

Sepals 5, equal. Petals 5, equal. Stamens 10, alternate ones larger, with nectariferous scales at the base. Carpels terminated by long awns.


Order XXV. Balsaminaceae.

Sepals 5, apparently only 4 from the union of the 2-upper ones, and sometimes only 2; the lowest one spurred, aestivation imbricate. Petals 4, united so as to appear but 2, hypogynous. Stamens 5, hypogynous. Filaments subulate. Anthers 2-celled. Ovary 5-celled, with a central placenta. Stigmas 5, sessile. Fruit 1 or 5-celled, 5-valved, many seeded. Seeds suspended. Embryo straight, anatropous. Succulent herbs. Flowers axillary.

Genus I. Impatiens.

Sepals apparently only 4. Petals apparently only 2. Stamens 5, more or less united at the summit.

1. I. Pallida. (I. Noli Tangere, of Ell.) Stem much branched, succu-
DICOTYLEDONOUS.

lent smooth. Leaves oval or ovate, serrate, teeth mucronate, on long petioles, glabrous. Lower sepal broad, spurred. Balsam. Snap-weed.

Yellow. 7. July to Sept. Common in wet places. 2-5 feet.

2. I. Fulva. (I. Biflora of Ell.) Leaves rhombic-ovate, serrate, teeth mucronate. Peduncles 2-4-flowered. Lower sepal acutely cordate, with a long resupinate spur. Flower spotted with brown spots. Plant similar to the preceding.


Order XXVI. Oxalidaceæ.

Sepals 5 distinct or slightly cohering at the base, persistent, aestivation imbricate. Petals 5, hypogynous, unguiculate, equal, with a twisted aestivation. Stamens, those alternate with the petals shorter. Anthers innate, 2-celled. Ovary composed of 5-united carpels, opposite the petals, 5-angled, 5-celled, with 5-filiform styles. Fruit a 5-celled, 5-valved capsule, 1-12-seeded. Seeds anatropous, with a loose fleshy testa, which burst when the seeds are mature. Embryo straight with a long radicle and foliaceous cotyledon. Plants herbaceous, with an acid juice.

Genus I. Oxalis.

Sepals 5, distinct or slightly united at the base. Petals 5. Stamens 10, those opposite the petals longer, monadelphous at the base. Style 5. Capsule 5-angled. Seeds one or several, tegmen ribbed, rugose. Wood sorrel.


Yellow. 7. Feb.—May. Low country.

3. O. Stricta. Stem erect, leafy, branching, hairy. Flowers in small umbels, peduncles 2-6-flowered. Petals obovate, generally entire. Leaves alternate near the base of the stem, in verticillate clusters towards the summit, leaflets ob-cordate. Styles not half as long as the shortest stamens, recurved.

Yellow. 7. April—May. Common.

Order XXVII. Zygophyllaceæ.

Sepals 5, persistent. Petals 5, obovate, aestivation convolute. Stamens 10, hypogynous, the 5 opposite the petals somewhat abortive. Ovary of 5 carpels, apparently 10-celled with an ovule in each cell. Style conical, furrowed. Stig-
ma capitate, ribbed. Fruit a regina, with 5 or 10 indehiscent cocci. Seeds anatropous. Embryo green, with foliaceous cotyledons. Herbaceous plants, with opposite, stipulate leaves.

**Genus I. KALLSTROEMIA.**


**Order XXVIII. ZANTHOXYLACEÆ.**

*Flowers* dioecious or perfect, regular. Sepals 3-7, cohering at the base. Petals as many as the sepals or none, aestivation twisted-convolute. Stamens as many or twice as many as the petals. Filament distinct. Anthers introrse. Ovaries as many as the sepals, or sometimes fewer, distinct or united. Fruit of several drupes, or baccate or membranaceous, 2-5-celled, sarcocarp fleshy, separable from the endocarp. Seeds anatropous, solitary or in pairs, pendulous. Embryo lying within fleshy albumen. *Trees or shrubs, usually with prickles.*

**Genus I. ZANTHOXYLUM.**

Dioecious. Sepals usually 5, small, united at the base. Corolla none. Stamens 3, 5, 6 or 8, those of the pistillate flowers rudimentary. Pistillate flowers sometimes with a corolla. Styles 2, 3 or 5, and ovaries as many. Carpels crustaceous in fruit, 2-valved, 1-2-seeded. Seeds black, shining and globose when solitary, hemispherical when in pairs.

1. Z. Americanum. (Z. Clava, Herculis of Linn.) A shrub with the branches armed with strong stipular prickles. Leaves pinnate. Leaflets ovate, acuminate nearly sessile, more or less pubescent. Flowers in axillary umbels, greenish. *Prickly ash. Toothache bush.*

Greenish. April—May.


**Genus II. PTELEA.**

Dioecious. Sepals 4, united at the base. Petals 4 spread.
DICOTYLEDONCUS.

ing, much larger than the sepals. Stamens 4, alternate with and longer than the petals. Filaments hairy on the inside. Fruit a samara, 2-celled, with one seed in each cell, wing reticulated.

1. P. Trifoliata. A shrub, branching; the young branches pubescent. Leaves ternate. Leaflets sessile, ovate, the terminal one attenuate at the base, obscurely crenulate. Flowers in terminal panicles. Petals oval, pubescent, greenish. Flowers with a disagreeable odour.

Greenish. May—June. Middle Car. & Geo. 6-8 feet.

ORDER XXIX. ANACARDIACEÆ.

Dioecious or perfect, regular. Sepals generally 5, distinct, or united at the base. Petals of the same number as the sepals, or none, when present inserted into a glandular disk at the bottom of the calyx, aestivation imbricate. Stamens the same number as the sepals, and opposite them, or twice as many, anthers introrse. Ovary solitary, of 1–5 carpels, all but one abortive, 1-celled. Styles usually 3, distinct or united. Stigmas 3. Fruit usually drupaceous, 1-seeded. Seed erect or suspended, anatropous. Embryo curved. Albumen none. Vines and shrubs, or small trees with a caustic juice. Cotyledons foliaceous.

GENUS I. RHUS.


Greenish yellow. 12. June. 15-20 feet. Middle Georgia, in dense bunches on rich land.

2. R. Glabra. A large shrub, with milky juice, glabrous, generally tinged with purple. Leaves pinnate, with 13-31 leaflets, lanceolate-oblong, acuminate, smooth, acutely serrate, glaucous beneath. Flowers in terminal, thyrsoid panicles, often dioecious. Fruit clothed with crimson, acid hairs. Smooth Sumack.

Greenish yellow. 12. July. Around fields, common. 6-12 feet.


Dull yellow. 12. August. Common. 3-12 feet.

5. R. Vernix. A shrub, with glabrous branches, poisonous. Leaflets 7-13 membranaceous, oval, acuminate, entire, glabrous. Flowers in slender
panicles, axillary, mostly dioecious. Fruit sub-globose, smooth, greenish white.


6. R. Toxocordendon. A small, slender shrub. Leaves tri-foliate, somewhat pubescent, leaflets broad-oval or rhomboidal, acuminate, the lateral ones nearly sessile, unequilateral. Flowers in axillary racemes. Fruit sub-globose, white, poison.


7. R. Radicans. This plant agrees in many respects with the R. Toxocordendon and is made a variety of that species by Torrey & Gray. A large vine, climbing the highest trees, giving out radicles all along the stem, which enter the bark of the tree and afford support to the vine; small glabrous branches numerous. Leaves ternate, ovate, lanceolate, acute or acuminate, generally enure, lower ones rhomboidal. Differs entirely in habit from the T. preferring damp places. Fruit white. Poison Ivy.


8. R. Aromatica. A small aromatic shrub; the young branches tomentose. Leaves pubescent when young, glabrous and coriaceous when old, ternate. Leaflets sessile, rhomboid-ovate, incisely toothed, the terminal one, narrowed at the base. Flowers dioecious, in axillary, compact, panicles, ammenaceous. Fruit nearly spherical, light red, hispid, acid.


**Order XXX. Ternstroemiaceae.**

Sepals 5, deciduous, concave, coriaceous, estivation imbricate. Petals 5, united at the base, alternate with the sepals. Stamens numerous, monadelphous, generally adhering to the base of the petals. Ovary 5-celled, situated on a flattened torus. Placenta central. Styles 5 or 6 distinct or united. Fruit 5 or 6-celled, capsule baccate, or coriaceous and indehiscent. Seeds anatropous or campulitropous, large. Embryo straight or curved. Trees or shrubs. Leaves alternate, without stipules. Flowers large and showy.

**Genus I. Gordonia.**

Sepals 5, coriaceous, broad, ovate, or nearly round, imbricate. Petals 5, united at the base. Styles 5 united, forming a five angled column. Capsule ligneous, 5-celled, 5-valved, with 2 winged seeds in each cell.


2. G. Pubescens. A tree, with spreading branches, the young branches smooth, pubescent at the summit. Leaves oblong-cuneate, sharply serrate, shining on the upper surface, hoary beneath, thin, somewhat membranaceous. Flowers solitary, axillary, on short thick peduncles. Sepals nearly


Genus II. STUARTIA.

Sepals 5, united at the base, lanceolate. Petals 5, united at the base. Stamens very numerous, monadelphous, with the tube united to the base of the petals. Styles 5, distinct or united. Capsule 5-celled, 5-valved, somewhat ligneous. Seeds 2 in each cell slightly margined. Shrubs with showy flowers.

1. S. VIRGINICA. A handsome shrub, with somewhat geniculate branches, pubescent when young. Leaves oval-lanceolate, acuminate, serrate, pubescent beneath. Flowers solitary or by pairs, axillary, on very short peduncles. Sepals united, forming a campanulate calyx, persistent, mucronate, 2 ovate bracts at the base and with the sepals covered with a silky pubescence. Petals 5, a little hairy, obovate. Filaments purple, hairy at the base. Styles united. Stigmas 5-lobed. Capsule hairy.

White. 6. May. Rich soils, middle Car. & Geo. 8-12 feet.


Order XXXI. MALVACEÆ.

Sepals 5, seldom 3 or 4, more or less united at the base, often calyculate, aestivation valvate. Petals hypogynous, equal the number of sepals. Stamens numerous, monadelphous, hypogynous. Anthers reniform. Pollen hispid. Ovary composed of several carpels, generally united, with as many styles. Fruit usually capsular, seldom baccate; cells 1 or many seeded; dehiscence loculicidal or septicidal. Seeds campylotropous or heterotropous. Embryo curved with foliaceous cotyledons. Herbs or shrubs. Leaves alternate.

Genus I. MALOPE.

Sepals 5 united, with 3 setaceous bracteoles, hairy.—Capsules with many distinct carpels, each 1-seeded, aggregated.

1. M. MALACOIDES. Stem sparingly branched, with hairs near the summit. Leaves ovate, crenate, obtuse at the base, glabrous on the upper surface, hairy along the vines beneath. Flowers axillary, solitary. Petals about twice as long as the sepals. Capsules hispid. Seeds compressed.

Yellow. 6. Virginia.

Genus II. MALVA.

Sepals 5 united, with 3 bracteoles at the base, both hairy. Carpels generally more than 5, arranged circularly, indehiscent.
**GENUS II. MALVA.**

**Calyx** 5-cleft, with 3 bracteoles at the base. **Carpels** arranged circularly, 2-valved spuriously 2-celled, 2-seeded.

1. **M. MULTIFIDA.** (Malva Caroliniana of Ell.) **Stem** diffuse, hispida, prostrate. **Leaves** 3-5-lobed, obtuse, cordate at the base. **Lobes** dissected. **Carpels** numerous, hispid with 2 subulate horns, lunate, compressed, united in a truncated head.

   **Red.** 5. **April—June.** Common about buildings.

**GENUS III. MODIOLA.**

**Calyx** 5-cleft, angled, without an involucel. **Ovary** 5 or many celled, with a single ovule in each cell. **Capsules** consisting of 5 or more carpels, commonly 2-valved.

1. **S. SPINOSA.** **Stem** branching, finely pubescent. **Leaves** alternate, cordate-ovate, or broad lanceolate, serrate. **Stipules** setaceous, with a spinose suberecal at the base. **Flowers** axillary, solitary, on short peduncles. **Calyx** pubescent. **Petals** obovate. **Stigma** 5-cleft. **Carpels** 5, easily separated when mature, 2-lobed.

   **Yellow.** 5. **May—July.** Sandy soils. 1-2 feet.

2. **S. ELLIOTTII.** **Stem** slender, herbaceous, nearly glabrous, with spreading branches. **Leaves** linear, serrate, varying in width, obtuse at the base, nearly glabrous. **Flowers** axillary. **Segments** of the calyx broad. **Petals** marginate, striate, expanding. **Styles** many cleft. **Carpels** 10, united into a spherical head, glabrous.

   **Yellow.** 7. **Aug.—Sept.** On the coast of Car. & Geo. 2-4 feet.

3. **S. HISPIDA.** **Stem** branching, stellular tomentose. **Leaves** lanceolate, serrate, slightly hairy on both surfaces. **Flowers** on small axillary branches, crowded and nearly sessile. **Calyx** angular, hairy. **Petals** rather longer than the calyx.

   **Yellow.** 7. **July—Aug.** Sandy soils.

4. **S. RHOMBOFOLIA.** **Stem** suffructicose, branching, stellular pubescent. **Leaves** in alternate clusters, hairy on the upper surface. **Flowers** axillary and usually solitary, on peduncles much longer than the petioles. **Carpels** 10-12 with 2 subulate horns. **Petals** obovate. **Calyx** angular, segments very broad, acuminate.

   **Yellow.** 7. **July—Sept.** Dry pastures. 1-2 feet.

**PART II.**
Genus V. Hibiscus.

Calyx consisting of 5 sepals, united at the base, with a 5-toothed summit, surrounded by a many leaved involucel usually distinct. Petals 5. Stigmas 5. Capsule 5-valved 5-celled, many seeded, dehiscence loculicidal.


Rose color. 4. July—Sept. In wet soils. 2-4 feet.


4. H. Incanis. Stem tall, minutely tomentose. Leaves ovate, acuminate, obtusely serrate, tomentose on both surfaces. Flowers very large, axillary solitary, on peduncles jointed near the middle, confluent with the petiole.

Yellow. 4. July—Aug. Southern Geo. 3-5 feet.


Purple. 4. July—Sept. Raised by Elliott, from seed obtained from Wilmington Island, Geo. 4-6 feet.


Rose color. 4. July—Sept. Common on the banks of streams in the middle country. 3-4 feet.


Red. 4. July—Sept. Southern Georgia and Florida. 4-8 feet.

Remarks.—The Flowers of this genus are very showy, and though coarse, form a conspicuous and beautiful ornament of the Flower Garden. They are used for no other purpose, than ornament, with a single exception. An Egyptian species affords seeds, which are employed in preparation of perfumery, on account of their peculiar odor, resembling musk.

Order XXXII. Tiliaceæ.

Sepals 4-5 deciduous, with a valvate aestivation. Petals
4-5, hypogynous. Stamens generally numerous, hypogynous, distinct. Anthers 2-celled. Ovary with 4-10 united carpels, with as many stigmas, styles united. Fruit a 2-5-celled. Capsule with several seeds in each cell. Seeds anatropous. Leaves alternate, with deciduous stipules. Flowers axillary.

Genus I. CORCHORUS.


1. C. SILIQUEUS. Stem branching. Leaves ovate or broad-lanceolate, serrate. Flowers generally with 4 sepals and petals, late in the summer, often 5. Capsule pod-shaped, 2-valved. Many seeded, linear. Yellow. 2. Through the summer.

Genus II. TILIA.

Sepals 5, united at the base, deciduous. Petals 5. Stamens numerous, hypogynous. Ovary 5-celled, with 2-ovules in each cell, globose. Fruit ligneous, or coriaceous, sometimes only 1-celled, 1-2-seeded. Trees with simple, alternate, cordate leaves. Flowers with the peduncle attached to an oblong, foliaceous, bract.

1. T. AMERICANA. A large, beautiful tree, with light, soft, white wood. Leaves obliquely cordate, nearly orbicular, glabrous, somewhat coriaceous. Flowers in axillary cymes. Sepals lanceolate pubescent without, woody within. Petals truncate at the summit, longer than the sepals. Fruit small, covered with a grayish pubescence.

Yellowish. 2. May—June. On the coast from Penn. to Geo. 20-60 ft.


Yellowish. 2. May—June. On the coast from Penn. to Geo. 30-50 ft.

3. T. PUDESCENS. Trees with young branches, pubescent, old ones glabrous. Leaves alternate, cordate, glabrous on the upper surface, pubescent beneath, serrate, slightly mucronate. Flowers with the sepals scarcely united, deciduous, lanceolate, acute, tomentose. Petals lanceolate, longer than the calyx, crenulate at the summit.


Order XXXIII. MELIACEÆ.

Sepals 5, united at the base, with an imbricate aestivation. Petals 5, hypogynous, longer than the sepals, often cohering at the base or attached to the stamen tube. Stamens usually 10, usually with united filaments. Anthers sessile within the orifice of the tube. Ovary 5-celled, 1-2 ovules in each cell. Fruit capsular, 5-celled, 1-seeded. Seeds mostly anatropous, cotyledons foliaceous, albumen fleshy.
Genus I. MELIA.

1. M. AZEDARACH. A medium sized tree, with thick, spreading branches. Leaves bifinnate, leaflets, smooth, about 5 together, obliquely ovate-lanceolate, toothed. Flowers in axillary panicles. Petals glabrous or very slightly pubescent.

Remarks.—This tree although a native of Persia, has become naturalized in the Southern States. It affords a good shade and is not subject to the attacks of insects. The bark of the root has been used as a vermifuge, administered in decoction. It possesses narcotic properties and should be followed by some carthartic medicine.

ORDER XXXIV. VITACEÆ.


Genus I. VITIS.

Calyx scarcely toothed, small. Petals 4–5 spreading, or more generally united at the top, caducous. Ovary usually 2-celled with 2-ovules in each cell. Fruit a berry 1–3-celled and 1–5-seeded. Peduncles usually changed into tendrils.

1. V. ROTUNDIFOLIA. Stem twining, ascending the highest trees, with smooth bark, sometimes not climbing, branches verrucose. Leaves cordate, both surfaces shining, glabrous; small tufts of hair at the junction of the veins, obscurely 3 lobed, toothed. Flowers in racemes, composed of numerous small umbels, polygamous. Fruit large, with a coriaceous integument, pleasant to the taste. Bull-grape. Muscadine-grape. Fox-grape.

Yellow. ½. May—June. Common in the middle and low country of Georgia and Carolina.

2. V. CORDIFOLIA. Leaves cordate, acuminate, toothed, glabrous, often slightly 3-lobed. Flowers numerous in loose racemes. Fruit small, sour, nearly black when ripe. Winter-grape. Frost-grape.

Yellow. ½. Common on the banks of streams. May.

3. V. RIPARIA. Leaves unequally incised and toothed, teeth very coarse, acuminate, somewhat 3-lobed, petioles, margins and veins pubescent. Flowers fragrant in loose racemes. Fruit small, dark purple. Winter Grape—pleasant fruit.

Yellow. ½. May—July. Along the margins of rivers in the upper country.

4. V. ESTIVALIS. Stem very long glabrous, young branches tomentose. Leaves broadly cordate, 3–5-lobed, ferruginous, tomentose beneath when young, coarsely and unequally toothed, sometimes not lobed. Flowers in racemes opposite the leaves polygamous or dioecious. Fruit small, black, very sour. Summer Grape.

Greenish yellow. ½. May. In rich soil.

5. V. LABRUSCA. A large vine, covering the loftiest trees, branches covered with a ferruginous pubescence. Leaves broadly cordate, lobed and angled, repand toothed, tomentose beneath. Racemes small, fertile. Fruit dark purple, globose, large, of a disagreeable flavour. From the seeds...
his species have been produced several very highly esteemed garden varieties. *Isabella, Alexander's Catawba and Blane's Grape.*


**Genus II. AMPELOPSIS. (Cissus.)**

_Calyx_ entire. Petals 5 reflexed, spreading. Stamens 5.

_D vars._ 2-celled, with 2-ovules in each cell. Style conical. Fruit a 2-celled, berry with 1 or 2 seeds in each cell. Flowers perfect, in corymbose panicles. A shrubby vine.

1. A. HEDERACEA. Stem climbing lofty trees, throwing out short lateral fibres by which it attaches itself. Leaves on long petioles, digitate, by fives. Leaflets petiolate, oblong, coarsely serrate, glabrous, the middle leaflet largest. Flower many flowered, opposite the leaves, the ultimate divisions umbellate seduncles crimson. Petals much longer than the calyx. Fruit deep blue, about as large as a pea. _American Ivy, Virginian Creeper._


**Order XXXV. ACERACEAE.**

_Sepals_ 5 or rarely 4-9, united at the base, colored, with an imbricate aestivation. Petals as many as sepals and alternate with them, occasionally wanting. Stamens 8-12 distinct. Anthers oblong versatile or introrse. Torus discoid. Ovary composed of 2 united carpels. Styles united. Stigmas separate. Fruit a samara, composed of 2 indehiscent carpels, each 1-celled, 1 or 2 seeded. Embryo curved, with foliaceous cotyledons. Trees with opposite leaves.

**Genus I. ACER.**

_Calyx_ 5-cleft. Petals 5 or wanting. Stamens 5-7--10.

Leaves simple.

1. A. PENNSYLVANICUM. A small tree with smooth striped bark. Leaves glabrous, sub-cordate, serrate, 3-lobed, lobes acuminate. Flowers in nodding racemes large. Petals obovate. _Striped Maple, Dog-wood._


Greenish yellow. April—May. Mountains. 8-12 feet.

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3. A. SACHARINUM. A large tree, with compact, white wood, and from the peculiar arrangement of its woody tissues often exhibits an appearance distinguished by artists and mechanics by Birds-eye Maple. Leaves 3-5-lobed acuminate, dentate, sub-cordate at the base. Flowers in nearly sessile coryms, with filiform long villous pedicels, pendulous. Petals wanting. Fruit glabrous. Sugar Maple.

Greenish yellow. h. May. Cool, damp places. Middle Geo. 50-80 ft.


Pale yellowish purple. Feb. In river swamps, common. 50-70 feet.


Bright red or purplish. h. Feb. In swamps, common. 20-50 feet.


Ashed leaved Maple. Box Elder.

Yellowish green h. May. Common on the banks of streams. 30-50 ft.

**Order XXXVI. HIPPOCASTANACEÆ.**

Calyx composed of 5 united sepals, either campanulate or tubular, 5-lobed or 5 toothed, with imbricate aestivation. Petals 4-5, unequal and irregular, hypogynous, unguiculate. Stamens 7-8 distinct, unequal. Anthers versatile. Ovary composed of 3 united carpels, 3-cornered, 3-celled. Styles united, filiform. Ovules 2 in each cell. Fruit coriaceous, sub-globose, 1-2-3-celled with 1-seed in each cell, dehiscence loculicidal. Seeds large with a smooth shining testa and pale hilum. Embryo curved, inverted without albumen. Cotyledons very thick, fleshy, cohering, not rising in germination.

**Genus I. ÅÆCLUS.**

Sepals united, forming a 4-5 toothed, tubular calyx. Petals 4-6 unequal hypogynous, often united with the calyx. Capsule 2-celled. Seeds large, solitary.

1. Å. PAVIA. A shrub or small tree, with irregular, thick, obtuse branches. Leaves by fives. Leaflets oblong-lanceolate, unequally toothed, glabrous, or minutely pubescent along the veins. Flowers in terminal racemes. Calyx tubular, purplish. Petals 4, unequal, connivent, the claws of the lateral ones about as long as the calyx, upper ones the longest. Stamens 6-8. Capsules nearly round, 3-celled, coriaceous. Buck-eye.

Red. h. April—May. Common. 3-5 feet.

2. Å. FLAVA. A small shrub, a tree, branches flexuous, glabrous. Leaves by fives pubescent along the mid-rib on the under surface. Leaflets lanceolate, ribbed, acuminate serrate. Petiole long, with a pubescent line along the upper side. Flowers in a terminal condensed panicle. Calyx pubescent.
Order XXXVII. SAPINDACEÆ.

Sepals 4, unequal, aestivation imbricate, 2 of them outer and larger. Petals equal in number to the sepals, and alternate with them, with a tuft of hair at the base of each. Stamens 6–8 filaments hairy near the base, anthers introrse. Ovary composed of 3 united carpels, surrounded by a glandular disk. Styles united. Stigmas obtuse. Ovula generally solitary. Fruit capsular, 3-celled, 2 obliterated, ventricose, glabrous, somewhat fleshy, 1-seeded. Trees with compound, pinnate leaves. Fruit saponaceous.

Genus I. SAPINDUS.

1. S. SAPONARIA. Small tree with smooth branches, somewhat geniculate. Leaves pinnate, generally 4 or five pair. Leaflets, falcate, very oblique, not opposite, entire. Petals 6–10 inches long, slightly furrowed. Flowers in dense, compound terminal and axillary panicles, dioecious or polygamous. Soap-berry.


Order XXXVIII. CELASTRACEÆ.

Sepals 4–5, persistent, united at the base, aestivation imbricate. Petals equal in number to the sepals and alternate with them, with the same aestivation. Stamens usually 5, alternate with the plants, inserted on a broad fleshy disk at the bottom of the calyx. Ovary more or less surrounded by the disk, 2–5-celled, each with 1 or 2 or several ascending ovules. Styles 2–5, distinct or combined. Fruit capsular, 2–5-celled, with a loculicidal dehiscence. Seeds anatropous. Embryo straight. Shrubs.

Genus I. STAPHYLEA.

DICOTYLEDONOUS.


White. ½. May. In middle Car. & Geo. 6-12 feet.

Genus II. EUONYMUS.

Sepals generally 5, united at the base, spreading. Petals 5, Stamens inserted into the upper surface of the broad disk. Anthers with a thick connectivum at the back. Ovary imbedded in the disk, 3-5-celled, with 2-3 ovules in each cell. Styles short and thick. Fruit a 4-5-celled and as many lobed capsule, dehiscence loculicidal. Seeds usually enclosed in a fleshy aril. Shrubs with opposite, sarrate leaves. Peduncles axillary.


Strawberry tree. Burning bush.

Green tinged with purple. ½. Common. 4-5 feet.


Dark purple. ½. June—July. Common along streams. 4-12 feet.

Order XXXIX. RHAMNACEÆ.

Calyx 4-5-cleft, aestivation valvate. Petals 5, distinct, cuculate or convolute, narrowed at the base, inserted into the throat of the calyx, sometimes wanting. Stamens 5, and opposite the petals. Ovary composed of 2-4 united carpels, 2-4-celled, cohering to the calyx or imbedded in a fleshy disk. Ovules erect, solitary. Styles more or less united. Stigmas distinct. Fruit fleshy or dry, generally united to the calyx. Scales anatropous, generally with fleshy albumen. Shrubs, generally, sometimes small trees, with thorny branches. Flower, not conspicuous, usually perfect, but sometimes monoeious, dioecious or polygamous.

Genus I. RHAMNUS.

Calyx urceolate or tubular, 4-5-cleft. Petals 4-5, emarginate or 2-lobed, convolute. Torus lining the tube of the calyx. Ovary free, 2-4-celled. Styles 2-4, generally distinct, Fruit a drupe, containing 2-4 seeds. Flowers small, generally in axillary clusters.
Rhamnaceae—Leguminosae.

1. R. Carolinianus. A shrub, unarmed. Leaves alternate, oval-oblong, obscurely serrate or entire, glabrous, with parallel veins. Flowers in small umbels, perfect, 4-6-flowered. Petals 2-lobed, minute, embracing the stamens. Stamens 4 or 5. Fruit the size of a pea, generally 3-seeded.

White. 1st May—June. Common along the coast. 4-6 feet.

Genus II. Sageretia.


White. 1st Oct.—Nov. Along the sea coast. 6-8 feet.

Genus III. Ceanothus.

Calyx campanulate, 5-cleft. Petals 5, saccate and arched, anguiulate. Stamens 5, exerted. Disk fleshy at the margin, surrounding the ovary. Ovary composed of 3 united carpels, 3-celled, with 3-ovules. Fruit, a dry, triangular, 3-celled, 3-valved capsule, 1 seed in each cell. Seeds obovate. Small shrubs, unarmed, with alternate leaves. Flowers perfect.

1. C. Americanus. Root large, dark red. Stem frutescent, the young branches pubescent. Leaves obovate or obovate-oblong, 3-nerved, acutely serrate, veins beneath very hairy, reflexed. Petals with long claws, enclosing the stamens. Disk with a 10-tooth border. Seeds convex extremely concave within. New Jersey Tea.


2. C. Microphyllus. Stem much branched, many from each root, branches, straight, slender, glabrous, yellow. Leaves small, obovate, clustered, glabrous on the upper surface, 3-nerved, somewhat denticulate, or entire. Flowers a loose raceme. Peduncles slender.

White. 1st April. Sandy pine forests, common. 1-2 feet.

3. C. Serpylli folius. A small, slender shrub, decumbent, diffusely branched, branches filiform. Leaves very small, ovate-elliptical, serulate, oblong, the lower surface, as well as the petioles, rugose. Peduncles axillary. Flowers few, in a simple corymbose head.

White. 1st St. Mary's, Ga.

Remarks. The Ceanothus Americanus, commonly known by the names of New Jersey Tea and Red-root, has enjoyed considerable reputation among the Faculty. It takes the former name from its leaves having been used by the American army, as a substitute for tea, during the Revolutionary War. In apthous, sore mouth, it has been highly recommended, and in the sore throat accompanying Scarlet Fever.

Order XL. Leguminosae.

Sepals 5 united into a 5-toothed calyx, hypogynous, segments often unequal and variously combined, the odd segment inferior. Petals 5, sometimes none or less than 5, by abor-
D I C O T Y L E D O N O U S.

tion, inserted into the base of the calyx, sometimes regular at others papilionaceous; the odd petal superior. 

Stamens generally deficient, distinct monodelphous, or diadelphous. Anthers versatile. Ovary simple, 1-celled, 1 or many seeded. Stigma simple. Fruit generally a legume, sometimes a drupe. Seeds 1 or several attached to the upper section, heterotropous or anatropous, sometimes with one aril, or large caruncle. Embryo straight, destitute of albumen, or with the radicle curved along the edge of the cotyledons. Leaves alternate, stipulate, entire.

Sub-Order I. PAPILIONACEÆ.

Sepals with an imbricated aestivation. Stamens 19, perigynous or inserted with the petals into the bottom of the calyx. Corolla papilionaceous.

Genus I. Vicia.

Calyx tubular, 5-toothed, the two upper teeth shortest. Style bent, outside of the style, near the summit, villous. Legume many seeded. Leaves pinnate. Leaflets in several pairs. Petioles extended into tendrils.


Genus II. E RVUM.

Calyx deeply 5-cleft, with nearly equal segments, linear, acute, about equal in length to the corolla. Stigma glabrous. Legume 2–4 seeded, oblong, seeds nearly globose. Petioles produced into tendrils. Peduncles axillary.


Genus III. LATHYRUS.

Calyx campanulate, 5-cleft, the the 2-upper segments short.
**PAPILIONACEE.**

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**Genus IV. PHASEOLUS.**


2. **P. Diversifolius.** *Stem* prostrate, diffuse, retrorsely hirsute. *Leaves* ternate. *Leaflets* ovate, angular, or 2-3-lobed, slightly hairy along the margin and veins. *Flowers* capitate, 8-14, and peduncles 3-6 inches long, the lower tooth of the calyx narrower, longer than the tube, the upper formed of 2 sepals cohering nearly to the summit, having the appearance of a 4-cleft calyx. *Vexillum* reflexed, keel acuminate, twisted. *Legume* terete, slender, slightly pubescent, many seeded, seeds wooly, hilum linear. Purple. ©. Aug.—Oct. Sand hills and the coast. 2-8 feet long.

3. **P. Helvolus.** *Stem* slender, prostrate or climbing, retrorsely hirsute. *Leaves* ternate; leaflets obovate-ovate, or linear-oblong, tapering towards the summit. *Flowers* in heads, few, calyx with the upper segment broad, lower lanceolate, about the length of the tube; vexillum nearly round, keel as long as the vexillum, with a tooth at the base of the beak. *Legume*, terete, pubescent, straight, linear, many seeded. *Seeds* reniform, pubescent. Purple. ©. July—Sept. In dry fertile soils. 3-5 feet.

**Genus V. VIGNA.**


1. **V. Glabra.** (*Dolichos Luteolus of Ell.*) *Stem* twining, running over small shrubs. *Leaves* ternate, leaflets ovate, acuminate. *Flowers* 3-5 and peduncles 2-4 inches long, lower tooth of the calyx longer than the other; vexillum reflexed; wings rhomboidal. *Keel* longer than the vexillum. *Legume* a little hairy, slightly compressed. Yellow. ©. Oct.—Nov. Around rice fields in the low country. 4-8 ft.

**Genus VI. DOLICHOS.**

*Calyx* bilabiate, the upper lip generally 2-cleft, seldom en-
DICOTYLEDONOUS.


**Genus VII. Erythrina.**

*Calyx* cylindrical, tunicated or bilabiate, 2-lobed. *Corolla* with a very long, lanceolate *vexillum*, destitute of callosities; wings and keel small. *Stamens* unequal, straight, usually diadelphous, as long as the *vexillum*. *Style* straight, glabrous. *Legume* torulose, stipitate, many seeded, compressed between the seeds. *Herbaceous* plants, with trifoliate leaves.


**Genus VIII. Apios.**

*Calyx* somewhat bilabiate, the upper lip with 2 short rounded teeth, the lower, with three teeth, the middle tooth lanceolate subulate, the lateral ones very minute. *Vexillum* reflected; keel falcate. *Legume* coriaceous, many seeded, slightly falcate, nearly terete.


**Genus IX. Wisteria.**

*Calyx* campanulate, bilabiate, the upper lip truncate, the lower ones 3-cleft, forming 2 lanceolate teeth. *Vexillum* with 2-callosities at the base; keel and wings falcate. *Legume* torulose, stipitate, many seeded, nearly terete, coriaceous. *Seeds* reniform, spotted. Twining shrubby plants, with unequal pinnate leaves.

1. *W. Frutescens*. *Stem* twining, running over shrubs, branches pubes-
cent and somewhat angular. Leaflets 4-6 pair with a terminal one, pubescent, ovate-lanceolate. Flowers in axillary racemes, clustered, with large, colored, bracts at the base of the pedicels. Vexillum, broad, reflexed at the summit, green at the base. Legume rugose.


Genus X. RHYNCHOSIA. (Glycine of Eu.)

Calyx 4-cleft, or 4-parted, or somewhat bilabiate, the lower lip 3-parted, the upper 2-toothed. Vexillum without callosities, keel-falcate, wings with 2-teeth at the base. Style smooth. Legume compressed, 1-2-seeded, short, generally ovate. Seeds generally carunculate. Generally herbaceous plants.


2. R. MONOPHYLLA. Stem pubescent, erect, low. Leaves simple, orbicular, or reniform, rugose, with yellow glandular dots on the under surface. Flowers in axillary racemes, or aggregated at the summit of the stem. Calyx slightly bilabiate, the upper lip 2-cleft, wings toothed on each side. Anthers glabrous. Legume pubescent, mucronate, falcate. Seeds orbicular, spotted.


Yellow. 4. May—July. In dry soils, common. 1-3 feet.


Yellow. 4. Near St. Mary's, Ga.


Genus XI. PITCHERIA.

Calyx 4-cleft, lobes nearly equal, subulate, the lower one a little the largest, the upper one slightly bifid. Vexillum nearly orbicular, without callosities. Wings small, narrow, with a subulate tooth at the base. Keel large, rounded. Ovary compressed, hairy, with 2 ovules. Style hairy towards the base. Legume oblong, sessile, compressed, 1-2-seeded. Seeds slightly carunculate, variegated.

1. P. GALEACTIDES. Stem rigid, branching; branches angled, pubescent. Leaves small, numerous, trifoliate. Leaflets oval or obovate-oval, glabrous.
the lateral leaflets swollen and sessile. *Flowers* solitary or in pairs, on axillary peduncles. *Vexillum* partly enclosing the other petals. Red or yellow. 2. May. Alabama. 2-3 feet.

**Genus XII. GALACTIA.**


**Genus XIII. CLORIA.**

*Calyx* tubular, 5-cleft, or by the union of the two upper segments, 4-cleft. *Vexillum* large, expanding, covering the wings, 2 bracts at the base of the calyx. *Legume* linear, compressed, many seeded.


White, or pale blue. 2. May—Aug. Dry soils. 2 feet.
Genus XIV. AMPHICARPA.

Calyx 4-toothed, the two upper sepals united nearly or quite to the summit, tubular, slightly gibbous at the base, destitute of bracts. Vexillum broad, slightly auricled at the base, appressed. Keel and wing petals nearly straight, and nearly equal, unguiculate, lamina oblong. Stamens diadelphous. — Ovary stiped, with 2—4-ovules. Style glabrous, filiform. Legume compressed, stipitate, 2—4 seeded. The flowers of this genus, towards the summit of the stem, usually differ from those near the base. The upper ones usually perfect in all their parts, while the lower sometimes are wanting in a corolla and a part of the stamens; but the latter are the ones that usually mature the fruit. Climbing, herbaceous, plants.

1. A. MONGEA. Root creeping. Stem slender, climbing over small shrubs, retrorsely hisrate, angular. Leaves ternate, ovate, or rhombic-ovate, thin, glabrous or hairy, a little oblique. Flowers in pendulous racemes, on filiform peduncles. Calyx hairy at the base, 4-toothed, acuminate. Legume smooth, 3—4-seeded.


Genus XV. SESBANIA.

Calyx 5-toothed, teeth nearly equal, with 2 caducous bracteoles at the base. Vexillum roundish, with 2 appendages on its claw. Stamens diadelphous. Legume, long, (10—12 in.) linear, slender, cylindrical or compressed, many seeded. Seeds cylindrical-oblong. Herbaceous plants, with pinnate leaves.

1. S. MACROCARPA. Stem with expanding branches, glabrous, herbaceous. Leaves pinnate 10—25 pair. Leaflets linear-elliptical, glabrous, entire, slightly mucronate. Flowers in axillary racemes, few flowered, shorter than the leaves. Calyx pubescent along the margin, two upper teeth reflected. Vexillum reflected. Legume somewhat 4 angled about 12 inches long.

Genus XVI. GLOTTIDIUM.

Calyx 5-toothed, teeth nearly equal, small, obtuse. Vexillum short, broad, slightly unguiculate, reniform, keel petals united at the middle. Legume, elliptical-oblong, stipitate, compressed, 2-seeded. Seeds compressed.


Genus XVII. ROBINIA.

Calyx campanulate 5-toothed, the two upper sepals united nearly to the summit, so as to give the calyx somewhat the ap-
DICOTYLEDONOUS.

pearance of being only 4 toothed. Vexillum broad and large. Keel obtuse. Stamens diadelphous. Style bearded next the free stamen. Legume compressed, many seeded, long, the pascalent suture margined. Seeds compressed. Trees or shrubs, with stipular spines. Leaves unequally pinnate.


White. 1 May—April. A large tree among the Mountains, 60-80 feet; smaller in the middle country. 30-40 feet.


White, tinged with red. 1/2. Mountains. Car. & Geo. 20-40 feet.


Rose color. 1/2. April. Mountains. 3-6 feet.

Var. Rosa. Leaflets mostly scattered, not hispid, stipules spiny; young branches petioled and under surface of the leaves pubescent.

Middle Carolina and Georgia. 2-4 feet.

Var. Nana. Very small shrub, scarcely a foot high. Near Columbia South Carolina and Macon Geo.

GENUS XVIII. TEPHROSIA.


2. T. Paucifolia. Stem erect or decumbent, pilose hispid, with rusty hairs. Leaves scattered, few. Leaflets 4-7 pairs, elliptic, often slightly cuneate, mucronate, silky-pubescent, petiole villous. Flowers on long peduncles, opposite the leaves, bearing but few flowers, 4-5. Calyx hispid. Vexillum hairy on the outer surface. Legume compressed, hispid.


3. T. Hispidula. Stem erect much divided. dichotomous, slightly pubescent. Leaflets numerous 11-17, elliptical-oblong, mucronate glabrous on the upper surface, hisrate on the lower, slightly retuse. Racemes as long as the leaves, few flowered, opposite the leaves. Calyx very villous, segments expanded. Legume straight, mucronate, somewhat hispid. Seeds reniform, compressed, spotted.


4. T. Chrysophylla. Stem prostrate, pubescent, dichotomous. Leaves
nearly sessile, with 5-9 leaflets, cuneate-ovate, obtuse, coriaceous, smooth, above, silky pubescent beneath. Peduncles longer than the leaves, few flowered, slightly compressed. Legume linear, 8-10-seeded.

Yellowish-purple. 4. May—Aug. Common around Savannah, found in Middle Georgia and Florida. 10-12 inches.

**Genus XIX. Indigofera.**

Calyx 5-cleft, expanding, minute, subulate. Vexillum nearly round, emarginate. Keel furnished with a spur on each side. Stamens diadelphous. Style filiform, glabrous. Legume 1 or many seeded.

1. I. Caroliniana. Stem erect, branching, glabrous, striate. Leaves unequally pinnate. Leaflets 5-6 pairs, mucronate, oval-oblong, slightly pubescent, glaucous underneath. Flowers in slender axillary racemes, a bract at the base of each pedicel. Calyx small with 5 subulate teeth, pubescent. Keel longer than the vexillum: Legume short, pointed with the style. Indigo Plant.

2. I. leptosepala. Stem decumbent, rough. Leaves unequally pinnate. Leaflets 7-9 obovate-oblong, nearly glabrous on the upper surface. Flowers in racemes longer than the leaves, nearly sessile. Segments of the calyx equal, subulate. Legumes reflexed, linear nearly terete 6-7-seeded, pubescent, terminated by the style.

Pale scarlet. 7. Georgia. 2-3 feet.

**Genus XX. Psoralea.**

Calyx campanulate, 5-toothed, sprinkled with glandular dots, lower segment a little the longest. Stamens diadelphous. Legume indehiscent, 1-seeded, slightly beaked, as long as the calyx.


Violet. May—June. Middle and upper country. I found it near Greenville, So. Ca. 10-20 inches.

Genus XXI. AMORPHA.

Calyx campanulate, 5-cleft, persistent. Vexillum ovate, concave, unguiculate; wings and keel wanting. Stamens monadelphous. Style filiform. Legume falcate, rough or tuberculate with glands, 1-2-seeded. Shrubby or herbaceous plants, with pinnate leaves, leaflets numerous, punctate. Flowers in spiked racemes, numerous, pedicels articulated with the flower.


Dark purple. June. On the margin of rivers in the low country. 6-16 ft.


Lead Plant.


4. A. Caroliniana. A small shrub, nearly glabrous. Leaflets oblong or elliptical petiolate, dotted, the lowest pair approximated to the stem. Flowers on very short pedicels. Calyx with short teeth, the two upper obtuse, the three lower longer or nearly equal, villous on the margin. Style hairy towards the base.


Genus XXII. DALEA.

Calyx 5-cleft, often glandular, with nearly equal segments. Petals unguiculate, the keel and wing petals, united to the stamen tube. Vexillum inserted into the base of the calyx, short, limb cordate. Stamens monadelphous, the tube being 3-cleft. Ovary with two collateral ovules. Legume 1-seeded, indehiscent. Leaves unequally pinnate. Flowers in dense spikes, often capitate.

1. D. Alopecuroides. Stem erect, glabrous, branched. Leaves numer-
Leaflets 10-14 pairs, narrow elliptical, dotted beneath. Flowers in cylindrical spikes, villous, caliculate. Segments of the calyx, lanceolate, acuminate, hairy.

Blue. ☐. Middle Carolina and Georgia. 1-2 feet.

Genus XXIII. Petalostemon.

Calyx 5-toothed, teeth nearly equal. Petals 5, on filiform claws, 4 of them united to the stamen tube, the 5th free, with an oblong-cordate limb. Stamens 5, monadelphous. Legume indehiscent, 1-seeded. Herbaceous plants glandular. Flowers in terminal spikes or heads.


Genus XXIV. Trifolium.

Calyx campanulate 5-cleft, with setaceous segments. Petals more or less united, vexillum, longer than the wings. Legume membranaceous, 1-6-seeded, generally indehiscent. Leaves palmately divided, or trifoliate; leaflets 3-7. Flowers in dense spikes or heads.

Clove. Tree foil.


Stone Clover. Rabbit-foot.

Whitish, with purple spot on the wings. ☐. June—Aug. 8-12 in.


Red Clover.


Buffalo Clover.

Vexillum red, wings and keel, white. ☐. April—June 12-18 inches.


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Genus XXV. MELILOTUS.

Calyx tubular, campanulate, 5-toothed, persistent. Petals deciduous. Vexillum longer than the wing; keel petals, united, cohering to the wings. Style filiform. Legumes coriaceous one to few seeded, nearly globose. Leaves trifoliate. Flowers in axillary racemes.


Genus XXVI. MEDICAGO.

Calyx somewhat cylindrical, 5-cleft, keel of the corolla, bending from the vexillum. Legume spirally coiled, many seeded, compressed.


Genus XXVII. ASTRAGALUS.

Calyx 5-toothed, keel obtuse. Stamens monadelphous. Legume 2-celled, by the inflexion of the lower suture. Leaves unequally pinnate; leaflets numerous.

1. A. Obcordatus. Stem nearly glabrous, decumbent or assurgent; leaflets 15—23, obcordate, small, on partial petioles. Flowers in ovate spikes Calyx hairy, with subulate teeth. Legumes oblong slightly curved, acute. White. 2. Southern Georgia, Florida. 4—8 inches.


3. A. Glaber. Stem erect, glabrous. Leaflets numerous, 15—23, small, linear oblong, hairy underneath. Flowers in elongated spikes, few flowered 3—6; peduncles long as the calyx. Legume glabrous, acute at each end, incurved.

Whitish. 4. April. Low country of Ga. 1—2 ft.

Genus XXVIII. PHACA.

Calyx 5-cleft, the two upper segments more remote than the others. Keel obtuse. Style smooth; stigma capitate.
Legume inflated, 1-celled. Flowers in axillary racemes, herbaceous.


Genus XXIX. ZORNIA.

Calyx bilabiate, upper lip emarginate, the lower 3-cleft. Petals inserted into the calyx, vexillum broad-cordate, revolute; keel petals cohering. Stamens monadelphous, alternately shorter; anthers alternately oblong and globose.—Legume jointed, hispid, 4-5 joints. Perennial herbaceous plants. Leaves digitate, petiolar, stipulate. Flowers with 2 bracts.

1. Z. Tetraphylla. Stem prostrate, branching, diffuse. Leaflets 4, lanceolate, glabrous. Flowers in long spikes 5-9 flowered, alternate; bracts ovoid, 3-nerved; upper segments of the calyx broad, emarginate, all the segments ciliate; vexillum broad, reniform; wings broadly ovate as long as the vexillum; keel short. Legume 2-4 jointed, joints nearly round. Yellow. (4) July. Sandy lands. 1-2 ft. long.

Genus XXX. STYLOSANTHES.

Calyx tubular, somewhat bilabiate, with two lanceolate bracts at the base. Corolla inserted into the calyx; vexillum broad; keel small. Stamens monadelphous. Anthers alternately linear and ovate. Style short and recurved.—Legume 1-2 jointed, hooked.


Genus XXXI. ÆSCHYNYOMENE.

Calyx bilabiate, the upper lip bifid: the lower 3-cleft.—Corolla inserted into the base of the calyx. Vexillum nearly round; wings oblong; keel cymbiform. Stamens 10, diadelphous, 5 in each division. Legume compressed, straight, generally composed of many 1-seeded joints; joints truncate, easily separated. Seeds compressed; annual plants. Leaves unequally pinnate. Flowers in axillary racemes.

1. Æ. Hispida. Stem erect, hispid, tubercled. Leaves in many pairs, 20-25 with hispid petioles; leaflets linear, obtuse; stipules sub-sagittate, ovate. Flowers in simple racemes; calyx bilabiate deeply divided, the upper lip b-
DICOTYLEDONOUS.

fid, the lower trifid. Corolla much larger than the calyx, showy, Legume very hispid, 6-10-jointed. Yellow, tinged with red, 3. Aug. Along rivers. 2-3 ft.

2. _Æ. Viscidula_. Stem prostrate, viscidly pubescent, slender, diffuse. Leaflets generally 7-9, obovate, oblique, lanceolate. Peduncles generally 2-flowered bracts like the stipules; calyx almost equally 5 cleft. Lomentum with 2 joints, hispid.

**Genus XXXII. Hedysarum. (Syn. Desmodium.)**

Calyx 5-cleft, bilabiate, upper lip 2-cleft or 2-toothed; the lower lip 3-cleft or 3-toothed, usually bracteolate, bearing the corolla at its base. Vexillum nearly round; keel obtuse.—Stamens 10, sometimes partially monodelphous; but usually diadelphous. Stigma capitulate. Legume composed of several 1-seeded joints, compressed. Leaves usually trifoliate. Herbaceous and suffructicosse plants. Flowers becoming more or less green by age.

1. _H. Nediflorum_. Stem simple, erect, pubescent, leafy at the summit. Leaves ternate; leaflets ovate, or broad ovate, acuminate, pale beneath, slightly scabrous above. Flowers in an elongated loose panicle; pedicels filiform; calyx with short teeth, spreading, the lower tooth longest. Petals nearly equal, the vexillum marked by two dark spots at the base. Stamens monodelphous. Legume pubescent, 3-1-jointed, stipel.


2. _H. Acuminatum_. Stem erect, simple pubescent, leafy at the summit. Leaves ternate, ovate, nearly orbicular, acuminate, terminal one the broadest, on long petioles, slightly hairy. Flowers in a terminal panicle, with a very long naked peduncle 1-2 feet; calyx 4-toothed; petals nearly equal in length; stamens monodelphous. Legume with 2-4 rounded joints.


3. _H. Canescens_. Stem erect, scabrous, branching, striate. Leaves ternate; leaflets ovate, tapering at the apex, pubescent on both sides, stipulate. Flowers in large terminal canescens panicles; calyx hairy, conspicuously bilabiate, with acute segments; corolla much larger than the calyx. Legume large, 2-6-jointed, scarcely stipel, truncate at each end.


4. _H. Cuspidatum_. Stem erect, glabrous towards the base, scabrous near the summit. Leaves ternate; leaflets ovate, acute, acuminate into a long point. Flowers in large, sparingly branched panicles 1-2 feet long; bracts large. Calyx 5 cleft, the lower segment long. Corolla large. Stamens diadelphous. Legume scabrous, segments nearly triangular, 3-6.

Purplish violet. 2. Aug.—Sept. Common on the banks of streams. 4-5 ft.

5. _H. Viridiflorum_. Stem erect, pubescent. Leaves ternate; leaflets ovate, obtuse, scabrous on the upper surface, villous beneath. Flowers in an elongated, naked panicle; peduncles scabrous. Calyx hairy, short, the lower segment longest. Stamens generally diadelphous. Legume with 2-4 oblong, triangular joints.

Purplish. 2. June to Oct. Common. 3-5 feet.

6. _H. Rhombifolium_. Stem erect, pubescent. Leaves ternate, somewhat coriaceous; leaflets rhomboidal, obtuse, pubescent along the veins, rugose, paler beneath. Flowers in compound racemes, scabrous; bracts small; calyx with the lower segment longest. Legume with 2-4 joints, hispid, nearly rhomboidal.

Purple. 2. Sept.—Oct. On the coast of Car. & Geo. 2-3 feet.
7. H. Glabellum. Stem erect, nearly glabrous. Leaves ternate; leaflets small, ovate, obtuse, pubescent on both surfaces. Flowers in terminal leafy panicles; calyx with the upper lip entire. Legume with 3-5 reticulated rhomboidal hispid joints.


8. H. Octosum. Stem erect, branching, hairy towards the summit glabrous below. Leaves ternate; leaflets small, ovate, obtuse, often slightly cordate. Flowers in terminal, elongated, erect panicle; upper lip of the calyx emarginate, the lower lanceolate. Legume with 2-3 hispid, nearly orbicular, reticulate joints.


10. H. Rigida. Stem erect, much branched, with rigid pubescence towards the summit, slender, pubescent or glabrous. Leaves ternate, leaflets linear, elongated, coriaceous, reticulate, glabrous or slightly pubescent. Flowers in terminal or axillary racemes, few flowered on slender pedicels; upper lip of the calyx emarginate shorter than the lower. Legume 1-2 jointed, joints semi-ovate, hispid.

Purple, green at the base. 4. Aug.—Sept. In pine barrens. 3-4 ft.

11. H. Paniculatum. Stem erect, generally simple, or branching towards the summit, slender, pubescent or glabrous. Leaves ternate, leaflets linear, elongated, coriaceous, reticulate, glabrous or slightly pubescent. Flowers in terminal or axillary racemes, few flowered on slender pedicels; upper lip of the calyx emarginate, much shorter than the lower. Legume usually 5-jointed, pubescent; joints somewhat triangular.


12. H. Rotundifolium. Stem angular, prostrate, hirsute, branching, geniculate. Leaves ternate; leaflets large, orbicular, pubescent, ciliate. Flowers in axillary, paniculate racemes. Calyx nearly equally 4-cleft. Legumes hispid, with 3-5 rhomboidal joints, pubescent along the margins.

Pale purple or nearly white. 4. Aug.—Sept. In dry soils, common. 2-4 ft.

13. H. Lineatum. Stem creeping, angled, striate. Leaves ternate on very short pedicels; leaflets nearly round, small, almost glabrous; stipules persistent, subulate. Flowers in loose, terminal, elongated panicles; upper lip of the calyx 2-cleft, lower one 3-cleft with the middle segment longest. Legumes sessile, hispid, generally with 3 joints, which are nearly orbicular.


Genus XXXIII. Lespedeza.

Calyx 5-cleft with nearly equal segments, with two persistent bracteoles at the base. Corolla inserted into the base of the calyx; vexillum unguiculate oblong, or nearly round, generally with an appendage at the base; keel obtuse as long as the wings, or long claws; wings straight; stamens diadelphous; stigma capitate, legume lenticular, flat, unarmed, one seeded. Perennial or suffructicoso plants, with ternate reticulated leaves.
(a.) Flowers of two kinds. Some with all the organs perfectly developed apparently, but seldom perfecting their fruit. Others perfecting their fruit, but generally destitute of corolla and stamens. Both kinds may be on the same plant; the fertile ones usually occupying a lower situation than the others.


4. L. Stuevi. Stem simple or branching, erect, pubescent. Leaves ternate, tomentose; leaflets oval or nearly round. Flowers in axillary racemes or spikes, few flowered; peduncles longer than the leaves. Legumes pubescent ovate a little longer than the calyx.


(b.) Flowers all perfect and fertile in dense oblong or nearly glabrous spikes.

5. L. Hirta. Stem erect branching, whole plant pubescent. Leaves ternate, nearly sessile; leaflets nearly orbicular or obovate, covered with soft pubescence. Flowers in axillary, oblong spikes; peduncles long. Calyx hairy with narrow, lanceolate segments. Petals nearly equal about, as long as the calyx; vexillum with a purple spot in the center. Legume hairy, oval, swollen.


6. L. Capitata. Stem erect, pubescent, scarcely branched. Leaves ternate on short pedioles; leaflets elliptical, obtuse, pubescent. Flowers in dense, axillary, capitate spikes; peduncles short; calyx hairy, three nerved; vexillum with a purple spot near the base. Legume oval, pubescent.


7. L. Angustifolia. Similar to the preceding species, but the leaflets vary from elliptical-oblong to linear, are smaller than those of the L. Capitata. Grows through middle and Southern Car. & Geo. 4–5 ft.

Remarks.—The two preceding Genera are exceedingly perplexing in arranging descriptions even of well known species, from the frequent variations produced by different circumstances; and we are to disregard these variations, and describe the specimens as varieties or distinct species we should multiply the species and varieties to an indefinite extent. We have given descriptions of those which are well established species. We have little doubt that there are other species, when sufficient examination shall have determined their characteristics.

Genus XXXIV. Crotalaria.

Calyx slightly bilabiate, 5-cleft. Vexillum cordate, large; keel generally acuminate; wings somewhat plicate towards the base. Stamens monadelphous, the tube cleft on the upper side; the 5 alternate anthers smaller. Legume pedicillate, turgid. Seeds reniform. Herbaceous plants with yellow flowers.

1. C. Sagittalis. Stem erect, branching, hirsute. Leaves simple, nearly
sessile oval or oblong-lanceolate, stipules decurrent, acuminate sagittate. 

*Flowers* on rather short few flowered peduncles opposite the leaves. *Corolla* about as long as the calyx or shorter. *Legume* inflated, nearly black when mature. *Seeds* small smooth and shining, when ripe rattling in the capsule. 

Yellow. C. April—July. Common. 8-12 inches.

2. C. *Parviflora*. Stem erect, hirsute, branching. *Leaves* linear, or linear-lanceolate, nearly sessile, lower ones broader than the upper, upper stipules decurrent. Peduncles opposite the leaves 3-7 flowered; corolla about as long as the calyx or shorter.


Yellow. 4. April—July. Common in dry sandy soils. 6-12 in.

**Genus XXXV. Lupinus.**

*Calyx* distinctly bilabiate, upper lip usually 2-cleft, the lower entire or 3-cleft. *Vexillum* with reflexed margins; wings united at the summit; keel falcate, acuminate. *Stamens* monodelphous; alternate anthers oblong, the others round. *Legume* coriaceous, slightly compressed. Herbaceous plants with palmate or simple leaves.


**Genus XXXVI. Baptisia.**

*Calyx* 4-5-cleft, campanulate or bilabiate. *Vexillum* nearly orbicular, emarginate, reflexed; wings about equal in length to the vexillum, oblong. *Keel* slightly curved, scarcely as long as the wings. *Petals* slightly united. *Stamens* separate, deciduous. *Legume* stipitate, many seeded, ventricose. *Flowers* in terminal racemes, or axillary and solitary. Perennial herbaceous plants.


2. B. *Lanceolata*. *Stem* pubescent, sometimes nearly glabrous, branching. *Leaves* ternate, nearly sessile; leaflets cuneate-lanceolate, obtuse, glu-


Remarks. The Baptisiae are quite conspicuous among the flowering plants of the early part of summer. The B. Tinctoria possesses valuable properties. It is decidedly antiseptic, and, on this account, is used in cases approaching mortification; either internally or applied to the surface in the form of cataplasms, as the case requires. It is an emetic and cathartic in large doses, but in small ones is a mild laxative. The root is the part generally used, but the whole plant is said to possess similar properties.

Genus XXXVII. CERCIS.

Calyx 5 toothed, campanulate, gibbous at the base. Petals distinct, vexillum small within the wings; keel larger than the wings, composed of two distinct petals. Stamens distinct, unequal. Legume compressed, many seeded, oblong, acute, on a short stipe. Trees with simple leaves, flowering before putting forth leaves.


Genus XXXVIII. CASSIA.

Calyx 5-sepaled; sepals slightly united at the base, generally unequal. Petals 5, unequal. Stamens unequal, the
three upper sterile. *Legume* ligneous, terete or compressed, sometimes with several transverse partitions. Mostly annual plants, with pinnate leaves.


2. C. *Occidentalis*. Stem erect, glabrous, branching or simple. *Leaflets* in 5-pairs, occasionally 3 or 6 pairs, ovate or ovate-lanceolate, slightly ciliate, acuminate, unequal at the base, and serrulate; gland at the base of the petiole. *Flowers* in axillary racemes, few. *Legumes* long, glabrous, many seeded. *Seeds* compressed, nearly oval.

Styptic-weed.

Yellow. (2). July—through the summer. 4—6 feet.

3. C. *Marilandica*. Stem glabrous, or covered with scattered hairs. *Leaflets* in about 8 pairs, oblong-lanceolate, slightly ciliate, mucronate; gland at the base of the petiole. *Flowers* in short, axillary racemes, numerous, paniculate at the summit of the stem. *Legumes* curved, linear, pubescent or glabrous.

Yellow. (2). June—Aug. On the banks of streams. 3—4 feet.

4. C. *Chamaecrista*. Stem erect, or somewhat decumbent, with divaricate, hisrate, and scabrous branches. *Leaflets* in 10—15 pairs, glabrous, oblique, oval, narrow, mucronate, glabrous beneath, serrulate; petiole hisrate, with a cup-like gland near the base of the lowest pair of leaflets. *Flowers* in supra-axillary fascicles. *Stamens* all fertile, a part of the petals spotted at the base, 4 of the anthers yellow, 6 purple. *Legumes* villous, linear. The *C. Fasciculata* is considered only a variety of this; differing from it in being nearly glabrous, anthers all yellow, petals not spotted at the base.


5. C. *Nietitans*. Stem erect or procumbent, pubescent when young, glabrous when old. *Leaflets* in 10—15 pairs, linear, mucronate, gibbous at the base; gland below the base of the leaflets. *Flowers* in supra-axillary fascicles, small; petals unequal; stamens 5, anthers purple. *Legumes* somewhat hairy, oblong, compressed.


pressed, stipitate. Seeds oval, testa crustaceous. Trees with pinnate leaves, and generally spiny branches.


Greenish. July. Middle Car. & Ga., in swamps. 40-50 feet.

**Sub-Order II. Mimoseæ.**

Sepals and petals regular, the latter hypogynous. Stamens as many as the petals, or numerous; inserted into the base of the corolla. Leaves pinnate or bi-pinnate.

**Genus XL. Mimosa.**

Flowers polygamous. Calyx 4-5-toothed, or entire, urceolate. Petals 4-5, united into a somewhat campanulate corolla with a 4-5-cleft border. Stamens 4-15, exserted, inserted into the base of the corolla, sometimes monodelphous at the base, but generally distinct. Herbaceous plant. Flowers in globose heads, rose color. Leaves pinnate, sensitive.


**Genus XLI. Schrankia.**

Flowers polygamous. Calyx 5-toothed, minute. Petals 5, united into an Intundibuliform corolla. Stamens 8-12 distinct or monodelphous. Legume 1-celled, many seeded, 4-valved. Prickly, herbaceous plants, with bipinnate, sensitive leaves. Flowers in spherical heads, on axillary peduncles.

1. S. Uncinata. Stem procumbent, or running over other objects, grooved or angled. Leaflets numerous, oblong-oval, reticulated beneath. Flowers generally in solitary heads, peduncles axillary. Legumes rugose, acuminate, oblong-linear, somewhat 4-sided, or terete. Seeds elliptical.


**Remarks.** A beautiful plant when cultivated and trained, its sensitive leaves and beautiful heads of pink flowers, distinguish it as a subject of attention. Its abundance, however, prevents that care being bestowed upon it which it would otherwise receive from the hand of the florist.
**Genus XLII. ACACIA.**


1. **A. Lutea.** Stem herbaceous, procumbent, unarmed, pubescent, with angular branches; stipules nearly subulate, petioles without glands. Leaflets linear-oblong, crenulate. Flowers on axillary peduncles, in oblong heads; calyx deeply cleft; petals ovate acute. *Legumes* stipitate, compressed, about half an inch long. Yellow. 

**Remarks.**—The Order Leguminosae is one of the most extensive and important. It yields to medicine and the arts its full proportion of the substances derived from the vegetable kingdom. In the Pea and Bean it affords two important articles of food, and in point of beauty many of its productions are scarcely rivalled. Among the most important articles of the Materia Medica derived from this Order are the gums *Tragacanth* Arabic and *Kino*, Senna, Tamarind, Cutche from a species of Acacia, *Dragon's Blood*, Cowage from the Doliichos pruriens, and *Balsam Copaiba*, and Tolu. To the arts it affords *Indigo*, *Logwood*, *Rosewood*, a species of *Mimosa*, *Sandal wood*, &c. As food for men and animals, the Pea, the Bean, *Clover*, *Lucerne*, &c.

**Order XLI. ROSACEÆ.**

*Sepals* usually 5, more or less united, persistent. *Petals* 5 perigynous, occasionally absent. *Stamens* numerous, inserted into the lining of the calyx. *Ovaries* solitary, or several. sometimes united with the calyx, or with each other. *Seeds* anatropous. *Leaves* alternate, stipitate, simple or compound.

**Genus I. CHRYSOBALANUS.**

*Calyx* 5-lobed persistent, campanulate, with nearly equal segments. *Petals* 5. *Stamens* numerous, those next the ovary usually shortest and sterile; ovary sessile; ovules 2. *Fruit* a drupe, with very little pulp, 1-seeded. *Shrubs* with flowers in terminal or axillary paniculate cymes.


**Genus II. PRUNUS.**


1. **P. AMERICANA.** Stem smooth with long flexible branches, the old branches somewhat rough and thorny. *Leaves* ovate, or oblong-ovate, scu-
minate, sharply serrate, veined beneath; petioles with two glands nearly glabrous when old. *Flowers* in umbels 2--5. *Segments* of the calyx lanceolate. *Fruit* a roundish drupe, reddish when ripe, large with a tough skin.

**White.** 12. March and April. Along the banks of streams. 15--20.


**Genus III. Cerastus.**


1. *C. Virginiana*. A tree with smooth branches, or small shrubs, with greyish bark. *Leaves* broadly oval, or oblong-lanceolate, mucronate, serrate or entire; petioles glandular. *Flowers* in axillary racemes, short, erect, segments of the calyx acute, whitishe. *Petals* nearly orbicular. *Fruit* a dark red globular drupe, very astringent. **Choke Cherry.**


**White.** 12. April—May. In rich soils. 30--80 ft.


**Genus IV. Spiræa.**


1. *S. Ouphilolia*. A small shrub, with the old bark detaching itself.—*Leaves* ovate, roundish, or subcordate, 3-lobed, doubly serrate, glabrous. *Flowers* in terminal corymbs, numerous, pedicels filiform. *Carpels* 3--5 inflated. *Seeds* obovate, shining, very bitter. **Nine Bark.**


**Purple.** June—July. Upper districts of Car. & Ga. 3--6 feet.
4. S. Lomatia. Stem herbaceous, glabrous, strigate, angled. Leaves pinnate; leaflets 3-5-7, the terminal ones large; 7-9-lobed, lateral ones 3-lobed, cuneiform lobes serrate; stipules reniform. Flowers in a very compound panicle. Sepals reflexed. Carpels 6-8 glabrous.

Deep rose color. 4. June—August. Near the mountains. 5-8 feet.


White. 4. June—July. Mountains of Car. & Ga. 3-5 feet.

Remarks. The Spiraeas are cultivated as ornamentals; and the bark of the S. Tomentosa is possessed of tonic and astringent properties, and is used both in the regular and folk medicines where such properties are demanded. In debility it has proved very serviceable. It is administered in decoction or extract.

**GENUS V. GILLENIA.**

**Calyx** 5-toothed, campanulate, with the orifice contracted. Petals 5, inserted into the calyx, cuneate, lanceolate, very long. Stamens 10-15. unequal. Carpels 5; styles filiform; stigmas subcapitate. Seeds ascending, 2-4. Perennial herbs, with trifoliate leaves. Flowers axillary and terminal, on elongated peduncles.


**GENUS VI. GEUM.**

**Calyx** 5-toothed, campanulate, with the orifice contracted. Petals 5, inserted into the calyx, cuneate, lanceolate, very long. Stamens 10-15. unequal. Carpels 5; styles filiform; stigmas subcapitate. Seeds ascending, 2-4. Perennial herbs with trifoliate leaves. Flowers axillary and terminal, on elongated peduncles.

1. G. Virginianum. Stem pubescent, or nearly glabrous. Radicle leaves ternate, or pinnate with minute lateral leaflets on long petioles. Cauline ones simple or variously divided or lobed, toothed or serrate, pubescent, or nearly glabrous; stipules ovate, entire or toothed. Flowers in erect or diverging peduncles, calyx rather longer than the petals. Petals cuneate-obovate.—Carpels somewhat hispid, with hooked arms.


**GENUS VII. WALDSTEINIA. (Syn. Dalibarda.)**

**Calyx** 5-cleft, tubular sometimes with 5 bracteoles at the base. Petals 5, sessile. Stamens numerous inserted into the calyx. Filaments filiform, persistent. Styles long, caducous. Carpels 2-6, dry or fleshy, pubescent. Perennial herbs, with a creeping rhizoma. Flowers always yellow.
DICOTYLEDONOUS.

1. **W. Fragarioides.** *Rhizoma* thick; stem hairy. *Leaves* trifoliate; leaflets cuneiform, and generally petiolate, and incised. *Flowers* numerous on an erect scape; calyx obconic, the segments shorter than the petals; petals obovate. *Carpels* 4-6 minutely hairy.

   Yellow. 4. May—June. Mountains. 4-8 in.


**Genus VIII. AGRIMONIA.**


1. **A. EuPATORIA.** Stem and petioles hirsute. *Leaves* pinnate the terminal leaflet petiolo; leaflets 5-7, oblong, obovate coarsely toothed, pubescent, generally with several minute leaflets intermingled. *Flowers* in virgate spikes, with the calyx sulcate towards the base. *Petals* much longer than the calyx. *Fruit* hispid. *Agrimony.*


2. **A. PARVIFLORA.** Stem and petioles hirsute, with brownish hairs. *Leaves* dotted on the under surface, pinnate; leaflets 11-19, crowded, with minute ones intermixed, toothed, lanceolate, acute, scabrous above, pubescent beneath; stipules incised. *Flowers* small, in virgate racemes. *Petals* small. *Dotted Agrimony.*


3. **A. INCISA.** Stem and petioles pubescent, intermixed with hirsute hairs. *Leaves* pinnate; leaflets 3-5 pairs, intermixed with smaller ones, incised, oblong, with unequal teeth on each side, almost glabrous above, hairy beneath. *Flowers* in virgate racemes, small on short pedicels, teeth of the calyx very short.


**Remarks.**—Agrimonia Eupatoria, is said to be one of the Indian medicines for the cure of fevers. Its properties seem to be principally astringent and on account of this property is used in affections of the mucous membrane of the alimentary canal. It has also been employed in Jaundice.

**Genus IX. POTENTILLA.**

*Calyx* 4-5-cleft, with 4 or 5 exterior segments. *Petals* 4-5 ob-cordate. *Stamens* numerous, inserted into the base of the calyx. *Capsules* numerous, collected into a head. *Plants* with compound leaves.


