FAMILIAR LESSONS

IN

BOTANY

WITH

FLORA OF TEXAS,

ADAPTED TO GENERAL USE IN

THE SOUTHERN STATES.

BY

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PREFACE.

IN presenting this volume to the public, the author feels compelled to explain its design. The book is an outgrowth of the wants of her own class-room, and was first used there, without any thought of publication. Finding the primary works too primary, and, therefore, not awakening the proper interest—the more advanced too scientific, thus at the very outset disheartening the pupil—she prepared these Lessons, endeavoring to combine simplicity of diction with some degree of technical and scientific knowledge, thereby leading the pupil gradually on to where he should get such glimpses of the wonders and beauties of Vegetable Physiology, and all the cognate subjects that make up the science of Botany, as to become willing to go with earnest zeal into the advanced works of WOOD and GRAY.

And here she would express her indebtedness to Professor WOOD for some admirable cuts, the perfection of which is unrivaled, being prepared by himself, who is at the same time botanist and artist. No student should be without WOOD's "Plant Record," a most valuable aid in his study of Plant Analysis.

The Flora appended is the Flora of the Southwest. As there has never been any report of consequence made of the Flora of Texas, she has in many instances stated where certain flowers are found in that young and growing empire. But the Flora is equally applicable and useful to the students of all the Gulf States—Arkansas, Kansas, and Missouri—as the flowers described are found there: also in Southern Illinois and Indiana.

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FAMILIAR LESSONS IN BOTANY.

CHAPTER I.

Introduction.

1. THAT science which treats of the vegetable kingdom we call Botany. The name is derived from a Greek word, *botanē*, which signifies plant. It tells us not only the names of grasses, herbs, flowers, and trees, but also how they grow and where; what they feed upon, and what they produce.

2. You will at once perceive the importance of this study and its intimate connection with agriculture, manufactures, chemistry, and the arts. A moment's reflection will also suggest the names of many well-known food-plants, as Indian corn, wheat, rye, oats, pease, beans, potatoes, coffee, tea, cocoa, and sugar-cane; clothing-plants, as cotton, ramie, flax, and hemp; dye-plants, as indigo, madder, woad, logwood, saffron, alkanet, etc.; medical plants, as poppy, aloes, jalap, Peruvian bark, etc.

3. To this kingdom the chemist turns as the great laboratory in which are the products that challenge his researches, and at the same time verify the truth of his speculations. Here he sees Nature quietly transforming

1. What is that science called which treats of the vegetable kingdom? From what is the word derived? What does botany tell us?

2. Mention the names of some clothing-plants. Food-plants. Medicine. Dye-plants.

3. What does the chemist see?

minerals and metals, acids and alkalies, solids and gases into pleasant and agreeable food for the animal creation; while he stands awed at beholding in the humble grass of the field a power and capability of chemical analysis and combination that all his wisdom, with the best-contrived laboratory, cannot essay to imitate.

I have given you a glimpse into the world whose wonders, beauties, and uses I wish you to investigate. I shall endeavor to divest your study of all difficulties by plain and familiar conversations, avoiding learned technicalities as much as possible, and aiming to make you thoroughly acquainted with the groundwork of the science, that you may be prepared to study with pleasure and profit the more elaborate works of Wood, Darby, Gray, and others. As I take it for granted that you are beginners, I will commence where Nature commences, with the plant.

CHAPTER II.

Root.

SECTION I.—KINDS OF ROOTS.

4. THE *root* is that part of the plant which supports it in an upright position and supplies it with nourishment for its growth. The large body of the root, the descending axis of the plant, called the tap, serves the first-named purpose; but it is only the small fibrous rootlets that are furnished with mouths, by which nourishment is taken up from the soil and carried to the other parts of the plant. These mouths appear in the form of small sponge-like bodies on the sides and at the extreme ends of the fibers.

4. What is the root? What are its uses? What is the tap root? What of the fibrous roots? How and where do these mouths appear?

5. Their botanical name, *spongioles*, comes from their resemblance to a sponge, and their office of sucking up or imbibing moisture. Under the microscope, they do not exhibit a different organization from the minute radicles, but appear only as expansions of them.

6. *Radicle* is the name given to little roots or rootlets, and comes from the Latin *radix*, which signifies root.

7. Roots, when found penetrating the soil, and performing the offices of support and sustentation to the plants, are denominated ground-roots.

8. There are several varieties of *air-roots*: First, those which strike from the sides of the stem, but grow downward, ultimately entering the soil. A familiar example of these is seen in the Indian corn. Here you will perceive roots springing from the second and third joints of the stalk, and proceeding downward until they penetrate the soil to a depth equal to the ground-roots. These are found generally on the plants whose stems are tall and slender, where they perform the twofold work of fixing the plant more securely to the soil, and of drawing up nourishment for its growth. This additional support is very necessary to the Indian corn, whose slender stalk, laden with such a weight of leaves and ears, is unusually liable to be prostrated by both wind and rain; and even with all the precaution of this double stay and prop, it is not uncommon to see whole fields of it leveled to the ground after a heavy rain-storm.

9. Secondly, plants throw out *aerial* roots, which do not

5. What is the botanical name of these mouths? From what derived? Do they, under a microscope, exhibit a different organization from the fibrous root?

6. What is a radicle? From whence is the word derived? Its signification?

7. Roots that penetrate the soil, and support and nourish the plant, are called what?

8. Are there several varieties of air-roots? What is the first? What purpose do the air-roots of Indian corn serve?

9. What is the second kind of air-root? What is their use? The work they perform is similar to what? What plant has the second kind of air-root? What proof that these roots are not feeders?

seek the soil, but attach themselves to other plants, to the sides of buildings, etc. They are more useful to support the plant in its place than to nourish it, and they thus *perform the work of tendrils*. Of this class is the Virginia creeper, *BIGNONIA grandiflora*. A proof that its aerial roots are not feeders is, that it never injures the tree to which it attaches itself, any more than the grape or any other air-rootless creeper.

10. The third class of air-roots do not attach themselves to anything, but hang from the plant like seemingly useless threads. These roots draw nourishment from the air, and a plant so fed will continue to grow for years in a suitable atmosphere, merely suspended in a room. These are called *Epiphytes*, from the Greek word *epi*, upon, and *phuein*, to grow. I have seen a leaf of this kind transfixed to the side of a plastered wall, pretty much as an entomologist would secure a bug. There it threw out roots from the terminal point of each primary vein, and in a few weeks the whole margin of the leaf was adorned with tiny plants, fed by these air-rootlets. Spanish moss, *TILLANDSIA usneoides*, is an epiphyte.

11. In the mistletoe (*Viscum flavesces*) we have an example of roots that fix their abode upon and draw nourishment from other plants. These are called parasites, from the Greek *parasitos*, which means an eater at the table of another, that is, to be fed or nourished by another. These plants often destroy the tree upon which they fix themselves.

12. Roots when found growing in water are called aquatic (*radix aquatica*). I gave you the derivation of root from *radix*. I will now tell you that aquatic comes from *aqua*, which signifies water. Some of the aquatic roots

10. Is there still another class of roots? Their names? What is the name Epiphytes derived from?

11. How does the mistletoe grow? What are these kinds of plants called? Its signification? Do they injure the tree upon which they grow?

12. Roots, when growing in water, are called what? Derivation of aquatic?

serve no other purpose than to supply the plant with nourishment, having no fixed place, but drifting hither and thither with the waves.

13. The little miniature plant, duck-meat (*LEMNA minor*), that covers the surface of so many of our ponds and bayous, is a familiar example of the unfixed, floating aquatic plant, while the *NYMPHÆA odorata*, common pond-lily, though often found in water from ten to fifteen feet in depth, is ever anchored firm and strong. Thus moored, it sways upon the tide like some fairy barque laden with beauty and perfume.

14. A plant called by our Mexican neighbors the *siempre viva* belongs to the Lycopodium tribe, and seems to be the connecting link between all the other mentioned roots. It possesses the extraordinary power of lying dormant and apparently dead for an indefinite period, months or years, in an atmosphere however dry and unfavorable to vegetable life, and then to be called into perfect and active existence again by the application of water. A dead, crisp, unsightly thing was brought to me by an officer of the army, who had found it, during a hard wind, blown like a dry burr through a mountain-pass in Arizona. It lay in his haversack over a year, and when he brought it to me it was literally "a root out of dry ground, without form or comeliness." Following his directions, I placed it in a shallow saucer of water, and what was my astonishment to see it commence in a few minutes to expand and grow green, its black, crisp roots becoming flexible and golden, and soon a plant not unlike a rose in shape, with imbricated leaves, expanded its living green cup to my delighted gaze, and the Resurrection Rose, as it has been happily called, in all its mysterious beauty stood before me. I have been told by those who have had the opportunity of observing its habits, that this plant has no fixed place of abode;

13. What can you tell of the root of the *Lemna minor*? *Nymphæa odorata*?

14. What of the *siempre viva*? Why is it called the Resurrection Rose?

that for eight or nine months it lies coiled up like a hedgehog, its crisp, brown leaves presenting no more appearance of life than the empty bur of last year's chestnut. In this condition it becomes the foot-ball of the winds, and is taken up hill and down dale, over the heated rocks and through the arid sands, but called into life and beauty when the hollows and crevices of the rocks become filled with water during the rainy season. Then its roots strike downward, its leaves expand, and countless young plants spring up around the parent stem, to be broken asunder during their future wanderings in wind and weather.

15. I have now told you that roots are — 1st. Those growing under-ground, and nourishing the plant. 2d. Those commencing their growth above, but finally penetrating the soil. 3d. Those plants that are supplied with ground-roots for nourishment, and air-roots for support. 4th. Those roots which are simply air-roots for nourishment. 5th. Those roots growing upon other plants for support and nourishment. 6th. Those growing in water, not fixed to the soil. 7th. Those growing in water, fixed to the soil. 8th. Those fixed in water and soil part of the year, dry and unfixed the rest of the time. These, however, are all placed under three general heads: the ordinary ground-root, air-root, aquatic root.

SECTION II.—DURATION OF ROOTS.

16. Roots have different durations, and are classed under names expressive of their term of life. *Annual* roots belong to those plants which come from seed in the spring, bloom in summer, bear seed in autumn, and perish with the year. This word we also owe to the Latin *annus*, a

15. Please tell me, in regular succession, the different kinds of roots. These eight are placed under how many heads? Their names?

16. Have roots different durations? What is the first mentioned? From whence is the word derived? Signification?

year. It means anything that returns every year. Balsams, China aster, Indian corn, wheat, etc., are annuals. If you wish to have these things in your gardens and fields, you must sow them every year.

17. *Biennial* roots (Latin, *bis*, twice, and *annus*, year) are those plants which live two years, as the name suggests. The seed is sown in spring, but the plant does not bloom until the next year. That is, it comes up in the spring, lives through the summer, fall, and winter, blooms the next spring, bears seed in summer, and dies in autumn. It will perhaps not be out of place to mention here a peculiarity of many of the biennial family; that is, their care for the future, storing up food in root, stem, and leaf, the first summer, for the development of flower and seed the next. The turnip, beet, and potato are familiar examples of the food stored in roots. The cabbage and spinach in leaves, and the banana and potato-cabbage in the stem. During the first summer these organs are juicy and succulent, cellular tissue predominating, and forming a very important part of the food for man and beast. The second summer, when the flower-bud springs, this food is drawn up to support the growing shoot and perfecting seed. When the latter are fully matured, the root, stem, or leaf, as the case may be, is found to consist entirely of woody tissue, the cellular all having been exhausted for the growth and development of bud, flower, and seed. The *GILIA coronopifolia*, known to the children of the Southwest as the Texas plume, the *EUCHROMA coccinea* called the Mexican blanket, mustard, and cabbage are biennials. Perennial roots (*perennis*, through the year) are plants whose term of life is indefinite. We therefore find

17. From what is biennial derived? What remarkable provision for the future do many of this family exhibit? When do they store their food? For what purpose? Examples of food-storing plants? What kind of tissue predominates the first summer? What the second? What has become of the cellular? Do biennials constitute an important article of food? Mention some. Some noted for their flowers.

in botany that the oak, cedar, orange, mezquit, retamma, grasses, etc., are called perennials.

SECTION III.—FORM.

18. You will find a distinguishing feature of botany to be that it calls for a close and marked observation of seemingly unimportant particulars. Frequently the identification and separation of a plant from all its congeners will hinge upon what a casual observer would consider a trifle quite unworthy of notice. This is as true of the study of the root as any other organ. We have talked about the situation, uses, and duration of roots, but still a very important part of the study is yet before us; that is, the different forms under which roots present themselves.

FIG. 1.

19. Perhaps we see the fibrous (*Radix fibrosa*—*fibra*, thread) as often as any other. Most of the grasses and many annuals have this form of root, resembling a bunch of threads tied together. Plants that frequent dry, sterile sands are furnished with fibrous roots, these having a greater number of spongioles by which to absorb the scanty nourishment.

20. CREEPING ROOTS (*Radix repens*—*repens*, creeping) send out branches that do not penetrate downward, but run horizontally along the surface, sending down fibers here and there along the stem. On the Mexican Gulf coast we find almost all the plants with these

18. What is a peculiar feature of botanical investigation? What do we now proceed to talk about?

19. Describe the fibrous root. Where are they generally found?

20. What of creeping roots? What does *repens* mean? What of Holland? What lesson should we learn from the *radix repens*?

roots; in fact, wherever the soil is loose and yielding, Providence stations these guardians, whose apparently feeble

FIG. 2.

threads effectually bind the gliding feet of the sands. Holland would have long ago, in spite of all the mechanical skill of her engineers, been swept into the sea, but for these seemingly insignificant roots that meander like life-veins through her soil. We should learn a lesson of wisdom from the *Radix repens*, when we see them accomplishing what blocks of granite and walls of iron could not do. With the small things of earth God often confounds the mighty, and it would be well for us to remember this oftener than we do. Examples of creeping roots are found in the violet, strawberry, and many grasses.

21. FUSIFORM ROOT (*Radix fusiformis*—*fus*us, spindle, and *forma*, shape). This root is large above, but gradually diminishes to a point. Many garden vegetables possess this form of root, as the beet, radish, and parsnip.

22. NAPIFORM ROOT (*napus*, turnip) is large at the upper part, and becomes suddenly small.

FIG. 3.

23. BRANCHING ROOT (*Radix ramosa*—*ramus*, a branch)

21. What is a fusiform root? From what is the name derived?

22. Napiform? Its derivation? Examples of napiform root?

23. Branching?

(Fig. 5) presents much the same appearance as the stem and branches would if stripped of the leaves, and is recog-

FIG. 4.

FIG. 5.

nized by botanists as the true type of roots. Examples are seen in all shrubs and trees.

- 24. TUBEROUS ROOTS** (*Radix tuberosa*—*tuber*, a knob) are hard, fleshy bodies, growing sometimes at the ends of the fibers, and again strung irregularly along upon them. The potato, ground artichoke, and the Mexican vine are tuberous roots.

FIG. 6.

- 25. BULBOUS ROOTS** (*Radix bulbosa*—*bulbus*, bulb) (Figs. 7, 8, 9) are divided into *corms*, or solid bulbs, as the gladiolus; *tunicated*, or coated, as the onion; *squamous*, or scaly, like the lily.

- 26. The RHIZOMA** grows horizontally, throwing out fibers and putting forth leaves only at one end. These

24. Describe a tuberous root.

25. Bulbous. Derivation of bulbous? Corm? Tunicated? Squamous bulb?

26. Describe the rhizoma. Examples. Are there other subdivisions of roots? What have you now learned?

leaves, as they fall off, leave scars, as seen in the cut. As this root grows at one end, it gradually dies at the other.

FIG. 7.—CORM.

FIG. 8.—TUNICATED.

FIG. 9.—SQUAMOUS.

Iris, calamus, day-lily, and ginger are examples of the rhizoma. There are many other subdivisions, but I have mentioned enough to enable you to classify pretty accu-

FIG. 10.

ately the most important varieties. You have now learned the uses of the root, its places of growth, duration, and form.

27. You will now repeat what I have told you: That there are—1. Ground roots; 2. Air roots; 3. Water roots; 4. Fixed roots; 5. Floating roots; 6. Roots for support and nourishment; 7. Roots merely for support; 8. Roots simply for nourishment; 9. Roots fixed upon and nourished by other plants; 10. Annual; 11. Biennial; 12. Perennial.

That they are—1. Fibrous; 2. Creeping; 3. Fusiform; 4. Napiform; 5. Branching; 6. Tuberous; 7. Bulbous; 8. Rhizoma.

28. The work of supplying the plant with nourishment has merely been stated. The process by which this is done shall be more fully explained in a future chapter, when, after the description of other organs, you will be more fully able to comprehend the higher functions of this. I have now finished what I purpose to tell you about roots; and as this is the first *organ* we have had under consideration, I will now explain to you, before we go any further, what an organ is.

29. Webster says, “An organ is an instrument or medium by which an important action is performed, or an important object is accomplished; a natural part of a living existence, capable of special functions that are essential to the life and well-being of the whole.” For instance, your heart is an instrument that performs the very important action of sending the blood through every artery in your body; it is a natural part of your living existence; that is, it is no artificial addition made after you had come into existence. It performs the office I mentioned above, receiving and propelling the blood; it does it independently, that is its special function, no other part of you can do it, and it is so entirely essential to your life that should it cease to beat ten minutes, you would cease to live.

30. We have seen that the root is an instrument by which an important action is performed, an important object accomplished, imbibing moisture and food from the soil, nourishing the plant, and fixing it in its place of abode. We furthermore have seen that no other part of the plant could do this work; and as the plant would per-

28. Has the process by which plants are nourished been explained? Why not?

29. Give Webster's definition of an organ.

30. What have we seen concerning the root? Shall we therefore call it an organ?

ish without it, we find that the root is essential to the life and well-being of the plant. Consequently we see that the root is an organ.

CHAPTER III.

The Stem.

SECTION I.—KINDS OF STEM.