Genus X. FRAGARIA.

The different organs of the flower the same as in Potentilla. Carpels placed on an enlarged, succulent receptacle. Perennial herbs with trifoliate leaves; receptacle red, edible. 

Strawberry.


White. 4. April—May. In shady places.

Genus XI. RUBUS.


3. R. VILLOUS. Stem erect or bending, angular, armed with stout prickles curved downwards; branches villous. Leaves 3-5 foliate, glandular pubescent beneath; leaflets ovate, acuminate, unequally serrate the terminal one petiolar. Flowers in racemes, sepals linear-acuminate. Petals spreading, obovate. Fruit black large. Blackberry. White or rose color. 4. May—June. Common. 3-8 feet.


6. R. CUNEIFOLIUS. Stem shrubby, erect, low, armed with stout recurved prickles. Leaves trifoliolate; leaflets, obovate, cuneate, tomentose beneath,
somewhat coriaceous, serrate towards the apex, with revolute margins near the base. Flowers few on each peduncle. Sepals mucronate oblong, tomentose. Petals obovate. Fruit black.

White or rose color. 4. May—June. Common. 1-2 feet.

Remarks.—The genus Rubus affords fruit, which is much used for food and is healthy and agreeable when perfectly ripe. A jelly made from the fruit of the R. Villosus common Blackberry, is much esteemed as an article of diet by patients suffering under dysenteric affections. The root of this species is much valued in domestic practice in the same diseases, and is considered by many as a certain remedy. The Faculty recommend it in such affections as require vegetable astringents.

Genus XII. Rosa.

*Calyx* 5-cleft, tube urceolate, contracted at the summit, enclosing several distinct ovaries. *Carpels* 1-seeded, hairy, indehiscent. Shrubby plants, with pinnate leaves, with stipules adhering to the petiole.


3. R. Parviflora. Stem glabrous, dotted, branches geniculate. Leaflets 5, the lateral ones ovate, obtuse, terminal one lanceolate, acute, glabrous or slightly pubescent on the veins beneath. Spines stipulate, generally straight. Flowers terminal, solitary or by pairs. Calyx hispid; segments subulate. Petals emarginate, obovate. Fruit nearly glabrous.


4. R. Leavigata. Stem glabrous, branches flexible, armed with strong recurved prickles. Leaflets 3-5, lanceolate, serrate, coriaceous, shining. Flowers solitary, terminal; segments of the calyx acuminate, unequal serra. Petals obovate, obtuse, with the point crenulate.


Remarks.—The Rose has been an object of esteem in all civilized nations. The species and varieties of this genus, most of them produced by the Horticulturist, amount 4—500. As an ornamental shrub it stands unrivaled in public esteem. It yields but little to the mass of vegetable materials made subservient to the uses of man. The leaves of the Red-rose are slightly astringent and tonic but are used chiefly in infusions as a vehicle for the administration of cathartic medicines. Rose water is produced by the distillation of the Flowers of various species. The Atar of Roses is a volatile oil existing in very minute quantities in rose leaves, is obtained by distillation and sold at high prices as a perfume.

Genus XIII. Crataégus.

*Calyx* 5-cleft, tube urceolate. Petals 5, spreading, orbicular. Stamens numerous. Styles 1-5. Fruit fleshy or baccate, crowned with the teeth of the persistent calyx, 1 to 5-seeded. Seeds bony. Thorny shrubs, with simple leaves. Fruit often edible. Thorn tree.

1. C. Crus-galli. Stem spiny, branching; branches geniculate, divari-


White. 5. May. On banks of streams. 10-25 feet.

3. C. Viridis. Stem spiny; branches slender. Leaves nearly sessile, spatulate, ovate, serrate, with round lobes generally. Segments of the calyx with glandular serratures. Flowers in small corymbs. Fruit large globular, 3-4-seeded, red.

White. 5. May—June. 8-14 feet.


White. 5. April. Middle and Southern Carolina and Georgia.

5. C. Punctata. A small tree, spiny or unarmed, with numerous rugged branches. Leaves obovate, cuneate, glabrous serrate, decurrent into a slender petiole, sometimes incised towards the apex and slanted spines stout when present. Flowers in tomentose corymbs. Calyx villous. Fruit globose, large, tough, and pleasant to eat; dotted. Thorn.


7. C. Aprifolia. A spiny shrub, much branched. Leaves deltoid on long petioles, in fascicles, pubescent, 5-7 cleft, segments incised, lobed, serrate; spines stout. Flowers in simple corymbs; calyx villous; segments lanceolate reflexed; styles 2-3.

White. 5. March. Common. 4-12 ft.


10. C. Festivalis. Stem spiny, branching from the base. Leaves elliptical or obovate, cuneate, on short petioles, sinuate toothed, or angled towards the summit, tomentose when young, glabrous above when older; veins beneath covered with a rusty pubescence. Flowers in small corymbs, glabrous. Styles 4-6. Fruit globose, large, acid red, used for tarts or preserves.

White. 5. Febr.—March. In wet places. 20-30 ft.

11. C. Flava. A shrub, spiny, with coarse bark. Leaves obovate, cuneate, acute at the base, running into a glabrous petiole, glabrous, shining, incised or lobed towards the apex. Flowers in small corymbs; segments of the calyx serrated with globar glands. Styles 4-5 Fruit globular, yellow.

White. 5. May. Sandy soils. 13-20 ft.

12. C. Lucida. A shrub with short spines, very strong. Leaves cuneate, obovate, crenate, coriaceous, lucid on short branches. Flowers few in sim-
ple corymbs, on small lateral branches. *Styles 5.* *Fruit* large, globose, red, 5-seeded.

White. 1. April. Southeastern Ga. 10-12 ft.

13. C. Eliptica. A spiny shrub, with course rough bark. *Leaves* obovate or nearly round, cuneate at the base, coriaceous, margined, with glandular dots, pubescent in the axils of the veins, and on the petioles, slightly lobed towards the apex. *Flowers* solitary, or in small corymbs. *Calyx* pubescent; segments incised or serrate. *Fruit* oval, large, red, 5 seeded.

White. 1. April. In Sandy soils. 8-12 ft.


White. 1. April—May. Dry soils common. 3-6 ft.

**Genus XIV. Pyrus.**


White. 1. March—April. In rich soils. 10-20 feet.


White or rose color. 1. March. April. Common in damp soils. 3-8 ft.

**Genus XV. Amelanchier.**

*Calyx* 5-cleft. *Petals* 5, obvate, oblong. *Stamens* numerous, short. *Styles* 5, more or less united. Some 5-10-celled; cells 1-2-seeded; endocarp cartilaginous. Small trees or shrubs, with simple leaves.


White. 1. Feb.—March. Common. 10-12 feet.


White. 1. March—April. Middle Car. & Geo. 2-3 feet.
CALYCANTHACEÆ—MELASTOMACEÆ.

Order XLII. CALYCANTHACEÆ.

Sepals and petals confounded, aestivation imbricate, formed at the base into an urceolate tube; segments colored, petal-like. Stamens numerous inserted into the tube of the calyx; anthers adnate, extrorse. Seeds numerous, contained in an enlarged ventricose calyx.

Genus I. CALYCANTHUS.

Lobes of the calyx in several series, lanceolate, colored, more or less fleshy. Stamens numerous, outer ones fertile. Flowers purple, odoriferous when bruised.

Carolina Allspice. Sweet Shrub.

1. C. Floridus. Small shrub. Leaves oval or ovate-lanceolate, often pubescent beneath, acute, branchlets tomentose. Flowers solitary; segments disposed in two rows.
   Purple. ½. March—June. Shady places. 4-6 feet.

2. C. Ixodorus. A shrub with glabrous, virgate branches. Leaves entire, acuminate, shining on the upper surface, pubescent along the veins on the under surface. Flowers larger than the preceding, terminal, axillary; segments in several series.
   Purple. ½. March to April. Low country. 4-6 feet.

3. C. Latifolius. Leaves large, oval, lanceolate, acuminate, glabrous; segments of the perianth lanceolate.
   Purple. ½. March—April. Along streams. 4-6 feet.

4. C. Glaucus. A shrub with expanding branches, glabrous. Leaves large, lanceolate, with a long acumination, glaucus underneath; segments of the perianth lanceolate.
   Purple. ½. May—June. Upper districts of Georgia. 4-6 feet.

Order XLIII. MELASTOMACEÆ.


Genus I. RHEXIA.

Tube of the calyx ventricose at the base, narrowed above the ovary. Petals obovate, or roundish. Anthers 1-celled, with a thick connectivum. Style declined. Stigma obtuse. Leaves generally sessile, 3-nerved.

1. R. Marianæ. Stem hirsute, terete, furrowed. Leaves lanceolate, attenuate at the base, hispid, serrate ciliate. Flowers axillary or terminal. Ca-
DICOTYLEDONOUS.


Pale purple, or nearly white. 4. Damp soils. 1-2 ft.


Purple. 4. July—Sept, In swamps. 2-3 ft.

4. R. Stricta. Stem glabrous, square, angles-winged, bearded at the nodes. Leaves sessile, ovate, lanceolate, acuminate, setaceously serrulate, often hispid above. Flowers in dichotomous corymbs. Calyx glabrous.

Purple 4. In wet pine barrens. August—Sept. 3-4 ft.

5. R. Globella. Stem glabrous, slightly furrowed, terete, simple. Leaves lanceolate, entire, or with few serratures at the summit. Flowers large. Calyx with glandular hairs. Petals large, glandular externally before their expansion. Deer Grass.


7. R. Serrulata. Stem small, simple, quadrangular, glabrous. Leaves small, ovate or oval, glabrous, serrulate and ciliate. Flowers 1-3 together. Calyx glandular hispid.

Purple. 4. June—July. Swamps. 6-10 in.


ORDER XLIV. LYTHRACEÆ.

Calyx 4-lobed, Petals none, or four. Stamens inserted into the tube of the calyx, generally in number equal to the lobes. Anthers short, introrse; ovary 2--4 celled, enclosed in the calyx; ovules numerous, placenta central. Capsule membranaceous, sometimes 1-celled. Seeds numerous, anatropous. Cotyledons folicaceous. Herbs with opposite leaves, without stipules.

GENUS I. HYPOBRICHIA.

LYTHRACEÆ.

1. H. Nuttallii. Stems leafy, immersed. Leaves linear, acute, the uppermost shorter and broader, obtuse. Flowers very small. Stamens 2-4 shorter than the Calyx.

GENUS II. AMMANNIA.

Calyx 4-lobed with 4 intermediate lobes produced in the sinuses. Petals 4 or none. Stamens generally 4, sometimes 8. Ovary 2-4-celled. Capsule included in the calyx. Seeds numerous, herbaceous annual plants. Stems square; leaves opposite. Flowers axillary, with small petals; growing in wet places.


2. A. Ramosior. Stem erect, somewhat columnar, succulent glabrous leaves nearly sessile, narrow, lanceolate, more or less cordate. Flowers axillary, the lower ones several in each axil, the upper solitary. Petals small. Stamens 4. Capsule globose, furrowed. Seeds numerous.


GENUS III. LYTHRUM.

Calyx cylindrical, with 4-6 short teeth, and generally with as many intermediate processes. Petals 4-6. Stamens equal, or twice as many in number as the petals, inserted into the calyx. Style filiform, Capsule 2-celled, many seeded, inclosed in the calyx. Herbaceous glabrous plants, with entire leaves.


   - Bright purple. June—July. Lower Georgia. 3-4 feet.


GENUS IV. DECODON.

Calyx campanulate, with 5 erect teeth, and 5 subulate,


Genus V. CUPHEA-


Order XLV. RHIZOPHORACEÆ

Sepals united into a 4-lobed calyx. Petals inserted into the calyx and equaling the number of lobes. Stamens equal to, or several times the number of petals, ovary united to the tube of the calyx, 1-2-celled. Fruit 1-celled, indehiscent. Seed solitary, pendulous.

Genus I. RHIZOPHORA.

Tube of the calyx obovate. Petals oblong, emarginate, coriaceous. Stamens twice as many as the petals. Anthers nearly sessile. Fruit ovate, longer than the tube of the calyx to which it adheres. Trees.


Order XLVI. ONAGRACEÆ.

Sepals united into a tubular calyx, the limb generally divided into 4 segments. Petals equal in number to the segments, sometimes wanting. Stamens inserted with the petals, and gen-
erally equaling them in number. **Anthers** introrse. **Pollen** triangular. **Ovary** cohering with the tube of the calyx, 1–2–4-celled. **Style** elongated. **Stigma** capitate or 4-lobed. **Fruit** usually capsular. **Seeds** indefinite, anatropous; albumen none, embryo straight.

**Genus I. EPILOBIIUM.**

Calyx campanulate, segments 4-spreading. **Petals** 4. **Stamens** 8, alternate ones longest. **Anthers** elliptical, attached near the middle. **Stigma** clavate. **Capsule** quadrangular, 4-celled. **Seeds** numerous, crowned with a coma. Perennial herbs.

1. **E. Coloratum.** Stem branching, glabrous, nearly terete. **Leaves** opposite or alternate, lanceolate, serrulate, on short petioles. **Flowers** in terminal racemes, small. **Petals** 2-cleft. **Capsules** on short pedicels, slightly pubescent, linear, 4-angled. **Seeds** oblong. Purple. 4. July—Aug. Mountains. 1–3 feet.

**Genus II. OENOTHERA.**

Calyx tubular, 4-cleft, segments reflexed. **Petals** 4-equal, obovate. **Stamens** 8-ovary, 4-celled, ovules numerous. **Stigma** 4-cleft. **Capsule** 4-valved, many seeded. Herbaceous plants with alternate leaves and axillary or terminal flowers.

1. **OE. Biennis.** Stem herbaceous, erect, terete, generally simple, hirsute. **Leaves** alternate, pubescent, sessile, ovate-lanceolate, denticulate. **Flowers** in terminal, leafy spikes. **Calyx** longer than the ovary, thickened at the summit, segments hairy, on the outside, reflected. **Stamens** slightly declined. **Petals** obovate, emarginate. **Capsule** nearly cylindrical. **Seeds** numerous. **Evening Primrose.**


2. **OE. Muricata.** Resembles the OE. Biennis, but with smaller flowers. Stem purplish, muricate. **Leaves** lanceolate. **Petals** a little longer than the stamens. **Ovaries** strigose-hirsute.

3. **OE. Grandiflora.** Stem nearly glabrous, branching. **Leaves** ovate-lanceolate, glabrous, sometimes pubescent. **Flowers** axillary, large; tube of the calyx very long; petals longer than the stamens. **Yellow.** 2. Through the summer. Cultivated grounds. 2–3 feet.

4. **OE. Sinuata.** Stem diffuse, pubescent, ascending or decumbent, simple, or branching from the base. **Leaves** sinuate, toothed, oblong, often pinnaled. **Flowers** axillary, solitary, sessile. **Petals** nearly obcordate. **Calyx** villous. **Capsules** cylindrical, furrowed. **Yellow,** becoming rose color. 4. May—June. Dry pastures. 1–2 ft.

5. **OE. Fructicosa.** Stem pubescent, or nearly glabrous, branching from the base, divericate. **Leaves** sessile, lanceolate, denticulate, acute, marked with minute linear dots. **Flowers** large, in terminal racemes; petals broadly obcordate, longer than the segments of the calyx. **Capsules** oblong-clavate, pedicellate, angled. Pale yellow. 4. July—Aug. Middle Ga. & Car. 1–2 feet.

6. **OE. Linearis.** Stem pubescent, slender, generally branched. **Leaves** linear, entire, obtuse, crowded near the summit. **Flowers** in terminal corymbs;
petals larger than the stamens. *Capsules* clavate, tapering at the base into a pedicel.


7. **OE. GLAUC**. Stem glabrous, somewhat glaucous, erect, branching above. *Leaves* sessile, ovate or oblong-ovate, denticulate. *Flowers* very showy, in short, leafy, corymb; petals emarginate, broadly obovate, erosely crenulate at the summit, much longer than the segments of the calyx. *Capsules* winged, pedicellate, ovoid.

Bright yellow. 4. May—July. Carolina. 2-3 feet.

8. **OE. RIPARIA**. Stem slightly pubescent, slender. *Leaves* linear-lanceolate, elongated, attenuate, entire, remotely denticulate. *Flowers* in leafy, elongated racemes; tube of the calyx longer than the ovary; segments of the calyx acuminate; petals obcordate. *Capsules* oblong, clavate, 4-winged, with 4 intermediate ribs.

Yellow. 4. June—July. In damp soils. 2-3 feet.

**GENUS III. GAURA.**

*Calyx* 4-cleft, tubular, prolonged beyond the ovary, deciduous; segments reflexed. *Petals* 4, unguiculate. *Stamens* 8, somewhat declined, anthers attached near the middle. *Ovary* 4-celled, with 1-2 suspended ovules in each cell; style filiform, declined. *Fruit* somewhat ligneous, indehiscent, by abortion 1-celled. 1-seeded, 4-angled. Perennial plants, with alternate leaves. *Flowers* in terminal spikes or racemes.

1. **G. AUGUSTIFOLIA**. Stem terete, pubescent. *Leaves* clustered, sessile, linear, repand, undulate, denticulate, somewhat hairy. *Flowers* in terminal panicles formed of slender racemes; calyx with reflected segments; segments long, linear; petals inserted near the summit of the calyx, spatulate, obtuse, shorter than the segments of the calyx. *Fruit* ovate, with acute or winged angles.


2. **G. BIENNIS**. Stem villous-pubescent, branching. *Leaves* lanceolate, acute, denticulate, or entire, pubescent, sometimes glabrous above when old. *Flowers* crowded in the terminal spikes; segments of the calyx rather longer than the petals; petals spatulate, larger than the preceding. *Fruit* oval-oblong, acute at each end, with 4 conspicuous ribs.

White or red. 4. July—Aug. Upper districts. 3-5 feet.

3. **G. FILIPES**. Stem suffructicose at the base, branching above. *Leaves* linear, or oblong-linear, acute at the base, often in the axils, remotely, sinuately toothed, often almost pinnatifid, mucronate. *Flowers* in panicles, on very slender branches, calyx hairy, with segments exceeding in length the petals; petals spatulate, oblong ovate. *Fruit* clavate, on a filiform pedicel, 4-angled.

White or reddish. 4. July—Aug. In dry soils. 2-4 feet.

**GENUS IV. JUSSLEA.**

*Calyx* 4-6 parted; tube prismatic, or cylindrical, not extended beyond the ovary. *Petals* 4-6, spreading. *Stamens* double the number of petals. *Capsule* 4-6 celled, oblong, ribbed. *Seeds* numerous. Herbaceous plants, growing in wet places. *Leaves* alternate. *Flowers* axillary.

1. **I. GRANDIFLORA**. Root creeping. Stem erect, ascending, little branch-
ed, villous when young. Leaves lanceolate, entire, acute at each end, nearly sessile, lower ones spatulate. Flowers solitary, axillary, nodding before their expansion. Calyx villos with very acute segments. Petals oblong, emarginate, double the length of the segments. Stamens 10, unequal. Ovary 5-angled.

Yellow. 2. May—Aug. Low country. 2-3 feet.


3. J. D. DECURRENS. (Ludwigia Decurrens of Elliot.) Stem erect, glabrous, branching, winged, branches slender. Leaves ovate, lanceolate, decurrent, closely sessile, shining, with 2 glands at the base. Flowers on square winged peduncles with 2 corolate glands in the middle, segments of the calyx 4, acuminate, 5 nerved. Petals obovate, as long as the segments, caducous. Stamens 8. Capsules 4-seeded, winged, on short pedicels.

Yellow. 2. July—Sept. Damp soils very common. 2-3 feet.

**GENUS V. LUDWIGIA.**

Calyx 4-parted, tube angled or cylindrical. Petals 4 or none. Stamens 2, apex of the ovary generally flat. Stigma capitate. Capsule quadrangular, 4-celled, many seeded. Perennial plants growing in wet places. Flowers axillary or spicate.

1. L. ALTERNIFOLIA. Stem erect, branching, slightly angled, slightly scabrous. Leaves alternate, lanceolate, sessile, tapering at each extremity. Flowers axillary, solitary on short pedicels; segments of the calyx, ovate, acuminate, spreading, 5-nerved. Petals caducous, as long as the calyx. Capsule with winged angles, cubical, wings ciliate.

Yellow. 2. July—Sept. Low country. 3-4 ft.

2. L. PILOSA. Stem hairy, or hirsute, erect, branching. Leaves ovate, obtuse, upper ones lanceolate or oblong linear, sessile, somewhat decurrent. Flowers axillary, on short pedicels, large, segments of the calyx ovate, lanceolate, spreading. Capsule villos, nearly cubical, angles winged.


3. L. VIRGATA. Stem erect, virgate, slightly angled, pubescent, sometimes branched. Leaves ovate, or oblong, the upper linear, obtuse sessile, pubescent. Flowers axillary, large on slender pedicels; lobes of the calyx ovate, reflexed. Petals larger than the segments. Capsule cubical, with winged angles.

Yellow. 2. May—Sept. In dry places. 2-4 ft.

4. L. LINEARIS. Stem erect, branching, slender, glabrous, angled near the summit. Leaves linear, acute at each end. Flowers axillary, solitary, sessile, segments of the calyx triangular, ovate. Petals oblong-ovate, sometimes wanting.

Pale yellow. 2. July—Sept. In shallow water. 10-20 in.

5. L. LINIFOLIA. Stem erect glabrous, branching from the base, slender, angled above. Leaves linear, tapering at the base. Flowers axillary, sessile, larger than the preceding, lobes of the calyx ovate lanceolate. Capsule cylindrical, slender.

Yellow. 2. July—Aug. Middle Georgia. 6-18 in.

6. L. CYLINDRICA. Stem erect, branching, slightly angled, glabrous. Leaves slightly dentate, lanceolate, tapering at each extremity, slightly decurrent. Flowers small, solitary, or clustered, apetalous, sessile, segments of the calyx short ciliolate. Capsule cylindrical, pubescent, with 4 furrows.

DICOTYLEDONOUS.

   Yellow. 2 July—Sept. In swamps. 2-3 feet.

8. L. Alata. Stem erect, glabrous, sparingly branched, winged. Leaves cuneate, decurrent at the base, lower ones lanceolate or oval. Flowers axillary, solitary, sessile, apetalous; segments of the calyx broad triangular ovate capsules, cubical slightly winged, small.
   Yellow. 2 July—Sept. In swamps. Southern Car. & Geo. 1-3 ft.


©. Damp places. Lower Car. & Geo. 8-12 inches.

11. L. Capitata. Stem erect, glabrous, slender, somewhat angled. Leaves narrow-lanceolate, obtuse at the base, sessile acute. Flowers in a crowded terminal head or spike, sessile. Petals small or none; segments of the calyx, broad triangular-ovate. Capsule oblong, quadrangular slightly winged.

12. L. Palustris. Stem procumbent, glabrous, creeping, branching, succulent. Leaves opposite, ovate-spatulate, entire, tapering at the base into a slender petiole. Flowers axillary sessile; segments of the calyx very short.
   Red. 2. Through the summer. In water.

   Yellow. 2 July—Oct. In swamps, middle Car. & Geo.

   Yellow. 2 May—June. In wet places. Stem 3-10 inches.

Genus VI. PROSERPINACA.


   2. April. In shallow waters.

   4. May—April. In shallow water. 2-8 inches.
Genus VII. Myriophyllum.

*Flowers* perfect or monocous. *Calyx* 4-parted. *Petals* 4 or none. *Stamens* 4–8. *Ovary* 4-celled. *Fruit* of 4 indehiscent carpels, cohering by the inner angles, adhering to the tube of the calyx. Aquatic plants. The submersed leaves pinnate with filiform segments. *Flowers* sessile, axillary, the upper stamine, the middle perfect, the lower fertile.


Order XLVII. Turneraceae.


Genus I. Turnera.

*Petals* longer than the calyx. *Stigmas* many cleft.


Order XLVIII. Passifloraceae.

DICOTYLEDONOUS.

Genus I. PASSIFLORA.


Order XLI. CUCURBITACE.


Genus I. BRYONIA.


Genus II. MELOTHRIA.


Genus III. SICYOS.

Flowers monoecious. Calyx 5-toothed, flattish, teeth subu-

1. S. **Anulatus.** A small procumbent vine, viscidly pubescent. *Leaves alternate, cordate, 5-angled, toothed, sebaceous, palmately veined; tendrils 3-5 cleft, sterile flowers in racemose corymbs, on long peduncles. *Fruit viscidly pubescent with introrse sebaceous, bristles.


**Genus IV. Cucurbita.**


**Order L. Cactaceae.**


**Genus I. Cactus.**


Yellow. © Through the summer. Common.
**DICOTYLEDONOUS.**

**ORDER LI. CRASSULACEÆ.**

Calyx 4-5-cleft, persistent. Flowers 4-5, with as many hypogynous scales at the base of the ovary. Ovary 5, generally distinct. Ovules numerous. Carpels many seeded, opening by the inner suture. Seeds anatropous. Succulent plants.

**Genus I. SEDUM.**

Calyx 5-cleft, inferior. Corolla 4-petaled. Stamens 10. Styles 5. Capsules 5, with 5 nectariferous scales at the base of the germ.


2. \( \text{S. Ternatum.} \) Stem creeping, branching from the base. Leaves flat, glabrous, entire, the lower ones verticillate by threes, broad, cuneiform, obovate, the upper ones sessile, oval or lanceolate. Flowers in a three spiked cyme. Stamens 8, with the exception of the terminal ones, which has 10. Petals linear-lanceolate, acute. Stone crop. Floral color: White. 4. May-June. Mountains.


**Genus II. DIAMORPHA.**

Sepals 4, united at the base, obtuse. Petals 4, concave.—Stamens 8, with purple, nearly round, anthers. Carpels 4, with minute, obcordate scales at their base. Seeds 4-8. A succulent, biennial herb, branching from the base.


**Genus III. PENTHORUM.**

Calyx 5-cleft. Petals 5 or more. Stamens 10. Carpels 5, united, into a 5-angled, 5-celled capsule with 5 diverging beaks. Seeds minute, numerous. Perennial plants, with alternate, serrate leaves.

Order LII. SAXIFRAGACEÆ

Saxifraga 4–5, united or distinct. Petals as many as the sepals. Stamens usually as many as the petals, inserted with the petals into the calyx. Ovary of 2–5 carpels either free from, or cohering to the calyx, 1-celled with parietal placentæ, or with as many cells as carpels, with central placentæ. Ovules usually numerous. Fruit a capsule, and generally with a septicietal dehiscence. Seeds anatropous, numerous and small. Embryo straight.

Genus I. SAXIFRAGA.

Saxifraga 5, more or less united. Carpels 2-beaked, 2-celled, many seeded, free or attached to the calyx, opening by a hole between the beaks.


White tinged with purple. 4 Mountains. 4–12 in.

Genus II. BOYKINIA.

Calyx turbinate, or urceolate, cohering to the ovary, 5-cleft, segments acute, triangular. Petals 5, entire. Stamens 5. Styles 2–3, short. Capsule 2–3-celled, with a central placenta, many seeded, 2-beaked, dehiscent by pores between the beaks. Perennial plants, with alternate, lobed, and palmately round leaves. Flowers in corymbose cymes, small.


White. 4 June—July. Mountains.

Genus III. HEUCHERA.


1. Americana. Stem somewhat viscid, generally naked. Leaves 7–9 lobed, lobes rounded, obtuse, dentate, teeth mucronate, ciliate. Flowers nu-
merous in loose elongated panicles, bracteate. Petals spatulate, small. Seeds small numerous.

White. 4 April—May. Rich damp soils common. 1-2 feet.


Genus IV. ASTILBE. (Tiarella of Elliott.

Calyx campanulate, 5-parted persistent. Petals 5, inserted on the calyx, spatulate, marcescent. Stamens 10, exerted. Anthers cordate, 2-celled on subulate filaments. Capsule 2-celled, dehiscing longitudinally along the inside of the carpels, which separate after maturity. Perennial plants, with compound leaves, leaflets serrate. Flowers in crowded panicles, bracteate.


Genus V. CHRYSOSPLENIUM.


Genus VI. LEPUROPETALON.


1. L. Spathulatum. Stem glabrous, somewhat succulent, slightly angled,
branching from the base. Flowers large for the size of the plant. Calyx persistent; segments ovate. Petals scale-like, ovate. Capsule 3-valved at the summit.

White. O. March—April. Close soils. 1 inch.

**Genus VII HYDRANGEA.**

*Calyx* 5-toothed. Flowers fertile, or sterile; calyx of the sterile flowers membranaceous, colored, flat, dilated; the remaining organs rudimentary, or none; tube of the calyx in fertile flowers, hemispherical, cohering to the ovary, ribbed. Petals 5, ovate, sessile. Stamens double the number of the petals. **Styles 2.** Capsule 2-celled, dehiscing by an aperture between the styles. Seeds numerous. Shrubs with opposite leaves, with cymose flowers.

1. *H. Arborensis.* Stem with opposite branches, pubescent when young. Leaves oblong-ovate, acuminate, dentate, nearly glabrous. Flowers in fastigiate cymes, generally fertile. **Styles 2.**

White. h. May—June. Mountains. 6-8 feet.


White. h. May—June. Mountains. 6-8 feet.

3. *H. Nivea.* Leaves ovate, cordate, acuminate, serrate, pubescent along the veins on the upper surface, silvery, tomentose beneath. Flowers in terminal radiate cymes, with few sterile florets in the circumference; by cultivation all become sterile.


4. *H. Quercifolia.* A showy shrub. Leaves deeply 3-5 lobed, serrate, tomentose beneath. Flowers in paniculate, radiate cymes, sterile flowers large, numerous.


**Genus VIII. DECUMARIA.**

*Calyx* 8-12 cleft, tube campanulate, adhering to the ovary. Petals 8-12, narrow, oblong, with margins somewhat induplicate. Stamens 3 times the number of the petals. Capsule 5-10-celled, ribbed, opening between the ribs; placenta central. Seeds numerous. A shrub with opposite leaves. Flowers in compound cymes, fragrant.

1. *D. Barbara.* Stem climbing by rootlets large trees. Leaves broadly ovate, slightly serrate, acute at each end, or obtuse at the base. Flowers in corymbose panicles.

White. h. July. In middle Georgia. 20-40 feet.

**Genus IX. PHILADELPHUS.**

*Calyx* 4-5-parted, persistent, tube adhering to the ovary. Petals 4-5, broadly obovate. Stamens numerous. Styles 4,
more or less united. Capsule 4–5-celled, with a loculicidal dehiscence. Seeds numerous. Shrubs with opposite leaves.


ORDER LIII. HAMAMELACEÆ.

Calyx 4–5-cleft or with 5–7 obscure teeth, the tube somewhat adhering to the ovary. Petals 4–5 linear, spiral at the apex, sometimes none. Stamens twice the number of the petals, or indefinite. Capsule ligneous, 2-beaked, 2-celled, dehiscent at the summit. Seeds anatropous. Shrubs with alternate leaves, feather veined.

Genus I. Hamamelis.

Calyx 4-parted, with 2–3 bracts at the base. Petals 4 marcescent. Stamens 4 that are fertile, and 4 sterile, the latter opposite the petals. Styles 2. Capsule bony, cohering at the base to the calyx, 2-celled. Seeds one in each cell, shining.


Genus II. Fothergilla.


ORDER LIV. UMBELLIFERÆ.

Calyx adhering to the ovary. Limb 5-toothed or entire. Petals 5, usually inflexed at the point. Stamens 5, alternate with
the petals. **Ovary** consisting of 2 united carpels, covered by the coherent calyx, 2-celled, an ovule in each cell. **Styles** 2. **Fruit** consisting of 2 carpels, adhering to a common axis, indeliscent; marked with 5 longitudinal ribs. **Seeds** anatropous embryo minute. Herbaceous plants with fistular stems. **Leaves** compound, with sheathing petioles. **Flowers** in umbels.

**Genus I. HYDROCOTYLE.**

Margin of the calyx obsolete. **Petals** entire, ovate, acute. **Fruit** flattened laterally, 5-ribbed. Herbaceous plants, aquatic, creeping stems and peltate or cordate leaves. **Flowers** in simple umbels. **Involucre** 4 leaved.

1. **H. AMERICAN.** Stem glabrous. **Leaves** orbicular reniform, slightly 7-lobed, crenate. **Flowers** few, sessile in axillary umbels. **White** or greenish. **4.** May—June. Mountains. 2-3 inches.

2. **H. INTERRUPTA.** Stem terete, glabrous, creeping, branching. **Leaves** peltate, orbicular, doubly crenate. **Flowers** in small nearly sessile capitulum umbels, 4-8-flowered. **Fruit** broad. **White.** 4. Through the summer. In wet soils. 3-4 inches.

3. **H. UMBELLATA.** Stem glabrous, creeping or floating. **Leaves** peltate, crenate, emarginate at the base. **Fruit** somewhat tumid. **Calyx** slightly toothed.

White. 4. Through the summer. Grows in bogs. 4-6 inches.

4. **H. REPANDA.** Stem creeping. **Leaves** cordate, rounded, repandly toothed, hairy when young. **Flowers** in capitulum umbels, 3-4-flowered. **Fruit** reniform, 4-ribbed on each side, involucre 2 concave bracts.

White. 4. Through the summer. Damp soils.

5. **H. RANUNCULOIDEAS.** Stem creeping or floating, glabrous. **Leaves** reniform, 3-5-ribbed, crenate. **Umbels** 5-10-flowered on peduncles shorter than the petals. **Fruit** orbicular, smooth, obscurely 2-ribbed on each side.


**Genus II. CRANTZIA.**

**Calyx** with a subglobose tube, margin obsolete. **Petals** roundish, entire, obtuse. **Fruit** subglobose nearly orbicular. **Carpels** unequal, small, glabrous, creeping plant with linear, entire, succulent leaves. **Umbels** few flowered, simple.

1. **C. LINEATA.** (Hydrocotyle Lineata of Elliott.) **Leaves** erect, 1-2 inches long, marked with transverse lines, cuneate, linear, obtuse. **Umbels** 8-12 flowered. **Involucre** 5-6 leaved.

White. 4 April—May. Low country.

**Genus III. SANICULA.**

**Calyx** with 5 somewhat foliaceous teeth. **Petals** obovate, erect, with a long inflexed point. **Carpels** clothed with hooped bristles, without ribs. **Seeds** hemispherical. Radical leaves on long petioles.

1. **S. MARILANDICA.** Stem terete, glabrous, dichotomously branched towards
the summit. Leaves digitately 5-parted; segments incisely serrate, the middle lobe distinct to the base, lateral ones slightly confluent at the base. Flowers in somewhat capitulate umbels, a part sterile, fertile ones nearly sessile; tube of the calyx echinate. Fruit oval. Seed flat on one side.

Genus IV. ERYNGIUM.

Flowers capitately. Calyx with a roughened tube, with somewhat foliaceous lobes. Petals oblong, ovate, emarginate, with a long inflexed point. Fruit obovate, crowned. Carpels semi-terete. Flowers bracteate, the lower large, the others intermixed with the flowers, small, scale-like.


2. E. Virginianum. Stem glabrous, fistular, branched, thickened at the joints. Leaves long, lanceolate, incisely serrate, tapering at each extremity with prominent midrib. Flowers in numerous heads. Involucre long, subulate, sessile, whitish on the under surface.

3. E. Aromaticum. Stem branching towards the summit, leafy, many from each root. Leaves pinnately parted, crowded on the stem, bristly, with a silvery cartilaginous margin. Flowers in numerous heads on long peduncles. Involucre 5-leaved, leaves 3-cleft.

4. E. Virgatum. Stem erect or decumbent, glabrous fistular. Leaves spatulate, ovate, membranaceous, cauline ones on short petioles, toothed, or sharply serrate. Involucre 6-8 leaves, longer than the head; chaff biciliate. Flowers in heads in the angles of the branches near the summit.

5. E. Baldwinii. Stem prostrate, often creeping, branching, filiform. Leaves oval or ovate, petiolate, entire, or somewhat lobed, remotely toothed; upper ones usually sessile, 3-cleft, with narrow entire, lateral segments; middle segment entire, or 2-3 toothed. Flowers in small heads on axillary peduncles, with the involucre shorter than the heads.

Genus V. HELOSCIADIUM.

Calyx with an obsolete, or 5-toothed margin. Petals ovate, entire. Carpels with 5 prominent ribs. Fruit compressed, laterally ovate-oblong. Herbaceous plants, with compound or many parted leaves.

1. H. Nodiflorum. Stem procumbent, striate. Leaves pinnate; segments oblong, serrate; upper ones sometimes ternate, with acute leaflets. Flowers in umbels opposite the leaves, generally destitute of an involucre, sessile, or on short peduncles; petals expanding; acuminate.

2. H. Leptophyllum. Stem glabrous, slender, erect or diffuse. Leaves ternate with linear segments; cauline ones sessile or nearly so. Umbels opposite the leaves, sub sessile, involucre none. Fruit small glabrous.
GENUS VI. DISCOPLEURA.


2. D. COTATA. Stem branching towards the summit, slightly angled, glabrous. Leaves very compound; leaflets parted to the base, somewhat verticillate. Umbels terminal, large; 10-12-leaved, dissected, involucel, many leaved, as long as the pedicels. Petals acuminate. Seeds glabrous, ribbed. White. Oct.—Nov. Swamps on the Ogeechee. 4-5 feet.


GENUS VII. LEPTOCAULIS.


GENUS VIII. CICUTA.

Margin of the calyx 5-toothed, somewhat foliaceous. Petals obcordate, with an inflexed point. Fruit laterally compressed. Carpels ribbed. Seed terete. Aquatic, perennial, glabrous herbs, with fistulous stems. Involucel few leaved, or none; involucels many leaved.


GENUS IX. SIUM.

Margin of the calyx 5-toothed. Petals obovate, with an
inflexed point. **Fruit** sub-globose, laterally compressed.—**Carpels** ribbed. **Seeds** nearly terete. Perennial herbs, with pinnately divided leaves. **Flowers** in many rayed umbels.

1. **S. Lineare.** Stem angular; segments of the leaves linear lanceolate, serrate. Involucre 5-6-leaved. **Umbels** with about 20 rays. **Petals** with an obtuse, inflexed point. **Fruit** strongly ribbed, obovate. **Water Parsnip.**

White. 4. June—July. Florida. 2-5 feet.

**Genus X:** **NEUROPHYLUM.**

Margin of the calyx 5-toothed, persistent. **Petals** obovate, with an inflexed point. **Fruit** ovate, laterally compressed, minutely ribbed. **Seed** nearly flat on one side, convex on the other.

1. **N. Longifolium.** Stem glabrous, slender, striate above. **Leaves** ternately divided, with long, linear, entire segments, the upper ones undivided, rays of the umbel 10, slender. Involucre 2-4-leaved; involucels 5-6-leaved. White. 4. Sept. Near Macon, Ga. 3-4 feet.

**Genus XI.** **CRYPTOTÆNIA.**

Margin of the calyx obsolete. **Petals** obcordate, with an inflexed, narrow point. **Fruit** linear-oblong. **Carpels** obtusely ribbed. **Seed** teretely convex on one side, the other slightly concave. Perennial herbs, with ternate leaves.

1. **C. Canadensis.** Stem erect, glabrous, with many branches; leaflets ovate, acute, sometimes notched, radical ones 2-3-lobed, serrate. **Umbels** numerous, rays unequal. Involucre none; involucels few leaved, small, subulate, with abortive flowers in each umbel. **Seeds** acuminate pointed, with persistent styles. White. 4. June—Sept. In shady, rich soils. 2-3 feet.

**Genus XII.** **ZIZIA.**

Margin of the calyx obsolete, or 5-toothed. **Petals** oblong with an inflexed point. **Fruit** compressed, roundish, or oval. **Carpels** ribbed. **Seed** convex on one side, flat on the other. Perennial herbs. **Leaves** ternately divided.

1. **Z. Aurea.** Stem erect, glabrous, terete. **Leaves** binate; segments oblong-lanceolate, serrate, terminal one alternate at the base, serrulate, glabrous. **Umbel** 10-15 rayed, involucre of 2-3 very small leaflets. **Fruit** elliptical, nearly black when mature. Yellow. 4. May. Common. 1-2 feet.

2. **Z. Integerrima.** Stem glabrous, and slightly glaucous. **Leaves** 2-3 ternately divided, terminal leaflet usually 2-3-lobed; segments oblong-ovate, entire. **Umbels** on slender peduncles, with long slender rays. Involucels of 1-3 subulate leaflets. **Fruit** roundish-ovate, with prominent ribs. Yellow. 4. May—June. Common. 1-2 in.

**Genus XIII.** **THASPIUM.**

**Limb** of the calyx toothed, or nearly obsolete. **Petals** elip-
tical, with an alternated inflexed point. **Fruit** eliptical. **Carpels** convex, ribbed. **Seed** nearly terete. Perennial plants with ternate or binate leaves. **Flowers** in terminal umbels or opposite the leaves. **Involucre** none; involucels lateral, 3 leaved.


2. **T. Barbinode.** Stem pubescent at the nodes. Leaves bi or tri-ternate; segments cuneate, ovate, unequally serrate. **Involucre** terminal, and opposite to the leaves. **Fruit** eliptical or ovate, some of the ribs only winged. Deep yellow. 4. June. Banks of rivers. 1-2 feet.

**GENUS XIV. LIGUSTICUM.**

**Limb** of the calyx toothed or obsolete. **Petals** unguiculate, obovate emarginate, with an inflexed point. **Fruit** slightly compressed or nearly terete. **Carpels** ribbed, somewhat winged. **Seeds** somewhat semi-terete. **Leaves** ternate or 2-3 ternate. **Involucre** composed of few short subulate leaflets; involucels nearly the same.

1. **L. Actefolium.** (Angelica Lucida of Elliott.) Root large with a strong odor, a favorite food for hogs. Leaves tri-ternately divided; segments ovate, with deep serratures. **Involucre** composed of few short subulate leaflets; involucels nearly the same.

**GENUS XV. ARCHANGELICA.**

**Limb** of the calyx 5-toothed. **Petals** ovate, entire, with an incurved point. **Fruit** compressed on the back. **Carpels** with 3 dorsal ribs, with 2 marginal wings. Perennial herbs. Leaves bi-pinnately divided; petioles dilated at the base. **Involucre** almost wanting, involucels many leaved.

1. **A. Hirsuta.** (Angelica Triquinate of Elliott.) Stem pubescent near the summit, serrate; leaflets quinate; segments ovate-oblong, serrate, the upper connate. **Involucre** on long peduncles densely pubescent, rays rather long, spreading; involucels 6-10-leaved, sometimes unilateral. **Fruit** slightly winged, oblong. White or greenish. 4. July—Aug. So. Car. and Geo. 2-5 feet.

**GENUS XVI. TIEDMANNIA.**

**Limb** of the calyx 5-toothed. **Petals** ovate, with a narrow inflexed point. **Fruit** compressed on the back, obovate. **Carpels** ribbed, lateral ones dilated into a broad margin. **Seeds** flat. A biennial plant.

1. **T. Teretifolia.** Stem fistulous, erect, branching above. Leaves simple, terete, 4-5 inches long, divided by numerous transverse partitions, invo-
lucr many leaved, subulate, persistent; involucel similar, but smaller. Flow-
ers sessile; filaments red near the summit. Seeds compressed.
White. ♂. Aug.—Sept. Middle Georgia. 3-6 feet.

**Genus XVII. Archemora.**

Limb of the calyx 5-toothed. Petals obcordate with an inflexed point. Fruit somewhat elliptic lenticularly compressed. Carpels ribbed, lateral ones dilated. Perennial aquatic herbs. Involucre wanting or few leaved; involucels many leaved.

1. A. Rigidia. Stem erect, rigid, terete, striate fistulous. Leaves pinnately divided; segments ovate, oblong, remotely toothed, or entire, with a car-
talginous margin. Umbel of many slender rays. Fruit with the dorsal ribs greenish, lateral ones with a membranaceous margin.
White. ♀. Sept. Georgia—Florida. 3-5 feet.

2. A. Ternata. Stem striate, slender. Leaves ternately divided, on long petioles; segments linear, acute, entire, alternate. Involucre nearly want-
ing; involucel 5-6 leaved. Fruit oblong elliptic, surrounded with a thick winged margin.
White. ♀. Middle Car. & Geo. 2-3 feet.

**Genus XVIII. Daucus.**

Margin of the calyx 5-toothed. Petals obovate, emarginate, with an inflexed point, the exterior ones often larger, and deeply 2-cleft. Fruit compressed, ovate or oblong. Carpels with 5 filiform, bristly ribs. Biennial plants, with pinnately divided leaves.

1. D. Carota. Root fusiform. Stem hispid, branching. Leaves 2-3 pinnatified; segments pinnatifid, with lanceolate, cuspidate lobes. Involucre consisting of pinnatifid leaves, about the length of the umbel. Umbels con-
cave, the central one of each secondary one abortive. Carrot. Yellow. ♀. Naturalized.

2. D. Pusillus. Stem retrorsely hispid. Leaves bipinnate, with pinnatifid segments, with narrow, linear lobes; leaves of the involucre bi-pinnatifid. Seeds muricate, with 8 crested ribs.

**Genus XIX. Chærophyllum.**


1. C. Procumbens. Stem decumbent, glabrous, small. Leaves alternate, bi-pinnately divided; segments pinnatifid, divisions lanceolate, mucronate. Involucre none. Umbels usually sessile, opposite the leaves, consisting of 2-4 rays; involucels 4-5-leaved. Fruit oblong, striate pointed at the summit.
White. ♀. April—May. Shady places. 6-18 inches.

**Genus XX. Osmorhiza.**

Margin of the calyx obsolete. Petals oblong, with an in-

1. O. BREVISTYLIS. Stem pubescent when young, glabrous in shady places, erect. Leaves bi-ternate; segments oblong, serrate, sprinkled with hairs. Umbels opposite the leaves. Styles conical, short. Fruit tapering at the summit.

White. 4. May—June. Moist woods. 1-2 feet

ORDER LV. ARALIACEÆ.

calyx obscurely 5-toothed, adhering to the ovary. Petals 5, aestivation valvate. Stamens equal in number to the petals, and alternate with them, filaments short. Ovary 2-3-celled, with a solitary ovule in each cell. Styles 2, erect, or spreading. Fruit drupaceous, 2-3-celled. Seed anatropous. Herbaceous plants with compound leaves. Flowers umbellate.

GENTS I. PANAX.

Limb of the calyx very short. Fruit orbicular, or didymous. Perennial herbs, with sheathing petioles.


Yellowish green. 4. July. Mountains. 10-12 inches.


Yellowish green. 4. April. Mountains.

ORDER LVI. CORNACEÆ.

calyx 4-toothed, minute, adhering to the ovary. Petals 4, distinct, oblong, spreading, inserted with the calyx into an epigynous disk, aestivation valvate. Drupes baccate, with a 1-2-celled nucleus, crowned with the calyx. Seeds anatropous. Trees or shrubs, with an astringent bark. Flowers in cymes.

GENTS I. CORNUS.

Stamens 4-5, with filiform filaments. Style sub-clavate. Leaves entire, covered with appressed hairs. Dogwood.


White. 4. May—June. 4-6 feet.

White. 12 June. In dry, sandy soils. 4-10 feet.

4. **C. Sericea.** A shrub, with expanded branches. *Leaves* ovate, acuminate, glabrous above, silky pubescent beneath. *Flowers in depressed wolly cymes; teeth of the calyx lanceolate.* *Petals* lanceolate, obtuse.  
Yellowish white. 12 June. Mountains. 5-10 feet.

Yellowish. 12 March—April. In rich soils.

**Order LVII. Loranthaceae.**

*Calyx* attached to the ovary in fertile flowers; in perfect flowers double. *Corolla* 3-4-8 petals, distinct, or adhering to the base, estivation valvate. *Stamens* equal in number to the petals, and opposite them, or as many as the segments of the calyx, when the corolla is wanting and inserted upon them. *Ovary* 1-celled. *Fruit* baccate, 1-celled, 1-seeded. *Seed* anatropous, cotyledons sometimes united, parasitical evergreen plants, with fleshy, coriaceous leaves. *Flowers* dioecious.

**Genus I. Viscum.**


**Misseltoe.**

1. **V. Flavescens.** A small shrub, growing parasitically on the branches of most trees, branches opposite, or verticillate. *Leaves* cuneate, obovate, nearly sessile, 3-nerved, obtuse. *Flowers in spikes.* *Fruit* yellowish white, pellucid.  
Yellowish. 12 April—May. Common.
Sub-Class II. MONOPETALÆ or GAMOPETALÆ

Flowers in which the petals are firmly united, forming a tube of greater or less length. There are a few cases in which the petals are separate, or nearly so, as in Mylocarum, Clethra, Cyrrilla, Bejararia, Halisia, Diptera, &c.

Order LVIII. PYROLACEÆ.


Genus I. PYROLA.


Genus II. CHIMAPHILA.

Calyx and Corolla as in the preceding. Stigma sessile, orbicular. Anthers beaked. Capsule 5-celled, dehiscing at the angles.

1. C. Maculata. A small creeping plant. Leaves lanceolate, acuminate, incisedly serrate, variegated in the middle with white, opposite or by threes. Flowers in corymbs on pubescent peduncles, fragrant, nodding. Spotted Wintergreen.


Remarks. This plant resembles very closely the C. Umbellata in its sensible properties of taste and smell, and, we should presume, would have nearly the same effect on the human system. The C. Umbellata is a well known remedy under the names of Pyrola Umbellata and Pipisseuca, the latter, no doubt, its Indian name. The Indians, it is well known, highly esteemed it as a remedy in scrofula, rheumatism, &c. It is astringent, tonic and diuretic, and has been recommended in dropsy.

Genus III. MONOTROPA:

Calyx 5-parted, cuculate at the base. Corolla 5-petaled.

Part II. 10


White. July. Shaded soils. 8-10 in.

Order LIX. ERICEÆ.

Calyx 4–5-cleft, nearly equal, inferior, persistent. Corolla hypogynous, 4–5-cleft, regular or irregular; aestivation imbricate. Stamens 4–10, hypogynous. Anthers 2-celled, separate at the apex or base. Ovary many celled, many seeded, surrounded by scales, or disk at the base. Style 1, straight. Stigma simple or toothed. Fruit capsular, with central placenta. Seeds numerous, minute. Shrubs with evergreen, entire leaves, whorled or opposite.

Genus I. MYLOCARIUM.


Genus II. ELLIOTTIA.

Calyx 4-toothed, inferior. Corolla 4-parted. Stigma capitate, or clavate, undivided.


Genus III. GUALThERIA.

I. G. Pecumbens. A very small shrub. Stem procumbent, branches erect. Leaves obovate, acute at the base, crowded towards the summit, coriaceous, with fine serratures. Flowers few, terminal, nodding. Fruit a berry, red, edible.


Genus IV. CLETHRA.

Calyx 5-parted, persistent. Petals 5. Stamens 10. Style 1-3-cleft at the summit, persistent. Capsule 3-celled, 3-valved, enclosed by the calyx.


White. 12 July—Aug. Middle Carolina and Georgia.


3. C. Scabra. Similar to the preceding. Leaves sebaceous on both surfaces, with large uncinate serratures. Flowers in somewhat paniculate spikes, tomentose.

White. 12 July. Near Flint River, Middle Ga. 3-4 ft.

4. C. Paniculata. Leaves narrow, cuneate, lanceolate, acute, with acuminate serratures, glabrous on both surfaces. Panicle terminal, with the branches racemose, tomentose, and white. Elliott.

5. C. Acuminata. A small tree. Leaves on long petioles, oval, acuminate, serrate, glabrous, somewhat glaucous beneath. Flowers in racemose spikes, bracteate, with bracts longer than the flowers.

White. 12 Mountains.

Genus V. MENZIESIA.


Genus VI. ANDROMEDA.


White. 12 April—May. Mountains. 2-5 feet.

2. A. Angustifolia. Resembles the preceding. Leaves slightly ferrugi-
DICOTYLEDONOUS.

nous beneath, with revolute margins; segments of the calyx acuminate. Corolla oblong-ovate.

White. ½ April—May. In wet places. Middle Car. & Ga. 2-5 ft.


White, tinged with red. ½ March—April. In wet lands. 3-6 ft.


White. ½ June—July. Middle Ga. & Car. 1-3 ft.


White. ½ February—April. Margin of swamps. 2-4 ft.


White. ½ April. On the margins of swamps, middle and Southern Ga.


White. ½ June. Mountains.


White. ½ June—July. Pine barrens. 3-5 feet.


Yellowish. ½ June—July. Southern Geo. and Florida. 15-20 ft.


White. ½ May—June. Damp soils. 3-15 feet.


White. ½ May—June. Damp soils. 3-5 feet.


White. ½ Middle and upper Geo. & Car. June—July. 15-20 feet.


White. ½ March—May. Wet places. 3-5 feet.


White. ½ May—June. Southern Car. & Geo. 3-4 feet.
15. **A. Mariana.** A small shrub, sparingly branched. *Leaves* broad-lanceolate, acute, entire, coriaceous, sour to the taste. *Flowers* in clusters near the summit of the old branches; peduncles 1-flowered. *Corolla* ovate; filaments hairy at the base.

White, tinged with red. **r2. May—Aug. Dry sandy soils.**

**Genus VII. CYRILLA.**

*Calyx* minute, 5 parted. *Petal* s 5, inserted into the *calyx.*

**Stamens** 5. **Style** 1. **Stigmas** 2. *Fruit* a berry, 2-celled. *Seeds* solitary.

1. **C. Racemiflora.** A large shrub with vericellate branches, which spring from the summit of the wood of the preceding year. *Leaves* alternate, cuneate, lanceolate, coriaceous, alternate, growing only on the new wood; peduncles slightly decurrent. *Flowers* in simple racemes, clustered at the summit of the branches of the preceding year. *Calyx* small. *Petal* s scarcely united, inserted into the *calyx.* *Anthers* bifid at the base, 2-celled. **Style** short, thick. **Stigmas** 2, obtuse.

White. **r2. June—July. 10—15 feet.**

**Genus VIII. KALMIA.**

*Calyx* 5 parted. *Corolla* salver form, with a border continuing at the base into 10 cornute protuberences, into the cavities of which the anthers are concealed. **Stamens** 10. **Style** 1. **Capsule** 5-celled.


2. **K. Angustifolia.** A very small shrub, with creeping roots. *Leaves* scattered, or ternate, oblong, obtuse, slightly ferruginous underneath. *Flowers* in lateral corymb; peduncles and *calyx*, glandular, pubescent.

Red. **r2. April—May. Sandy woods. 1—2 feet.**

3. **K. Cuneata.** *Leaves* cuneate, oblong, pubescent underneath, scattered, slightly awned at the apex. *Flowers* few, in lateral corymb.

White with red near the base. **r2. June—July. Southern Car. 1—2 ft.**

4. **K. Hirseta.** A small shrub, with hairy branches. *Leaves* alternate, and opposite nearly sessile, lanceolate, acute, hairy. *Flowers* solitary, on axillary peduncles, longer than the leaves.

Red. **r2. May—Sept. In wet sandy pine barrens. 10—18 inches.**

*Remarks.*—The Kalmias afford some of the most splendid ornaments of the forest. The leaves are all poisonous, nevertheless some animals, it is said, eat them with impunity, and that too, to such an extent, as to make their flesh poisonous to man, it becoming so impregnated with the poison of the leaves. This has proved the case with Partridges after a winter of deepsnows among the mountains, when the bird is compelled to live almost entirely on these leaves. An exstremity made from the leaves, has been used in cases of Skin-head, itch, and other cutaneous affections. Care should be had in its use, lest the system should be injuriously affected by the cutaneous absorption of the poison.

**Genus IX. RHODODENDRON.**

*Calyx* 5 parted. *Corolla* funnel shaped, with an unequal border. **Stamens** declined, 10. **Styles** 1. **Capsule** 5-celled.

1. **R. Maximum.** A large shrub. *Leaves* oblong, acute, the under surface lighter than the upper, coriaceous, thick, perennial, entire, ferruginous
on the under surface. Flowers in compact terminal racemes, covered when young with large ferruginous bractees. Corolla large, irregular. Stamens declining, longer than the corolla. Styles as long as the stamens. The leaves of this species vary considerably in form, some being oblong and the others acute at the base, the flowers also vary from purple, white, to rose color. Mountain Laurel.

1. Mountains. 4-20 feet.

2. R. Punctatum. A small shrub, with straggling branches. Leaves oblong-lanceolate, ferruginous underneath with resinous dots, glabrous above. Flowers in compact terminal racemes. Corolla with oval or ovate segments, a little undulate.

Pale red. ½ June—July. 4-6 feet.

Genus X. EPIGAEA.

Calyx 5-parted, with 3-bracts at the base, large. Corolla hypocrateriform, border 5-parted, spreading, tube villous within. Stamens 10. Style 1. Capsule 5-celled.


Genus XI. LEIOPHYLUM.


White. ½ Mountains. 6-8 inches.

Genus XII. BEJARIA.


White. ½ June—July. Southern Ga. 3-4 feet.

Genus XIII. AZALEA.

Calyx small, 5-parted. Corolla campanulate, with somewhat unequal segments. Stamens 5-inserted on the receptacle. Style 1, straight. Capsule 5-celled, 5-valved, dehiscing at the summit.

1. Calendulacea. A small shrub. Leaves ovate, pubescent on both sides. Flowers in clusters, large, not viscid, teeth of the calyx oblong. Corolla with rather a short tube. Flowers vary in color from deep red variegated with yellow, to bright yellow, and rose colored, all of which are often found growing near each other.

½ April—June. Abundant near Culloden. 2-6 ft.

Rose color. h April—May. Lower Car. and Ga. 3-4 feet.

3. **A. Bicolor.** A small shrub, with the young branches hairy, hispid. *Leaves* oblong, hairy on both sides. *Flowers* small, naked, not viscid. Calyx very short, with 1 long narrow segment. *Stamens* longer than the tube.

Nearly white, with red tube. H May—June. Sandy hills Ca. & Ga. 2-3 ft.

4. **A. Nudiflora.** A small shrub producing many stems from the root. *Stems* branching towards the summit, young branches pubescent. *Leaves* pubescent, lanceolate oblong, the veins beneath bistrly, alternate, crowded towards the summit, margins of under surface pubescent. *Flowers* in terminal racemes, tube of the corolla pubescent, viscid; segments of the border unequal, filaments longer than the corolla. *Capsule* hairy. A very variable plant, from which has arisen numerous varieties, but the preceding description we believe will include all the essential characteristics.

White, pale red, deep red, scarlet and yellow. H March—May. Common.


White or red. H May—July. Damp soils. 3-6 ft.

**Order LX. VACCINEÆ.**

*Calyx* adhering to the ovary, 4-5-toothed. *Corolla* urceolate, or sometimes campanulate, 4-5-cleft. *Stamens* 8-10, inserted into an epigynous disk. *Anthers* with 2 horns at the base, 2-celled. *Ovary* inferior, 4-5-celled, many seeded. *Style* simple. *Fruit* a berry, crowned by the limb of the calyx, succulent. *Shrubs* with alternate, coriaceous leaves.

**Genus I. VACCINIUM.**

*Calyx* superior, 4-5-cleft. *Fruit* globose, 4-5-celled, many seeded. *Stamens* 8-10.

(a.) *Leaves* deciduous, *Corolla* campanulate.


White. H April—May. Dry soils. 2-3 feet.


3. **V. DEUOMEN.** A small shrub, with the young branches sprinkled with red spots. *Leaves* cuneate, obovate, nearly sessile, finely serrulate, with revolute margins. *Flowers* in leafy racemes; pedicels solitary, axillary; pedicels and calyx roughened with glandular dots. *Corolla* angled, berries nearly black. *Bush-Wortleberry.*


4. **V. PROSODIUM.** A branching shrub, with the young branches pubes-
Dicutyledonous.

1. **Leaves** oval, lanceolate, entire, rugose, somewhat glaucous, slightly pubescent, sprinkled with glandular dots. **Flowers** 6–8, in racemes. Corolla contracted at the mouth, somewhat urceolate. **Fruit** large, blue.


5. **V. Resinosum.** A branching shrub. **Leaves** oblong, oval, entire, sprinkled with resinous dots on the under surface. **Flowers** in lateral racemes, second. Corolla short, ovate. **Stamens** exserted. Berries large, black.

White. April–May. Black–Wortleberry. 116

6. **V. Myrsinites.** A small shrub, erect, branching, young branches pubescent. **Leaves** small, sessile, ovate, mucronate, serrulate, pubescent when young, dotted on the under surface. **Flowers** in axillary and terminal racemes; segments of the calyx acute, red. Corolla oblong, or nearly urceolate.


7. **V. Myrtifolium.** A creeping shrub, glabrous. **Leaves** oval, petiolate, denticulate, shining. **Flowers** small, in sessile axillary clusters. Corolla campanulate 5-toothed. **Anthers** unawned. **Fruit** small, on pedicels, globose, black.


(c) Corolla urceolate.

8. **V. Corymbosum.** A shrub, with few geniculate, straggling branches. **Leaves** nearly sessile, long-lanceolate, acute, finely serrulate, pubescent when young. **Flowers** in crowded racemes near the summit of the stem, bracteate. Corolla oblong, slightly angled. **Stamens** short, with unawned anthers, filaments hairy. **Style** longer than the stamens. **Berries** black. Bilberry.


9. **V. Anonenum.** Corolla cylindrical. **Calyx** reflexed. **Flowers** large, young branches reddish.

10. **V. Fuscatum.** Leaves serrulate. **Flowers** in terminal, corymbose racemes, nodding. Corolla cylindrical, striped with red. **Calyx** brown.

11. **V. Virgatum.** A shrub with the flower-bearing branches, nearly leafless. **Leaves** oblong-serrulate, glabrous on both surfaces. **Flowers** in sessile racemes, bracteate. **Calyx** with reflected segments Corolla contracted at the throat.

White, tinged with red. March–April. Damp soils. 2–3 feet.

12. **V. Galzeans.** A small shrub, with pubescent, dotted branches, and creeping roots. **Leaves** sessile, lanceolate, cuneate, serrulate, pubescent, with the margins often tinged with purple. **Flowers** in sessile fasicles, axillary, with 3–4 bracts, at the base of each peduncle. **Corolla** long, nearly cylindrical, slightly angled; filaments hairy. **Anthers** uncrowned. **Fruit** small, black.

White, tinged with red. 12. March–April. Damp soils. 1–2 feet.

11. **V. Tenellum.** A small shrub, with numerous green branches, branches angled. **Leaves** sessile, ovate-lanceolate, mucronate, serrulate, shining on both sides. **Flowers** in dense terminal fasicles. **Calyx** green. **Corolla** ovate. **Fruit** blush-black, large.


12. **V. Myrtioides.** A large shrub, with long slender numerous branches. **Leaves** small, sessile, lanceolate, crenulate, glabrous shining. **Flowers** usually solitary, axillary. **Fruit** black.

White. 12. March–April. On the banks of rivers. Middle and Southern Geo. 6–8 feet.

Genus II. **Oxyccoccus.**

**Calyx** 4-cleft. **Corolla** with 4 linear segments. **Stamens**
8; filaments connivent. **Anthers** tubular 2 parted. **Fruit** many seeded.

1. O. Erythrocarpus. A small shrub, with erect, flexuous branches. **Leaves** oval, membranaceous, acuminate, serrulate, and ciliate, hairy along the veins. **Flowers** axillary. **Calyx** minute, 4-cleft; **segments** acute. **Corolla** long, revolute. **Fruit** red, transparent.

Red. 1. June. **Mountains.** 2-3 feet.

**Order LXI. PRIMULACEA.**

**Calyx** divided 4-5-cleft, inferior, regular, persistent. **Corolla** hypogynous, regular; limb 4 or 5-cleft. **Stamens** inserted upon the corolla, opposite to its segments. **Ovary** 1-celled. **Style** 1. **Stigma** capitate. **Capsule** with central placent. **Seeds** numerous, peltate; embryo straight, cylindrical. Herbaceous plants, with opposite, or whorled leaves.

**Genus I. LYSIMACHIA.**

**Calyx** 5 parted. **Corolla**rotate, 5-cleft. **Stamens** 5. **Stigma** 1. **Capsule** 10 valved, globose.

1. L. Herbemontii. **Stem** erect, glabrous, columnar. **Leaves** usually by fours, ovate-lanceolate, entire, glabrous, dotted, sessile, 3-5 nerved, lateral ones obscure. **Flowers** in terminal racemes, the lower flowers opposite, or verticillate, the upper alternate; **segments** of the calyx linear-lanceolate; those of the corolla oblong-lanceolate, dotted; filaments 5, cohering at the base.

Yellow. 2. June—July. A few miles east of Columbia S. C.

2. L. Quadrifolia. **Stem** erect, hairy. **Leaves** verticillate by fours, ovate, acute, nearly sessile. **Flowers** on axillary peduncles; peduncles 1-flowered, about half the length of the leaves; **segments** of the calyx lanceolate, pubescent, dotted. **Stamens** shorter than the corolla, cohering at the base.

Yellow. 2. May—July. **Middle Car. & Geo.** 1-2 feet.

3. L. Lanceolata. **Stem** erect, simple, smooth. **Leaves** verticillate by fours, on short petioles, lanceolate. **Flowers** on verticillate peduncles, the upper ones in racemes; peduncles many flowered; **segments** of the corolla, ovate, acute.

Yellow. 2. June—July. **Middle Car.**

4. L. Ciliata. **Stem** erect, branching, quadrangular, furrowed, glabrous, dotted. **Leaves** generally by fours, verticillate, on rather short ciliate petioles, cordate-ovate, upper ones lanceolate. **Flowers** axillary, on 1-flowered peduncles, nodding; **segments** of the calyx acuminate, lanceolate; tube of the corolla, composed of a purple ring, sprinkled with yellow glands; **segments** toothed, slightly ciliate at the base. **Anthers** 2-lobed.

Yellow. 2. June—July. **In rich soils.**

5. L. Quadriflora. **Stem** glabrous, branching, furrowed. **Leaves** opposite, sessile, long-linear, lanceolate, narrowed at the base, almost to a petiole. **Flowers** on peduncles, by fours, terminal; **segments** of the calyx long, lanceolate, acuminate; those of the corolla, slightly crenate.

Yellow. 2. June—July. **Southern Geo.** 2-3 feet.

6. L. Heterophylla. **Stem** erect, branching, glabrous, angular. **Leaves** opposite, the lower ones nearly orbicular, becoming narrower towards the summit, the upper ones being linear, glabrous, ciliate at the base. **Flowers**
axillary nodding, on one flowered peduncles; segments of the calyx lanceolate, of the corolla, crenate.

Yellow. 74. June—Aug. Middle country of Car. & Geo.

Genus II. CENTUNCULUS.

Calyx 4-cleft, persistent, with lanceolate segments. Corolla 4-cleft, persistent, with acute segments. Stamens 4 inserted into the corolla. Capsule globose, 1-celled.


Red. 0. March. In pastures. 2-3 inches.

Genus III. HOTTONIA.

Calyx 5-parted. Corolla salver form, shorter than the calyx. Stamens 5, inserted on the tube of the corolla. Capsule globose.

1. H. INFLATA. Stem thick spongy, generally submersed. Leaves long, crowded, pectinate, submersed, with the segments linear, several scapes, rising from the summit of the stem, with inflated internodes. Flowers verticillate, pedunculate.


Genus IV. ANAGALLIS.

Calyx 5-parted, persistent, with acute, linear-lanceolate segments. Corolla 5-parted, with oblong segments, rotate. Stamens 5; filament 1. Capsule 1-celled.


Red. 0. June—July. Low country. 6-12 in.

Genus V. SAMOLUS.

Calyx 5-cleft, persistent. Corolla 5-lobed, salver form. Stamens 5, with 5 sterile filaments alternating with them. Capsule 1-celled, semi-inferior many seeded.

1. S. VALERANDI. Stem generally simple, erect. Leaves obovate, entire, obtuse, tapering into a petiole. Flowers in terminal loose racemes, small.

White. 74. June—Sept. In wet boggy places. 6-10 in.

Genus VI. MICRANTHEMUM.

Calyx 4-parted. Corolla 4-cleft, segments unequal. Stamens 2. Capsule 1-celled 2-valved, many seeded.

1. M. ORBICULATUM. Stem prostrate, creeping, glabrous, terete. Leaves
opposite, sessile, orbicular, abruptly narrowed at the base, entire, obscurely 5-nerved. Flowers axillary, solitary, on short peduncles; segments of the calyx slightly spatulate, the two upper ones shorter. Corolla shorter than the calyx: the lower segments elongated. Stamens dilated at the base. Anthers globose, 2-lobed, white. Style filiform. Capsule globose, 2-celled, 2-valved, many seeded, with central placenta. \textit{Round leaved Micranthemum.}

White. 2. Through the Autumn. Very common. 3-6 in.

2. \textbf{M. EMARGINATUM.} Stem prostrate or floating, creeping. Leaves sessile, oval, and obovate entire, emarginate, obscurely 5-nerved. Flowers smaller than the preceding, on very short peduncles. \textit{Large leaved Micranthemum.}

White. 2. Through the summer. Common in wet places.

\textbf{ORDER LXII. LENTIBULARIA.}


\textbf{Genus I. PINGUIICULA.}

\textit{Calyx} bi-labiate, 5-cleft. Corolla ringent, spurred at the base. Stamens 2, very short.

1. \textbf{P. ELATOR.} Stem none. Leaves all radicle, spatulate ovate, entire, viscid, obtuse, scape columnar, villous at the base, several from each root. Flowers solitary. Calyx deeply 5-cleft, the 3 lower segments approximate; tube of the corolla ventricose, villous within, veined with purple, equally 5-cleft; segments 2-lobed; spur obtuse, compressed, half as long as the tube. Anthers globose, approximate, 1-celled. Style short. Stigma somewhat 3-lobed. Capsule 1-celled, terminated by the persistent style. Tall Pinguiicula.


2. \textbf{P. LETEA.} Stem none; scapes 1-3 from each root, pubescent, 1-flowered. Leaves similar to the preceding. Calyx equally 5-cleft. Corolla campanulate, 5-cleft, with the segments 2-lobed, the inferior lamella of the stigma dilated, covering the anthers, the upper one minute; the whole plant pubescent, with the hairs terminated by a viscid gland. Yellow Pinguiicula.

Yellow. 2. March—April. Pine barrens very common.

3. \textbf{P. PUMILA.} Scapes several from each root, pubescent, hairs terminated by viscid globule. Leaves smoother than in the preceding species. Calyx pubescent, with obtuse segments. Corolla villous within; tube streaked with purple, yellowish. Stigma with the upper lamella slightly 3-lobed, short, the lower one ciliate, covering the anthers. Capsule globose, pubescent.


\textbf{Genus II. UTRICULARIA.}

\textit{Calyx} bilabiate, lips undivided, nearly equal. Corolla ringent, the lower lip spurred at the base. Stamens 2, with the filaments incurved, bearing the anthers within the apex. Stigma bi-lamellate. Capsule 1-celled.

1. \textbf{U. INFLATA.} Stem submersed, branching, terete, glabrous. Leaves alternate, the lower ones whorled, inflated, pinnatifid at the extremities; seg-
ments setaceous. *Flowers* in racemes, surrounded by a six leaved involucre, floating on the surface of the water. *Calyx* persistent, segments nearly equal, concave, ovate. *Corolla* with the upper lip entire, broad-ovate, smaller than the under lip, lower lip 3-cleft, the lateral segments broad, and shorter than the middle segments. Spur bifid, the lower lamella of the stigma dilated, ciliate, reflexed.

Yellow. 2. Still waters. Very common.

2. *U. Fibrosa*. Stem sub-mersed, round. *Flowers* in simple racemes; peduncles 6-8 inches long, columnar; pedicels 1-2 inches long, slender, upper lip of the corolla large, slightly 3-lobed, lower lip smaller; spur subulate, emarginate.

Yellow. 4. September—October. 2-3 feet.

3. *U. Saccata*. Stem sub-mersed, glabrous, terete. *Leaves* alternate, 4-5 parted at the base, segments divided, with setaceous segments; peduncles axillary, 1-2, generally 1-flowered, upper lip of the corolla nearly round, shorter than the lower; the middle segment of the lower lip oval, with reflected margin; spur subulate, covered by the reflected margins of the middle segment. Purple. 4. June—July. Stagnant waters, common. 1-2 feet.

4. *U. Longirostris*. Stem floating. *Leaves* divided, with setaceous segments. *Flowers* on peduncles 2-3 inches long, 2-flowered, lips of the corolla obscurely 3-lobed, the lower one emarginate, ascending.

Yellow. 4. June. Stagnant water. Carolina, Georgia.

5. *U. Gibba*. Stem floating; peduncle 6-8 inches long, bearing several small flowers. *Corolla* with the lips obscurely lobed; spur shorter than the lower lip of the corolla, gibbous in the middle.

Yellow. 4. June. In ponds in the low country.

6. *U. Bipartita*. Scape 2-4 inches high, bearing generally several flowers. *Corolla* small; lips nearly entire, equal; spur obtuse, half the length of the corolla, lower segment of the calyx generally 2-cleft.

Yellow. 4. October. In muddy places.

7. *U. Biflora*. Stem sub-mersed, slender. *Leaves* verticillately divided with setaceous segments. *Flowers* on axillary peduncles; peduncles long, (3-4 inches,) generally 2-flowered; lips of the corolla entire, or the upper one obscurely 3-lobed, reflexed, shorter than the lower; spur subulate.

Yellow. 4. May—June. In stagnant water.

8. *U. Personata*. Scape 1-2 feet high, slender, glabrous, leafless. *Flowers* 4-10 rather large; upper lip emarginate; spur subulate, slightly curved.


9. *U. Setacea*. Stem erect, setaceous, nearly leafless, with a few ovate scales. *Flowers* on short, setaceous peduncles, 4-7, lower lip 3-lobed, upper lip ovate; spur subulate; the lower lamella of the stigma incised.

Yellow. 4. April—May. Wet soils, common.

**Order LXIII. Sapoteæ.**

*Calyx* 5-cleft, regular, persistent. *Corolla* 5-cleft, hypogynous, regular, deciduous. *Stamens* 5, inserted into the corolla. *Style* 1. *Ovary* several celled, with an erect ovule in each cell. *Fruit* baccate, by abortion only one seeded; embryo erect, large. Trees or shrubs. *Leaves* alternate, entire, coriaceous, without stipules.

**Genus I. Bumelia.**

*Calyx* 5-cleft. *Corolla* 5-cleft, salver form. *Style* 1, para-corolla 5-leaved; drupe 1-seeded.
1. **B. Lycoides.** A small tree, with smooth branches, spiny. *Leaves* lanceolate, broad, smooth on both sides, on short petioles, clustered on the old alternate buds, alternate on the young branches; spines axillary. *Flowers* clustered, on 1-flowered peduncles; drupe black. 
Greenish white. 12 May—June. Wet soils. Middle Carolina, near Columbia.


White. 12 June—July. Dry, light soils. 8-12 feet.

**Order LXIV. EBENACEAE.**

*Flowers* dioecious. *Calyx* 4-6 cleft, nearly equal, persistent. *Corolla* urceolate, hypogynous, regular, 4-6 cleft, in the sterile florets 8-16 stamens; filaments frequently double, each bearing an anther. *Anthers* 2-celled, with longitudinal dehiscence; in the fertile florets 4-5 stigmas. *Fruit* fleshy, nearly globular, 8-12 seeded; embryo straight; cotyledons folicaceous. Trees or shrubs, with alternate ex-stipulate leaves.

**Genus I. DIOXYROS.**

Genus the same as the Order.

1. **D. Virginiaca.** A tree or shrub, with irregular branches. *Leaves* alternate on short petioles, oval-lanceolate, acuminate, somewhat pubescent along the margin. *Flowers* axillary, solitary, on short peduncles. *Calyx* of the fertile flowers persistent. *Fruit* yellowish red, with several large seeds immersed in a soft pulp, eatable when perfectly ripe. *Persimmon.*
Greenish yellow. 12 May—June. Common. 6-40 feet.

Remarks.—The Persimmon is too well known to need my directing the attention of the student to its uses or properties. The bark is a powerful astringent, and is used in intermittent fevers. The fruit when perfectly ripe, and mixed with yeast and sugar, makes an agreeable and healthy drink, known as *Persimmon Beer.*

**Order LXV. STYRACEÆ.**


**Genus I. STYRAX.**

*Calyx* 4-5-toothed. *Corolla* 5-parted. *Stamens* 10, uni-
ted at the base, cohering to the tube of the corolla. *Drupe* coriaceous, dry.


White. 12 April—May. In rich soils, middle Car. & Ga. 6-12 ft.


White. 12 April. On the margins of swamps. 4-6 ft.


White. 12 April. Margins of rivers. Middle Ga. 6-8 ft.

**Genus II. Halesia.**

*Calyx* 4-toothed, attached to the ovary. *Corolla* 4-cleft, or 4-petaled. *Stamens* 8-12. *Fruit* 4-angled, 2-seeded.


**Order LXVI. Ilicinææ.**


**Genus I. Ilex.**

*Flowers* dioecious. *Calyx* 4-toothed. *Corolla* rotate, 4-cleft, in the sterile flowers stamens 4, alternate with the segments of the corolla, and inserted into it; in the fertile florets stigmas 4. *Style* none. *Fruit* 4-seeded.

White. April—May. Dry, rich soils. 30-40 feet.


White. I. May. Common. 4-12 feet.


White. I. May—June. Swamps. 6-10 feet.

4. I. Myrtifolia. A shrub, with expanding, rigid branches, pubescent when young. *Leaves* alternate, perennial, linear-lanceolate, glabrous, occasionally with a few sharp serratures. *Sterile flowers* generally by threes, fertile ones solitary, axillary.


White. I. March—April. Loose soils, near the ocean. 6-15 feet.

6. I. Prinoides. A small shrub, with virgate branches. *Leaves* lanceolate, cuneate; peduncles several flowered, one of them abortive, the others fertile.

White. I. April—May. Near Culloden, Georgia.

**Genus II. PRINOS.**


1. P. Ambigens. A small shrub, branches terete, somewhat virgate.—*Leaves* deciduous, ovate-lanceolate, acuminate at each end, slightly serrulate, pubescent underneath, on short pedicles. *Flowers* with the sterile ones clustered, axillary, fertile ones generally solitary, or 3-4 in each axil; segments of the calyx sometimes 5, and of the corolla the same number. *Stigma* 4-5 furrowed. *Fruit* red, with 4-5 seeds.

White. I. April—May. Southern Georgia. 3-4 feet.


White. I.


White. I. June. Middle Carolina, Georgia. 6-8 feet.

5. P. Glaber. A small shrub, with many expanding branches. *Leaves* perennial, lanceolate, cuneate, alternate, glabrous, shining, somewhat serrate
towards the apex; fertile flowers, solitary, axillary; sterile ones clustered.  
Fruit black, 6–8-seeded.  
White. 2. May. On the margins of swamps. 5–6 feet.  

Order LXVII. CONVOLVULACEÆ.  
Calyx 5-parted, persistent. Corolla hypogynous, regular,  
5-lobed, deciduous, plaited. Stamens 5, inserted into the base of the corolla, alternate with its segments. Ovary 2–4-celled, occasionally 1-celled. Ovules few, erect. Style 1, usually bifid, sometimes separated to the base. Capsule 1–4-celled. Seeds borne at the base of the placenta. Herbs or shrubs usually twining. Leaves alternate, exstipulate.  

Genus I. CONVOLVULUS.  
Calyx 5 parted, sometimes bracteolate. Corolla funnel form or campanulate, plaited, with 5 segments. Stamens 5 shorter than the limb. Ovary 2–3-celled, few seeded. Stigmas 2. Style undivided.  
1. C. Tenuellus. Stem prostrate, branching at the base, hairy. Leaves on short petioles, elliptic, mucronate, slightly cordate, entire, somewhat hairy; peduncles axillary, bearing several flowers, longer than the leaves, bracts 2 at the summit of the peduncle. Calyx 5 leaved; acuminate, ciliate. Corolla small, externally hairy, with the margin obscurely 10 toothed; filaments 5, villous. Anthers sagittate. Style deeply cleft. Capsule hairy, 4-celled.  
2. C. Aquaticus. Stem tomentose. Leaves oblong-ovate, on short petioles; peduncles generally 3-flowered, some times as long as the leaves. Corolla hairy. Capsule tomentose.  
Rose color. 4. Through the summer. Middle and lower Geo.  
3. C. Spithameus. Stem erect, branching, pubescent. Leaves cordate, or oval, pubescent. Flowers solitary, on axillary peduncles; bracts longer than the calyx.  


GENUS II. IPOMOEAE.

Resembling the preceding genus. Stigma capitate globose. Capsule 3-celled.


2. I. BOSA NOX. Stem prostrate, roughened, sometimes prickly. Leaves cordate, entire, or angled; peduncles 1-3-flowered. Calyx awned. Corolla undivided, with a long tube, large, white. Elliott.


5. I. NIL. Stem twining hairy. Leaves cordate, the old ones 3-lobed, acuminate; peduncles 1-3-flowered; segments of the calyx subulate, long, villous. Corolla with the limb obscurely 5-angled. Stigma globose. White and Blue. O In cultivated lands common. August—Oct.


GENUS III. CUSCUTA.

Corolla 4-cleft. Corolla globose urceolate; limb 4-5 cleft. Stamens 5, inserted into the corolla. Stigmas 2. Capsule 2-celled, 2 seeds in each cell. Dehiscence transverse.
DICOTYLEDONOUS.


Genus IV. Dichondra.


Order LXVIII. Polemoniaceae.


Genus I. Phlox.

Calyx prismatic, deeply 5-cleft. Corolla salver form, with a flat 5-lobed border, lobes cuneate. Stamens unequal, inserted into the tube of the corolla. Capsule ovate, 3-celled, 1 seed in each cell.

1. P. Acuminata. Stem erect, little scabrous towards the summit, smooth towards the base. Leaves membranaceous, scabrous, lower ones spatulate-ovate, acuminate, upper ones lanceolate. Flowers in terminal corymbs; segments of the calyx subulate, awned; segments of the corolla rounded. Purple. 4 August—Sept. Common in the upper country. 3-5 ft.


5. P. Cordata. Stem erect, glabrous. Leaves cordate tapering towards the summit, auricled at the base, with scabrous margins. Flowers in somewhat paniculate corymbs, numerous, segments of the calyx awned, as long as the tube. Blue. 4 August. Upper districts Car. 1-2 ft.
6. P. Maculata. **Stem** erect, terete, dotted, sprinkled with glandular hairs. **Leaves** sessile, ovate-lanceolate, acute, with scabrous margins. **Flowers** in alternate corymbs. **Calyx** with subulate segments, angled. **Corolla** with ob-ovate rounded segments.


7. P. Carolina. **Stem** erect, pubescent. **Leaves** ovate-lanceolate, acute, glabrous. **Flowers** in fastigate corymbs: **Calyx** glabrous, with linear-lanceolate teeth; segments of the corolla rounded.


8. P. Nutida. **Stem** erect, glabrous. **Leaves** ovate-lanceolate, somewhat coriaceous. **Flowers** in fastigate corymbs; segments of the calyx linear-lanceolate, acuminate, those of the corolla obvate.

Purple. 4. May—June. Middle Carolina, Georgia.

9. P. Gladerrima. **Stem** erect, glabrous. **Leaves** linear-lanceolate, or oval-lanceolate, glabrous, long, smooth. **Flowers** in terminal corymbs; segments of the calyx acute, linear-lanceolate, of the corolla, nearly round.

Blue. 4. May—June. Low country. 1-2 feet.

10. P. Aristata. **Stem** erect, slender, pubescent. **Leaves** linear. **Flowers** few, corymbose; segments of the calyx awned; tube of the corolla curved; segments obvate.


11. P. Pilosa. **Stem** erect, villous, purple, covered with a white pubesence. **Leaves** linear-lanceolate, or ovate lanceolate, pubescent, sessile, with revolute margins. **Flowers** in fastigate corymbs, bracteate; segments of the calyx hairy, acute, subulate, those of the corolla obvate or acute.


12. P. Amenia. **Stem** decumbent, assurgent, hirsute. **Leaves** ovate-lanceolate. **Flowers** numerous, in corymbs; segments of the calyx subulate, those of the corolla obvate.

Purple. 4. May—June. Southern Georgia.

13. P. Divaricata. **Stem** erect, smooth, with divaricate branches. **Leaves** remote, ovate, membranous, sessile, upper ones alternate. **Flowers** in corymbs, securior; segments of the calyx subulate.

Purple. 4. April. Swamps. 1-2 feet.

14. P. Subulata. **Stem** procumbent, assurgent, branching, hirsute. **Leaves** subulate, mucronate, ciliate, pubescent, the lower opposite, the upper alternate. **Flowers** axillary, somewhat corymbose. **Calyx** hairy, with acute linear segments; segments of the corolla cuneate, emarginate.

Blue color. 4. Feb.—May. In light soils, middle and upper districts of Carolina and Georgia.

15. P. Setacea. **Stem** procumbent, assurgent, hairy. **Leaves** subulate ciliate, somewhat fasiculate, pubescent. **Flowers** somewhat umbelled, or solitary, forming terminal corymbs; teeth of the calyx subulate; segments of the corolla cuneate, emarginate.

Purple. 4. April—May. Middle Carolina and Georgia.

**GENUS II. POLEMONIUM.**

**Calyx** campanulate, 5-cleft. **Corolla** rotate, 5-parted; segments erect. **Stamens** 5, inserted on 5 teeth or valves, which close the orifice of the corolla. **Stigma** 3-cleft. **Capsule** 3-celled.

1. P. Reptans. **Stem** erect, glabrous, branching. **Leaves** pinnate, from 7-11 leaflets; leaflets lanceolate, acute, glabrous, entire. **Flowers** terminal, nodding. **Calyx** 5-cleft.

Blue. 4. Mountains. 10-12 inches.
Genus III. CANTUA. (Syn. Ipomopsis.)


Remarks. One of the most beautiful of our native plants which has become extensively introduced into our gardens. We have never found it in any other locality than the one above noticed.

Genus IV. COLLOMIA.

Calyx 5-cleft, somewhat campanulate, large. Corolla funnel form, 5-lobed, lobes oval, oblong; tube straight, long, slender. Capsule 3-celled, triangular. Seeds oblong, angular, covered with a mucilage containing the fibro-cellular tissue.


Order LXIX. HYDROLEACEÆ.


Genus I. HYDROLEA.

Calyx 5-parted, or 5-leaved. Corolla campanulate, with the limb 5-parted, filaments inserted into the tube of the corolla, dilated at the base. Capsule 2-celled. Seeds numerous.


2. H. Corymbosa. Stem erect, or assurgent toward the summit, without spines. Leaves lanceolate, sessile, with the veins and margins pubescent. Flowers solitary on the extremities of the small branches, somewhat corymbose. Calyx with the segments acute hairy. Corolla campanulate, with ovate segments, with yellowish veins, and white spots near the base. Capsule globose, glabrous.

Blue. 7. Through the summer. In pine barren ponds. 1–2 feet.
HYDROLEACEAE—LOBELIACEAE.

Genus II. DIAPENSIA.


Order LXX. LOBELIACEAE.


Genus I. LOBELIA.


1. L. Kalmit. Stem erect, slender, radical leaves, spatulate, ovate or nearly orbicular, pubescent; cauline leaves, linear, nearly, subulate. Flowers in terminal racemes, small, scattered, on short peduncles. Calyx 4-cleft, with subulate segments. Corolla with a 3-cleft border; the lateral segments subulate, reflexed, the middle segment 3-cleft. Anthers cohering into a tube, villous at the summit. Stigma villosus Capsule 2-valved, 2-celled, surrounded by the calyx. Blue. 4. May—Aug. Damp soils. Common.


The seeds of this species, are used in large quantities, in the Botanico Medical practice as an emetic.

6. L. Sylphilitica. Stem erect, hirsute, angled, nearly glabrous near the


7. L. PUBERULA. Stem erect, slightly angled, silky, pubescent. Leaves sessile, the lower ones obovate, obtuse, serrulate, the upper ones lanceolate, finely serrulate, with a silky luster. Flowers in racemes on short pedicels, all turning to one side; segments of the calyx villous, lanceolate, ciliate.


A bright scarlet flower. 74. Sept. Damp rich soils. 2-3 feet.

Remarks.—The L. Inflata and Syphiliticus are possessed of powerful medical properties; the former of which has long been esteemed by the profession as a remedial agent in Asthma and other pectoral affections. It is now considered by a class of Practitioners known by the usual appellation of Thomistian, as of prime importance in the cure of almost all diseases. Its being of universal application, we believe they found on the hypothesis of its possessing alterative powers in a high degree. Of the truth of these assertions we are entirely unable to judge.

Order LXXI. Campanulaceæ.

Calyx superior, 5-parted, persistent. Corolla inserted into the top of the calyx, with a 5-cleft border, marcescent, regular, aestivation valvate. Stamens 5, inserted into the calyx. Anthers 2-celled. Ovary 2-celled, with many ovules. Style simple, hairy. Fruit dry, crowned by the persistent calyx and corolla, dehiscing by pores. Seeds numerous, attached to a central placenta. Herbaceous plants.

Genus I Campanula.

Calyx 5-cleft. Corolla campanulate, closed with valves, bearing the stamens. Stigma 3-cleft. Capsule inferior, 3-celled, dehiscing by lateral pores.


2. C. ACUMINATA. Stem erect, terete, glabrous. Leaves lanceolate, remotely serrate, cuneate, glabrous. Flowers generally 3 in the axil of each leaf.

Blue. 74. July—August. Mountains

3. C. DIVARIATA. Stem erect, glabrous. Leaves sessile, lanceolate, with a long, tapering summit, a cluster of small leaves in each axil. Flowers small, solitary, in terminal panicles, with subulate leaves at each division.

September. Mountains. 2 feet.

Order LXXII. Cinchonaceae.

Calyx superior, simple, divided or entire, bracteate. Corolla superior, tubular, with the number of divisions equal to those of the calyx. Stamens 4-5, inserted into the corolla, and alternate with the segments. Ovary inferior surmounted by a disk, 2 or several celled. Ovules numerous, placenta central. Style 1. Stigma simple. Fruit dry or succulent. Seeds few or numerous. Leaves simple, entire, stipulate.

Genera I. Spermacoce.

Calyx 4-leaved. Corolla funnel shaped with a 4-parted limb. Capsules 2-celled with 2 seeds in each cell.


Genera II. Diodia.

Calyx 2-leaved. Corolla funnel-shaped. Capsule 2-celled, 1 seed in each cell.


3. D. Hirsuta. Stem hirsute, slender, procumbent. Leaves narrow-lanceolate, the whole plant hispid. In other respects it resembles the preceding species.

Genera III. Cephalanthus.


Genus IV. Hedyotis.

Calyx 4-parted, persistent. Corolla shorter than the calyx; limb 4-cleft. Stamens 4. Stigma 1, sessile. Capsule 2-celled, many seeded, inferior.


Genus V. Pinckneya.


1. P. Pubens. A large shrub, with numerous stems from each root; young branches tomentose. Leaves opposite, lanceolate, cuneate, sessile, entire, connected by stipules, with 2 or more subulate teeth. Flowers in clusters, whorled, axillary and terminal. Calyx persistent, hisped, with 1-3-bracts at the base. Corolla with a somewhat greenish tube; segments of the calyx sometimes equal, at others one or two of them resembling bracts. Corolla tomentose, with a somewhat greenish tube; segments oval. Capsule nearly globose. Seeds flat. Purple. May—June. Wet soils. 15-20 feet.

Genus VI. Mitchellia.

Calyx 4 toothed. Corolla superior, in pairs upon the same germ. Stamens 4. Style 1. Fruit didymous, 4-seeded.


Order LXXII. Caprifoliaceae.

Calyx superior, 4-5-toothed generally bracteate. Corolla superior, lobed, sometimes irregular; with the segments alternating with those of the calyx. Stamens 4-5. Ovary 1-5-celled, cohering with the calyx. Ovules pendulous, few. Style 1, exerted. Stigmas 1-3. Fruit indehiscent, gener-
ally fleshy, crowned by the limb of the calyx, 1–5-celled. Seeds 1–2, or several in each cell. Shrubs with opposite leaves, exstipulate.

**Genus I. CAPRIFOLIUM.**

Calyx 5-toothed, very small. Corolla campanulate, 5-cleft, often irregular, with a long tube. Stamens 5. Style 1. Fruit 3-celled, few seeded.

1. *C. SEMPERVIRENS.* Stem twining, running over trees. Leaves oblong, oval, smooth on the upper surface, glaucous, and somewhat hairy on the under, the lower ones petiolate, the upper connate. Flowers in verticillate spikes. Calyx very small, persistent. Corolla funnel form, with 5 acute segments. Stamens inserted into the tube near the summit. Fruit red, with 4 seeds in each cell. **English Honeysuckle.** Woodbine. Bright red. 4. April—Oct. In damp soils.

2. *C. FLAVUM.* Stem twining, running over shrubs. Leaves oval, slightly cordate, glabrous, obtuse, deciduous, glaucous underneath, connate at the base. Flowers in terminal verticillate spikes. Corolla ringent, the upper lip broad, 4-cleft, reflexed; lower one entire, reflexed; tube hairy within. Yellow, or orange. 4. March—April. Upper Dist. Car.


**Genus II. DIERVILLA.**


**Genus III. SYMPHORIA.**

Calyx 5-toothed. Corolla with 5 nearly equal segments. Stamens 5. Fruit 4-celled, 4-seeded, sometimes 2-celled by abortion.

1. *S. GLOMERATA.* A small shrub. Leaves broad-lanceolate, entire, nearly sessile. Flowers small, numerous, clustered, axillary. Fruit purple, crowned by the calyx.


**Genus IV. TRIOSTEUM.**

Calyx 5-cleft, with linear-lanceolate lobes, as long as the corolla. Corolla tubular, nearly equally 5-lobed, gibbous at the **Part II.**
base. *Stamens 5.* *Style 1.* *Berry* 3-celled, 3-seeded, crowned by the calyx.


Yellow. 2. June—July. Mountains. 2–3 feet.

**Genus V. Viburnum.**


1. V. *Acerifolium.* A small shrub. *Leaves* slightly cordate, 3-lobed, acuminate, sharply serrate, pubescent beneath; petioles hairy. *Flowers* in cymes, on long peduncles. *Fruit* oval, compressed, black.


2. V. *Dentatum.* A shrub, nearly glabrous. *Leaves* orbicular, ovate, on long petioles, with large serratures, plaited. *Flowers* in large terminal cymes. *Fruit* nearly globose, blue, small.


5. V. *Nudum.* A shrub, with virgate branches, the old ones glabrous, the young clothed with a ferruginous pubescence. *Leaves* opposite, oval, with revolute margins, glabrous on the upper surface, with veins beneath, pubescent. *Flowers* in naked, terminal cymes, on jointed peduncles. *Calyx* white. *Corolla* with reflected, obtuse segments. *Fruit* blue.

White. 2. April—May. Common. 4–12 feet

6. V. *Obovatum.* A shrub, with virgate branches. *Leaves* obovate, cuneate, crenulate, dentate, or entire, crowded near the summit, the lower leaves broader than the upper. *Flowers* in sessile cymes. *Fruit* nearly globular.


7. V. *Cassinoides.* A shrub, glabrous. *Leaves* ovate-lanceolate, the lower ones obovate, the upper lanceolate, the intermediate ovate, margin slightly revolute; petioles keeled without glands. *Berries* nearly black, in other respects resembles the preceding species.

8. V. *Levigatum.* A small shrub, much branched; branches sprinkled with a brown dust. *Leaves* small, lanceolate, cuneate, nearly sessile, upper ones dentate, shining on the upper surface, the under dotted with brown dust. *Flowers* in small cymes, nearly sessile.

White. 2. March—April. Low country. 2–4 feet.

9. V. *Nuttatum.* A low glabrous shrub, with quadrangular branches. *Leaves* linear-lanceolate, shining on the upper surface, entire, or slightly serrate.

White. 2. April—May. Low country. 2–3 feet.
**Genus 6. SAMBUCUS.**

**Calyx** 5-parted. **Corolla** 5-cleft. **Stamens** 5. **Stigmas** 3. **Fruit** globose, 3-seeded berry.

1. **S. CANADENSIS.** A shrub thickened at the joints with glabrous branches. **Leaves** generally bi-pinnate; leaflets oblong-oval, acutely serrate, acuminate, glabrous, shining. **Calyx** small. **Corolla** rotate, with revolute ovate segments. **Flowers** in axillary cymes. **Fruit** globose, black. **White.** 1. April—May. Wet grounds. Common. 8-15 feet.

2. **S. PUBESCENS.** A small shrub, with the bark somewhat tuberculate. **Leaves** pinnate, leaflets 2-3 pairs, oval-lanceolate, acuminate, pubescent beneath. **Flowers** in crowded racemose cymes. **Fruit** red. **White.** 1. June—July. Mountains.

**Order LXXIV. STELLATE.**

**Calyx** superior, 4-lobed, or the wing nearly wanting. **Corolla** rotate, or tubular, regular, inserted into the calyx, with the lobes equal in number to the calyx. **Stamens** 4. **Ovary** 2-celled, with solitary erect ovules. **Style** 1. **Stigmas** 2. **Fruit** an indehiscent pericarp, 2-celled, 2-seeded. Herbaceous plants with whorled leaves. **Stems** quadrangular. **Flowers** minute.

**Genus 1. GALIUM.**

**Calyx** with the tube ovate-globose, or oblong; limb nearly wanting. **Corolla** rotate, 4-parted. **Stamens** 4. **Style** 2-cleft. **Fruit** didymous.

1. **G. TRIFIDUM.** **Stem** procumbent, assurgent, much branched, with the angles retrorsely aculate. **Leaves** by fours to sixes, narrowed at the base, flat, oval, with hispid margins, acute. **Flowers** on divaricate peduncles. **Fruit** frequently 1-seeded from the abortion of the other, smooth. **Purple.** 4. June—July. Mountains.

2. **G. LATIFOLIUM.** **Stem** erect, glabrous. **Leaves** by fours, narrowed at the base, linear, acute, with revolute margins, glossy. **Flowers** on 3-angled peduncles. **Fruit** frequently 1-seeded from the abortion of the other, smooth. **White.** 4. April—July. Damp soils.

3. **G. UNIFLORUM.** **Stem** procumbent, assurgent, smooth, sparingly branched. **Leaves** generally by fours, linear, acute, with revolute margins, somewhat scabrous; peduncles usually solitary, with a whorl of small leaves in the middle. **Fruit** purple, smooth. **White.** 4. May—July. In rich shaded grounds. 12 in.


5. **G. PILOSUM.** **Stem** hairy, branches axillary, spreading. **Leaves** by fours, oval, entire, ciliate, sprinkled with hairs; peduncles dioonotous, axillary, solitary or by threes. **Fruit** hispid, white. **Purple.** 4. May—Sept. In dry soils.

6. **G. CUSPIDATUM.** **Stem** prostrate, small, glabrous. **Leaves** by sixes, at-
tenuate at the base, very acute at the summit, somewhat hairy, slightly ciliate; peduncles trifid. *Fruit* villous, with white hooked hairs.


White. 4 June—Aug. In shaded rich soils.

**Genus II. Rubia.**


*Nuttall.*


In shady woods from Car. to Florida. *Pursh.*

**Order LXXV. Compositæ.**

*Calyx* united to the ovary, with the limb either wanting, or membranous, or divided into hair-like segments called *pappus*. *Corolla* ligulate, or tubular. *Stamens* 5, alternate with the teeth of the corolla. *Anthers* cohering into a cylinder. — *Ovary* inferior, 1-celled. *Style* simple. *Stigmas* 2 distinct or united. *Fruit* an indehiscent dry pericarp, crowned with the limb of the calyx. *Seeds* solitary, erect; albumen none. *Flowers* collected into dense heads, surrounded by an involucre.

The obvious characteristics of this order, are its compound flowers, and the union of the anthers. Herbs or shrubs. *Leaves* without stipules.

**Sub-Order I. Cichoraceæ.**

Plants usually with a milky sap. Florets of the capitulum all ligulate and perfect.

(a.) Hawk-weed Tribe. *Flowers* yellow or purple.

**Genus I. Hieracium.**

*Involucre* imbricate; receptacle naked; *pappus* simple, persistent, setaceous. *Flowers* yellow, solitary or corymbose, perfect.


Yellow. 4 May—June. In shaded soils. 1–2 feet.


3. H. Gronovii† Stem leafy, erect, hairy, with a glandular pubescence. *Leaves* few near the base of the stem, ovate, sessile, ciliate, pubescent. *Flow-
Involucro cylindrical, in a single row, somewhat imbricate at the base with a few appressed scales, receptacle slightly pitted. Florets perfect. Stigmas somewhat hispid, filiform. Fruit narrow, angled, pappus pilose, erect, persistent, colored, scabrous.


Yellow. 4. Aug.—Sept. 4-6 feet.

2. P. Cordata. Stem erect, generally glabrous. Leaves ovate-lanceolate, petiolated, cordate at the base, irregularly toothed, ciliate, upper leaves lanceolate. Flowers in racemose panicles, nodding, 6-8 flowers in a head; leaves of the involucre usually 8, with membranaceous margins. Seeds striate, with scabrous pappus.

Yellow. 4. July—Aug. Mountains. 4-6 feet.


Purple. 4. Sept. Mountains. 2 ft.

4. P. Virgata. Stem erect, simple, glabrous. Leaves sessile, runcinate somewhat amplexicaule, upper leaves, narrow lanceolate. Flowers in long terminal racemes, pendulous, 10-12 florets in a capitulum; involucre, with 8 oblong, obtuse leaves, fringed at the summit. Seeds cylindrical, striate, pappus scabrous.


5. P. Crepidine. Stem branching towards the summit. Leaves broad-lanceolate, attenuate at the base, upper ones sessile, denticulate, scabrous. Flowers in terminal panicles composed of nodding clusters; involucre with 8-10 nearly glabrous leaves; florets numerous, pappus scabrous.

4. Sept. Mountains. 4-6 feet.

6. P. Alba. Stem herbaceous, much branched, pubescent, slightly angled; radicle leaves hastate, angled, toothed; upper leaves spatulate obovate-lanceolate, toothed and angled. Flowers in loose panicles, in terminal clusters, nodding, florets 8-12 in a capitulum; involucre with 8 oblong pubescent leaves, fringed at the summit. Seeds cylindric, striate, pappus 7-seabrous.

Pale yellow. 4. Sept.—Oct. Dry soils. 2 ft.

7. P. Serpentina. Stem erect, nearly glabrous. Leaves hastate, radicle ones palmate, caudine ones on long petioles, sinuate pinnatifid, somewhat 3-lobed, middle segment 3-parted, with a long, attenuated base, upper leaves lanceolate. Flowers in terminal, paniculate racemes, nodding; florets 12 in each capitulum; involucre 8-eleft.

Purple. 4. August—October. Upper district of Carolina.

(b) Dandelion tribe. Flowers yellow, with a single exception.
DICOTYLEDONOUS.

**Genus III. Leontodon.**

*Involucr* imbricate, with a few loose scales at the base; florets perfect; receptacle naked, pappus, stiped.

1. *L. Taraxacum.* *Scapes* several from each root, terete, glabrous, each 1-flowered. *Leaves* all radicé, runcinate, oblong; segments lanceolate, toothed, slightly hairy when young; involucrum with numerous leaves, equal, sometimes colored; scales reflexed. *Seeds* oblong, angled, pappus stipitate hairy; receptacle convex


**Genus IV. Krigia.** (Syn. Cynthia.)

*Involucrum* many leaved, simple, receptacle naked, pitted, pappus double, exterior one chaffy, short, the interior pilose, rough. *Stigmas* linear-ligulate.

1. *K. Virginica.* A very small plant, glaucous, the primary leaves nearly round, entire, the rest lirate, nearly glabrous. *Scapes* glabrous, 1-flowered, becoming elongated by age; involucrum glabrous.


Bright yellow. 4. Feb.—April. Sandy soils, common.

3. *K. Dandelion.* *Scapes* bearing a few glandular hairs near the summit, slightly glaucous. *Leaves* oblong, narrow, slightly obovate, secondary leaves linear-lanceolate, long, somewhat glaucous; involucrum 10-12-parted.

Yellow. 4. April—May. Southern Georgia.

4. *K. Amplexicaulis.* *Stem* bearing leaves, somewhat branched, glaucons; radicle leaves spatulate, lanceolate, dentate, cauline ones somewhat amplexicaule, lanceolate or ovate; involucrum generally 12-parted. *Flowers* solitary, at the extremity of the branches, large, exterior pappus consisting of 5 scales.

Yellow. 4. June—July. Middle & upper dis. of Car. Ga. 12-14 in.

**Genus V. Apargia.**

*Involucrum* many parted, imbricate, with a few appressed scales at the base; florets perfect; receptacle dotted. *Fruit* compressed, somewhat fusiform, pappus plumose, persistent, sessile, pedunculate.


Yellow. 4. July.


Blue. 4. July.

(c.) *Lettuce Tribe.* *Flowers* usually yellow, with a milky juice and bitter taste.

**Genus VI. Lactuca.**

*Involucr* cylindrical, imbricate, scales membranaceous at

1. L. ELONGATA. Stem glabrous. Leaves long, smooth beneath, the lower ones runcinate, amplexicaule, entire, toothed, the upper ones lanceolate; involucre imbricate, reflected when old; florets numerous. Flowers in corymbose panicles. Seeds compressed, pappus stipitate, hairy. Fireweed. Yellow. April—September. 4-7 feet.


3. L. SAGITTIFOLIA. Stem erect, terete, glabrous. Leaves sessile, sagittate, tapering towards the apex, entire, glabrous. Flowers in loose, terminal panicles; involucre with glabrous, subulate leaves. Seed compressed, pappus hairy. Yellow. July—September. Middle Carolina. 4-6 feet.


Genus VII. BORKHAUSIA.

Involucre many leaved, with a dorsal tooth near the summit, surrounded at the base with a few short subulate scales. Pappus hairy, stipitate. Receptacle naked. Florets perfect.

1. B. CAROLINIANA. Stem erect, few flowered, pubescent, towards the summit. Leaves oblong-lanceolate, old ones pinnatifid, pubescent along the margins, narrow. Flowers few, solitary, on the summit of the branches; florets numerous. Seed compressed, striate. Yellow. March—July. Common.

Genus VIII. SONCHUS.

Involucre many leaved, imbricate, connivant at the summit. Florets perfect. Receptacle pitted, naked, or scabrous. Stigma hispid. Pappus hairy.


DICOTYLEDONOUS.

GENUS IX. CICHERIUM.

Involucre surrounded with leafy scales. Florets perfect. Receptacle naked, or somewhat chaffy. Pappus plumose, sessile, unequal.


SUB-ORDER II. CARDOVACEÆ. (Thistle Tribe.

Florets of the capitulum tubular. Receptacle chaffy. Stigma articulate. Leaves alternate, often spiny.

GENUS X. CNICUS. (Syn. Carduus)

Involucre ventricose, imbricate, with spinose scales. Florets perfect. Receptacle hairy. Pappus plumose, or pilose.


7. C. Horridulus. Stem erect, simple, woolly. Leaves sessile, pinnatifid; crowded near the base; segments lobed, dentate, spinous, hairy on the upper surface, woolly beneath. Flowers solitary, axillary and terminal, on short pe-
CORTMBIFEREÆ. 141

Genus XI. CENTAUREA.

Involucre scaly; scales lanceolate, imbricate. Receptacle bristly. Florets of the ray pistillate, funnel-shaped, irregular, those of the disk staminate. Pappus consisting of three series, the exterior a toothed margin, the middle one composed of 10 or 12 awns, the interior one short, hairy.

1. C. Benedicta. Stem prostrate, somewhat branched, woolly. Leaves sessile, pinnatifid, with acute segments, villous. Flowers solitary, terminal. Involucre ovate, with the scales terminated by a pectinate spine; florets of the ray 3-cleft, those of the disk 5-cleft. Styles undivided.

Sub-Order III. CORYMBIFEREÆ.

Involucre often corymbose, but by no means always. Capitula usually with disk and ray florets. Stigma not articulated.

(a.) Inula, Elicampane Tribe.

Genus XII. STOKESIA.

Involucre leafy, imbricate. Corolla radiate; florets of the ray funnel form, irregular, all perfect. Receptacle naked. Pappus consisting of 4 bristles.

1. S. Cytanea. Stem herbaceous, leafy. Leaves lanceolate. Flowers solitary, large, ornamental; florets all perfect.
Blue or purple. ¶ May. Carolina.

Genus XIII. LIATRIS.


(a.) Flowers in spikes or racemes. Root tuberous.


Purple. ¶ September. Upper district of Carolina. 2-4 feet.


5. L. CYLINDRACEA. Stem slender, glabrous. Leaves linear, long, narrow, glabrous, upper ones pubescent along the margin, lower ones alternate at the base. Flowers few, in a terminal spike; involucre cylindrical, containing 14–20 florets; scales oblong, abruptly acuminate, pubescent along the margin. Corolla glandular, pappus, plumose. Purple. 4. Aug.—Sept. Dry, sandy soils. Middle Ga. 1–2 ft.


8. L. GRACILIS. Stem slender, pubescent, streaked. Leaves linear, glabrous, slightly fringed at the base; upper leaves much smaller than the lower. Flowers in terminal racemes, peduncles hairy, with a few scales; involucre generally with seven florets; scales obovate, dotted, ciliate, colored at the summit. Seeds hairy; pappus colored. Purple. 4. Sept.—Oct. Dry pine barrens. 2–3 ft.


11. L. ELEGANS. Stem erect, very pubescent. Leaves linear-lanceolate, scabrous beneath, cartilaginous along the margins. Flowers in a compact cylindrical raceeme; peduncles with small leaves; involucre with 5 florets; leaves about 12, lanceolate, villous, interior ones colored. Seeds villous; pappus colored. Purple. 4. August—Sept. Dry soils. 3–5 ft.


13. L. SPHERIVEA. Stem erect, pubescent. Leaves lanceolate, acute, slightly coriaceous, glabrous, the lower broader than the upper ones. Flowers in terminal racemes; involucre nearly globular, with many florets, scales...
obtuse, colored, sometimes fimbriate, dotted. Seeds hairy, pappus, slightly plumose.

Purple. 4. August—Oct. Middle and upper districts of Car. & Ga.

14. L. SQUARROSA. Stem erect pubescent. Leaves long-linear with sebaceous margins, glabrous, the upper ones frequently ciliate. Flowers few, in a terminal raceme; involucres cylindrical, with ovate ciliate scales, with expanding points. Corolla deeply cleft, segments hairy. Seeds hairy; pappus colored.


(b) Flowers in Corymbs; roots fibrous.

15. L. PANICULATA. Stem erect, hairy, viscid, colored and branching towards the summit, radicle leaves spatulate lanceolate, dentate, glabrous; cauline leaves sessile, nervetl, ovate-lanceolate, hairy. Flowers in terminal panicles; branches 4-6-flowered, involucre 4-5 florets, 6-8 leaved. Corolla viscid. Seeds hairy; pappus purple.


17. L. PUBESCENTA. Stem erect, simple, glabrous, striate, purple. Leaves ovate or lanceolate, radical ones spatulate, somewhat dentate; cauline ones clasping. Flowers in corymbose panicles; involucres usually with 7 florets, 10-12 leaved. Leaves appressed, glabrous. Seeds hairy; pappus colored.

Purple. 4. Sept.—Oct. 3-4 ft.

18. L. TOMENTOSA. Stem erect, branching near the summit, branches hirsute, tomentose; radicle leaves cuneate lanceolate, tomentose; cauline leaves oblong, sessile. Flowers in terminal corymbs, involucres with about 20 florets; scales hairy at the base, with a membranaceous margin; pappus colored.

Purple. 4. Sept.—Oct. Wet places. 2-3 ft.

19. L. WALTERI. Stem simple, glabrous at the base, hairy near the summit. Radicle leaves lanceolate, attenuate at the base, glabrous; cauline ones smaller, diminishing in size towards the summit, sessile, hairy. Flowers in corymbs; involucres with many florets; scales colored, tomentose. Seeds hairy; pappus colored.


Remarks. The root of the Liatris Spicata is said to possess powerful diuretic properties, and is used in the form of a decoction, as a gargle for sore throat.

The L. Scariosa and S. Squarrosa, are said to be an antidote to the poison of the Rattlesnake, and is used to cure the bite of this animal, and the former is known by our plantation negroes as the Rattlesnake’s master.

GENUS XIV. VERONONIA.

Involucre ovate, imbricate. Florets all perfect and tubular. Receptacle naked. Stigma bifid; pappus double, the exterior chaffy, the interior capillary.

1. V. Oligophylla. Stem erect, simple, branching towards the summit; striate pubescent, sebaceous. Radicle leaves ovate, coarsely dentate, acute; cauline ones scattered towards the base, scattered towards the summit; toothed, or serrate, sebaceous above, pubescent beneath. Flowers in paniculate corymbs; scales of the involucre ciliate, pubescent beneath. Flowers in paniculate corymbs; scales of the involucre ciliate, pubescent, ovate-lanceolate, Seeds oblong, hairy. Black root.


2. V. Scaberrima. Stem simple, slender, pubescent towards the base, nearly glabrous towards the summit. Leaves crowded on the lower part of the stem, sessile, linear-lanceolate, scabrous and hairy on both surfaces, mar-
gins revolute denticulate. Flowers in terminal corymbs; involucrum, with lanceolate ciliate scales, with a subulate point. Seeds striate, hairy

3. V. Angustifolia. Stem simple, erect, scabrous. Leaves long-linear, numerous, entire or slightly denticulate, margins revolute, pubescent beneath. Flowers in terminal corymbs; involucre with ovate, lanceolate scales, terminated by a subulate point. Seeds striate hairy.
Purple. 4. June—August. Common. 3-4 feet.

4. V. Novboracensis. Stem erect, pubescent, branching towards the summit. Leaves numerous, narrow, lanceolate, long, upper surface glabrous, the lower pubescent. Flowers in large fastigate corymbs; involucre hemispherical, with ovate lanceolate scales, terminated by a long subulate point. Seeds striate, somewhat hairy, exterior pappus subulate.
Purple. 4. July—September. Moist rich lands. 5-10 feet.

5. V. Tomentosa. Stem erect, slender, tomentose towards the summit. Leaves narrow-lanceolate, long, acutely serrate, upper surface scabrous, lower tomentose. Flowers in fastigate corymbs, involucre with ovate lanceolate scales, with a long filiform point, hairy.
Purple. 4. July—August. Wet soils. 3-6 feet.

6. V. Preferta. Stem erect, angled, branching towards the summit, pubescent. Leaves numerous, lanceolate serrate, somewhat scabrous, pubescent beneath. Flowers in fastigate corymbs; involucre with ovate, acute scales, unarmed.
Purple. 4. August. Upper district of Carolina and Georgia. 4-8 ft.

Purple. 4. Aug.—Oct. Georgia, damp places. 6-10 feet.

Genus XV. Baccharis.

Involucre imbricate, cylindric; scales sub-coriaceous, ovate, Receptacle naked; florets tubular, monoecious, with sterile and fertile intermixed. Stamine florets with exserted anthers, unawned at the base, pappus slightly plumose. Fertile florets with capillary pappus.


2. B. Halliiifolia. A shrub, with erect branches, glabrous, young branches angled. Leaves sessile, obovate, cuneate, dentate towards the summit, upper ones usually entire, covered with whitish scales or dust. Flowers in leafy compound panicles, axillary and terminal. Style of the fertile florets 2-cleft, rather shorter than the stamens. Seeds striate, oblong.
White. 4. Sept.—Oct. Low country. 6-12 feet.

3. B. Sessiliflora. A shrub with angular, erect, virgate branches, glabrous. Leaves nearly sessile, obovate cuneate, dentate towards the summit. Flowers sessile, axillary, scattered, involucre, with obtuse scales reddish at the summit.
White. 4. September—October. On the sea cost. 3-5 feet.
**Genus XVI. PTEROCAULON.** (Syn Conyza.)

*Involucre* imbricate, leaflets somewhat obovate, acute, appressed, tomentose. *Flowers* pistillate and perfect, intermingled, the pistillate ones slender, with the border 3-toothed; the perfect ones with the border 5-cleft. *Anthers* very short. *Style* 2-cleft. *Stigmas* glandular.


**Genus XVII. GNAPHALIUM.**


**Genus XVIII. ANTENNARIA.** (Syn. Gaphalium.)


**Genus XIX. CONYZA.**

*Calyx* imbricate, scales sub-linear, somewhat scarious, appressed, receptacle naked. *Flowers* pistillate and perfect; the exterior ones fertile, 5-cleft; pappus simple, plumose.—*Seeds* hairy.

**TART II.**

13
1. **C. Camphorata.** Stem herbaceous, succulent, slightly pubescent. Leaves ovate-lanceolate, acute, dentilicate. Flowers in axillary, terminal coryms, shorter than the leaves; scales of the involucre acute, as long as the florets. This plant, when bruised, gives out a strong, disagreeable odor. Purple. 7. August—Sept. Salt marshes. Marsh Fleabane.


**Genus XX. Arnica.**

Involucre hemispherical; leaflets equal, longer than the disk, receptacle naked, pappus simple; florets of the ray often with 5 filaments, destitute of anthers.

1. A. **Nudicaulis.** Stem simple, hispid, somewhat viscid. Radicle leaves opposite, sessile, somewhat viscid, decussate, dentate. Stem nearly leafless, or with 1-2 pair of ovate, sessile leaves. Flowers in terminal racemes, on small branches at the summit of the stem; leaves of the involucre hispid, in a single series. Style 2-cleft. Seed obovate, striate, pappus pilose. Leopard's-bane.

Yellow. 7. April—May. Damp pine barrens, common. 1-2 feet.

**Genus XXI. Chrysopsis.**

Involucre imbricate; ray florets pistillate, those of the disk perfect. Anthers naked at the base; pappus double, the outer chaffy and minute, the inner pilose and scabrous, many rayed. Seeds obovate, villous. Receptacle naked.


3. C. **Pinifolia.** Stem glabrous, rigid. Leaves numerous, crowded, linear, rigid, those of the branches small, linear. Flowers in terminal coryms; involucre imbricate, with linear-lanceolate scales, woolly at the point. Anthers white, conspicuous. Seeds long, hairy, hispid, exterior pappus subulate, whitish, the interior scabrous, brown. Yellow. Sept.—Oct. Sand hills, middle Georgia. 18-20 in.

4. C. **Mariana.** Stem erect, hairy, simple. Leaves oblong-lanceolate, serrate, acute, the upper ones sessile, the lower ones spathulate, hairy on the under surface. Flowers in a simple corymb; involucre many leaved, viscidly and glandular pubescent. Anthers 2-cleft at the base, with the apex white. Seed oblong villous; pappus scarcely colored. Yellow. 7. Aug.—Oct. Dry sandy soils. 1-2 ft

5. C. **Trichophylla.** Stem hairy, erect. Leaves oblong, sessile, obtuse, lower ones attenuate at the base, wooly. Flowers in simple coryms; invol
lucre many leaved; leaflets narrow, glandular; florets of the ray narrow, long. *Seed* oblong, almost hispid; pappus colored.

Yellow. 74 August—Sept. Dry soils. 12–18 in.

6. C. GOSSYPIUM. Stem covered with a white woolly tomentum, hoary. *Leaves* oblong, spatulate, sessile, obtuse, entire. *Flowers* in simple corymbs; involucre many leaved, woolly, ray florets numerous. *Anthers* white at the summit. *Seed* viscid, the exterior pappus white, the interior brownish.

Yellow. 74 August—Oct. Dry lands middle Ga.

7. C. DENTATA. Stem woolly. *Leaves* tomentose, cuneate, obovate, obtuse, deeply toothed, the lower ones with a long tapering base, obtuse-toothed towards the apex, upper leaves entire, sessile, amplexicaule. *Flowers* in simple corymbs; involucre with subulate woolly leaves, ray florets numerous, nerved. *Seed* hispid, exterior pappus white, interior brown.

Yellow. 74 August—Oct. Middle Ga. 1–2 ft.

8. C. DIVERICATA. Stem erect, slender, hispid, scabrous, branching towards the summit. *Leaves* linear-lanceolate acute, ciliate, serrate, hispid, the lower ones attenuate at the base. *Flowers* in long divericate panicles; involucre many leaved, scales pubescent on the back, linear-lanceolate *Seed* hispid; pappus reddish brown, the exterior wanting.

Yellow. 74 August—Oct. Southern Georgia. 1–2 ft.

9. C. SCABRA. Stem branching from the base, scabrous, divericate, glandular, hairy. Radicle leaves oval, on petioles, dilated at the base, coarsely toothed, caudate ones cordate-ovate, acute, amplexicaule, all scabrous *Flowers* in compound terminal panicles; involucre cylindrical; leaflets numerous, acute, linear, viscid; ray florets lanceolate nerved; exterior pappus a marginal ring, the interior wanting.

Yellow. 74 October. On the sea coast. 2–3 ft.

The following species are taken from the genus Aster.

10. C. LINARIFOLIA. Stem erect, pubescent when young. *Leaves* numerous, linear, mucronate, scabrous, rigid. *Flowers* in umbellate corymbs with one at the extremity of each branch; involucre imbricate, scales numerous, linear-lanceolate, fringed, ray florets linear-lanceolate 3-cleft. *Seed* oblong, villous; pappus double consisting of long and short hairs.


White, tinged with purple. 74 October. On the sea coast. 2 ft.


White. 74 Sept.—Oct. Mountains. 1–2 ft.

13. C. AMYGDALINUS. Stem stiuate, simple, branching, and finely pubescent towards the summit. *Leaves* lanceolate, acuminate, slightly pubescent, and scabrous on the upper surface *Flowers* in terminal corymbs; involucre with short, lanceolate, pubescent scales; ray florets generally 12, narrow. *Seeds* pubescent


White. 74 May—June. Damp soils. 2–3 ft.

**Genus XXII. ECLIPTA.**

*Involucre* many leaved, the leaves nearly equal, florets of
the disk perfect, 4-cleft, those of the ray pistillate; pappus wanting; receptacle bristly.

1. E. Erecta. Stem erect, strigose; dichotomous. Leaves opposite, lanceolate, serrate, or entire, attenuate at the base, 3 nerved, sessile. Flowers on long peduncles in pairs; involucre with ovate, acuminate leaves.

2. E. Procumbens. Stem procumbent, assurgent, terete, with numerous opposite branches, with appressed hairs. Leaves sessile, opposite, lanceolate, narrowed at the base, 3-nerved; involucre with acute lanceolate leaves. Flowers on peduncles, generally in pairs; involucre with 8–10 leaves, lanceolate, ciliate, unequal; ray florets numerous, 2-toothed.

3. E. Brachytoda. Stem prostrate, divaricately branched. Leaves lanceolate, slightly serrulate. Flowers on short peduncles, solitary or in pairs; involucre with oval lanceolate leaves; florets 4–5 cleft.

Genus XXIII. Buphthalmum.

Involucre many leaved; florets of the disk 5-cleft, perfect, numerous, those of the ray pistillate. Seeds winged. Pappus 4-toothed, or an obsolete margin. Receptacle chaffy.

1. B. Frutescens. Stem erect, glabrous, branching, pubescent towards the summit. Leaves opposite, sessile, cuneate, lanceolate, glaucous, sparingly toothed at the base. Flowers solitary, terminal; involucre many leaved, imbricate. Leaves mucronate, expanding; ray florets lanceolate, 10–12. Seeds of the ray triangular; pappus 4-toothed; chaff pubescent, with a stiffer point.

2. B. Augustifolium. Stem erect, branching. Leaves alternate, linear, entire, glabrous; involucre with acute, lanceolate leaves.

Genus XXIV. Gymnostyles.

Involucre many leaved. Flowers of the circumference sterile, of the center fertile; fertile florets apetalous. Stamina none; sterile florets with the corolla funnel shaped, slender. Seeds compressed. Pappus a winged margin, toothed. Receptacle naked.

1. G. Stolonifera. Stem glabrous, creeping. Leaves pinnatifid, with linear, and sometimes toothed segments somewhat succulent, sprinkled with soft pubescence, tapering into a long base; all radical. Flowers sessile at the root; involucre with oblong hairy leaflets, in a single series. Seed terminated by the persistent stile, enlarged at the summit.

Genus XXV. Elephantopus.

Involucre 4-flowered; florets all ligulate, perfect. Pappus bristly, consisting of 5 awns. Receptacle naked.

1. E. Carolinianus. Stem leafy, erect, terete, branching towards the summit, villous. Leaves oblong, attenuate at the base, hairy, slightly scabrous. Flowers in sessile, terminal clusters, with 3 unequal cordate bracts at the base of each capitulum; involucre 9–10 leaved, the interior longest, hairy
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Genxs XXVI.

CHRYSOCOMA.

Corolla tubular,
Imvlucre iml)ricatc, oblong, 8-10 leaved.
with reflected socmen ts florets perfect.
Seeds pubescent.
Pappus pilose, scabrous. Receptacle naked.
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1. C. NrnATA.
Stem erccf, glabrous, branching near the summit. Radicle leaves s{>atula(e, laiicculutc, acute, 3-nerved, entire, glabrous; cauline
leaves with the upper mies small and linear. Flourrs in a compound fastiaiate corymb; invulticre with appres^ed linear leaflets, colored, containing
3-4 tl.nvers.
Style about the length of the stamens, 2-clefi ; pappus unequal.

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Yellow.

Common.

Oct.— Nov.

Gents XXVII.

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ASTER.

Involucre imbricate, with the lower scales generally expanding, florets of the ray, usuall}' more than 10, pistillate,
never yellow those of the disk hi>pid, receptacle naked, pappus
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Stem erect, glabrous, striate, with fastigiate branchLius.
-lanneolate, 3-nerved, acute with scabrous margins. Flow-

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7. A. Grandiflorus. Stem pubescent towards the summit. Leaves scabrous, linear sessile, rigid, reflexed, with the margin ciliate. Flowers on the upper branches in racemes, involucre with glabrous, linear-lanceolate scales; ray florets numerous, narrow. Purple. 4. September—October. Sandv woods, common. 2-3 feet.

8. A. Exilis. Stem erect, slender, with corymbose branches. Leaves long, linear, slightly scabrous, diminishing in size towards the summit. Flowers on the upper branches in racemes, involucre with glabrous, linear-lanceolate scales; ray florets numerous, narrow. Purple. 4. September—October. Damp soils. 4-5 feet.


10. A. Foliolosus. Stem erect, branching, glabrous. Leaves sessile, linear-lanceolate, appressed, with scabrous margins, those of the branches minute, and numerous. Flowers in compound panicles; involucre with acute appressed scales, hairy, or ciliate at the summit; ray florets numerous, linear-lanceolate. Seed glabrous. Purple. 4. September—October. Sea coast. 2-3 feet.


12. A. Tenuifolius. Stem erect, glabrous near the base, branching. Leaves numerous, linear-lanceolate, tapering at each end, slightly scabrous along the margins, upper ones minute. Flowers in racemes on short peduncles; involucre with appressed linear acute scales; ray florets numerous, narrow.—Seed oblong. Purple. 4. Oct.—Nov. Mid. Upper dist. Carolina, Georgia.


15. A. Racemosus. Stem diffuse, with slender, slightly pubescent branches. Leaves linear-lanceolate, with the margins scabrous, pubescent beneath, those of the branches very small. Flowers in simple racemes at the summit of the branches; involucre with lanceolate scales; ray florets numerous, linear. Purple. 4. Sept.—Oct. On the coast. 1-2 ft.

16. A. Multiflorus. Stem diffusely branched, almost hispid. Leaves linear, acute, pubescent, and fringed along the margin. Flowers in terminal racemes, somewhat second; involucre with ciliate, obovate scales, squarrose.

17. A. Solarrosus. Stem procumbent, branching, hispid, hairy. Leaves small, numerous, ovate, reflexed, hispid along the margin, scabrous. Flowers terminal in a loose panicle; involucre with lanceolate hairy scales; ray florets numerous, 3-touched, rather large.


18. A. Concolor. Stem erect, pubescent, sparingly branched towards the summit. Leaves pubescent, almost tomentose, oblong-lanceolate. Flowers in terminal racemes; involucre, with lanceolate silky scales; ray florets linear lanceolate.


20. A. Novum Angliae. Stem erect, with diffuse, spreading branches, hairy. Leaves narrow, lanceolate, amplexicaule, auriculate at the base, hairy, and scabrous along the margin. Flowers in terminal panicles; involucre with lanceolate scales, somewhat hispid, ray florets numerous, narrow.

Purple. 21. Sept.—Oct. Western Ga. 4-10 feet.


Purple. 21. Sept.—Oct. Middle Car. and Ga. 3-4 ft.

22. A. Virgatus. Stem erect, glabrous, with long erect virgate branches, slightly pubescent at the summit. Leaves linear-lanceolate, amplexicaule, long, glabrous, margins slightly scabrous. Flowers in terminal racemes; involucre with the scale slightly squarrose, slightly mucronate, ray florets small. Seeds scarcely pubescent.

Purple. 21. Sept.—Oct. Middle Ga. 3-4 ft.

23. A. Carolinianus. Stem shrubby, flexuous and decumbent, much branched, pubescent. Leaves oblong lanceolate, sessile, attenuate at each end, pubescent, dilated and amplexicaule at the stem. Flowers large, numerous, solitary, on short peduncles; involucre with pubescent scales; ray florets numerous.

Purple. 21. Oct.—Nov. In swamps. 8-12 ft.

(c) Leaves serrate. Flowers in corymbs.

24. A. Sulcatus. Stem erect, simple, pubescent towards the summit. Leaves sessile, obovate lanceolate, pubescent on the under surface, scabrous above, ciliately; when young, slightly serrate, upper leaves generally entire. Flowers large, in terminal coryms; involucre with oblong, ovate, pubescent scales, reflexed; ray florets numerous, large. Seeds pubescent.


25. A. Puniceus. Stem erect, glabrous, shining, branches striate, pubescent. Leaves ciliately, sessile, clasping, serrate, scabrous on the upper surface, large. Flowers in corymbose panicles, large; involucre with ciliate, linear reflexed scales; ray florets numerous, linear-lanceolate.


26. A. Dracunculoides. Stem erect, with corymbose branches marked with a hairy line. Leaves linear, or linear-lanceolate, acuminate, serrate in the middle, upper ones entire. Flowers small, in coryms; involucre with lanceolate expanding scales.


(d) Leaves serrate. Flowers in panicles.

27. A. Junceus. Stem erect, with long, slender branches, slightly pubescent. Leaves sessile, linear-lanceolate, serrate, glabrous, upper ones entire.
Flowers in racemes; involucre with linear-lanceolate scales, nearly glabrous; ray florets small, narrow.

Purple. 2. Sept.—Oct. Damp soils. 2-4 feet.

23. A. Divergens. Stem erect, pubescent towards the summit, branching. Leaves broad-lanceolate, serrate, glabrous, upper ones entire. Flowers in crowded racemes; involucre with linear-lanceolate, glabrous scales.

White, tinged with purple. 2. Sept.—Oct. Common. 3-4 feet.

29. A. Tradescanti. Stem erect, glabrous, with numerous, virgate branches. Leaves lanceolate, serrate, attenuate at each end, upper ones small, entire. Flowers numerous, in compound racemes; involucre with linear-lanceolate scales; ray florets numerous, narrow.

Purple. 2. Sept.—Oct. Near the mountains. 3-4 feet.


Purple. 2. Sept.—Oct. In rich, high lands, northern Ga. 3-4 feet.

31. A. Versicolor. Stem erect, branching, glabrous. Leaves broad, lanceolate, amplexicaule, glabrous, serratate in the middle, upper ones entire. Flowers clustered towards the summit of the branches; involucre with loose, lanceolate scales.

White or purple. September—October. In damp soils. 2-3 feet.

32. A. Leavigatus. Stem glabrous, much branched. Leaves broad, lanceolate, glabrous, slightly serrate, somewhat amplexicaule, the upper ones narrower and entire. Flowers in racemose panicles; involucre with linear-lanceolate scales; ray florets numerous, linear. Seed pubescent.

Purple. 2. Sept.—Oct. Damp rich soils. 2-4 feet.

33. A. Amplexicaulis. Stem erect, glabrous, somewhat branched. Leaves oblong, lanceolate, acute, amplexicaule, cordate, serrate, glabrous, the lower more attenuate and less cordate at the base. Flowers in terminal panicles; involucre with thick, glabrous, lanceolate scales; ray florets numerous, narrow. Seed nearly glabrous.


(e) Leaves cordate, serrate.

34. A. Undulatus. Stem erect, scabrous, branching. Leaves oblong, cordate, amplexicaule, scabrous, somewhat undulate, dentate near the summit. Flowers in loose, terminal panicles; involucre with pubescent, linear-lanceolate scales; ray florets numerous. Seeds hairy.


35. A. Diversifolius. Stem erect, pubescent, scabrous, much branched towards the summit. Leaves entire or slightly toothed, petioles of the lower leaves winged, amplexicaule, those of the branches small, pubescent underneath, scabrous above. Flowers in terminal panicles; involucre with numerous, ciliate, pubescent scales. Seeds slightly angled, hairy.


36. A. Sagittifolius. Stem erect, glabrous, much branched. Radicle leaves oblong-lanceolate, cordate and sagittate at the base, unequally serrate, glabrous, petiolate; cauleine leaves acuminate, on winged petioles, upper ones oblong, lanceolate, sessile. Flowers in racemes; peduncles leafy, involucre with lanceolate scales.


37. A. Scaber. Stem erect, striate, scabrous, somewhat hairy. Radicle leaves on long petioles, cordate, with round lobes, acute at the apex; cauleine leaves ovate-lanceolate, or linear-lanceolate, attenuate at the apex, rigid, scabrous. Flowers in long, terminal panicles; involucre with acute, appressed scales, pubescent; ray florets oval, numerous. Seed angled, hairy.


38. A. Paniculatus. Stem erect, striate, glabrous, much branched, young
branches pubescent. *Leaves ovate-lanceolate, acute, slightly pubescent along the margins and veins, petiolate. Flowers in compact, racemose panicles; involucre with numerous, subulate scales; ray florets narrow, about 12. Seeds glabrous.*

Purple. 4. Sept.—Oct. In rich soils. 3-4 feet.


40. *A. Corymbosus.* Stem erect, glabrous, with slightly pubescent branches. *Leaves ovate, cordate, the upper spatulate, lanceolate, glabrous, acutely serrate. Flowers in fascinate corymb; involucre with pubescent, ovate-lanceolate scales; ray florets narrow, about 12. Seeds glabrous.*


**GENUS XXVIII. SOLIDAGO.**

*Involucre imbricate, with appressed scales; florets of the ray usually 5, pistillate, those of the disk perfect; receptacle naked, punctate. Pappus pilose, simple.*


2. *S. Procera.* Stem erect, villous. *Leaves lanceolate, 3-nerved, acute at each end, finely serrate, scabrous on the upper surface, finely villous beneath. Flowers in erect racemes, paniculate; involucre with linear-lanceolate scales; ray florets small.*

Yellow. 4. Sept.—Oct. Middle Georgia. 3-5 feet.


Yellow. 4. Aug.—Sept. Pine woods, common. 2-3 feet.


Yellow. 4. Aug.—Oct. Dry woods, common. 2-3 feet.

5. *S. Rugosa.* Stem erect, hispid, branching toward the summit, lower leaves sessile, lanceolate, serrate, scabrous, hairy underneath; upper leaves ovate, sparingly serrate. *Flowers in expanding, paniculate racemes; racemes recurved, second; involucre with linear, lanceolate scales; ray florets small.*


Yellow. 4. Sept.—Oct. Middle Car. Ga. 3-5 feet.

7. *S. Altissima.* Stem erect, hispid, stout, much branched at the summit. *Leaves lanceolate, sessile, acute, lower ones deeply serrate, very scabrous, rugose. Flowers in large, paniculate racemes; racemes recurved. Perhaps a variety of the rugosa.*

Yellow. 4. August—Sept. Common. 3-7 feet.

8. *S. Villosa.* Stem erect, villous, with many recurved branches near the
summit. Leaves sessile, the lower ones oblong-lanceolate, serrulate, with a few hairs along the veins, the upper ones entire, ovate-lanceolate, with several small leaves in the axils. Flowers in a terminal panicle; racemes recurved, secund; involucre with linear scales; ray florets small.


9. S. Nemoralis. Stem erect, tomentose, sparingly branched. Leaves lanceolate, alternate at the base of the stem, slightly hispid, with axillary clusters of small leaves, those of the root serrate, somewhat cuneate. Flowers in paniculate racemes, secund; involucre with linear-lanceolate scales, pubescent along the margins.

Yellow. 4. Sept.—Oct. In dry soils, common. 2-3 feet.

10. S. Ulmifolia. Stem erect, villous when young, tomentose, striate, with numerous recurved branches; cauline leaves oblong-lanceolate, serrate, acute, scabrous on the upper surface, hairy beneath. Flowers in paniculate racemes; racemes secund and recurved; involucre with narrow, oblong scales; ray florets short. Seed pubescent.

Yellow. 4. Sept.—Oct. In rich soils.

11. S. Arguta. Stem erect, glabrous, striate, with long virgate branches. Radicle leaves spatulate, acutely serrate, with a long attenuated base; cauline leaves elliptic, serrate. Those of the branches entire, 3-nerved. Flowers in long paniculate racemes; involucre with linear-lanceolate scales.

Yellow. 4. Sept. Shaded soils.

12. S. Cinerascens. Stem erect, pubescent, slender. With numerous slender expanding branches towards the summit. Leaves long-linear-lanceolate; radicle ones, with a long tapering base, slightly serrate; cauline ones, small, and scattered towards the summit. Flowers in paniculate racemes, racemes secund, with the pedicels often 3-flowered.

Yellow. 4. Sept.—Oct. Middle Georgia.

13. S. Juncea. Stem erect, slender, glabrous, branches pubescent when young. Leaves long-lanceolate, glabrous, with scabrous margins the lower ones serrate, obscurely 3-veined. Flowers in loose terminal, paniculate racemes; racemes secund, recurved; involucre with oval, slightly pubescent scales.

Yellow. 4. Sept.—Oct. Upper districts of Carolina, Georgia.

14. S. Elliptica. Stem erect, glabrous, with numerous recurved, branches towards the summit. Leaves oval-lanceolate, or elliptic, serrate, glabrous, with scabrous margins. Flowers in paniculate racemes; racemes secund, expanding, leafy; involucre, with acute linear-scales, glabrous.


15. S. Odora. Stem erect, pubescent towards the summit, branching.—Leaves sessile, linear-lanceolate, glabrous, entire, with scabrous margins.—Flowers in paniculate racemes; racemes recurved, involucre, with linear-lanceolate scales.


16. S. Retrorsa. Stem erect, glabrous or pubescent towards the summit. Leaves linear, sessile, tapering at the summit, glabrous, reflexed, scabrous along the margin. Flowers in paniculate racemes; racemes recurved; involucre with ciliate, lanceolate scales, ray florets 3, of the disk 3-4.

Yellow. 4. August—October. Very Common.

17. S. Tortifolia. Stem erect, pubescent towards the summit. Leaves linear-lanceolate, slightly serrate, obscurely 3-veined, usually twisted. Flowers in compact paniculate racemes recurved; involucre, with linear-lanceolate scales, ray florets 3-5.

Yellow. 4. August—October. Very Common. 2-3 feet.


Yellow. 4. August—September. Pine barrens. 4-6 feet.
19. S. CORYMBOSA. Stem erect, branching near the summit, glabrous, with the young branches hisrate. Radileaves long, indented along the margin, oblong-lanceolate, somewhat fleshy, the upper entire, ciliate along the margin. Flowers in corymbose racemes, lower branches recurved; involucre with pubescent cili ate scales; ray florets 10. Seed glabrous.

Yellow. 4. September—October. Middle Georgia. 4-6 feet.