31. THE stem is that part of the plant which supports the leaves, flowers, and fruit. The three great classes of Exogens, Endogens, and Acrogens constitute the first grand divisions of stems. These names express their different manner of growth, and mean simply outside growth, inside growth, and increasing in growth from the extremity.

32. EXOGENOUS plants grow by successive *additions* to the outside of the wood, a ring being formed each year, between the previous year's growth and the bark. They are furthermore distinguished by a light elastic substance occupying the centre of the stem, and well known under the familiar name of *pith*.

33. Medulla is its botanical name. This is large in young plants, but becomes partly absorbed by the growth of the plant, and partly compressed into thin plates that are found to extend through the woody portions, terminating in the bark, and dividing the wood into wedge-shaped portions. These divisions are called *medullary* rays. They

31. What is the stem? What is the first division of stems? What do their names imply?

32. How do exogenous plants grow? What furthermore distinguishes them?

33. Is this medulla larger in young plants? What becomes of it? What are the transverse lines of pith called?

are very plain to be seen in a transverse section of any exogenous stem, particularly some varieties of the oak. It will generally be found that the larger the space occupied by the medulla or pith, the harder is the surrounding wood, a wise provision of Providence to compensate for the weakness of the interior. For instance, the cane (*Arundinaria macrostema*), three-fifths of whose diameter is occupied by pith, has its surrounding wood almost as hard as a bone.

34. The ENDOGENOUS plants increase by internal growth and elongation at the summit, the wood growing in bundles and irregular distribution through the whole mass; the outside presenting more the appearance of scales and scars from the falling off of the leaves, than the bark proper, as seen in the exogenous family.

35. A botanist needs only a bit of stem of each of these to determine immediately the family to which it belongs. The first, exogen, will present a series of rings; in the centre will be the pith—surrounding this, concentric layers of wood, and then the bark; while the latter, endogen, has no pith, and the wood consists of fibrous bundles distributed in irregular masses through the cellular tissue of the stem, and with no true bark. You may be surprised to learn that from these same bits of stem he can tell you how the embryo, the first rudiments of the plant of each, appeared; the exogenous embryo having two seed-leaves (only a few have several in a whorl), with their true leaves net-veined, as in Fig. 11; while the embryo of the endogen plant has one cotyledon, and its true leaves are parallel-veined, as in Fig. 12.

36. ACROGENOUS means increasing in growth from the extremity. They are plants which grow taller, but do not

34. How does the outside appear?

35. What does a botanist only need, to determine one of these families? How will the exogenous stem appear? The endogenous? What further can he tell? What kind of leaf has the exogen? The endogen?

36. What plants are found in the exogen? Endogen? Acrogen?

increase in diameter. In the *first* class we find the oak, pine, pride of China, etc. In the *second*, the palm, yucca, banana. In the *third*, the ferns, mosses, etc.

37. Now, after examining the three primary or grand

FIG. 11.

FIG. 12.

divisions of stems, we will observe that the stems of some plants are soft and watery, and others tough and hard. The first are *herbaceous*, as mint, poke-weed, etc.; the second we call *woody*, as lilac, rose, and althea.

38. The main stem of a shrub or plant is called the *caulis*; the stem that supports the flower, the *peduncle*. When the peduncle is subdivided it is a *pedicel*. If a plant has one single stem, as the lily, it is said to be *simple*; if branching, as in the dahlia, it is compound; if the stalk springs from the root and bears the flower, but no leaf, it is called a *scape*. A jointed hollow stem is called a *culm*. The grasses, bamboo, cane, etc., have this kind of stem. When the flower is set down upon the main stem without any peduncle or flower-stalk, it is said to be *sessile*. A leaf also is sessile if it has no petiole or leaf-stalk.

39. There are some plants that present no division of stem and leaf; they appear as part of each other, and bear the flower and fruit upon the edges and under surface of

37. What further is to be observed respecting stems? What are soft stems called? Hard stems?

38. What is the main stem of a plant called? What the stem that supports the leaf? What the flower? When the peduncle is divided? If a plant has a single stem, what is it called? If branching? If the stalks spring from the root, supporting only the flower? What is a culm? Example. When is a flower sessile? When is a leaf sessile?

39. When plants present no division of stem and leaf, where do they bear the flower and fruit? Explain the cut (Fig. 13), and tell me what a stipe is.

the leaf. These are called *fronds*. Ferns are called fronds. The leafless part of a fern, the stem of a mushroom, the

little thread that supports some winged and downy seeds, are called *stipes*. Here is a dandelion seed (Fig. 13); *a* is the seed, *b* the stipe, and *c* the down. You are familiar with the mushroom. It looks like a tiny umbrella, the stem or handle being the stipe.

FIG. 13.

40. Now I have told you that the first grand division of stems is into Exogenous, Endogenous, and Acrogenous, and that exogenous stems are divided into herbaceous and woody; these are either simple or compound: if compound, the divisions are called branches, and if again subdivided, they are called boughs.

41. Herbaceous plants are soft and watery. Annuals are herbaceous; perennial plants are woody, though all woody plants are not perennial, yet they are longer lived generally than the soft-stem plants. Geologists tell us that acrogens, plants with stipe stems and fronds, were first formed. They call the carboniferous era, the period when coal-plants grew, the age of acrogens. Carboniferous means bearing or producing coal. What a singular appearance our globe must have presented when nothing but feathery fronds, from the tiny leaf soft as down to the gigantic tree-fern, waved their feathery foliage in the primeval air, we can form some faint idea when looking upon the wild wilderness of ferns growing in rank luxuriance as they do in the alluvial "bottoms" of the rivers and bayous of the South and West. We learn also from geology, that after the acrogenous came the cauline or branching variety of

40. Repeat what you have learned respecting the divisions of stems.

41. Are annuals herbaceous? Are *all* woody plants perennial? What class of plants do geologists tell us was first formed? What do they call this period? Meaning of carboniferous?

NOTE.—The teacher will explain this a little further.

stems. Before closing this chapter on stems, let me tell you something of the *Cuticle*, *Epidermis*, and *Bark*.

SECTION II.—CUTICLE.

42. The *cuticle* is a membranous substance covering the whole plant from root to anther-box, with the exception of the spongioles and the stigmatic surface of the pistil.

43. The *epidermis* is the exterior layer of the true bark; it also underlies the cuticle of the leaves, etc. Under the microscope it is seen to consist of layers of flattened cells, sometimes of one layer only, again of many. This membrane is full of pores on the under side of the leaf. These mouths are very evidently designed to carry off all superfluous moisture and unnecessary gases elaborated by the assimilation of sap. Upon the epidermis are found various organs, as **HAIRS, STINGS, PRICKLES, GLANDULAR HAIRS, SCURF, and LENTICELS.**

44. *Hairs* are formed of cells proceeding from the epidermis. They are covered with the cuticle.

45. *Stings* differ from hairs in the fact that they spring not immediately from the epidermis, but from cells rising above it, which cells contain an active poisonous fluid which is sent up the hollow hair and through the orifice at the top by the slightest pressure. *Prickles* are from the cuticle, and are hooked and stiff. They fall off as the stem increases, and are therefore found upon new wood, and very rarely upon old.

46. *Scurf* is a scaly substance, caused, as some botanists suppose, by the cohesion of many minute hairs.

42. What is the cuticle? Where found?

43. What is the epidermis? Its appearance under the microscope? What is this membrane full of? How are these pores formed? Their use? Mention the names of the organs found in the epidermis.

44. What are hairs? With what are they covered?

45. What are stings? How do they differ from hairs? What are prickles? Do they adhere permanently?

46. Scurf?

47. *Lenticels* are the spots, mostly of brownish color, found on the surface of cherry and other trees.

48. The BARK is beneath the epidermis, and consists of several layers.

49. During its early stages it presents a uniform structure, and is entirely cellular; but as the tree advances, lactiferous vessels and woody fiber are introduced into the inner portion, which is called *liber*. Here is obtained the fiber of flax, hemp, and ramie, which furnish to the manufacturer materials for the gossamer laces of Brussels and Valenciennes, as well as all the gradations from these down to carpets, sail-cloth, and bagging. From the liber of some plants a beautiful paper is obtained, and the natives of the South Pacific isles procure a lace of exquisite texture from the inner bark of one of their forest-trees. Before leaving the subject of the inner bark, I will mention the fact that the substance of which it is composed, *woody fiber*, is remarkable for its indestructibility by decay. You may take the linen that has lain in a Theban tomb three thousand years, grind it to a powder, and boil it to a pulp, and the manufacturer will present it to you again, in a week, in the form of paper for your letters, or bound in a volume to become the custodian of the mental labors of a Humboldt or the songs of a Tennyson.

50. The outer layer of the bark is called *cellular integument*. It varies in thickness in different plants. The *QUERCUS suber*, cork-tree, has it prodigiously developed, and furnishes thereby the cork of commerce. It is not so useful to man as the liber or inner layer, yet, besides the very important contribution already mentioned, we are indebted to it for many esculent roots, which by cultiva-

47. What are lenticels? Where seen?

48. Where is the bark situated? Of what does it consist?

49. Where is the liber? What is obtained from it? What is the outer layer called?

50. What tree has this integument largely developed? What are the offices of the bark? Tell me some of the substances found in the bark.

tion have increased their cellular integument, and thereby, from being totally worthless, have become food for man and beast. The bark seems to perform several functions, as the protection of the new wood, forming a channel for the descending elaborated sap, and for the secretion of various products, such as cinchona in the Peruvian bark, tannin in the oak, and what is more familiar to you, sweet-gum in the liquid-amber or sweet-gum tree.

CHAPTER IV.

Buds and Leaves.

SECTION I.—BUDS.

51. If in the summer you will observe a branch of hickory, oak, or almost any other tree belonging to the exogenous family, you will perceive in the axil of the leaf and at the extremities of the branches, little round or oval bodies; watch them as the season advances, and you will perceive them slightly increasing, and scales forming over them. When autumn robs the tree of its leaves, the protuberances will be found to be arranged along the tree at regular intervals, either alternate, opposite, spiral, or in whorls. These points of situation of the buds are called *nodes*.

52. In some cases these are covered with a substance not unlike varnish. The object of these scales and this varnish will be very evident when you are told that in the little bud is wrapped the infant leaf or flower of the coming spring. Cut the bud of the hickory (I mention this be-

51. What is the subject of the fourth chapter? What changes occur in a branch of oak or hickory? When are the buds formed?

52. How are buds protected from the cold?

cause it is one of the largest and best-developed scale-buds found in our forests), and you will find a tiny bundle of soft, moist, colorless leaves, folded so compactly together that the most delicate instrument cannot lift one fold without wounding the other. Over this is a roll or envelope of thick substances, around these a tunic of felt-lined leaves, over this still another set of leaves covered with a delicate varnish, and finally scales complete the external wrappings. Now the Empress of all the Russias never laid her babe into a more carefully prepared cradle, for Mother Nature is determined that neither rain nor dew nor chilling blasts shall disturb the winter slumber of her little ones.

53. When spring comes with its sunshine, balmy breezes, and soft showers, it sets the sap, the blood of the vegetable world, coursing through a million veins. These buds, warmed by the sunshine and fed by the sap, awake, and burst one dry scale after another, till soon little eyes are peeping forth from every node to bid the spring good-day. The sap still rises and goes rushing through the boughs, the buds push on and out, and soon young branches are stretching their limbs to the air, while the leaves are clapping their hands to the merry breezes that are singing along. Thus you see these buds are the rudiments of future branches and flowers.

54. Various theories have been offered as to their origin, and I don't believe that the now generally accepted theory of their being an outgrowth of the medullary process is any nearer the truth than many hypotheses long since discarded. The microscope reveals the fact that the sap takes up molecules of regular form, but whose tenuity and transparency have heretofore baffled the investigation of the most powerful lens. I believe them to be germs which,

53. Repeat the changes wrought by the coming of spring. Buds are rudiments of what?

54. Is their origin satisfactorily explained? What theory is here suggested?

by the action of elements drawn from the atmosphere and the earth, become elaborated into a perfectly *organized embryo*. This is taken by the descending sap in the fall and deposited at each node, where it remains until the warmth of spring quickens it into life. To make it plainer, we will say that a little egg is placed by the sap into these nests, the scaly buds, and when the sunshine hatches them they push through the scales and come forth as leaves, branches, and flowers. That simple process known to every practical gardener, called *budding*, goes to confirm this hypothesis relative to the original and independent existence of the bud germ. If, while the bud is yet in its normal condition, disconnected from the medullary process and the woody fiber, that is, before development commences, you take a sharp knife and remove it carefully from the parent stem, you can deposit it as safely and successfully in another, where it will grow and flourish, as the poulterer can remove an egg from one nest to be hatched in another, and under a different hen.

55. It is evident that if this bud was a development of some other part of the plant, an outgrowth of the *medullary process* or the *woody fiber* as some maintain, and consequently vitally connected therewith, a removal in its earliest stage would be more fatal to its life and growth than were that operation postponed until higher development should make its power more *self-sustaining and independent*. But this is not the case; it is only when the embryo bud lies an independent atom in the scale-bud that it can be removed at all. You understand that this is offered as a mere theoretic speculation, not an established fact.

56. Buds are arranged at regular intervals along the stem, and the points from which they spring are called *nodes*; the spaces between, *internodes*; and the bud

55. What is evident? When only can a bud be removed?

56. How are buds arranged? What are those points called? What the spaces? Bud on the extremities?

upon the extremity of the branch is called the *terminal* bud.

57. There are three kinds of buds: flower buds, leaf buds, and mixed buds. The flower bud is generally roundish, and contains the rudiments of one or more flowers. The leaf bud is longer than the flower bud, and contains not only the leaf, but the rudiments of the future branch. Consequently, the arrangement of the branches on the tree must be identical with the situation of the leaves. Mixed buds contain both leaves and flowers. The lilac bud, if cut longitudinally, and placed under a magnifying glass, will exhibit a beautiful example of this kind of bud; its leaves and flowers will be seen compactly inclosed together.

58. I have now told you where to find the buds, how they were protected during the winter, and that there were three kinds of buds. But there are a great many trees that have no scale buds at all. The young buds make their appearance and push out from the node at all seasons of the year, seemingly in the most reckless and disorderly manner. These trees, however, are not so improvident and foolish as you might suppose. The fact is, they are all natives of warm climates, where such precautions as extra coverings, felt-lined leaves, varnished coats, and dry scales are totally unnecessary. The men and women of tropical countries do not dress in woollens and furs, neither do the plants put on extra covering. Nature does no unnecessary work; we always find everything properly adjusted to the circumstances that surround it. Some trees, when taken from the tropics to more northern climates, form scales for their buds, and are thus enabled to contend successfully with the rigors of climate, while others

57. How many kinds of buds are there? What of flower buds? Leaf buds? Mixed buds? Example of mixed buds?

58. What have you now been told? Are there trees that have no scales? Why do not the trees of tropical climates form scale buds? Do they ever learn to do it? Mention some.

never do. The horse-chestnut, owing to this accommodating faculty, has become one of the most prized ornaments of our avenues and gardens; while the orange, after years and years of endeavor on the part of horticulturists, thrusts its young buds into the chilly air to perish at the first breath of Jack Frost.

SECTION II.—THE LEAF.

59. The *leaf* next claims our attention. All leaves are not packed up alike. Each species of tree differs as much in that respect as in any other. In fact, there is nothing which charms a botanist more than this endless variety. From the infinitesimally small grain of pollen to leaves, boughs, and roots, each tree has its own undeviating form, its characteristic peculiarity that never varies.

60. Thus the rose family invariably fold their leaves upon themselves, and hence their leaves are said to be *conduplicated*, from the Latin *conduplicare*, to double, to fold up.

61. When the surface of the leaves are applied to each other without being rolled up, they are said to be appressed (Latin, *appressum*, pressed to). When they lie over each other, like tiles on a roof, they are called imbricated (*imbricatus*, covered with tiles). When the margin of the leaves roll inward they are involute; when outward, revolute; when one leaf incloses the margin of the opposite leaf it is obvolute; when they overlap, or ride each other, they are called equitant (Latin, *equitare*, to ride). When they are rolled from the apex downward they are circinate.

62. This arrangement of leaves within their buds is called vernation or perfoliation.

59. What is the subject of this section? Are all leaves packed up in their buds alike?

60. How is the rose family folded?

61. What are their leaves said to be? What is appressed? Involute? Revolute? Obvolute? Equitant? Circinate?

62. What is this arrangement of leaves within their buds called?

63. You have now learned that leaves spring at regular intervals along the branches, and that these points are called nodes; that their different manner of folding themselves in the bud is called their vernation. You see from

FIG. 14.

this cut that the leaf is divided into three parts: *a* is the petiole or leaf stalk, *b* the midvein, and *c* the lamina. The petiole, if you will observe, seems to run through the entire length of the leaf, and is called the midrib. It supports the leaf, and from it the veins which form the netted framework of the leaf springs. Those veins which spring from the midvein are called primary, those branching from the primary are called secondary, and the smallest are veinlets. The midrib is never wanting, though the petiole is. I have before told you that a leaf destitute of a petiole was said to be sessile.*

* Prof. McCosh, some years ago, presented to the *British Association for the Advancement of Science* a paper upon the venation of exogenous plants, in which he asserts that the leaf is the type of the whole plant, that the distribution of the branches along the axis and the distri-

63. What have you now learned? What does the cut represent? How many parts has a leaf? What are they? How does the petiole run? What is it called? Veins springing from the midrib are called what? Have all leaves a midrib? Have all a petiole? When the petiole is absent, what is the leaf said to be?

64. The substance that constitutes the lamina (a word that means plates or scales, hence the term as applied to the blade of a leaf, that is, the thin expanded portion of the green leaf, the petiole of the flower, or the sepal of the calyx) is called cellular tissue, and the thin green skin which covers the whole is the cuticle.

65. If you take any thick fleshy leaf, as the Madeira-vine (*Basellaceæ baselloides*), pond-lily, or cabbage, you can with a delicate penknife or a needle-point lift this covering or cuticlè, and discover beneath the very different texture of the cellular tissue. Cellular tissue, when magnified by a strong glass, presents the appearance of an immense number of little sacks or cells cohering together, and are in reality tiny bladders or sacks in a greater or less degree of cohesion.