20. S. SEMPERVIRENS. Stem erect, glabrous, with recurved branches towards the summit. Leaves linear-lanceolate, long, acute, scabrous along the margin, entire. Flowers in axillary racemes, small; involucre with linear-lanceolate scales; ray florets generally 5.

Yellow. 4. Sept.—Oct. In rich soils, Common. 3-6 feet.

(b.) Racemes erect.

21. S. LIMONIFOLIA. Stem oblique, glabrous, usually colored. Leaves sessile, lanceolate, somewhat fleshy, entire, glabrous. Flowers infercct paniculate racemes; involucre with linear, acute scales; ray florets 7-10. Seed pubescent.

Yellow. 4. August—October. On the sea coast. 3-5 feet.

22. S. SPECIOSA. Stem erect, slightly furrowed, glabrous, with virgate branches pubescent when young. Leaves broad-lanceolate, coriaceous, upper ones entire, the lower slightly serrate. Flowers in numerous erect racemes; involucre with oblong, obtuse scales; ray florets 5. Seed glabrous.

Yellow. 4. September—October. Middle Georgia. 3-5 feet.

23. S. PUBESCENS Stem erect, pubescent, with numerous erect branches. Leaves long, lanceolate, the upper ones generally entire, pubescent, the lower serrate, slightly scabrous, spatulate. Flowers in paniculate racemes; involucre with pubescent subulate scales; ray florets 7-10. Seeds pubescent.

Yellow. 4. October. Damp soils. Middle Ga. 3-5 ft.


25. S. BIFLOR. Stem erect, pubescent. Leaves oblong-lanceolate, the lower ones serrate, attenuate at the base, pubescent. Flowers in compact racemes; involucre with obtuse linear-lanceolate scales; ray florets 5-8.


26. PETIOSEUS. Stem erect, striate, villous. Leaves oval-lanceolate, pubescent, upper ones nearly sessile, the lower, attenuate with a sheathlike petiole, serrate. Flowers in long, terminal racemes; involucre with oblong pubescent scales; ray florets 6-8. Seed glabrous.

Yellow. 4. August—Sept. Mountains. 2-3 ft.

27. S. STRICTA. Stem erect, glabrous. Leaves lanceolate, entire, glabrous, with scabrous margins. Radicle ones serrate. Flowers in erect paniculate racemes.

Yellow. 4. August—Sept. In sandy woods. 2 ft.

28. S. VIRGATA. Stem erect, striate, slender towards the summit, nearly glabrous. Radicle leaves very long, spatulate-lanceolate; cauline ones diminishing towards the summit, oblong-lanceolate, somewhat fleshy, scabrous along the margins, appressed; involucre with linear-lanceolate pubescent scales; ray florets 5-7. Seed hairy.

Yellow. 4. June—Oct. Damp soils. 2-4 ft.

29. S. PULVERULENTE. Stem erect, slender towards the summit, reddish, covered with a pulverulent pubescence. Leaves sessile, the lower ones acute, serrate, elliptic, the upper entire, with scabrous margins obovate. Flowers in erect racemes; ray florets long.

Yellow. 4. August—Sept. Low country. 3-1 ft.

30. S. ERECTA. Stem erect, simple, somewhat pubescent towards the summit. Leaves lanceolate, glabrous, acute at each end, the lower ones some-
what petiolate. *Flowers* in short, erect, axillary and terminal racemes; involucre with linear scales; ray florets 7-10. *Seed* glabrous.


31. *S. Creasia.* Stem erect, glabrous, with numerous, slender, expanding branches, slightly tinged with purple. *Leaves* sessile, lanceolate, acuminate, finely serrate, with the margins slightly scabrous. *Flowers in erect racemes; involucre with linear scales; ray florets generally 5. Seed nearly glabrous.*


32. *S. Lithospermifolia.* Stem erect, branching, pubescent. *Leaves* lanceolate, scabrous on both surfaces, tapering, 3 veined, entire. *Flowers in erect racemes; ray florets long.*


34. *S. Glomerata.* Stem simple, small *Leaves* glabrous, oblong-lanceolate, serrate, lower ones broad, acuminate. *Flowers in simple racemes, composed of axillary heads, the upper ones clustered; involucre swollen, many flowered.*


35. *S. Squarrosa.* Stem erect, pubescent, striate, branching. *Leaves* lanceolate, acute, serrate towards the apex, pubescent beneath, the lower ones tapering at the base into a petiole. *Flowers in compound, erect racemes, large; involucre with reflexed, linear scales; ray florets generally 10, the disk numerous. Seed glabrous.*

Yellow. 2. Sept.—Oct. Sandy soils. 3-5 feet.

36. *S. Angustifolia.* Stem erect, glabrous, with numerous erect branches, generally colored. *Leaves* sessile, subulate entire, nearly linear, somewhat scabrous along the margins, sometimes with axillary clusters of setaceous leaves. *Flowers in erect paniculate racemes; involucre with glabrous linear-lanceolate scales; ray florets 7-10.*


37. *S. Salicina.* Stem erect, slender, pubescent when young, nearly glabrous when old, with long erect virgate branches. *Leaves* sessile, the lower ones long, narrow-lanceolate, scabrous on the upper surface, glabrous on the under, upper leaves smaller. *Flowers in long slender racemes; involucre with oblong scales; ray florets slender, generally 5.*

Yellow. 2. Sept.—Oct. Middle Georgia. 4-5 feet.

38. *S. Elata.* Stem erect, terete, pubescens, with erect tomentose branches. *Leaves* sessile, oval-lanceolate, acute, tomentose beneath, nearly entire.— *Flowers in erect paniculate racemes, involucre with pubescent, linear-lanceolate scales; ray florets 7-10. Seed glabrous.*

Yellow. 2. Sept.—Oct. Middle Georgia. 2-3 feet.

39. *S. Rigida.* Stem erect, slightly angled, tomentose, when young branches numerous, fastigiate. *Leaves* ovate, sessile, pubescent, scabrous, upper ones entire, the lower serrate. *Flowers clustered near the summit of the branches, large; involucre with oblong pubescent scales; ray florets 7-10, those of the disk, numerous. *Seed* glabrous.

Yellow. 2. Sept.—Oct. Mountains. 3-4 feet.


Yellow. 2. Sept.—Oct. Damp rich soils. 2-3 feet.

41. *S. Tenutifolia.* Stem erect, angled, scabrous, with fastigiate branches. *Leaves* linear, expanding, obscurely veined, scabrous, clusters of small
leaves in the axils. Flowers in fastigiate terminal corymbs; involucre with viscid scales; ray florets, about 10, very short. Seed villous.

Yellow. 4-5 Sept.—Oct. In dry pastures very common. 3-4 ft.

**GENUS 20. ERIGERON.**

Involucre imbricate; ray florets pistillate, numerous, narrow, those of the disk perfect, linear. Pappus double, the outer series very small, the inner pilose. Receptacle naked.


2. *E. Bellidifolium.* Stem hispitate, very hairy. Radicle leaves obovate, slightly serrate; cauline leaves sessile, scattered, oblong lanceolate, the lower ones similar to the radicle. Flowers 3-5, terminal, central one the largest; involucre the leaves in a double series, linear-lanceolate; ray florets linear; disk florets yellowish. Seed compressed, nearly glabrous. Receptacle somewhat convex, dotted. Robin's plantain.

Pale blue. 4 March—April. Common. 1-2 ft.

3. *E. Strigosum.* Stem pubescent, slightly scabrous. Radicle leaves linear-lanceolate, denticulate; cauline ones long, linear, entire. Flowers in a terminal panicle; involucre with subulate leaves, pubescent; ray florets 2-3 cleft at the summit. Seeds hispitate; exterior pappus minute scales, interior wanting, or a few pilose rays; disk florets yellow.

White. 4-5 May—Aug. Common in sandy pastures. 2-3 ft.


5. *C. Philadelphicum.* Stem pubescent, slightly furrowed. Radicle leaves cuneate, obovate, sometimes incurly toothed; cauline leaves oblong-lanceolate, amplexicaule entire. Flowers in loose corymbs; ray florets capillary, numerous; involucre many leaved, with the leaves arranged in two series, subulate.

White, or pale purple. 4 Feb.—June. Common. 1-2 ft.

6. *E. Quercifolium.* Stem pubescent. Radicle leaves lyrate, and coarsely toothed; cauline ones entire. Flowers few, terminal; ray florets numerous; involucre with numerous subulate leaves.

Pale blue, or white. 4 July—Aug. Middle Car. 8-12 in.


8. *E. Pseud. Stem* glabrous, slender. Leaves linear-lanceolate, entire with scabrous margins. Flowers in simple panicles, with divaricate branches; involucre with narrow, acute leaves; ray florets numerous, capillary; pappus simple.

White. 4 July—Sept. Common. 6-8 in.

Remarks.—The two preceding species we think ought certainly to constitute a distinct genus, and we might add several varieties of these, differing from each other in a greater or less degree; but we must content ourselves for the present, till the obtaining of more extensive materials shall enable us to do it more satisfactorily.

**PART II.**
DICOTYLEDONOUS.

Genus XXX. Boltonia.

**Involucre** imbricate; ray florets numerous, pistillate; those of the disk perfect. **Receptacle** conic, dotted. **Seeds** flat, margined. **Pappus** awned, with two opposite ones larger than the rest.

1. *B. asteroides*. *Stem* erect, somewhat striate, glabrous. **Leaves** alternate, sessile, entire, lanceolate, glabrous, with scabrous margins. **Flowers** in panicles, on long peduncles; involucre with subulate scales; ray florets entire, linear; those of the disk yellow. **Seeds** compressed.


2. *B. glastifolia*. *Stem* erect, branching, slightly angled, glabrous. **Leaves** long-lanceolate, serrate, acute, with cartilaginous margins; lower ones somewhat toothed. **Flowers** solitary, on short peduncles; involucre with glabrous, subulate leaves, with the margins slightly serrulate; ray florets numerous, those of the disk numerous, yellow. **Seeds** pubescent, winged, obcordate; pappus consisting of scabrous bristles, unequal.

   White, or reddish. 2. July–Aug. Middle and Southern Ga. 2–3 ft.

   (c) *Eupatorium*. The Boneset Tribe.

Genus XXXI. Kuhnia.

**Involucre** cylindrical, imbricate; florets all perfect, tubular. **Pappus** plumose, sessile. **Seed** pubescent, striate.

1. *K. asteroides*. *Stem* glabrous, branching, the young branches very pubescent. **Leaves** broad-lanceolate, irregularly serrate, petiolate, slightly scabrous on the upper surface, pubescent beneath, spotted. **Flowers** in panicles, terminal; involucre about 10-flowered, with linear, pubescent leaves, the outer ones small. **Seeds** pubescent.

   White. 2. Sept.–Oct. Middle and Western Ga. and Ala. 2–3 ft.

2. *K. critonia*. *Stem* pubescent, slender, striate. **Leaves** lanceolate, or linear, petiolate, entire, with the margin revolute when young, dotted beneath. **Flowers** in terminal divaricate panicles; involucre imbricate, with 8–10 flowers. **Leaves** linear, pubescent, outer ones reflexed at the summit. **Seed** cylindrical; pappus of numerous plumose rays.


Genus XXXII. Mikania.

**Involucre** 4–6-leaved, equal, with 4–6 florets. **Receptacle** naked; florets all perfect, tubular. **Style** long, deeply cleft. **Pappus** pilose.

1. *M. scandens*. *Stem* twining, glabrous, **Leaves** cordate, acuminate, repand toothed, with unequal divaricate lobes. **Flowers** in axillary corymbs. **Climbing Thoroughwort**.


2. *M. pubescens*. *Stem* twining pubescent; striate. **Leaves** cordate, acuminate, angularly toothed, somewhat hastate at the base. **Flowers** in axillary, and terminal, paniculate corymbs; involucre, 5-leaved, one smaller than the rest, hairy. **Flowers** fragrant. **Seed** oblong, striate. **Receptacle** dotted.

COROMBIIFEREE.

GentS XXXIII. EUPATORIUM.

‘Involucr’ imbricate, oblong, florets all perfect, tubular.—


(a.) Involucr, 3-5-flowered.

1. E. FOENICULACEAUM. *Stem* striate, finely pubescent, with paniculate branches, lower leaves compoundly pinnatifid, with filiform segments, glabrous, furrowed on the upper surface, the upper ones scabrous, in cluster. *Flowers* in compound corymb, panicles, very small, and very numerous; involucre, with 5 inferior equal leaves, and 5 small exterior ones, all pubescent. *Seeds* cylindrical; receptacle naked.

Yellowish white. 4. Sept.—Oct. Very abundant. 3-10 feet.

2. E. CORONORIFOLIUM. *Stem* erect, pubescent, paniculately branched, lower leaves pinnatifid, with 5-7 linear-lanceolate, segments, denticulate, upper leaves linear, clustered, all pubescent. *Flowers* in compound panicles; involucre, with 8-10 unequal pubescent leaves. *Seed* glabrous, pappus scabrous.


3. E. PINNATIFIDUM. *Stem* erect, striate, glabrous, branching with the branches pubescent, lower leaves pinnatifid, vermicillate, with linear segments, pubescent, upper leaves generally alternate. *Flowers* in many-flowered corymbs; involucre, 8-10-leaved, with glandular dots on the back. *Seed* oblong, deeply striate, pappus, scabrous.

White. 4. Sept.—October. Damp soils. 3-4 feet.

4. E. LINEARIFOLIUM. *Stem* usually procumbent, very pubescent towards the summit, branching. *Leaves* sessile, pubescent, linear-lanceolate, with clusters of small leaves at the axil. *Flowers* in irregular corymbs; involucre with 10-15 villous leaves, glandular on the outer surface. *Seed* deeply striate, pubescent, pappus, scabrous.


5. E. HYSSOPHEDEUM. *Stem* erect, subpubescent. *Leaves* opposite, the lower ones linear-lanceolate, one-sided; somewhat toothed, upper ones alternate pubescent, with clusters of small leaves in the axils. *Flowers* in terminal corymbs; involucre with 8-10 lanceolate leaves, pappus, scabrous; *Seeds* browned, glabrous, pappus, scabrous.

White. 4. September—October. Very common. 2-3 feet.

6. E. GLAUCESCENS. *Stem* erect, pubescent. *Leaves* broad-lanceolate, slightly serrate toward the summit, 3 nerved, pubescent, with a pair of small leaves in the axil. *Leaves* of the branches usually alternate, small, glaucous. *Flowers* in corymbs; involucre with 8-10 lanceolate leaves, pappus, scabrous; *Seeds* browned, glabrous, pappus, scabrous.


7. E. OSSICINUM. *Stem* somewhat angled. *Leaves* sessile, amplexicaul, rounded at the base, dotted beneath, opposite serrate. *Flowers* in terminal corymbs; peduncles pubescent.

White. 4. Aug.—September. Mountains. 2-3 feet.

8. E. TETEULUM. *Stem* erect, pubescent, particularly towards the summit. *Leaves* sessile, amplexicaul, lanceolate serrate; glabrous on the upper surface, pubescent along the veins, beneath dotted, truncate at the base, involucre.

White. 4. August—September. Mountains. 2-3 feet.

9. E. ALBICINUM. *Stem* erect, striate, villous, lower leaves opposite, the upper alternate and pubescent, coarsely toothed, sessile, lanceolate. *Flowers* in many-flowered corymbs; involucre, 10-leaved, the 5 interior long, white with glandular dots. *Seed* browned, pappus scabrous.

White. 4. Aug.—Sept. Poor soils, common. 2-3 feet.

10. E. PARVIFLORUM. *Stem* erect, pubescent. *Leaves* sessile, lower ones
opposite, upper ones alternate, lanceolate, serrate, towards the apex, entire and alternate at the base. Flowers in terminal corymbs; involucre with the interior leaves ligulate, the exterior small, all pubescent, dotted. Seeds angled.

White. 4. September—October. Southern Georgia. 1-2 feet.

11. E. SCABRIDIUM. Stem pubescent, with the lower branches brachiate, the upper ones alternate. Leaves sessile, ovate lanceolate, opposite, serrate towards the summit, acute, and entire at the base. Flowers in corymbs, involucre, with acute lanceolate leaves, dotted. Seed angled.


12. E. ROTUNDIFOLIUM. Stem pubescent. Leaves sessile, decussate, deltoid, obtusely serrate, slightly scabrous, glaucous. Flowers in fastigiate corymbs; involucre with pubescent, acute scales. Seed angled; pappus scabrous.

Wild horehound.

White. 4 July—Sept. Dry pine barrens. 2-3 feet.

13. E. VERBENÆFOLIUM. Stem erect, pubescent. Leaves sessile, decussate, coarsely toothed, dotted, hairy on the under surface, somewhat deltoid. Flowers in corymbs; involucre with hairy, lanceolate leaves. Seed angled; pappus scabrous.


14. E. PUBESCENS. Stem erect, pubescent, lower branches opposite, upper alternate. Leaves sessile, ovate, alternate at the summit, obtuse at the base, slightly scabrous, the lower doubly serrate and opposite, the upper slightly serrate and alternate. Flowers in fastigiate corymbs; involucre with hairy, linear-lanceolate leaves. Seed angled; pappus scabrous.


15. E. CUNEIFOLIUM. Stem erect, pubescent. Leaves obovate, lanceolate, petiolate, lower ones obtusely serrate, the upper with few serratures towards the apex. Flowers in corymbs. Involucre 8 to 10 leaved.

White. 4 August—September. 10-12 inches.

(b.) Involucre many flowered.

16. E. PERFOLIATUM. Stem erect, striate, villous, covered with glandular dots, lower leaves petiolate, tapering from the base to the summit, serrate, pubescent on the upper surface, tomentose beneath, the upper leaves distinct, truncate at the base. Flowers in large corymbs. Involucre many leaved, with acute, linear-lanceolate, pubescent leaves. Seed angular. Bone-set.

White. 4. Sept.—Oct. At Barhamville, near Columbia. 3-6 feet.


White. 4. Sept.—Oct. In rich soils, low country. 2-3 feet.


20. E. SCEROTIUM. Stem erect, almost tomentose. Leaves ovate-lanceolate, large, tapering towards the summit; the lower ones opposite, the upper alternate, on rather long petioles. Flowers numerous, in fastigiate corymbs. Involucre with 10 linear, villous leaves. Seeds angled. Pappus scabrous.

White. 4. Sept.—Oct. On the sea coast. 5-6 feet.

21. E. INCARNATUM. Stem erect, very finely pubescent. Leaves opposite, on long petioles, cordate, deltoid, obtusely toothed. Flowers in terminal
corymbs. *Involucre* with 15-20 nearly equal scales, slightly pubescent. **Seed** angled. *Pappus* pilose.

Purple. Oct.—Nov. In rich soils. 2-3 feet.


(c.) *Involucre* with the scales scarious. **Leaves** verticillate.

23. E. Terminale. Stem erect, striate, pubescent. *Leaves* usually ternate, petiolate, ovate, acuminate, pubescent beneath, toothed, dotted on the under surface. **Flowers** in terminal corymbs. *Involucre* with about 15 linear-lanceolate leaves, the exterior ones shorter and broader. **Seed** angled. *Pappus* pilose.

Light purple. 4. Sept.—Oct. Damp soils. 3-4 feet.

24. E. Purpurum. Stem erect, glabrous, or nearly so, tinged with purple. *Leaves* 4-6 in a whorl, oval, lanceolate, petiolate, serrate, somewhat pubescent on the under surface, dotted. **Flowers** in large, terminal corymbs. *Involucre* generally 5-flowered, with the leaves slightly pubescent. **Seed** angled. *Pappus* pilose.

Pale purple. 4. Sept.—Oct. Moist soils. 4-8 feet.

25. E. Majusculum. Stem erect, furrowed, with purple dots. *Leaves* 4-5 in a whorl, ovate, lanceolate, acute, at each end, pubescent beneath, unequally serrate. **Flowers** in terminal corymbs. *Involucre* 5-8 flowered. **Seed** angled.

Pale purple. 4. Aug.—Sept. Moist soils. 4-5 feet.

26. E. Verticillatum. Stem erect, glabrous or pubescent towards the summit, tinged with purple. *Leaves* 3-4 in a whorl, ovate-lanceolate, crenate, serrate, glabrous, dotted on the under surface. **Flowers** in terminal corymbs; *Involucre* with 10-12, ovate, obtuse leaves. **Seeds** angled. *Pappus* scabrous.

Purple. 4. Sept.—Oct. Middle and upper Car. and Ga. 4-6 feet.

Remarks.—Many of the species of Equatorium possess decided medical properties. The *E. verticillatum* is a well known domestic medicine, and has been used with much success in treating fevers in its incipient state. It is a tonic and diaphoretic, and in large doses an emetic.

Genus XXXIV. CACALIA.

*Involucre* cylindrical, oblong, scaly at the base; florets all perfect, tubular. **Receptacle** naked. *Pappus* pilose.

1. C. Atropurpurea. Stem erect, branching, glabrous, slightly glaucous. *Leaves* cordate, somewhat reniform, glabrous, toothed, upper ones lanceolate-ovate, glaucescent beneath. **Flowers** in terminal corymbs; involucre with 5 equal linear leaves, 5 flowered. **Seed** oblong, ovate, glabrous. *Pappus* scabrous; receptacle with an irregular mass in the center, 3-cleft at the summit.


2. C. Ovata. Stem erect, branching at the summit. *Leaves* ovate, obtusely toothed, 7-nerved, glaucous beneath. **Flowers** in fastigate corymbs; involucre, composed of 5 equal linear leaves. **Seed** glabrous, pappus pilose; receptacle naked, with an irregular projection in the center.

White. 4. September—October. West Georgia, Alabama. 3-4 feet.

3. C. Lanata. Stem erect, branching towards the summit. *Leaves* long, narrow, lanceolate, remotely dentate, 7-nerved, glaucous beneath.— **Flowers** in terminal corymbs; involucre with 5 linear-lanceolate leaves, with membranous margins. **Seed** glabrous, striate; pappus pilose, receptacle small with a projection in the center.

White. 4. August—September. Middle Georgia: 4-6 feet.
**Genus XXXV. POLYPTERIS.**


1. *P. Integrifolia.* Stem erect, slightly scabrous, branching towards the summit. *Leaves* alternate, linear-lanceolate, entire; *involucre* 8-12 leaved; florets numerous, with a 5-cleft border. *Seed* somewhat scabrous, tapering at the base; pappus consisting of 9 membranaceous scales. Southern Georgia. 3-4 feet.

**Genus XXXVI. SENECEO.**


(a.) *Flowers with rays.*

1. *S. Tomentosus.* Stem tomentose, or woolly. *Radicle* leaves oblong, oval, serrulate, on long petioles; cauline ones oval-lanceolate, more or less divided. *Flowers* in terminal umbels; involucre many leaved, tomentose at the base; ray florets 12-15, nerved, slightly 3-toothed; pappus setaceous. White. 4. April—May. Middle Carolina. 2-3 feet.

2. *S. Obvatus.* Stem simple, glabrous. *Radicle* leaves obovate, or nearly orbicular, crenate, with an attenuated base; cauline leaves much smaller, sessile, pinnatifid, tomentose at the base. *Flowers* in terminal panicles; involucre many leaved, glabrous; ray florets 10-12, those of the disk numerous *Seed* striate; pappus pilose. Yellow. 4. June—July. Middle Carolina. 12-18 inches.


5. *S. Fastigiatus.* Stem erect, glabrous. Radicle leaves oblong-ovate, somewhat acute, dentate, glabrous; cauline ones pinnatifid, with the segments notched and toothed, the terminal segment ovate; involucre with subulate leaflets. *Seed* striate; pappus abundant, setaceous. Yellow. 4. May—June. Middle Car. 2-3 ft.


(b) *Ray florets wanting.*


8. *S. Hieracifolius.* Stem erect, pubescent, branching towards the sum-
Corymbiferae.

Leaves alternate, oblong, sessile, unequally notched, or pinnatifid, with acute lobes, pubescent. Flowers in compound terminal panicles; involucre with glabrous leaves, ventricose, with irregular setaceous leaflets at the base. Seeds slightly pubescent; pappus bristly.

Yellowish white.  (1) June—Sept. Rich soils. Middle Ga. 4-8 ft.

Genus XXXVII. CHAPTAHIA.

Involucre imbricate; florets of the ray in a double series, the inner series pistillate, with long styles; disk florets stamina, bilabiate. Receptacle naked. Seed oblong, striate, glabrous. Pappus pilose.

I. C. Interrifolia. Root tuberous; scapes several from each root, tomentose, 1-flowered. Leaves oblong-lanceolate, retrorsely dentate, white, tomentose beneath. Flowers solitary, nodding, leaves of the calyx linear-lanceolate, tomentose; ray florets 16-20 in the outer series.


(d) Helianthea. The Sunflower Tribe.

Genus XXXIX. HYMENOPAPPUS.


I. H. Scabrosus. Stem erect, angular, woolly, tomentose. Leaves alternate long, pinnatifid, with remote segments, linear, dentate, the upper ones with entire segments, all tomentose beneath. Flowers in terminal corymbs; involucre tomentose, the interior leaves large, colored; florets all perfect, tubular.


Genus XL. MELANANTHERA.


I. M. Hastata. Stem erect, quadrangular, furrowed, scabrous, branch- ing. Leaves hastate, 3-lobed, decussate, lanceolate, dentate, scabrous, and somewhat hispid, petiolate. Flowers solitary on peduncles, usually in pairs; involucre hispid. Corolla tubular, 5-lobed. Seed slightly winged at the angles; chaff leaf-like.

White. (4) August—Sept. Rich soils. 4-6 ft.

Genus XLI. MARSHALLIA.

Involucre imbricate. Florets all perfect, tubular. Receptacle chaffy. Pappus consisting of 5 membranaceous scales.

I. M. Lanceolata. Stem erect, simple, striate, pubescent towards the summit. Radicle leaves obvate, cauline ones lanceolate, all glabrous, entire, attenuate at the base, dilated at the stem, and clasping it. Flowers terminal; involucre many leaved, with membranaceous margins; florets nu-

Pale purple. 4 April—May. Mid. and upper Dist. of Car. & Ga. 1-2 ft.

2. M. ANGUSTIFOLIA. Stem erect, branching, angular, glabrous, or slightly pubescent towards the summit. Leaves long, narrow-lanceolate, glabrous, the upper ones linear. Flowers solitary, terminal; involucre with numerous subulate leaves. Corolla pubescent without. Seed angular. Pale purple. 4 May—June. In pine barrens. 1-2 ft.

GENUS XLII. CHRYSANTHEMUM.

Involucrē imbricate, with subulate leaves; ray florets pistillate, those of the disk perfect; receptacle naked; pappus none.

1. C. LEUCANTHEMUM. Stem erect, somewhat branched, glabrous, or very slightly pubescent. Leaves sessile, amplexiculæ, lanceolate, dentate towards the base, or sometimes nearly pinnatifid. Flowers solitary; involucre glabrous, with the margins of the leaves membranaceous. Seed furrowed.


GENUS XLIII. HELENIUM.

Involucrē gamosepalous, many parted; florets of the ray pistillate, of the disk perfect. Pappus chaffy, 5-awned. Receptacle globose, naked.

1. H. ATEMNALE. Stem erect, branching towards the summit, glabrous, winged by the decurrent leaves. Leaves sessile, alternate, lanceolate, doubly serrate, glabrous. Flowers in small corymb; involucre 8-parted, with subulate segments, longer than the disk; ray florets about 10, 3-toothed at the summit. Seed angular, larger at the summit; scales of the pappus lacerate, mucronate.

Yellow. 4 October—Nov. In wet soils. 2-3 ft.

2. H. Quadridentatum. Stem erect, pubescent, slightly winged, by the decurrent leaves. Leaves narrow-lanceolate, entire, pubescent. Flowers solitary and terminal; ray florets obovate, 3-4-toothed. Seeds hispid; pappus consisting of 6 mucronate scales; receptacle oblong.

Yellow. 4 Sept.—Oct. Swampy lands. 2-3 ft.

GENUS XLIV. ACMELLA.

Involucrē consisting of 12 leaves, arranged in a double series, pubescent, equal; florets of the ray pistillate, of the disk perfect. Seed quadrangular, compressed. Receptacle chaffy, with yellow scales.

1. A. REPENS. Stem procumbent, rooting at the lower joints, pubescent. Leaves opposite, ovate-lanceolate, attenuate at the base, slightly pubescent. Flowers solitary, on axillary and terminal peduncles. Leaves of the involucre ovate-lanceolate, acute; ray florets about 12. Seed oblong, naked, truncate at the summit.

Yellow. 4 Sept.—Oct. Wet soils. 1-2 ft.

GENUS XLV. HELIOPSIS.

Involucrē imbricate, many leaved; ray florets pistillate, those of the disk perfect. Receptacle conic. Seed quadrangular. Pappus wanting.

Yellow. 4. May—June. Sandy soils. 2-4 ft.

GENUS XLVI. TETRAGONOTHECA.

Involucre gamosepalous, deeply 4-parted, 4-angled, with broad hairy segments. Receptacle chaffy. Seed obovate, pubescent at the summit. Pappus wanting.

1. T. Helianthoides. Stem erect, branching, scabrous, somewhat hispid. Leaves opposite, sessile, spatulate, lanceolate, dentate, hairy. Flowers axillary and terminal; segments of the involucre ovate-lanceolate, with reflected margins; ray florets 6-8, large, of the disk numerous. Seeds slightly angled; scales of the receptacle covered with glandular dots.

Yellow. 4. May—June. Sandy soils. 1-2 ft.

GENUS XLVII. SIEGESBECKIA.

Involucre many leaved, in a double series, the outer series 5-leaved, expanding; ray florets pistillate, those of the disk, perfect. Receptacle chaffy. Seed somewhat 4-angled. Pappus wanting.

1. S. Laciniiata. Leaves laciniate, pinnatifid, the upper ones lanceolate, entire, tuberculate; ray florets large.

Yellow. 4. Carolina.

GENUS XLVIII. ACTINOMERIS.

Involucre many leaved, with leaves nearly equal; ray florets 4-12, neutral, those of the disk perfect. Receptacle chaffy. Seed compressed, margined, enclosed by the chaff. Pappus 2-awned.

1. A. Helianthoides. Stem erect, winged, slightly scabrous. Leaves lanceolate, serrate, acute, scabrous, villous beneath. Flowers in terminal corymbs; involucre with leaves arranged in two series, ovate-lanceolate, hispid; ray, florets 10-12, those of the disk numerous, slightly winged hairy.

Yellow. 4. June—July. Middle Ga. 3-4 ft.

2. A. Squarrosa. Stem erect, winged, glabrous when old, or pubescent towards the summit. Leaves lanceolate, serrate, scabrous, on short petioles. Flowers in leafy panicles; scales of the involucre expanding, arranged in 1-2 series; ray florets about 4 beneath, lanceolate. Seed slightly winged, somewhat hairy.

Yellow. 4. August—Oct. Middle and low country Car. & Ga. 3-7 ft.

GENUS XLIX. HELIANTHUS.

Involucre imbricate, leafy, generally squarrose; ray florets neutral, those of the disk perfect. Receptacle chaffy. Pappus 2-leaved, caducous.

(a) Florets of the disk dark purple.

1. H. AtroRubens. Stem hispid, naked towards the summit, paniculate-
DICOTYLEDONOUS.

ly branched. Leaves opposite, spatulate, acute, crenate, scabrous on the upper surface, pubescent beneath, those towards the base very long, upper ones small, sessile. Flowers in terminal panicles; involucre many leaved, ciliate; ray florets lanceolate, nerved. Seed compressed. Pappus 2 long, deciduous awns. Receptacle convex, with the chaff 3-cleft at the summit.

Yellow. 4 Aug.—Oct. Dry soils. Comm n. 3-4 ft.

2. H. Spergulifolius. Stem scabrous, with long slender branches, nearly glabrous. Leaves opposite, ovate, coarsely toothed, hispid, scabrous, the upper ones nearly sessile. Flowers in loose panicles; involucre with the leaves finely ciliate; ray florets about 14; pappus subulate.

Yellow. 4 Aug.—Oct. Western Ga.

3. H. Augustifolius. Stem pubescent slender, sparingly branched. Leaves narrow-lanceolate, with revolute margins, scabrous on the upper surface, pubescent beneath, lower ones opposite, upper ones alternate. Flowers terminal; ray florets about 12; pappus setaceous ciliate.

Yellow. 4 Aug.—Oct. 2-3 ft.

(b) Florets of the disk yellowish.

4. H. Truncatus. Stem glabrous, slender, simple, or divided at the base. Leaves opposite, rounded at the base, ovate, serrate, tapering towards the summit, hairy, sessile. Flowers terminal; involucre, with the leaves somewhat hispid on the inner surface; ray florets 10-12; pappus subulate; chaff of the receptacle pubescent.

Yellow. 4 Aug.—Oct. Western Georgia. 2-3 feet.

5. H. Longifolius. Stem glabrous, tinged with purple, paniculately branched. Leaves long-lanceolate, nearly sessile, glabrous, the upper ones entire, the lower ones serrate and connate. Flowers at the extremities of the branches in corymbs; involucre with nearly glabrous leaves; ray florets about 10; pappus subulate; chaff of the receptacle 3-toothed.

Yellow. 4 Sept. Sept.—Oct. In damp soils. Western Ga. 3-4 feet.


Yellow. 4 Aug.—Sept. Middle Georgia. 2-3 feet.

7. H. Mollis. Stem glabrous towards the base, scabrous at the summit, purple. Leaves ovate-lanceolate, acute, serrate, pubescent beneath, lower ones opposite, the upper alternate. Flowers in a terminal panicle; involucre with numerous, pubescent, ciliate leaves; ray florets about 10, hairy; pappus acuminate, pubescent.

Yellow. 4 July—Aug. Common. 3-6 feet.

8. H. Hispidulus. Stem erect, scabrous. Leaves opposite, ovate-lanceolate, tapering towards the summit, serrulate, slightly hispid beneath; involucre with scabrous, ciliate leaves; pappus subulate, pubescent; chaff 3-toothed.

Yellow. June.—Sept. Middle Georgia, common. 3-4 feet.

9. H. Strumosus. Stem erect, slender, glabrous, sparingly branched. Leaves opposite, narrow, tapering towards the summit, long, pubescent beneath. Flowers few, terminal, small for this genus; involucre shorter than the disk, with fringed leaves; ray florets about 6; pappus setaceous; chaff pubescent.

Yellow. 4 Aug.—Sept. 3-4 feet.

10. H. Tenuefolius. Stem erect, glabrous. Leaves opposite, on rather long petioles, ovate-lanceolate, somewhat tapering at the base, coarsely serrate, slightly scabrous on the upper surface, and slightly pubescent beneath. Flowers few, terminal; involucre as long as the disk, with ciliate leaves; ray florets about 10; pappus subulate.

Yellow. 4 Aug.—Oct. Western Georgia.

11. H. Spatiiatus. Stem strigate, scabrous towards the summit, sparingly branched. Leaves opposite, ovate, spatulate, tapering towards the summit,
on short petioles, pubescent beneath. Flowers at the extremities of the branches; involucre with subulate leaves; ray florets pubescent. 10-12; pappus subulate; chaff hispid.

Yellow. 4. Aug.—Oct. Middle & western Ga. 4-6 ft.

12. H. Tricostus. Stem scabrous. Leaves opposite, ovate-lanceolate, scabrous, whitish on the upper surface, brownish beneath, with revolute margins. Flowers terminal; involucre with subulate leaves; ray florets 14-16; pappus subulate.

Yellow. 4. Sept.—Oct. Western Georgia. 3-4 ft.

13. H. Diversifolius. Stem scabrous, with opposite branches. Leaves opposite, the lower ones ovate-lanceolate, tapering at the base, serrulate, the upper ones cordate, ovate, mucronate, nearly entire; petioles hispid, short; involucrular shorter than the disk; ray florets 10-12; pappus subulate, pubescent; chaff with 2 lateral teeth.

Yellow. 4. Aug.—Oct. Western Georgia. 3-5 ft.

14. H. Scaberrimus. Stem scabrous, slightly branched. Leaves opposite, lanceolate, subulate, nearly entire, whitish. Flowers few; involucre with ciliate leaves; ray florets from 16-26; pappus subulate.


15. H. Trachelifolius. Stem scabrous, branching. Leaves ovate-lanceolate, serrate, attenuate at the base, scabrous, tomentose beneath, whitish above. Flowers in terminal panicles; involucre with subulate ciliate leaves; ray florets 10-12; pappus subulate; chaff hairy at the summit.

Yellow. 4. Sept.—Oct. Mountains. 3-4 ft.

16. H. Tomentosus. Stem pubescent, scabrous, branched. Leaves long, ovate-lanceolate, tapering towards the summit, serrulate, scabrous on the upper surface, tomentose beneath, upper leaves alternate. Flowers terminal; involucre with long, ciliate leaves, summits hispid; ray florets 10-14; pappus subulate; chaff 3-cleft, hairy towards the summit.

Yellow. 4. Aug.—Oct. Western Ga. 4-6 ft.

17. H. Decapetalus. Stem pubescent, scabrous, branched. Leaves ovate, somewhat spatulate, serrate, scabrous above, pubescent beneath, upper ones alternate. Flowers in large panicles; involucre with long ciliate leaves; ray florets 10-12, long; pappus subulate, pubescent.

Yellow. 4. Aug.—Oct. Middle Ga. 3-4 ft.

18. H. Multiflorus. Stem scabrous. Leaves scabrous, the lower ones cordate, the upper ovate; involucre many leaved, smooth; ray florets numerous.

Yellow. 4 July—Sept. Mountains. 2-3 ft.

19. H. Gigantens. Stem somewhat scabrous towards the summit, branching. Leaves alternate, lanceolate, serrate, scabrous, tapering at each end, on short petioles, ciliate at the base. Flowers in terminal panicles; involucre many leaved, fringed; ray florets 12-14; pappus subulate.

Yellow. 4. Aug.—Oct. Mountains 5-8 ft.

20. H. Altiissimus. Stem glabrous, purple. Leaves alternate, ovate-lanceolate, serrate, scabrous, tapering towards the summit, on short fringed petioles; ray florets about 16; involucre with ciliate lanceolate leaves; chaff green.

Yellow. 4 July—Sept. Mountains. 6-8 ft.

21. H. Divaricatus. Stem glabrous, branching. Leaves ovate-lanceolate, serrulate, tapering towards the summit, scabrous on the upper surface, glabrous beneath. Flowers numerous, small, in terminal panicles; involucre with acute ciliate leaves; ray florets 5-10; pappus consisting of 2 hairy awns.

Yellow. 4. Aug.—Sept. Mountains. 5-6 ft.

22. H. Aristates. Stem scabrous, with slender branches. Leaves oval-lanceolate, toothed, sessile, acute, upper ones alternate, the lower opposite. Flowers in terminal corymb; involucre pubescent; ray florets small; pappus consisting of 2 persistent awns.

Yellow. 4 Sept.—Oct. Western Ga. 2-3 ft.
DICOTYLEDONOUS.

Genus L. BIDENS.

Involucre double, the outer unequal; ray florets neutral when present, frequently wanting; those of the disk perfect. Receptacle flat, chaffy. Pappus consisting of 4 retrorsely scabrous awns. Seed quadrangular.

1. B. CHRYSANTHEMOIDES. Stem glabrous below; somewhat pubescent towards the summit, with opposite branches. Leaves sessile, opposite, oblong-lanceolate, serrate, glabrous, somewhat connate; involucre double, the exterior one consisting of about 8 unequal foliaceous leaves; the interior of about the same number of equal, membranaceous leaves; ray florets lanceolate, 8. Seed compressed, oblong; pappus consisting of 2 awns which are distinct, and 2 others very minute: receptacle convex.

Yellow. 4 October—November. In wet cultivated lands. 2-3 ft.

2. B. CONNATA. Stem glabrous, with opposite branches. Leaves opposite lanceolate, toothed, glabrous, attenuate, at the base, the lower ones ternate, the upper ones simple, all sessile. Flowers solitary, on opposite peduncles, the exterior involucre foliaceous, the interior chaffy; ray florets none.

Yellow. 4 July—October. Middle Carolina and Georgia. 2-3 ft.

3. B. PILOSA. Stem pubescent, branching, lower leaves dentate, pubescent. Flowers solitary, on opposite and terminal peduncles; exterior involucre foliaceous, the interior chaffy; ray florets none.

Yellow. 4 July—October. Common. 2-3 ft.

4. B. FRONDOSA. Stem slightly pubescent, branching. Leaves lanceolate, the lower ones pinnate, the upper ternate and simple, slightly pubescent. Flowers solitary, on opposite and terminal peduncles; exterior involucre with unequal, ciliate leaves; the exterior chaffy; ray florets none.

Yellow. 4 June—September. Damp soils, common.

5. B. BIPINNATA. Stem glabrous, obtusely angled, with opposite branches. Leaves opposite, decussate, bipinnate; leaflets lanceolate, pinnatifid, slightly pubescent along the margin. Flowers on long, usually terminal peduncles; exterior involucre with linear-lanceolate leaves; interior leaves ciliate towards the summit. Seed slightly angled.

Yellow. 4 July—October. Common. 2-4 feet.

Genus LI. COREOPSIS.

Involucre double, each many leaved, the exterior equal, the inner one sub-coriaceous, and colored. Receptacle chaffy, with flat scales. Seeds compressed, emarginate. Pappus consisting of 2 awns; ray florets neutral; those of the disk perfect.

(a) Leaves opposite, entire.

1. C. LANCEOLATA. Stem procumbent, glabrous towards the summit, branching at the base. Leaves sessile, entire, linear-lanceolate, ciliate towards the base. Flowers solitary and terminal, on long, naked branches; involucre with the leaves about equal in both series; ray florets toothed at the summit, about 8. Seed compressed, winged; pappus 2 subulate, hairy awns; chaff narrow.

Yellow. 4 April—May. Damp soils. 1-2 feet.

2. C. CRASSIFOLIA. Stem pubescent, striate, branched at the base. Leaves opposite, oblong, the lower ones alternate at the base, hirsute. Flowers terminal; involucre glabrous; ray florets toothed, about 8.

Yellow. 4 June—July. Pine barrens, common. 1-2 feet.

3. C. ARGUTA. Stem glabrous. Leaves lanceolate-ovate, acuminate, ser-
rate. Extra on axillary and terminal peduncles, dichotomously divided.

Yellow. 4. Carolina.

4. C. Oemler. Stem glabrous, angular. Leaves sessile, glabrous, acute at each end, clasping, and somewhat connate. Flowers opposite, axillary, the upper ones in corymbs, the exterior involucre smaller than the interior; ray florets about 8, entire. Seeds compressed, margined.


5. C. Rosea. Stem glabrous, simple or branching. Leaves opposite, connate; linear, entire. Flowers on axillary and terminal peduncles, exterior involucre small; ray florets about 8. Seed entire.

Pale red. 4. Aug.—Sept. In damp pine barrens, common. 10—12 in.

(b) Leaves opposite divided.

6. C. Aubriculata. Stem pubescent, or nearly glabrous. Leaves sessile, entire, oblong-lanceolate, finely pubescent, the lower ones divided, with 2 small lateral leaflets at the base. Flowers axillary, and terminal; exterior involucre equal to the interior; ray florets about 8, toothed.

Yellow. 4. August—October. Mountains. 3—4 feet.

7. C. Desertsolia. Stem pubescent, dichotomously divided, lower leaves trifoliate, the leaflets obovate, or nearly orbicular, the upper ones spatulate lanceolate, all entire, sprinkled with glandular hairs. Flowers on long peduncles, exterior involucre equal to the interior. Seed nearly round.

Yellow. 4. May—July. Middle Carolina, Georgia.

8. C. Senifolia. Stem pubescent, branching towards the summit, angled. Leaves sessile, opposite, trifoliate, leaflets pubescent, lanceolate. Flowers in terminal corymbs; exterior involucre equal to the interior, both pubescent; ray florets pubescent on the outer surface, about 8.

Yellow. 4. June—August. Pine lands. 2—3 feet.


Yellow. 4. June—August. Dry soils. 2—3 feet.

10. C. Textiforma. Stem glabrous, slightly angled, branching towards the summit. Leaves trifoliate, sessile, leaflets many parted, with linear, entire segments. Flowers in corymbs, exterior involucre, with about 8 lanceolate leaves.

Yellow. 4. July—August. Upper Carolina. 2—3 feet.

11. C. Trichosperma. Stem glabrous, branching. Leaves opposite, pinnate, leaflets serrate. Flowers in corymbs, exterior involucr, with 8 ciliolate leaves; ray florets 8, entire; chaff linear-lanceolate.

Yellow. 4. August—October. Upper Carolina. 2—3 feet.

12. C. Mitis. Stem obusely angled, glabrous, much branched. Leaves deccussate, bipinnatifid, segments linear serrulate, slightly securab. Flowers in terminal panicles; exterior involucre, with serrulate, linear leaves, interior pubescent at the base; ray florets 8, obovate.

Yellow. 4. August—September. Wet grounds. 3—4 feet.

13. C. Aristata. Stem pubescent. Leaves quinquefoliate, leaflets pinnate, serrate. Flowers large; florets of the ray entire, broad, oval. Seed cuneate, obovate, 2 awned, awns very long, divaricate.

Elliott.

Yellow. 4. August—September.

14. C. pubescens. Stem pubescent, obtusely angled, sparingly branched. Leaves quinquefoliate, pinnate; leaflets lanceolate, obtuse, entire, the lateral ones small. Flowers terminal on long branches; exterior involucre about equal to the interior; ray florets 8, broader at the summit. Seed slightly winged.

Yellow. 4. August—September. Western Georgia. 2—3 feet.

15. C. Triptetus. Stem glabrous, branching towards the summit, fistular. Leaves opposite, the upper ones trifoliate; leaflets lanceolate, glabrous, entire,
scabrous along the margin. Radicle leaves, pinnate; exterior involucre not as long as the interior; ray florets entire, 8. Seed slightly winged.

Yellow. 4. August—October. Western Georgia. 4-6 feet.

16. C. Nudata. Stem erect, glabrous, striate, dichotomously divided towards the summit. Leaves subulate, linear, glabrous, those near the summit smaller. Flowers terminal, exterior involucre minute.

Red. 4. July—August. Southern Georgia. 2-3 feet

(c) Leaves alternate.

17. Gladiata. Stem glabrous, striate, dichotomously divided towards the summit. Leaves narrow, lanceolate entire, succulent. Radicle ones on long petioles. Flowers terminal, exterior involucre smaller than the interior, expanding; ray florets 3-lobed at the summit, 8. Seed with serrulate wings; pappus pilose; chaff purple.

Yellow. 4. August—September. Damp pine barrens. 2-3 feet.

Genus LII. LEPTOPODA.

Involucre many leaved, in double series. Ray florets neutral, dilated at the summit, 3-cleft, those of the disk perfect. Receptacle convex, naked. Seed cylindrical. Pappus membranaceous, 8-12 leaved.

1. L. Puberula. Stem simple, viscidly pubescent, striate, fistular. Radicle leaves obovate, or linear-lanceolate, slightly serrate; cauline leaves alternate, linear-lanceolate, glabrous, notched and toothed. Flowers terminal, solitary; involucre, with the outer leaves subulate, pubescent, longer than the interior; ray florets numerous. Seeds hairy; pappus biminate.


2. L. Decurrens. Stem glabrous, simple, striate, solid. Leaves decurrent, somewhat denticulate. Flowers solitary, terminal. Involucre with the interior leaves subulate, pubescent at the summit; ray florets somewhat pubescent. Seed glabrous, pappus, awned, biminate.

Yellow. 4. March—April. Middle Georgia. 1-2 feet.

Genus LIII. BALDWINA


1. B. Uniflora. Stem simple, slightly angled, pubescent. Leaves obovate tapering at the base, narrow, entire, pubescent when young. Involucre squarrose, with the leaflets ovate, the interior mucronate. Ray florets numerous pubescent, 3-toothed at the summit. Seed hairy, enlarged toward the summit. Pappus consisting of acute, membranaceous scales.


Yellow. 4. September—October. Middle & Southern Ga. 2-3 feet.

Genus LIV. RUDBECKIA.

Involucre in a double series, nearly equal. Ray florets
neutral, the disk perfect. *Receptacle conic, chaffly. Pappus a 4-toothed margin.


11. *R. Fugida. Stem hispid, with long virgate 1-flowered branches. *Leaves numerous, oblong-lanceolate, alternate, sessile, hispid, tapering at the
base. **Involucre** hirsute, exterior leaves largest, somewhat foliaceous. **Ray** florets 12-14, 2-cleft. **Pappus** a slight margin. **Chaff** glabrous.


12. **R. HIRTA.** Stem hirsute, sparingly branched. Leaves alternate, sessile, spatulate lanceolate, hirsute, upper ones narrower. **Florets** solitary, terminal. **Involucre** many leaved, hairy; exterior leaves the largest. **Pappus** wanting. **Chaff** fringed at the summit.


13. **R. ARISTATA.** Stem erect, corymbose branched. Leaves serrate, lanceolate, hispid. **Florets** at the extremities of the branches. **Involucre** many leaved, disk nearly hemispherical. **Pappus** subulate.

Yellow. 4.

**GENUS LV. SILPHIUM.**

**Involute** nary, squarrose. **Ray** florets pistillate, those of the disk staminate. **Seed** compressed, obcordate, emarginate, 2 toothed. **Receptacle** chaffy.

1. **S. LACINIATUM.** Stem hispid, simple, nearly glabrous towards the base. Leaves alternate, about 2 feet long and 1 wide, pinnatifid, the segments toothed and sinuate, scabrous. **Involucre** consisting of 10 leaves, subulate. **Ray** florets numerous, about as long as the involucre. **Pappus** 2 small awns.

Yellow. 4. August—Sept. Western Ga. 8-12 ft.

2. **S. PINNATIFIDUM.** Stem glabrous. Leaves large, pinnatifid, sinuate; segments usually acute, upper surface glabrous, the under slightly scabrous. **Florets** in panicles, large. **Involucre** glabrous with the exterior leaves orbicular, the interior oval.

Yellow. 4. July—Western Ga. and Ala. 4-6 ft.

3. **S. COMPOSITUM.** Stem glabrous. Leaves irregularly lobed, sinuate, sometimes pinnatifid, glabrous above, somewhat hairy beneath. **Florets** in terminal panicles. **Involucre** with the leaves slightly ciliate.


4. **S. TEREBINTHINACEUM.** Stem erect, glabrous. **Radicle** leaves cordate or nearly orbicular, or reniform, sometimes lobed and dentate; cauline ones alternate, serrate, scabrous, ovate. **Florets** numerous, in corymbose panicles, exterior leaves of the involucre ovate, acute, the interior obtuse. **Ray** florets 10-12.

Yellow. 4. July—Aug. Mountains. 4-5 ft.

5. **S. PERFOLIATUM.** Stem glabrous, quadrangular. Leaves opposite, connate, serrate, ovate, the upper ones perfoliate, broad. **Florets** on axillary peduncles. **Involucre** squarrose. **Ray** florets 24.

Yellow. 4. July—Sept. Mountains. 4-6 ft.

6. **S. CONNATUM.** Stem erect, terete, hispid, with reflexed hairs. Leaves opposite, perfoliate, scabrous, serrate. **Florets** in terminal panicles. **Involucre** squarrose, with ovate leaves, reflexed at the summit. **Ray** florets 12.

Yellow. 4. August—Sept. Middle & western Ga. 4-5 ft.

7. **S. INTEGRIFOLIUM.** Stem quadrangular, hispid. Leaves opposite, sessile, oblong, entire, scabrous on the upper surface. **Florets** few, on short peduncles. **Involucre** with oblong ovate leaves.

Yellow. 4. August—Sept. Mountains. 3-4 ft.

8. **S. LÆVIATUM.** Stem quadrangular, glabrous. **Radicle** leaves lanceolate, oblong; the lower cauline ones oval-lanceolate, on short peduncles, which are connate at the base; the upper ones sessile, ovate, the highest cordate, glabrous. **Florets** in corymbs. **Involucre** with ciliate leaves, the inner ones largest.

Yellow. 4. August—Sept. Middle Ga. 2-3 ft.

9. **S. SCABERRIMUM.** Stem angled when young, becoming terete when old,
scabrous towards the summit. Leaves on short pedioles, connate at the base, ovate, serrate, rigid, scabrous. Flowers in corymbs. Involucre with ovate ciliate leaves, exterior ones smallest. Seed nearly circular, winged.

Yellow. 4. August—Sept. Middle and western Ga. 3-4 ft.

10. S. Trifoliatum. Stem glabrous, somewhat hexagonal, usually purple. Leaves ovate-lanceolate, serrate, slightly scabrous on the upper surface, glabrous beneath, the upper ones nearly sessile, the lower ternate. Flowers in terminal corymbs. Involucre with ovate, ciliate, loosely appressed leaves. Ray florets about 14.

Yellow. 4. August—Oct. Mountains. 4-5 ft.

11. S. Ternatum. Stem terete, or slightly angled, glabrous. Leaves verticillate, by threes, lanceolate, acute, denticulate or serrate, slightly scabrous on the upper surface, pubescent along the veins beneath. Flowers in terminal corymbs. Involucre ciliate, with ovate, loosely appressed leaves. Ray florets 12-14, long.

Yellow. 4. August—Oct. Mountains. 4-6 feet.

12. S. Atropurpureum. Stem erect, terete, purple, glabrous. Leaves mostly verticillate, by fours, numerous, the lower ones alternate, and the uppermost scattered, the intermediate ones sometimes by threes; all lanceolate scabrous, dentate, on ciliate pedioles; midrib purple. Flowers in dichotomous panicles. Involucre ciliate, with ovate scales. Ray florets long, narrow.

Yellow. 4. Aug.—Sept. Upper districts. 4-5 feet.


14. S. Asteriscus. Stem erect, terete, hispid. Leaves lanceolate, acute, serrate, scabrous; the lower ones opposite, petiolate, the upper ones alternate, sessile. Involucre ciliate, with ovate leaves. Ray florets 8-10.

Yellow. 4. June—Aug. Sandy soils, common. 2-3 ft.

15. S. Pumilum. Stem erect, or procumbent, terete, tomentose. Leaves alternate, old, long, irregularly dentate, acute, petiolate, pubescent on the upper surface, tomentose beneath. Flowers in irregular corymbs. Involucre tomentose, with the leaves ovate, 8-10. Ray florets 8-10, tomentose on the under surface.


Genus LVI. POLYMNIA.

Involucre double, the exterior usually 5-leaved, the interior 10-leaved. Ray florets pistillate, those of the disk staminate. Receptacle chaffy. Pappus none.

1. P. Canadensis. Stem erect, viscid, villous, somewhat scabrous. Lower leaves deeply lobed, or pinnatifid, the upper ones entire or 3 lobed, all finely serrate, somewhat ovate, slightly scabrous. Flowers in terminal panicles. Involucre viscid and villous. Ray florets 10, small.

Yellow. 4. July—Sept. Mountains. 2-4 feet.

2. P. Uvedalia. Stem erect, villous, terete, scabrous. Leaves opposite, 3-5-lobed, or ternate, leaflets or lobes, tomentose, ovate, scabrous, petiole winged. Flowers in a terminal panicle, with opposite or ternate branches. Involucre with the exterior scales largest, ciliate, ovate; the interior lanceolate, villous. Ray florets 10, 3-toothed at the summit. Seeds globose, somewhat compressed, glabrous.

Yellow. 4. June—August. Common. 3-5 feet.
Genus LVII. CHRYSOGONUM.

Involucre 5-leaved, oblong, villous. Ray florets pistillate, those of the disk staminate. Receptacle chaffy. Seed enfolded in a 4-leaved calyx. Pappus 1-leaved, pubescent at the summit.


Yellow. 4 Apr.—June. Common. 4-12 inches.
(c) Anthemideae, Chamomile, or May-Weed tribe.

Genus LVIII. SANTOLINA.

Involucre hemispherical, imbricate, with the leaves keeled, having scarious points. Ray florets wanting, those of the disk perfect. Receptacle chaffy. Pappus wanting.


Yellow. 6 June—July. On the Southern coast.

Genus LIX. ARTEMISIA.

Involucre imbricate, with the leaves round, connivant. Ray florets none. Receptacle naked. Pappus none.

1. A. CAUDATA. Stem erect, simple, glabrous, paniculately branched. Radicle and lower cauline leaves sub-bipinnate, pubescent, upper ones sub-pinnate; segments sub-setaceous, convex, alternate, divaricate. Flowers erect, pedicillate, globose, in dense panicles.

Yellow. 4 July—Aug. On the sea shore. 2-6 feet.

Genus LX. SPARGANOPHORUS.

Involucre imbricate, sub-globose, pubescent, with the leaves recurved at the summit. Ray florets wanting, those of the disk perfect. Receptacle naked. Seed glabrous, pentangular. Pappus membranaceous, 5-cleft.


Genus LXI. ANTHEMIS.

Involucre hemispherical, many leaved, with leaves nearly equal. Ray florets pistillate; disk florets perfect. Receptacle chaffy, with the chaff rigid and acuminate. Seed naked. Pappus wanting or none.

1. A. COTULA. Stem erect, pubescent, slightly angled, much branched. Leaves bipinnate, with subulate, 3-parted segments. Flowers in terminal
Corymbifereæ. 199


Genus LXII. Achillea.

Involucr e ovate, imbricate, many leaved. Ray florets pistillate, those of the disk perfect. Receptacle chastly. Pappus none.

1. A. Millefolium. Stem erect, pubescent, furrowed, branched at the top. Leaves urinate, with the segments linear, acute, glabrous. Flowers in dense, terminal corymbs. Involucr e with the leaves ovate-lanceolate, pubescent. Ray florets 4-5. Yellow. White, or pale red. 1 July—August. 1-2 feet.

Genus LXIII. Verbesina.


2. V. Sinuata. Stem erect, pubescent, winged towards the base, striate. Leaves alternate, sessile, spathulate, or ovate, those on the middle of the stem sinuate, with acute lobes, scabrous on the upper surface, pubescent beneath. Involucr e pubescent, shorter than the disk. Ray florets 3-5. Seed winged, cuneate. White. 1 Octobor—November. On the sea coast. 4-6 feet.


Genus LXIV. Parthenium.


Genus LXV. iva.


2. Imbricata. Stem herbaceous, terete, slightly angled towards the summit, glabrous, becoming purple. Leaves sessile, linear-lanceolate, cuneate, succulent, the upper ones usually alternate and entire, the lower frequently opposite and toothed. Flowers axillary, pedunculous. Involucre with 6-9 fleshy leaves, with the margins lacerate. Ray florets 2, those of the disk numerous. White. 4. July—October. On the sea coast.

Genus LXVI. AMBROSIA.

Flowers numerous, staminate florets, with the involucre hemispherical, 1-leaved, many flowered. Anthers approximate, but not united. Receptacle naked, pistillate florets with the involucre 1-leaved, entire, or 5-toothed, 1-flowered. Corona none. Styles 2. Fruit a nut formed from the indurated calyx, 1-seeded.


3. A. Artemisifolia. Stem erect, slightly pubescent, fastigiate branched. Leaves towards the base bipinnatifid, opposite, those towards the summit, pinnatifid opposite, nearly glabrous on the upper surface, pubescent beneath. Racemes terminal by threes. Involucre of the staminate florets, globose; fertile florets axillary, sessile, spines short. White. 8. August—September. Mountains. 4-6 feet.


Genus LXVII. XANTHIUM.


1. H. Strumarium. Stem erect, pubescent, scabrous, angled. Leaves alternate, cordate, usually 3-lobed, serrate, pubescent, very large, on long peti-
DIPSACEÆ—PLANTAGINEÆ.

Genus same as the order.

1. D. SYLVESTRIS. Stem erect, angular, prickly. Leaves opposite. Involucre many leaved, curved upwards. Flowers in dense oval heads, shorter than the scales of the receptacle.

ORDER LXXVI. DIPSACEÆ.

Genus L. DIPSACUS.

Genus same as the order.

1. D. SYLVESTRIS. Stem erect, angular, prickly. Leaves opposite. Involucre many leaved, curved upwards. Flowers in dense oval heads, shorter than the scales of the receptacle.

ORDER LXXVII. PLANTAGINEÆ.

Genus I. PLANTAGO.

Genus same as the order.

1. P. MAJOR. Stem none. Leaves broad-ovate, glabrous, on rather long petioles, remotely toothed, 5-nerved; petiole pubescent; scape pubescent. Flowers in bracteate spikes; segments of the calyx, lanceolate, glabrous. Capsule 2-celled, the upper half falling off when the seeds are mature.

ORDER LXXVI. DIPSACEÆ.

Genus same as the order.

1. D. SYLVESTRIS. Stem erect, angular, prickly. Leaves opposite. Involucre many leaved, curved upwards. Flowers in dense oval heads, shorter than the scales of the receptacle.

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Genus same as the order.

1. P. MAJOR. Stem none. Leaves broad-ovate, glabrous, on rather long petioles, remotely toothed, 5-nerved; petiole pubescent; scape pubescent. Flowers in bracteate spikes; segments of the calyx, lanceolate, glabrous. Capsule 2-celled, the upper half falling off when the seeds are mature.

ORDER LXXVI. DIPSACEÆ.

Genus same as the order.

1. D. SYLVESTRIS. Stem erect, angular, prickly. Leaves opposite. Involucre many leaved, curved upwards. Flowers in dense oval heads, shorter than the scales of the receptacle.

ORDER LXXVII. PLANTAGINEÆ.

Genus I. PLANTAGO.

Genus same as the order.

1. P. MAJOR. Stem none. Leaves broad-ovate, glabrous, on rather long petioles, remotely toothed, 5-nerved; petiole pubescent; scape pubescent. Flowers in bracteate spikes; segments of the calyx, lanceolate, glabrous. Capsule 2-celled, the upper half falling off when the seeds are mature.

4. P. Interrupta. Stem none. Leaves long, narrow, lanceolate, 3-5-nerved; scape pubescent near the base, spike long slender. Flowers scattered, glabrous, occasionally in clusters.

Order LXXIX. PLUMBAGINEÆ.

Calyx tubular, plaited, entire, persistent, scarious. Petals (the only genus belonging to this order, found in our geographical limits.) 5, regular. Stamens 5, inserted on the petals. Ovary superior. Ovule inverted, pendulous, suspended from the point of a strap-like umbilical cord, which arises from the base of the ovary. Stigmas 5. Fruit indehiscent. Seed inverted. Embryo straight. Herbaceous plants, with sheathing leaves. Flowers in panicles.

Genus I STATICE.

Genus the same as the Order.


Remarks.—The root of this plant possesses decided medicinal properties. It is very astringent, and may be used as a substitute for the most astringent medicines. In ulcerated sore mouth it forms a most valuable gargle, in the form of infusion or decoction.

Order LXXX. LABIATEÆ.

Calyx tubular, persistent, regular, or bilabiate, hypogynous. Corolla bi-labiate, with the upper lip entire, or bifid, the lower 3-cleft. Stamens 4-didynamous, the two shorter being sometimes abortive, inserted into the corolla. Ovary 4-lobed. Ovules 4. Style 1, arising from the base of the lobes. Stigma bifid. Fruit enclosed within the persistent calyx. Seed erect, with little or no albumen. Usually herbaceous plants, with whorled, spiked, or capitulate flowers, and square stems, and opposite branches and leaves.

Genus I LYCOPOS.


2 *L. ARISTOPLIUS*. Stem erect, glabrous, square. Leaves narrow-lanceolate, acuminate, the upper ones slightly, and the lower ones deeply toothed, Flowers in dense whors, sessile. Calyx armed with spines, longer than the seed, with the segments acuminate. Water Horehound. 


3 *L. EXALTATUS*. Leaves at the base pinnatifid, serrate, with the segments entire and slightly serrate. Calyx spinos. 

August—September.

4 *L. SINUATUS*. Stem erect, suffused, glabrous, square. Leaves sinuate and incised, and sometimes dentate; the segments acute. Flowers in dense sessile whors; segments of calyx acute, longer than the seeds. 

White. 4. August—Sept. In swamps. 4-6 feet.

Remarks. The *Lycoceus Virginicus* is a medicinal plant possessing mild narcotic properties. In hermaphrode from the lungs it has been used with advantage, it being taken in the form of infusion.

**Genus II MENTHA.**

Calyx tubular, ciliate, glabrous, 5-toothed. Corolla funnel-shaped, with the border nearly equally 4-cleft, with the upper segments emarginate. Stamens erect, distant. 


Remarks. This is one of the species of the genus from which the Oil of Peppermint of the shops is obtained. This oil exists in the whole plant and is distilled with water, or it yields the oil to Alcohol by maceration. It is an aromatic stimulant, and is extensively used as a family medicine.

**Genus III PYCNANTHEMUM.**

Calyx tubular, striate, 5-toothed. Corolla with the upper lip nearly entire, the lower one trifid, with the middle segments longest. Stamens distant. Cells of the anthers parallel. Flowers in heads, surrounded by a many leaved involucre. 


Yellow, spotted with purple. 4. August—Sept. In dry fertile soils. 3-6 ft.

2 *P. ARISTATUM*. Stem square, pubescent, much branched. Leaves lanceolate-ovate, slightly serrate, on short petioles, whitish. Flowers in one or two sessile whors, and a terminal head, bracts awned. Calyx with the segments terminated by long awns. Corolla glabrous small. 

White. 4. July—August. Mountains. 2-3 feet. 

3 *P. MONTANUM*. Stem glabrous, purple. Leaves oval-lanceolate, serrate, nearly sessile. Flowers in one or two whors, and a terminal head.—
DICOTYLEDONOUS.


Genus IV. HYSSOPUS.

Lower lip of the Corolla 3-parted, middle lobe sub-crenate. Stamens straight, distant, long. Style longer than the corolla.


Genus V. TEUCRIUM.

Upper lip of the corolla short, 2-parted, the lower one 3-lobed, the middle lobe largest. Stamens projecting through the cleft of the upper lip.

1 T. canadense. Stem erect, furrowed, pubescent, somewhat jointed.—Leaves opposite, ovate-lanceolate, serrate, on short petioles, almost tomentose beneath. Flowers in whorled racemes. Bracts subulate longer than the calyx. Calyx pubescent, with the three upper segments broad, the 2 lower narrow. Corolla pubescent, the upper lips deeply divided. Stigmas 2. Blue or reddish. 11. July—September. Damp soils common, 2-3 ft.


Genus VI. TRICHOSTEMA.

Calyx resupinate, upper lip of the corolla falcate. Stamens very long incurved.

Blue. @ July—September. Dry soils, very common. 2–3 feet.

2 T Linearis. Stem viscidly pubescent. Leaves linear, smooth, sessile, acute at each end, teeth of the calyx awned. Stamens very long.

Blue. @ June—September. Dry fields. 6–12 inches.

Genus VII. COLLINSONIA.


3 C Ovalis. Stem glabrous. Leaves oblong-oval, glabrous, acute, on long petioles. Flowers in simple terminal panicles, teeth of the calyx short. Corolla small.

Yellow. 4. July—August. Middle Carolina.

4 C Tuberosa. Stem somewhat pubescent, branching. Leaves large, rhomboid-oval, glabrous, serrate, on long petioles, except the upper ones.


5 C Punctata. Stem erect, sebaceous, pubescent, branching at the summit. Leaves ovate-lanceolate, large, acuminate, dentate, pubescent and dotted beneath, upper pair nearly sessile, ovate. Flowers in compound, paniculate racemes. Calyx with the lower lip longest, sprinkled with resinous dots. Corolla pubescent, upper segments short, lower one fimbriate; filaments 4, two upper ones sterile.


Yellow. 4. May—July. Middle Georgia. 1–2 ft.


Pale yellow. 4. July—Sept. Mountains. 1–2 feet.

Genus VIII CERANTHERA.

Calyx bilabiate, the upper lip emarginate, the lower 2-cleft. Corolla double the length of the calyx, bi-labiate, the upper lip 2-lobed, the lower 3-parted. Stamens 4, distant, exserted. Anthers awned.


Reddish, spotted with violet. @ Sept.—Oct. Near Culloden. 12–18 in
**Genus IX Monardia.**

*Calyx* 5-toothed, cylindric, striate. *Corolla* ringent, with the tube long, cylindric, upper lip linear, entire, the lower one reflexed, 3-lobed, middle lobe longest. *Stamens* 2. *Seed* 4.


2. **M Punctata.** Stem erect, branched, nearly glabrous, obtuse, angled, whitish. Leaves oblong, lanceolate, remote and obscurely serrate, tapering at the base, smooth. *Flowers* in whorls. *Bracts* lanceolate, colored, longer than the whorl. *Calyx* long. *Corolla* hairy, dotted with brown, the upper lip slightly arched, longer than the lower. *Horse mint.*

Yellow. ½ Dry, pine barrens. Common. 3–5 ft.


**Genus X Leonurus.**

*Calyx* 5-angled, with 5 acute, expanding teeth. *Corolla* bilabiate, the upper lip entire, hairy; the lower 3-parted, reflexed. *Stamens* 4. *Anthers* sprinkled with shining dots.

1. **L Cardiaca.** Stem with 4 pubescent angles. Leaves pubescent, the lower ones 3-lobed, lanceolate, the upper ones entire, pale beneath, sometimes dentate, on petioles about 1 inch long. *Flowers* in numerous, axillary whorls. *Calyx* nearly glabrous. *Corolla* small, villous on the outer surface. *Motherwort.*

White, tinged with red. ½ or ¾ May—Aug. In rich soils. Introduced

**Genus XI Lamiun.**

*Calyx* tubular, hairy, with 5-cleft, expanding border. *Corolla* bilabiate, the upper lip vaulted, the lower lip 2-lobed, toothed at the base. *Anthers* hairy.

1. **L. Amplexicaule.** Stem pubescent, square, branching at the base. Leaves pubescent, broadly-cordate, crenate, the upper ones sessile, clasping, the lower ones on short petioles. *Flowers* on axillary whorls. *Calyx* hairy. *Corolla* with the tube long, marked with pale spots.

Bright purple. ½ Common. 6–9 inches.

**Genus XII Dracoccephalum.**

*Calyx* 5-cleft, with the segments nearly equal. *Corolla* with the throat inflated, the upper lip concave. *Stamens* 4.

2 D Varielatum. Stem glabrous, square, with cartilaginous angles. Leaves sessile, oblong-lanceolate, toothed towards the summit, glabrous, lower ones alternate at the base. Flowers in short spikes. Bracts ovate, pubescent. Calyx pubescent. Corolla pubescent, inflated, the upper lip large, the middle segments of the lower lip streaked.

Bright purple. 4 May—June. Wet soils. 2-3 ft.

3 D Denticulatum. Stem glabrous, or minutely pubescent at the summit. Leaves sessile, ovate-lanceolate, glabrous, slightly toothed. Flowers in long spikes. Bracts subulate, finely pubescent. Calyx with the teeth nearly equal, pubescent. Lower lip of the corolla variegated.

Purple. 4 June—July. Mountains. 10-12 in.


Purple. 4 May—July. Southern Georgia. 12-15 in.

Genus XIII. STACHYS.

Calyx 5 cleft, segments awned. Upper lip of the corolla vaulted, lower lip 3-lobed, with the lateral lobes reflexed, the middle lobe large, emarginate. Stamens 4.

1 S Hyssopifolia. Stem erect, generally glabrous, slender, usually simple. Leaves sessile, linear-lanceolate, remotely dentate, or finely serrulate. Flowers sessile, about 4 in a whorl. Calyx glabrous, with the teeth rigid. Corolla slightly pubescent on the inside.


2 S Hispida. Stem erect, pubescent, hispid, with the bristles usually retrorse. Leaves on short petioles, ovate, oblong, acute, serrulate, hispid; the upper ones nearly linear. Flowers 4-5 in a whorl. Calyx hairy; segments acute. Lower lip of the corolla whitish with dark spots.


3 S Aspera. Stem erect, square, retrorsely hispid. Leaves sessile, linear lanceolate, serrulate, glabrous. Flowers usually 6 in a whorl. Teeth of the calyx divaricate, spiny.


Genus XIV. NEPETA.

Calyx tubular, ribbed, 5-toothed, with the teeth nearly equal. Corolla with the upper lip slightly emarginate, straight, the lower one 3-lobed, the middle lobe crenate. Stamens approximate.


Remarks.—This plant is very frequently employed as a family medicine, in poultices as an external application and internally in colic in children. It is agreeable, and is said to be efficacious.

Genus XV. MARRUBIUM.

Calyx with 10 ribs, with 5 or 10 spreading teeth. Corolla with the upper lip bifid, linear, straight, the lower lip 3-cleft, the middle segment largest, emarginate. Stamens 4.

White 1/4 Through the summer. Common around buildings.

Remarks.—This plant is a tonic, and in large doses cathartic. It is decidedly a family medicine, and is used in the incipient stages of coughs and catarrhs with good effects. It also derives celebrity from being extensively used in manufacturing the Horehound candy.

**Genus XVI MACBRIDEA.**

*Calyx* turbinate, striate, 3-cleft, 2 of the segments large, the other narrow. *Corolla* bilabiate, the upper lip entire, the lower one 3-lobed. *Anthers* villous, fringed.

1 M *Pulchra.* Stem erect, simple, glabrous, pubescent at the joints. *Leaves* lanceolate, serrulate, slightly hairy on the upper surface, ciliate; the upper ones sessile, the lower ones on short petioles. *Flowers* in a whorl, bracteate *Corolla* with the lateral lobes obtuse, reflexed.


**Genus XVII HEDEOMA.**

*Calyx* bilabiate, the upper lip with 2 subulate, ciliate segments; the lower lip 3-cleft, segments lanceolate. *Corolla* ringent. *Stamens* 2.


Pale purple. 1/2 July—Aug. Sandy soils. 6-10.

Remarks.—This plant is an aromatic stimulant, and like many of the plants of this Order is used much in family practice. It is taken in hot infusion for producing perspiration.

**Genus XVIII CALAMINTHA.**

*Calyx* tubular, ribbed, glabrous, throat closed with hair after flowering. *Corolla* pubescent, with the throat inflated, the upper lip emarginate, erect, the lower one 3-parted, with the segments obtuse, nearly equal. *Stamens* 4.


Rose color spotted with purple. 1/4 June—Aug. Middle Car. & Ga.

**Genus XIX PRUNELLA.**

*Calyx* with unequal lips, the upper one truncate, 3-toothed. *Upper* lip of the corolla dilated. *Filament* forked at the extremity one point bearing another. *Stigma* bifid. *Stamens* 4.

1 P *Vulgari.* Stem square, pubescent along the angles, hairy at the summit, branching at the base. *Leaves* oblong ovate, denticulate at the base, on long hairy petioles. *Flowers* in compact spikes, axillary and terminal. *Bracts* ciliate. *Calyx* somewhat hairy, upper one 3-awned. *Corolla* with the upper lip emarginate. *Self heal,* or *healall.*

Violet. 1/4 May—July. Common. 6-8 in.
**GENUS XX SCUTELLARIA.**

*Calyx* bi-labiate, upper lip with a lid closing the calyx after flowering. *Corolla* bi-labiate, upper lip concave, lower 3-lobed, tube long. *Stamens* 4.

1 S *Integriporta.* Stem 4-angled, usually branching, pubescent, lower leaves ovate, attenuate at the base, crenate, on short petioles; upper ones linear-lanceolate, obtuse, sessile. *Flowers* in panicled racemes of opposite racemes. A *Bract* at the base of each peduncle. *Corolla* villous, spotted with white. *Anthers* hairy.

Blue. 4 May—Aug. In damp soils, common. 2-3 ft.


Blue. 4 May—June. In thick woods. Middle Car. & Ga. 1-2 ft.


Blue. 4 June—Sept. In fields. 2-3 ft.


Blue. 4 May—July. Middle Ga. 2-3 ft.


White, tinged with violet. 4 May—July. Fertile soils. 1-2 ft.


7 S *Lateriflora.* Stem erect, glabrous, with the angles sometimes pubescent, much branched. *Leaves* ovate serrate, acuminate, lower ones on rather long petioles; the upper nearly sessile. *Flowers* in leafy racemes. *Calyx* glabrous.

Blue. 4 June—Sept. Upper Car. and Ga.

**GENUS XXI SALVIA.**

*Calyx* somewhat campanulate, 2-lipped, upper lip 3-toothed, the lower bilabed. *Corolla* ringent. *Stamens* 2. *Filaments* bifid with the connectivum elongated, bearing an anther cell at each extremity.


Blue. 4 March—Sept. Common. 2-3 ft.


Violet. 4 June—Oct. Common. 8-12 in.

DICOTYLEDONOUS.

4 S Cocinea. Stem erect much branched. Leaves cordate, serrate, tormentose, on rather long petioles. Flowers 6 in a whorl; upper lip of the corolla erect, emarginate, connectivum, bearing the anther only at one extremity. Scarlet-sage.
Red. 24 Through the summer. On the sea-coast. 1-2 ft.
Blue. 24 Through the Summer. Middle and upper Car. & Ga. 1-6 ft
Blue 24 June—July. Middle Ga. 1-2 ft.

GENUS XXII HYPTIS.

Calyx 5-toothed, tubular. Corolla ringent, the upper lip 2-cleft, the lower 3-parted, the middle segment forming a small sack. Stamens 4, inserted into the tube.

1 H Radiata. Stem erect, square, pubescent. Leaves sessile, pubescent, tapering at the base, dentate. Flowers in axillary heads, on long peduncles. Involucre about 12 leaved. Calyx pubescent, 5-toothed, teeth linear.
White, tinged with purple. 24 July—Sept. Damp soils, common. 3-4 ft.

ORDER LXXXI. VERBENACEÆ.

Calyx tubular, persistent inferior. Corolla hypogynous, usually with an irregular limb. Stamens 4, didynamous, sometimes only 2. Ovary 2-4 celled. Ovules erect, or pendulous, solitary or twin. Style 1. Fruit a drupe or berry. Albumen none. Generally herbaceous plants, with exstipulate leaves.

GENUS I VERBENA.


1 V Aubletia. Stem creeping, assurgent, angled, pubescent. Leaves opposite, oval-lanceolate, 3-lobed, dentate. Flowers in terminal spikes. Calyx angled, with unequal setaceous segments. Corolla pubescent at the summit, the border expanding.
Purple. 24 Through the Summer. Pine barrens common.
3 V Hastata. Stem erect, pubescent. Leaves lanceolate, acuminate, serrate, the lower ones frequently lobed, or hastate. Flowers in short, linear spikes, paniculate. Bracts ovate, shorter than the calyx.
Purple. 24 July—Aug. Mountains. 4-6 ft.
VERBENACE.E—BIGNONIACE.E.


Genus II CALLICARPA.

Calyx small, persistent, 4-cleft. Corolla 4-cleft, with obtuse segments. Fruit baccate, 4-celled, juicy, purple.

1 C Americana. A shrub bearing many branches, the old wood glabrous, young branches tomentose. Leaves opposite, lanceolate, serrate towards the base; petioles sprinkled with resinous atoms. Flowers in axillary clusters, on very short peduncles. Calyx tomentose. French Mulberry. Purple. ½ May—July. Very common. 3-5 ft.

Genus III ZAPANIA.


Bluish white. ½ July—Aug. Damp soils common. 4-6 in.

2 Z Lanceolata. Stem herbaceous, creeping, similar to the preceding. Leaves linear-lanceolate, serrate. Flowers on long peduncles, in conical heads.

Bluish white. ½ July—Aug. Banks of streams. 6-8 in.

Genus IV LANTANA.

Calyx obtusely 4-toothed. Corolla with the limb 4-cleft. Stamens 4, didynamous. Stigma hooked. Fruit a drupe, dark blue, containing a smooth 2-celled nut. Flowers in heads.

1 L Camara. A shrub with the stems rough, square. Leaves opposite, ovate-lanceolate, scabrous, pubescent along the veins, serrate. Flowers on axillary peduncles, numerous. Bracts longer than the calyx. Stamens short. Drupes globular.

Bright yellow. ½ June—Nov. Southern Ga. and Florida. 2-4 ft.

Order LXXXII. BIGNONIACE.E.

Calyx divided. Corolla hypogynous, usually irregularly 4-5 lobed. Stamens 5, 1 or 3 sterile. Ovary 2-celled, or spursiously 4-celled, many seeded. Style 1. Capsule 1-2-

**Genus I** BIGNONIA.


1 B *Capreolata*. A vine, climbing over small trees and shrubs. *Leaves* connate, lanceolate, cordate, glabrous, bearing tendrils, peduncles azillary, each one flowered.

Dull red. ½ March—April. Common.

2 B *Radicans*. A vine, climbing over the loftiest trees, attaching itself by radicles. *Leaves* pinnate; leaflets ovate, toothed, acuminate, glabrous on the upper surface, pubescent beneath. *Flowers* in corymbs. *Corolla* slightly ventricose beneath, tinged with yellow on the inside, with the segments nearly round, with a barren filament.

Red. ½ June—September. Common.

**Genus II** CATALPA.


1 C *Cordifolia*. A tree, with long, opposite, expanding branches. *Leaves* nearly round, cordate acuminate, glabrous on the upper surface, downy beneath, very large, usually 3 in a whorl. *Flowers* in large, terminal panicles, segments of the *calyx* ob-ovate, concave, those of the *corolla* crenulate, with the tube variegated, with yellow and purple; silique long, with the disseminopposite the valves.

White. ½ April—May. Common on the Ocmulgee. 20-50 feet.

**Order LXXXIII. PEDALINEÆ.**


**Genus I** MARTYNIA.

Genus the same as the order.

1 M *Proboscideæ*. Stem procumbent, branching, fistulous, viscidly pubescent, whole plant fetid. *Flowers* on axillary peduncles. *Calyx* split to the base on the under side. *Capsule* ligneous, 2-valved, 4-celled, with the surface furrowed, with 2-curved beaks, 2-3 inches long.

Dull yellow. ½ June—August. Common.

**Order LXXXIV. SCROPHULARINEÆ.**

*Calyx* divided, unequal, persistent. *Corolla* bilabiate, hy-
SCHROPHULARINAE. 213


Genus I VERONICA.

Calyx 4, rarely 5-parted. Corolla 4-lobed, unequal; the lower segments narrowest. Stamens 2. Capsule 2-celled, obcordate. Seed few.

(a) Flowers terminal, in spikes.


5 V Anagallis. Stem succulent, erect. Leaves lanceolate, serrate, varying in width. Flowers in long, opposite racemes. Blue. 4 May—June. In damp places. 1–2 ft


Genus II BUCHNERA.

Calyx cylindrical, 5-toothed. Corolla tubular, a little curved, with the border equally 5-cleft; segments obcordate. Stamens 4 didynamous. Capsule 5-celled.


Genus III SCROPHULARIA.

Calyx campanulate, 5-cleft, with equal segments. Corolla
with the tube globose, the border 5-cleft. **Stamens 4, didynamous.** **Capsule 2-celled, many seeded.**

1 **S Marilandica.** Stem erect, angled, glabrous, much branched. **Leaves** opposite, cordate, ovate, lanceolate, serrate. **Petioles ciliate. Flowers** in compound, terminal panicles. **Corolla twice as long as the calyx; the 4 upper segments erect, the lower one reflexed.**

Greenish, tinged with purple. 4 Aug.—Oct. Rich soils. 2-4 ft.

**Genus IV** **ANTIRRHENUM.**

**Calyx** gibbous at the base, deeply 5-parted, with lanceolate, pubescent segments. **Corolla** ringent, with a short tube bearing a spur. **Capsule 2-celled, 2-valved.**

1 **A Canadense.** Stem assurgent, glabrous, simple. **Leaves** scattered, erect, linear, dotted, alternate on the fertile branches, verticillate on the sterile. **Calyx** pubescent. The spur of the corolla **3 lobed,** larger than the upper. **Seeds** angled, blue. 4 March—April. Common. 12-18 inches.

**Genus V** **MIMULUS.**

**Calyx** prismatic, 5-toothed. **Corolla** ringent, with the upper lip reflexed at the sides; palate of the lower lip prominent. **Stamens 4 didynamous. Stigma** thick, bifid. **Capsule 2-celled, many seeded. Seeds** minute.

1 **M Ringens.** Stem erect, glabrous, 4-angled. **Leaves** opposite, sessile, narrow, lanceolate, acuminate, serrate, glabrous. **Flowers** axillary on peduncles about the length of the leaves; segments of the calyx subulate; lower lip of the corolla 3 lobed, larger than the upper. **Seeds** numerous, small. Pale blue. 4 July—Sept.

2 **M Alatus.** Stem erect, glabrous, square, slightly winged. **Leaves** ovate, lanceolate, serrate, on short petioles. **Flowers** axillary, on short peduncles; segments of the calyx mucronate. **Corolla** tinged with yellow. Pale blue. 4 August—Sept. Pine barrens. 1-2 ft.

**Genus VI** **LINDERNIA.**

**Calyx** pubescent, 5-leaved. **Corolla** bilabiata, 4-cleft; the upper lip short, reflected, emarginate; the lower lip 3-cleft, with the segments oval, obtuse. **Stamens 4, the two longest sterile. Capsule 2-valved, 2-celled, many seeded.**

1 **L Dilatata.** Stem procumbent, smooth, square. **Leaves** oblong, ovate, amplexicaule, sparingly toothed. **Flowers** axillary, on square peduncles, covered with glandular hairs. **Corolla** resupinate. **Stigma** compressed. Pale purple. © May—Sept. Around ponds. 6-8 in.

2 **L Attenuata.** Stem procumbent, or erect, square, glabrous. **Leaves** lanceolate, and obovate, narrowed at the base. **Flowers** on erect peduncles, shorter than the leaves, axillary, solitary. Purple. © May—June. Wet places. 6-8 in.

**Genus VII** **SCHWALBEA.**

**Calyx** tubular, ventricose, obliquely 4-cleft, upper segment
small; lower large, emarginate. Corolla bilabiate, ringent; the upper lip arched, entire, the lower 3-lobed. Capsule ovate, 2-celled, 2-valved. Seed numerous, winged.

1 S AMERICANA. Stem pubescent, angled, simple. Leaves alternate, lanceolate, entire, sessile. Flowers in terminal racemes, nearly sessile. Bracts 2, as long as the calyx.

Dull purple. ½ May—June. Pine barrens.

GENUS VIII CHELONE.


1 C GLABRA. Stem angled, rooting at the joints, glabrous. Leaves usually opposite, oblong-lanceolate, acuminate, serrate, glabrous, nearly sessile. Flowers in terminal spikes. Bracts shorter than the calyx. Calyx with the segments obuse. Corolla with the lower lip bearded.

White. ½ July—Aug. In wet shady places. 2-3 ft.

GENUS IX PENTSTEMON.

Calyx 5-leaved, bilabiate, ventricose. Stamens 4, with a fifth sterile filament, bearded on the upper side, and longer than the others. Anthers smooth. Capsule ovate, 2-celled, 2-valved. Seed numerous.

1 P LEVIGATUM. Stem glabrous, or slightly pubescent, terete. Leaves ovate, oblong; those of the root lanceolate, acute, upper ones slightly dentate. Flowers in terminal panicles. Calyx hairy. Corolla pubescent, upper lip 2-cleft, with the segments reflected; the lower 3-cleft.


3 P DISSECTUM. Stem erect, slightly pubescent. Leaves opposite, glabrous, compendiously dissected, with the segments irregular, linear. Flowers in panicles, with the flowers at the summit of the branches.

Purple. ½ June—July. Middle Georgia. 1-2 ft.

GENUS X HERPESTIS.

Calyx 5-cleft, unequal. Corolla tubular, somewhat bilabiate. Stamens 4 didynamous, included. Capsule ovate, 2-celled, 2-valved, with the dissepiment parallel to the valves.

1 H CUNEIFOLIA. Stem prostrate, branching, glabrous, succulent. Leaves opposite, cuneate, obovate, obscurely crenate towards the summit, sessile. Flowers on axillary peduncles about as long as the leaves; the three exterior segments of the calyx broad, the two narrow, with 2 bracts at the base. Corolla nearly campanulate, with a 5-cleft border; segments nearly equal.


2 H ROTUNDIFOLIA. Stem procumbent, assurgent, pubescent. Leaves oval, nearly orbicular, slightly hairy, amplexicaule. Flowers on opposite pe-
dicotyledons. The 3 outer leaves of the calyx large, the 2 interior small and subulate. *Anthers* sagittate.

Blue. 2. July—Sept. Along the margin of ponds.

3 H *Amplexicaulis*. *Stem* procumbent, woolly. *Leaves* cordate, amplexicaule, entire. *Flowers* on opposite peduncles, shorter than the leaves, larger than the preceding species.


4 H *Micrantha*. *Stem* prostrate, glabrous, succulent. *Leaves* sessile, ovate, obtuse, entire, glabrous. *Flowers* on axillary peduncles, shorter than the leaves.


**Genus XI GERARDIA.**


4 G *Fasciculata*. *Stem* erect, scabrous, marked with lines, branching at the summit. *Leaves* opposite and by threes, sometimes alternate, linear, acute, clustered. *Flowers* large, on peduncles shorter than the leaves. *Calyx* truncate, with small, subulate teeth. *Corolla* with the upper segments reflexed, villous, the three lower pubescent, ciliate. Purple, spotted with red. 2. Aug.—Oct. Common in the low country


7 G *Tenuifolia*. *Stem* diffuse, much branched, glabrous, angled. *Leaves* linear, acute, glabrous, except on the margins. *Flowers* on peduncles shorter than the leaves. *Calyx* with minute teeth. *Corolla* pubescent, ventricose, with the segments ciliate, with the tube nearly white.


8 G *Linifolia*. *Stem* erect, slender, with erect, virgate branches. *Leaves* linear, appressed to the stem. *Flowers* on peduncles shorter than the leaves, which become elongated. *Calyx* truncate, with 5 minute teeth.


9 G *Flava*. *Stem* pubescent, sparingly branched, or simple, pubescent. Lower leaves lanceolate, sometimes deeply serrate, on short petioles, upper
ones entire, or slightly dentate. Flowers axillary, opposite, on very short peduncles. Calyx with subulate segments.

Yellow. 7-4 July—Sept. Upper district Car. & Ga. 2-3 feet.


Yellow. 7-4 May—Sept. Rich soils, common.


Yellow. 7-4 July—Sept. Pine barrens, common.

Genus XII SEYMERIA.

Calyx deeply 5-cleft. Corolla campanulate, equally 5-cleft. Stamens 4, inserted into the throat of the corolla. Capsule ovate, ventricose, 2-celled, 2-valved, many seeded, dehiscing at the summit.


Yellow and purple. 7-4 Aug.—Sept. Low country. 3-4 ft.

2 S Pectinata. Stem much branched, viscidly pubescent, obtusely angled. Lower leaves pectinately pinnatifid, with the segments linear, entire; upper ones smaller, and often entire. Flowers on axillary peduncles. Corolla with a short tube.

Yellow. 7-4 Aug.—Sept. Middle Georgia. 2-4 feet.

Order LXXXIV. OROBANCHEÆ.


Genus I OROBANCHE.

Calyx 4-5-cleft, segments unequal. Corolla ringent. Capsule ovate, 1-celled. Seed numerous, with a gland beneath the base of the germ.


Brownish yellow. 7-4 July—Aug. Rich soils. 6-8 in.

2 O Uniflora. Stem erect, short, numerous from each root, covered with smooth, concave scales. Scape 1-flowered, 4-6 inches long, pubescent. Corolla with oblong, oval lobes, with a pubescent margin. Bluish white. 7-4 May—July. Pine barrens.

Part II. 17
Genus II EPIPHAGUS.

Calyx short, 5-toothed. Flowers polygamous, the upper ones sterile, the lower fertile. Corolla of the sterile florets ringent, compressed, 4-cleft; of the fertile 4-toothed, small. Capsule truncate, oblique, 1-celled.

1 E Virginica. Stem erect, branching, covered with small, ovate scales. Flowers alternate, small, sterile flowers largest, striped with purple, growing on the roots of Beach trees. White, with purple. 4 August—September. 12-18 inches.

Order LXXXV. ACANTHACEÆ.

Calyx 4-5-cleft, persistent, with the segments equal or unequal. Corolla hypogynous, with a regular or irregular border. Stamens inserted into the tube of the corolla, 2 or 4, when 4 didynamous, the short ones sometimes sterile. Ovary 2-celled, surrounded at the base by a disk. Style 1. Capsule 2-celled, few or many seeded; dissepiments opposite the valves. Seeds suspended, nearly globular. Cotyledons large. Herbaceous plants, with opposite, simple leaves.

Genus I JUSTICIA.

Calyx 5-parted, often with 2 bracts at the base. Corolla bilabiate, the upper lip emarginate, the lower 3-cleft. Stamens 2. Stigma 1. Capsule 2-celled, 2-valved.


Genus II RUHELLA.

Calyx 5-parted, often with 2 bracts. Corolla campanulate, with a 5-lobed border. Stamens 4 or 5 approximate. Capsule attenuate, dehiscing at the summit.

1 R Strefens. Stem erect, 4-angled, hairy. Leaves opposite, petiolate, lanceolate-ovate, entire. Flowers axillary, 1-3 in each axil. Calyx with acute hispid segments, with 2 bracteal leaves as long as the calyx. Corolla with the segments rounded; tube longer than the calyx. Seed generally 4. Blue. 4 May—Sept. Damp soils. 1-2 ft.

GENTIANA.


4 R Oblongifolia. Stem erect, obtusely angled, branched or simple, pubescent. Leaves sessile, obovate, obtuse; lower leaves nearly round. Calyx with the segments filiform, as long as the tube of the corolla, hirsute; segments of the corolla emarginate. Capsule surrounded with a glandular ring. Seed few.

Blue, spotted with yellow. 4 May—Sept. Very common. 1-2 ft.


Genus 3 ELYTRARIA.

Calyx 4-5-parted, with the front segment bifid. Corolla 5-cleft, with the segments nearly equal. Stamens 2, with 2 barren filaments. Capsule 2-celled, 2-valved, few seeds in each cell.

1 E Virginata. Stem none. Leaves long, entire, lanceolate, cuneate at the base, scabrous on the upper surface, slightly undulate; scape covered with ovate, amplexicaule scales. Flowers in dense spikes. Bracts enclosing the flowers rigid; scales 2 at the base of the calyx, pubescent. Calyx pubescent.


Order LXXXVI. GENTIANAE.

Calyx 5-10-cleft, persistent. Corolla hypogynous, usually regular, limb with as many lobes as the calyx. Stamens inserted into the corolla, and alternate with the segments, and equal to them in number. Ovary 1-2-celled, 1-2-seeded. Style 1. Fruit capsular, 1-celled. Seed small. Herbaceous plants, with opposite exstipulate leaves.

Genus 1 GENTIANA.

Calyx 4-5-cleft. Corolla tubular, campanulate, 4-5-cleft, with the orifice naked. Stamens 4-5, included. Stigmas 2. Capsule 1-celled, 2-valved.

1 G Saponaria. Stem erect, simple, terete, glabrous. Leaves ovate-lanceolate, acute, glabrous. Flowers axillary, terminal, sessile, clustered. Calyx with short segments. Corolla with the border 5 cleft, with the segments acute; the inner segments unequally 2-cleft. Soap Gentian.


2 G Catesbaei. Stem erect, simple, slightly pubescent, rough. Leaves narrow, lanceolate, scabrous. Flowers axillary, 1-3 in an axil. Calyx with the segments 2-3 times as long as the tube; border of the corolla erect, or expanding. Anthers sagittate. Seed compressed, slightly winged.


3 G Ochroleuca. Stem simple, terete, glabrous. Leaves lanceolate, entire, glabrous, of the margins scabrous; segments of the calyx foliaceous, linear-lanceolate. Flowers opposite, sometimes clustered, on very short peduncles; border of the calyx connivent, the interior segments short, denticulate. Sampson Snake-root.

White, striped with green and purple. 4 Sept.—Oct. Damp soils. 10-15 in
4 G. Angustifolia. Stem simple, slender, glabrous. Leaves linear, cuneate. Flowers terminal. Corolla large, of the segments expanding, the middle ones shorter and lacerate.

Blue, tinged with purple. 4 Wet places. Oct.—Nov. 12-18 in.

5 G. Crista. Stem erect terete at the base, angled towards the summit, glabrous. Leaves sessile, with scabrous margins, acute. Flowers solitary, axillary, and terminal, on rather long peduncles; segments fimbriate.

Pale blue. 4 Oct.—Nov. Mountains. 1-2 ft.

6 G. Quinqueflora. Stem erect, branching, glabrous, angled, and slightly winged. Leaves sessile, ovate-lanceolate, amplexicaule, acute. Flowers usually terminal, generally from 3-5. Corolla with the segments undulate.

Blue. 4 Among the mountains.

7 G. Acuta. Stem erect, angular. Leaves oblong, acute, amplexicaule. Flowers in terminal and lateral clusters; throat of the corolla ciliate; segments linear-lanceolate.

Blue. 4 Mountains.

Genus II Frasera.

Calyx 4-parted, with the segments lanceolate. Corolla 4-parted, with a paracorolla in the center of each segment. Capsule 1-celled, 2-valved. Seed compressed, winged, elliptical.

1 F Walteri. Stem erect, angled, branching, furrowed. Leaves verticillate or opposite, glabrous; the lower ones lanceolate-oblong, long; the upper ones narrower, small. Flowers verticillate; segments of the corolla lanceolate. Stamens 4. Stigmas 2. Wild Columbo.

Red and Yellow. 4 July—Aug. Middle Car. 6-8 ft.

Genus III Sabbatia.


1 S. Paniculata. Stem erect, much branched, marked by a decurrent line. Leaves linear-lanceolate. Flowers in diffuse panicles; segments of the calyx setaceous. Corolla with the segments lanceolate.


White. 4 June July. Wet pine barrens.


4 S. Brachia. Stem erect, slightly angled, with brachiate branches. Leaves lanceolate. Flowers in panicles, generally 3 at the extremity of each branch; segments of the calyx linear-lanceolate, those of the corolla obovate.

Red. 4 June—Aug. Middle Car. & Ga. 1-2 ft.


Red. 4 July—Aug. In rich soils. 1-2 ft.
GENTIANEE.

6 S CYLINDROSA. Stem slightly angled, sparingly branched. or simple. Leaves sessile, oval, obtuse. Flowers terminal, frequently solitary. Calyx usually 10-parted, with the segments leafy. Corolla 7-10 parted, with lanceolate segments.

Red. 4 July. In rich and wet soils. 1-2 ft.

7 S CLOREIDES. Stem erect, slender, branching. Leaves lanceolate, erect; segments of the Calyx 7-13-parted, linear, shorter than the corolla. Corolla 8-12-parted, with the segments lanceolate.

Red. 4 July. In rich ponds.

8 S GENTIANOIDEA. Stem erect, slightly angled. Leaves linear, acuminate. Flowers axillary and terminal, the terminal ones crowded. Calyx campanulate, 8-10-parted, with the segments subulate. Corolla 8-10-parted, with obovate segments. Stamens short.

Red. 4 Aug. Sept Middle Georgia.

Remarks. We have found several varieties of this genus without being able to determine to which species they belong, and we have only given those species which are well-characterized, leaving it for future investigation to arrange the genus more satisfactorily.

GENUS IV CENTAURELLA.

Calyx 4-cleft, persistent, glabrous. Corolla campanulate, persistent, 4-cleft. Stamens 4, inserted into the tube of the corolla, short. Capsule 1-celled, 2-valved, many seeded.


White. 0 Feb.—April. On the sea coast of Ga. 4-8 in.

2 C PANICULATA. Stem smooth, with brachiate branches. Leaves minute, subulate, those of the base alternate, those towards the summit opposite. Flowers in panicles, on opposite peduncles, the lower ones branched. Calyx 4-cleft, the two outer decurrent. Corolla about the length of the calyx.

Greenish white. 0 Aug.—Sept. In ditches and damp grounds. 8-12 in.

GENUS V HOUSTONIA.


1 H PATENS. Stem erect, square, glabrous, with expanding branches, dichotomous. Leaves opposite, spatulate-lanceolate, ciliate. Flowers solitary, terminal, or axillary, 2 scales in the middle of the peduncle. Calyx with linear segments, persistent. Capsule compressed.

White. 0 Feb.—March. Common. 1-2 in.

2 H CERIFLORA. Stem erect, slender, square, sparingly branched. Leaves of the roof, spatulate, those of the stem lanceolate. Flowers on axillary, long peduncles, each one flowered.

White. 4 May—Aug. Common in mid. Car. & Ga. 4-6 in.

3 H LONGIFOLIA. Stem erect, square, branching, glabrous. Leaves sessile, lanceolate, attenuate. Flowers in corymbs, on very short peduncles.

Purple. 4 June—Aug. Mid. & upper dis. 8-16 in.

4 H PERPERTUA. Stem erect, much branched, glabrous, hairy at the joints, and with the angles ciliate. Leaves sessile, ovate-lanceolate, obtuse at the base; nerves pubescent. Flowers in terminal corymbs. Calyx pubescent, with ciliate segments.


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5 H Serpyllifolia. Stem procumbent, cespite, filiform. Leaves spatulate, obtuse. Flowers on terminal peduncles, each 1-flowered.

6 H Rotundifolia. Stem prostrate, rooting at the joints, glabrous. Leaves ovate, narrowed at the base, slightly ciliate. Flowers on axillary peduncles, each one flowered. Corolla salverform, pubescent within; tube long; segments lanceolate. Capsule emarginate.

White. 4 Through the summer. On the sea coast.

Genus VII POLYPREUM

Calyx 4-parted, persistent. Corolla rotate, 4-cleft, with the throat hairy. Stamens 4, very short. Style 1, slender. Capsule compressed, 2-celled.

1 P Procumbens. Stem procumbent, furrowed, dichotomously branched. Leaves sessile, linear, opposite, connected by a stipular membrane. Flowers terminal, and in the divisions of the branches sessile, 2-4 leafy bracts at the base of the calyx; segments of the calyx subulate, serrulate. Seed angular. White. 4 May—Sept. Very common. 6-12 inches.

Genus VII VILLARSI. A


1 V Lacunosa. Stem filiform, floating. Leaves reniform, lacunose beneath, slightly crenate, on long petioles. Flowers somewhat umbellate, arising from the petioles. White. 4 July—August. In still waters.

Genus VIII OBOLARIA

Calyx 2-parted, in the form of bracts. Corolla campanulate, 4-cleft; segments equal, entire or crenulate. Stamens 4, somewhat didynamous. Stigma 2-cleft. Capsule 1-celled, 2-valved, many seeded.

1 O Virginica. Stem cespite, simple, or sparingly branched, glabrous. Leaves opposite, sessile, obovate, slightly decurrent, glabrous. Flowers 2-3 on the summit of axillary branches. White or red. 4 April—May. In rich soils. 4-6 inches.

Order LXXXVII. SPIGELIACEÆ


Genus I. SPIGELIA

Genus same as the Order.
ORDER LXXXVIII. APOCYNEÆ.

Calyx persistent 5-cleft. Corolla hypogynous, 5-lobed, regular, estivation twisted. Stamens 5, inserted into the corolla, alternate with its lobes. Ovaries 2, or 1–2 celled, many seeded. Style 1–2 or wanting. Stigma 1. Fruit, usually a follicle, double or single, or a capsule. Seed numerous. Plants usually with a milky juice. Leaves entire.

Genus I APOCYNUM.

Calyx minute, 5-cleft, persistent. Corolla campanulate, with the limb divided into 5 short, spreading or revolute lobes, the base furnished with 5 glandular teeth, alternating with the stamens. Stamens 5. Anthers sagitate. Style wanting.—Follicles 2, long, distinct.

1 A Androsaemifolium. Stem erect, with spreading branches. Leaves ovate, glabrous. Flowers in terminal and lateral cymes. Tube of the corolla longer than the calyx. 

2 A Cannabinum. Stem erect, branched. Leaves lanceolate, acute on short petioles, glabrous. Flowers in paniculate cymes. Calyx about as long as the tube of the corolla. 

3 A Pubescens. Stem erect. Leaves ovate, oblong, on short petioles, mucronate. Flowers in short pubescent cymes, tube of the corolla, longer than the calyx. 

Genus II. AMSONIA.

Calyx 5-parted. Corolla funnel shaped, with the throat closed. Follicles 2-ezrect. Seed terete with the summit obliquely truncate.

1 A Latifolia. Stem erect, glabrous. Leaves oval-lanceolate, on short petioles, alternate; upper ones acuminate, pubescent along the veins beneath. Flowers in terminal corymbose panicles. Follicles linear, long. 
Pale blue. 4. April—May. Very common. Middle Car. & Ga.

2 A Salicifolia. Stem erect, smooth, growing in bunches. Leaves linear lanceolate, acute, glabrous. Flowers in terminal corymbs, numerous.—Follicles long slender. 

3 A Augustifolia. Stem erect, pubescent, branching. Leaves linear-
lanceolate, numerous, pubescent, erect, those of the branches linear, ciliate. *Follicles* long slender.

Blue. 4 April—May. Middle Car. & Ga. Abundant.

**Genus III. ECHITES.**

*Calyx* 5-parted, with acute segments. *Corolla* funnel shaped, the border 5-parted, the throat naked. *Anthers* adhering to the stigma. *Follicles* 2, distinct, long, slender.

1 *E Difformis.* Stem climbing over small shrubs. *Leaves* opposite, pubescent, beneath, the lower ones narrow lanceolate or linear, the upper oval-lanceolate, acuminate. *Flowers* in corymbose racemes. *Stamens* included, inserted into the base of the corolla.

Yellowish white. 4 May—Aug. Damp rich soils.

**Genus IV. GELSEMINUM.**


1 *G Semprevirens.* Stem twining, smooth, glabrous. *Leaves* opposite, lanceolate, entire, perennial, shining on the upper surface, paler beneath. *Flowers* in axillary clusters, on short peduncles, which are covered with small scales. *Leaves* of the calyx equal, glabrous. *Capsule* oblong, furrowed, terminated by the style. Yellow. 12 Feb.—March.

**Order LXXXIX. ASCLEPIADEÆ**


**Genus I. ASCLEPIAS.**


1 *A Variegata.* Stem erect, simple, terete, with 2 pubescent lines. *Leaves* opposite oval-lanceolate, undulate glabrous beneath; veins and margins pubescent. *Flowers* in terminal umbels, with the peduncles and pedicels pubescent, with a caducous bract at the base of each pedicel. *Calyx* hairy, reflexed, with subulate segments. *Corolla* glabrous, green on the outer surface; follicle lanceolate, smooth. White. 4 April—June. In rich soils. Common. 2–3 feet.

2 *A Phytolaccoides.* Stem erect, simple. *Leaves* opposite, broad lan-
ceolate, large, acuminate, smooth, pale beneath. **Flowers** in lateral and terminal umbels, nodding.

Greenish purple. 4 June—July. Mountains 2-4 feet.

3 A *QUADRIFOLIA*. Stem erect, simple, smooth. **Leaves** verticillate by fours, ovate-lanceolate, glabrous, acuminate on short petioles. **Flowers** in terminal and axillary umbles; pedicels capillary; nectaries with horns, 2-toothed.

White. 4 June—July. Dry woods. 2-3 feet.

4 A *CONNIVENS*. Stem erect, terete, glabrous. **Leaves** opposite, sessile, oblong, oval, sprinkled with hair. **Flowers** few, in umbels, large; nectaries with horns.

White. 4 June—July. Southern Georgia. 1-2 feet.

5 A *INCARNATA*. Stem erect, branching, tomentose. **Leaves** opposite, lanceolate, long, somewhat tomentose, pubescent along the veins and margins. **Flowers** in numerous umbels, generally in pairs. Nectaries with subulate, exsert horns.

Purple. 4 July—Aug. On the banks of streams. 2-4 ft.

6 A *TOMENTOSA*. Stem erect, tomentose when young. **Leaves** opposite, tomentose on the under surface, acuminate. **Flowers** in terminal umbels, simple. Horns of the nectaries exserted.

Southern Ga.

7 A *OBOVATA*. Stem erect, tomentose, terete. **Leaves** opposite, nearly sessile, obovate, obtuse, mucronate, tomentose on the under surface; the upper ones smaller and lanceolate. **Flowers** in terminal and axillary umbels, nearly sessile.

Middle Ga. 2-3 ft.

8 A *OSTUSIFOLIA*. Stem simple, erect, purple. **Leaves** sessile, opposite, cordate, ovate, undulate, glabrous, glaucous beneath. **Flowers** in terminal umbels, usually solitary, on long pedicles. **Corolla** large, tinged with purple and green. Horns of the nectary exserted.

Purple and white. 4 June—July. Sandy soils. 2-3 ft.

9 A *AMPLEXICAULIS*. Stem decumbent, terete. **Leaves** large, succulent, sessile, opposite, cordate, strongly veined. **Flowers** in axillary and terminal umbels. Horns of the nectary exserted.

Dull white. 4 April—May. Dry sandy soils. 1-2 ft.


Purple. 4 June—July. In swamps. 3-4 ft.

11 A *LAEVIFOLIA*. Stem erect, glabrous, marked by a decurrent hairy line. **Leaves** sessile, opposite, ovate, tapering at the summit, glabrous. **Flowers** in axillary and terminal umbels; peduncles long. **Corolla** green on the outer surface.

Purple. 4 June—July. Damp pine barrens. 2 ft.

12 A *PAUPERULA*. Stem erect, glabrous, marked by a decurrent, hairy line. **Leaves** opposite, linear lanceolate, long, glabrous, margins pubescent. **Flowers** in umbels, on long peduncles.

Bright purple. 4 May—July. Damp sandy soils. 3-4 ft.

13 *PARVIFLORA*. Stem erect and decumbent, slightly pubescent. **Leaves** opposite, lanceolate, acuminate, tapering at the base, slightly pubescent, silky on the upper surface, on short pedioles. **Flowers** in axillary and terminal umbels. Horns of the nectary long.

White. 4 May—Aug. 1-2 ft.

14 A *VERTICILLATA*. Stem erect, slender. **Leaves** hairy, linear, crowded at the base, verticillate in the middle, opposite towards the summit of the stem. **Flowers** in axillary and terminal umbels. Horns of the nectary exserted.

Dull white. 4 May—Aug. In rich soils. 2-3 ft.

15 A *CINEREA*. Stem erect, slender. **Leaves** long, linear opposite, glab-
rous; upper ones minute. *Flowers* in terminal umbels. Horns of the nectary exserted.

Dull white, variegated. 4 June—July. Pine barrens. 2-3 ft.


Dull white. 4 May—June. Pine barrens. 8-16 in.

17 A *Tuberosa*. *Stem* erect, and decumbent, hirsute, branchings to the summit. *Leaves* alternate, crowded, sessile or on short petioles. *Flowers* numerous in umbels.

Orange. 4 May—June. Pine barrens.

**Remarks.**—The root of the *A. Tuberosa* is highly esteemed throughout the Southern States as a valuable remedial agent. It is a diaphoretic, and expectorant, and is employed in all affections of the lungs, dysentery, rheumatism, and pleurisy, and it is said with great benefit in all of these cases.

**Genus II GONOLOBIUS.**


3 G *Prostratus*. *Stem* prostrate, branching at the base, lower leaves reniform; upper ones cordate, all pubescent, and ciliate *Flowers* in axillary umbels; segments of the corolla ovate; follicles oval, glabrous. Purple. 4.

**Order XC. OLEACEÆ.**

*Flowers* perfect, or dioecious. *Calyx* divided, persistent. *Corolla* hypogynous, 4-cleft. *Stamens* 2, alternate with the segments of the corolla. *Ovary* simple, 2-celled, 2 seeds in a cell. *Style* 1. *Stigma* simple, or bifid. *Fruit* usually a drupe, often 1-seeded by abortion; cotyledons foliaceous. Trees or shrubs, with opposite leaves.

**Genus I OLEA.**

*Flowers* dioecious. *Calyx* small, 4-toothed. *Corolla* with a short tube; limb 4-cleft; segments ovate. *Fruit* a drupe 1-seeded.

**Gentis II CHIONANTHUS.**

*Calyx* minute, 4-cleft, persistent. *Corolla* 4-cleft, with long, linear, pendulous segments. *Fruit* a striated drupe.

1 C *Virginica.* A beautiful shrub. *Leaves* opposite, lanceolate, entire, shining when mature. *Flowers* in panicles, composed of opposite branches. *Fringe tree, or Old Man's Beard.*

White. 12 April—May. Common. 6-10 ft.

**Gentis III FRAXINUS.**


White. 12 March—April. River swamps. 40-60 ft.


White. 12 March—April. Swamps. 50-70 ft.

3 F *Caroliniana.* A small tree. *Leaflets* generally 7, lanceolate, slightly serrulate towards the apex, entire and attenuate at the base, glabrous, lucid on the upper surface. *Flowers* having a calyx. *White.*

White. 12 April—May. In high lands.

4 F *Platycarpa.* A small tree. *Leaves* opposite; leaflets petiolate, oval-lanceolate, serrate, pubescent when young. *Samara* with a broad-lanceolate wing.

White. 12 March—April. Swamps.

5 F *Pubescens.* A large tree. *Leaflets* 7-9, ovate-lanceolate, serrate, on short petioles, acuminate, pubescent beneath. *Samara* with an oblong-lanceolate wing.

12 March—April. Swamps. 50-60 ft.

6 F *Triptera.* A small tree. *Leaflets* obovate, tomentose beneath, oblique at the base. *Fruit* unlike that of the other species of this genus, 3-winged, tapering at the base. *Seed* 3-sided.

**Order XCI. BORAGINEÆ.**


**Gentis 1 LITHOSPERMUM.**


1 L *Arvensis.* Stem erect, hispid, branching. *Leaves* oblong-obtuse, or
DICOTYLEDONOUS.


Genus II BATSCHIA.

Calyx 5-parted. Corolla salver form; tube straight, bearded at the base, open at the orifice; segments rounded.


Genus III CYNOGLOSSUM.

Calyx 5-parted. Corolla funnel form, with a short tube and 5-lobed border, orifice closed. Seed depressed, affixed to the style to their inner margin.


Genus IV ONOSMIDIUM.


Genus V PULMONARIA.

Calyx small, 5-parted, persistent, prismatic. Corolla funnel form, obscurely 5-lobed.


Genus VI MYOSOTIS. (Syn. Echinospermum.)

Calyx 5-parted. Corolla 5-cleft, emarginate, salver-form, throat closed by connivant scales. Nuts fixed to a central column, echinate, compressed.
HELIOTROPICEAE.


Order XCI. HELIOTROPICEAE.

Calyx 5-parted, persistent. Corolla hypogynous 5-parted. Stamens 5, alternate with the segments of the corolla. Ovary entire, 4-celled, with a pendulous ovule in each cell. Style simple. Fruit drupaceous, easily separable into 4 pieces.—Seed solitary. Herbaceous plants with alternate simple leaves. Flowers in axillary or terminal spikes.

Genus I. HELIOTROPIUM.

1 H indicum. Stem erect, hispid, furrowed. Leaves alternate, cordate, ovate, scabr us, acute, margins irregular. Flowers in axillary spikes. Calyx 5-parted, hisrate shorter than the corolla. Fruit angular, separating.
Blue. ☂ June—Aug. Middle and Southern Car. & Ga. 8-12 feet.

2 H Curassavicum. Stem erect, or decumbent, simple, or branched, succulent, glaucous. Leaves narrow, lanceolate, glabrous, succulent. Flowers in terminal spikes. Calyx succulent, as long as the tube of the corolla. Corolla salver form, furrowed. Fruit angled on the inside, coated with a fleshy pulp.
White tinged with yellow. ☂ May—July. On the sea coast. 6-12 in.

Order XCIII. HYDROPHYLLEAE.

Calyx 5-10-cleft, persistent. Corolla hypogynous, 5-lobed, with two lamellae at the base of each lobe. Stamens 5, alternate with the segments of the corolla. Ovary simple, 1-celled. Ovule suspended. Style 1, bifid. Placenta 2-parietal. Fruit capsular, enclosed in the permanent calyx. Few, or many seeded. Herbaceous plants, hispid.

Genus I HYDROPHYLLUM.


1 H Virginicum. Stem erect, nearly glabrous. Leaves pinnate, and pinnaudif; segments oval-lanceolate, serrate. Flowers in compact axillary clusters; segments of the calyx linear.

Genus II PHACELIA.

Calyx 5-cleft. Corolla 5-cleft, sub-campanulate, with 5


**Order XCIV. SOLANEÆ.**

Calyx 4-5-parted, persistent. Corolla hypogynous 4-5-cleft. Stamens 5, inserted into the corolla, alternate with its segments, sometimes 1-abortive. Ovary 2-celled, with 2-polyspermous placentæ. Stigma simple. Fruit a capsule with 2-4 cells, and a double dissepiment, or a berry with the placentæ adhering to the dissepiment. Seeds numerous. Embryo curved. Herbaceous, or shrubby plants, with alternate leaves.

**Genus I SOLANUM.**

Calyx 5-cleft. Corolla rotate, 5-cleft. Stamens 5, connivent, dehiscing by 2 pores at the extremity. Fruit a subglobose berry, 2-celled.

1 S Nigrum. Stem erect, angled, glabrous, with the young branches pubescent, unarmed. Leaves ovate-angled, dentate, tapering at the base, on long petioles, sprinkled with hair. Flowers in 3-6-flowered umbels between the leaves. Calyx persistent, pubescent. Corolla pubescent, with acute segments. Fruit black, many seeded. Night shade. White. 4 Through the Summer. Damp soils, common.

2 S Mammosum. Stem prickly. Leaves cordate, angled, villous, lobed, very broad, villous and prickly on both sides. Flowers in loose terminal racemes and opposite. Fruit yellow, tapering at the base. Yellow. 6 June–Aug. Middle and Southern Ga.


**Genus II PHYSALIS.**


1 P Lanceolata. Stem erect, densely pubescent, angled, somewhat branch-

Yellow, with purple spots. 4. June—Aug. Dry soils, common.

2 P ANGULATA. Stem erect, glabrous, branching, the branches angular. Leaves broad-ovate, dentate. Flowers axillary, on slender peduncles, becoming elongated. Corolla spotted at the base.

Yellow. © Through the Summer. In the low country.

3 P PENNSYLVANICA. Stem slightly angled, pubescent. Leaves ovate, obtuse, slightly repand, tomentose on the under surface. Flowers on axillary solitary peduncles. Fruit red, small.


4 P PReUNOSA. Stem prostrate, angled, divaricately branched, pubescent Leaves ovate, unequally dentate, pubescent several at each division of the stem, on long pedioles. Flowers axillary, nodding. Corolla with 5 purple spots at the base. Calyx angled.

Yellow. © May—June. Cultivated lands, common. 6-8 in.

5 A Viscosa. Stem erect, dichotomous, the young branches pubescent, and viscid. Leaves alternate and lanceolate, repand, dentate, viscid, on long pedioles. Flowers solitary in the divisions of the stem. Calyx pubescent. Corolla pubescent, with villose spots at the base. Ground cherry.


Genus III NICOTIANA.


1 N Tabacum. Stem erect, viscidly pubescent. Leaves ovate, entire, peltate, very large. Flowers in terminal panicles and racemes, tube of the corolla cylindrical, much longer than the calyx. Tobacco.


Genus IV DATURA.

Calyx large, tubular, ventricose, 5-angled. Corolla funnel-form, with a long tube, the limb 5-angled, plaited. Stamens 5. Stigma bilamellate. Capsule 2-celled, cells 2-parted, apparently 4-celled.

1 D Stramonium. Stem erect, branching, dichotomous. Leaves alternate, angled, sinuate, unequal at the base, on long pedioles. Flowers solitary in the divisions of the stem. Calyx pubescent, with acute segments. Fruit spinous.


Genus V LYCIUM.


1 L Carolinianum. A small shrub, with long slender branches, unarmed. Leaves clustered, cuneate, glabrous, narrow. Flowers solitary, axillary.

White. To Through the summer. Saline marshes. 3-5 ft.
Genus VI Verbascum.

Calyx 5-parted. Corolla rotate, 5-lobed, unequal. Stamens 5, declined, usually hairy. Capsule 2-valved, 2-celled, ovate or globose.


Order XCV. Conifereae.

Flowers monoecious, or dioecious. Sterile flowers monandrous, 5 or monadelphous, collected in a catkin. Anthers 2, or many lobed, bursting outwardly. Fertile flowers usually in strobiles or cones, sometimes solitary. Ovary none, or open, resembling a scale, destitute of style or stigma. Ovules naked. Fruit a naked seed. Trees or shrubs abounding in resin. Leaves with parallel veins.

Genus I Juniperus.

Flowers dioecious. Sterile florets, ament ovate. Calyx a scale, verticillate, peltate. Anthers 4-8, 1-celled. Fertile florets, ament globose. Scales 3-concave. Stigma open. Fruit a berry, with 3 long 1-seeded nuts, surrounded with the united and fleshy scales.


Genus II Cupressus.


1 C Distica. A large tree. Leaves small, linear, acute, flat, deciduous. Sterile flowers paniculate, catkin sub-globose.

2 C Thyoides. A large tree, with compressed branches. Leaves imbricate, in 4 rows, ovate, tuber-culate at the base, catkin globose.

(a) Leaves 2-5, with a sheath at the base; scales of the cone thickened at the summit

1 P INOPS. A small tree, abounding in resin, with scattered, smooth branches. Leaves short, in pairs. Cone oblong, conic, about the length of the leaves. Scales with subulate spines. Scrub pine.
12 May. Sandy barrens. 20-40 ft.

2 P VARIABILIS. A large tree, much branched. Leaves by pairs or threes, slender and channelled, 4-5 inches long, deep green. Cone generally solitary, ovate, 2-3 inches long. Scales with incurved spines. Balsam pine.
12 April. Along the sea coast. 60-70 ft.

3 P RIGIDA. A large tree. Leaves by threes, 4-6 inches long, with short sheaths. Cones ovate, scattered, or in clusters, usually the latter, 2-4 inches long. Scales with reflexed spines.
12 April—May. Usually in the upper country. 70-100 ft.

4 P SEROTINA. A small tree. Leaves by threes, 6-8 inches long. Cones ovate, large for the size of the tree. Scales with straight, slender spines.
12 April. Round about. 30-40 ft.

5 P PUNGENS. A middle sized tree, irregularly branched. Leaves by pairs, short, acute. Cones ovate, clustered, sessile. Spines long, subulate, the lower reflexed.
12 Mountains. 40-50 ft.

6 P T.EDA. A large tree, with a straight, tall trunk. Leaves long, by threes, in long sheaths. Cones long, deflexed. Scales armed with rigid spines. This is an abundant species but affords very little resin.
12 April. 80-100 ft.

7 P PLESTRIS. A large tree. Leaves by threes, very long, with the sheaths pinnatifid. Cones nearly cylindrical, 6-10 inches long. Scales imbricate. Long leafed pine.
12 April. Common in sandy soils. 80-100 ft.

12 April. Mountains. 100-140 ft.

(b) Leaves solitary, distinct at the base. Scales of the cone even, attenuated, glabrous.

12 May. Mountains. 40-50 ft.

10 P CANADENSIS. A large or small tree, with horizontal branches. Leaves solitary, flat, decuminate, in 2 rows. Cone small, ovate, terminal, scarcely longer than the leaves. Hemlock.
12 May. Mountains. 30-100 feet.

11 P NIGRA. A large or small tree. Leaves solitary, very numerous, 4-angled, scattered, erect, straight, dark green. Cones ovate, 1-2 inches long. Scales cupulate, imbricate, closely decumbent at the apex, undulate on the margins. Black spruce.
12 April. Mountain swamps. 30-100 ft.
12 P. Alba. A small tree. Leaves solitary, 4-sided, less crowded than the preceding species, incurved. Cones slender, nearly cylindrical. Scales broad, ovate, entire.

½ May. Mountains, swamps. 30–40 feet.

**Genus** IV. **THUYA.**


1 T Occidentalis. A small tree, with spreading ancipital branches. *Leaves* imbricate, in 4-rows, appressed, naked, ovate rhomboidal, tuberculate. *Cones* obovate with the inner scales truncate, gibbous below the summit.

½ May. Mountain streams. 15–20 feet.

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**Class II.** **ENODOGENÆ, OR MONOCOTYLÉDONÆ.**

*Trunk* usually cylindrical, with no distinction of pith, wood and bark increasing by the internal deposition of new matter. *Leaves* with simple, parallel veins running from the base to the apex of the leaf, usually alternate. *Embryo* with 1 cotyledon, or if more than 1, alternate. *Radicle* enclosed in a sheath, through which it bursts in germination.

**Sub-Class I.** **PETALOIDEÆ.**

*Stamens* and *Pistils* naked, or enclosed in a regularly developed corolla.

**Group I** TRIPETALÆ.

Plants with calyx and corolla distinct, with 3 petals.

**Order** XCVI. **ALISNACEÆ.**

ral, 1-celled. **Ovules** solitary, or in pairs, erect, or ascending. **Styles** several. **Fruit** dry, indehiscent, 1–2-seeded. **Albumen** none. **Embryo** curved. **Aquatic** plants, with parallel veined leaves.

**Genus I SAGITTARIA.**

**Flowers** monoecious. **Sepals** 3, herbaceous. **Petals** 3, colored. **Sterile** florets with stamens numerous. **Fertile** florets with capsules numerous, compressed, each 1-seeded.

1 S **Sagittifolia.** Stem none. **Leaves** ovate, sagittate, acute. **Lobes** long, acute, acuminate, lanceolate, on long petioles, 1–2 feet. **Flowers** whorled, by threes, the upper ones sterile, the lower fertile. **Petals** larger than the calyx, round. **Stamens** numerous. **Capsules** collected into a globose head.

The above species is very variable in the form of its leaves, and its flowers are sometimes dioecious.

White. 2 Aug.–Oct. In wet places, common. 1–2 ft.

2 S **Natans.** Stem none. **Leaves** floating, elliptic, lanceolate, obtuse, entire, 3-nerved, alternate at the base, the lower ones somewhat cordate, 7-nerved. **Scape** simple, few flowered, 3–6 inches long. **Flowers** small, the upper ones sterile, the lower ones fertile, with the peduncles elongated. **Sepals** lanceolate. **Petals** round. **Stamens** 8. **Capsules** numerous.

White. 2 May–Aug. In shallow ponds 6–8 in.

3 S **Lancifolia.** Stem none. **Leaves** ovate-lanceolate, very long, entire, somewhat coriaceous, glabrous, on long petioles, 1–2 feet. **Scape** 2–3 feet long, simple. **Flowers** verticillate by threes, the upper ones sterile, the lower fertile. **Sepals** tinged with purple, nearly round. **Petals** larger than the calyx. **Stamens** numerous. **Capsules** numerous, collected into a globose head.

White. 4 April–June. In marshes. 2–3 ft.

4 S **Graminea.** Stem none. **Leaves** linear-lanceolate, entire, 3-nerved, 4–5 inches long, about half an inch wide on long petioles. **Scape** simple. **Flowers** verticillate, the upper sterile, the lower fertile. **Sepals** lanceolate, small. **Petals** larger than the calyx. **Stamens** about 10, hairy. **Capsules** mucronate.

White. 4 April–June. In wet pine barrens, very common. 4–5 in.

**Genus II ALISMA.**

**Sepals** 3, persistent. **Petals** 3. **Stamens** 6. **Ovaries** and **Styles** numerous. **Capsules** numerous, indehiscent. distinct, 1-seeded.

1 A **Plantago.** Stem none. **Leaves** cordate, ovate, 9-nerved, on long petioles. **Scape** triangular, 1–2 feet. **Flowers** in compound, verticillate panicles. **Fruit** obusely triangular.

White. 2 July–Aug. In the water. 1–2 feet.

**Order XCVII. HYDROCHARIDEÆ.**

**Flowers** monoecious, or dioecious. **Sepals** 3. **Petals** 3. **Stamens** epigynous, definite. **Ovary** solitary, 1-celled.—**Ovules** numerous. **Stigmas** 3–6. **Fruit** indehiscent, 1, or many celled. **Albumen** none. **Floating** plants, sometimes with spiny leaves. **Flowers** spathaceous.
MONOCOTYLODENOUS.

GENTS I HYDROCHARIS.

*Flowers monoeious.* **Sepals** 3, oval, membranaceous. **Petals** 3, narrower than the sepals. **Sterile** florets usually with 2 filaments, united at the base, with a 2-leaved spathe. **Fertile** florets with a 2-leaved spathe. **Styles** 6, 2-cleft. **Capsule** 5-celled, many seeded.

1 H *Spongiosa.* **Leaves** floating, orbicular, cordate, with purple veins beneath, with inflated vessels near the summit of the stem. **Flowers** axillary. **Style** 6, deeply 2-cleft. **Stigma** simple, spotted. **Seed** numerous, striate. White, tinged with purple. 4 July—Sept. Stagnant waters.

GENTII VALISNERIA.

*Flowers dioecious.* **Sterile** florets. **Spathe** 2-4-parted. **Spadix** covered with minute flowers. **Sepals** 3. **Stamens** 2. **Fertile** flowers. **Scape** spiral, very long. **Spathe** 2-cleft. **Sepals** 3, elongated. **Petals** 3, smaller than the sepals. **Stigmas** 3, sessile. **Capsule** cylindrical, 1-celled, many seeded, 3-toothed.

1 V *Spiralis.* A floating plant. **Leaves** linear, obtuse, 3-nerved, minutely serrulate. **Scapes** axillary; those bearing the sterile flowers very short, the fertile ones long and spiral, raising the flowers to the surface of the water when ready to expand. White. 4 August—September. Still water.

ORDER XCVIII. COMMELINEAE.

**Sepals** 3, distinct. **Petals** 3, sometimes united at the base. **Stamens** 6, or sometimes fewer, hypogynous, a part of them deformed, or abortive. **Ovary** 3-celled, with few ovules in a cell. **Style** 1. **Stigma** 1. **Capsule** 2-3-celled, with as many valves. **Seed** anatropous, inserted by their whole side, on the inner angle of the cell. Herbaceous plants.

GENUS I COMMELINA.

**Sepals** 3. **Petals** 3. **Stamens** 6, usually 3 of them sterile and furnished with cruciform glands. **Capsule** 3-celled, 3-valved.

1 C *Communis.* **Stem** prostrate, creeping, glabrous, much branched, jointed. **Leaves** alternate, ovate-lanceolate, with cartilaginous margins, sheathing, with the sheath ciliate. **Flowers** on peduncles opposite the leaves. **Bracts** ciliate. **Sepals** unequal, the lateral ones large, obtuse. **Petals** unequal, the lateral ones rounded, spatulate, the others reniform. **Style** blue. **Seed** 2 in a cell. Light blue. © June—Nov. Wet grounds.

2 C *Erecta.* **Stem** procumbent, and erect, branching near the base, slightly pubescent. **Leaves** ovate-lanceolate, slightly scabrous on the upper surface, sheathing; sheath ciliate. **Bracts** cordate, enclosing the flower be-
for it expands. Sepals 3-oval, unequal white. Petals 2, larger than the other.

Blue. 4 May—June. Dry sandy soils. 12-18 in.

3 C Virginia. Stem erect, slightly pubescent, striate. Leaves oblong, finely serrulate, scabrous, slightly hairy; sheathing at the base; sheath ciliate. Flowers clustered, axillary, or terminal. Sepals 3, membranaceous, unequal. Petals 3, unequal, lower one smallest.

Blue. 4 August—Oct. Moist places. 2 ft.

4 C Hirtella. Stem erect, hairy. Leaves lanceolate, petiolate; sheaths lateral and terminal, sessile.

July. In shaded, rocky situations.

Genus II Tradescantia.


Style 1. Capsule 3-celled, many seeded.


Rose color. 4 Common. May—Aug. 8-12 in.

Order Xcix. Xyrideæ.

Sepals glumaceous, 3. Petals 3, unguiculate. Stamens 6, with 3 fertile ones inserted into the claws of the petals, and 3 sterile ones alternate with the petals. Ovary single.

Style 3-cleft. Capsule 1-celled, 3-valved. many seeded, with parietal placenta. Herbaceous plants, with radicle ensiform leaves. Flowers in terminal imbricate heads.

Genus I Xyris.


Yellow. 4 July—Sept. Pine barrens, common. 2 ft.


Yellow. 4 July—Aug. Middle Ga. 2 ft.


Yellow. 4 August—Sept. Pine barrens, common, 12-18 in.

4 X Juncea. Stem erect, terete. Leaves terete, 4-8 inches long, fistular. Keel of the calyx slightly toothed.

Yellow. 4 May—June. Pine barrens, southern Ga. 12-18 in.
Order C. Bromeliaceae.

Calyx gamosepalous, 3-parted, or tubular, persistent. Petals 3. Stamens 6, inserted into the base of the corolla. Ovary 3-celled, usually cohering with the calyx. Style simple; stigma 3-parted, often twisted. Fruit capsular, 3-celled, many seeded. Plants usually without stems, with rigid, channelled leaves.

Genus I. Tillandsia.

Calyx 3-cleft, persistent, divided nearly to the base. Sepals 3, slightly united at the base. Capsule 1-3-celled. Seeds comose. Parasitic plants.


2 T. Bartramii. Stem attached to the bark and wood of old trees. Leaves subulate, channelled, hoary, covered with whitish scales, cartilaginous at the base. Flowers in pairs at the summit of simple leafy scapes. The upper leaves tinged with red at the base.

3 T. Recurvata. Stem terete, short. Leaves subulate terete, recurved flowers in pairs, at the summit of the stem, sessile. Petals longer than the calyx.


Genus II. Agave.

Calyx and corolla confounded, 6-parted, erect, tubular, furrowed. Stamens 6, longer than the corolla. Anthers versatile. Style spotted, shorter than the stamens.


Tribe II. Hexapetaloidae.

Petals and sepals confounded, usually 6, and all colored, and undistinguishable from each other.

Order CII. Hypoxidaceae.

Perianth petaloid, superior, 6-parted, regular. Stamens 6, inserted into the base of the segments. Ovary inferior, 3-celled, many seeded. Style 1. Stigma 3-lobed. Capsule
indeciscent, many seeded. Herbaceous plants with grass-like leaves.

**Genus I HYPOXIS.**


1 H *Erecta.* *Leaves* subulate, entire, hairy, channelled, 3-nerved; *scape* slender, hairy, slightly compressed, 1-4 flowered. *Perianth* expanding, green on the outer surface. *Yellow.* 4 March—April. Very common. 3-6 in.


**ORDER CII. BURMANNIEÆ.**


**Genus I BURMANIA.**

Genus the same as the Order.


**ORDER CIII. HÆMODORACEÆ.**


**Genus I LACHNANTHES.**

*Perianth* with the border 6-parted, segments unequal, the three inner ones small linear, the three others lanceolate. *Stamens 3.* *Style* declining. *Capsule* 3 celled, many seeded, truncate.

Genus II CONOSTYLIS.


Order CIV. AMARYLLIDEÆ.

Perianth superior, petaloid, regular, the outer segments overlapping the inner. Stamens 6, arising from the perianth. Ovary 3-celled, with numerous ovules. Style 1. Stigma 3-lobed. Fruit a 3-valved, 3-celled capsule. Seed numerous. Herbaceous plants, with ensiform leaves.

Genus I AMARYLLIS.

Perianth 6-parted, petaloid. Filaments 6, inserted into the throat of the tube. Anthers incumbent.


Genus II PANCRATIUM.

Perianth with the tube very long, with the border 6-parted, segments linear lanceolate, the tube of the perianth bearing a 12-cleft paracorolla. Stamens 6.


Order CV. IRIDEÆ.

Perianth tubular, 6-parted, petaloid, irregular, the outer segments largest. Stamens 3, opposite the outer segments.

**Genus I IRIS.**

**Perianth** 6-parted, segments unequal, the outer ones large and reflexed, the inner smaller, and erect. **Stamens** 3-distinct. **Style** none. Stigmas 3, petaloid, deflected, covering the stamens.

1 **I Cristata.** Stem compressed, short. Leaves ensiform; scape 1-flowered; exterior segments of the perianth, oblong, obtuse, entire, with 3 longitudinal crests, interior petals narrower. Crested Iris.

Blue and yellow. 4 Feb.—March. Abundant in Mid. Car. 2—4 in.

2 **I Versicolor.** Stem erect, simple, or branches towards the summit. Leaves ensiform. Flowers 2—4 at the summit of the scape; segments of the perianth spathulate, exterior segments pubescent on the inner surface, inner ones smaller. Stigmas ligulate 2-toothed near the base. Capsule ventricose.

Yellow and purple. 4 April—May. In ponds. Very common. 2—3 ft.

3 **I Tripletala.** Stem slender, columnar. Leaves ensiform. Flowers solitary, exterior segments of the perianth large, interior very small, 3-toothed. Stigmas 2-toothed near the base. Capsule obscurely angled.

Purple. 4 April—May. Southern Ga. and Florida. 2—3 ft.

4 **I Hexagona.** Stem columnar, flexuous. Flowers solitary, exterior segments of the perianth, spathulate, reflexed, variegated at the base with purple and white, the exterior ones erect, spathulate. Capsule hexagonal, ventricose.

Blue. 4 May—July. In swamps in the low country. 2 ft.

5 **I Ceprea.** Stem erect, angled on one side. Leaves ensiform axillary; the exterior segments of the perianth obovate, emarginate, the interior smaller. Stigmas with a membranaceous margin. Capsule ventricose, hexagonal.

Tawney. 4 April—May. In marshes of lower Ga. and Florida.

**Genus II SISYRINCHIUM.**

**Perianth** 6-leaved. **Stamens** usually monadelphous, 3. **Capsule** triangular, projecting out of the spathe. With grass-like leaves.

1 **S Micronatum.** Stem simple, compressed. Leaves narrow, acute, usually tinged with blue. Flowers in terminal clusters. Spathe colored. 2-leaved, with a partial sheath at the base of each peduncle. Leaves of the perianth emarginate, mucronate. Style triquetrous. Capsule 3-valved. 3-celled, many-seeded.

Blue. 4 June—July. Damp soils. Mountains. 4—6 in.

2 **S Bermudiana.** Stem erect, compressed, glabrous, divided at the summit. Leaves ensiform, glabrous. Flowers in terminal racemes. Spathe 2-leaved, with a small spathe at the base of each peduncle. Leaves of the perianth emarginate, mucronate, pubescent. Capsule pubescent, 3-celled, 3-valved, many-seeded.

Blue. 4 March—May. Damp soils. 12—18 in.

3 **S Ancps.** Stem compressed, winged, simple. Leaves ensiform, radical. Flowers in clusters. Spathe 2-leaved, unequal: Leaves of the perianth mucronate.

Blue. 4 July—August. Dry soils. 8—12 inches.

**Part II.**
Order CVI. Orchideæ.

Perianth superior, ringent, 6-parted, the 3 outer segments colored, the odd one uppermost from the twisting of the ovary, the 3 inner colored, with the odd one below, which is frequently lobed and different from the others, often spurred. Stamens 3, united into a central column, epigynous, the two lateral ones usually abortive. Pollen powdery, or in waxy masses. Ovary usually 1-celled, with 3 parietal placentæ.—Ovules numerous. Style forming a part of the column with the stamens. Stigma a viscid cavity in front of the column. Fruit usually an inferior capsule, rarely baccate. Seeds numerous. Albumen none. Herbaceous plants, usually with tuberous roots. Leaves simple, entire.

Genus I Goodyera.

Perianth ringent, the two outer lateral segments situated beneath the lip, the interior segments ovate, with the lip gibbous at the base, undivided at the summit. Pollen consisting of granules in a loose state of cohesion, angular, column free.


Genus II Neottia. (Syn. Spiranthes.)

Perianth ringent, the two outer segments affixed beneath the lip, interior ones connivant. Lip unguiculate, parallel to the column. Pollen farinaceous.

1 N. Tortilis. Stem pubescent towards the summit. Radicle leaves linear, glabrous; cauline ones subulate, acute. Scope sheathed. Flowers in compact, spiral spikes, the lip 3-cleft, the middle lobe large and crenulate. White. 4 June—July. Damp soils. Through the summer. 8-12 in.

2 N. Cernua. Stem erect, sheathed. Leaves lanceolate, nerved. Flowers in dense spikes, recurved, nodding. Lip oblong, acute, entire. This plant varies much in the form of its leaves and the size of its flowers, and in the time of their blooming. Greenish white. 4 Through the summer. Moist grounds. 1-2 ft.

Genus III Listera.