66. The cuticle, under the microscope, exhibits hundreds of minute pores, especially that from the outside of the leaf. These mouths or breathing-places are called *stomata*.

67. In my remarks upon the epidermis, I told you something about the breathing-pores. Those in the cuticle are the same in their appearance and office. Leaves are furnished with these mouths to inhale such things as are necessary for the plant, and exhale all superfluous or unnecessary gases, moisture, etc., elaborated by the process

bution of the veins in the leaf always correspond. When the branches are whorled the leaves are also whorled, as in the rhododendron, or the veins of the individual leaf, as in the common sycamore and lady's-mantle. When the leaf has a petiole, the tree has its trunk unbranched near the base, as is the case in the sycamore, cottonwood, etc.; and when the leaf has no petiole, the trunk is branched from the root, as in the common ornamental low shrubs, laurel, holly, *lagerstremia*, box, etc. I mention Prof. McC.'s theory that you may in your own observations verify the endless variety that is brought out by the Great Creator from one type. Everything in the whole round of scientific facts goes to prove that the idea of creation was conceived upon one broad, comprehensive, unified thought; each detail being worked out from the great central original type.

64. What is the *lamina*? What does the word lamina mean? To what applied? What is the substance called that constitutes the lamina of the leaf? What is the thin green covering called?

65. When this is removed, what is found beneath? Of what does this cellular tissue consist?

66. How does the cuticle appear under a strong glass?

67. The offices of these pores?

of assimilation. You see, therefore, that leaves perform the threefold function of mouth, lungs, and stomach.

68. What I told you concerning the root is equally applicable to the leaf; great care is to be observed concerning its shape, etc. Often a species is determined entirely by the leaf. Thus the violet family is divided into several species, the difference in the leaf constituting their basis, as the violet *sagittata*, violet *rotundifolia*, that is, arrow-shaped and round leaves.

69. When plants are destitute of leaves, which is sometimes the case, they are said to be *aphyllous*. Mushrooms, some seaweeds, garlic, rushes, etc., are all aphyllous, without leaves.

70. The first leaves that appear are seminal, from *semina*, seed, and are named *cotyladons*, or seed lobes. Those that appear first after the seed leaves are called primordial. Those upon the fully matured plant are styled characteristic. When the leaf springs from the root, like the dock and plantain, it is said to be radical; when from the stem, cauline; when on the stem, sessile. And we describe their position further by the terms *alternate* and *opposite*, as they may be situated, thus:

FIG. 15.—OPPOSITE.

FIG. 16.—ALTERNATE.

71. The duration of all leaves is not the same. Some fall off as soon as they expand, and are then said to be

68. Why must care be observed relative to the form of the leaf?

69. When a plant is destitute of leaves, what is it called?

70. What are the first leaves called? Have they any other name? What is seminal derived from? Those that succeed them? Those on the mature plant? When a leaf springs from the root? When from the stem? How are they further described?

71. Is the duration of the leaves the same? If they fall off as soon as they expand, what are they? What are deciduous leaves? What persistent?

caducous; others remain until autumn, and are called *deciduous*; others live through the winter, and are called *persistent*, or evergreen.

72. I have told you that a leaf consists of a petiole and lamina; that the lamina is composed of cellular tissue and the cuticle; that the midrib is but a continuation of the woody fiber of the petiole, and that the branches that spring from it are primary veins, and they again are subdivided into secondary and veinlets. You have heard that the minute pores on the under surface are mouths by which the plant performs the operation of breathing and feeding. You have been taught how to distinguish between seminal, primordial, and characteristic leaves, and the situation of cauline, radical, and sessile leaves. We will now look at some pictures of the various leaves, and learn their names.

73. Leaves are divided into simple and compound. Simple have but one blade, as the violet, cottonwood, crape myrtle. Here are pictures of some of the various forms of simple leaves:

FIG. 17.
Ovate,
(Quince.)

FIG. 18.
Elliptical,
(Black Haw.)

FIG. 19.
Lanceolate,
(Flowering Almond.)

72. Repeat all that you have now learned concerning the leaf.

73. The teacher should make the pupil not only describe each leaf, but identify each by specimens, and also draw them on the blackboard.

FIG. 20.
Ensiform,
(Sword-shaped.)

FIG. 21.
Oblong,
(Willow.)

FIG. 22.
Narrow lanceolate,
(Weeping Willow.)

FIG. 23.
Spatulate,
(Fraser's Magnolia.)

FIG. 24.
Deltoid,
(Cottonwood.)

FIG. 25.
Orbicular,
(Winter-green.)

FIG. 26.
Oval,
(Crape Myrtle.)

FIG. 27.
Bi-pinnately,
(Pigweed.)

FIG. 28.
Lyrate,
(Moss-cup Oak.)

FIG. 29.
Acerose when short, as in the Pine. *Linear* when long, as in the Grasses.

FIG. 30.
Undulate,
(Jack Oak.)

FIG. 31.
Sinuate,
(White Oak.)

FIG. 32.
Lobed leaf,
(Horned Poppy.)

FIG. 33.
Three-lobed,
(Wild Violet.)

FIG. 34.
Oblong lanceolate,
(*Silene Virginica*.)

FIG. 35.
Peltate,
(*Nasturtium*.)

FIG. 36.
Reniform,
(Wild Ginger.)

FIG. 37.
Reniform,
(Pennyworth.)

FIG. 38.
Sagittate,
(Water Plantain.)

74. A compound leaf consists of several distinct blades on one petiole; each blade is a *leaflet*. When these leaflets have each a little foot-stalk, those foot-stalks are called *petiolules*, as in the rose-leaf, which is a *pinnate* leaf.

FIG. 39.
Pinnate Leaf.

FIG. 40.
Odd Pinnate.

FIG. 41.
Interruptedly Pinnate.

FIG. 42.
Equally Pinnate.

FIG. 43.
Pinnately Ternate.

FIG. 44.
Palmately Ternate.

75. The parallel-veined leaves have figures resembling the net-veined, and you distinguish them by saying cordate, parallel-veined, sagittate, etc., etc.

FIG. 45.
Bipinnate.

FIG. 46.
Parallel-veined Leaves.

FIG. 47.

FIG. 48.
The Onion Leaf is
tubular.

76. DEFINITION OF TERMS.

Cordate, heart-shaped.

Deltoid, from the Greek letter delta, Δ .

Lanceolate, lance-shaped.

Linear, thread or line.

Orbicular, round.

Oval, longer than broad.

Peltate, shield-shaped.

Pinnate, feather-shaped.

Reniform, kidney-shaped.

Sagittate, arrow-shaped.

Spatulate, *spatula*, a thin knife used by druggists.

77. Leaves are further distinguished by their margins and their apex. The margin, when indented like a saw (Fig. 49), is *serrate*, as the chestnut and chinquapin; *dentate* (Fig. 50), when the teeth are perpendicular to the edges, as the viburnum; *bidentate* (Fig. 51), larger teeth with small ones between them (elm); *repand* (Fig. 52),

77. What are serrate leaves? Dentate? Bidentate? Repand? Lobed? Entire? What is an acuminate apex? Acute? Obtuse? Emaeinate? Cordate, etc.? Have you learned *all* about the different forms of leaves?

hollowed out between the teeth (nightshade); *lobed serrate* (Fig. 53), geranium; *entire*, magnolia. The apex is divided

into *a*, Mucronate; *b*, Cuspidate; *c*, Acuminate; *d*, Acute; *e*, Obtuse; *f*, Emarginate; *g*, Cordate; *h*, Truncate; *i*, Retuse.

The base is divided into *A*, Hastate; *B*, Sagittate, and *C*, Sagittate; *D*, Auriculate (ear); *E*, Cordate; *F*, Reniform.

These are not all, but sufficient has been said to accom-

plish the intention of this volume ; that is, to *introduce* you to the study of botany, leaving it to the larger works of Wood and Darby to unfold still other wonderful forms of beauty.

SECTION III.—APPENDAGES.

78. Many leaves are furnished at their base with little appendages or organs, separated by the substance of the base of the petiole, called *stipules*. These frequently fall off as soon as the leaf is developed, and they are said to be caducous ; others remain as long as the leaf, and are termed persistent. The rose, hop, and hickory have stipules.

79. Those little thread-like organs, by which plants attach themselves to other objects, are called *tendrils*. Every child is familiar with these, as the grape-vine, melon, etc., are liberally supplied with them.

80. There is a form of leaf that seems in its relation to the true leaf and flower to be a kind of joint property of the two. In many cases, it is hardly to be distinguished from the true leaf ; again, hardly distinguished from the proper flower. Its situation, however, determines it, as it is always found on the peduncle, and never on the petiole. These we call *bracts*. In the Mexican blanket, *Euchroma coccinea*, and the *Salvia splendissima*, the bracts are highly colored, and constitute the whole beauty of the flower ; while in the sage, and many other plants, being green, it is with difficulty that the botanist can discriminate as to where the leaves cease to be and the bracts begin.

81. Many leaves are largely furnished with *glands* for the secretion of various products. These are found both upon the upper and under surface of the lamina, as well as

79. What are those little thread-like organs called by which plants cling and climb ?

80. What can you tell me about bracts ? Are they ever colored ? How can they be distinguished ?

81. What are glands ? Where found ? Office ?

upon the petiole and midrib. They yield fluids that are oily, saccharine, and acid, as their peculiar secretions may develop. In the orange and lemon these glands are imbedded in the lamina, presenting the appearance of small yellow grains: if they are pricked with a needle, the oil will be seen with the naked eye rising from the orifice.

82. Other leaves are covered with a coating varying in softness from the velvet down of the mouse-ear, through all the gradations of woolly mullein, to the sharp prickles of the thistle. They are described under the various names of hairy, villous (Latin, *villus*, hairy), pubescent (which also means hairy), ciliate (Latin, *cilia*), muricate (Latin, *murex*, sharp-pointed), etc.; all of which, being new words to you, must be found in the Glossary and committed to memory.

83. Our lesson upon leaves is now closed, and I hope you will remember all that has been said concerning this organ, so necessary to the beauty, growth, and life of the tree. Did you ever think how this world would look if all the leaves were gone? You have seen them fade and fall in autumn, but it was when the chill air drove you within doors, when birds, flowers, and leaves were all gone; and, besides, you knew they would all come again. But think of the blazing sun of the long summer days shining on barren hills and scorched plains, without a green leaf anywhere! They seem very insignificant and unimportant, but summer would not be summer without them. And, moreover, if they were all destroyed, the whole earth would perish for lack of their sustaining care; for they not only feed the tree and plant, but no animal life could exist without them. The whole atmosphere would become so noxious without their regulating power, that death to all animal life would ensue. As the sun regulates the boundary between day and night, so do these seemingly insignificant

82. What of the down upon plants? The different terms?

83. What would be the consequence of universal death to the leaves? What if leaves were to reverse their actions? Can you hope to understand all this now?

things hold in their hands the issues of life and death. If they were to invert their processes, reverse their actions one month, the earth would be one vast charnel-house. You cannot understand all this now, but I want you to think about it, and when we come to the chapter upon *how* plants live and what they feed upon, you will see for yourself that what I have just told you is true.

84. To recapitulate : Leaves are sometimes supplied with *tendrils, stipules, bracts, thorns, prickles, hairs, scales, and glands*. Stipules are immediately below the leaf. Bracts are upon the flower-stalk ; tendrils are from the extremities and sides of the stem, sometimes from the apex of the leaves. These, you remember, were spoken of in our talk about the epidermis.

CHAPTER V.

The Flower.

85. THE flower is the crowning grace of Nature. It is this organ, or rather combination of organs, which is distinguished by its color, form, and odor from the other parts of the plant, and in whose production Nature seems to have emptied her store-house of beauty and variety. These "voiceless preachers" silence by a look those extreme utilitarians who declare that the merely beautiful is unnecessary waste. They answer, in language more potent than words, that loveliness has high and holy uses, and teach lessons which could never be enforced without them. They cause gratitude and love to spring eternal in the human breast, and suggest to the weary wanderer consol-

84. Tell me again the various appendages of leaves. Where are they found ? Where did we learn of them before ?

85. What is the subject of Chapter V. ? By what is the flower distinguished ?

ing dreams of the matchless glories of the infinite world, that land of pure heart's-ease, where fadeless flowers and sweet perfumes delight the garden of the Lord.

86. Their profusion, their fragility too, united with the important offices that many of them accomplish, the early fading away of their young lives, and the good they leave behind them in fruit, food, and seed, all teach us useful and beautiful lessons, that we should strive to remember.

87. A glance will show us that the flower is not a single organ, like the root, the stem, or the leaf, but a combination of several organs, distinguished by their names, *calyx*, *corolla*, *stamens*, *pistil*, *anther*, *stigma*, etc.

SECTION I.—CALYX.

88. Calyx signifies a cup, and is the outer covering of the flower. It is generally green, sometimes entire, that is, without divisions, sometimes divided into leaves, which are called *sepals*. When the calyx is entire we call it *monosepalous* (from the Greek *monos*, one, and English *sepal*, from the Latin *seprio*, to inclose). If divided into many sepals it is *polysepalous* (*poly*, from the Greek *pollus*, many). Sometimes there is but one row of leaves, and they are colored. We say then that the plant has no corolla, for in *all* cases the *outer row is the calyx*. Sometimes there are many rows, all colored, and we say that the calyx and the corolla are *confounded*, that is, they cannot be distinguished. We simply call it then a *perianth* (Greek, *peri*, around, and *anthos*, flower).

89. In the monosepalous calyx, that portion formed by

86. What lessons do flowers teach?

87. Is the flower a single organ or a combination of several? What are their several names?

88. What does calyx signify? Describe it. When without divisions. When divided. When there is but one row of leaves, what do we call it? When many, and colored? What is the word perianth derived from? What does it mean?

89. In a monosepalous calyx, what is that portion called formed by the union of sepals? What the upper division? If the calyx takes its rise from below the ovary? What is strictly true regarding the true position of the calyx?

the union of the sepals is called the *tube*. The divisions of the upper margin we call *limbs*. In this cut, *a* is the tube, *b* the limb. If the calyx takes its rise below the ovary or seed-vessel, it is said to be *inferior*; if above, *superior*. These distinctions, however, are merely nominal, for the origin is in *all* cases the same, *beneath*. But in some plants the calyx adheres to the ovary, uniting with it so as to become a part of it, as the haw, apple, etc.

FIG. 54.

90. You have now been told that the calyx is the covering of the flower, that it is generally green and leaf-like, that it may be monosepalous, that its divisions are called sepals, and that it may be inferior or superior. It falls off in some cases as soon as the flower expands; it is then said to be *caducous*. The calyx of the magnolia is caducous. If it remains as long as the corolla it is *deciduous*. The virgin-bower has this kind of calyx. If it remains until the seed is perfect it is said to be *persistent*. The rose has a persistent calyx.

91. There are several kinds of calyx. Linnæus divides them into seven classes: the *ament*, *calyptra*, *glume*, *involucrum*, *perianth*, *spatha*, and *volva*.

FIG. 55.

AMENT, or catkin, consists of chaffy scales on a thread-like stalk. Each scale is the receptacle of stamens and pistils, and we call the whole aggregate a flower, and consequently it is classed as a mode of inflorescence, as in cottonwood and banana.

92. CALYPTRA (from the Greek, to cover or conceal) is the name given to the little hood or cap that covers the pistil of the

FIG. 56.

90. State the period of the falling of the sepals, and the names given to each.
91. How many kinds of calyx did Linnæus arrange? Their names? Describe the ament.

92. What of calyptra?

mosses, which resembles in form and position the extinguisher of a candle.

93. GLUME (from the Latin *gluma*, a husk) is seen in the calyx of grasses, and plants of that family. It is known when separated from the ripened seed of oats, barley, etc., as husk or chaff. Those long thread-like appendages called the beard of wheat and barley are parts of the calyx.

FIG. 57.

FIG. 58.

94. INVOLUCRE (from *involvere*, to wrap) is generally found in the umbelliferous family. When inclosing a cluster, it is said to be *universal*; when but a single flower, *partial*.

95. PERIANTH, when applied to a distinct calyx, means those cup-like calyces in which the corolla may properly be said to be placed. The long tubular calyx of the pink and the graceful urn-shaped calyx of the rose are examples.

FIG. 59.

FIG. 60.

96. SPATHA, or sheath. This form is very common among the bulbous-root families, as in the narcissus and daffodil. These frequently wither and fall off in the early stage of bloom. In others they are beautifully colored, and remain, constituting what we call the flower, as in the calla tribe.

97. VOLVA. The curtain or ring that incloses the head of the mushroom, and which, after it bursts, remains on the stem, is called the volva. Fig. 61 shows you a mush-

93. Describe glume.

94. What of involucre?

95. What can you say of perianth?

96. Describe spatha.

97. Volva.

room with its head still inclosed, while Fig. 62 represents the volva bursted and clinging to the stem.

FIG. 61.—ENTIRE.

FIG. 62.—BURSTED.

98. The calyx is rarely wanting in delicate fragile flowers, where its evident use, the protection and support of the other organs, is so much needed. Bouncing Bet, pinks, and all those flowers whose petals are long and slender at their base, would be blown to pieces by the first breeze but for the sustaining office of this organ.

99. In the amaryllis, tulip, and hyacinth tribe, we find but one covering for the stamens and pistils, the strong, firm, well-seated petals requiring no aid from the calyx; and here we find none, or at least what would properly be considered none. I have explained that in botanical analysis, if there is but one envelope, it is called a calyx, *not* a corolla.

SECTION II.—COROLLA.