Perianth irregular. Lip pendulous, 2-lobed, sessile, column minute, free. Pollen farinaceous.

1 L. Pubescens. Stem erect, pubescent, leafless. Leaves all radicle, ovate, acute. Flowers in racemes, the lip 2-lobed, the other segments connivant, about as long as the lip. Capsule clavate. Greenish white. 4 June—July. Pine barrens, Car. & Ga

2 L. Convallaroides. Stem erect, with 2 opposite, sessile leaves near the

Greenish white. 4 May—June. Damp soils. Southern Georgia and Florida. 6–12 inches.

Genus IV CRANICHIS.

Segments of the perianth reflected. Lip vaulted. Pollen farinaceous. Anthers parallel with the style, inserted behind.

1 C Multiflora. Stem pubescent towards the summit. Radicle leaves oval-lanceolate, glabrous, alternate at the base, on very short petioles; cauline leaves merely scales, sheathing. Flowers in a terminal spike, the exterior segments of the perianth lanceolate, pubescent on the outer surface, the 2 upper interior segments obliquely ensiform, connivent. Lip vaulted, compressed at the margins, generally enclosing the column. Capsule triquetrous, tapering to the base.

Pale green. 4 Sept.—Oct. Southern Georgia and Florida. 1–2 ft.

Genus V POGONIA.

Lip sessile, cucullate, crested internally, the remaining 5 segments distinct, without glands. Pollen farinaceous. Anthers terminal, persistent.

1 P Ophioglossoides. Stem erect, with an oval-lanceolate leaf, and a foliaceous bract near the flower. Lip scarcely longer than the other segments; winged, fimbriate, with the centre thickened, with crested ridges. Flowers solitary, nodding. Column short, thick, solid. Anthers in a cavity at the summit of the column.

Purple. 4 April—May. Damp soils, common. 10–15 in.

2 P Divaricata. Stem erect, glabrous. Leaves narrow, lanceolate, acute, glabrous, one near the middle of the stem, the other at the summit. Flowers solitary at the summit of the stem. The three exterior leaves of the perianth linear-lanceolate, the two interior lanceolate, connivent, somewhat fleshy. Lip 3-lobed, middle lobe longest, crested, crenulate. Capsule furrowed.

Purple. 4 May. Damp soils 1–2 ft.

3 P Verticillata. Stem erect, glaucous. Leaves 5, verticillate, oblong-lanceolate, cuneate. Flowers solitary at the summit of the stem. The three exterior leaves of the perianth long-linear, the 2 interior lanceolate. Lip rather short, 3-lobed, crested along the centre, the terminal lobe undulate. Anthers 2-celled.

Greenish. 4 May. Middle Carolina and Georgia. 12–18 in.

Genus VI CALLOPOGON.


1 C Pulchellus. Stem erect, glabrous, naked. Leaves radicle, ensiform, long, erect, generally but 1. Flowers in a terminal spike; segments of the perianth lanceolate, the two lateral exterior ones oblique, the interior narrower. Anthers in a small cavity at the summit of the column.

Purple. 4 June—July. In damp soils. 13–19 in.

Genus VII COROLLORHIZA.

Segments of the perianth equal, connivent. Lip extended
behind, joined to the spur, or free. **Column** free. **Anthers** terminal. **Pollen** masses 4, oblique.

1 C **MULTIFLORA.** Stem glabrous, clothed with sheaths, the upper sheath frequently terminating in a subulate leaf. **Leaves** none. **Flowers** numerous, in a terminal raceme nodding. **Lip** cuneate-oval, with 2 teeth at the base. **Spur** adnate, conspicuous. Purplish brown. 74. Sept.—Oct. In rich woodlands. 12-15 in.

2 C **ODONTORHIZA.** Stem erect, slender, enclosed in two or three sheaths. **Flowers** numerous, in terminal racemes, pendulous; segments of the perianth connivent. **Lip** dilated, spotted, with 2 teeth. **Capsule** globose. Purple. 74. March—April. In rich soils, middle and lower Car. & Ga.

3 C **HYEMALIS.** Leaf solitary, large, somewhat plaited, tapering into a long petiole; **scape** enclosed in about 3 sheaths. **Flowers** in erect, terminal racemes; segments of the perianth nearly equal, connivant, linear-oblong. **Lip** dilated at the summit, ridged along the middle, 3-lobed; the middle lobe nearly round, crenulate. **Pollen** masses 4, waxy. Purple. 74. May. In rich shaded soils. 12-18 in.

**Genus VIII** **ARETHUSA.**

Segments of the **perianth** united at the base. **Lip** joined to the column, cuculate at the apex, crested internally. **Pollen** angular.

1 A **BULBUSA.** Stem sheathed, generally 3-4. **Flower** 1 at the summit of the stem; segments of the perianth nearly equal, the upper ones incurved. **Lip** about the length of the other segments, crenulate, bearded in the middle. Purple. 74. June. Mountains. 6-12 in.

**Genus IX** **TRIPHORA.**

Segments of the **perianth** lanceolate, acute, distinct, connivant. **Lip** unguiculate, cuculate. **Column** spatulate, flat, without wings. **Pollen** farinaceous.

1 T **PENDULA.** Stem erect, obscurely angled, nodding at the summit, succulent. **Leaves** alternate, amplexicaule, decurrent. **Flowers** axillary and terminal, 3-4, on short peduncles. **Lip** 3-lobed; the lateral ones inflected. Purple. 74. July—Aug. Damp soils. 12-18 in.

**Genus X.** **ORCHIS.**

**Perianth** ringent, the upper segment vaulted. **Lip** dilated, entire, with a spur at the base. **Pollen** masses 2, affixed by the base, terminal, pedicillate. Glands contained in a common bag.

1 O **SPECTABILIS.** Root palmate; **scape** pentangular, sometimes bearing a leaf. **Flowers** few, large, **Lip** obovate, undivided, crenate, retuse; segments of the perianth connivent; **spur** clavate. **Bracts** longer than the flower. **Leaves** radicle, oval, glabrous, generally 2, large. Purple and white. 74. June. Shady woods. 8-10 in.

2 O **NIVEA.** **Scape** erect, lower leaves linear, very long, subulate. **Flowers** in dense spikes. **Bracts** short. **Lip** linear, oblong, entire, the other segments spreading; **spur** filiform. **Column** small. **Pollen** masses nearly sessile. White. 74. May—June. Southern Ga.
3 O Viridis. A small plant. Lip linear, 3-toothed at the apex, other segments of the perianth connivant; spur obtuse, somewhat inflated. Bracts longer than the flowers.

Greenish white. Mountains. 3 in.

4 O Bidentata. Stem erect, nearly naked. Leaves narrow, lanceolate. Lip oval, oblong, 2-toothed at the base, the other segments ovate, expanding; spur short, thickened at the point.

Yellowish. 4 May—June. Middle Car. & Ga. 12-18 in.

**Genus 11 HABENARIA.**

**Perianth ringent.** Lip dilated, toothed, lobed or fringed, spurred at the base. Pollen masses pedicillate. Glands of the pedicels naked, distant.

1 H Ciliaris Stem erect, leafy, glabrous. Leaves lanceolate, acute, entire, sheathing at the base, long. Flowers in terminal spikes. Lip oblong, lanceolate, beautifully ciliate, double the length of the other segments; spur filiform, long.

Orange yellow, varying with age. 4 In moist lands. 1-2 ft.

2 H Blephariglottis. Stem erect, leafy. Leaves lanceolate, acute, sheathing at the base. Flowers in terminal spikes. Lip lanceolate, ciliate, about as long as the upper petal; spur filiform, pendulous.

White. 4 June—July. Damp soils. 1-2 ft.

3 H Cristati. Stem erect, slightly angled, glabrous, leafy. Leaves lanceolate, sheathing at the base, long. Flowers in a terminal spike, crowded. Lip longer than the exterior segments, ciliate, the other segments rounded, the two lateral ones toothed; spur short.

Yellow. 4 June—July. Swamps. 1-2 ft.

4 H Psycodes. Stem erect, slender, glabrous. Leaves long, lanceolate, sheathing at the base. Flowers in loose terminal spikes. Lip twice as long as the other segments, 2-parted, many cleft, the other segments ovate-lanceolate; spur filiform, clavate, ascending longer than the germ.

Pale yellow. 4 June—July. Middle Car. & Ga. 12-18 in.

5 H Elliottii. Stem erect, leafy. Leaves narrow-lanceolate, sheathing, upper ones small. Flowers in crowded spikes, exterior segments of the perianth rather large. Lip with the margins toothed, almost imbricate, smaller than the other segments; spur subulate.

Yellow. 4 July. Low grounds, common. 1-2 ft.

6 H Tridentata. Stem erect, slender, glabrous. Leaves lanceolate, the lower one large, the upper one small. Flowers in compact spikes. Lip ovate-lanceolate, 3-toothed, the other segments ovate, obtuse, connivant, spur filiform.

White. 4 June—July. Swamps. 1-2 ft.

7 H Fuscescens. Stem erect, glabrous, leafy. Leaves lanceolate, glabrous, sheathing. Flowers scattered in terminal spikes. Lip ovate, toothed at the base, the other segments spreading; spur subulate. Bracts longer than the flowers.


8 H Michauxi. Stem erect, leafy. Leaves numerous, ovate-lanceolate, glabrous, sheathing at the base. Flowers in a long terminal spike, scattered. Lip 3-parted, the lateral segments seateous, the 2 interior segments 2-parted; spur long, obtuse.


9 H Refens. Stem erect, leafy. Leaves lanceolate. Lip 3-parted with the lateral segments seateous, the 2 interior segments of the perianth 3-parted, the lower segment seateous. Bracts as long as the flower.

Greenish yellow. 4 August—Sept. Damp soils. 12-18 in.

19


GENUS XIII EPIDENDRUM.

Segments of the perianth spatulate, expanding. Lip 3-lobed at the summit, the middle segment obtuse. Column with the lip united into a tube. Pollen masses 4, parallel, divided by persistent partitions.

1 E Conopseum. Root fibrous, adhering to the barks of trees, branches short, alternate. Leaves lanceolate, acute, succulent, entire, generally 2 on each branch, sheathing at the base. Flowers in a terminal raceme; exterior segments of the perianth lanceolate, the interior cuneate, smaller. Anther operculate. Yellow, tinged with purple. Aug.—Sept. On the barks of trees along the sea coast of Car. and Ga.

GENUS XIV BLETIA.


1 B Verecunda. Leaves radicle, lanceolate, plaited, broad; scape many flowered. Lip ventricose, the border emarginate, furrowed, the interior segments connivent. 4 July—Aug. Southern Ga. and Flor.


GENUS XV MALAXIS.


1 M Lilifolia. Leaves 3, radicle, oval-lanceolate, glabrous; scape 3 angled. Flowers numerous, in a terminal raceme, the exterior segments of the perianth acute, the 2 interior filiform, reflexed. Lip obovate, concave, acute at the summit. White and yellow. 4 June—July. Upper Dist. Car. & Ga. 6–8 in.

2 M Ophioglosoides. Stem erect, with a single leaf near the middle. Leaf ovate, amplexicaule. Flowers numerous, in a terminal raceme, small. Lip erect, concave, cucullate, bi-dentate, the other segments connivant, the two interior filiform. Column minute. Greenish white. 4 May—June. Mid. and upper Dist. Car. & Ga. 6–9 in.
Lip ventricose, inflated, saccate, large, the other segments of the perianth expanding. 4. Column terminating in a petaloid lobe.

1 C Parviporum. Stem leafy, slightly pubescent. Leaves alternate, lanceolate, acute, pubescent beneath, sessile, sheathing. Flowers usually solitary, outer segments of the perianth ovate-oblong, acuminate, the inner ones linear, twisted, bearded on the inner surface. Lip shorter than the petals, bearded at the base within.

Yellow, spotted. 4 May—June. Upper Dist. Car. & Ga. 8-10 in.

2 C Pubescens. Stem leafy. Leaves oval, clasping pubescent. Lip yellow, contracted at the mouth; lobe of the style triangular, oblong, obtuse, the exterior petals acuminate, the interior very long, linear, twisted.

Bright, yellow. 4 May. Middle Ga. Near Culloden, 1-3 ft.

3 C Spectabile. Stem leafy. Leaves ovate-lanceolate, plaited, entire, pubescent, sheathing at the base. Flowers 2-3, large, outer segments broad, oval, the two interior linear-lanceolate, white; lobe of the style white, with red spots. Lip longer than the petals, cleft in front.

White and purple. 4 May—June. Mountains. 2-3 ft.

4 C Humile. Stem pubescent. Leaves lanceolate, nerved, pubescent. Flowers solitary. Lip large, cleft in front, pubescent, the outer segments brownish purple, the interior narrower and twisted.

Purple, striped. 4 May—June. Rocky soils. Mid. and upper Car. and Ga. 6-12 in.

Order CVII. Marantaceae.


Genus I Canna.

Calyx 4 leaved, superior. Corolla with a long tube, the margin 6-parted, the three exterior segments reflexed, 2 of the inner ones obovate, undulate, the other one very large, margin reflexed, nearly round. Style ensiform. Stigma linear, attached to the margin of the style. Capsule globose, 3-celled, 3-valved, many seeded.

1 C Flaccida. Stem glabrous, terete Leaves alternate, lanceolate, large, membranaceous, glabrous, with a long sheath at the base; upper leaves merely a sheath. Flowers in a terminal spike. Bracts an ovate scale. Sepals lanceolate acute. Petals flaccid.

Yellow. 4 May—July. Wet soils. Low country of Car. & Ga. 2-3 feet.
Genus II THALIA.


1 T Dealbata. Leaves all radicle, distichous, cordate-ovate, acute, glabrous, long and wide, on very long petioles; scape erect, columnar. Flowers in terminal panicles. Peduncles jointed, with a many leaved involucrate at each joint. Bracts 2-flowered, coriaceous. Sepals ovate-lanceolate, purple, the three exterior segments of the corolla obovate, equal, the three interior irregular; sterile filaments irregular, the fertile one filiform. Petals. 2. June—Sept. In the low country. 3-5 ft.

Order CVIII. JUNCEÆ.

Perianth 6-parted, more or less glumaceous. Stamens 3-6, inserted into the base of the segments. Ovary 1–3-celled, 1 or many seeded. Style 1. Stigmas generally 3, sometimes 1. Fruit capsular, 3-valved. Dehiscence loculicidal. Herbaceous plants with fistular or flat channeled leaves. Flowers brown or green.

Genus I JUNCUS.

Perianth 6-parted, with 2 bracts at the base, glumaceous. Stamens 6. Capsule 3-celled, 3-valved, many seeded. Dissepiments bearing the seeds.

(a) Leaves none.

1 J Acutus. Stem erect, rigid, hard, with a sheath at the base. Flowers in terminal panicles. Involucre 2-leaved, erect, spinous. Leaves of the perianth lanceolate, acute, the three exterior the longest. Capsule obovate, pointed with the persistent style. Brown. 2. April. Salt marshes. 2-3 ft.


3 J Setaceus. Stem filiform, terete, declining. Flowers in lateral panicles. Leaves of the perianth lanceolate, acute, the outer ones largest. 2. July. Swamps. 2-3 ft.

(b) Plants with leaves.

4 J Tenuis. Stem erect, terete, simple, sometimes naked. Leaves channeled, linear-subulate, concave, the radicle ones shorter than the stem; cauline ones longer. Flowers in panicles, sessile, the 2 lower leaves of the involucre longer than the panicle. 2. April—May. In wet pastures, common. 10-12 in.

5 J Dichotomus. Stem erect, glabrous, sometimes, naked. Leaves channeled, filiform, shorter than the stem, sheathing. Flowers in dichotomous panicles, solitary, 1 leaf of the involucre longer than the panicle. Leaves of the involucre nearly equal. 2. April—May. In wet pastures. 1-2 feet.

6 J Bufonis. Stem terete, dichotomous towards the summit. Leaves an-
bled, subulate, concave, sheathing at the base. Flowers in terminal panicles, solitary, or by pairs. Leaves of the perianth acute, the 3 exterior longest.

March—May. On the coast. 3–6 in.


May—July. Around ditches and ponds. 2–3 ft.

8 J Aristatus. Stem erect, compressed. Leaves flat, glabrous, nerved, sheathing at the base. Flowers in terminal panicles.

May—June. Damp soils, common. 2–3 ft.


May—July. Muddy soils, very common. 6–12 in.


March—May. Damp, wet places. 1–2 ft.


May—Aug. Wet soils, very common. 2 ft.

13 J Campestris Stem leafy, terete. Leaves flat, pubescent, shorter than the stem, very hairy at the throat of the sheath. Flowers in a simple umbel. Leaves of the perianth ovate, acuminate, with membranaceous margins. Capsule 3-angled, truncate, 3-valved, 3-seeded.

May—June. Abundant near Macon.

**Genus II Pleea.**


1 P Tenefolia. Stem erect, leafy. Leaves ensiform, narrow, glabrous. Flowers in a terminal spike. Spathe 1-flowered; segments of the perianth, lanceolate, acute.


**Order CIX. Melanthaceae.**


**Genus I Melanthium.**

Perianth rotate, expanding; segments unguiculate, with 2 glands at the base. Stamens 6, arising from the claws of the perianth. Capsule sub-ovate, 3-celled, partly trifid. Seed numerous, winged.
MONOCOTYLODENOUS.

1 M. VIRGINICUM. Stem erect, terete, pubescent, leafy. Leaves long, linear-lanceolate, flat, smooth. Flowers in a large panicle, pyramidal. Segments of the perianth ovate, somewhat hastate, flat. Flowers polygamous.
Greenish white. 4 June—July. Wet meadows. 3-4 ft.

2 M. MONOCOT. Stem erect, pubescent. Leaves linear-lanceolate, flat. Flowers monoeious, the lower sterile, the upper fertile, in paniculate racemes. Leaves of the perianth flat, slightly unguiculate.
Greenish white. 4 July. Mountains. 1-2 ft.

3 M. HYBRIDUM. Stem erect, leafy, striate. Leaves long, linear, amplexicaule. Flowers in racemose panicles, pubescent. Leaves of the perianth orbicular, plaited, unguiculate, monoeious.
Greenish white. 4 May—July. Middle Ga. 2-3 ft.

GENUS II. TOFIELDA.

Perianth 6-parted, with a 3-parted involucre at the base.

1 T. PEBENS. Stem scabrous, simple, naked towards the summit. Leaves ensiform, narrow, glabrous, the upper one very small. Flowers in racemes. Segments of the perianth lanceolate, alternately larger, the involucre very small, 3-toothed. Stamens attached to the base of the perianth. Capsule 3-angled, 3-valved, 3-celled, with 2 seeds in a cell.
Green and purple. 4 July—Sept. In wet soils, common. 1-2 ft.

White. 4 Oct. Middle Car. & Ga. 2-3 ft.

GENUS III. HELONIAS.

Perianth 6-leaved. Leaves flat, sessile, without glands.

White. 4 April—May. Rich soils 2 ft.

2 H. ANGSTIFOLIA. Stem erect, terete, glabrous, leafy. Leaves linear, long, subulate, upper ones very minute. Flowers in terminal racemes. Capsule oblong, with the summit appressed. Seed linear.
White. 4 June—July. Damp soils. 1-2 ft.

3 H. DIOSCA. Stem erect, slightly angled, glabrous, leafy. Radicle leaves, spatulate, long; cauline ones narrower, becoming almost linear towards the summit. Flowers in simple racemes, dioecious. Leaves of the perianth linear, obtuse, green, 3-furrowed. Stigmas 3, sessile. Capsule 3-celled, many seeded.
White. 4 May—June. Damp soils, very common. 2-3 ft.

GENUS IV. NOLINA.

Capsule 3-angled, 3-celled, 1-seeded in each cell.

1 N. GEORGIANA. Stem erect, with small, subulate scales at the base. Leaves
linear, long, coriaceous, scabrous along the margins. Flowers in racemose panicles, small.


Genus V VERATRUM.

Perianth 6-parted, expanding the segments sessile, without glands. Stamens 6, inserted on the recepticle. Style 3, short. Capsule oblong, 2-valved, many seeded.


Greenish yellow. July Mountains. 3-6 ft.

2 V Parviflorum. Leaves ovate-lanceolate, flat, glabrous. Flowers in slender, expanding panicles. Segments of the perianth acute at each end, bearing the stamens.


Greenish yellow. June. Mountains. 3-4 ft.

Genus VI ZIGADENUS.

Perianth 6-leaved, expanding, with 2 glands at the base of each. Stamens 6, inserted into the petals. Styles 3, shorter than the stamens. Capsule membranaceous 3-celled, many seeded.

1 Z Glaberrimus. Stem erect, leafy, terete. Leaves sessile, linear-lanceolate, glabrous, channeled, long and wide. Flowers in a terminal panicle. Leaves of the perianth equal, persistent. Capsule 3-sided, furrowed, 3-celled, pointed with the persistent styles. Seed numerous, angled.


Order CX. PONTEDERÆ.


Genus I PONTEDERIA.

Perianth inferior, 6-parted, bilabiate, the under side of the tube perforated with 3 longitudinal foramina, lower part persistent. Stamens 6, unequally inserted. Capsule 3-celled.

1. P Cordata. Stem none. Leaves cordate, obtuse, entire, membranaceous, glabrous; petioles very long, succulent. Flowers in crowded spikes. Corolla villous on the outer surface, the upper lip 3-parted, the lower 3-cleft,
MONOCOTYLODENOUS.

with a yellow spot at the center, 3 of the stamens at the base of the tube, and 3 at the summit. *Pickerel weed*. *Wamppee*.

Blue. 4 April—Sept. Bogs and ditches.

2 *P Lancifolia*. *Stem* none. *Leaves* oblong, lanceolate, nearly linear when young, in other respects similar to the preceding species.

**Genus II HETERANTHERA.**


1 *H Reniformis*. *Stem* partly floating. *Leaves* orbicular, reniform, on petioles; spathe oblong, acuminate, 3-5 flowered. *Mud plantain*.

White. 4 July—Aug. N. Car.

**Genus III SYENA.**


Purple. 4 June. In wet places. Middle Car. & Ga. 2-3 in.

**Order CXI. ASPHODELEÆ.**


**Genus I ORNITHOGALUM.**

*Perianth* 6-leaved, erect, persistent, expanding near the summit. *Stamens* 6, dilated at the base, hypogynous. *Capsule* angled, 3-celled.


White. 4 June—July. Middle Ga. 12-18 in.

**Genus II ALLIUM.**


1 *A Canadense*. *Leaves* linear, flat, straight, about 4-6 inches long; scape terete, erect, about the length of the leaves. Head bearing bulbs; segments of the perianth oval.

White. 6 June. In wet soils, common.


Rose colored. 6 July. Mountains. 1-2 ft.
3 A Striatum. Leaves glabrous, linear, concave; scape as long as the leaves, compressed; spathe 2-leaved, united at the base, acute, withering. Flowers in a simple umbel. Leaves of the perianth unequal, the exterior largest. Filaments unequal. 


4 A Mutabile. Leaves linear, flat, narrow, scabrous at the summit, membranaceous at the base; scape terete; spathe 3-leaved. Umbels many flowered. Leaves of the perianth lanceolate, acute. 

Green, becoming red. May—June. Pine barrens. 2 ft.

Genus III ALETRIS.

Perianth tubular, ovate, 6-cleft, rugose. Stamens 6, inserted upon the margin of the orifice. Style triquetrous, 3-parted. Capsule 3-celled, many seeded, clothed with a marcescent perianth.

1 A Farinosa. Stem none. Leaves expanding, oblong, lanceolate, acute, membranaceous, glabrous. Flowers in lax spikes; scape terete, furrowed, somewhat viscid, with a few small scales. Perianth rough. Star grass.


Order CXII. SMILACEÆ.

Flowers dioecious, or perfect. Perianth petaloid, 4 or 6-parted. Stamens 4–6, inserted into the base of the perianth. Ovary 3-celled, 1, or many seeded. Style usually 3-parted. Stigmas 3. Fruit baccate. Seeds with a membranaceous testa, shrubby or herbaceous, often climbing. Leaves sometimes reticulated.

Genus I SMILAX.

Flowers dioecious. Perianth campanulate, spreading, 6-parted. Sterile florets with 6 stamens, fertile ones with 3 styles, and 3 stigmas. Berry globose, 3-celled.

(a) Stem shrubby.


2 S Bona Næ. Climbing over small shrubs. Stem unarmed, angled. Leaves cordate ovate, sometimes slightly hastate, glabrous, 7-nerved, prickly along the midrib and margins. Flowers in small axillary umbels. Fruit black.


3 S Quadrangularis. Stem quadrangular, prickly at the summit. Leaves ovate, unarmed, slightly cordate, 5-nerved, distinctly reticulate.


Greenish. 12 June—July. Sea Islands.

7 S Lanceolata. Stem climbing, terete, the upper branches unarmed. Leaves lanceolate, and ovate, membranaceous, 3-5-nerved, perennial. Flowers numerous in axillary umbels, on short peduncles. Fruit red.

White. 12 July. Swamps.

Greenish yellow. 12 Sept.—Oct. In rich shaded soils.

10 S Pseudo China. Stem climbing, unarmed, lower leaves cordate, 5-nerved, those of the branches ovate. Flowers in axillary umbels, on long peduncles. Fruit black.

11 S Rotundifolia. Stem prickly, flexuous. Leaves cordate, ovate, nearly round, 5-7-nerved, pale beneath. Flowers in umbels, on very long peduncles.

12 S Caduca. Stem flexuous, prickly, somewhat angled. Leaves ovate, mucronate, 5-nerved. Flowers in axillary umbels, on short peduncles.


(b) Stem herbaceous.

14 S Peduncularis. Stem terete, unarmed, bearing stipular tendrils. Leaves cordate, ovate, slightly acuminate, 3-nerved. Flowers in umbels, on long peduncles. Fruit blue. The whole plant foetid.

15 S Herbacea. Stem slightly angled, glabrous, sparingly branched. Young leaves oval, or ovate when old, slightly cordate, the upper ones verticillate and crowded, 5-7-nerved, pubescent beneath. Flowers in long compressed peduncles, arising from the base of the stem. Fruit black, 2-3-seeded.

Yellowish white. 12 May—July. Fertile soils, common.

Genus II Convalaria.

Perianth campanulate 6-cleft inferior. Stamens 6, inserted into the base of the perianth. Style 1. Fruit globose, 3-celled, cells 1-2-seeded.

1 C Masalis. Leaves ovate; scape naked, smooth. Flowers in spikes, campanulate, nodding.
White. 12 May. Mountains. 1-2 ft.
**Genus III STREPTOPUS.**


**Genus IV MEDEOLA.**


1 *M. Virginica*. *Stem* erect, terete, with small sheaths at each joint. *Leaves* verticillate around the middle of the stem, 6-8 in a whorl, a three leaved whorl at the summit, lanceolate, 3-nerved, entire, membranaceous. *Flowers* terminal on peduncles arising from the upper whorl. *Indian cucumber*. Yellow. ¼ May—July. In rich shaded soils. 12-18 in.

**Genus V TRILLIUM.**

*Perianth* 6-parted, the 3 outer resembling a calyx, the 3 inner petaloid. *Stamens* 6, inserted into the base of the segments. *Stigmas* 3, usually distinct. *Fruit* 3-celled, many seeded.

1 *T. Sessile*. *Stem* erect, glabrous, spotted, with sheaths at the base. *Leaves* 3 at the summit of the stem, sessile, broad ovate, acute. *Flowers* sessile, erect, the petal-like segments lanceolate, erect, twice as long as the calyx. *Fruit* glabrous, dark purple. Dark purple. ¼ March April. Rich lands, common. 6-12 in.


Dark purple, or white. ¼ May—June. Common.


White, or reddish. ¼ May—June. Banks of streams. 8-12 in.

5 *T. Erythrocarpum*. *Leaves* ovate, acuminate, rounded at the base, abruptly contracted into a short petiole, *Peduncle* erect, or declining. *Petals* ovate-lanceolate, recurved, broader than the calyx.

White, with purple veins. ¼ May—June. Shady woods. 6-8 in.


White, with red veins. ¼ April—May. Mountains. 10-12 in.

7 *T. Cernuum*. *Leaves* rhomboidal, acuminate, very large, on rather long peduncles. *Peduncle* recurved. *Petals* lanceolate, acuminate, reflected, about as long as the calyx.

White. ¼ April—May. Rocky places 12-18 in.

8 *T. Catesb.ii*. *Leaves* obovate, and oval, acuminate, attenuate at the

9 T Nervosum. Leaves lanceolate, ovate, acute, membranaceous. \textit{Peduncle} recurved. \textit{Petals} oblong lanceolate, larger than the calyx. Rose color. 4 April—May. Middle and upper Car. & Ga. 12 in.

\textbf{Genus VI UVULARIA.}

\textit{Perianth} inferior, 6-parted, erect, with a nectariferous cavity at the base. \textit{Stamens} 6, hypogynous, short. \textit{Stigmas} 3, reflexed. \textit{Capsule} 3-celled, 3-valved, many seeded, angled.


2 U Flava. Leaves perfoliate, elliptic, obtuse. \textit{Perianth} tapering at the base, scabrous within. \textit{Anthers} awned. Bright yellow. 4 May—June. Sandy soils, common. 8–12 in.


4 U Puberula. Leaves oval, rounded at the base, amplexicaule, pubescent along the margin. \textit{Flowers} few, glabrous. Yellow. 4 May—June. Upper Car & Ga. 8–12 in.


\textbf{Order CXIII DIOSCOREAÈ.}


\textbf{Genus I LIOSCROREA.}

Genus the same as the order.


2 D Quaternata. Stem climbing. Leaves verticillate, or alternate, cordate, acuminate, glabrous, 7-nerved, lateral nerves bifid. White. 4 July. Old fields. 6–8 feet.

\textbf{Order CXIV. LILIACEÆ.}

\textit{Perianth} colored, regular, deeply 6-parted. \textit{Stamens} 6,
perigynous, opposite to the segments. **Ovary** superior, 3-celled, many seeded. **Style** 1. **Fruit** capsular, 3-celled, 3-valved, many seeded, dehiscence loculicidal. **Seed** in 1-2 rows. **Embryo** straight. **Plants** usually with scaly bulbs.

**Genus I** LILIUM.

**Perianth** campanulate, deeply 6-parted. **Segments** straight, or reflexed, with a longitudinal, nectariferous line. **Stamens** 6. **Stigma** entire.

1 L CATESBEIAN. Stem erect, simple, glabrous. **Leaves** sessile, linear-lanceolate, appressed, most numerous near the middle of the stem. **Flowers** solitary, terminal. **Perianth** erect, the segments with long claws, undulate at the margin, reflexed at the summit. **Seared**, spotted with yellow and brown. ♀ June—Aug. **Pine Barrens**. 18-24 in.


3 L CANADENSE. Stem erect, terete, glabrous. **Leaves** verticillate, in remote whorls, lanceolate, 3 nerved, hirsute along the nerves beneath. **Flowers** on long, reflected peduncles, generally by threes. **Perianth** campanulate, revolute; segments lanceolate. Yellow, spotted on the inside. ♀ July—Aug. **Wetlands**. 2-3 ft.

4 L CAROLINIANA. Stem erect, terete. **Leaves** verticillate and scattered, lanceolate, cuneate. **Flowers** terminal, solitary, in pairs, or by threes. **Perianth** with the segments long, lanceolate, the midrib of the three interior winged. Deep yellow, spotted with purple. ♀ July—Aug. **Damp soils**. **Low country**. 1-2 ft.

5 L SCOPARIUM. Stem erect, terete, glabrous. **Leaves** linear-lanceolate, 3-nerved, the lower ones verticillate, the upper scattered. **Flowers** in a pyramidal raceme. **Perianth** revolute. Superb lily. Deep yellow, spotted with purple. ♀ July—Aug. **Up country**. 3-6 ft.

**Genus II** YUCCA.

**Perianth** campanulate, expanding. **Stamens** 6. **Stigma** sessile. **Capsule** 3-celled.

1 Y FILAMENTOSA. **Leaves** lanceolate, with filamentous margins, the veins roughened on both surfaces. **Scape** long terminated by a long panicle. **Stamens** recurved, expanding. **Silk grass**. **Bear grass**. White. ♀ Aug.—Sept. Common in rich soils. 7-8 ft.

2 Y GLORIOSA. Stem erect, thick, succulent, usually simple, roughened towards the base by the remains of decayed leaves. **Leaves** crowded, lanceolate, acute, thick. **Flowers** in a large, terminal panicle, consisting of simple racemes. **Pedicels** stipulate at the base. **Perianth** 6-leaved; leaves lanceolate, acute, slightly ciliate. **Filaments** pubescent, compressed. **Stamens** bifid, concave. **Capsule** pulpy, glabrous. White. ♀ May—Aug. **On the sea coast**. 2-6 ft.

3 Y DRACONIS. Stem erect, branching. **Leaves** lanceolate, reflexed when old, the margins rigid; the young leaves erect and expanding. **Flowers** in racemose panicles similar to the preceding. White. ♀ May—Aug. **On the sea coast**. 10-12 ft.

4 Y RECUMBIFOLIA. Stem erect, simple. **Leaves** recurved, linear-lanceolate, 20"
with the margins filamentose. *Flowers* in racemose panicles. Leaves of the perianth unequal, the interior widest.


**Genus III ERYTHRNUM.**


Yellow. ¾. March—April. Common. 6-8 in.

**Remarks.** This plant when fresh, has long been known to be an emetic, but, as far as we know, has been but little used for any purpose. In scrofulous sores it is used in family practice, by making the fresh plant into poultices, with milk, and applying to the sores. Happy effects are said to result from its application in this manner.

**Order CXV. PALMÆ.**

*Flowers* perfect, or polygamous. *Perianth* 6-parted, in 2 series, persistent. *Stamens* 6, opposite the segments of the perianth, into the base of which they are inserted. *Ovary* 1-3-celled: when 3-celled it is deeply lobed, cells 1-seeded. *Fruit* baccate, or drupaceous.

**Genus I SABAL.**


**Genus II. CHAMÆROPS.**

*Flowers* polygamous. *Spathe* compressed; spadix branching. *Filaments* partly united. *Drupe* 3-celled, only 1 usually containing a seed.


2 C Histrix. *Stem* creeping. *Leaves* flabelliform, with the stipes intermingled with long thorns from the root. *Flowers* as in the preceding species. *Blue Palmetto.*


Remarks. The following remarks of Elliott on the C. Palmet o, we consider peculiarly appropriate. "This palm possesses a great and, to this country, an increasing value. It is the only tree produced in our parts which is not attacked by the Teredo Navalis; and as it is incorruptible in salt water, its value for sub-marine construction is almost incalculable.

Its leaves can be employed in the manufacture of hats, baskets, mats, and many other purposes of domestic economy; and the Cabbage, composed of the unexpanded empty leaves, may be classed among the most delicious vegetables produced on our tables. It is, however, a wasteful luxury, as the tree always perishes when deprived of this part of its foliage."

ORDER CXVI. RESTIACEÆ.

Flowers monœcious. Perianth 4-parted. Stamens 4-6, attached to the perianth. Ovary 2-3-lobed, 2-3-celled, with a solitary, pendulous ovule in each cell. Fruit capsular. Herbaceous plants, with stems naked, or bearing leaves. Flowers in terminal heads, separated by bracts.

Genus I. Eriocaulon.

Flowers monœcious; sterile florets occupying the center of the capitulum. Stamens 4-6. Perianth 4-parted, the 2 interior segments cohering; fertile florets in the circumference; perianth 4-parted. Style 1. Stigmas 2 or 3.

1. E Decangulare. Leaves ligulate, very narrow, glabrous, 10-12 inches long. Scapes terete, 10-furrowed, glabrous, sheathed near the base, bearing a large, spherical head. Scales of the involucre ovate, those of the disk longer than the flowers. Perianth somewhat fimbriate.


2. E Gnathaloeæ. Leaves subulate, ensiform, glabrous, 8-10 inches long. Scapes 10-furrowed, sheathed at the base. Flowers in a compact head.

Scales of the involucre oval, silvery white, villous when young.


ORDER CXVII. TYPHACEÆ.

Genus I SPARGANIUM.

Flower monoecious; sterile florets ament nearly spherical, dense; perianth 3-leaved; fertile florets ament nearly spherical; perianth 3-leaved. Stigma 2-cleft, or simple. Fruit a dry, 1-seeded drupe.

1 S Americanum. Stem flexuous, terete, glabrous, sparingly branched. Leaves ligulate, glabrous, thick, the lower ones carinate, about as long as the stem; the upper concave at the base, erect. Flowers in sessile, globular heads; fertile heads 2-5, usually sessile; sterile ones, 6-9. Stigma simple, oblique. May—June. In stagnant waters. 12-15 in.

Genus II TYPHA.

Flowers monoecious, collected into a long, cylindrical spike; sterile florets perianth wanting. Stamens united into a common filament; fertile florets perianth none. Pericarp pedicillate, surrounded at the base with hairs resembling a pappus.

1 T Latifolia. Stem terete, glabrous. Leaves linear, nearly as tall as the stem, sheathing at the base. Flowers in a cylindrical spike, the upper ones sterile, the lower ones fertile. July—Aug. In stagnant waters. 5-6 ft.

Order CXVIII. AROIDEÆ.

Flowers monoecious, or perfect, arranged upon a spadix, sometimes naked. Perianth either wanting or 4-6-parted. Stamens definite, or indefinite, hypogynous, short. Ovary superior, 1-celled, or rarely 3-celled. Stigma sessile. Fruit indehiscent, solitary, or several. Herbaceous plants, generally with tuberous roots. Leaves sheathing, with parallel veins.

Genus I ACORUS.


1 A Calamus. Leaves ensiform, ancipitous, glabrous, entire. Scape 3-angled, concave on one side, with the summit resembling the leaves. Flowers on a cylindrical spadix, protruding from the side of the ensiform scape. Stigma obtuse. Pale yellow. April. Wet places. 2-3 ft.

Remarks. The dried root of this plant is known in shoos under the name of Calamus. It is a stimulant, tonic and aromatic; it is prescribed in the regular practice as an aid to cathartic medicines, and in cases of debility of the alimentary canal. It was anciently much more highly esteemed than at the present day.

Genus II ORONTIUM.

Spadix cylindric, crowded with flowers. Perianth 6-leaved, naked. Stigma sessile, very small. Fruit 1-seed.

Genus III ARUM.

Flowers monoeious. Spathe 1-leaved, cucullate, convolute at the base. Spadix naked at the summit, bearing sterile florets in the middle, and fertile ones at the base. Perianth none. Fruit 1-celled, many seeded.

1 A Dracontium. Leaves perhaps never but one, pedate, leaflets lanceolate, oblong, entire, 1, on long petioles. Spadix subulate, longer than the spathe. White. 2. June. Moist places. 10-12 in.

2 A Triphyllum. Leaves ternate; leaflets ovate acuminate, entire. Spadix clavate, about half as long as the spathe. Fruit scarlet, 3-4-seeded. This species is said to be sometimes dioecious. The A. Quinatum differs in no respect from the above, but in its quinwise leaves. Dragon root. Wake robin. Indian turnip. Purple, striped. 2. March—April. Rich soils. 10-12 in.

3 A Virginicum. Leaves oblong, hastate, entire, glabrous, 10-15 inches long; petioles long, sheathing at the base; spathe incurved. Spadix about as long as the spathe. Fruit many seeded. 2. April—May. Marshy soils, very common. 12-18 in.

4 A Waltheri. Leaves sagittate, triangular with the lobes divericate, acute, probably only a variety of the preceding. Purple. 2. March—April. In swamps. 12-18 in.

Genus IV. CALADIUM.

Flowers monoeious, sterile florets perianth none. Stamens numerous. Anthers peltate, collected in a spike at the summit of the spadix. Fertile florets perianth none at the base of the spadix. Stigma sessile. Fruit 1-celled, many seeded.

1 C Glaucum. Leaves hastate, cordate, acuminate, entire, glaucous, lobes long; scape about the length of the petioles; spathe cucullate, dilated at the summit. Spadix longer than the tube, with the sterile florets extending to the summit. Fruit red, many seeded. White. May—June. Wet soils 12-15 in.

Order CXIX. FLUVIALES.

Flowers monoeious, or perfect. Perianth 2 or 4-parted, or none. Stamens hypogynous, definite. Ovary superior,

**Genus I. ZOSTERA.**


**Genus II. CAULINIA.**


1 *C. Flexilis.* Stem slender, glabrous, submersed, branching. *Leaves* verticillate, in a whorl, linear, denticulate at the summit. *Flowers* solitary, axillary, sessile. 4 May—July. Stagnant waters. 2–3 ft.

**Genus III. RUPPIA.**


**Genus IV. POTAMOGETON.**

*Flowers* perfect, on a spadix arising from the spathe. *Perianth* 4-leaved. *Anthers* 4, sessile, alternating with the leaves of the perianth. *Nuts* 4, 1-seeded, sessile.

1 *P. Fluitans.* Stem branching, glabrous. *Leaves* floating, on long petioles, sub-coriaceous, oval-lanceolate, the lower ones narrow, sessile, long. *Flowers* in axillary spikes, almost submersed. 4 May—June. Stagnant waters. 2–6 ft.

2 *P. Heterophyllum.* Stem branching, glabrous, upper leaves opposite, lanceolate, 5-nerved; lower ones linear, sessile. *Flowers* crowded on the spadix. 4 July—August. Stagnant waters.

3 *P. Pauciflorum.* Stem branching, diffuse. *Leaves* linear, sessile, the upper verticillate, the lower alternate. *Spadix* 1 from each whorl of leaves, bearing 4–10 flowers. 4 Through the summer. Shallow water.
Order CXX. Juncaginæ.

Flowers perfect. Perianth 4-6 leaved, or 6-parted, rarely wanting. Stamens 3-6, hypogynous. Ovaries 3 or 6, cohering. Ovules 1 or 2, erect. Fruit dry, 1 or 2-seeded. Herbaceous plants, growing in bogs. Leaves ensiform, flowers in spikes, or racemes.

Genus I TRIGLOCHIN.


Order CXXI. PISTIACEÆ.

Flowers 2, enclosed in a spathe. Stamens 2-7. Ovary 1-celled, with 1 or more erect ovules. Style 1, short. Fruit indehiscent, 1 or more seeded. Seeds with a fungus integment. Floating plants, with cellular, lenticular, or lobed stems and leaves.

Genus I LEMNA.

Flowers monoeious, with the sterile and fertile flowers collateral. Stamens 2. Capsule 1-celled, 1-5 seeded.


Genus II PISTIA.

Perianth a tubular, cucullate spathe, strap shaped. Stamens 3-8. Capsule 1 celled, many seeded.

MONOCOTYLODENOUS.

SUB-CLASS III. GLUMACEÆ.

Flowers destitute of a true perianth, the floral envelops consisting of imbricated bracts, which are alternate instead of verticillate, as in all preceding flowers.

ORDER CXXII. GRAMINEÆ.

Flowers usually perfect, sometimes monœcious or polygamous, the exterior floral envelops called glumes, the interior ones paleæ, and the innermost at the base of the ovary, scales. Glumes usually 2, sometimes single, usually unequal. Paleæ 2, the exterior one simple; the interior or uppermost usually keeled. Scales 2 or 3, sometimes wanting. Stamens hypogynous, 1–6. Anthers versatile. Ovary simple. Styles 2, rarely 1, or 3. Stigmas hairy, or plumose. Albumen farinaceous. Embryo on one side of the albumen. Culms cylindrical, fistular, jointed. Leaves with a split sheath.

(a) Agrastideæ.


GENUS I AGROSTIS.

Glume naked beardless, 2-valved, 1-flowered; valves longer than the paleæ. Paleæ 2, membraneous. Stigmas longitudinally hispid.

1 A Arachnoïdes. Stem erect, slender, glabrous. Leaves with the sheath as long as the joints. Stipules lacerate. Panicle long, with capillary branches. The upper Paleæ awned, with the awn very slender. Stamens 1–3. Styles 2.

April–May. Middle Car. 4–8 in.


3 A Sericeæ. Trichochloa Capillaris. Stem erect, slender. Leaves subulate, glabrous, involute. Panicle long, diffuse. Peduncles purple. Glume shorter than the corolla, with the valves awned, purple. Paleæ the exterior one lanceolate, 3-awned, with the intermediate awn longest, purple, when young the valve is unawned.


4 A Trichorodes. Stem glabrous, with long stipules. Panicle diffuse. Peduncles capillary, long. Glumes much shorter than the paleæ. The exterior palea with a short, straight awn, the interior longest.


5 A Decumbens. Stem geniculate, decumbent, branching, taking root at the joints. Leaves flat, scabrous. Stipules ovate, membraneous. Panicle
GRAMINEE.

with the branches nearly verticillate, expanding. *Glumes* acute, the exterior largest. *Palea* much shorter than the glumes, unawned.

4 May—June. In the low country. 1-2 ft.


This plant is considered by some, the same as the preceding, but we believe that they are distinct species.

7 A JUNEA. Stem erect, slender, glabrous. *Leaves* glabrous, concave, margins scabrous. *Panicle* with verticillate branches, about 6 in a whorl. *Glumes* glabrous, the exterior much smaller than the interior, both purple—*Palea* nearly equal.

4 Dry pine barrens, common. 1-2 ft.


4 Sept.—Oct. Sandy soils. 3-4 ft.


10 A VIRGINICA. Stem procumbent, assurgent, glabrous. *Leaves* subulate, short, entire. *Panicle* appressed. *Glumes* the exterior shorter than the palea, keeled, the interior larger. *Palea* nearly equal, the exterior acute, the interior obtuse.

4 Aug.—Sept. On the sea coast. 6-8 in.


4 July. Mountains. 12-18 in.


4 Aug. Middle Georgia.


4 Aug.—Sept. Swamps. 2-2 feet.

Genus II. TRICHODIUM.

*Glumes* 2, 1-flowered. *Palea* 1, shorter than the glumes, bearded, and supported at the base by fascicles of hairs. *Flowers* in capillary panicles.

1 T LACIFLORUM. Stem erect, glabrous. *Leaves* setaceous, scabrous.—*Panicles* diffuse, capillary, with trichotomous branches. *Glumes* unequal, lanceolate, acute. *Palea* shorter than the glumes, with the margins pubescent.

4 March—May. Dry fields, or swamps. 18 in.—3 ft.


4 Sept.—Dec. Shady places. 12-18 in.

Part II. 21
Glumes 2, very minute fringed. Paleæ ovate, gibbous, much larger than the glumes, the lower one awned. Panicle simple.


2 M Erecta. Stem erect, simple, pubescent. Leaves shorter than the joint, hairy at the throat. Panicle loose. Glumes with one very minute. Paleæ with the exterior one bearing a long awn, many nervèd.

Genus IV ALOPECURUS.

Glumes 2, 1-flowered, nearly equal. Paleæ united, cleft on one side below the middle. Styles often connate.


Genus V PHLEUM.

Glumes 2, equal, mucronate, longer than the paleæ. Paleæ 2, included in the glume, truncate, boat shaped, without awns. Flowers in dense, cylindrical spikes.


Genus VI PHALARIS.


1 P Americana. Stem erect, branching, scabrous near the summit, geniculate near the base. Leaves glabrous. Sheaths shorter than the joints. Style 1, bifid.

B. PANICEÆ.

Glumes usually 2-flowered, one of the flowers sterile. Paleæ cartilaginous, thicker than the glumes, the lower one partly enclosing the upper, neither of them keeled.
Genus VII PANICUM.

[The first eleven species of this genus would constitute the genus Setaria, but as that genus differs from the Panicum only by having the flowers in spikes, we do not deem it of sufficient importance to alter the arrangement from that to which we have been accustomed.]

Glumes 2, unequal, the lower one very small; the lower florets usually abortive, or bearing stamens only. Palea concave, equal, beardless. Seed coated with the paleae. Flowers in loose, scattered panicles or spikes.

1 P Cenchröides. Stem erect, scabrous near the summit. Leaves scabrous, contracted at the throat. Flowers in a compact, rigid spike. Involucres many cleft, with the exterior segments short. Glumes nearly equal nerved, with an accessory glume of half their length. Palea longer than the glumes.


3 P Corrugatun. Stem erect, terete, slightly scabrous. Leaves acute, scabrous. Sheaths longer than the joints. Flowers in compound, compact spikes; spikelets with about half the flowers fertile, the others sterile. Glumes with an accessory valve, 5-nerved. Palea as long as the glumes, the exterior one wrinkled.

4 Through the summer. Sea islands 1-2 ft.

3 P Corrugatun. Stem erect, terete, slightly scabrous. Leaves acutec, scabrous. Sheaths longer than the joints. Flowers in compound, compact spikes; spikelets with about half the flowers fertile, the others sterile. Glumes with an accessory valve, 5-nerved. Palea as long as the glumes, the exterior one wrinkled.

4 Through the summer. Low country. 2-3 ft.

4 P Crus Galli. Stem erect, terete, glabrous. Leaves long, scabrous. Flowers on spikes forming a terminal panicle. Rachis angled, hairy. Glumes 2-flowered, one perfect, the other sterile; exterior glume with a long awn, the interior one flat, awned, the accessory glume very small. Palea pubescent.

© Aug.—Sept. Cultivated grounds. 2-4 ft.

The glumes of this species are not always awned, and the awns vary very much in length.


© Through the summer. In damp soils. Low country. 2-3 ft.

6 P Hirtellum. Stem procumbent, creeping, sometimes assurgent, hairy at the joints. Leaves undulate, scabrous, slightly hairy, contracted at the base, throat and margin of the sheath hairy, spikes compound; spikelets 5-8-flowered. Rachis angled, villous. Glumes 1-flowered, with purple awns.


© Through the Summer. Damp soils, common. 1-2 ft.

8 P Molle. Stem erect, pubescent towards the summit, and all the joints. Leaves glabrous with the throat of the sheath ciliate. Flowers in spikes or racemes. Glumes 2-flowered perfect, and sterile; valves acute, hairy. Palea of the sterile floret 1.

© Aug.—Sept. On the sea islands. 4-6 ft.

9 P Gymnocarpn. Stem erect, glabrous. Leaves cordate, long. Sheaths about the length of the joints, striate. Flowers in simple panicles in two rows on one side of the branches; spikelets 3-5 flowered. Glumes 3. Palea about half the length of the glumes.

© Aug.—Sept. Low country. 2-4 ft.

(b) Flowers in panicles, either solitary or in racemes.
10 P. Glauccm. Stem erect, glabrous, slightly compressed. Leaves linear-lanceolate, acute, upper surface scabrous; spike cylindrical. Glumes with an accessory one, acute, 3-nerved. Palea 2, the exterior one, obscurely 5-nerved. Annu s 8-10, in 2 fascicles.

3 July—Aug. Road sides. 2 ft.

There are two or three varieties of this plant, varying in the direction of the stem, and in the number of the flowers in the Spikelets, and in being pubescent.

11 P. Italicum. Stem erect, slightly compressed, tomentose. Leaves very long, channeled, scabrous, the sheath with the throat and margins ciliate; spikes compressed, with the spikelets many flowered. Involutec longer than the flowers. Glumes 2-flowered, only one palea to the sterile floret.

4 Aug ust—Sept. Wet soils. 2-10 ft.


4 August—Oct. Wet soils. 3-6 ft.


4 August—Nov. Wet soils, common. 2-4 ft.


15 P. Latifolium. Stem procumbent, pubescent. Leaves ovate-lanceolate, hairy at the throat. Flowers solitary, scattered. Glumes 2-flowered, perfect and sterile, pubescent. Palea of the perfect flowers larger than those of the sterile ones.

4 Through the Summer. Dry shady soils, common. 12-15 in.

16 P. Scopearum. Stem erect, villous. Leaves glabrous on the upper surface, 3-6 inches long, 1-2 wide, pubescent beneath. Flowers few; large. Glumes 2-flowered, pubescent, with an accessory valve. Palea of the perfect floret larger than those of the sterile one.

4 April—May. Shady places. 2-3 ft.


18 P. Virgatum. Stem erect, glabrous. Leaves somewhat serrulate, long. Sheaths shorter than the joints. Panicle large, with the branches often verticillate. Glumes 2-flowered, perfect and sterile with an accessory valve.

4 August—Sept. Sea coast. 4-6 ft.


4 October. Sand hills on the sea coast. 2-3 ft.


4 Sept.—Oct. Low country of Ga. 2-3 ft.


4 May—July. Dry soils. 2-3 ft.
22 P Multiflorum. Stem erect, glabrous. Leaves broad-lanceolate, pubescent at the base, and ciliate, slightly undulate. Flowers in a much branched panicle, small, pubescent.


4. March—April. Damp soils. 4-10 in.


33 P Barbatum. Stem erect, usually geniculate, with the joints bearded, branching at the base. Leaves ovate-lanceolate, glabrous, expanding. Sheath glabrous, ciliate. Glumes 2 flowered, pubescent. Paleae of the perfect flower equaling the glumes; of the sterile flower only one, small.


36 P Melicarum. Stem slender, glabrous. Leaves long, narrow, gla-

4 April—June. Car. & Ga.


4 August—Oct. Damp soils. 2–4 ft.


4 May—June. Shaded soils. 1–3 ft.


4 June—August. Dry soils. 12–15 in.

**Genus VIII Digitaria.**

*Inflorescence* digitate, or fuscicled; spikelets in pairs, on short bifid peduncles, arranged on one side of the rachis. *Glumes* 3, the lower one very minute, the lower floret sterile, the upper perfect. *Palea* of the perfect floret sub-coriaceous.


5 Through the Summer. Cultivated grounds very common.

2 D Villosa. *Stem* columnar, hairy at the joints, geniculate, forming dense tufts. *Leaves* linear-lanceolate, villous. *Sheaths* villous; spikelets 3-flowered. *Glumes* pubescent, the exterior one very small.

4 June—Aug. Wet places, common.


4 Sept.—Oct. On poor lands. 1–2 ft.


4 June—Sept. Low country. 1–2 ft.

**Genus IX Paspalum.**


4 June—Aug. Dry soils, common.


3 P Pr.ecox. Stem erect, glabrous. Leaves linear-lanceolate, glabrous. Spikes numerous, with the flowers crowded, 2 from each bud, and one of them sessile. Rachis hairy at the base. Glumes orbicular, glabrous.

2 1 May—Aug. Damp soils. 1—2 ft.

4 P Leae. Stem erect, glabrous. Leaves short, lanceolate, glabrous, hairy at the throat. Spikes 2—3. Flowers 1 from each head. Rachis little hairy at the base.

4 June—Sept. Damp pastures. 1—2 ft.

5 P Floridanum. Stem erect, glabrous. Leaves long, the lower ones hairy and scabrous, the upper ones becoming nearly glabrous. Throat of the sheath villous. Spikes generally 3. Rachis hairy at the base. Flowers 1-2 from each bud.

4 June—Sept. Common. 3—4 ft.

6 P Purperascens. Stem decumbent, and erect, branching, glabrous. Leaves long, hairy at the base, dark purple. Spikes crowded, 2 from each bud. Rachis hairy at the base.


4 Through the summer. In damp soils, common.

8 P Vaginatum. Stem creeping, glabrous, branching. Leaves linear, short, the sheaths of the upper leaves longer than the joints. Spikes 1—2, one of them sessile.

4 Through the summer. Damp soils, low country. 12—18 in.

Genus X CERESIA.

Glumes 2, 1-flowered, with the exterior one longer and bifid at the summit. Paleae 2, a little smaller than the glumes. Spikes numerous. Flowers in 2 rows, under a wide, membranous rachis.

1 C Fluitans. Stem procumbent, creeping, assurgent, glabrous. Leaves scabrous, 2—3 inches long, slightly glaucous beneath. Sheaths hairy at the base. Spikes numerous, 20—30, recurved. Rachis with the flowers arranged on the upper surface. Glumes dotted, white. Paleae equal, the interior one flat, the exterior convex.

2 Sept.—November. Swamps. 1—3 ft.

Genus XI AULAXANTHUS.

Glumes equal, lanceolate, 1-flowered, nerved. Paleae 2, nearly equal, the exterior concave, the interior flat.

1 A Ciliatus. Stem erect, glabrous, compressed towards the base. Leaves linear, ciliate, glabrous. Sheath ciliate, hairy at the throat. Glumes villous. Palea brown, nearly black when mature.


2 A Rufus. Stem erect, larger than the preceding. Leaves glabrous. Panicle large. Glumes covered with long, reddish brown hair.

4 Aug.—Sept. Damp soils. 2—3 ft.

Genus XII CENCHRUS.

Involucrre 1—3-flowered, many parted, bristly. Glumes 2, 2-flowered, exterior ones smallest, the exterior floret sterile, the other perfect. Paleae 2, unawned.


Genus XIII TRIPSACUM.


1 T Dactyloides. Stem erect, glabrous, more or less compressed. Leaves large, contracted at the base. Sheath villous at the throat. Flowers in 3-clustered spikes, the upper florets sterile, the lower fertile, generally 2-4. © July—Aug. On dry soils. 5-7 ft.

2 T Monostachyon Stem erect, glabrous, compressed. Leaves large, serrulate, contracted at the base. Flowers in a solitary, terminal spike, upper florets sterile, the lower fertile. © Aug.—Oct. Along the sea cost. 3-5 ft.

C. STIPACEÆ.

Inflorescence panicled, consisting of one flowered, solitary spikelets.

Genus XIV STIPA.

Glumes 2, membranous, 1-flowered. Palea 2, coriaceous, shorter than the glumes, the lower one with a long terminal awn, the upper one entire. Panicle lax.


D. BROMEÆ.

Inflorescence panicled, consisting of solitary spikelets or racemes, 2, or many flowered. Glumes keeled. Palea resembling the glumes, the lower one keeled, or concave, bearded, the upper with 2 keels.

Genus XV ARISTIDA.

Glumes 2, membranaceous, unequal. Palea 2, on pedicels, lower one coriaceous, 3-awned, the upper one very small, or wanting. Scales collateral.

1 A Dichotoma. Stem slender, branching, glabrous. Leaves narrow, flat
finely serrulate. *Flowers* in paniculate racemes. *Glumes* narrow lanceolate, with short awns, keels serrulate. *Pales* involute, 3-awned, the middle one longest, contorted.


4 A *Gracilis*. *Stem* erect, slender, glabrous, branching at the base. *Leaves* linear, with sheaths shorter than the joints. *Flowers* in long spikes, appressed. *Glumes* equaling the palea in length, the exterior palea involute, banded with light and dark spots, 3-awned, the interior palea minute, or wanting.


**Genus XVI** CALAMAGROSTIS.

*Glumes* 2, 1-flowered, acute. *Pales* 2, shorter than the glumes, surrounded by a woolly pubescence at the base, dorsal one sometimes awned.

1 C *Americana*. Phalaris *Americana* of Ell. *Stem* erect, branching, geniculate at the base with summit somewhat scabrous. *Leaves* glabrous, linear-lanceolate; sheath shorter than the joints. *Glumes* compressed, with the keel serrulate; the interior one longest. *Pales* with 2 minute accessory valves.

2 C April—May. *Damp* soils.

**Genus XVII** ANTHOXANTHUM.


**Genus XVIII**. AIRA.

1 A Pallens. Stem erect, geniculate at the base, glabrous. Leaves flat, slightly scabrous, narrow. Sheaths glabrous. Glumes compressed, keeled, the interior valve longest. Palea 2, the exterior double the length of the interior, bearing a short awn on the back.

2 A. Flexus. Stem erect, terete, glabrous. Leaves setaceous. Panicle diffuse, with the branches somewhat verticillate. Glumes unequal. Palea equal, the exterior one pubescent at the base, bearing an awn at the base.

3 A Puncta. Stem slender, compressed, scabrous at the joints. Leaves scabrous, pubescent on the upper surface. Sheaths scabrous, the throat pubescent. Glumes 2-flowered, the exterior valves small, with the margins incised. Palea 2, the exterior one bifid, with the midrib extending into an awn, the interior valve villous.

4 A Capillacea. Stem erect, small. Leaves short, glabrous, narrow. Flowers in capillary panicles, diffuse, large for the size of the plant. Glumes acute, with the keel rough. Palea unawned, larger than the glumes.


6 A Obitus. Stem erect, glabrous. Leaves flat, somewhat scabrous and hairy. Sheaths hairy. Panicle racemose. Glumes 2-3-flowered, the exterior one linear, the interior broad, obtuse. Palea nearly equal, the exterior tinged with green, the interior white.

7 A Mollis. Stem slender, glabrous, naked at the summit. Leaves linear, short. Flowers in racemose panicles, scattered. Glumes with the interior obtuse, the exterior acute. Palea acute, the interior shortest, usually 2-cleft.

8 A Spicata. Stem erect, pubescent, near the summit. Leaves subulate, small, pubescent. Sheath with the throat bearded, villous. Flowers panicled. Spikes racemose, on short pedicels. Glumes usually 6-flowered, longer than the spike, margins membranous. Palea 2, exterior one lanceolate, villous, the sides terminating in two awns, with the spiral one on the back, between them, interior one ciliate.

9 A Pennsylvanica. Resembles the preceding with the exception that the glumes are 2-flowered, and seeds villous.

10 A Phragmites. Stem erect, jointed, branching towards the summit.—Leaves lanceolate, flat, pubescent on the under surface. Panicle large, loose.


Genus XX FESTUCA.

Glumes 2, unequal, many flowered. Paleae 2, lanceolate, outer one acuminate, or awned. Panicle usually compound.


© April—May. Dry soils, common. 6-12 in.

2 F Polystachya. Stem proeminent, branching, glabrous. Leaves narrow, subulate. Sheaths longer than the joints. Panicle secund, erect; spikelets about 10-flowered, the exterior glume small, the interior larger and awned, the exterior palea awned and keeled.


3 F Myuros. Stem erect, geniculate at the base, glabrous. Leaves subulate, scabrous on the margins. Sheaths much longer than the joints. Panicle slender, crowded, not secund; spikelets 4-7, flowered. Glumes small, exterior palea concave hairy, awned.

© March—April. Dry soils. 6-12 in.

4 F Parvipectora. Stem slender, glabrous. Leaves linear, almost filiform. Panicle slender; spikelets subulate, terete, 5-flowered, exterior palea awned.

4 April—May. Pine barrens 12-18 in.


© June—July. In fields. 12-18 in.


4 June—July. Woods. 2-3 feet.

Genus XXI CERATOCHLOA.

Glumes 6-8-flowered, shorter than the florets. Paleae toothed, the lower one mucronate between the teeth. Seed furrowed, 3-horned. Panicle nearly simple. Spikelets compressed. Florets in 2 rows.

1 C Unioioides. Stem erect. Leaves narrow, the sheaths bearded at the throat, the lower one hairy. Panicle nodding, spreading; spikelets oblong-lanceolate, compressed, 6-8-flowered.

© July. Fertile soils. 12-18 inches.

Genus XXII DACTYLIS.

Glumes 2, many flowered, unequal, the larger one keeled. Paleae 2, without awns, lanceolate, lower one mucronate, the upper one bifid. Spikelets clustered into a 1-seeded head.

1 D Gleomera. Stem erect, glabrous. Leaves linear, scabrous. Sheath

Genus XXIII Bromus.

Glumes 2, usually many flowered, shorter than the florets, which are imbricated in 2 rows. Lower palea cordate, emarginate, with an awn sometimes below the summit. Scales ovate, smooth.

1 B Secalinus. Stem glabrous, swollen at the joints, erect. Leaves pubescent on the upper surface, ciliate. Panicle erect, or nodding, branched; spikelets oblong-ovate, compressed. Florets about 10, distinct, longer than the bristles.

3 July. Cultivated lands. 2–3 ft.


4 July—September. Mountains. 1–2 ft.

Genus XXIV Poa.

Glumes 2, usually many flowered. Spikelets compressed. Palea sometimes woolly at the base. Scales smooth. Panicle more or less branching, or scattered.


3 Aug.—Sept. Sandy fields. 1–2 ft.


4 Aug.—Sept. Upper Car. 12–18 in.

3 P Hirsuta. Stem erect, compressed, glabrous, branching, hairy at the axes. Leaves glabrous, long, pubescent at the base. Sheath hairy. Glumes glabrous, tinged with purple.

4 Aug.—Oct. Dry fields. 1–2 ft.


4 July, Shady woods. Middle Car. & Ga.


4 July—August. Middle Car. & Ga. 2–3 ft.


Feb.—April. Cultivated grounds. 6–8 in.
7 P. Autumnalis. Stem erect, glabrous. Leaves slightly scabrous, flat. 
Panicles diffuse. Spikelets generally 3-flowered. Glumes unequal; exterior 
palea obtuse, 5-nerved.
4 August—Sept. Middle Car. and Ga. 12-18 in.
8 P. Viridis. Stem erect, oblique at the base, striate, glabrous. Leaves 
glabrous, linear, flat. Panicle diffuse, with 3 or 4 branches at each joint. 
Glumes acute, margins scarios, white. Spikelets 3-5 flowered, woolly at 
the base.
4 May—June. Common. 2-3 ft.
9 P. Angustifolia. Stem glabrous, erect. Leaves linear, glabrous, invo-
lude, upper ones broadest. Panicle crowded. Spikelets usually 4-flowered, 
villous at the base. Palea tinged with purple, villous at the base.
10 P. Tenella. Stem decumbent, glabrous. Leaves subulate, scabrous 
on the upper surface. Sheath hairy at the throat. Panicle expanding, with 
verticillate branches; exterior palea purple, 3-5-nerved.
O Through the Summer. Cultivated grounds, common. 6-12 in.
11 P. Pectinacea. Stem erect, or oblique. Leaves erect, hairy at the base. 
Sheaths hairy at the throat. Panicle capillary, expanding, pyramidal, hairy 
in the axis. Spikelets 5-10-flowered; interior palea persistent.
O July—Aug. Sandy fields. 8-12 in.
12 P. Eragrostis. Stem geniculate and branching at the base, glabrous. 
Leaves short, linear, glabrous, nerved. Panicle spreading, lower branches 
hairy in the axis. Spikelets 9-15-flowered; florets obtuse; exterior palea 
aeute, 5-nerved, transparent.
O July—August. Sandy fields. 12-18 in.
13 P. Nitida. Stem erect, glabrous. Leaves linear; throat of the sheath 
slightly hairy. Panicle diffuse, capillary. Spikelets 7-9-flowered. Glumes 
compressed; exterior palea 3-nerved, transparent.
O Through the Summer. Cultivated lands. 12-18 in.
14 P. Refracta. Stem erect, terete, glabrous. Leaves slightly hairy. Pan-
icle diffuse, large. Spikelets 15-20-flowered; exterior palea 3-nerved.
4 August—Sept. Damp soils. 2 ft.
15 P. Fluitans. Stem erect, glabrous. Leaves scabrous on the upper 
surface. Sheaths glabrous, with large stipules. Panicle branching. Spike-
lets sessile, 9-10-flowered. Glumes membranous, smaller than the palea; 
exterior palea 7-nerved, obtuse.
Leaves subulate, striate, slightly pubescent. Sheath hairy at the throat. 
Panicle fascicled. Spikelets 12-20-flowered; exterior palea with the midrib 
green.
O Through the Summer. Moist cultivated lands. 6-18 in.
17 P. Rigida. Stem assurgent, glabrous, rigid. Leaves subulate, glabrous. 
Panicle scious. Spikelets linear-lanceolate. 3-5-7-flowered. Glumes keeled. 
Palea rounded, tinged with purple.
O April—May. Dry soils. 2-4 in.
18 P. Quinqueflora. Stem erect, glabrous. Leaves distichous at the base, 
slightly serrulate. Sheath hairy at the throat. Panicle expanding. Spikelets 
3-flowered; exterior palea 3-5-nerved, which extend beyond the margin, 
hairy at the base.
4 Sept.—Oct. Sandy soils, common. 4 ft.
19 P. Ambigua. Stem erect, glabrous. Leaves linear, glabrous. Sheaths 
bearded at the throat. Panicle expanding. Spikelets dark purple, sessile.
4 Sept. 2 ft.

Genus XXV. UNIOLA.

Glumes numerous, shorter than the florets. Florets 3-20,
in two rows. Spikelets compressed, the lower palea carinate, mucronate, the upper one subulate. Scales emarginate. Seed 2-horned.

1 U Paniculata. Stem erect, glabrous. Leaves long, narrow, entire, glabrous. Sheaths hairy at the throat. Panicle large. Glumes 4-5 many flowered; exterior palea mucronate, 6-nerved, interior one ciliate.

4 July—Aug. On the sea coast. 4-8 ft.


4 July—Sept. On the sea coast. 1 ft.

3 U Latifolia. Stem terete, glabrous. Leaves flat, glabrous, throat of the sheath ciliate. Glumes 3, 7-14-flowered; the upper ones sterile, exterior palea many nerved, with the keel ciliate. Flowers generally monandrous.

% July—Sept. Mountains.


4 June—July. Middle Ga. 2-5 ft.


% Through the Summer. Very common. 1-2 ft.

Genus XXVI. BRIZA.

Glumes 2, many flowered. Flowers imbricate, in two rows. Paleae ventricose, lower one embracing the upper. Seed beaked. Panicle compound, loose, with pendulous branches.

1 B Eragrostis. Stem decumbent, geniculate, glabrous. Leaves scabrous on the upper surface, finer-lanceolate. Sheaths shorter than the joints, bearded at the throat. Panicle compound; spikelets cordate at the base.—Flowers numerous; exterior palea 3-nerved, acute, the interior one ciliate along the nerves.

© June—Nov. Cultivated lands, very common. 12-18 in.

Genus XXVII. MELICA.

Glumes 2, unequal, 2-flowered. Paleae 2, unequal; upper florets sterile.


© April—May. Mid. Car. & Ga. 2-3 ft.

CHLORIDEÆ.

Inflorescence spiked; spikelets solitary, with the upper floret abortive and different from the rest. Glumes keeled; the lower palea with 2 keels, usually bearded.

Genus XXVIII. CYNODON.

Spikes digitate. Spikelets 1-sided, in a single row, fili-
form. **Gramineae.**

**Glumes** 2, shorter than the florets. The upper *palea* of the fertile floret bifid, toothed. *Seed* loose.


2 Trough the summer. Common.

**Genus XXIX CHLORIS.**

**Flowers** polygamous. *Glumes* 2, 2-flowered, one of them perfect and sessile, the other staminate. *Palaec* of the perfect flower 2, awned. Spikes by fours, digitate.

1 C Petrea. Stem prostrate, branching, assurgent, geniculate. Leaves glabrous, with the margins and midrib serrulate. *Glumes* 2, 2-flowered, exterior glume awned, the interior smaller, keeled. *Palaec* of the sterile floret concave, obtuse

3 June–Aug. On the sea coast.

**Genus XXX MONOCERA.**

**Flowers** polygamous, on one side of the rachis. *Glumes* 2, many flowered, awned below the summit. *Palaec* of the perfect flower 2-valved, unequal, the exterior one awned below the summit, those of the sterile flower unawned.

1 M Aromatic. Stem pubescent, erect. Leaves scabrous on the upper surface, glabrous beneath. *Sheaths* shorter than the joints, hairy at the throat. Spikes terminal, secund; spikelets in 2 rows. *Glumes* 3-flowered, the exterior glume with an awn projecting from the center of the back, the interior palea small, pubescent.


**Genus XXXI ELEUSINE.**


1 E Mucronata. Stem erect, glabrous. Leaves slightly scabrous, with hispid sheaths, longer than the joints. *Panicle* long, with the spikes 4–5 inches long. *Glumes* nearly equal, with colored keels. *Palaec* unequal, the exterior or hairy.

2 E Indica. Stem decumbent, lucid. Leaves linear, with the under surface glabrous, long. *Sheaths* pubescent, compressed. Spikes usually 5, digitate, one below the rest; spikelets usually 5 flowered. *Glumes* unequal, with the keels scabrous.


3 E Crucifera. Stem decumbent and assurgent, glabrous. Leaves narrow, ciliate. Spikes 2–4; spikelets usually 3-flowered, the terminal one usually sterile, or wanting, extremity of the rachis naked.

3 July—Common 12–13 inches

**Cerealiae.**

Inflorescence spiked. Spikelets 1, or many flowered.—*Glumes* equal. Upper palea 2-keeled.
MONOCOTYLEDENOUS.

**Genus XXXII ELYMUS.**

*Spikelets* 2, or more at each joint of the rachis, 3–9-flowered. *Glumes* 2, nearly equal, sometimes absent, lower palea entire, with a short awn, upper one bifid. *Scales* ovate, hairy.

1 *E. Virginicus.* Stem erect, glabrous. *Leaves* scabrous, with scabrous sheaths. *Glumes* 2, somewhat lateral, terminating by an awn, the exterior palea concave, awned, about the size of the interior.

   4 June. Shady woods. 8–12 in.

   4 July. Mountains 2–3 feet.

**Genus XXXIII ROTTBOLLIA.**

*Flowers* in 1-sided spikes. *Glumes* 1–2-flowered, the flowers sterile and perfect.

   4 Through the summer. On the sea coast.

**Genus XXXIV SPARTINA.**


1 *S. Juncea.* Stem glabrous, columnar. *Leaves* linear, convolute when old. *Sheaths* glabrous, ciliate at the throat. *Spikelets* few, pedunculate; exterior glume small, the interior one long, keeled; exterior palea shortest, the interior compressed, as long as the glume.
   4 Through the summer. *Sea* coast. 2–3 ft.

2 *S. Polystachya.* Stem glabrous, columnar. *Leaves* broad, very long, scabrous on the upper surface. *Spikelets* shorter than the joints, with the throat hairy. *Spikelets* numerous, 10–12 expanding, alternate.
   4 September. On the sea coast. 3–10 ft.

   4 August–Sept. On the sea coast. 2–4 ft.

**SACHARINEæ.**

*Inflorescence* spiked, or panicled. *Glumes* not keeled. *Paleae* thin, membranaceous, without keels, the lower one commonly bearded.

**Genus XXXV. ANDROPOGON.**

*Flowers* polygamous, spiked. *Spikelets* in pairs, 1–2-flowered, the lower ones sterile, or when but one it is perfect.
Glumes and paleae sometimes wanting, when present, the glumes coriaceous. Paleae membranaceous, with the lower one generally awned.

1 A Ciliatus. Stem erect, sometimes decumbent, pubescent at the joints. Leaves scabrous, slightly hairy. Panicle naked, expanding. Flowers perfect and sterile. Glumes hairy, the exterior one many nerved, the interior 5-nerved. Paleae ciliate, the interior one awned.

4 Sept.—. Pine barrens. 3-4 ft.


4 Sept.—Oct. Dry soils. Very common. 3-6 ft.

3 A Melanocarpus. Stem erect, branching, glabrous. Leaves scabrous, with the sheath hairy at the throat. Spikes clustered, many flowered, with the involucre bearing a long awn. Glumes 2, lanceolate, pubescent, colored. Paleae small, membranous, with a long contorted awn arising from the base.

4 Sept.—Oct. Pine barrens. 2-3 ft.

4 A Scoparius. Stem glabrous, tinged with purple. Leaves channelled, slightly hairy. Sheaths hairy. Flowers in straight panicles, by pairs on the spikes, the perfect ones sessile, the neuter one stiped and awned. Rachis hairy. Glumes 2, the exterior 5-nerved. Paleae purple, with hairy margins, the interior awned at the summit.

4 Sept.—Oct. Poor soils, common. 2-3 ft.

5 A Argenteus. Stem glabrous, branching, tinged with purple. Leaves linear, scabrous. Sheaths long, slender. Spikes conjugate, covered with white silvery hairs. Glumes hairy along the margins.

4 Sept.—Oct. Dry soils. 2-3 ft.


4 Sept.—Oct. Damp soils. 3 ft.


4 Sept.—Oct. Common. 3-4 ft.


4 Oct.—. Damp soils. 2-3 ft.


4 Oct.—. Pine barrens. 2-3 ft.

10 A Ferrugatus. Stem erect, glabrous. Leaves linear, nearly glabrous. Spikes generally by fours, terminal; sterile flowers without awns, the awn of the perfect flower contorted.

4 Aug.—Sept. Mountains. 2-3 ft.

Genus XXXVI. Gymnoptogon.

Glumes 2, carinate, nearly equal, longer than the floret. Paleae shorter than the glumes, equal; the exterior one 3-nerved, terminated by a straight awn. Spike panicled.
MONOCOTYLODENOUS.

1 G Racemosum. Stem erect and decumbent, glabrous, short joints. Leaves distichous, cordate, lanceolate, nerved, short, glabrous. Sheaths hairy at the throat. Panicle terminal, expanding, somewhat verticillate.


Genus XXXVII. ERIANTHUS.

Glumes 2, nearly equal, villous at the base. Paleæ 2, unequal, the inner one bearing a long awn near its summit. Stamens 2. Styles 2.

1 E Alopecuroides. Stem erect, a little scabrous, villous towards the summit. Leaves long, striate, hairy on the under surface. Sheaths hispid. Glumes lanceolate. Paleæ purplish, unequal; the interior smallest, awned.


Genus XXXVIII LEERSIA.

Inflorescence panicled. Spikelets solitary, 1-flowered.—The lower palea cartilaginous, compressed, keeled.

Genus XXXIX ZIZANIA.


1 L Virginica. Stem decumbent, erect, hairy at the joints. Leaves linear-lanceolate, scabrous, acute. Panicle loose, terminal, with scattered branches. Flowers on one side of the rachis, monandrous. Paleæ equal, the exterior one keeled, the interior one ciliate.


3 L Oryza. Stem erect, or procumbent at the base. Leaves scabrous, linear-lanceolate. Panicle large. Flowers triandrous, imbricate, with the keel of the paleæ ciliate.

Genus XXXIX ZIZANIA.

1 Z Aquatica. Stem erect, glabrous, pubescent at the joints. Leaves oblong, lanceolate, glabrous. Sheaths shorter than the joints. Flowers in terminal panicles, the upper branches bearing fertile flowers, the lower ones sterile. Stamens 6. Styles 2. Wild Rice.


BAMBUSACEAE.

Genus XL ARUNDINARIA

Glumes 2, many flowered, unequal, the exterior one smallest. Panic' 2, unequal, the exterior one largest. Styles 3-cleft, short.

1 A Macrostema. Stem erect, glabrous, terete, with hollow internodes. Leaves large, flat, distichous; sheaths longer than the joints. Panicle terminal, composed of distichous spikes, peduncles pubescent. The exterior glumes ciliate, very small. The exterior palea largest, ciliate. Seed cylindrical. Does not flower every year. When it does bloom, it is in the spring.

Rich, damp soils. 5-20 feet.

Order CXXIII. CYPERACEAE.

Flowers perfect, or monoecious, consisting of imbricated, solitary bracts. Perianth none, unless the glumes, when present, be so considered. Stamens hypogynous, definite, 1-12. Anthers fixed by their base. Ovary 1-seeded, often surrounded by hypogynous setae, which are probably a rudimentary perianth. Style 1, divided. Stems usually angular.—Sheaths of the leaves entire.

Genus I CYPERUS.

Spikelets compressed. Glumes imbricate, in 2 rows, each generally enclosing a flower. Seta none.

1 C Articulatus. Stem erect, jointed, clothed at the base with 3 sheath like leaves. Flowers in compound umbels; spikelets many flowered. Glumes dotted with red, two or three of the lowest sterile.

2 C Fusciculatus. Stem triquetrous. Leaves setaceous, 1 or 2. Spikes many flowered, in terminal fascicles. Involucre 2-leaved, linear. Glumes with the keel green.

C Rich, damp soils. 5-20 feet.

3 C Poiformis. Stem triquetrous, glabrous. Leaves linear, glabrous. Spikelets fascicled, flattened. Involucre 3-leaved, 2 of them long. Glumes ovate, yellowish

4 C Kullingoides. Stem triquetrous. Flowers in globose heads.—Spikes generally 8-flowered. Involucre 4-leaved.

C Rich, damp soils. 5-20 feet.
5 C Autunnalis. Stem terete. Spikes slender, terminal, digitate, usually by threes. Involucrre 2-leaved, as long as the umbel. Glumes purple.

6 C Compressus. Stem triquetrous, naked. Leaves linear-lanceolat.—Flowers in compound umbels; spikelets many flowered, nearly capitulate. Glumes acuminate, with white margins.


10 C Flavescens. Stem nearly terete, shining. Leaves linear, sheathing the stem at the base. Umbels compound; spikelets crowded, lanceolate.


13 C Repens. Stem 3-angled, with the sides concave. Leaves glabrous, recurved. Umbels usually simple. Involucrre 3-4-leaved. Spikelets crowded.

14 C Tenuiflorus. Stem leafy, nearly terete. Leaves channelled, serrulate. Spikelets corymbose; spikelets linear. Involucrre many leaved, with the two exterior very long. Flowers frequently diandrous.

15 C Strigosus. Stem 3-angled. Leaves long, minutely serrate. Spikelets oblong; spikelets subulate. Involucrre longer than the umbel.


Genus II Dulichium.

Spikes somewhat racemose, axillary. Spikelets linear-lan-
ceolate, compressed. **Glumes** distichous, sheathing. **Style** very long, 2 cleft. **Nut** with bristles at the base.

1 D _Sphathaeum_. Stem striate, columnar, terete at the base, triangular above. **Leaves** linear-lanceolate, pointing in 3 directions; spikelets spreading, 6-7 flowered, forming axillary racemes. **Peduncles** as long as the sheaths of the leaves.

**Genus III. KYLLINGIA.**

**Flowers** distinct, arranged in a roundish spike, imbricate. **Glumes** 2, 1-flowered. **Palaee** 2, longer than the glumes.

1 K _Monocereus_. Stem filiform, 3-angled. **Leaves** linear, heads single, inclining to one side. **Involucre** generally 3-leaved, one of the leaves erect.

4 October. Lower Ga. 2-12 in.

2 K _Filiformis_. Stem erect, triquetrous, glabrous. **Leaves** subulate, expanding. **Involucre** usually 3-leaved, unequal. Flowers in a terminal, nearly globose head. **Glumes** none. **Palaee** 2, compressed. **Flowers** diandrous.


3 K _Maculata_. Stem triquetrous, glabrous. **Leaves** subulate. **Flowers** usually in 3 heads. **Glume** 1, lanceolate, cuneate. **Palaee** 2, unequal, the exterior one shortest. **Flowers** monandrous.

Aug. -- Oct. 3-5 in.

**SCIRPUS.**

**Genus IV. SCIRUS.**

**Glumes** imbricating the spike on all sides, one or two of the outer ones occasionally without flowers. **Palaee** none. **Seed** 1, with bristles at its base.

(a) **Spike solitary, terminal.**

S _Capillaceus_. Stem erect, and procumbent, slightly furrowed with a sheath surrounding its base. **Leaves** none. **Glumes** acute. **Seed** compressed, obovate, with 6 bristles at the base.

Mar.--June. 1-3 in.

2 S _Trichodes_. Stem setaceous, glabrous. **Spikes** ovate-lanceolate. **Glumes** ovate-lanceolate, nearly white. **Seed** 3-angled, ribbed

June-July. Low country. 6-8 in.

3 S _Simplex_. Stem erect, glabrous, with a sheath at the base. **Spike** ovate. **Glumes** obtuse, nearly white.

Aug. Through the summer. Wet places. 8-13 in.

4 S _Filiformis_. Stem filiform, terete. **Spike** cylindrical, oblong, obtuse. **Glumes** nearly round.

July-Aug. Wet places.

5 S _Palustris_. Stem glabrous, striate, lucid, with 2-3 sheaths at the base. **Spikes** oblong-lanceolate. **Glume** obtuse, with the midrib green.

Apr.-May. Marshes. 1-2 ft.

6 S _Capitatus_. Stem erect, glabrous, inflated, with a short sheath at the base. **Spike** ovate. **Glumes** coriaceous, nearly round. **Bristles** 6.

Aug. Through the summer. Damp soils. 10-13 in.

7 S _Tuberculatus_. Stem erect, columnar, sheathed at the base. **Spike** ovate-lanceolate. **Glumes** obtuse, with scarious margins. **Stamens** 2. **Seed** striate, with a sagittate tubercle. **Bristles** plumose.

July-Aug. Wet soils. 10-12 in.

8 S _Quadrangularis_. Stem quadrangular, glabrous, with the sides une-
Monocotylodenous.

April-May. In swamps. 1-2 ft.


June-July. Damp soils. 18-24 in.

(b) Spikes numerous. Stems without leaves.


(c) Spikes numerous. Stem leafy at the base.


Aug.-Oct. Damp soils, very common. 8-12 in.


Sept.-Oct. Damp soils. 6-8 in.

15 S Stenophyllus. Stem filiform, obtusely 3-angled, erect and procumbent. Leaves setaceous, with the throat of the sheath hairy. Spikes clustered, sessile. Involucre 4-leaved, with the leaves unequal. Flowers monandrous.

July-Sept. Dry soils. 3-4 in.

16 S Coarctatus. Stem filiform, generally declining. Leaves glabrous, with the throat of the sheath bearded. Spikes in a compound umbel. Involucre many leaved, setaceous, one of the leaves longer than the rest. Glumes ferruginous, ciliate.


June-July. Low country.

18 S Spadiceus. Stems forming a thick tuft. Leaves long, narrow, arranged in two rows. Spikes in compound umbels, with the sessile one in the division of the stem. Involucre subulate. Glumes nearly orbicular, glabrous.


19 S Ferrugineus. Stem erect, compressed, with the angles at the summit scabrous. Leaves coriaceous, with cartilaginous margins. Thread of the sheath ciliate. Spikes in compound umbels, with the sessile one in the division of the stem. Involucre ciliate. Glumes coriaceous, ferruginous, pubescent and ciliate.

June-Oct. In moist places. 1-3 ft.


(d) Spikes numerous. Stems leafy.

21 S Maritimus. Stem erect, 3-angled. Leaves very long, glabrous, chan-
neled. spikes arranged in a leafy panicle, some sessile, others pedunculate, large and ovate. Glumes mucronate, toothed at the summit, with the midrib extending into an awn.

24 May—June. In salt water marshes. 3-4 ft.


Var. Viviparus. Stem tall, somewhat climbing. Umbels viviparous, bearing flowers at the base of the branches.

4 July—Aug. In shady woods. 2-10 ft.


4 May—June. Pine barrens. 2-4 ft.


4 July—Aug. In low country. 2-3 ft.

Genus V Eriophorum.

Glumes chaffy, imbricate in all directions. Paleæ none.

Seed surrounded by a long, dense wool.

1 E Virginicum. Stem erect, glabrous, terete. Leaves linear, keeled, with the margins scabrous. Spikes clustered, in a globose head. Involucre longer than the head, 3-leaved, unequal. Flowers diandrous.

4 Aug.—Sept. In wet places. 3-4 ft.

Genus VI Schenodus.

Glumes numerous, collected into a spike, lower ones empty. Paleæ none, deciduous. Seed naked.

1 S Effusus. Stem erect, stout, leafy, obtusely 3-angled. Leaves long, glabrous, finely serrate. Flowers in compound panicles, lateral or terminal, diffuse. Seed ovate, wrinkled, without bristles or hairs.

4 August—Sept. In ponds. 6-10 ft.

Genus VII. Dichromena.

Glumes imbricate on all sides, the lower ones without flowers. Paleæ none. Seed naked.

1 D Leucocephala. Stem erect triangular, naked. Leaves linear, glabrous, concave. Flowers in compound heads. Involucre 6-leaved, white at the base, the three exterior ones longest. Glumes membranaceous, lanceolate, white.


2 D Latifolia. Stem erect, glabrous, leafy at the base, terete. Leaves usually longer than the stem, concave, with long sheaths. Flowers in compressed heads, compound. Involucre about 10-leaved, the exterior ones longest tapering towards the summit, white. Glumes ovate, white.

4 May—June. On the margins of ponds. 10-18 in.
Glumes collected into a spike, inferior ones without flowers. *Palex* none. **Seed** 1, crowned with a persistent style, surrounded by bristles.

1 R *Alba*. Stem slender, glabrous, 3-angled at the summit. **Leaves** linear, channeled, glabrous. **Spikes** in corymbose clusters, axillary and terminal. **Glumes** nearly white. **Seed** tuberculate, surrounded by 10 bristles. © May—June. Common. 10-12 in.

2 R *Raniflora*. Stem leafy sessionaceous. **Leaves** glabrous sessaceous. **Flowers** in lateral and terminal panicles. **Glumes** 5-7, the exterior ones smallest, the two interior resembling *palex*. **Bristles** 3-4.

3 R *Plumosa*. Stem erect, glabrous, 3-angled, slender. **Leaves** linear, with scabrous margins. **Flowers** in axillary and terminal panicles. **Glumes** usually 6, with the outer ones ferruginous, the inner one white, 2-flowered. **Seed** rugose, with 6 plumose bristles. June—Aug. 8-12 in.

4 R *Cymosa*. Stem terete, erect. **Leaves** linear, glabrous, concave. **Flowers** in axillary and terminal panicles. **Glumes** usually 6, with the flowers between the fifth and sixth glumes. **Seed** compressed, terminated by a long persistent style. July—Oct. Wet places. 3-6 ft.

5 R *Longirostris*. Stem triangular, erect, glabrous. **Leaves** linear-lanceolate, channeled, glabrous. **Flowers** in corymbose panicles, axillary and terminal. **Glumes** usually 6, with the flowers between the fifth and sixth glumes. **Seed** compressed, terminated by a long persistent style. July—Aug. Damp places. 1-2 ft.


8 R *Capitellata*. Stem erect, triangular. **Flowers** in spherical, axillary heads. **Leaves** sessile, shorter than the stem. **Seed** compressed, surrounded by scabrous bristles. May—Sept. Wet places. 1-2 ft.

9 R *Inexpansa*. Stem somewhat triangular, generally inclined. **Leaves** linear, channeled. **Flowers** in axillary and terminal panicles, pendulous. **Seed** compressed, surrounded by scabrous bristles. Through the summer. Wet soils. 1-2 ft.


**Genus IX. FUIRENA.**

Glumes arranged in a spike, on all sides, awned. *Palex* 3, petaloid, awned, cordate, unguiculate.


C. SCLERÆ.

Genus X Scleria.


1 S Oligantha. Stem slender, 3-angled, glabrous, slightly pubescent at the summit. Leaves linear, slightly pubescent at the base, scabrous, on the upper surface. Flowers in fascicles or spikes, 2-3-sessile near the summit, one on a long peduncle. Fertile florets at the summit; sterile at the base. Seed white, smooth.

2 S Gracillis. Stem filiform, 3-angled, glabrous. Leaves linear, glabrous, narrow. Spikes 2-3 at the summit of the stem, each bearing a fertile floret. Glumes ferruginous, mucronate. Seed white, smooth.


4 Through the Summer. In dry or moist soils, common. 1-2 ft.

4 S Pacitflora. Stem slender, acutely 3-angled, glabrous. Leaves linear, scabrous along the margin. Spikes lateral and terminal, pendulous. Glumes keeled, ferruginous, glabrous. Seed rough.


5 Through the Summer. Damp soils. 12-18 in.


6 Through the Summer. Damp soils. 12-18 in.

7 S Reticulata. Stem acutely 3-angled, glabrous. Leaves narrow, glabrous, with the sheaths winged. Spikes numerous, axillary and terminal, on long peduncles. Glumes lanceolate, glabrous. Seed rough.

7 July—August. Damp soils. 1-2 ft.


8 July—August. Damp soils. 10-15 in.


Part II.

23
Flowers monocious, rarely dioecious. Flowers imbricate, amentaceous. Glume 1, 1-flowered. Paleæ of the sterile florets none, of the fertile ones ventricose, persistent, enclosing the nut.

A. Inflorescence dioecious.


B. Inflorescence monocious.

(a) Spikes androgynous, solitary, with the summit sterile.

2 C Fraseri. Stem erect. Leaves broad, lanceolate, radicle, undulate, crenulate. Spike simple, ovate. Fruit entire at the apex, longer than the glume.

3 C Willdenowii. Stem triangular, erect. Leaves linear, longer than the stem. Spikes terminal, simple, ovate; sterile and fertile florets about equal in number, about 6. Fruit ovate, nearly terete, beaked. Glumes ovate, the inferior ones long and foliaceous, acuminate.

4 C May—June. Dry woods. 6-8 ft.

(b) Spike solitary with the summit fertile.

5 C Squarrosa. Stem triangular, scabrous along the margin. Leaves narrow, glabrous, with scabrous margins. Spikes mostly simple, sometimes 2-3 cylindrical, oblong, very thick. Glumes at the base lanceolate, slightly colored, those of the summit. Fruit imbricate, smooth, bi-dentate, longer than the glume.

6 C Cephalocephala. Stem 3-angled, scabrous along the margin, leafy at the base. Leaves linear, long. Spikes collected into an elliptical head. Glumes ovate, mucronate. Fruit ovate, scabrous on the margin.

May—June. Oak woods, common. 2-3 ft.

(d) Spikes distinct, not in a head, the summit sterile, stigmas 2.

6 C Bromoides. Stem 3-angled, scabrous along the margins, slender. Leaves linear, slightly scabrous. Flowers in numerous linear spikes, the spikes alternate, erect. Glumes lanceolate, mucronate. Paleæ ovate. Fruit scabrous, bifid, longer than the glume.


5 C Cephalocephala. Stem 3-angled, scabrous along the margin, leafy at the base. Leaves linear, long. Spikes collected into an elliptical head. Glumes ovate, mucronate. Fruit ovate, scabrous on the margin.

May—June. Oak woods, common. 2-3 ft.

(d) Spikes distinct, not in a head, the summit sterile, stigmas 2.

6 C Bromoides. Stem 3-angled, scabrous along the margins, slender. Leaves linear, slightly scabrous. Flowers in numerous linear spikes, the spikes alternate, erect. Glumes lanceolate, mucronate. Paleæ ovate. Fruit scabrous, bifid, longer than the glume.


April—May. Wet lands. 1–3 ft.


April—May. Damp soils. 1–2 ft.

12 **C Multiflora**. Stem scabrous, 3-angled. *Leaves* narrow, rigid, longer than the stem. *Spike* compound, oblong, spikelets glomerate, ovate, oblong, obtuse. *Glumes* lanceolate, brownish. *Fruit* ovate, acuminated, compressed, 3-nerved, serrulate on the margin, diverging when mature, shorter than the glumes.

May. Moist lands. 12–18 in.

13 **C Lagopodioides**. Stem erect, obtusely 3-angled, scabrous towards the summit. *Leaves* sheathing the stem at the base, ligulate. *Spike* numerous, elliptic crowded. *Bract* beneath the lowest, very long, overlapping the stem. *Fruit* bi-cuspidate, erect, lanceolate, with a serrulate margin, longer than the glumes.

May. Wet lands. 1–2 ft.


May. Swamps. 1–2 ft.

15 **C Fenja**. Stem obtusely angled, scabrous near the summit, furrowed. *Spike* numerous, the lower ones compound, the upper ones aggregated. *Palea* serrulate, larger than the ciliate glumes, the lowest bract largest, subulate.

May—June. Marshes. 1–2 ft.


May. Damp soils. 2–3 ft.

17 **C Scirpoidea**. Stem erect, slender, slightly 3-angled. *Leaves* narrow, the lower ones short. *Spike* 4–6, ovate, the uppermost one clavate. *Glume* small. *Palea* ovate, 2-toothed. *Fruit* ovate, bidentate, longer than the glume.

May. Swamps. 6–12 in.

(f) **Sterile and fertile spikes distinct. Sterile spikes solitary.**

18 **C Cespitosa**. Stem erect, slender, 3-angled, striate. *Leaves* linear, acute, with scabrous margins, fertile spikes cylindrical, generally 3, nearly sessile, sometimes with sterile florets at the summit. *Bracts* long. *Fruit* ovate, obtuse, longer than the glume.

May. In bogs. 12–18 in.

19 **C Crinita**. Stem acutely angled, concave, serrulate. *Leaves* channelled, glabrous. *Fertile* spikes 3–4, pendulous, each generally terminated by a number of sterile florets. *Glumes* ovate, with a subulate point. *Palea* ovate, not divided at the summit, shorter than the glume. *Fruit* elliptic, with a short beak, shorter than the glume.

April—May. Swamps. 1–2 ft.

20 **C Acuta**. Stem 3-angled, scabrous. *Leaves* narrow, with scabrous margins, the upper ones sessile, the lower sheathing. Sterile spikes 1–3; fertile 3–4, nodding, cylindrical, the upper ones sessile, with sterile florets at the summit. *Glumes* acute. *Palea* ovate, entire. *Fruit* oblong.

April—May. In bogs. 1–2 ft.
(g) Stigmas 3, terminal spike sterile, the rest androgynous.  
21 C TRICOCARPA. Stem acutely angled, slender, scabrous along the margins. Leaves linear, pubescent at the base. Spikes usually 4, approximate, sessile, 3 of them larger than the other. Glumes ovate. Palea shorter than the glume, glabrous. Fruit ovate, compressed, 3-angled.  
4 April—May. Damp soils. 12-18 in.  
22 C HIRSUTA. Stem 3-angled, slender, pubescent near the summit. Leaves narrow, slightly pubescent—Spikes 3-4, the terminal one sterile at the base. Lower ones on short peduncles. Fruit ovate, obtuse.  
4 May—June. Southern Ga. 10-12 in.  
23 C BUFOVULSI. Stem slender, 3-angled. Leaves narrow, with scabrous margins. Spikes 3-4, the terminal one, with the lower half, bearing sterile flowers. Glumes lanceolate, dark colored. Palea light colored, 2-cleft at the summit. Fruit elliptic, as long as the glume.  
(h) Stigmas 3; fertile and sterile spikes distinct, the fertile ones sessile, or with sheathed peduncles.  
25 C VARIA. Stem erect, slender, with scabrous angles. Leaves subulate; Fertile spikes generally 3, nearly globose; sterile spike terminal. Glumes oblong-lanceolate, tinged with brown. Palea pubescent. Fruit sub-globose, hispidly pubescent, obtusely 3-angled.  
4 April—May. Dry woods. 8-12 in.  
26 C Marginata. Stem slender, 3-angled. Leaves linear, with slightly scabrous margins; fertile spikes generally 2, sub-globose, approximate, the sterile one terminal, cylindrical, long. Glumes ovate, brown, with a white margin. Fruit globose, pubescent, longer than the glume.  
4 April—May. Dry soils. 8-12 in.  
27 C VESTITA. Stem acutely 3-angled. Leaves narrow, ligulate. Sterile spike mostly solitary, terminal; fertile spikes generally 2, sessile, sometimes sterile at the summit. Glumes brown, with white margins. Palea pubescent. Fruit ovate, nerved, pubescent, with a short beak.  
4 May—June. Wet soils. 1-2 ft.  
28 C TENTACULATA. Stem 3-angled. Leaves long, linear-lanceolate, nerved. Sterile spike solitary, cylindrical; fertile spikes 3, sessile, horizontal, with long bracts. Glumes mucronate. Palea ovate, beaked. Fruit ovate, nerved, with a long beak.  
4 May—June. Wet places. 12-18 in.  
29 C LUPULINA. Stem erect, glabrous, leafy, thick, 3-angled. Leaves linear-lanceolate, with scabrous margins. Sterile spike on a short peduncle; fertile ones, 3, erect, with long, leafy bracts. Glume with a hispid point.—Palea 2-beaked, longer than the glume. Fruit ovate, nerved, with 2 long beaks.  
4 April—May. Swamps. 2-3 ft.  
30 C GIGANTEA. Stem erect, 3-angled, glabrous. Leaves ligulate, slightly channeled. Sterile spike terminal, with acute, ovate glumes; fertile spikes 3, Palea ovate, nerved. Fruit 3-angled.  
4 April—May. Bogs, common. 1-2 ft.  
31 C FOLLICULATA. Stem erect, 3 angled. Leaves ligulate, scabrous. Sterile spike solitary, terminal, with acute lanceolate, glumes; fertile spikes usually 4, erect, on short peduncles. Palea ovate, beaked, inflated. Fruit ovate, beaked.  
4 June. Swamps. 12-18 in.
293 CYPERACEAE.

32 C Zanthophyia. Stem erect, slender, leafy. Fertile spikes 3-4, ovate, remote, pedunculate. Fruit strinate, bifid, horizontal when mature, tapering into a long acute point. Glumes ovate, acuminate.

June. Swamps. 2-4 ft.

(i) Stigmas 3. Fertile spikes on peduncles.

33 C Plantaginea. Stem erect, glabrous, with purple sheaths, nearly leafless. Leaves linear, nerved, glabrous. Sterile spike terminal; fertile ones mostly 4, distant, erect, linear, the lower ones on long peduncles. Bracts leafy, sheathing the peduncle. Fruit oblong, cuneiform, recurved at the apex.

April—May. Shaded soils. 8-12 in.

34 C Castanea. Stem 3-angled, slender, purple at the base. Leaves linear, shorter than the stem. Sterile spikes shorter than the bract. Glumes brown, with white margins. Fertile spikes 3, nearly round, the lowest one on a long peduncle. Pales inflated, with a long beak, shining. Fruit 3-angled.

April. Wet pine barrens. 1-2 ft.

35 C Angies. Stem 3-angled, compressed. Leaves broad. Fertile spikes 3, loosely flowered, cylindric. Bracts sheathing. Fruit ovate, 3-angled, acute, narrowed at the base about as long as the glume.

April—May. Woods. 12-15 in.

36 C Conoidea. Stem 3-angled, the angles scabrous. Leaves narrow, flat, scabrous along the margin. Fertile spikes 2-3 remote, the lower ones on long peduncles. Sterile spike terminal, small, with lanceolate glumes, the lower bracts leaflike. Fruit conical, obtuse, recurved at the apex.

April. Wet soils. About 1 ft.

37 C Tettanica. Stem slender, glabrous, 3-angled. Leaves linear, shorter than the stem. Fertile spikes 2, distant, the upper one nearly sessile, the lower on a long peduncle, the sterile spike on a long peduncle. Glume mucronate. Fruit ovate-oblong, acute at each end, oblique.

May. Wet soils. 12 in.

38 C Laxiflora. Stem 3-angled, with scabrous margins. Leaves narrow-lanceolate, acute, nerved. Sterile spike nearly sessile; fertile spikes 2-3, the lowest one on a long peduncle, the upper one, shorter. Glume ovate, cuspidate. Fruit ovate-oblong, longer than the glume, shining, inflated.

May. Wet soils. 12-15 in.

39 C Granularis. Stem erect, or decumbent, glaucous. Leaves narrow, somewhat glaucous. Sterile spike usually solitary; fertile spikes 2-3, the lowest pedunculate, the upper nearly sessile. Glumes ovate, acuminate. Pales nearly orbicular. Fruit nerved, with a short, recurved beak.

May. Wet shaded soils. 12 in.

40 C Flexuosa. Stem slender, 3-angled, glabrous. Leaves linear, slightly channeled. Sterile spike slender, terminal; fertile spikes 4, pendulous, remote, the peduncles sheathed. Glumes lanceolate. Pales striate. Fruit oblong, beaked, double the length of the glume.

April—May. Damp soils. 12 in.

(j) Fertile spikes on long peduncles, nearly destitute of sheaths.

41 C Milliacea. Stem slender, 3-angled, with the angles scabrous. Leaves linear, with scabrous margins. Fertile spikes 3, slender, filiform, nodding. Bracts of the lower spike longer than the stem, those of the upper small. Glumes emarginate. Fruit ovate, 3 angled, with short beak, longer than the glume.

May. Wet grounds. 12-15 in.

42 C Hysterica. Stem 5-angled, with the angles scabrous. Leaves narrow, long, scabrous. Sterile spikes cylindrical, with ovate-lanceolate glumes; fertile spikes 3-4, thick, the lower ones on exerted peduncles. Pales ovate, with a long 2-cleft beak. Glume ovate, terminated by a hispid scatcuous bristle. Bracts long. Fruit ovate, nerved, beaked.

April—May. Wet soils. 1-2 ft.

43 C Pseudo-Cyperus. Stem erect, acutely 3-angled, scabrous along the
angles, stout. *Leaves* channeled, with scabrous margins. Sterile spike long, slender, with linear-lanceolate glumes; fertile spikes, 3 pendulous. Bracts long, scabrous, nerved. *Palea* ovate, beaked, 2-cleft at the summit. *Glume* small, with a subulate point. *Fruit* oblong-lanceolate, beaked, many nerved, with the apex bifid.


4. June. Swamps. 2-4 ft.

46 C *ACUTA.* Stem acutely 3-angled *Leaves* somewhat glaucous. Sterile spikes 1-3; fertile ones usually 3, nodding, remote, cylindrical. *Glumes* oblong, acute, brown. *Fruit* oblong, as long as the glume.

4. May. Wet soils. 2 ft.

(k) Sterile florets 2, or more. *Stigmas* 3.


4. May. Swamps. 2-3 ft.

48 C *LACESTRIS.* Stem erect, 3-angled. *Leaves* broad, long. Sterile spikes usually 4; fertile ones usually 3, erect, on short peduncles. *Glumes* oblong, mucronate. *Fruit* oblong, smooth, many nerved, longer than the glumes, brown.

4. June. Swamps. 3-5 ft.

49 C *PELLATA.* Stem erect, 3-angled. *Leaves* long, linear. Sterile spikes 2-4, the upper ones pedunculate; fertile ones 2-3, the upper ones sessile, the lower on erect peduncles. *Glumes* lanceolate, mucronate. *Fruit* ovate, 2-cleft, hairy, shorter than the scale.


50 C *RIPARIANA.* Stem erect, smooth, 3 angled. *Leaves* ligulate, the upper ones without sheaths. Sterile spikes usually 4. *Glumes* chaffy. Fertile spikes 3, erect, with sterile flowers at the summit. *Fruit* ovate, 2-cleft, nerved, shorter than the glume.


4. April. In ditches. 2 ft.
Sub-Class III. Apetalæ, or Monochlamydeæ.

[This Sub-Class should have come in immediately preceding the Order Conifera under Dicotyledonous plants, but through mistake some of the Monocotyledonous plants were printed off before the omission was discovered. This notice will prevent any misapprehension on the part of the student, from its present position.]

Flowers with a simple perianth.

Order CXXIV. Nyctaginææ.

Perianth tubular, somewhat colored, aestivation plaited, becoming indurated at the base. Stamens definite, hypogynous. Ovary superior; ovule 1. erect. Style 1. Fruit enclosed in the tube of the calyx. Seed with its testa coherent with the utricle. Cotyledons foliaceous. Leaves opposite, usually unequal.

Genus I Boerhaavia.


1 B Erecta. Stem erect, trichotomous, glabrous at the summit, jointed. Leaves opposite, ovate, undulate, veins purple on the under surface. Flowers in corymbose panicles. Perianth seated on a minute, glandular ring, white, tinged with purple. Stamens 2–3, longer than the perianth.

© June–Sept. Sandy soils.

Genus II Allionia.


Order CXXV. Amaranthaceææ.


Genus I Amaranthus.

Genus same as the Order.
© June—Sept. About cultivated grounds. 2-3 ft.

Order CXXVI. Chenopodeae.


Genus I Chenopodium.


1 B Murale. Stem decumbent, branching. Leaves ovate, lanceolate, toothed, on long petioles. Flowers in leafy, corymbose racemes.

2 C Album. Stem branching. Leaves ovate, rhomboid erose, entire at the base, the upper ones entire, when old becoming covered with a mealy substance. Flowers in branched racemes, somewhat leafy. Seed smooth.
© July—Aug. Waste grounds. 3-6 ft.

3 C Botrys. Stem much branched, somewhat viscid. Leaves oblong, sinuately pinnatifid, with the segments toothed. Flowers in short, axillary racemes at the extremity of the branches. Jerusalem Oak.

© Aug.—Sept. Road sides. 1-2 ft.

© June—Aug. Fields. 4-6 ft.

Genus II Salsola.


1 S Caroliniana. Stem erect, striate, glabrous, branching. Leaves subulate, fleshy, rigid. Flowers usually solitary, sessile, with 2 bracts at the base. Calyx persistent, red.
© June—Sept. In drifting lands.


Genus III Atriplex.

Flowers polygamous, or monoecious. Perfect flowers peri-

1 A Patula. Stem prostrate, spreading, somewhat angled, glabrous. Leaves triangular, hastate, acuminate, entire, or slightly toothed, glabrous. Flowers clustered, in axillary and terminal spikes. Calyx persistent, submucronulate on the sides.

○ June—Sept. In low country. 1-2 ft.

2 A Angustifolia. Stem divaricate, angled, glabrous. Lower leaves hastate, slightly toothed, the upper ones lanceolate, entire, attenuate at the base. Flowers in axillary and terminal compact clusters. Calyx hastate.

○ June—July. On the sea coast.


○ July—Nov. On the sea coast. 10-12 in.

Genus IV ACNIDA.


○ Oct.—Nov. Marshes. 4-9 feet.

Genus V SALICORNIA.


1 S Herbacea. Stem erect, much branched, jointed, succulent; joints notched, compressed. Flowers by threes, in cylindrical spikes, slightly tapering at the extremity. Perianth thick, truncate, split on one side.


2 S Ambigua. Stem procumbent, branching, assurgent; joints crescent shaped, small. Flowers in opposite and alternate spikes. Calyx truncate.

4 July—Sept. Salt marshes, very common.

Order CXXVII. PHYTOLACCEAE.

Perianth 5-parted, petaloid. Stamens 10, alternate with the segments of the perianth. Ovary 10-celled, with one ovule in each cell. Styles 5-10. Fruit indehiscent. Seed ascending, solitary. Herbaceous plants, with alternate leaves.


**Genus 1. Phytolacca.**

Genus the same as the Order.

1 P Decandra. Stem succulent, tinged with purple. Leaves ovate, alternate, entire. Flowers in simple racemes opposite the leaves. Fruit superior, 10 seeded, 10-seeded, dark purple.

2. May—Sept. Cultivated grounds, very common. 4-10 ft.

**Order CXXVIII. Polygonæ.**

Perianth divided, inferior, aestivation imbricate. Stamens definite, 5-9 inserted into the bottom of the perianth. Ovary superior, with a single erect ovule. Styles or stigmas several. Fruit usually a triangular nut. Seed with farinaceous albumen. Embryo inverted. Herbaceous plants, with alternate leaves, sheathing at the base.

**Genus 1. Polygonum.**


1 P Maritimum. Stem glabrous, branching. Leaves lanceolate, alternate at the base, with revolute margins. Stipules large, frequently lacerate. Flowers axillary. Perianth white, tinged with red.


○ July—Sept. Margins of ponds. 2-4 ft.

○ July—Aug. Cultivated grounds. 4-5 ft.

(c) Spikes in panicles.

4 July—Sept. Pine barrens. Middle Car. & Ga. 6-8 in.

(d) Flowers in racemose panicles. Leaves subcordate or sagittate.

○ July—Aug. Wet grounds.

○ August—Sept. Wet grounds.


16 P Scandens. Stem climbing, glabrous, bright purple, angled. Leaves broad-cordate, with the margins and veins slightly scabrous. Flowers in axillary racemes, large. Stamens 8. Styles 2. Perianth winged, white, or reddish.

Genus II Rumex.


2 R Pulcher. Radicle leaves oblong, with a sinus on each side. Cauleine leaves entire. Perianth toothed.
4 June—July. Introduced.

3 R Verticillatus. Leaves long, lanceolate, narrow, acute, with cylind-
dicotyledons. Flowers whorled, in simple racemes. Leaves of the perianth entire, each bearing a vein on the back. Pedicels thick, half an inch long.

24 June—July. Wet grounds. 1-2 ft.

4 R Britannicus. Stem branching, tinged with red, furrowed. Leaves broad lanceolate, flat, alternate. Flowers in leafless whorls, forming a compound, terminal panicle, polygamous.

24 April—May. Swamps. 2-3 ft.

5 R Crispus. Stem erect, angled. Radicle leaves lanceolate, long, acute, undulate, attenuate at the base. Flowers in crowded whorls, pedicillate.—Leaves of the perianth large, cordate, entire, bearing grains.


6 R Persicarioides. Stem erect, much branched, smooth, often colored. Leaves on short petioles, lanceolate, undulate, entire. Flowers in whorls.—Leaves of the perianth with 3 long teeth on each side, each leaf bearing a grain.

24 July. Wet, shady places. 6-12 in.

7 R Divaricatus. Stem erect. Leaves cordate, oblong, pubescent, undulate. Flowers in whorls, forming a long, slender spike. Leaves of the perianth 4 or 5-toothed at the base.


8 R AcetoSELLA. Flowers dioecious. Stem erect, furrowed. Leaves lanceolate, entire, hastate, on rather long petioles, not auricled. Flowers in fasciculate racemes.

24 April—June. Dry sandy soils, very common. 1-2 ft.


24 April. Poor dry soils. 1-3 ft.

Genus III. ERIOGONUM.


1 E TOMENTOSUM. Stem erect, branching, somewhat dichotomous. Leaves oval-lanceolate, 3 at each division of the stem, sessile, white, tomentose beneath. Lower leaves attenuate at the base. Flowers in axillary sessile clusters.


Order CXXIX. LAURINEÆ.

Flowers perfect, polygamous and dioecious. Perianth 4-6-cleft. Stamens perigynous, usually 9, the three inner ones sterile. Anthers adnate, 2-4-celled, with thick connectivum. Ovary superior, single. Style simple, obtuse. Fruit a one-seeded drupe. Shrubs or small trees, with alternate leaves.

Genus I. LAURUS.

Genus the same as the Order.

1 L Carolinensis. A large shrub, or small tree. Leaves oval-lanceolate, coriaceous, perennial, glaucous beneath, entire, rigid. Flowers in small clusters, polygamous, pale yellow, exterior segments of the perianth half as the interior. Bay galls.

24 May—June. Swamps. 4-30 ft.

May—June. On the sea coast. 6-9 ft.


Feb.—March. Margins of rivulets. 4-10 ft.


Feb.—March. Around ponds. 10-15 ft.


Feb.—March. Around ponds. 2-3 ft.


March. Light soils. 10-25 ft.

**Order CXXX. Thymeæ.**


**Genus I. Dirca.**

Genus the same as the Order.

1. **Dirca Palustris.** A small shrub, with numerous tough branches. *Leaves* alternate, oblong-oval, entire, obtuse, pale green. *Flowers* yellow, the bark has a sweetish taste, and very tough. *Leather wood.*

April. Damp moist places. 2-4 ft.

**Order CXXXI. Santalaceæ.**

*Perianth* superior, 4 or 5-cleft, partly colored. *Estivation* valvate. *Stamens* 4 or 5, opposite the segments of the perianth and inserted into their bases. *Ovary* 1-celled, with 1-4 ovules. *Style* 1. *Stigma* often lobed. *Fruit* a nut or drupe, 1-seeded. Trees or shrubs with alternate, undivided leaves.

**Genus I. Nyssa.**


**Part II.**
acite at each end, with the petiole and under surface pubescent. **Flowers** in small umbellate clusters. Sterile florets numerous, fertile florets 5–8 in an umbel. **Drupe** nearly spherical, bluish black. **Black gum.**

302

12 April. Damp soils. 40–50 ft.

2 N *Aquatika*. A small, or large tree. **Leaves** oblong lanceolate, entire, glabrous, acute at each end, slightly pubescent beneath. Sterile florets numerous, small; fertile florets 2. **Fruit** oval, compressed, blue.

3 N *Capitata*. A small tree. **Leaves** on short petioles, oblong-lanceolate and oval, pubescent and hoary beneath. Sterile florets numerous, in compact heads; sterile florets solitary, on short peduncles. **Perianth** tomentose. **Fruit** ovate, of a dull red color, sour. 302

12 April—May. Wet soils. 15–20 ft.

4 N *Tomentosa*. A tree. **Leaves** on long petioles, oblong acuminate, tomentose beneath, coarsely and acutely toothed. Fertile florets solitary, pedunculate; segments of the perianth cuneate.

12 April—May. Southern Ga.

5 N *Uniflora*. A large tree. **Leaves** on long petioles, large, ovate, oblong, acuminate, irregularly and acutely toothed, pubescent beneath; the old leaves cordate. Fertile flowers solitary, axillary. **Fruit** oval, or ovate, dark blue, large. 302


**Genus II. HAMILTONIA.**

Polygamous. Perfect flowers. **Perianth** turbinate, campanulate, 5-cleft. **Germ** immersed in a 5-toothed, glandular disk. **Stamens** 5. **Style** 1. **Stigmas** 2–3. **Drupe** inferior, 1-seeded, inclosed in the base of the perianth.

1 H *Oleifera*. A shrub. **Leaves** oblong, obovate, entire, acuminate, pubescent beneath, petiolate. **Flowers** in a terminal raceme, small, greenish yellow. **Nut** globular, depressed, 1-celled. The whole plant more or less oily. **Oil nut.**

12 May—June. Mountains. 4–6 ft.

**Genus III. THESIUM.**

**Flowers** perfect. **Perianth** 4 or 5-cleft. **Stamens** 4 or 5, opposite the lobes of the perianth, villous externally. **Nut** 1-seeded, crowned by the persistent perianth.

1 T *Umbellatum*. **Stem** erect, glabrous, branching near the summit. **Leaves** oblong, lanceolate, entire, alternate, mucronate. **Flowers** in terminal panicles, sub-corymbed. **Involucre** 4-leaved, small. **Perianth** 5-cleft, with the upper half colored.

4 July—Aug. Rocky hills. 8–12 in.

**Order CXXXII. ARISTOLOCHIÆ.**

**Flowers** perfect. **Perianth** superior, tubular, 3-cleft, regular, or sometimes very unequal, aestivation valvate. **Stamens** 6–12, epigynous. **Ovary** inferior, 3–6-celled. **Ovules** numerous. **Styles** simple. **Stigmas** radiating, equal in number to the cells of the ovary. **Fruit** capsular, 6-celled, many seeded. Herbaceous or shrubby plants, the latter usually
climbing. **Leaves** alternate, simple. **Flowers** axillary, solitary, of a brownish dull color.

**Genus I ARISTOLOCHIA.**

**Flowers** gynandrous. **Perianth** tubular, ligulate at the apex, ventricose at the base. **Anthers** 6, sub-sessile, inserted into the style. **Stigma** 6-cleft. **Capsule** 6-sided, 6-celled, many seeded.

1. **A Siphon.** A vine, climbing over large trees. **Leaves** very large, cordate, acute, alternate, sprinkled with hairs. **Flowers** solitary, pedunculate, with an ovate bract at the base. **Perianth** ascending, somewhat tubular, the border 3-cleft, brown. **Dutchman's pipe.**

2. **A Tomentosa.** Stem twining, ascending the loftiest trees. **Leaves** nearly round, cordate, tomentose beneath, strongly veined. **Perianth** villous, the border 3-cleft, nearly equal, the orifice oblique, greenish yellow, with the margin dark purple. **Stigmas** 3.

3. **A Serpentaria.** Stem herbaceous, pubescent, erect, geniculate and flexuous, geniculate at the base. **Leaves** cordate, oblong, acuminate, slightly hairy. **Flowers** on radicle peduncles, sometimes under the surface of the ground. Limb of the perianth lanceolate, ventricose at the base.

4. **A Hastata.** Stem flexuous, simple, erect and procumbent. **Leaves** somewhat cordate, hastate, acute, auriculate. **Peduncles** radicle, lip of the perianth ovate.

**Mountains.**

**Genus II ASARUM.**

**Perianth** campanulate, urceolate, 3-4-cleft. **Stamens** 12, placed upon the ovary. **Anthers** attached to the side of the filament. **Style** short. **Stigma** stellate, 6-lobed. **Capsule** 6-celled.

1. **A Canadense.** **Leaves** by pairs, broad, reniform. **Perianth** woolly, deeply 3-parted, segments sub-lanceolate, reflexed. **Peduncles** short.

2. **A Virginicum.** **Leaves** solitary, cordate, nearly round, coriaceous, glabrous, spotted. **Perianth** glabrous, externally short, campanulate, with obtuse segments.

3. **A Atriplicium.** **Leaves** several from each root, hastate, cordate, variegated, on long, pubescent petioles. **Perianth** urceolate, dark purple, border 3-cleft, pubescent within. **Filaments** 12, short. **Anthers** linear. **Seed** few in each cell.

**Order CXXXIII. EMPETREÆ.**

**Flowers** dioecious. **Perianth** consisting of 2-4 rows of imbricated hypogynous scales. **Stamens** equal in number to the scales, and alternate with them. **Anthers** with 2 distinct
cells. **Ovary** superior, seated in a fleshy disk, 6–9 celled. **Style** 1. **Stigma** multifid, radiating. **Fruit** baccate, 2-celled, 2-seeded. An evergreen shrub, with flowers in the axils of the leaves.

**Genus I. CERATIOLA.**

Genus the same as the Order.

1 C. **Eriocides.** An evergreen shrub, with virgate branches, somewhat verticillate when young, tomentose. **Leaves** linear, glabrous, rigid, with the margins revolute, verticillate, 3–4 in a whorl. **Flowers** axillary, sessile. **Scales** of the calyx persistent, tomentose. **Berries** small, 2-seeded. **August—Sept.** Dry soils. 4–8 ft.

**Order CXXXIV. EUPHORBIACEÆ.**

Flowers monoecious, or dioecious. **Perianth** lobed, inferior, frequently with glandular or scaly appendages. Sterile flowers. **Stamens** 1–12 or numerous. Fertile flowers. **Ovary** 1, superior, sessile or stiped, usually 3-celled. **Ovules** solitary, or twin, suspended. **Styles** usually 3, sometimes united. **Fruit** usually consisting of three dehiscent cells, separating from the axis. **Seed** suspended. Herbaceous, or shrubby plants, usually with milky juice.

**Genus I. PACHYSANDRA.**

**Perianth** 4-leaved. **Stamens** 4. **Filaments** sub-clavate. **Styles** 3. **Capsule** 3-horned, 3-celled, cells 2-seeded.

1 P. **Procumbens.** Stem procumbent, and simple. **Leaves** alternate, pubescent, crenate, toothed oval. **Flowers** in spikes, nearly radicle, the lower ones fertile, the upper sterile, all bracteate. **Perianth** minute, ciliate. **Capsule** finely pubescent. **June** Mountains.

**Genus II. CROTON.**

Monoecious. Sterile florets. **Perianth** cylindrical, 5-toothed. **Corolla** 4-petaled, or none. **Stamens** 10–15. Fertile flowers. **Perianth** 5 or many leaved, or none. **Corolla** none. **Styles** 3–6, 2-cleft. **Capsule** 3-celled, with one seed in each cell.

1 C. **Maritimum.** Stem somewhat shrubby, erect, trichotomously divided, with the branches clothed with a stellular tomentum. **Leaves** oval, obtuse, entire, subcordate, pale above, hoary beneath. **Flowers** in spikes, those of the sterile florets many flowered, the fertile florets generally in pairs. **Capsule** tomentose. **June—Oct.** Drifting sands along the sea coast. 2–3 ft.

2 C. **Argyranthemum.** Stem somewhat shrubby. **Leaves** entire, obtuse, obovate. **Leaves** entire, obtuse, obovate. **Flowers** numerous in short terminal racemes. **Perianth** pedicillate, silvery. **July.** Dry soils. 1–2 ft.
Genus III. Crotonopsis.


1 C. Glandulosum. Stem erect, hispid, trichotomously divided, often colored. Leaves oblong, serrate, hairy beneath, bearing 2 glands at the base. Flowers in spikes in the divisions of the stem, with the fertile and sterile intermingled, the sterile with a 5-petalled corolla, the petals white, longer than the calyx, and inserted into its base. Stamens 10, the fertile florets; perianth 5-leaved, hispid. Leaves unequal.


4 C. Ellipticum. Stem pubescent, irregularly branched, tomentose when young. Leaves oval-lanceolate, entire, pale beneath, bearing 2 glands at the base. Flowers in terminal clusters; the sterile spike growing in the midst of the fertile flowers. Capsule tomentose.

© July. Middle Car. and Ga. 1-2 ft.

Genus IV. Borya.


1 B. Porelosa. Somewhat shrubby, rarely spiny. Leaves coriaceous, opposite, oblong-lanceolate, sessile, dotted underneath, and ferruginous, margins revolute.

Genus V. Tragia.


Genus VI. Stillingia.

Monoeious. Involucre hemispherical, many flowered.
**Perianth** tubular, erose. **Stamens** 2-3 exserted. Fertile florets; perianth 1-flowered, fimbriate or toothed. **Style** trifid. **Capsule** 3-celled, 3-seeded.

1 **Sylvatica.** Stem herbaceous, somewhat angled, glabrous, with a milky sap. Leaves sessile, oblong-lanceolate, serrulate, sub-coriaceous lucid on the upper surface. Flowers in a terminal spike, the upper ones sterile, with a few fertile ones at the base.

2 **S.** May—June. Sandy soils. 2-3 ft.

2 **Sebifera.** A small tree with glabrous branches, yielding a milky juice or sap. Leaves alternate, petiolate, rhomboidal, acuminate, entire, with a gland on the petiole. Flowers in terminal spikes with the fertile ones few at the base of the spikes. **Involucre** 10-12 flowered. **Perianth** 4-toothed. **Style** 3-subulate. **Capsule** black. **Seed** white.

2 **S.** June—July. Introduced. 20-40 ft.

3 **Ligustrina.** A shrub much branched, glabrous. Leaves lanceolate, tapering, entire, petiolate. Flowers in terminal spikes. Sterile florets numerous at the summit; fertile ones few at the base. **Involucre** 1-2 flowered. **Perianth** 3-cleft.

3 **A.** May—July. Margins of creeks. 6-12 ft.

**Genus VII. Phyllanthus.**

**Monoeious.** Sterile florets; perianth 5-6-parted. **Filaments** 6-united. Fertile florets; perianth 5-6 parted. **Parkerolla** a 12-angled margin. **Styles** 3. **Capsule** 3-celled, 3-seeded.

1 **P. Carolinensis.** Stem erect, with alternate branches, glabrous. Leaves alternate, oval, obtuse, smooth, distichous. Flowers axillary, nodding, fertile and sterile intermingled. **Perianth** colored at the base.

2 **J.** Sept.—Oct. Damp soils. 10-12 in.

**Genus VIII. Jatropha.**

**Monoeious.** Sterile florets; perianth funnel-shaped, petaloid. **Stamens** 10, alternately short. Fertile florets; perianth 5-leaved, expanding. **Styles** 3, 2-cleft. **Capsule** 3-celled, 3-seeded.

1 **J. Stimulosa.** Stem herbaceous, hispid, stinging. Leaves palmately lobed, lobes 3-5-toothed, slightly sinuate, ciliate. Flowers with terminal cymes. Fertile florets setting in the divisions of the peduncles. Sterile florets; perianth salverform, pubescent, with a fine cleft border, petaloid, white. **Stamens** 10. Fertile florets; perianth 5-leaved. **Style** 12-cleft.

2 **A.** Through the summer. Sandy soils. 6-18 in.

**Genus IX. Acalypha.**

**Monoeious.** Sterile florets; perianth 3-4-parted. **Stamens** 8-16, united. Fertile florets; styles 3, 2-parted. **Capsule** 3-celled, 3-seeded.

1 **A. Virginica.** Stem erect, pubescent, striate, branching. Leaves alternate, lanceolate, on short petioles, remotely and obtusely serrate, dotted. **Involucre** axillary, pubescent, cordate, toothed. Sterile florets in a spike.
EUPHORBIACEAE.

Perianth 4-leaved, hairy. Fertile florets within the involucre. Perianth 3-leaved.
  0 June—Sept. In woods and cultivated lands, common. 12-18 in.

2 A Caroliniana. Stem erect, pubescent, striate. Leaves rhombic-ovate, acuminate, serrate, entire at the base, on long petioles. Involucre small, sessile, deeply notched. Spikes axillary small, with the fertile flowers at the base.
  0 July—Aug. Cultivated lands. 10-20 in.

Genus X. Euphorbia.


1 E. cyathophora. Somewhat shrubby, glabrous. Leaves alternate, oblong, pubescent, slightly toothed, panduriform, the upper ones red at the base. Flowers in terminal clusters. Involucre colored. Capsule smooth, 3-celled.
  1 Through the summer. 2 ft.


3 E. Hypericifolia. Stem erect, branching, spreading branches, divaricate. Leaves opposite, oval-oblong, slightly falcate, serrate, 3-nerved, spotted. Flowers in terminal corymbs, small.
  0 August—Sept. Fields. 1-2 ft.

4 E. Maculata. Stem erect, spreading, or decumbent, dichotomously branched, slightly pubescent, usually purple. Leaves opposite on short petioles, serrate, oblong, hairy, 3-nerved, oblique at the base. Flowers axillary, solitary, crowded near the summit, inner segments of the involucre colored.
  0 June—Oct. Cultivated lands 2-3 ft.

5 E. Depressa. Stem procumbent, pubescent, slender, branches alternate. Leaves oval, opposite, slightly serrate, unequal at the base, hairy beneath. Flowers solitary, axillary, clustered towards the summit of the branches. Stipules 4 at each joint, plumose, inner segments of the perianth white, 4, small.
  0 Through the Summer. Cultivated lands, very common. 8-13 in.

6 E. Cordifolia. Stem prostrate, branching, glabrous, with the branches alternate. Leaves unequal, and cordate at the base, oval, entire, glabrous, small. Flowers solitary, axillary, surrounded at the base, with plumose stipules, inner segments of the perianth white.
  0 Through the Summer. Cultivated lands. 8-15 in.

  4 July—Sept. Sandy soils. On the sea shore. 8 in.

8 E. Ipsecuana. Stem procumbent, or erect, small glabrous. Leaves sessile, varying in form from obovate, lanceolate, to linear, opposite. Flowers solitary, axillary, on peduncles as long as the leaves. Root very long.
  4 April—July—Sandy soils.

9 E. Pucentissima. Stem erect, very pubescent, somewhat dichotomous. Leaves opposite, sessile, elliptic, entire, slightly cordate, obtuse. Flowers solitary in the division of the stem, on peduncles about as long as the leaves, interior segments of the involucre white.

10 E. Helioscopia. Stem erect, glabrous, branching. Leaves alternate,
DICOTYLEDONOUS.

oovate, scattered sessile, cuneate, finely serrate, the floral ones oovate, or broad-lanceolate. Umbel 5-cleft, with the small branches dichotomous. Fruit smooth.

☐ May. Damp clay soils. 12-18 in.

11 E Corollata. Stem erect, slightly hairy, usually simple. Leaves alternate, oval, petiolate, varying in form. Flowers in terminal umbels, conspicuous, the inner segments of the involucre petaloid, oovate.

☐ Through the Summer. Dry fields. 1-2 ft.

Var. Angustifolia. Leaves 3-4 inches long, linear-lanceolate, sessile, hairy beneath, the upper branches of the umbel dichotomous.

☐ May—Sept. Dry soils, very common. 1-2 ft.

12 E Paniculata. Stem slightly angled, hairy. Leaves large for the gen-

us, entire, with revolute margins, hairy along the midrib beneath. Flowers terminal, somewhat paniculate. Fruit smooth.

☐ August—Sept. Middle Car. & Ga. 1-2 ft.

ORDER CXXXV. URTICACEÆ.

Flowers monœcious, or dioecious, scattered or clustered.—Perianth membranous, lobed, persistent. Stamens definite, 4-5, inserted into the base of the perianth and opposite its lobes. Ovary superior, simple. Ovule solitary, erect. Stigma simple. Fruit an indehiscent nut, surrounded by the pe-

rianth. Usually herbaceous plants, with alternate leaves, often covered with stings.

GENUS I URTICA.

Flowers usually monœcious. Sterile florets; perianth of 4 leaves. Stamens 4. Fertile florets; perianth 2-leaved.—

Stigma 1. Seed 1, shining.

1 U Pumila. Stem usually erect, succulent Leaves opposite, decussate, ovate, acuminate, serrate, 3-nerved, lower ones on rather long petioles.—Flowers monœcious, in clustered corymb. Stamens usually 3.

☐ July. Wet grounds. 6-12 in.

2 U urens. Stem erect, quadrangular, hairy, hispid. Leaves opposite, elliptic, 3-nerved, or partly 5-nerved, coarsely toothed, with white stings.—


☐ June—July. Cultivated grounds.

3 U Chamedioles. Stem erect, glabrous. Leaves opposite, ovate, hairy beneath, with white stings on the upper surface. Flowers in axillary clus-

ters, the upper ones fertile, the lower sterile. Perianth hairy.

☐ Feb.—March. Southern Ga. 4-6 in.

4 U Dioica. Stem erect, branching, hispid. Leaves cordate, ovate-lan-

celate, coarsely serrate. Flowers dioecious, in clustered, paniculate spikes; spikes 2 from each axil, covered with stings. Large stinging nettle.

☐ June—Aug. Waste places. 2-3 ft.

5 U Procera. Stem erect, pubescent, quadrangular. Leaves ovate-lan-

celate, serrate, on fringed petioles. Flowers dioecious, in compact, cluster-

ed spikes.

☐ July—Aug. Wet soils. 3-4 ft.

6 U Capitata. Stem erect, furrowed, quadrangular. Leaves alternate, cordate-ovate, acuminate, serrate, 3-nerved. Flowers in sessile clusters.—

Spikes solitary, lateral and axillary.

☐ June—July. Damp soils. 4-5 ft.
URTICACEÆ.

7 U DIVARICATA. Stem erect, branching, covered with stings. Leaves alternate, ovate, acuminate, smooth, serrate, on long, ciliate petioles. Panicles axillary, solitary, divaricately branched.

7 July—Aug. Damp, rocky situations. 2-3 ft.

8 U CANADENSIS. Stem erect, branching, hispid, with stings. Leaves alternate, cordate-ovate, acuminate, hispid. Flowers in axillary panicles, the lower ones sterile, the upper fertile.

7 July—August. Wet soils. 5-6 ft.

GENUS II PARIELARIA.


1 P PENNSYLVANICA. Stem simple, erect, striate, pubescent. Leaves alternate, linear-lanceolate, pubescent, with opaque dots. Involucre 3-leaved. Flowers in compact, axillary clusters. Perianth oblong, persistent, enclosing the seed.


2 P FLORIDANA. Stem decumbent, with erect branches, pubescent near the summit. Leaves ovate, pubescent, dotted, sometimes nearly round. Flowers in axillary clusters. Leaves of the involucre nearly linear.


GENUS III HUMULUS.


1 H Lupulus. Stem twining, scabrous. Leaves opposite, 3-5-lobed, scabrous, serrate. Sterile florets; paniculate, axillary and terminal. Fertile florets, verticillate and sessile.

17 August. Mountains.

GENUS IV BŒHMERIA.


1 B CYLINDRICA. Stem obously 4-angled, glabrous. Leaves opposite, ovate-oblong, acuminate, dentate, smooth. Flower dioecious. Sterile spikes clustered, interrupted. Fertile ones cylindrical.

17 June—Aug. Wet ground. 2-3 ft.

2 B LATERIFLORA. Stem smooth, with opposite branches. Leaves alternate, ovate-lanceolate, acuminate, serrate, scabrous, on long petioles. Flowers in lateral and axillary clusters.

17 July. Shady woods.

ORDER CXXXVI. ULMACEÆ.

Flowers perfect, or polygamous. Perianth divided, campanulate, inferior. Stamens definite, 5-8, inserted into the
base of the perianth. **Ovary** superior, 2-celled, with solitary, pendulous ovules. **Stigmas** 2, distinct. **Fruit** 1–2-celled, membranous, or drupaceous. **Seed** solitary, pendulous.—Trees or shrubs.

**Genus I ULMUS.**

*Flowers perfect.* **Perianth** campanulate, 4–5-cleft. **Stamens** 5–8. **Styles** 2. **Fruit** compressed, with a broad membranaceous border.

1 **U Americana.** A large tree, with smooth, gracefully recurved branches. **Leaves** alternate, lanceolate, oblique, doubly serrate, with the serratures uncutate. **Flowers** 5–10 in a fascicle, pedicillate. **Fruit** fimbriate. **Styles** 2, short. **Fruit** 1-seeded, surrounded by a large, membranous wing. *White Elm.*


2 **U Fulva.** A small tree. **Leaves** large, oval, doubly serrate, rough, sometimes slightly cordate, acuminate, pubescent. **Flowers** nearly sessile. **Stamens** 5–7. **Stigmas** purple. **Buds** tomentose. **Fruit** pubescent. 

½ Feb.—March. In fertile lands. 20–30 ft.

3 **U Alata.** A middle sized tree or shrub, with a cork-like excrescence on opposite sides of the branches. **Leaves** nearly sessile, oblong-lanceolate, doubly serrate. **Samara** pubescent, ciliate. 

½ Feb.—March. Fertile soils. 10–30 ft.

**Genus II PLANERA.**

*Flowers perfect.* **Perianth** campanulate, 3–5-cleft. **Stigmas** 2. **Nut** 1-seeded, roughened.

1 **P Gemelini.** A middle size tree. **Leaves** ovate, acute, glabrous, serrate. **Flowers** axillary, generally by threes. **Perianth** 3–5 cleft. **Stamens** 3–5. **Stigmas** 2, plumose. **Nut** roughened. 

½ Feb.—March. River swamps. 30–40 ft.

**Genus III CELTIS.**

*Flowers perfect.* **Perianth** 5 or 6 parted. **Stamens** 5 or 6. **Styles** 2, expanding. **Drupe** small, purple.

1 **C Occidentalis.** A large tree. **Leaves** ovate, acuminate, serrate, unequal at the base, pubescent beneath. **Flowers** small. **Fruit** a small berry, with a sweet pulp. 


**Order CXXXVII. ARTOCARPEÆ.**

*Flowers* monoecious, in amments or heads. **Perianth** usually divided, sometimes tubular, or entire. **Stamens** 4, straight. **Ovary** 1 or 2 celled, with a suspended ovule. **Style** 1, filiform. **Stigma** bifid. **Fruit** a fleshy receptacle, covered by numerous nuts. **Seed** suspended, solitary. Trees or shrubs.

**Genus I MORUS.**

Genus same as the order.


**Order CXXPVIII. Podostemae.**

Flowers naked, monoeious, bursting through an irregurarly lacerated spathe. Stamens hypogynous, monadelphous, 2, or more, alternately sterile and shorter. Ovary 2-celled, with numerous ovules. Stigmas 2-3. Fruit capsular. Seed numerous, minute. Aquatic plants, with capillary leaves.— *Flowers* minute.

**Genus I Podostemum.**

Genus the same as the order.


**Order CXXXIX. Callitrichineae.**


**Genus I Callitriche.**

Genus the same as the order.


**Order CXL. Saurureæ.**

Genus the same as the order.

1 S Cernuus. Stem erect, furrowed, with jointed hairs. Leaves cordate, pubescent, entire. Flowers in spikes, opposite the leaves. Perianth tubular, hairy, split on the upper side.

4 May—July. Bogs and ponds, very common. 2-3 ft.

Order CXLI. AMENTACEÆ.

Flowers monoecious, or dioecious. Sterile florets in aments, with scales, or scaly perianth. Stamens inserted into the scales. Anthers 2-celled. Fertile florets in aments, with scales or perianths. Ovary free, simple. Stigmas many.—Fruit a drupe, or a bony, membranaceous capsule, usually 1-celled. Seed 1, or many. Trees or shrubs.

Sub-Order I. SALICINEÆ.

Genus I Salix.


1 S Muhlenbergiana. A small shrub, often decumbent, with pubescent branches. Leaves lanceolate, pubescent, hoary, entire, white, tomentose beneath. Flowers diandrous, appearing before the leaves. Scales oblong, villous along the margin, white, with a red apex. Germs ovate-lanceolate, on long pedicels, hairy. Styles short. Stigmas bifid.

12 April. Dry woods. 2-5 ft.

2 S Tristis. A small shrub. Leaves linear-lanceolate, acute at each end, entire, with revolute margins, glabrous above, rugosely veined, and tomentose beneath. Stipules none.

12 March—April. Sandy soils. 1-4 ft.

3 S Rosmarinifolia. A small shrub, the branches silky, pubescent. Leaves linear-lanceolate, acute at each end, entire when young, pubescent above, silky beneath, becoming nearly glabrous when old; scales of the ament obtuse, ciliate. Germs lanceolate, villous. Stigmas bifid.