100. Corolla (from the Latin *corona*, a crown) is the interior envelope, and exhibits every variety of color, form, and texture. Under the subject of calyx I explained to you that sometimes the distinction between the corolla and calyx was not plainly marked; these are exceptional cases, however, as generally they present a very marked and

98. In what kind of flowers is the calyx seldom wanting?

99. What of the amaryllis? If there is but one envelope, is it proper to call it a corolla?

100. What is the corolla? What does it signify? Is the difference between the calyx and corolla ever difficult to determine? What is generally the case? What do vegetable physiologists tell us?

striking difference, both texture and color presenting a decided contrast. Vegetable physiologists tell us that the calyx is a continuation of the outer bark; the corolla, of the inner cellular integument. Hence the corolla is distinguished by the exquisite delicacy of its texture, the soft and flexible character of its petals, the brilliancy of its color, the fleeting character of its existence.

101. Each part of the corolla is called a *petal*. Like the calyx the corolla is frequently entire, and then it bears a name analogous to that of the calyx under the same circumstances, *monopetalous*; and when divided, *polypetalous*. The monopetalous corolla presents us with a great variety, to which names have been applied indicative of their characteristic differences.

102. When the throat is short, and the limbs or petalous divisions, short and spreading, it is called *rotate*. When the border is like the rotate, but with a long tube, we call it *salver-shaped*. When the throat is shorter, but wide in proportion, and the margin separated into limbs, it is *campanulate*, Canterbury bell.

FIG. 63.

FIG. 64.

FIG. 65.

103. When the corolla is separated into unequal divisions, called the upper and lower lips, it is called *labiate*, posterior and anterior. These when open, as in Fig. 66, are said to *personate*; when closed, as in Fig. 67, are

101. What is each part of the corolla called? When entire, what is it called? When divided?

102. What is a rotate corolla? Salver-form? Campanulate? Describe a campanulate corolla.

103. Describe a labiate. Funnel-form.

ringent. When the throat spreads into an expanded tube, we call it funnel-form, as Fig. 68, morning glory and Jamestown weed.

FIG. 66.

FIG. 67.

FIG. 68.

104. In polypetalous corollas each leaf or petal consists of two parts, a *limb* or *lamina*, and a *claw* or *unguis*. The claw (*b*) is the narrow part, generally supported by the calyx. The limb (*a*) is the spreading part, generally supported by the claw. The unguis or claw corresponds to the petiole, while the limb agrees with the lamina of the leaf.

FIG. 69.

105. When there are several abruptly spreading petals with short claws as (Fig. 70), it is *rosaceous*, rose. When the claws gradually expand into laminae and the petals are upright and

FIG. 70.

FIG. 71.

spreading, as Fig. 71, it is *liliaceous*, lily. Flowers like

104. In polypetalous corollas, each leaf consists of how many parts? What is the limb? What is the claw?

105. Describe a rosaceous corolla. Liliaceous. Caryophyllous. Papilionaceous.

the pink (Fig. 72), with long, slender claws inserted into a tubular calyx, are called *caryophyllous* (Fig. 73); with four petals at right angles, *cruciform*, mustard. *Papilionaceous* corollas have five petals (Fig. 74), the upper one erect and

FIG. 72.

FIG. 73.

FIG. 74.

more dilated than the others, the two lateral at right angles with the upper, and parallel with the other. We call the exterior petal the banner, or *vexillum*, and taken apart it looks thus (Fig. 75); the two half exterior are wings, or *alæ* (Fig. 76); the two lower are the keel, or *carina* (Fig. 77). These are frequently united (pea clover).

FIG. 75.

FIG. 76.

FIG. 77.

106. Various flowers are furnished with different appendages, differing from the other organs, though situated among them. Their uses have never been discovered, though ancient botanists supposed their peculiar functions to be the secretion of honey, and hence styled them *nectaries*. But subsequent investigation has proved this to be untrue, as they rarely if ever exhibit any such product.

106. What are various flowers furnished with? Are their functions known? What did ancient botanists think? Is this true? Mention flowers that have no appendages. Mention the various forms of nectaries.

The larkspur, violet, columbine, monk's hood, horned poppy, etc., present us with a variety of nectaries in the form of hoods, spurs, horns, scales, cavities, etc.

107. A little more talk about the corolla, and we are done. Some flowers have stamens and pistils, but no calyx or corolla. Sometimes they have the two latter and only stamens, and again no stamens, only pistils. However, if the stamens and pistils are present it is said to be a *perfect flower*, as they alone are indispensable for the reproduction of the plant. If *all* the organs are present we say it is *entire*. When the calyx and corolla are absent, the flower is said to be *achlamydeous* (from the Greek, signifying without a cloak); when only the calyx is present, *monochlamydeous* (one garment or covering); *dichlamydeous* (two) when the two floral envelopes are present. In this case we say it has calyx and corolla. The *Crinum Americanum*, found upon Buffalo Bayou, near Houston, and in some parts of Louisiana, familiar to you all, is *monochlamydeous*; also the common white lily. The rose is *dichlamydeous*. The sweet gum (liquid amber) is *achlamydeous*.

108. The most important office of the corolla seems to be the protection of the stamens and pistils from injury. We thus frequently find the corolla using the greatest care to insure this. Many of them close up at night, or at the approach of rain-storms and high winds; others droop their heads at evening, evidently to prevent too great an accumulation of dew in their cups at night. When you learn the important office of the stamen and pistil, you will more readily perceive the necessity of this protecting care. It is the corolla that also elaborates the volatile oils that give such delicious fragrance to the flower, making

107. Have all flowers a calyx and corolla? Have all pistils? Stamens? When is a flower *perfect*? *Entire*? *Achlamydeous*? *Monochlamydeous*? *Dichlamydeous*? Examples?

108. What is the most apparent use of the corolla? Mention the coverings with which it protects the other organs. What is elaborated by the corolla? What of poisonous plants?

the rose, pink, jasmine, and heliotrope the very synonym of all that is pleasant. Poisonous flowers are often distinguished by their disagreeable fœtid odor, and by the dull color of their corolla.

SECTION III.—STAMENS.

109. You have been told that the flower generally consists of two sets of envelopes, the outer termed the calyx, the inner the corolla.

110. Now within the corolla are a set of thread-like organs called stamens. They consist of three parts, the filament, anther, and the pollen. The filament (Latin, *filum*, a thread) is the slender part of the stamen supporting the anther—the little knob or box on the top of the filament—and which is generally divided into two lobes, sometimes more. This box contains the pollen, which is a fine dust that is ejected from the anther-box when it is fully matured, and is necessary for the fertilization of the ovary. Fig. 78 is an anther with pollen grains enlarged.

FIG. 78.

111. To the naked eye, pollen appears only as a mass of fine dust, but under the microscope the grains present us with forms as various as the flowers on which they are found. Here again we perceive the richness of God's treasure-house of beauty, its infinite diversity, marshaled into fixed rank and order by His undeviating laws, making each flower to differ from the others, but each to bear pollen after its kind. The magnolia bears pollen grains which look like long needle-shaped crystals of translucent white-

109. How many envelopes has a flower generally ?

110. What within the corolla ? Their names ? How many parts have they ? What is the filament ? Anther ? Pollen ? Its uses ?

111. How do pollen grains appear under the microscope ? The magnolia ? Crape myrtle ? Mallow ?

ness; the crape myrtle has light-brown, egg-shaped grains; the mallow has a white opaque sphere, covered with elongated projections (papillæ), and looks just like an infinitesimally small gherkin. The crimson Texas-star (*Sabbatia brachiata*) has golden-colored grains shaped like rice. These forms are as fixed and uniform as any other peculiar characteristic distinguishing one family of flowers from another.

112. The microscope shows us also that these grains consist of a delicate tube of great tenuity, surrounded by a thin liquid, which is inclosed in a thin sack or skin. When the pollen falls upon the stigmatic surface of the pistil, this sack bursts and the pollen tube issues therefrom, penetrating the stigma, descends the hollow tube of the style, and finally reaches and fertilizes the ovules in the germ below. As insignificant as this dust may appear to you, it is just as important as the root, the stem, or the leaf. If for a few years the corn and wheat blossoms should fail to perfect pollen, starvation to millions would be the consequence. Reproduction depends on this, and no seed can mature without it.

113. Observation will teach you that the stamens are sometimes *below* the pistil, sometimes *around* it, and again *upon* it. When they arise from the calyx, they are said to be *perigynous*; from the pistil, *epigynous*; under the pistil, *hypogynous*. When the stamens are longer than the corolla's depth, so that they project beyond, as in the honeysuckle, they are said to be exserted (Latin, *exserere*, to stretch out); when shorter than the corolla, included (Latin, *includere*, to shut up, to confine within). When they bend down in a curve, they are said to be declinate (Latin, *declinare*, to lean, to bend).

112. What does the pollen grain consist of? When it falls on the stigma, what takes place? What if the pollen of grain-bearing plants should all fail for years to perfect their pollen?

113. When the stamens rise out of the calyx, what are they called? When upon the pistil? Under the pistil? When longer than the corolla? When shorter? When they bend downward?

114. There are some plants, that you shall have described to you in the future, whose stamens and pistils are in separate flowers, and others again on separate plants. And as the pollen of these plants is very light and very abundant, the winds and the insect world easily transport it from plant to plant, and from tree to tree, and thus secure the fertilization of the pistillate blooms. The palm, olive, mulberry, Indian corn, pumpkin, and strawberry, are all members of these families.

SECTION IV.—PISTILS.

115. In the center of the flower we find the *pistil*. It also consists of three parts, the *germ* or *ovary*, the *style*, and the *stigma*. This organ has not been inaptly compared to a column in architecture; the germ corresponding to the base or pedestal, the style to the shaft, and the stigma to the capital. The *germ* is the base of the style, and on fertilization develops into ovules, ovary, and receptacle. The *style* is the hollow thread-like tube springing from the germ and supporting the stigma. It is sometimes so short as to appear entirely wanting. It is then said to be *sessile*, that is, having no stalk.

FIG. 79.

Pistil.

a—Ovary.

b—Style.

c—Stigma.

FIG. 80.

116. It is through the style that the pollen tube is transmitted to the germ. Upon the top of the style rests the stigma, which is properly only its development, just as I

114. Are the stamens and pistils ever in separate flowers? How is the pollen transported? Mention some plants whose stamens and pistils are in separate flowers.

115. Where is the pistil found? Of what does it consist? What is the germ? The style? When sessile?

116. Through what is the pollen transmitted? Where is the stigma, and what is its use? To what is it compared? Has it an epidermis? What is said of a secreted fluid? With what is the stigmatic surface filled?

told you that the spongioles are the development of the fibrous roots; and like these spongioles, the stigma has *no epidermis*. They are the only parts of the entire plant not furnished with that covering. It secretes a viscid fluid whose office is to secure the adhesion of the pollen grains, and also to furnish sufficient moisture to cause the sack to burst, and the consequent expulsion of the pollen tubes. Its surface is also filled with cells, through which these tubes find easy entrance to the style, and thence downward to the ovules in the germ, ovary.

117. After these ovules become fertilized by the pollen tubes, they begin to mature into perfect seeds, and the ovary enlarges and undergoes very remarkable changes. As the other parts of the flower within die, and fall off, it becomes the future pericarp (*peri*, around, and *carpos*, fruit). The apple, peach, pumpkin, acorn, in fact all that part of fruit, nut, or berry which is *not* the *seed*, is the pericarp, and has once been the ovary.

118. You have now had explained to you the three parts constituting the stamens, the filament, anther, and pollen, and their uses. The pistil also consists of three parts; the germ, the style, and stigma, and also their offices. If you will take the ovary of the okra, which is unusually large, and can be examined without a glass, and cut it longitudinally or transversely, you can plainly see the ovules arranged just as the ripened seed appear in the perfected pod. These ovules have the form of seed, but present a color and texture differing but little from the ovary in which they are inclosed.

119. You have now been told that the flower has a

117. What of the fertilized ovules? Of the ovary? What does it become? What is a pericarp?

118. Of what does the stamen consist? The pistil? What experiment is suggested with the okra? What of the color and texture of the ovules?

119. What have you learned about the calyx? The corolla? What is each division called? How is the stamen divided? What does the pollen contain? How is the pistil divided? What about the germ?

CALYX, which when entire is called *monosepalous* ; divided, *polypetalous* ; and that each division is called a *sepal* ;—a COROLLA, which when entire is *monopetalous* ; when divided, *polypetalous* ; each division being called a *petal* ;—STAMENS, which are formed of a *filament*, to support the anther ; *anther*, which is divided into two lobes ; *pollen*, a fluid and a tube ;—PISTILS, which are formed of a *germ*, which is the base of the style ; *style*, which is the channel from the stigma to the germ ; *stigma*, which receives the pollen ;—GERM, which, on being fertilized, is a *receptacle* for the pericarp ; *ovary*, which develops into the pericarp ; *ovules*, which become the seed.

120. You have been told that the calyx is to protect and support the corolla ; that the corolla is to protect the stamens and pistils ; that the stamens are designed to fertilize the ovules in the germ of the pistil, and that thus the stamens and pistils are the *necessary* organs of reproduction.

SECTION V.—INFLORESCENCE.

121. In walking over the prairies of the Southwest, the pupil must have noticed that the buffalo clover grows on its stem very unlike the Texas star, that the Mexican blanket puts out blossoms quite differently from the *Houstonia*, and that the Elder bears no sort of resemblance in its flat clusters of blossoms to the long tassel-like senna or fringe-like retama. The peculiar style of each is called its manner of INFLORESCENCE, and it furnishes another very striking distinction to aid us in classifying plants. When the flower springs from a terminal branch and bears a flat-topped cluster, as the mustard and cabbage, we call it a *cyme* (Fig. 81). When they grow in clusters and spread out regularly

120. What are the indispensable organs of reproduction ?

121. What is the subject of Section V. ? What is inflorescence ? What is a cyme ? Example ?

from a common plane or convex surface, as in the carrot, we call it an *umbel* (Fig. 82).

Fig. 81.

Fig. 82.

Fig. 83.

122. When the flower stalks spring from the different points along the main stem, but form a level top, as in yarrow, we call it a *corymb* (Fig. 83).

123. When the cyme is clustered closely together, forming a compact group, as in sweet william, it is a *fascicle* (Fig. 84).

Fig. 84.

Fig. 85.

124. When the flowers are more closely grouped, and the foot-stalk or peduncles are entirely wanting, that is, a cluster of sessile flowers arranged in a globular form on the stalk, as in the bachelor's button, it is called *head* (Fig. 85).

125. When they have short stems, but clustered together on the main stalk, they are *glomerate* (Fig. 86).

126. The ament or catkin has already been described to

122. What is a corymb?

123. A fascicle?

124. A head?

125. What is a glomerate flower?

126. A spadix?

you in the chapter on the calyx. When an assemblage of flowers grows upon a common receptacle surrounded by a *spatha*, as in the Ethiopian lily, it is a *spadix* (Fig. 87).

FIG. 86.

FIG. 87.

127. When the flowers arise along the common stem, supported by short peduncles, as in some grasses, they form a *spike* (Fig. 88). A compound spike (Fig. 89), water oats.

FIG. 88.

FIG. 89.

FIG. 90.

128. When the peduncles are arranged regularly and equally around the stem, as in the hyacinth and hare-bell, they form a *raceme* (Fig. 90).

129. When the peduncles are divided and subdivided, as in grasses, they form a *panicle* (Fig. 91). When the panicles are very dense, as in lilac, it is a *thyrses* (Fig. 92).

127. A spike? Compound spike?

128. A raceme?

129. Describe a panicle. A thyrses. A whorl.

When the flowers grow around the stem, as in mint and pennyroyal, they are called a *whorl* (Fig. 93). When the

FIG. 91.

FIG. 92.

FIG. 93.

FIG. 94.

receptacle is dilated, bearing flowers above and scale bracts around, as in the sunflower, it is a *capitulum* (Fig. 94), as seen in composite flowers. The flowers are called *florets*; those on the outer circle, *ray florets*; those in the center, *disk florets*.

130. You have now had described to you several forms of inflorescence: the *cyme*, *umbel*, *corymb*, *fascicle*, *head*, *ament*, *glomerate*, *spadix*, *spike*, *raceme*, *panicle*, *thyrs*e, *whorl*, and *capitulum*.

131. You have now watched the plant in its growth from root to flower. You have seen the flower withering away, but you have learned that the fertilizing germ always remains. This is supported upon what is called the *receptacle*, on the *extremity of the peduncle*.

132. The *receptacle* supports the fruit and flower, and the fact that it is a separate organ, and not merely the apex of the peduncle, is more obvious in compound flowers than in any other.

133. Take, for instance, the sunflower. Its receptacle

130. Recapitulate the various kinds of inflorescence that you have had described to you.

131. What is the extreme end of the peduncle called?

132. Is the receptacle a separate organ from the peduncle?

133. In what family of plants do we see this particularly plain?

expands into a broad saucer-like flower containing the aggregate flowers and seeds of that well-known plant. This form of the receptacle is called common, indicating its office to numerous flowers and florets.

134. In the Indian corn it is a pillar or center column, upon which the staminate flowers and afterward the ripened grains are arranged. It is familiarly known to you as the *cob*. This sort of receptacle is called *columella*.

135. In the nelumbium we have the receptacle extraordinarily developed, and filled with cavities in which the seeds are lodged.

136. In some plants the receptacle is hairy, as the thistle, or chaffy, as in the helichrysum (everlasting). Sometimes it is convex, sometimes conical, concave, spherical, etc.

CHAPTER VI.

The Fruit.

SECTION I.—PERICARP.

137. IN the description of the pistil you were told that the ovary became the pericarp, and that all the innumerable forms of fruits, berries, nuts, etc., were the results of the changes that this organ undergoes in arriving at maturity. The pericarp always incloses the seed. It may be dry and thin, as the mustard; or thick and fleshy, as the pumpkin; soft and juicy, as the tomato; or hard and flinty, as the ivory plant.

134. Describe the columella. Where do you find this?

135. What of the receptacle of the nelumbium or water-lily?

136. Mention some of the appearances of the receptacle.

137. A matured germ consists of how many parts? Examples of the dry, thin, and fleshy?

- 138.** The pericarp is divided into three parts, the epicarp, or outer part, which in a fully ripe peach can be removed with your finger, as it separates easily from the next larger or middle portion, which you eat, the *sarcocarp*. In the interior lies the *endocarp*, the stony seed.

FIG. 95.

139. When the ripened fruit remains closed after full maturity, it is said to be *indehiscent*, and when it bursts, *dehiscent*. Acorns, persimmons, haws, etc., are *indehiscent*, while peas, beans, okra, balsams, etc., are *dehiscent*.

140. The valves of a pericarp are the divisions or sides of the seed vessels. A pericarp without these divisions is univalved, as the chinquapin, buckeye, olive, etc. If it is separated into two, it is a *bivalve* (Fig. 96). If it separates into three, like the violet, it is *trivalved* (Fig. 97). The

FIG. 96.

FIG. 97.

Jamestown weed has four, and therefore is said to be *quadrivalved*. Before the fruit is fully ripe, the valves are joined together, and the line of union is called a *suture* or *seam*.

138. How many parts has the pericarp? What is the epicarp? The sarcocarp? The endocarp? In the peach, which is the first? Second? Third?

139. When the ripened fruit remains closed, what is it said to be? When it opens?

140. What are the valves? When divided into three cells? Into four? How are the valves in partially ripe fruit? What are the lines of connection called?

141. The column is the axis. In the orange it can be seen like a tough string of fresh pith running through the center, or like the core in an apple. When divisions, as in the orange, extend from the suture to the column, they are called *dissepiments*, and form the *cells* in which the seed are found; when they run lengthwise, they are called *longitudinal*, and when across from side to side, *transverse*.

142. Pericarps are further distinguished into drupe

FIG. 98.

FIG. 99.

FIG. 100.

FIG. 101.

FIG. 102.

FIG. 103.

FIG. 104.

FIG. 105.

(Fig. 98), nut or glans (Fig. 99), pome (Fig. 100), berry (Fig. 101), pod or legume (Fig. 102), follicle (Fig. 103),

141. What is the column? How in the orange? Apple? What are the separating walls called? When lengthwise? When crosswise?

142. How are pericarps further distinguished? What is a drupe?

capsule (Fig. 104), strobilium (Fig. 105). The drupe is a juicy fruit, composed, as you have been told the peach was, of three parts, an *epicarp*, *sarcocarp*, and an *endocarp*.

143. The cocoa-nut is also called a drupe, because it possesses three divisions, though the middle one is not succulent, but a dry mass of woody fiber. The walnut and hickory-nut, though you know them under the name of nuts, are, properly speaking, drupes.

144. A *nut* or *glans* has a hard pericarp, one-celled, surrounded by bracts. The acorn is a nut. You perceive it has a hard shell-like skin or covering, that it has no division, and the cup of the acorn is covered with scales or bracts. The chestnut is a *nut*, and the bur is composed of bracts. You will thus perceive the difference, and will remember hereafter to distinguish between *drupes* and *nuts*.

145. The epicarp, sarcocarp, and calyx form the edible part of the fruit, while the endocarp forms the cells for the

FIG. 106.

seed; altogether they are called a *pome*. The apple, quince, and pear are *pomes*. The thickened and juicy calyx is the most important part of the apple. It is quite curious to observe this fruit maintaining the form of this organ, even presenting us the claws of the calyx at the top of the full-grown fruit. When the seeds are imbedded in a

mass of juicy pulp, as in the whortleberry, gooseberry, tomato, grape, etc., it is called a berry. When single berries are clustered in a head, they are called *compound*, as the blackberry (Fig. 106).

146. The strawberry reverses the situation of seeds, and is not a berry at all, but seeds on a juicy receptacle. You

143. What is the cocoa-nut? Hickory-nut? And why?

144. What is a nut? Example? What is the chestnut? What the bur?

145. What is a pome? Example? A berry?

146. What is a strawberry?

will, perhaps, be surprised to hear that the orange and citron are berries; but if you will remember what constitutes a berry, seeds imbedded in a pulpy mass, you will immediately recognize them as berries, gigantic though they be.

FIG. 107.

147. A pericarp of two valves, that is, having only one suture, one cell, and one row of seeds, is called *leguminous* (Fig. 108): peas and beans are *leguminous*. A *siliqua* has two valves, two cells, and two rows of seeds arranged upon the membrane forming the divisions of the cells: mustard seed-pods are *siliques*. When this pod is very short and broad, as in the cat-bell, it is called a *silicle* (Fig. 110). A *follicle* is a pericarp of one valve, opening lon-

FIG. 108.
LEGUME.

FIG. 109.—SEEDS IN A POD.

FIG. 110.
SILICLE.

gitudinally, with seeds lying loose within. The follicle may be simply one pod, or compound, two or many.

148. When the fully ripe pericarp opens by pores, it is called a *capsule*, as the poppy and hollyhock. The word capsule means box or chest.

149. The *strobilium* pericarp (Fig. 111) is a cone or spike with seeds inclosed by scales, each scale having covered a flower. A strobile may be regarded as an exaggerated ament or catkin, hardened into almost woody scales. The cedar,

147. What are leguminous seeds? What is a siliqua? A silicle? A follicle?

148. What is a capsule? Examples?

149. A strobilium? Examples?

pine, fir, hop, cypress, etc., are examples. They are long in the pine, small in the birch, chaffy in the hop, round in the fir and cypress.

FIG. 111.
STROBILIUM.

150. You will certainly be able to designate all the different varieties of seed-vessels in the future. Botanists make other divisions, but we have considered those made by Linnaeus a sufficient tax upon your memory at present, and you will please now repeat them: Drupe, nut or glans, pome, berry, pod or legume, follicle, capsule, strobilium.

You will pause now a moment, and arrange in your minds the different organs in succession, and their various functions. The root, stem, bud, petiole, pedicel, leaf, peduncle, calyx, corolla, stamens, pistils, anther, pollen, germ, ovule, ovary, receptacle, and the pericarp.

SECTION II.—SEED.

151. We now come to the last and connecting link in the grand chain, the perfect ovule, the *seed*. Here we see that “extremes meet;” for this crowning work, the product of all the other organs, holds within its narrow casket the root and germ of the future plant. Though it was born and bred in the sunshine, the very child of light and air, yet, strangely incomprehensible, it has to go under the dark earth, and there in darkness and mystery the imprisoned plant is freed, and mounts in beauty to the upper air again, to perform the work allotted by the Divine hand that formed it.

152. Does not the language of St. Paul, in the same time

150. Have botanists made other divisions? What of Linnaeus’ divisions? Name the different organs in succession.

151. What does this chain of organs now bring us to? And what axiom does the seed confirm? What mysterious change incomprehensible to the human mind now takes place?

152. What use does St. Paul make of the seed in illustrating a more mysterious change?

and beautiful comparison he makes between the mortal body and the seed, and the immortal body and the springing plant, occur with startling emphasis to your memory?

“That which thou sowest is not quickened except it die: and that which thou sowest, thou sowest not that body that shall be, but bare grain, it may chance of wheat, or some other grain.” So of the body: “It is sown in dishonor, it is raised in glory; it is sown in weakness, it is raised in power; it is sown a natural body, it is raised a spiritual body.”

Some of the sublimest lessons of truth and wisdom were taught by the Saviour and his apostles through the silent ministry of flowers, the lilies of the valley, the grasses of the field, corn and olives, figs and grapes. In these latter days, we find these “voiceless preachers” conveying promises and assurances that the wisest men have failed sometimes to enforce. There are limits to our investigations, points where we hear the voice that controls the waves, saying, “Thus far shalt thou come and no farther.” We can talk much about the seed, and may feel wise and puffed up with our learning, until we come where mystery guards the *principle of life*. At this door we knock in vain for admission. Here human knowledge falters. However, with chastened, humble hearts, let us endeavor to learn all that science can teach us; and, remembering that revelation declares that every soul is responsible to God for every talent, strive to use our time conscientiously and profitably.

153. We already know that the seed is the perfected ovule, and in our conversations about the stamen and pistil, we described the fertilization of the ovule by the pollen tubes. When this is effected a marked change takes place, the ovule enlarges and changes from a semi-fluid into a solid body called the seed; and now, if cut into two

153. Under the microscope how does the ovule appear? What is this called? How many parts has the embryo?

parts, and placed under a microscope, it will disclose the rudiments of the plant. This is called the *embryo* (Fig. 112). This embryo will be found to

FIG. 112.

consist of three parts, the (*r*) *radicle*, the (*p*) *plumule*, and the (*c*) *cotyledon*.

154. The radicle descends and becomes the root, the plumule ascends and develops into the plant (Fig. 113). The *cotyledons* are the first leaves, and serve to nourish the young plant until

the radicle has developed sufficiently to assume its duties of drawing nourishment from the soil for the growth of the plumule or plant.

FIG. 113.

155. Before proceeding farther, you must be told that the seed has three parts: the outer covering, *coat*, *skin*, or *husk*; the *hilum* or *scar*, made by the separation of the thread that fastened the seed to the seed-vessel or pericarp; and the *kernel*.

156. These parts can be plainly seen in the bean. In boiling, the skin or husk falls off; the hilum is what we call the eye, and the kernel

is the part we eat.

157. *Albumen* constitutes the greater part of the seed, and it is deposited around the embryo. In germination it becomes food for the young plant. It is the nutritious part of all seed, being flour in corn and wheat, the fleshy part of the cocoa-nut, oil in the palma Christi, and hard and bone-like in the vegetable ivory.

154. What is the radicle? The plumule? The cotyledon? Their growth, development, and uses?

155. How many parts has the seed? What is the husk? Hilum? Kernel?

156. In the bean how do these appear?

157. What constitutes the greater part of the seed? Where is the albumen deposited? Under what form does it appear in corn? Cocoa-nut? Palma Christi?

158. All young plants are supplied with this albumen either around the embryo or in the fleshy leaves of the cotyledons. When around the embryo, we say the seed is albuminous; when not there, that the seed is exalbuminous. We learned something about seed leaves in our talk about the stem, and you were told that endogenous plants had one cotyledon, exogenous two.

159. Now, when observing the embryo of these different classes, we find they are divided into plants having no seed leaves, and are therefore termed *acotyledonous*; those having one, *monocotyledonous*; those having two, *dicotyledonous*.

160. The acotyledonous are seen in ferns and mosses; monocotyledonous in grasses, yucca, sarsaparilla, pine, spruce, etc.; dicotyledonous, oak, orange, beans, peas, etc.; polycotyledonous, pine, spruce, arbor vitæ, etc.

161. Seeds, like stems and leaves, are sometimes furnished with appendages that constitute very marked characteristics, and should always receive our careful attention in observing them for classification. Some seeds are inclosed in a thin, dry, indehiscent covering; and these, to distinguish them from other forms of indehiscent pericarps, are called *achenium* (plural, *achenia*). The achenia are more frequently furnished with these appendages. Sunflower, lettuce, maple, elm, blue milkweed, are all achenia. In the clematis we find this organ adorned with a soft fringe-like plume. The dandelion has a *pappus*, or feather crown, connected to the achenium containing the seed by a stipe. This is also called an *aigret*.

162. When the aigret springs from the seed or achenium

158. What are all young plants supplied with? Where?

159. How are embryos divided?

160. What is an acotyledon? Monocotyledon? Dicotyledon?

161. Are seeds ever furnished with appendages? Clematis? Dandelion? What is a pappus?

162. When the aigret springs from the seed without a style or stem, what is it said to be? When the hairs are not branched? When hairs are branched, that is, other hairs arranged on the primaries, what do we call it?

without a stipe or stem, it is said to be sessile. If the hairs are without branches they are *simple*, if other hairs are arranged on the primary ones they are *plumose*. Pine and maple have a scale-like appendage called a *wing* (Fig. 114).

FIG. 114.

163. The seed of the cotton plant is entirely covered with long hairs called *coma*. Willow and poplar are also covered with coma, but it differs from that of the cotton plant in being short and brittle.

164. These appendages are not placed upon seed accidentally or for no obvious use—far from it. These wings,

FIG. 115.—COMA OF COTTON PLANT.

FIG. 116.—COMA OF COTTON TREE.

plumes, trains, coma, scales, and aigrets, are so many balloons, ships, carriages, or expresses, for the safe transportation of seed through the air, down the rivers, over the mountains, and across oceans, dispersing vegetation over the face of the earth. Have you not often seen our rivers white with the soft down of the cottonwood seed, and in a few weeks after beheld a barren sandbar or a “new bank” come out in a dress of green verdure that rivaled in beauty and freshness the grassy prairies of the upper table-land? Well, in a few years you may find those same spots groves of stately cotton-trees! Those sandbars would never have received their garments of green without the friendly office of these traveling seeds. Well, what you have seen one kind of winged seed doing for one spot, is what the myriad seeds are doing for the whole globe, causing the barren places to rejoice and the desert to bloom

163. What is the appendage of the cotton seed called?

164. Are these things accidental? What are their uses?

like a garden, dispersing plants that would otherwise remain only in certain localities, leaving other places poorer for their absence.

CHAPTER VII.

Germination.

165. ALTHOUGH nearly all that you shall learn in this chapter has been detailed to you in the previous chapters, yet for the sake of clearness, and your perfect understanding of the process of germination, we will dwell a little more upon how the principle of life seems to awaken into activity; and the result, as exhibited in the various transformations and developments of the parts of the seed.

166. There are three things necessary for germination, and these three are *heat, water, and air*. If a seed is exposed to moisture without heat, it decays; if you give it heat without moisture, no change takes place unless the temperature be very high or long continued, when it loses its vitality. You may give it all the other requirements, and yet without the proper quantity of air, or, more properly speaking, oxygen, the result will be the same—no germination takes place.

167. When the requisite agents are present the seed swells, bursts the outer covering or coat; the radicle first makes its appearance and strikes downward; the cotyledons arise and expand; the plumule next is seen issuing from between the cotyledons, and arising upward.

165. Subject of this lesson?

166. How many things are necessary for germination? What if a seed has moisture without heat? Heat without moisture? Heat and moisture without air, or rather oxygen?

167. When all are present? Describe the change that takes place. What appears first? The next, etc.?

168. It is during the earliest stage of germination that we discern the important office of oxygen. It unites with the carbon of the plant and passes off as carbonic acid gas, diminishing the carbon and leaving an excess of oxygen, which now busily employs itself converting the amylaceous (starch) contents of the seed leaves into sugar, food for the future plant. When this is prepared the plant develops into life.

169. It is not by the *direct* agency of oxygen, though it is the leading power, if we may so express it, that converts the starch into sugar. Neither is this conversion confined to seed leaves, but is performed in tubers, as in the potato, etc. The agent for this transformation is originally oxygen, but that, uniting with the nitrogen and carbon of the plant, creates another substance, a sub-agent, known in chemistry as *diastase*. It seems to have no office save this, and is found only in one situation, immediately in the passage between the cotyledon and the germ; and in tubers, only at the very base of the eye or sprout.

170. It exercises no influence other than that above mentioned; but chemistry has revealed to us few more powerful agents, converting as it does two or three thousand times its own weight of starch into sugar, for the growing plant. If you have not studied chemistry, I hope you will very soon, for you will thereby gain a more perfect knowledge of this important agent and its offices to the plant, and also of what I shall further relate to you concerning the chemical process of germination.

171. Carbon, of which the greater part of all the sub-

168. What do we discover in the earliest stages of germination? With what does the oxygen unite? Forming what? What becomes of the excess of oxygen resulting from the diminution of carbon? What does *amylaceous* mean?

169. Is it by the direct agency of oxygen that sugar is formed? What is this sub-agent called? Where is it found? Has it any other office or situation?

170. Give me a proof of its power. What study is necessary for the perfect comprehension of this subject?

171. Of what is the greater part of seeds composed? To what is carbon opposed? Why does a housekeeper put up her vegetables in salt?

stance of the seed is composed, is the great principle in nature opposed to putrefaction. In common parlance, it is antiseptic. When the housekeeper wishes to preserve green cucumbers, etc., she packs them down in salt. Salt is antiseptic, and prevents these things from fermenting and decaying. When she is ready to make them into pickles or sweetmeats, she soaks them in water to remove the salt, preparatory to converting them into agreeable articles for the table.

172. Thus is given you a very homely but familiar comparison to make you understand that carbon is the strong anti-putrefactive principle in nature, and that the seed, being almost all carbon, is on this account preserved from decay; and that nature, like the housekeeper soaking her fruits in water to remove the salt, must put her seed into some situation where this superfluous carbon shall be removed.

173. You know seeds differ greatly in the duration of time they observe between perfecting and germinating. Some actually sprout while yet in the pericarp, as the well-known epiphyte, love-vine. Some retain the living principle only a few months; others years, as the olive, peach, etc.; and some varieties of the grasses and grains will continue centuries without losing it. Chemistry informs us that these differences are due to the quantity, greater or less, of carbon in the seed.

174. You will now perceive how indispensable is oxygen, as it alone has power to combine with the carbon. It thus forms carbonic acid gas, which is immediately conducted off. But after life is awakened it forms diastase for the nourishment of the plant. This diastase converts the

172. Why does Nature pack seeds in carbon? What then becomes necessary for their germination?

173. Do seeds differ in time of germination? These differences are due to what?

174. What does oxygen do? The remaining oxygen unites with what to form diastase? And diastase does what? What becomes of the sugar?

starch into sugar, upon which the young plumule feeds until the root has become long enough and strong enough to draw up nourishment from the soil for the growth of the plant. It is not necessary that you should be told more about this subject now, as you would need preparatory studies to understand it.

CHAPTER VIII.

Simple Organs.

175. WE will now take a peep into Nature's workshop, and see of what materials she forms those compound organs, roots, stems, leaves, and flowers, of which we have been learning.

176. You know of your own observation that vegetables are composed of fluids and solids. You can take a young sprout of pokeweed and crush it in your hand, or watch the sugar-cane as it goes under the crush-wheel, and you will perceive that a quantity of fluid will be pressed out, leaving a mass of pulp and fibrous substance. A tree, when first felled, will be found to contain much moisture. This may be seen exuding from the pores in drops even in winter, and in the spring flowing almost in a stream. Thus practical every-day observation will teach you the first lesson on this subject, that is, that vegetables are composed of solids and fluids.