12 March—April. Wet lands. 1-3 ft.

4 S Conifera. A small shrub, with the young branches pubescent, with cone like excrences at the extremities of the branches. Leaves oblong-lanceolate, acutely serrate towards the apex, glabrous on the upper surface, tomentose beneath, on long petioles. Scales lanceolate, villous. Germs lanceolate, villous. Stigmas 4.

12 March—April. Dry soils. 4-8 ft.


12 April. Low grounds. 8-15 ft.
AMERICANACEAE.


12 March. On water courses. 15-20 ft.

I have a specimen sent me by W. S. Rockwell, Esq. from Baldwin Co. which he thinks is the S. Eridocephala, but there being only a small branch of the fruit, I am unable to form an opinion respecting it.

GENUS II. POPULUS.


1 P Grandidentata. A large tree, with a smooth greenish bark. Leaves alternate, nearly round, unequally and sinuate toothed, glabrous, villous when young, petioles compressed near the summit. Flowers in small axillary, cylindrical aments.

Cotton tree, or American aspen.

12 March. Mountains.

2 P Angulata. A large tree, with the branches winged. Leaves ovate, deltoid, acuminate, serrate, glabrous, with the serratures uncinate. Flowers small.

12 March. On the margins of rivers. 50-80 ft.

3 P Heterophylla. A large tree, branches terete. Leaves roundish, ovate, obtuse, uncinately toothed, the sinus small, cordate, and somewhat auricled, when young tomentose.

March. Swamps. 60-80 ft

SUB-ORDER II. MYRICEÆ.

GENUS III. MYRICA.


1 M Cerifera. A small shrub, diffusely branched. Leaves perennial, alternate, somewhat coriaceous, linear-lanceolate, glabrous dotted, slightly pubescent when young. Flowers in short, cylindrical, axillary aments.

Bayberry, or Wax Myrtle.

12 March—April. In damp soils.

2 M Carolinensis. A small shrub. Leaves cuneate, oblong, coarsely toothed. Scales acute. Fruit globular, large.

March—April. Wet places. 3-4 ft.

GENUS IV. COMPTONIA.


PART II.
DICOTYLEDONOUS.


Sub-Order III. BETULINÆ.

Genus V. BETULA.


2 B Lenta. A large tree, with long slender branches, which are spotted with white when young, with a fragrant and aromatic bark. Leaves cordate, ovate, acuminate, sharply serrate, nerves and petioles hairy, scales of the ament smooth. ½ May. Mountains. 70–80 ft.

Genus VI. ALNUS.


1 A. Serrulata. A middle sized shrub, with numerous irregular branches. Leaves alternate, obovate, acuminate, with the veins on the under surface hairy, doubly serrate. Sterile flowers in long pendulous aments. ½ February. Along water courses. Very common. 8–12 ft.

Genus VII. CARPINUS.


Genus VIII. OSTRYÀ.


Sub-Order IV. Plataneæ.

Genus IX. Platanus.


1 P Occidentalis. A large tree, with nearly white branches, with soft wood. Leaves 5-angled, obscurely toothed, pubescent beneath. Aments axillary, on long peduncles. Seed forming a compact head. Button-wood or Sycamore.

½ May. Banks of streams. 60-70 ft.

Genus X. Liquidambar.


1 L Styraciflua. A large tree. Leaves alternate, palmately lobed; lobes acuminate, serrate. Sterile ament terminating the branches. Fertile ament near the base of the sterile. Sweet gum.

½ May. Damp soils. 70-80 ft.

Sub-Order V. Cupuliferæ.

Genus XI Quercus.


(a) Fructification biennial. Leaves usually setaceous mucronate, entire.

1 Q Phellos. A middle sized tree, slender and straight. Leaves deciduous, linear-lanceolate, tapering at both ends, glabrous, mucronate. Acorn small, nearly spherical. Willow oak.

½ May. Swamps. 30-60 ft.

2 Q Imericaria. A small sized tree, with irregular branches. Leaves deciduous, oblong, tapering at each extremity, mucronate, entire, pubescent beneath. Cup shallow; scales broad-ovate. Acorn small, nearly spherical. Shingle oak.

½ June. Banks of rivers, mountains. 40-50 ft.


½ March—April. In pine woods. 2-3 ft.

4 Q Vires. A large tree, with spreading, irregular branches. Leaves perennial, coriaceous, oval-lanceolate, with revolute margins, pubescent beneath. Fruit oval, nearly black, generally in pairs. Live oak.

½ April. Along the sea coast. 40-50 ft.
5 Q Laurifolia. A middle sized tree. Leaves sessile, oblong-lanceolate, tapering at the base, entire, glabrous, the young leaves toothed and sometimes sinuate. Acorn ovate, in a shallow, nearly sessile cup. 


(b) Leaves lobed at the summit.

6 Q Aquatica. A small tree, with regular branches. Leaves obovate, cuneate, nearly sessile, obscurely lobed at the summit. Acorn ovate, rather small, in a shallow cup, on a short peduncle.

2 March–April. Damp soils. 30–70 ft.

7 Q Nigra. A small tree, with thick, rough, black bark. Leaves coriaceous, cuneate, dilated at the summit, retusely 3-lobed, 5–7 inches long, fergusineous beneath Acorn ovate, mucronate, in rather a deep, sessile cup. 

4 March–April. In poor soils. 15–30 ft. 

8 Q Tinctoria. A large tree, with dark colored bark. Leaves obovate, sinuate, mucronate, angled, glabrous on the upper surface. Acorn depressed, in a deep, sessile cup. 

2 March–April. In rich uplands. 60–70 ft. 

9 Q Coccinea. A large tree. Leaves deeply sinuate, glabrous, with the lobes acute, notched and mucronate, petioles rather long. Fruit abundant. Acorn oblong, mucronate, in a deep cup. 

4 April. In rich lands. 70–80 ft. 

10 Q Rubra. A large tree. Leaves glabrous, oblong, sinuate, with the angles rather acute. Lobes acute and tapering, acutely notched, mucronate. Acorn large, mucronate, in a flat, shallow, sessile cup. 

2 April. Dry soils. 70–80 ft. 

11 Q Catesbeian. A small tree, with stem and branches irregular and crooked. Leaves coriaceous, cuneate, sinuate, the lobes divaricate, usually simple. Acorn ovate, in a large, deep cup, sessile, with the scales obtuse. 

2 April. Poor, sandy soils. 15–30 ft. 

12 Q Falcata. A large tree, with regularly expanding branches. Leaves on long petioles, deeply lobed, falcate, mucronate, shining on the upper surface, tomentose beneath. Fruit small, abundant, with a shallow cup. 

2 April–May. Common. 70–80 ft. 

Var. (a) Triloba. Leaves cuneate, nearly equally 3-lobed at the summit mucronate. 

Var. (b) Pagodefolia. Leaves oblong, many lobed, on rather long petioles, lobes simple, mucronate. 

13 Q Illicifolia. A small shrub. Leaves cuneate, on long petioles, obovate, 3-5-lobed, tomentose beneath. Fruit abundant. Acorn ovate, in a shallow cup. 

2 April–May. Poor soils. 2–8 ft. 

(b) Fructification annual. Leaves unawned.

14 Q Obtusiloba. A middle sized tree, with irregular branches. Leaves oblong, sinuate, on short petioles, generally 5-lobed, the upper ones dilated, pubescent beneath. Acorn oblong, in a hemispherical cup. 

2 April. In stony, clay soils. 30–40 ft. 

15 Q Lyrata. A large tree. Leaves long, irregularly lyrate, the lobes oblong, nearly acute, the upper ones dilated, glabrous. Acorn nearly globular, almost entirely enclosed in the cup. 

2 April. Swamps. 60–70 ft. 

16 Q Alba. A large tree. Leaves oblong, pinna-tifid, sinuate, pubescent beneath, on short petioles. Lobes oblong, obtuse Fruit large, usually in pairs. Acorn ovate, in a deep cup. 


17 Q Prinus. A large tree, with a long trunk without branches. Leaves large, obovate, or oblong-lanceolate, obtusely toothed, slightly pubescent beneath. Fruit abundant. Acorn large, in a hemispherical cup. 

2 April. Common. 70–80 ft. 

Swamp chestnut oak.
18 Q Michauxii. A large tree. Leaves obovate, unequally toothed, sinuate, obtuse at the base, tomentose beneath. Fruit usually in pairs. Acorn large, ovate.

13 April. Rich soils. 60-80 ft.

19 Q Montana. A large tree. Leaves obovate, acute, tomentose beneath, coarsely toothed, teeth indurated at the point. Acorn ovate, in a hemispherical cup.

14 April. In rocky places near the mountains. 30-50 ft.

20 Q Castanea. A large tree. Leaves oblong-lanceolate, on long petioles, tomentose beneath, acuminate, coarsely toothed, teeth with indurated points. Acorn ovate, in a hemispherical cup. Chestnut oak

17 April—May. In rich, damp soils. 60-70 ft.

21 Q Chinquapin. A small shrub, with a smooth, slender stem. Leaves oblong-lanceolate, on short petioles, coarsely toothed, glabrous when mature. Acorn ovate, in a hemispherical cup

18 April—May. Near the mountains. 3-4 ft.

Genus XII Castanea.


17 May—June. Dry woods. 60-70 ft.


18 May. In light soils. 15-20 ft.

3 C Nana. A small shrub. Leaves oval-lanceolate, obtuse, serrate, mucronate, shining on the upper surface, slightly tomentose beneath. It agrees nearly with the preceding species, except in size.

19 May. Sandy, pine barrens. 2-4 ft.

Genus XIII Corylus.


13 March—April. Shady woods. 4-8 ft.

2 C Rostrata. A small shrub. Leaves oblong-ovate, acuminate, slightly cordate, on short petioles, doubly serrate, pubescent beneath. Involucre somewhat globular, hisrate, 2-parted at the summit, with incised segments.

15 March—April. Mountains. 3-4 ft.

Genus XIV. FAGUS.

Monoeious. Sterile florets; ament globose. Perianth
**DICOTYLEDONOUS.**


12 March-April. Damp rich soils. 50-60 ft.

ORDER CXLII. **JUGLANTIDEAE.**


**Genus I. JUGLANS.**

Monoecious. Sterile florets. Scales usually 5-parted, imbricate. Perianth 5-6 parted. Stamens numerous. Fertile florets; perianth double, each 4-parted. Drupe large, with the nut irregularly furrowed.

1 J Nigra. A large tree. Leaflets ovate-lanceolate, numerous, serrate, slightly cordate, pubescent beneath when young. Fruit spherical, scabrous, the pulp decaying and turning black.  
12 April. Rich soils. 30-60 ft.

2 J Cineræa. A middle sized tree. Leaflets numerous, lanceolate, pubescent, on villous petioles. Fruit oblong-ovate, acuminated, irregularly grooved.  
12 April. Fertile soils. 30-50 ft.

**Genus II. CARYA.**


12 April. Fertile soils. 60-80 ft.

2 C Alba. A large tree, with the bark separating in flat scales. Leaves pinnate; leaflets large, oblong-lanceolate, serrate. Nut nearly spherical, with the pericarp thin. Shag bark Hickory.  
12 April. Fertile soils. 40-60 ft.

3 C Tomentosa. A large tree. Leaves pinnate; leaflets obovate-lanceolate, acuminated, slightly serrate, pubescent beneath, 7-9. Ament tomentose,
very long. Fruit sub-globose, smooth, with a thick pericarp. Nut somewhat 6-sided, with a thick, hard shell. Common hickory.

April—May. Fertile soils. 40–60 ft.

4 C Amara. A large tree. Leaves pinnate; leaflets sessile, ovate-oblong sharply serrate, acuminate, glabrous, except the veins and midrib. Fruit small, bitter and astringent. Bitter nut.

May. Fertile woods. 40–50 ft.

5 C Porcina. A large tree. Leaves pinnate; leaflets lanceolate, 7–9, glabrous. Fruit small, with a hard, smooth nut, very bitter. Pig nut hickory.

April. Margins of swamps. 70–80 ft.

6 C Aquatica. A middle sized tree. Leaves pinnate; leaflets narrow, lanceolate, oblique, slightly serrate, glabrous, 9–13, with the midrib tomentose. Fruit nearly round, angled.

April. Swamps. 40–60 ft.
Page 25. **Genus CORONOPUS.** (Syn. Senebiera.) [Order Cruciferae to succeed Lepidium.]

_Silicile_ reniform, didymous, compressed contrary to the septum, sometimes 1-celled; cells 1-seeded; seeds globose-triquetrous. Herbaceous plants with small white flowers.

1 C **DIDYMA.** Stem branching, lying flat on the earth. _Leaves_ alternate, sessile, pinnately divided; the lobes 3-4-parted, toothed or incised, mucronate. _Flowers_ in small corymb, opposite the leaves; but by the elongation of the rachis, the fruit is in racemes. _Calyx_ 4-leaved. _Petals_ none, or very minute. _Silicile_ emarginate.

White. 0 or C  February—June. Open, dry fields, common.

2 C **RUCELLI.** Resembles the preceding, and grows with it. _Leaves_ pinnately divided; segments entire, toothed, or pinnatifid. _Flowers_ few. _Style_ prominent. _Silicile_ entire, not emarginate.

Page 216. **Genus GRA'bl IOLA.** [Order Schropularinæ p. 216, to precede Gerardia.]

_Calyx_ 5-leaved or 5-parted, often with 2 bracts at the base. _Corolla_ irregular, resupinate. _Stamens_ 2-4; when 4, two of them sterile. _Capsule_ 2-celled.

(a) 2 bracts at the base of the calyx.

1 G **VIRGINICA.** Stem succulent, somewhat furrowed, not quite terete, erect or declined. _Leaves_ sessile, obscurely, 3-nerved. _Flowers_ axillary, on short peduncles; lobes of the calyx nearly equal, with the bracts about equal to the segments. _Corolla_ curved. _Stamens_ 2, short. _Capsule_ ovate, 2-celled, 2-valved. _Seeds_ numerous.

White, tinged with red. 4 March—April. Wet places. 3-8 in

2. G **AJREA.** Stem procumbent, glabrous, terete, slightly furrowed, jointed. _Leaves_ ovate-lanceolate, somewhat amplexicaule, obscurely 3-nerved, acutely serrate, dotted. _Flowers_ axillary, solitary, on short peduncles. Bracts as long as the segments of the calyx.

Yellow. 4 April—June. Wet pine barrens. 1-2 ft.

**PART II.**
APPENDIX.


White, tinged with purple. 4 In wet places, common. July—Sept.


4 Sept.—Oct. In ponds.

(b) Calyx without bracts


White, tinged with yellow and purple. 4 Around ponds.


White, streaked. 4 In water. Sept.—Nov.


4 August—Sept. Wet places. 12–18 in.


Yellow. 4 July—Aug. Wet places.

Page 295. **Genus I. AMaranthus—Order AMARANTHACEÆ.**

**Flowers monoecious:** sterile florets; calyx 3–5-leaved. Stamens 3 or 5. Fertile florets 3–5-leaved. Styles 3. Capsule 1-celled, 1-seeded.

1. **A. Lividus.** Stem erect, glabrous, usually purple. Leaves alternate, ovate or elliptic, slightly undulate, veins prominent. Flowers clustered, axillary and terminal, with the sterile and fertile intermingled. Stamens 3. Styles 2 or 3.

4 June—Sept. Cultivated lands, common. 2–3 ft.


4 August—Oct. On the sea coast. 1–2 ft.


Genus II. Oplotheca.

Perianth double, the exterior 2-leaved, truncate; the interior 5-cleft, tomentose. Stamens 5, monadelphous. Capsule 1-seeded, enclosed in the calyx.

1. O. floridana. Stem erect, branching at the summit, pubescent, with swollen joints. Leaves opposite, sessile, linear-lanceolate, woolly beneath. Flowers in paniculate spikes. The inner perianth tomentose.


Genus III. Irisine.

Flowers dioecious. Sterile florets; perianth double, exterior one 2–3-leaved. The interior 5-leaved, petaloid. Stamens 5, with glands between the filaments. Fertile florets; the inner perianth surrounded by long hair. Stigmas 2. Capsule ovate, 1-celled, 1-seeded.

1. J. celosides. Stem erect, glabrous, with opposite branches, fistulous, furrowed. Leaves opposite, attenuate at the summit, lanceolate, irregularly serrate, swollen at the joints.

© Sept.—Oct. On the sea coast. 3–4 ft.

Genus IV. Achyranthes.

Perianth double, exterior one 3-leaved, the interior 5-leaved, unequal. Stamens 5, sitting on a nectary. Style 1. Capsule 1-celled, 1-seeded.

1. A. reffins. Stem procumbent, hairy. Leaves opposite, usually unequal, lanceolate, somewhat hairy beneath. Flowers in sessile, ovate heads, somewhat 3-angled; the interior calyx hairy near the base; the two interior sepals smaller than the others, hairy at the summit.


Calyx campanulate, 5-cleft, with subulate segments. Petals 5, inserted into the tube of the calyx, linear-lanceolate, with incurved points. Stamens 5, alternate with the petals. Style 1. Stigma capitate, 2-lobed. Capsule 2-celled, with a central placenta.


White. 4. April—May. Wet soils, common. 3–6 ft.
Flowers usually perfect. Calyx entire, or 5-toothed. Petals 5, spreading. Stamens 5, alternate with the petals, short. Styles 5. Fruit baccate, 5-lobed, 5-celled, with a solitary suspended seed in each cell. Herbs and shrubs, when the latter, prickly.

1. A. Racemosa. Stem much branched, glabrous. Leaves compound, 3-parted, with the divisions 3-5-leaved; leaflets glabrous, ovate, acuminate, acutely serrate, frequently cordate; petioles pubescent. Flowers in umbels, disposed in racemose panicles, small, greenish white. Spikenard. July. Mountains. 3–5 ft.


Page 56. Genus Berchemia. (Zizyphus of Ell.) [Order Rhamnaceae, to precede Rhamnus.]


Page 39. Genus MOLLUGO. [To precede Sagina under Caryophyllaceae.]

Sepals 5, united at the base. Petals 5, minute, or more frequently none. Stamens 3-5, opposite the sepals. Styles 3. Capsule 3-valved, 3-celled, many seeded.


Page 221. Genus MITREOLA. (Syn. Ophiorrhiza.) [To precede Houstonia in Order Gentianaceae.]


1. M. Sessilifolia. Stem erect, somewhat branched, nearly square, scabrous towards the summit. Leaves ovate, opposite, appressed. Flowers in second spikes, erect at first, afterwards recurved; throat of the corolla closed by jointed hairs, segments expanding, tube short. Fruit consisting of 2 carpels united at the base and apex. Seeds numerous. [Sent to me by Wm. S. Rockwell, Esq. of Baldwin County.]


2. M. Lanceolata. Stem erect, 4-angled, 4-furrowed, glabrous. Leaves lanceolate, attenuate at the base, scabrous on the upper surface, tube of the corolla as long as the calyx, purple, segments white. Purple and white. ☀ August—Sept. Wet soils common. 12—18 in.

Page 231. Genus ATROPA. [To succeed Physalis in Order Solanaceae.]


Page 251. Genus POLYGONATUM. [To succeed Convolvularia in Order Smilaceae.]

Perianth 6-cleft, cylindrical. Stamens 6, inserted near the summit of the tube. Fruit baccate, 3-celled, with 2 seeds in each cell.

PART II.

2. P. MULTIFLORUM. Stem erect, terete. Leaves oblong, oval, broader than the preceding species, amplexicaule, usually 7-nerved. Peduncles long, axillary, several flowered.

© May—June. On the banks of rivulets. 1–2 ft.

Genus SMILACINA.

Perianth 6-parted, expanding. Stamens 6, expanding, inserted into the base of the segments of the perianth. Fruit baccate, 3-celled.

1. S. UMBELLATA. Stem erect, pubescent. Leaves embracing the base of the stem, oblong-oval, many nervied, attenuate at the base, ciliate. Flowers in a small terminal umbel.

2. S. RACEMOSA. Stem geniculate, leafy. Leaves oblong, sessile, acuminate, many nerved. Flowers in terminal racemes, crowded.


Calyx tubular, 5-ribbed, bilabiate, upper lip 3-cleft, lower one 2-toothed. Corolla bilabiate, with the upper lip much the smallest and emarginate. Fruit 1-seeded.

1. P. LEPTOSTACHYA. Stem erect, pubescent, somewhat branched. Leaves opposite, ovate, spurred, toothed. Flowers in a terminal spike, with 3 bracts at the base of each flower. Calyx reflexed after flowering.

Page 217. Genus PEDICULARIS. [To succeed Seymeria in order Schrophularinae.]

Calyx 2-cleft at the summit, obliquely truncate. Corolla ringent with the upper lip emarginate, compressed. Stamens 4.
Capsule 2-celled, mucronate, oblique. Seeds few in each cell, slightly angled.

1. P. CANADENSIS. Stem simple, succulent, pubescent. Leaves pinnatifid, with the segments notched and toothed, the lower ones crowded, with compressed petals. Flowers in leafy spikes; lower lip of the corolla 3-lobed, middle lobe smallest.
Yellow, tinged with purple. ©. March—April. Common. 6–12 in.

Genus EUCHROMA.

Calyx tubular, 2–4-cleft, ventricose. Corolla bilabiata
with the upper lip very long, enclosing the stamens; lower lip trifid, short. **Stamens 4.** Capsule compressed, 2-celled, many seeded.


**Genus MELAMPYRUM.**

Calyx 4-cleft; upper lip of the corolla compressed, with the margins folded back; lower lip trifid, grooved. Capsule oblique, 2-celled, 2 seeds in each cell.

1. M. **AMERICANUM.** Stem erect, branching, terete; lower leaves linear, entire, the upper lanceolate, toothed at the base, all opposite. Flowers axillary, solitary. Seeds oblong, cartilaginous.

Yellow. **♂** June—July. Mountains.

Page 25. **Genus THLASPI.** (Syn. Cypselea.) [To succeed Lepidium in Order Cruciferae.]

Silicle triangular, cuneiform; valves boat-shaped, wingless, coriaceous; cells small, many seeded.

1. T. **BURSA-PASTORIS.** Stem erect, furrowed, slightly branched. Radical leaves pinnatifid, tapering at the base into a petiole. Cauline leaves small, entire, or with a few teeth, connate, lanceolate, pubescent. Flowers in elongated racemes.

White. **♂** Sent to me by Wm. S. Rockwell Esq., Baldwin Co. 12 in.

Page 121. **Genus HOPEA.** [To succeed Styrax in Order Styraceae.]

Calyx superior, 5-cleft. Petals 5. Stamens numerous, collected into 5 parcels. Style 1. Fruit drupaceous, with a 3-celled nut.

1. H. **TINCTORIA.** A small tree or shrub, with expanding branches and smooth bark. Leaves lanceolate, serrulate, crowded near the summit of the branches, shining on the upper surface. Flowers in axillary clusters, sessile. Calyx campanulate with scales at the base.

Yellow. 12 March—April. In rich soils. 4-20 ft.

Page 194. **Genus GAILLARDIA.** [To precede Baldwinia in Order Compositae.

1. G. LANCEOLATA. Stem erect, pubescent, slightly branched. Leaves alternate, linear-lanceolate, sessile, with a few serratures, ciliate. Flowers solitary, terminal. Florets of the ray dilated at the summit, 3-cleft. Pappus 8 or 9-leafed; leaves terminated by a long awn. Yellowish or purple. May—August. Middle Georgia. Pine barrens. 1-2 feet.

Page 201. ORDER VALERIANACEÆ.

Calyx a border, 3-4-toothed, or pappus-like. Corolla tubular, rather irregular, with the border 5-parted, inserted on the top of the ovary, slightly calcarate at the base. Stamens 1-5, but usually 3. Style 1. Ovary 1-celled, with only 1-fertile; ovule suspended. Fruit dry indehiscent, with two empty cells, and one with a single seed. Herbaceous, rather succulent plants, with opposite, or whorled leaves. Flowers in crowded corymb.

Genus I. FEDIA.

1. F. Radiata. Stem erect, winged or furrowed by the decurrent leaves and midribs, pubescent on the angles and wings. Leaves opposite; lower ones somewhat spatulate, upper ones sessile, broad-lanceolate, rather obtuse, finely ciliate, irregularly dentate, sometimes nearly panduriform. Flowers terminal; in dichotomous corymb, with a flower in each division, crowded, each corymb having the appearance of only 4 flowers, with a several leaved involucre; corolla slightly irregular at the summit, slightly calcarate near the base. White. March—May. On the Ocmulgee above Macon. 10-15 in.

Page 202. PLANTAGO PUSILLA.


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VOCABULARY AND INDEX

TO

PART I.

The figures refer to the page in the First Part.

Acaculis, without stem.
Accreta, fastened to another body, and growing to it.
Accumbent, when the edges of the cotyledons are presented to the radicle.
 Acerose, needle-shaped.
Achenium, p. 96.
Achlymyloides, flowers with no floral envelopes. p. 70.
Acicular, resembling needles.
Actinaciform, scimitar shaped, curved, fleshy, with the concave border thick, the convex border thin.
Aciniform, pine or pine leaf-shaped.
Acme, p. 45.
Acute, terminating in a point, without tapering.
Adansonid digitata, p. 40.
Adnate, adhering to the face of a thing, p. 83.
Adnation, the mode in which the sepals or petals are folded in the flower bud.
Aggregata, p. 97.
Air cells, p. 32.
Ala, p. 75.
Ala, p. 74.
Albumen, p. 104.
Alburnum, p. 41.
Alisnaceous, p. 74.
Alternate, one above another, on opposite sides.
Amentum or Ament, p. 78.
Amnios, p. 102.
Amphisarea, p. 99.
Amphitropous, p. 93.
Amplexicaul, leaves embracing the stem by their bases.
Amylaceous, resembling starch.
Anadropous, p. 93.
Anastomosing, the opening of one vessel into another.
Anatomy of Vegetables, 14.
Angular, having sharp edges.

Animalculae, microscopic animals 85.
Annular Duets, 29.
Annulus in the form of a ring.
Anther, 80 and 82.
Anthocarpi, 100.
Anthocyane, 143.
Anthoxanthine, 13.
Apetalous, without petals.
Apocarpi, 96.
Apocarpous, 89.
Appendages, 74.
Appendix, 75.
Arcuate, bent in the form of a bow.
Aril, 96.
Articulated, united by a joint.
Ascending, 93.
Assurgent, rising from a horizontal position.
Atenuate, tapering, gradually diminishing in width.
Autodiocrisis, 138.
Autosyncrisis, 133.
Auriculate, having two small rounded lobes at the base.
Awned, having a bristle.
Axillary, arising from an axil, formed by a leaf and the stem.
Axis, 80.

B.
Bacca, 100
Bacca, having the form of a berry.
Balausta, 100.
Bark, 36.
Beak, 75.
Berry, (see bacca.)
Bidentate, having two teeth.
Bifid, split in two.
Bifoliate, two leaved.
Bilobus, two lobed.
Bipinnate doubly pinnate.
Biterinate, twice ternate.
Boabab tree, 40.
Boat-shaped, having the figure of a boat, being concave and tapering at each end, with a keel externally.
Botany, definition of, 13.
Botrenchyma, 25.
VOCABULARY.

Brachiate, when the ramifications proceed from a common axis, nearly at right angles.

Bracts, 75.

Branched, divided into many branches.

Buds, 50.

Bulb, 49.

C.

Caducous, falling very early.

Capsitose, forming dense patches or turfs.

Calcar, 75.

Calyciflor, stamens attached to the calyx.

Calyx, 70.

Cambium, the descending elaborated sap.

Campanulate, bell-shaped.

Campylotropous, or Campylotropous, 92.

Canescent, hoary, greyish white.

Capillary, of the size of a hair.

Capitate, arranged in heads.

Capitula, the heads of compound flowers.

Capitulum, 77.

Capsular, 99.

Carcerulus, 98.

Carina, 74.

Carina, keeled.

Carpel, flesh-colored.

Carpellate, each of the leaves of which the ovary is composed.

Carpology, 96.

Cartilaginous, hard and tough.

Caryuncle, or Caryunculus, an enlargement of the testa, in the form of lumps or protuberances, about the umbilicus of the seed.

Caryophyllous, 74.

Caryopsis, 97.

Caulis, 79.

Caudate, with a long and slender point like the tail of some animal.

Cauliculus, 102.

Cauline, belonging to the stem.

Caulis, stem.

Cellular System, 16.

Cellular Integument, 36.

Centrifugal inflorescence.

Centripetal inflorescence, 73.

Ceratium, 99.

Chalaza, 93—102.

Chinmenced, having longitudinal grooves.

Chlorophyll, see Chromule.

Chromule, 141.

Cilicate, having fine hairs on the margin, resembling the eyelash.

Chromule, 29.

Cineriae, ash-grey, a mixture of white and black.

Circinate, 51.

Circulation, 134.

Circumscisile, 95.

Cirrhose, a pinnate leaf, terminated by a tendril.

Cirrhole, terminated by a spiral, filiform appendage.

Cirrus, see Tendril.

Clavate, club-shaped.

Claw, 72, see Unguiculate.

Club-shaped,—gradually thickening from the base to the apex.

Clustered, collected in parcels.

Colichnica, 103.

Color, 141.

Columna, the axis of the fruit.

Columna, 82.

Coma, 102.

Compound, having various divisions, or ramifications.

Compressed, flattened lengthwise.

Conceptaculum, 98.

Conducting tissue, 87.

Conduplicate, 53.

Cone, see Strobilus.

Confounded, 70.

Connate, when the bases of two opposite leaves are united together.

Connectivum, 82.

Continuous Bothrenchyma, 26.

Contorted, twisted.

Convolute, 54.

Cordate, heart-shaped.

Coriaceous, leathery, having the consistence of leather.

Coriaceous, 48.

Coriaceous, horny, hard and very compact in texture.

Coriaceous, 75.

Corolla, 71.

Corona, 75.

Corrugate, wrinkled or folded up irregularly in every direction.

Corymb, 77.

Corymbose, in the form of a corymbs.

Cotyledon, 102.

Cremocarpium, 100.

Crenate, when the teeth are rounded, the organ is said to be crenate.

Crested, having an elevated, irregular, or notched ridge.

Cruciater or Cruciform, 74.

Cucullate, hooded; a plain body with the apex and sides turned inwards, so as to resemble a hood.

Culm, the stem of grasses.
Cuneate, wedge-shaped with the apex of the wedge next the stem.
Cuspidate, tapering into a rigid point.
Cuticle, 33.
Cyanic, blue, 142.
Cyclisii, 30 and 137.
Cyme, 78.
Cymarrhopadum, 97.
Cypsela, 99.
Cytoblast, 24.

D.
Deciduous, falling off at maturity.
Declining, falling gradually back from the perpendicular.
Decom;nd, 63.
Decumant, reclining upon the earth, and rising again from it at the apex.
Decurrent, running downwards from the point of insertion.
Decussate, arranged in pairs that alternately cross each other.
Dehiscence, 95.
Deliquecent pericyle, 79.
Dentate, having sharp teeth with concave edges.
Diadelphous, 81.
Dichlamydeous, 70.
Dichotomous, having the divisions always in pairs.
Diclesium, 100.
Dilicate, 82.
Dicotyledons, plants whose seeds have two cotyledons.
Didymous, growing in pairs, 82.
Didynamous, 82.
Diffuse, spreading widely.
Digitate, having five narrow lobes, spreading from a common point.
Diploeotogia, 100.
Dissempents, 83.
Disk, the support of the flower.
Disk florets, 77.
Dichious, arranged in two rows, the one opposite the other.
Divaricate, irregularly branched, with the branches nearly at right angles with the stem.
Dotted ducts, 25.
Drupaceous, resembling a drupe.
Drupes, 96.
Duration, of vegetables, 118.

E.
Echinable, furnished with numerous rigid hairs or straight prickles.
Elementary organs, 14.
Emarginate, having a notch at the end.
Embryo, 102.
Endocarp, 94.
VOCABULARY.

Floral envelopes, 70.
Florets, 77.
Foliaceous, leaf-like.
Foliation, the manner in which the young leaves are arranged in the leaf bud. 53.
Follicle, or folliculus, 97.
Food of plants, 130.
Foramen, 92.
Fovilla, 85.
Fringed, (see fimbriate.)
Fruit, 93.
Fruiting, 125.
Fugaceous, falling off, or perishing very quickly.
Functions of roots and leaves, 106.
Funiculus, 91.
Funneled, any organ in which the tube is ob-conical so that it resembles a funnel.
Furcate, forked, having long terminal lobes.
Furrowed, marked by longitudinal channels.
Fusiform, 47.

G. Galea, when the upper lip of a bilabiate corolla is arched.
Gamosepalous, 71.
Gamopetalous, 71.
Gelatinous, resembling jelly.
Gemmule, 84.
Geniculate, bent abruptly.
Germ, 86.
Germination, 127.
Gibbous, very convex, or tumid.
Glabrous, smooth, without hairs.
Glandular, bearing glands.
Glandular hairs, 34.
Glares, 99.
Glaucous, covered with a fine bloom of the color of a cabbage leaf.
Globose, nearly a sphere.
Gommerule, 78.
Glaucocous, a sub class of Endogens, whose floral envelopes are glaucocous.
Glumaceous, chaffy.
Glume, 76.
Glutinous, viscid, covered with a viscid exudation.
Granular, divided into little knobs or knotts.
Grunomous, in the form of little clustered grains.
Gynobase, 91.
Gynophore, 91.

H.
Halbert-shaped, (see hastate.)
Hairs, 34.
Hairy, (see pilose.)
Hastate, abruptly enlarged at the base into two acute diverging lobes.
Heat, 150.
Heart-shaped, (see cordate.)
Heartwood, 41.
Herbaceous, soft, green and cellular.
Hesperidium, 99.
Heterogamous, 77.
Hilum, 91-102.
Hirsute, covered with rough hairs.
Hispid, similar to hirsute.
Hoary, covered with short dense hairs, giving an appearance of whiteness to the surface.
Homogamous, 77.
Hooded, (see cucullate.)
Hypocrateriform, a calyx or corolla of which the tube is long and slender, and the limb flat.
Hypogynous, 81.

I.
Imbricate, when the organs overlap each other, like the tiles of a roof.
Included, stamens shorter than the corolla, 81.
Incumbent, when cotyledons are folded with their back to the radicle.
Incurved, bent inwards.
Indehiscent, not opening, 95.
Inflated, swollen.
Inflected, same as incurved.
Inflorescence, 76.
" Determinate, 77.
" Indeterminate, 78.
Infundibuliform, 72.
Innate, adhering to the apex of a thing, 83.
Integuments of the seed, 101.
Intercellular passages, 32.
Innominate, the space between two nodes.
Intexine, 85.
Intine, 85.
Introrse, 30, turned inwards, towards the axis to which it appertains.
Involucel, a partial involucre, the organ that surrounds the partial umbel.
Involucre, 76.
Involute, 54.
Irregular, where the symmetry is destroyed by inequality of parts.
Irritability, 140.

J.
Jointed, having joints, articulated.

K.
Keel, 74.
Keeled, formed in the manner of the keel of a boat, with a sharp protecting ridge.
Kidney-shaped, see Reniform.

Labellum, a lip.
Labiate, 72.
Laciniate, divided by deep taper-pointed incisions.
Lacunose, having large deep depressions.

Lamella, 74.
Laminin, 79.
Lamento, 61.
Lateral, 30—133.
Leaf, 54.
Leaf buds, 50.
Legumen, 97.
Lenticels, 35.
Lipides, 33.
Liber, 36.
Light, 117.
Ligneous, woody, having the texture of wood.

Ligula, 75.
Ligulate, strap-like.
Limb, the spreading part of a calyx or corolla, 72
Linear, narrow, with the two opposite margins parallel.

>Lobed, divided into segments.
Loculicidal, 95
Locusta, spikelets.
Lomentum, 97

Lunate, crescent shaped.
Lyrate, when the divisions of a pinnaulid leaf are unequal.

M.
Marcascent, not falling off, but withering on the organ that supports it.
Medullary sheath, 39
" processes, 39
Membranaceous, thin, and semi-transparent.
Membrane, 15
Mesocarp, (see sarcocarp)
Mesophyllum, the cellular tissue of leaves.
Micropyle, the foramen of the seed at maturity.
Midrib, 54
Monochlamydeous, 70.
Monodelphous, 81.
Moniliform, necklace shaped.
Monocarpous, bearing fruit but once.
Monocotyledons, those plants whose seeds have but one cotyledon.
Monopetalous, 71
Monoplyllous, composed of one leaf.
Monocorneate, abruptly terminated by a hard sharp point.

Mucous, 16
Multifid, split into numerous segments.

Muricate, furnished with numerous short, hard excrescences.

N.
Naked, (see glabrous)
Napiform, 47
Neck, 102
Nectarary, 74
Nectarotheca, 74
Needle-shaped, (see Acicular)
Nerved, having several ribs
Netted, (see reticulated)

Nodding, inclining from a perpendicular, so that the apex is directed downwards.
Node, 44
Nodule, 42
Nucleus, 91
Nuculaninn, 99

O.
Obcordate, when the tapering end of a cordate leaf is towards the stem.
Oblique, inclined to one side.
Oblong, 61
Obovate, when the tapering end of a leaf is towards the stem.
Obluse, blunt.
Ochrea, 69
Ochre color, yellow, changing to brown.
Ochroleucus, light ochre color.

Odors, 144
Ovolute, perfectly circular.
Ovulate, perfectly circular.
Organic mucous, 16
Organs, 32
Origin of wood, 116
Orthotropous, 92
Origin, elliptical
Ovary, 87
Ovate, egg-shaped

P.
Paleaceous, chaffy
Palea, 75 and 76
Palmitate, having five lobes, the mid-ribs of which meet in a common point, in appearance like a hand.
Panduriform, middle-shaped, an obovate leaf, with a deep recess on each side.
Pamicle, 79
" deliquescent, 79
Papilionaceous, 74
Pappus (see egret 75)
Paracorolla, 74
Parastemon, 74
Parenchyma, 17
Parietal, attached to the side.

Passages, intercellular, 32
Patens, spreading.
VOCABULARY.

Pectinate, comb-shaped, with the segments very numerous, close and narrow like the teeth of a comb.

Pedate, the same as palmate, except the two lateral lobes are divided.

Pedicels, 80
Peduncle, 80
Peltate 62
Penicillate, or pencillate, resembling the painter’s pencil, as the summit of the style of some Compositae

Pendulous, hanging, 93
Pepo, 100
Perennial, lasting several years
Perfoliate, stem passing through the leaf
Perianth, 70
Pericarp, 94
Perigynous, 81
Perisperm, covering of the seed
Permanent, remaining
Persistent, not falling off
Personnate, 72
Petal, 71
Petaloïd, like a petal
Petaloïdeæ, Endogenous plants, having a perianth like petal
Petiole, 63
Phylloïdium, 67
Pilose, hairy
Pinnate, 65
Pinnatifid, with deep, regular, marginal incisions
Pistils, 86
Pitcher-shaped, (see urceolate)
Pith, 41
Pitted, having numerous small, shallow depressions
Placenta, 87
Plaïtéd, folded lengthwise, like the plaits of a folded fan
Plumose, consisting of long hairs, which are themselves hairy.

Plumula, 102
Pollen, 80 and 84
“ grains 84
“ masses, 125
“ tubes, 121
Polycarbonous, bearing fruit many times
Polydeltiaceus, 81
Polypletalos, 71
Polyphoræ, 91
Polysépalous, 71
Poïum, 100
Premorse, the same as Truncate, except the termination is ragged and irregular.
Prickles, 35
Primate, 92
Procumbent, spread over the surface of the ground
Proserchyma, 17

Prostrate, lying flat upon the ground
Pubescent, downy, covered with short, weak, dense hairs
Pulverulent, powdery, covered with a fine bloom
Punctate, dotted
Putamen, 94
Pyxidium, 93

Quartine, 92
Quinquefoliate, five leaved
Quintine, 92

Racemose, like a raceme
Racemous, 76 and 80
Radiate, diverging from a center, as the ligulate florets of a compound flower.
Radical, arising from the root
Radicle, 102–103
Raditi, 78
Raphe, 93.
Ray florets, 77.
Receptacle, 80 and 91.
Reclinate, bent down upon the stalk.
Recurred, suddenly bent backwards.
Reflexed, same as recurved.
Regma, 98.
Reniform, resembling the figure of a kidney.
Repand, having an uneven, slightly sinuous margin.
Replum, 96.
Respiration, 111
Resupinate, inverted in position by a twisting of the stalk.
Reticulate, netted, covered with lines which intersect each other.
Retorse, turned backwards.
Retuse, terminating in a round end.
Revolute, rolled backwards.
Rhizoma, 48.
Rhomboid, oval, a little angular in the middle.
Ringent, (see personate.)
Rosaceous, 72.
Roscrum, 75.
Rostrum, 75.
Rotate, 71.
Root, 45.
Root stalk, 48.
Rufous, reddish brown.
Rugose, covered with reticulated lines, the spaces between which are convex.
Ruminate, 104.
Ruptured, 95.

S.

Sagittate, 64.
Salver-shaped, 72, same as hypocrateriform.
VOCABULARY.

Samara, 98.
Sep, 130.
Sapwood, 41.
Sarcoecarp, 94.
Sarcodeinous, 102.
Saubrous, rough.
Sape, 80.
Scurious, having a thin, dry, shriveled appearance.
Scurf, 35.
Scutelliform, broad oval and thick.
Scutum, 75.
Secundine, 92.
Seed, 101.
Semi-anatropous, 93.
Sepals, the separate leaves of the calyx.
Secticidal, 95.
Sectiforme, 95.
Serrate, like the teeth of a saw.
Sessile, without a support.
Seta, 96.
Silicula, 93.
Sitiqua, 98.
Simunuta, having the margin uneven.
Slashed, divided by deep, taper-pointed divisions, the same as laciniate.
Sorosis, 101.
Spadix, 79.
Spathe, 75.
Spatulate, oblong, with the lower end very much attenuated.
Spermatic animaleules, 85.
Sphalerocarpum, 101.
Spherical, nearly spherical.
Spike, 78.
Spikelet, a subdivision of the spike of a grass.
Spongiole, 49.
Spur, 75.
Squad, 75.
Squamose, scaly, covered with minute scales, 75.
Squamule, 76.
Squarrose, spreading at right angles from the common axis.
Stamens, 80
" arrangement of, 80
" number of, 81
" situation of, 81
" union of, 81.
Stellate, the form of a star.
Stem, 35.
Stigma, 86.
Stings, 34.
Stipe, an additional support of any organ.
Stipitate, supported by stipes.
Stipules, 69.
Stomates, 33.
Striate, marked by longitudinal lines.

Strigose, covered with sharp, appressed, rigid hairs.
Strobilus, 101
Style, 86 and 87.
Suberos, corky.
Submersed, under water.
Subulate, in the shape of an awl.
 Succulent, cellular and juicy.
Sulcate, marked by longitudinal channels.
Supra-axillary, proceeding from above the axil.
Supra-decompound, 65
Suspended, 93
Sutural dehiscence, 95
Suture, the mark on the pericarp where the parts that compose it seemed to be joined.
Sword-shaped, (see falcate.)
Syconus, 101
Syncarp, 97.
Syncarpium, 97.
Syncarpos, 89

T.
Tap root, 47
Tendril, 70
Tercine, 92.
Terece, round.
Terminal, at the extremity of a branch.
Ternate, by threes.
Testa, 102
Tetradynamous, 32
Thalamisflora, plants with the stamens inserted on the torus.
Throat, 71
Thyrea, or thyrsus, 79
Tissues, 16
Tomentose, covered with dense, rather rigid, short hairs.
Toothed, (see dentate.)
Torus, 91
Trachea, 23
Tracenchyma, 15
Transverse dehiscence 95.
Triadaphous, stamens united in three parcels.
Trichotomous, having the divisions all by threes.
Trifid, three cleft.
Trifoliate, three leaved.
Trigonus, three cornered.
Trilobate, three lobed.
Triquetrous, having three acute angles.
Triernate, when the common petiole divides into three secondary petioles, which are each divided into three tertiary petioles, each bearing three leaflets.
Trumpet-shaped, hollow and dilated at one extremity.
**VOCABULARY.**

**Truncate,** terminating very abruptly, as if cut off.

**Tryma,** 99

**Tuber,** 49

**Tubercled,** covered with little excrescences or warts.

**Tubular,** approaching a cylindrical figure and hollow.

**Turbinate,** inversely conical.

**Turgid,** swollen.

**Turions,** the scaly shoots that arise from the neck of perennial plants.

**Twining,** twisting round some other body.

**U.**

**Umbel,** 77

" universal, 77

" partial, 77.

**Uncinate,** hooked, curved suddenly back at the point.

**Undulate,** waving.

**Unguiculate,** 72

**Unguis,** 72.

**Urceolate,** 72

**Urtriculus,** 96.

**V.**

**Valvate,** when the sepals or petals fit by their edges, not overlapping each other.

**Vascular system,** 27

**Veins,** 58.

**Velvety,** covered with dense softomentum, so that the surface resembles velvet.

| **Venation,** the manner in which the veins run. |
| **Ventral,** the projecting part of a pericarp. |
| **Ventricose,** swelling unequally on one side. |
| **Vernation,** 53 |
| **Verrucose,** (see tubercled.) |
| **Versatile,** 83 |
| **Vertical,** perpendicular. |
| **Verticillate,** whorled, when several things are in opposition around a common axis. |
| **Vexillum,** 74 |
| **Villose,** shaggy, covered with long weak hairs. |
| **Virgate,** slender. |
| **Viscid,** covered with a glutinous exudation. |
| **Vitellus,** a sack in which the embryo is enclosed. |
| **Voluble,** twining. |

**W.**

**Water,** 155

**Wedge-shaped,** (see cuneate-)

**Wheel-shaped,** (see rotate.)

**Whorled,** (see verticillate.)

**Wings,** 74

**Winged,** having a thin, broad margin.

**Wood,** origin of, 116.

**Woolly,** covered with long, dense, curled hairs.
GRiffin's Series of Southern School Books.

The Publisher would call the attention of the Southern public to his Series of Southern School Books.

Our teachers are now very generally impressed with the necessity of having a series of School Books of our own, that shall harmonize with our political and domestic institutions, and give a proper tone to the moral and religious character of our youth. At present there is scarcely a school reading book published at the North, that does not contain sentiments in a greater or less degree inimical to our interests; and we cannot expect it to be otherwise, so long as we remain dependent on the Northern presses for every book made use of in our Schools, Academies and Colleges. It is presumed that the series now offered will render further dependence unnecessary.

The recommendations from Teachers, and other gentlemen of high standing who have examined the series, are sufficient to stamp their character as deserving of peculiar merit.

NOTICES OF THE SERIES.

Macon, Ga., March 10, 1840

Str.—Having examined with attention two of the works included in your "Series of Southern Class Books," I feel bound in duty to thank you for the pleasure which I received in the perusal of them.

As the "Southern First Class Book" has secured, already, a large measure of public favor, it might be superfluous to add my commendation of its excellence. But, as the "Southern Second Class Book" has appeared more recently, it is entitled to the fostering care of all who feel an interest in the cause of Southern Education. Let Parents read it for themselves, and they will not hesitate to buy, and place it in the hands of their children—in the full persuasion that it will please, and do them good.

The remembrance of such a book will be gratifying through every season of life—and its salutary influence must be felt, in connexion with the character and happiness of "children's children."

S. G. BRAGG.
Rector of Christ Church, Macon.

From an attentive examination of the "Southern First Class Book," I feel fully authorized to assert that it is a work presenting no ordinary claims to public encouragement, and that too much praise cannot be bestowed upon the talented compiler, for the successful execution of a task which has long been regarded as a desideratum in the schools of the South.

THOMAS R. LAMAR, M D

From the Augusta Constitutionalist

It is with pleasure we have to announce that a new edition of the "Southern First Class Book," by M. M. Mason, A. M., Principal of the Vineville Academy, has been printed, and can be had at our book stores. It is a work which has been highly recommended by many of our literary and respectable citizens, as the best school book ever presented to teachers in the South. We have hastily looked over its contents, and we find that its contents consist principally of selections from American authors of distinguished character. Together with this volume may be had "THE Southern Second and Third Class Books," both compiled by Mrs. S. L. Griffin, and both well calculated, with the first, to accomplish the objects for which they have been printed and published.

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Griffin’s Series of Southern School Books

Milledgeville, December 20, 1836.

Dear Sir:—Having examined your compilation under the title of “The Southern First Class Book,” it gives us great pleasure in expressing our entire approbation of its matter, form and object; and we cheerfully recommend its speedy adoption in all our schools and academies.

Receive, sir, our united and ardent wish for your entire success, in every effort to advance the interest of general education.

Respectfully your obedient servants,

J. H. STEELE, Esq., Putnam County.
J. BRANHAM,
Col. HAZARD, Glynns.
N. B. TOWELL, Talbot.
M. HALL M’ALLISTER, Chatham.
M. MYERS.
SAYUEL SPENCER, Liberty.
HENRY LOCKHART, Warren.
J. B. LAMAR, Bibb.
GEO W. CRAWFORD, Richmond.
HOWELL COBB, Sol. Gen. W. C. G.

I have introduced “The Southern First Class Book” into our Institution, and its use more than confirms me in the high opinion I before entertained of its merits. It is the book we have long needed, containing sentiments calculated to advance the principles of virtue, religion and patriotism.

J. DARBY, A. M.,
Principal of the Sigourney Institute.


Dear Sir:—I have the pleasure to inform you that the “Southern First Class Book” has been introduced into my School, and its merits duly appreciated by its patrons. We consider it far preferable to any compilation of the kind, and recommend it to the patronage of the public.

WM. LEWIS, Rector.

Augusta, 21st April, 1840.

Sir:—Within a few days past I have examined a series of Books, published by you, entitled “The First, Second and Third Class Book,” and am gratified to find that it is what its title purports it to be, a “Southern” compilation.—By Southern, I do not mean sectional, but equally suited to the South, with other parts of the United States. In point of matter, it is candidly believed it will not suffer by a comparison with any similar selection in the language. It is true, many excellent publications of a similar nature, have, within the last few years, made their appearance before the American public, in rapid succession. Indeed, so many, so excellent, and in such rapid succession, that it would be a difficult task to fix a standard of merit, by which to determine the precedence. There is one point, however, which should not be passed by unnoticed, in drawing a comparison between it and other similar compilations, in which it is believed to possess a decided advantage.

In other similar selections, those pieces which related to the manners, customs, and institutions of the South, have either been avoided altogether, or else such have been selected as were blindly filled with reproachful remarks, with ridicule or abuse, in relation to these subjects. The “Southern Class Books,” on the contrary, being compiled in the midst of Southern Scenes, by a Southern compiler, is enabled to present a picture which is familiar to the mind of every Southern child, and thus, by meeting many things, he is enabled to realize, be the more able to appreciate, and consequently to relish the whole. Many other, perhaps equally important considerations, might be added, to recommend the series to the patronage of the public, but they are all, doubtless, sufficiently prominent to attract that attention which their merit so justly claims. Yours, respectfully;

Mr. B. F. Griffin.

Cyrus Pike,
Of the Ellis Street Elementary Academy.
Macon, October 10, 1839.

We cheerfully recommend the "Southern First Class Book," as well adapted to the purposes contemplated by the compiler. Such a work has been needed in juvenile instruction—a work judicious in its selections, moral in its sentiments, national in its subjects, and conveniently arranged in its divisions for reading lessons. Its adoption by teachers throughout the country we regard as desirable, not only because of its intrinsic merits, its fitness for the end designed, but as an act of justice, a patronage due to the generous zeal, the home-bred feelings of the proprietor and publisher. Southern people ought to support Southern manufacture, or cease their complaints of dependence.

GEORGE F. PIERCE, Pres't.
WM. H. ELLISON, Prof.
THOMAS B. SLADE.

Georgia Female College.

Greensborough, Ga. July 2, 1840

Mr. Griffin—Sir: I am happy to say, that after a careful examination of the "Series of Southern School Books," I feel no hesitation in saying that I consider them equal, and in some respects superior to any series of reading books now in use. The selections are judiciously arranged, and combine in an eminent degree, that which instructs, and at the same time improves and elevates the mind. I shall take pleasure in introducing the series into my school, as soon as circumstances will permit.

Very respectfully,

A. P. HAMILTON,
Principal of Greensboro' F. Seminary.

From the Augusta (Ga.) Mirror.

Southern School Books—"The Southern Second and Third Class Books," by Mrs. Sarah L. Griffin, have been placed on our table. From an attentive examination of the arrangement and contents of these volumes, we have no hesitation in recommending them to the use of Southern schools. The selections are mainly from Southern writers, and beside being free from sentiments inimical to our domestic institutions—which are of late frequently introduced into school books of northern origin—are of a character adapted to the capacities of youths usually embraced in the respective classes for which they are designed. That the people of the South, with interests and institutions so dissimilar to those of the North—at a time, too, when every influence, moral and political, is exerting for the destruction of her dearest right—should not see the madness of her continued dependence upon that section of the country for the means of mental culture, is truly astonishing.—That we should feel and talk as we do on this subject—hold commercial conventions and threaten non intercourse, and at the same time continue in a more abject state of dependence upon the North, than that of the colonies of old upon the mother country, is indeed ridiculous. Is it asked why is this so? The answer is plain: The great leaders of party, those teachers of political ethics, the speech-makers of the day, have altogether overlooked and neglected the great superstructure of all correct national or moral sentiment. While they have fermented and excited the public mind upon the subject of tariffs and sub-treasuries, battling with the pecuniary interests and political prejudices of the legal voters, they have left the youth of the country to imbibe all their impressions and sentiments from foreign sources, and to grow up, if not in indifference for their home and State, at least with a preponderating reverence and respect for the sources from whence they received their first and most lasting impressions. We are brought up Northern boys to become Southern men. Hence our imbecility, and our humiliating dependence. The publisher of the series of Southern School Books before us, has begun at the right place; and from the pure patriotism and sound morality inculcated in his volumes, truly gratifying results may be anticipated. We are glad to learn that the First Class Book, which has been before the public only about eighteen months, has passed through three editions. We hope to see Mr. Griffin's school books universally adopted by Southern teachers.
DEAR SIR:—I have examined, with much satisfaction, the series of "Reading Books," published by you. Highly approving of your experiment, I hope the South will fully sustain it. Concerning the works themselves, I cannot better express my views, than by saying that I expect to introduce them into the institution over which I preside.

I am, respectfully yours,
C. F. STURGIS,
Principal of the Lancasterian Institute, Augusta, Ga.

April 9th, 1840.

From an attentive perusal of "The Southern First Class Book," I do not hesitate to pronounce it, in my humble opinion, a work of sterling merit.—It is a judicious and well arranged compilation, and would, I think, be an acquisition to our schools, in improving pupils in the art of correct reading.—"The Third and second Class Books" are excellent—I admire them much.

The above works I shall introduce into my school, as soon as I can conveniently do so.

JAS. R. BOLLOUGH,
Preceptor, Savannah, Ga.

From an examination of the "Southern First Class Book," I am favorably impressed with its merits. The selections seem to have been made with care and judgment. Many of the pieces are from the pens of our best Southern writers, and possess very great merit. Such a book has been much needed in our schools and academies, and will, I doubt, be at once introduced by every judicious teacher who becomes acquainted with its value as a school book.

B. B. HOPKINS,
Principal of the Female Select School, Macon.

Milledgeville, Dec. 1, 1837.

DEAR SIR,—It affords me great satisfaction in recommending your "Southern First Class Book" to the public. During its progress of preparation, I was not ignorant of the inconvenience and labor to which you were subjected in acquiring the means of making such selections as your judgment approved. I consider it not only well adapted to the use of common schools, but would well repay all for its perusal. I congratulate you on the close of your arduous labors, and trust that a liberal public will repay services so diligently bestowed, as well as talents so usefully employed.

HENRY G. LAMAR.

I have examined the "Southern First Class Book," and do cheerfully recommend it as well adapted for a reading book, especially for the higher classes. The selection is judicious, and well arranged. One great excellence of the work is, that most of the pieces are from the pens of our own citizens—of recent date, and relating to things and events of our own country—rendering the work much more interesting, and better calculated to excite a good moral influence on the minds of our youth.

JAMES WELLS.

My opinion with respect to the "Southern First Class Book" coincides with that expressed by Mr. Wells; and I very cordially recommend its speedy introduction into our Schools and Academies.

DELOS PALMER,
Principal of the Marion Academy.

From the Macon Telegraph, Dec. 18, 1837.

We are indebted to the author for a copy of the "Southern First Class Book," or exercises in Reading and Declamation, by M. M. Mason," which as its title imports, is designed particularly for Southern schools and academies. Most of the books now in use are procured from the North, and are tinctured with abolition, and other heresies obnoxious to Southern feelings, and should be discomfitered. We hope, therefore, that the work will be introduced into our schools without delay.
I have examined "The Southern First, Second and Third Class Books" and regard them as well adapted to the purposes for which they are designed. I have no doubt that these books will be duly appreciated, and that at no distant period, they will be generally introduced in the schools of the South.

W. ERNEST PUTSCH,
Rector, Richmond Academy.

Dear Sir:—I have examined, with some care, the "Southern First Class Book," and cheerfully accord to it my hearty approval. Designed for the first classes in our schools and academies, it affords quite a variety of judiciously selected lessons, adapted to reading, recitation and declamation. I find in your selections nothing to offend the taste or the scholar, or to weaken the strength of moral and religious principle; on the contrary, these are studiously strengthened. Your book should be acceptable, particularly to the Southern public, in as much as it contains short extracts from speeches and writings of many of our own distinguished men—all breathing sentiments in harmony with Southern principles and Southern institutions. It affords ample testimony that Southern genius, when directed to the walks of literature, is capable of the highest distinction.

Respectfully, your friend,

E. A. NISBET.

My views correspond with those expressed by Eugenius A Nisbet, Esqr.

JAMES C. PATTERSON,
Principal of the Gwinnett Institute.

Macon, Dec. 15, 1837

Dear Sir:—I approve of your book, first, as a man—it is to instruct youth. I approve of it, as once a teacher myself—it is absolutely needed. I approve of it so far as I am a scholar—the matter is well selected and is truly literary. I approve of it as a citizen—it is thrice native—its matter is much of it native—its design is native—its publication native. And I approve of it as a Christian teacher—it co-operates with the good in doing good

Reverend M. Mason
Rev. M. Mason
Pastor of the Presbyterian Church, Macon.

From the Macon Messenger, Dec. 14, 1837.

The pieces are moral and well written; and we think it high time that our youths should have the writings of Southern American authors placed before them, instead of being confined, as heretofore, almost exclusively to those of Great Britain and the Northern States. We have too justly proved the truism, that "A prophet is not without honor, save in his own country," by our neglect of our own authors; but in the present posture of affairs, it should be self-evident to the most careless and unthinking, that our children should be particularly conversant with the writers of our own section of country, whose views, and feelings, and sentiments must of course be governed by our domestic and political relations.

In his efforts to promote this object, we most sincerely wish Mr. Mason the success of which we think him deserving.

From the Augusta Chronicle & Sentinel, Dec. 20, 1839.

"The Southern First Class Book," a new work, designed for the use of Schools and Academies in the South and West, a copy of which has been laid on our table, by the publisher, comes to us with such strong recommendations, that we cannot doubt its high value. We have glanced through it, and take pleasure in adding our testimony to that of many others already given, that it deserves, in an eminent degree, the patronage of the public of the South. We hope that the instructors of youth will introduce it into immediate use in their seminaries of learning. It is by Mr. M M. Mason, Principal of the Vineville Academy, at Macon, Georgia.
Griffin's Series of Southern School Books.

From the Southern Ladies' Book, January, 1840.

From our peculiar social and political relations, we must ever be at variance with the source from whence has heretofore proceeded all our school books; and not only this, but nearly all our literature, which has been more or less tinged with feelings and sentiments contrary to our own, and in their tendency, destructive to those rights which we hold most dear. But we will not enlarge upon this topic, satisfied that the reason for encouraging the dissemination of works of this kind is well understood by every Southerner. The work is classified by reading lessons, consisting of prose and poetry, chiefly from the pens of Southern writers; but there are many other selections which come from distinguished authors whose name and fame belongs to the world at large. We understand that a series of works, of a similar character, is in preparation for publication. It is to be hoped that they will be characterized by the same taste and judgment, in the selections, as is manifest in the work before us.

From the Tallahassee Star, Feb. 14, 1840.

We have received copies of the Southern First and Second Class Books, in two separate volumes; the former, by M. M. Mason, adapted to the higher, and the latter, by Mrs. Sarah L. Griffin, designed for the middle class in the schools of the Southern and Western States.

Upon examination of these books, we view them as containing articles of composition far better adapted to the taste and genius of Southern children, than any other class books extant, which have come to our notice. The pieces are extracted from the writings and speeches of Southern gentlemen, and contain such sentiments and principles as we hold essential to be inculcated in the present rising generation. We heartily recommend the books to the attention of teachers, parents, and guardians of youth.

I have carefully examined the "Southern First Class Book," and feel no hesitation in saying that I consider it a work of a very superior character—indeed, I am so well pleased with it, that I shall introduce it into my school without delay.

Charles Dean,
Principal Etowah Academy.

Having long desired to see an elementary Class Book issue from a Southern press, unobjectionable in its selections, and adapted to the wants of our youthful readers, we greet the volume which you have just issued, believing it to be both a safe and suitable book for Southern schools and academies.

A. Means, M. D.
G. W. Lane,

I have examined the "Southern First Class Book," by M. M. Mason, and think the selections very judicious, both in prose and poetry. From the high estimation I place upon it, I have adopted it in my school as a principal reading book, and take pleasure in recommending it to public patronage, as an excellent book for the improvement of youth.

B. F. Price,
Principal Farmer's Academy, Houston.

I fully concur with Mr. Price, and hope the day is not distant when our own press will be able to furnish our own schools with elementary books like the present, of a character suited to our wants.

H. B. Hathaway.

Sir—Your "Southern Class Book," I regard as a most valuable accession to the book now used in our schools. That your compilation may immediately supersede all similar ones which are not congenial with our institutions, whether civil or religious, is the ardent wish of

Your obedient servant,
Rev. M. M. Mason.

Peter MacIntyre,
Principal of the Macon Academy.
Griffin's Series of Southern School Books.

Sir—I have examined your late publication, the "Southern First Class Book," and find it a judicious and well arranged compilation, admirably adapted to Southern schools. It is a work that has been much needed at the South, and I have no doubt that its circulation will be rapid and extensive.

J. O'KIEFFE,
Principal of the Plumb Street Seminary, Macon.

From the Augusta Constitutionalist, Dec. 21, 1839.

"The Southern First Class Book," is the title of a new work we have just received from the publisher, M. M. Mason, A. M., Principal of the Vineville Academy. It is well spoken of and highly recommended, by a number of our most distinguished citizens, and from the little we have seen and read of it, we are led to the belief that it is just such a compilation as is needed in our different Schools. The work is handsomely got up, and printed on good paper.

From the Savannah Georgian, Dec. 31, 1840.

But the other day the frequent inquiry was made, "Who reads an American book?" It will soon be asked, who does not? Our Irving has established the literary fame of his country in every land, for more than one species of composition, while the pulpit, the bar, and the Halls of the National and State Legislature evince in bold relief the fact, that the School master has been abroad in our happy land. The Notts, the Wirts, the Jeffersons, the Madisons, the Wildes, the Grimkes, and other bright names in their peculiar walks, are inscribed, not on the annals of one State alone, but shine on the tablets of their country's history. The Statesman, and his pulpit eulogist, the scholar, and the barrister, the philanthropist and the poet, all contribute in their respective spheres, to elevate the moral tone of a nation's principles; and it is pleasant to behold their eloquent minds pressed as instruments in the great work of training the aspirations of youth in that path, which, when followed without deviation, leads to the lofty temple of science.

The volume before us is the first of a series of Southern School Books, published by Mr. BENJAMIN F. GRIFFIN, of Macon, in this State, and has been before the public about two years. In that period it has passed through three editions, and now enlarged, it has assumed a permanent form. The compiler of this interesting volume (Rev. M. M. Mason,) has performed well his task, and by his judicious selector, has rendered a service to teachers and their pupils, which will be duly appreciated.

We rejoice to find that his labors are already being rewarded in the estimation placed upon his Southern First Class Book, which, wherever it is known, is winning its way to public favor. We believe that it will not be confined to Southern Schools, but will soon be found in those of the North, for the lucid minds of their orators and poets, essentially contribute to enrich its pages.

Although designed more especially for the atmosphere of the South, a National tone pervades so generally the selections, as to make it acceptable to all sections—for what American youth is there who does not desire an acquaintance with the gifted minds of those American Patriots, who, though removed by distance, still breathe in the language of Washington, the sentiments his character inculcated.

In these pages this fellowship is brought about and encouraged, to be extended as the leisure of an ambitious mind will allow, and the communion thus effected between the young and those who have preceded them, cannot fail to exert a beneficial influence upon the actions of the former, when they arrive at that epoch when they shall be called upon to assume the mantles of their predecessors.

That this work will meet increasing patronage at the South, we cannot for a moment doubt, and it is a source of pride to the Southern reader, that although rich in its selections, there are not a few minds, even in our own State, whose treasures have not been extracted from their caskets, to gild the pages of the present publication. The fact shows the fertile field whence the publisher had to call his flowers for the advancement in science of the rising generation.
Griffin's Series of Southern School Books.

Sir—I congratulate you as the proprietor and publisher of a work so long needed here, as your third edition of "The Southern First Class Book." It is well adapted to the whole design, and will, no doubt, be much preferred in all the schools of the South and West.

GEORGE P. COOPER,
Rector of Ocmulgee Academy.

Having carefully examined the "Southern First Class Book," it affords me much pleasure to recommend it to public patronage. Its real merit could scarcely fail of securing it a most favorable reception. Its particular adaptation to Southern Schools I think an additional reason for its general and speedy adoption.

NATHAN LONGFELLOW,
Principal of the Female High School, Scottsboro.

I have the "Southern First Class Book," by M. M. Mason, in use in my academy, and take pleasure in bearing testimony to its peculiar merits and adaptation to the wants of those institutions for which it is intended.

MILTON WILDER,
Principal of the Jefferson Academy.

Richland, Twiggs Co., Feb. 8, 1840.

DEAR SIR—But a cursory examination of the reading books now used in some of our academies, is requisite, to discover that they contain sentiments inimical to Southern institutions, and therefore unfit to be placed in the hands of those who are shortly to act their parts as citizens of the South. It is important, also, to interest pupils in any branch they pursue. To give them a work whose authors are mostly their acquaintances, and imparting sentiments congenial to their own feelings and principles, will measurably effect this desirable end. The "Southern First Class Book," portraying briefly the genius and sentiments of the South, is admirably adapted to secure these objects—The introduction of it in my school as the principal reading book, is not only to encourage Southern publications, but from a conviction of its own utility, hoping also that it may shortly supercede every similar work in Southern academies.

MILTON E. BACON,
Rector of the Richland Academy.

Mr. B. F. Griffin.

Savannah, Ga. April 11, 1840.

MR. GRIFFIN—I have examined the "Southern First Class Book," which you had the kindness to present me through Mr. Boardman, and I feel a pleasure in saying that I regard it as meriting the most extensive patronage.

GEORGE WHITE,
Principal of the Savannah Academy.

Georgia Female Academy, February, 1840.

The Southern Second Class Book is a compilation judiciously selected, and aptly designed to catch the attention—awaken the interest and promote the love of reading among the children for whose benefit it has been prepared. Without making any ostentatious claims to extraordinary merit—to exclusive preference, it is yet entitled on many considerations to circulation and use. We hope the toil of the compiler will meet with its just reward in the general adoption of the work by the Southern schools.

G. F. PIERCE, Pres't.
W. H. ELLISON, Prof.

DEAR SIR—The copy of the Southern Second Class Book you had the goodness to forward to me was duly received, and I have given it a sufficient examination to convince me of its superior merits. It is what our middle classes need; and its compilation, and the dress in which it appears, reflect equal credit on both the compiler and publisher. You have our most hearty wishes for success in your endeavors to furnish our Southern schools with Southern books.

J. DARBY, A. M.,
Principal of the Sigourney Institute.
Griffin's Series of
SOUTHERN SCHOOL BOOKS.

SOUTHERN FIRST CLASS BOOK; OR EXERCISES IN READING AND DECLAMATION: Selected principally from American Authors, and designed for the use of Schools and Academies in the Southern and Western States. By Mrs. M. Mason, A. B.

Having carefully examined the Southern First Class Book, it affords me much pleasure to recommend it to public patronage. Its real merit could scarcely fail of securing to it a most favorable reception. Its particular adaptation to Southern Schools I think an additional reason for its general and speedy adoption.

NATHAN LONGFELLOW,
Principal of the Female High School, Scottsboro.

SOUTHERN SECOND CLASS BOOK; designed for the middle class in the Schools of the Southern and Western States. By Mrs. Sarah L. Griffin.

GEORGIA FEMALE COLLEGE, February 1840!

The Southern Second Class Book is a compilation judiciously selected, and aptly designed to catch the attention, awaken the interest and promote the love of reading among the children for whose benefit it has been prepared. Without making any ostentatious claims to extraordinary merit—to exclusive preference, it is yet entitled on many considerations to circulation and use.

We hope the toil of the compiler will meet with its just reward in the general adoption of the work by the Southern Schools.

GEORGE M. ST. JOHN, Pres.

SOUTHERN THIRD CLASS BOOK; designed for the younger classes in the Schools of the Southern and Western States. By Mrs. Sarah L. Griffin.

MACON, GEORGIA, April 10, 1840.

Mr. B. F. Griffin—Whether for the school or nursery, I think the Southern Third Class Book one of the best little manuals ever printed: and do respectfully recommend it to every Mother and Teacher.

It seems to have been compiled strictly on the philosophical principle in juvenile instruction that "little things are great to little men," and the most important tenets in morals are here found dressed in the simplest garb; in language pure, but well adapted to youthful capacity.

GEORGE P. COOPER.

THE SOUTHERN PRIMARY READER; or Child's First Book: consisting of Progressive Lessons in words of One and Two Syllables. By Mrs. Sarah L. Griffin.

This little work is expressly intended for the Beginner. Not only the Alphabet, but the whole book is printed in a very legible type, rendering it perfectly suited to the little learner to distinguish at once the form of the letters.