177. For the next step, however, the microscope must be called into requisition. By its magical power we shall

175. What do we now take under consideration ?

176. What does common observation teach us ?

177. What does the microscope teach us ? The solid parts of vegetables are composed of what ?

see that the solid parts of vegetables are composed of a substance called by the common name of tissue.

178. Tissue is divided into three kinds: *cellular*, *woody*, and *vascular*. *Cellular tissue* is the fleshy part of fruits, leaves, etc. It is composed of little cells, which adhere together in very different degrees of closeness, sometimes so loosely as to be easily separated from other parts, as in very ripe fruits, the orange, for instance; and sometimes cohering so firmly as to resist even the powers of an ordinary magnifying-glass to demonstrate that it is not simple membrane.

179. Each cell is a little bag containing a liquid in the early stage of its formation, but, changing with the growth of the plant, it becomes firm, as in the wood of trees; dry and inelastic, as in the lamina of the leaf; hard, as in the shell of nuts; sweet in the watermelon and sugar-cane, acid in the lemon. Coloring matter is also deposited here, and we have the *blue* violet, the *red* rose, the *golden* sunflower, and the many-colored morning-glories. Here, too, is deposited the material for the food of man, the amylaceous material that makes the edible roots; the substance for bread, as found in corn, wheat, etc.; the flour-like deposit in the leguminous tribes.

180. If you cook an Irish potato over steam until it bursts open, you will see a *mealy* mass, which under the microscope comes out into regular bags or starch grains. This is simply the cellular tissue distended to an unusual size by the action of heat.

181. In the quince and guava, little grains, hard like seed, are found in the cellular tissue of the fruit. These

178. This tissue is divided into how many kinds? Where is cellular tissue found?

179. What is each cell? How does it change with growth? What is deposited here? Where is coloring matter deposited? Where food material?

180. What causes a cooked potato to appear mealy?

181. What are those hard particles found in the quince and guava? What else does sclerogen form?

are produced by the deposit of *sclerogen*, and this is the substance that forms the peach-stone, cherry-seed, etc. Professor Lindley demonstrated concerning cellular tissue that it has the power of reproducing itself. He estimated the production of mushroom cells to be at the rate of four billions per hour.

182. These cells are not always the same shape or size. Sometimes they are like honeycomb. You find leaves, pith, and most kinds of fruits presenting this form of cell. Again they are arranged in parallelogram form, like bricks in a wall, and are therefore called *muriform*; they are also egg-shaped, and sometimes round, looking like a pile of balls.

183. Among those cells other little organs or cells are sometimes found. They are called *receptacles of secretion*. Here are found oil, as in olive, myrtle, and orange; turpentine, as in the pine and fir; coloring matter, as in woad, logwood, and madder.

184. You were told just now that these cells looked sometimes like balls piled one upon another, as you see cannon-balls in forts and arsenals. In these the interstices, or openings between, can be easily enough seen. These cells, whatever their shape, have cavities, which are called *inter-cellular passages*, and are filled with fluids. They communicate with the open air through the pores that you have been told cover the epidermis.

185. Cellular tissue decays early, as you will perceive in fruits and the lamina of the leaves; while the seed of the fruit and the veins of the leaves, being formed of a firmer

182. Are these cells always shaped alike? Where do you find them shaped like honeycomb cells?

183. What is found among these cells? What are they called? What is found here?

184. Are there cavities in the cells? What are they filled with? How do they communicate with the outer air?

185. Does cellular tissue decay early? What of woody tissue? What of the bundles of tubes? With what were they a long time confounded? What has the microscope demonstrated? What are they?

texture, resist decay for a much longer period. This firmer part is called *woody tissue*, and consists of bundles of cylindrical tubes or cells, of great length and toughness, tapering at both ends. These are so minute that for a long time they were confounded with fiber, but microscopic investigation has demonstrated that beyond a certain point they cannot be divided, and that each of them is a perfect and complete cylindrical tube, tapering at both ends, and overlapping and adhering to each other.

186. Here sclerogen is deposited, giving durability, hardness, and elasticity to the plant or tree. Woody fiber is as indispensable to trees as bones are to the bodies of animals.

187. In their early stage these woody fibers serve as channels for the ascending sap; but as their cavities become filled with solid matter, and are rendered dense and firm, their developed uses unfit them for any secondary work. They then only give strength and durability to the plant. There is a third tissue, called **VASCULAR TISSUE**, which consists of hair-like tubes coiled spirally, and inclosed in an external membrane.

188. In their normal condition they are coiled up like a corkscrew, but they may be drawn out to a great length. If you take a young shoot of hop-vine or pokeweed, and bend it down first on one side and then on the other, until the outer skin is broken, and then draw the pieces gently asunder, these spiral vessels may be plainly seen with the naked eye. Such spiral vessels abound where great elasticity is needed, as in the tender shoots of young plants, the leaves and flowers, the petioles and peduncles.

186. What is deposited here? Its uses? Is woody fiber indispensable to trees?

187. What do they serve in their earlier stages? Does it continue this office? What is the third tissue called? Its constitution? Its appearance?

188. What of its normal condition? What is it capable of? Example? Where do spiral vessels abound?

189. Some botanists style them *air vessels*, because they contain air; but as investigation has proven them to contain fluids also, this term cannot be considered strictly correct. Their offices have been as much a matter of discussion as their name. Some affirm that they are breathing-tubes; others, that they convey fluids to recently developed tissues. Darby believes that both these theories are true, that in their earliest stage they contain fluids, and in more advanced age, air. Chemical analysis has proved this air to contain seven or eight times more oxygen than the air we breathe.

190. If you cut a stem of water-lily under water, air will be seen rushing up in great bubbles to the surface. The most important functions that these vessels thus far are known to serve is the protection of the plant in the earliest stage of development. No other form of vessel could so preserve the plant from the injurious effects of wind and rain as this spiral tube, which above all other forms combines the great requisites of strength and elasticity. There is another tissue which consists of minute tubes connected with each other, forming a network of branching veins. It extends throughout the plant, but is more abundantly developed in the liber of the bark. It is called *lactiferous tissue*, from the Latin *lac*, milk, because it contains the mucilaginous substance called *latex*, the milky juice of the plant.

191. Botanists disagree as to the character of this fluid, some consider it highly elaborated sap; others, that so far from being sap fit for the use of the plant, it is a substance eliminated totally unfit for use. It is this fluid that exudes from fig stems when you pluck the unripe fruit, and is seen in abundance in the euphorbia on our prairies.

189. What do some botanists call these vessels? Why? What are the theories respecting them? What does Darby say?

190. If you cut a stem of the water-lily, what will you see? What has an analysis of this air shown? What is the most important function of these tubes? Is there another tissue? Describe it.

191. Do botanists disagree concerning this fluid also?

CHAPTER IX.

Miscellaneous Vegetable Phenomena.

192. You would, perhaps, if asked what constitutes the difference between vegetables and animals, say boldly that they differ every way, that there is no resemblance; but you would commit a grave error by such a declaration, for in some particulars there are points of great resemblance, which resemblances increase to such a degree as you descend the scale of vegetable and animal existence, that at last you arrive at a point where the greatest wisdom and discrimination is necessary to say correctly to which organism the thing under examination belongs, vegetable or animal.

193. But higher up in the scale of complete vegetable development we also see these wonderful analogies. Thus we say in general that plants have no stomach, and yet that wonderful flower, the catchfly (*Dionæa muscipula*), not only catches flies, but digests them, as it will bits of meat. In fact, animal food is necessary for its nourishment. This is proved by placing a net over it so as to shut off its insect dinner. The poor, starved plant will soon sicken and die. We again say that plants are fixed and have not the power of motion, but the duck-meat and the fresh-water sailor rise from the muddy soil below to float upon the surface, and again sink when their health or comfort require the change.

194. The mimosa is very sensitive, shrinking from the slightest touch. Darwin, in his beautiful yet absurd poem

192. Is there any resemblance between vegetable and animal life? How as you descend the scale?

193. What can you say respecting the phenomena of the catchfly? Are there plants endowed with powers of locomotion?

194. What of the mimosa? Repeat Darwin's lines.

of the "Loves of the Flowers," claims that the mimosa knows even the approach of rough weather :

"Weak with nice sense the chaste mimosa stands,
From each rude touch withdraws her timid hands ;
Oft as light clouds o'erpass the summer glade,
Alarmed, she trembles at the morning shade,
And feels alive through all her tender form
The whispered murmurs of the gathering storm."

195. If you but touch the pericarp of the balsam it bursts, scattering its contents in the most irritable manner. The *Desmodium gyrans* possesses the most remarkable powers of spontaneous movement. Its branchlets sometimes moving together, then again one solitary leaf, then two or more, then perfect quiet will reign, perhaps to be broken by every leaf from base to apex putting themselves into the most diverse and fantastic motions. Plants also sleep, particularly those belonging to the pinnate leaf tribe so common in Louisiana and Texas. Some exhibit this peculiarity much more than others. The retama and weesachie, for instance, seem to sink to rest at night, and arouse to life again with the morning sun.

196. In witnessing these various phenomena so analogous to similar exhibitions of animal life, we sometimes feel almost inclined to fall into Darwin's theory, that plants have a nervous system similar to that in the animal economy. He goes farther, and compares the sap to the blood, pores to lungs, spongioles to mouths, woody tissue to bone, cellular tissue to fiber, pith to marrow, etc. But this is fanciful and overstrained. Botanists of later days have rejected all such theories, and place these vegetable phenomena under the general head of irritability. This they refer to three heads, as it is produced by the atmosphere,

195. What of the pericarp of the balsam ? The *Desmodium gyrans* ? Of other plants ?

196. In witnessing these phenomena, what are we inclined to do ? Where do botanists place these phenomena ? How divided ?

by the touch, or by some unobserved force. We know of no satisfactory theory to account for these demonstrations.

197. Linnæus formed what he called a *floral time-piece*. It was made of those flowers which open and close their petals under atmospheric influence. Each hour was represented by a flower that expanded or shut up at that particular time.

198. We have many flowers in our gardens that are thus affected. The portulaca opens at sunrise and closes at 12 M.; the marvel of Peru at 4 o'clock P.M.; the night-jasmine at 8 P.M., and is deliciously fragrant until sunrise, when it closes and is entirely scentless. The night-blooming cereus is another well-known night-bloomer.

199. De Candolle, noting the time that flowers bloom in Paris, arranged a *floral clock*, which you can take a hint from and arrange one of Southwestern flowers. We have a number of those that you will find in this "clock." Here is the list, and their hours of expanding:

Between 3 and 4 A.M. Bindweed of the hedgerows.

At 5 A.M. Naked-stalked poppy and most of the cichoraceæ.

Between 5 and 6 A.M. Nipplewort and Day-lily.

At 6 A.M. Many of the Solanaceæ (nightshade family).

Between 6 and 7 A.M. Snow-thistle and spurry.

At 7 A.M. Water-lilies and lettuces.

At 7 and 8 A.M. Venus' looking-glass.

At 8 A.M. Wild pimpernel.

At 9 A.M. Wild marigold.

At 9 to 10 A.M. Ice plant.

At 11 A.M. Purslain, star of Bethlehem.

At 12 M. Most of the mesembryanthemum family.

197. What did Linnæus form from a knowledge of the atmospheric effects upon the expansion of flowers?

198. What flowers in our gardens are thus affected?

199. What did De Candolle arrange with flowers?

At 2 P.M. *Scilla pomeridiana*.

Between 5 and 6 P. M. *Silene noctiflora*.

Between 6 and 7 P.M. Marvel of Peru.

Between 7 and 8 P.M. *Cereus grandiflorus*, night-blooming cereus.

At 10 P.M. Purple convolvulus.

You will be interested in noting the fact that the same flower expands at different hours here and in Paris. Owing to the excess of light and heat enjoyed on the Western Continent, they expand **an** hour or two earlier than the time noted by De Candolle. But to resume the subject of vegetable phenomena :

200. The *color* of plants is supposed to be owing to a substance called *chromule*, and that the variety of hues is formed by the action of alkalies and acids on this chromule. This substance is pure carbon, and is deposited in minute grains in the vesicles of cellular tissue. Light being necessary for the deposition of this substance, plants growing in dark places are nearly colorless.

201. Plants have been found in deep mines, however, that were green, though they had never seen the light. A great many theories have been advanced to account for the variety of hues in leaf, stem, and flower.

202. "Macquart supposed it was owing to the various modifications of chlorophyle being converted into two distinct substances on the addition or abstraction of water."
—*Darby*.

203. The coloring matter obtained from various plants is of the greatest value in arts and manufactures. Madder, saffron, oak, logwood, woad, indigo, give us the red, yellow, brown, black, and blue dyes of commerce. These in all

200. To what is the color of plants ascribed ? What is this chromule ? Where deposited ? What of plants growing in dark places ?

201. What of some plants found in mines ?

202. What did Macquart suppose ?

203. Of what value is the coloring matter found in plants ? Examples ? What do they require ? What is a mordant ?

cases require a *mordant* to fix them, that they may not be removed by washing. A *mordant* is any substance that will unite with the coloring matter and with the fabric that is to be dyed, and hold them united. We speak of it in common conversation as setting the dye, to prevent its fading.

201. Besides the exquisite beauty of form and color, Nature has furnished plants with *perfume* as varied as the forms and hues of the corolla. The rose, violet, mignonnette, lemon, verbena, weesachie, and a thousand others of the flower garden and the lawn, owe their chief attraction to the odor that distinguishes them.

205. These perfumes proceed from oily or resinous matter contained in the receptacles of secretions. But how they are liberated baffles investigation.

206. *Odors* are of three kinds, *permanent*, *fugitive*, and *intermittent*. *Permanent* odors are such as give out slowly, and not only when living, but when separated from the plant. They are more generally present in the wood and bark, as the sandalwood, sassafras, etc.; also in some flowers and plants, as the rose, lavender, sweet clover, etc. *Fugitive* odors are those that belong to transient organs, such as leaves and flowers. These odors vary also with the hour of the day, being generally stronger in the morning and evening than at midday. This of course is easily explained. The heat dissipates the odor by excessive evaporation; this being suspended in the evening, the perfume accumulates, and when again rising is of course stronger. Also at midday the current of air being upward, the odors are wafted rapidly beyond us, while in the evening the vapors settle, preventing their escape.

207. *Intermittent* odors are more difficult of explanation.

204. Have plants any other attraction besides form and color? Odors proceed from what?

205. Where is the oil and resin deposited? Is the process of liberation known?

206. How many kinds of odors are there? Describe them.

207. What of intermittent odors?

It seems evident that their generation must be like their emission, periodical; but further than this no satisfactory theory has been given. The law that controls them is hid from us. Of course, various theories have been suggested. The effects of solar light and heat, or its absence, and certain atmospheric conditions, have been referred to as causes. Some have supposed that intervals of fragrance were caused by the respiration of plants.

208. We heard of the night-jasmine and its periodic odor in our conversation about night-blooming flowers. The day-jasmine, an equally familiar plant, noted also for its intermittent odor, is quite scentless at night, but deliciously fragrant in the day. The *magnolia glauca* gives out great waves of perfume at irregular intervals.

209. No satisfactory theory has yet been presented to account for these phenomena. To account for the other properties, taste, texture, etc., is a much easier task. You know that the flavor of vegetables varies with the modes of culture. Not that cultivation will make a tomato pungent like a pepper, the aloe sweet, or camomile sour. The nature of the plant is fixed as to taste or odor, but the manner of culture very materially governs *quantity*. Every child who has cultivated his little "patch" of sugar-cane knows that if he wants *sweet* cane he must have it grow in the sunshine.

210. The influence of light and heat, then, is to intensify the peculiar properties of plants. Consequently the absence of these two solar influences will diminish them. Celery, when perfectly developed, is a pungent, disagreeable plant. When its pungency is decreased by the absence of light, the aromatic property is subdued into a delicate flavor that makes the plant an agreeable salad.

208. What is said of the night and day jasmine? *Magnolia glauca*?

209. Has any satisfactory theory been given of these phenomena?

210. What is the effect of light and heat on plants? Example?

211. The peculiar property of the cane is *sweetness*; if grown in the shade it is insipid and watery, and not much better than a corn-stalk. By the influence of light and heat its saccharine properties are fully developed. Thus we see that the sunlight makes the aloe more bitter, the cane sweeter, the lemon sourer, the melon more juicy, the pepper more pungent, the vanilla more fragrant, the grass greener, the wood harder. I have told you that cellular tissue decays rapidly; so does the timber when this predominates.

212. As light increases the growth of woody tissue, so darkness develops cellular; consequently the mushroom, which is composed entirely of cellular tissue, grows only in the night; though it will never develop *spores*, or seed vessels, without the agency of light.*

CHAPTER X.

Food.

213. You have been told that the *organs of nutrition* were the spongioles and leaves. The former take up food from the earth, converting solids into fluids, which, mixing with the sap, is conveyed to all parts of the plant, while the leaves take in through their pores gases and

* What influence this fact has in the common practice of planting certain crops in the increase of the moon, and others in the decrease, may possibly be worth investigation.

211. Give some examples of the effect of sunshine in developing peculiar properties.

212. What tissue grows best in darkness? Will mushrooms develop spores (seeds) in the dark?

213. What have you been told of the organs of nutrition?

moisture from the atmosphere. These meet and combine with the various substances brought up by the ascending sap, and are assimilated for the growth of the plant.

214. There are four elements necessary for vegetable life, *carbon, oxygen, hydrogen, and nitrogen*. Being a solid, carbon has first to be united with oxygen and converted into carbonic acid gas, before it can be taken up by the plant. Oxygen is also absorbed from the atmosphere in combination with nitrogen. Hydrogen is obtained in the same way from the atmosphere, and also in combination with water from the soil, or in union with ammonia.

215. You were told, in our conversation upon the *stomata*, how those breathing pores enable a plant to get rid of its superfluous gases and moisture. It is in this way a plant disposes of an excess of oxygen. You were also informed that a great deal of oxygen was required to convert carbon into such a form that the plant could use it. Now, when it has assimilated the carbon, the oxygen is liberated and finds its way again to the atmosphere through the spiral vessels which conduct it to the stomata, and through them to the air.

216. An excess of carbon is deleterious to animal life, while oxygen is necessary to it; and we see the wisdom of the great God in making these two great supporters of life mutually balancing and counteracting each other, the vegetable kingdom throwing out just what will promote animal life, and absorbing all that would be deleterious, while the animal kingdom throws off what the plant needs. As light is necessary for the decomposition of carbonic

214. How many elements necessary for vegetable life? What are they? How is carbon rendered fit for vegetable food? How is oxygen absorbed? How is hydrogen?

215. What are the uses of the stomata? Why is oxygen in such an excess in plants?

216. How do the two kingdoms, vegetable and animal, balance each other? What is necessary for the proper analysis and assimilation of carbonic acid gas? When does this take place then?

acid gas, and the plant's healthy assimilation of carbon, it is during the day that carbon is absorbed and oxygen liberated. There is no chemical action of plants at night. Sunshine is necessary for their work. The night, therefore, brings to them that rest which it does to almost all animated nature.

217. Besides these four primary organic elements, plants absorb various substances from the soil, as sulphuric acid, magnesia, potash, lime, alumina, chlorine, iron, etc. These are converted into liquids by the action of spongioles, so as to enable the plant to draw them up in the shape of sap.

218. The process by which the plant then assimilates this food thus prepared is called chemical action, differing, however, very materially from inorganic chemical union, inasmuch as no art has been able to imitate it, requiring as it does the action of life.

219. A chemist can analyze a glass of water, and show you the two gases, hydrogen and oxygen, in their original elementary form; he then can recombine them and present them to you again under the form of water. The same chemist can take a plant, and in his laboratory reduce it to its component elements, and tell you to a fraction what gases, liquids, solids, acids, alkalies, etc., and in what quantities, enter into its composition. But this is all he can do. He cannot convert them back into a plant. This can only be accomplished through the mysterious agency of what we call the *principle of life*, the secret of which is hid from us in a cloud of impenetrable mystery. You see that organic chemistry requires the action of *living* organs, while inorganic chemistry combines its elements by a

217. Besides the four elements, carbon, oxygen, hydrogen, and nitrogen, what other substances do plants absorb? and how?

218. How does organic chemistry differ from inorganic?

219. Tell me what a chemist can do with a glass of water. Can he do the same with a plant? Why cannot he make a plant if he has all the component parts?

power we call chemical affinity. Perhaps I should explain to you the meaning of the word *assimilation*.

220. It is a term used to express that process by which different substances are converted into a common substance suitable to the organism of the individual. Thus food assimilated by a plant becomes a part of the plant; just as the food you eat is assimilated or converted into the material that makes blood, which replaces the wasted tissues of your body. You now understand a little of the difference between organic and inorganic chemistry, and how the assimilation of food is performed by what we term *organic chemical action*, that is, it is accomplished by *living organs*, the spongioles, as before explained, having the power of converting inorganic substances, such as lime, potash, iron, magnesia, ammonia, etc., into liquids, combining them with the organic elements, oxygen, hydrogen, carbon, and nitrogen, and assimilating the whole into food necessary for the growth and perfection of the plant.

221. If you are curious to know how much inorganic matter is taken up by a plant, sweep your hearth clean, and burn upon it a log of oak or a branch of ash, or simply a bunch of grass: the organic substances will escape in the form of smoke, vapor, and invisible gases into the open air, while the inorganic earthy substances will remain upon the hearth in the form of ashes.

222. If you burn rushes or reeds, you will probably find quite a quantity of small shining particles in the ashes; this is silica. These little roots, you think, must possess astonishing power to be able to convert silica into a liquid, carrying it up, and covering the whole stem with it. When you have studied chemistry, you will learn that silica is an acid, and thus combines with the alkalies, soda and potash,

220. What is the meaning of assimilation? How is this performed?

221. How can you form some idea of the quantity of inorganic substances in a plant? What do you find in the ashes? What has become of the gases and vapors?

222. What of silica? Raphides? Where found?

in the soil, and, being dissolved by the rain, is taken up in a fluid state by the plant as silicate of potash or silicate of soda. The microscope has discovered it in the form of a perfect wall of exquisite masonry of crystals or *raphides*, from the Greek, *raphis*, a needle. This gives the graceful cane its strength, and enables the slender wheat and barley stems to bear upright heavy heads of grain.

223. The Dutch rush contains such an amount of these raphides, that before the invention of sand-paper, it was extensively used in the arts for polishing purposes. It is stated on good authority, that reeds, during hurricanes in tropical regions, have been set on fire by the friction of the stems striking and lashing each other, owing to the superabundance of silica (flint) in them.

224. You have been told of the food of plants, how absorbed, and how assimilated. The *sap* is the medium by which this food is conveyed, in spring-time, through the wood to the remotest branches of the trees, and continues to rise until the leaves fed by it are developed into organs competent to perform the functions of absorption, elaboration, and exhalation. Then the sap descends slowly and through another set of vessels to the root again, taking out of the plant all extraneous and useless matter not expelled through the epidermis of the bark and leaf.

225. It is called, in its first movement, *ascending sap* or *lymph*; when flowing downward, *descending sap* or *juice*. The lymph is thin and watery, possessing no peculiar characteristics, being perfectly innoxious even in poisonous plants. There is a plant in the Canary Islands whose copious ascending sap is freely drunk by the thirsty traveler, while the descending sap of the same plant is a deadly poison. The ascending sap goes up with wonderful force.

223. What of the Dutch rush? What of reeds in tropical countries?

224. What is the medium through which food is conveyed?

225. What is the ascending sap called? and through what vessels does it go? What course does the descending sap take? and what is it called? Does *lymph* possess any peculiar properties?

226. The experiment made so often by school-boys on mustang grape-vines will give you some idea of the quantity of sap and the power with which it is propelled upward. A branch is chosen, say an inch in diameter, and cut off four feet from the ground; over this the neck of a bladder is stretched and secured firmly by a rosined thread. In a few hours this bladder will be full of sap, and soon it will burst into shreds with an explosion like that of a pistol.

227. The force with which sap ascends has been estimated to be five times greater than that which impels the blood in the great crural artery of the horse. After rising to the leaves, exhaling through them superfluous moisture, exchanging gaseous compounds, yielding up some, receiving others, it commences its downward motion, and is now true sap, containing all the peculiar products of the plant, gums, resins, oil, milk, and mucus.

228. Its principal flow is now through the bark, though it spreads horizontally also. It makes a deposit of tissue for a new layer of wood, and continues downward, hardening the root by deposits of various matter. It adds fresh cellular tissue to the extremities to form new spongioles, converting them into epidermis.

229. We thus see each year a new layer of wood and bark deposited; the soft wood of the year previous becoming harder and firmer from the deposit of sclerogen and other substances left by the descending sap. Some approximation may be made to the age of a tree by counting the number of rings the yearly sap deposits in a transverse section of its trunk.

226. What of the grape-vine experiment?

227. What is the ascending force computed to be equal to? Describe its action after it reaches the leaves.

228. Where is the principal flow of the sap after it reaches the leaf? Is it confined entirely to the bark? Describe its further downward flow.

229. How does soft wood become hard? How can you judge the age of a tree?

230. Many theories have been advanced to account for the motion of the sap, all of about equal consideration. Some attribute it to *evaporation through the leaves*, others to *capillary attraction*, others to *vital action*. I confess that no theory that I have ever seen satisfactory explains this circulation. All are plausible up to a certain point, when some stubborn fact intervenes and checks one's pride of opinion as effectually as a frosty night does the flow of sap. To the one mysterious power, *vital action*, must the phenomenon be ascribed.

231. You have now been told of the sap and its offices. Let us take a hasty glimpse at some of the substances elaborated by it. The first in importance is starch. How important can be imagined when I tell you that more than one-half of the human family *live entirely upon it* in its various forms. Here we also find sugar, gum, oil, wax, resin, mucilage, alkaloids, narcotine, morphine, cinchona, iodine, potash, soda, and poisons, both narcotic and acrid.

232. The sap elaborates all these, but certain cells are formed which secrete from it some of these substances; others seem to be thrown out from the sap as excessive; and hence we divide them into two classes, calling the first *secretions*, and the latter *excretions*. Sweet-gum (*Liquid-amber, styraciflua*) is an excretion of the sweet-gum tree, while tannin in the red-oak (*Quercus ruba*) bark is a secretion.

233. We have now in discursive chapters learned of various vegetable phenomena: such as the irritability of plants; their color; their permanent, fugitive, and intermittent odors; the influence of light upon tissue; the properties and longevity of plants; of their food, organic and inorganic,

230. Has any satisfactory theory been advanced to account for the upward flow of sap? To what must we ascribe it?

231. Tell some of the substances eliminated by the sap. Where are these found?

232. What are the two kinds of cells called? Sweet-gum? Tannin?

233. What have you now learned?

its assimilation ; of ascending and descending sap, and its elaboration and deposit of secreted and excreted substances. We will now take up a subject that will give a long name to the next chapter.

CHAPTER XI.

Metamorphosis.

234. THE *metamorphoses* of plants may be explained to be the changes that take place in the organs during growth, in respect to form, color, size, etc., and the incidental changes from exceptional circumstances, as culture, excessive or deficient nourishment, etc., that may arise in the organs. In their normal state all flowers are single, and are made otherwise by cultivation. This is effected by the conversion of stamens into petals.

235. You sometimes see a full-blown rose with a perfectly green unexpanded flower-bud in the center where the stamens and pistils should be. The common honey-locust in an early season will put out fresh young branches. If the season is invaded by the return of cold winds and frosts, followed by drought, these tiny rudimentary branches lose their leaves and become thorns. It may be, in a year or two the reverse of all this will be the case—a warm, wet season, when vegetation becomes extremely rank and vigorous, and these thorns may be seen adorning themselves with tufts of green leaves. That well-known floral ugliness, the green rose, is a development of the sepals of the calyx, to the utter extinction of all the other floral organs. Thus we see sometimes a stamen, and the next year a petal,

234. What does this chapter treat of? What does metamorphosis mean? .

235. Tell me of the rose. The honey-locust. Mention some changes in the flower caused by exceptional or incidental circumstances. What are they called?

one season a thorn, the next a branch, one year the rose is double, full, and perfect as to petals, the next year a bud usurps the stamens and pistils; now these are all *irregular metamorphoses*.

236. *Regular metamorphosis* is the change we see going on in regular sequence, governed by laws that act with precision, unless controlled directly by some of those agents just alluded to as producing irregular metamorphoses.

237. This change botanists pronounce to be the result of two forces, *expansion* and *contraction*. The plumula expands into a stem, the radicle into root, the stem into branches, and the branches into leaves; the leaf contracts into bracts, the bracts into calyx, the calyx into the corolla, which expands into fruit or contracts into seed. Irregular metamorphosis can be easily demonstrated by experiment; the single poppy, for instance, can be made perfectly double in two or three years by proper cultivation. To witness regular metamorphosis you have but to follow any plant through its different stages of germination, growth, flowering, and seeding.

238. The expansion into leaves and contraction into flowers is prettily shown in the hoyá, common wax-vine. Take two slips, put one in a large pot with plenty of rich soil, and supply it abundantly with water, and you will have a large vigorous vine, with a superabundance of green leaves, but no flowers; place the other in a small jar, scantily supplied with nourishment, and you will have a small vine, few leaves, and large and beautiful clusters of flowers. You will, perhaps, be surprised to hear that it was a poet and not a philosopher that made this discovery. Goethe has embodied his history of metamorphosis in a poem, the beauty of which will make you excuse its length. So,

236. What is regular metamorphosis?

237. To what are these changes due? Explain the process. What of irregular metamorphosis?

238. Illustrate the expansion into leaves and contraction into flowers. Who made this discovery?

without even craving your patience, we will venture to give it to you, in Mr. Dwight's admirable translation :

THE METAMORPHOSIS OF PLANTS.

Thee perplexes, beloved, the intertangled confusion
Of this flowery throng, which in the garden thou seest ;
Many the names you must hear, and ever one after another
With its barbarous clang crowds itself into your ear.
All in their forms are kindred, and yet no one like another ;
So this wonderful choir points to a half-hidden law—
Yes, to a holy enigma. Oh, could I teach thee, beloved,
Happily teach thee the word, which will unriddle it all !
Study it now as it grows, and see how the plant, ever changing,
Step by step carried up, forms into blossoms and fruit.
Out of the seed it unfolds itself, so soon as the fruitful
Earth's still fostering lap letteth it forth into life,
And to the soft-wooing light, the holy, eternally moving,
Quick the opening leaves' delicate structure commits.
Singly slept the germ in the seed ; an embryo fore-type
Lay enwrapped in itself, curling up under the shell ;
Leaf, and root, and bud, half-formed, and all without color,
Thus the kernel so dry safely protects the still life ;
Then it flowers strivingly upwards, turning the delicate moisture,
And soon lifteth itself out of its mantle of night.
But what shows itself first is always a simple formation ;
Thus may we among plants always distinguish the child.
Soon a following impulse lifts itself upward repeating,
Joint upon joint built up, ever the earliest form ;
Yet not always the same ; for, constantly changing its figure,
Opens out, as you see, ever the following leaf,
More spread out and indented, and cut into points and divisions,
Which, half-grown, heretofore slept in the organ below,
And so reaches its first, its highest determined completion,
Which in many a tribe thee to astonishment moves.
Variously ribbed and jagged, on the juicy exuberant surface
Seems the fullness of life free and unbounded to be.
But here Nature holds with powerful hands the formation
Back, and to perfecter shape softly inclines it to grow.
Now more sparingly leads the sap through slenderer vessels,
And the delicate plant's finer formations begin.
Now the forth-putting edges draw themselves quietly backward,

While the rib of the stalk builds itself solidly out.
Leafless, however, and swift, upsprings the delicate flower-stem,
And a miraculous sight fills the beholder with joy.
Round in a circle there place them, in number exact or uncounted,
Leaflets, the smallest one first, next to that likest itself.
Gathered close round the axle, now opens the sheltering calyx,
And to full beauty and height lets out the gay-colored crown.
So shines Nature complete in all her fullness and glory,
As in regular rise, limb upon limb she displays.
Ever thou marvest anew, so soon as the stem with its blossom
Over the changing leaves' delicate scaffolding rocks.
But this beauteous show now a new creation announces ;
Yes, the soft-colored leaf feeleth the hand of the God,
And together draws itself quick ; the tenderest forms now
Lean together in pairs, seemingly made to unite.
Lovingly now they stand, the beautiful couples, together.
See, in numerous crowd, ranged round the altar they wait !
Hymen hovers this way, and streams of exquisite odors,
Borne on the generous breeze, breathe a new life in all around.
Now distinctly swell at once the germs without number,
Germs of the swelling fruit, soft in the motherly lap.
And here Nature concludes the ring of her infinite powers ;
Yet a new one at once links itself on to the last,
That unbroken the chain through endless time may be lengthened,
And the whole made alive, like the one part we have seen.
Turn thee now, beloved, and look at the motley confusion ;
Now, no longer perplexed, you may look as it waves.
Every plant but announces to thee some law everlasting .
Every blossom, it speaks plainer and plainer to thee.

239. You thus see in the beautiful garb of poesy the same thing presented to you in the talk about *leaves*, that Nature works from one type—the leaf being the embodiment of the idea which she varies and elaborates through all her marvelous development of vegetable structure. This development and contraction you are again told is known by botanists under the general name of *regular metamorphosis*.

239. What is presented to you in the talk about leaves ? Under what name is it known by botanists ?

CHAPTER XII.

SECTION I.—PHENOGAMIA.

210. IN the course of these conversations you have been told of *monocotyledonous* plants, with one cotyledon or seed-leaf, stems growing by *inner deposition*, and called, therefore, also, *endogens*; *dicotyledonous*, having two seed-leaves, the sap making *external deposits*, and hence styled *exogens*; *polycotyledonous*, having several seminal leaves, as seen in the coniferous family, the pine, hemlock, etc. All these have been described, and yet you have not been told that there is another classification made, by which the vegetable world is divided into two classes, styled *par excellence* the two grand divisions, *phenogamous* and *cryptogamous*.

241. *Phenogamous* (Greek, *phaino*, appear, and *gamos*, marriage) are plants which have their stamens and pistils visible. To make this division clear we will present a table:

PHENOGRAMOUS	{ contain	Monocotyledons	{ contain	Endogens: Palms, lilies, yuccas, etc.
		Dicotyledons Polycotyledons		
			{ contain	Exogens: Including all forest-trees, etc.

SECTION II.—CRYPTOGAMIA.

242. *Cryptogamous* (Greek, *krypto*, to conceal, and *gamos*, marriage) are plants with stamens and pistils invisible. They are divided into:

1. *Felices*, ferns.
2. *Equisetaceæ*, horse-tails.
3. *Musi*, mosses.

240. What are the grand divisions?

241. What does phenogamous mean? Phenogamous plants include what?

242. What does cryptogamous mean? Give the botanical name of ferns.
Horse-tail. Mosses. Mushrooms. Lichens. Lycopodium. Algæ.

4. *Hepaticæ*, liverworts.
5. *Fungi*, mushrooms.
6. *Lichens*, rock-mosses.
7. *Lycopodiums*, club-mosses.
8. *Algæ*, water-weeds, mosses, etc.

243. We will now take up the cryptogamous plants, but in describing them we use different terms from those describing analagous organs in the phenogamous tribe; and before proceeding farther you must be told some of them, and their meanings explained, so as to assist you as much as possible in your future studies of the natural specimens.

244. *Calyptra* means a cap or vail, and is the covering that incloses the *theca* or capsule before the sporules or seeds are yet ripe. It is shaped much like an extinguisher, and bursts longitudinally (Fig. 117), leaving the theca (Fig.

FIG. 117.

FIG. 118.

FIG. 119.

FIG. 120.

118). The little cap on the theca is called *operculum* (Fig. 119).

245. *Indusium* is the shield or scale covering the capsule or seed-cases of ferns (Fig. 120). *Sori* are the fruit-dots on the back of the fronds (Fig. 121). The *cap* is the head or expanded part of the mushroom (Fig. 122). *Gills* or *lamellæ* are the laminated divisions of the under side (Fig. 123). *Volva* is the membranous covering protecting the gills; it is attached to the margin of the cap and to the stipe. When the cap is fully grown the volva bursts at the margin, but, retaining its connection with the stipe, falls over it like a curtain (Fig. 124). When the plant is fully

243. What can you say of the cryptogamous plants?

244. What is a calyptra? A theca?

245. What is an indusium? Sori? Cap? Volva?

matured, this, partly absorbed and partly thrown off by decay, becomes simply a ring, called *annulus* (Fig. 125).

FIG. 121.

FIG. 122.

FIG. 123.

FIG. 124.

246. *Ferns* have light graceful leaves which we call *fronds*. When young they are curled, *circinate* (Fig. 126), and expand by unrolling. Their *spore-cases* or seed-ves-

FIG. 125.

FIG. 126.

sels are situated on the back of the fronds, as you saw in the cut showing *sori*, and are arranged differently in different species.

247. The genus *equisetaceæ*, horse-tail, contains numerous species. They consist of leafless, jointed stems, erect, hollow, and ridged. The spores of the *equisetaceæ* are contained in scales forming the inflorescence, which appears in the form of a terminal spike (Fig. 127).

248. The mosses are composed of cellular tissue entirely, and are furnished with a *theca* supported on a slender stalk called *seta* (Fig. 128). The tuft of leaves from which the seta or stem springs is called a *perichætium* (Fig. 129): a

246. What are ferns? Fronds? Spores? Sori?

247. What are *equisetaceæ*? Describe them. Where are their spores?

248. What is the seta? Perichætium?

represents the *theca*, *b* the *seta*, and *c* the *perichæcium*. You have before been told that the theca contains the

FIG. 127.

FIG. 128.

FIG. 129.

spores or seeds, and is covered by a lid or operculum. An enlarged theca with its lid would look like an old-fashioned sugar-bowl (Fig. 130). Moss seeds are first seen in the theca, then covered over with operculum. These are then all wrapped up in a calyptra.

249. *Hepaticæ*, or liverworts, are small creeping plants.

FIG. 130.

FIG. 131.

Their leaves lap over each other like scales (Fig. 131), and are hence said to be *imbricated*. They generally have no lid to their capsule, and are by that distinguished from the mosses. They grow upon old walls, rock, bark of trees, and are sometimes found in damp places, but *never under*

249. Describe hepaticæ. How do you distinguish hepaticæ from algae?

water. By that circumstance they are never confounded with algæ.

250. Fungi or mushrooms have already been fully explained in giving you the technical names of their several parts. You were told, when learning of tissues, of the effect of light upon vegetation, and that mushrooms are composed of cellular tissue, and therefore grow during the night, though unable to perfect spores without the agency of light. We are indebted to the microscope for our knowledge of several varieties of fungi. The *rust* upon wheat, the mold upon paper-hangings, old cheese, etc.; the mildews that at some seasons so disfigure the orange-trees and oleanders along our coast, are all plants, and are all fungi.

251. *Lichens* (Fig. 132) are those scaly wood-colored plants found on trees, old buildings, fences, felled forest-trees,

FIG. 132.

FIG. 133.

Cup Magnified.

etc. Though generally of gray color, they are often found brown, green, and yellow. The sporules are in cup-shaped receptacles (Fig. 133). Sometimes these cups are upon stalks, called *podita* (Fig. 134); again these cups sit down upon the *thallus*, which is the leaf-like expansion of the plant (Fig. 135). You will have some idea of the research and industry of botanists when you hear that they have described over two thousand species of this one genus.

250. What is rust, mildew, and mold?

251. What of lichens? Their sporules?

252. Lycopodiums or club-mosses, better known as ground-pines (Fig. 136), seem to be a connecting link be-

FIG. 134.

FIG. 135.

FIG. 136.

tween mosses and ferns. They have imbricated leaves growing close down upon the stem, like the arbor-vitæ. Their erect branching stems are surmounted by a terminal cone-like spike, containing its sporules at the base of these scales. These sporules are seen in the form of yellow dust, very much resembling the pollen-grain of the pine. There are a few species without stems, having awl-shaped leaves. The resurrection rose is a lycopodium.

253. Algæ are water-plants, found either in salt or fresh water. They are cellular, some having the distinction of fronds and stems. Some have merely stems, simple or branching. The sporules are imbedded in the substance of the frond, or in the tubercles, variously situated. They are generally entirely submerged. The salt-water algæ

252. What of lycopodiums ?

253. What can you say of the algæ plants ? Describe their growth and organs of reproduction.

comprise an immense family of exceeding beauty, varied and curious in construction, and presenting us every variety of form, color, and condition. Some are fixed to the rocks and sands below, some floating. In many, roots are perfectly developed; again, a mere expansion of the stem attaches them to the rocks; others again show no sign of either root or expansion, but spread into vast laminæ, thin and delicate, like yards of finest Florence silk, green, purple, and crimson, or they appear like bundles of irregular tubes; while others present themselves as masses of tangled threads. Here vast frond fans wave to and fro in the waters, fastened by foot-stalks to the rocks, while above them the gulf-weed, buoyed by its air-bubbles, goes floating along from Honduras to the Hebrides, dallying with the rosy coral of the tropical seas, and anon weaving a shroud for the adventurous sailor lost amid the icy waters of the Northwest Passage.

254. In contemplating these wonders of the land and water, we can but exclaim, "*O Lord, how manifold are thy works; in wisdom hast thou made them all; the earth is full of thy riches; so is the great and wide sea.*"

255. We cannot dismiss the subject of the cryptogams without speaking of the important work that these pioneers of the vegetable world perform. Geologists inform us that they were the origin of all vegetable life. Making their appearance upon the rocks that first emerged from the bosom of the waters, they disintegrated these rocks, and by this process and their own decay furnished soil for more complex organization. Thus we see cryptogamous plants preparing the way for endogenous, and they in their turn for exogenous plants.

256. Here we see a new cause for wonder and admira-

254. What are we forced to exclaim in contemplating these wonders of the land and sea?

255. What can you say of the important work of the cryptogamous plant?

256. What new cause have we for adoration of the Almighty?

tion of the great God, who works with means so simple and apparently so weak for so great accomplishments, making the very existence of the gigantic oak, that braves the tempests of a thousand years, the result of the life and labors of the lowly cryptogams.

CHAPTER XIII.

SECTION I.—RECAPITULATION.

HAVING now completed so much of the study of vegetable physiology as the limited plan of this introductory work will admit, for the sake of impressing several divisions of the subject upon your mind, I will now make a brief recapitulation of the whole. We first took up the root and its three divisions, ground-roots, air-roots, water-roots, and found these again divided into branching, fibrous, bulbous, tuberous, running, and fusiform; and that these were either annual, biennial, or perennial.

From the roots springs the stem. It is either ligneous, hard, woody, and perennial; herbaceous, succulent, green, and annual; suffruticose, partly woody and partly herbaceous. Ligneous stems are subdivided into endogenous, inward growth; exogenous, outward growth; acrogenous, growing from the apex only.

At regular intervals upon the branches are nodes; the spaces between are internodes. From the nodes spring the leaf. The leaf consists of two parts, lamina and petiole. The first leaves are called seminal, the next primordial. Those on the perfect stem, characteristic. When the leaf springs from the root, it is radical; from the stem, cauline; when on the stem, sessile. If the leaf falls off early after unfolding, it is caducous; if in autumn, it is deciduous; remaining all winter, persistent or evergreen.

The arrangement of the veins, *venation*, is either reticulate or parallel. The first is divided into palm venation, lobed venation, etc.; the second, into forked venation, etc.

Leaves are simple or compound. They are cordate, lanceolate, deltoid, needle-shaped, ovate, reniform, palmate, pedate, pinnate, unequal, alternate, regular and irregular, bipinnate, tripinnate, etc. Leaves have stipules, stings, scales, pubescence.

The complete flower consists of calyx, corolla, stamens, and pistils. The first two are called floral envelopes; the last, essential organs. When the calyx and corolla are both present, the flower is dichlamydeous; when one is wanting, monochlamydeous; when both are wanting, achlamydeous.

The manner in which the petals are situated in the bud is called their *æstivation* or *præfloration*. When they fit by their edges, they are called *volvate*; when the outermost pieces cover the margin of the inner, *imbricate*; when each overlaps the other in a spiral manner, *contorted* or *twisted*. Each division of the corolla is called a *petal*; when the corolla is entire, *monopetalous*; when divided, *polypetalous*. A monopetalous corolla may be *salver-shaped*, *funnel-form*, *campanulate*, *trumpet*, etc. Polypetalous corollas may be *liliaceous*, *cruciform*, *rosaceous*, and *caryophyllaceous*. Irregular corollas are *labiate*, *lingulate*, and *papilionaceous*.

The essential organs are the stamens and pistils. The stamens consist of *filiment*, *anther*, and *pollen*. If the stamens are inserted upon the pistil, it is *epigynous*; under the germ, *hypogynous*; if around, *perigynous*.

In the center of the flower is the pistil. This consists of the *germ*, *style*, *stigma*. The ovary, if placed above the calyx, is said to be *superior*; if below, *inferior*. When the style is wanting, the stigma is said to be *sessile*. The arrangement of the flower upon the branches and stems is called their *manner of inflorescence*, and may be a *spike*, *head*, *raceme*, *corymb*, *umbel*, *ament*, *panicle*, *spadix*, *ver-*

ticillate. The termination of the peduncle upon which the flower sits has several names, receptacle, torus, etc. When it supports but one flower, it is proper; when a cluster, it is common.

The germ is the base of the style, and the stigma its apex; the rudimentary seeds, the ovules. When the germ is fully developed it becomes fruit. This consists of pericarp and seed. The pericarp may be a shell, pod, or pulp.

Fruits are divided into dehiscent and indehiscent. Indehiscent are those which do not open when matured, and are subdivided into drupe, berry, pepo, and pome. Dehiscent are those which do open when matured, and are subdivided into legume, follicle, silicle, silique, capsule, and pyxis.

Seeds are sometimes furnished with appendages, as down, aigret, wings, and scales. A seed consists of three parts, embryo, albumen, epidermis. The embryo contains the cotyledon, plumula, and radicle.

We commenced at the root, and—like the mariner, who, sailing west, if he sails long enough and far enough, will reach the port he left—we have, by continually traveling upward, found ourselves where we started from, at the bottom of the plant again, the radicle or root.

SECTION II.—GENERAL REMARKS.

You have been told that plants consist of solids and fluids, that these constitute various tissues, cellular, vascular, woody, and lactiferous. These are made from inorganic substances held in solution by the water drawn from the soil by the spongioles, by gases taken from the earth by the roots, and from the air by the leaves. That by the process of assimilation they are converted into material identical with the plant, and that this material is deposited by the sap in its descending flow.

You have seen how the well-being of both the vegetable and animal kingdom depends on the seeming discord of their forces ; that they are

“ Formed for one another, though dissimilar,”

and work together for the good of man with a beneficence and wisdom that fills the Christian heart with profound awe and adoration.

CHAPTER XIV.

Classification.

SECTION I.—ARTIFICIAL SYSTEM.

To classify plants is to arrange into groups and families those that bear the closest resemblance to each other. Botanists have taken different circumstances as the grounds for this resemblance, and consequently we have several systems of classification. You should make yourselves familiar with both the Linnæan or artificial, and the natural system. The first named is founded upon the number, length, and situation of the stamens and pistils. This first division is into phenogamous, with stamens and pistils visible ; and cryptogamous, stamens and pistils invisible. The phenogamous plants include the first twenty classes.

As a knowledge of Latin and Greek numerals is necessary in order to understand the names of the classes and orders, you will commit the following to memory :

<i>Latin.</i>		<i>Greek.</i>	
Unus,	1.	Monos,	1.
Duo,	2.	Duo,	2.

<i>Latin.</i>		<i>Greek.</i>	
Tres,	3.	Treis,	3.
Quatuor,	4.	Tettares,	4.
Quinque,	5.	Pente,	5.
Sex,	6.	Hex,	6.
Septem,	7.	Hepta,	7.
Octo,	8.	Okto,	8.
Novem,	9.	Ennea,	9.
Decem,	10.	Deka,	10.
Undecim,	11.	Endeka,	11.
Duodecim,	12.	Dodeka,	12.
Tredecim,	13.	Dekatreis,	13.
Quatuordecim,	14.	Dodekatreis,	14.
Quindecim,	15.	Dekapente,	15.
Sexdecim,	16.	Dekaex,	16.
Septendecim,	17.	Dekaeptha,	17.
Octodecim,	18.	Dekaokto,	18.
Novemdecim,	19.	Dekaenna,	19.
Viginti,	20.	Eikosi,	20.
Multus,	many.	Polus,	many.
Bis,	twice.	Bis,	twice.

Andria signifies stamen. Instead of saying *monos andria*, one stamen, we make a compound word, and write it thus:

1st class	Monandria,	one stamen.
2d “	Diandria,	two “
3d “	Triandria,	three “
4th “	Tetrandia,	four “
5th “	Pentandria,	five “
6th “	Hexandria,	six “
7th “	Heptandria,	seven “
8th “	Octandria,	eight “
9th “	Enneandria,	nine “
10th “	Decandria,	ten “
11th “	Icosandria,	twenty “

This last class, the eleventh, has twenty or more stamens inserted on the calyx.

Twelfth class, polyandria, has twenty or more inserted on the receptacle.

The orders of the first twelve classes depend on the number of pistils, and are named by prefixing the Greek numerals to the word *gynia* :

1. Monogynia.	7. Heptagynia.
2. Diagynia.	8. Octogynia.
3. Triagynia.	9. Enneagynia.
4. Tetragynia.	10. Decagynia.
5. Pentagynia.	11. Dodecagynia.
6. Hexagynia.	12. Polygynia.

When the filaments are united, making a little tube in which the pistil stands, we call it monadelphia (from *monos*, alone, and *adelphos*, brother) : this makes the fifteenth class. Sixteenth class, diadelphia (*dis*, two, *adelphos*, brother), has stamens united by their filaments, forming two sets. In these classes the orders depend upon the number of pistils, and are named in the first twelve classes only, adding *gynia* (pistil), monogynia, diagynia, etc.

Seventeenth class have their anthers united, and hence are called *syngenesia*, which means growing together (flowers compound). This class has these orders :

1st. *Equalis*, flowers perfect ; that is, each flower having a stamen, pistil, and seed.

2d. *Superflua*, disk florets perfect, ray florets containing neither stamens nor pistils.

3d. *Necessaria*, florets of the disk, *staminate* ; rays, *pistillate*.

4th. *Segregata*, florets each furnished with a perianth or calyx.

The eighteenth class, *gynandria*, stamens growing on the pistil.

Nineteenth, stamens and pistils in separate corollas on the same plant, and is called *monæcia*: *æcia* signifies house; hence, *mono*, one; *æcia*, house.

Twentieth class, *diæcia*, two houses; stamens and pistils in separate corollas upon different plants or houses.

The orders of these three last classes, like those of monodelphia and diadelphia, depend upon the *number of stamens*. The cryptogamous family, stamens and pistils invisible to the naked eye, form the twenty-first class. The orders of this class are six—filices, musci, hepaticæ, algæ, lichens, and fungi.

SECTION II.—NATURAL SYSTEM.

The natural system differs totally from the artificial, paying but little attention to any one organ, but, regarding the plant as a whole, takes the *collective resemblances* and groups them by their *natural* relationships. On this basis it forms them first into *classes*; these classes are separated into *orders*, orders are subdivided into *genera*, and genera into *species*.

We say that *exogenous* plants constitute one class, *endogenous* another, *acrogenous* a third. The first class is divided into two sub-classes:

1st. Angiosperms, which have pistils of the common kind, in which seed are formed. This includes nearly the whole of the exogens, except the conifers, such as the pine, yew, cedar, etc. These belong to the sub-class number.

2d. Gymnosperms, with ovules and seeds naked, there being no pistils, or, if any, a mere scale, as in the conifers.

The cryptogamous plants are subdivided into three classes:

Class 3. Acrogens, including ferns, horse-tail, and club-moss.

Class 4. Anophytes, containing mosses and liverworts.

Class 5. Thallophytes, including lichens, algæ, mushrooms.

Thus we see the vegetable kingdom is divided into two sub-kingdoms:

1st. Phenogamia are distinguished by peculiarities:

- a. Consists of regular axis of growth and with leaves.
- b. They have a woody and spiro-vascular construction.
- c. They have stamens and pistils.
- d. They produce seeds containing an embryo.

2d. The cryptogamia:

- a. Are destitute of regular axis and true leaves.
- b. They are of vascular structure.
- c. Their flowers are invisible to the naked eye.
- d. They produce spores instead of seed.

The phenogamia are divided into two great *classes*, whose characteristics are distinct and palpable.

Exogens (outside growers) or dicotyledons:

- a. Growing by layers external to the wood, internal to the bark.
- b. Leaves net-veined.
- c. Flowers, 4- or 5-parted, rarely 3.
- d. Seeds with two cotyledons.
- e. The radicle producing an axial root.

Endogens (inside growers) or monocotyledonous plants:

- a. Growing by internal bundles of cellular and woody tissue.
- b. Pistils complete, inclosing the ovules.
- c. Seeds inclosed in a pericarp.
- d. Embryo with one cotyledon.

The third division is into *sub-classes*. The exogens form two:

ANGIOSPERM (seed covered):

- a. Flowers generally perfect and complete.
- b. Pistils complete, inclosing the ovules.
- c. Seeds in a pericarp.
- d. Embryo with two cotyledons.

GYMNOSPERMS (seed naked):

- a. Flowers imperfect and incomplete.

b. Pistils scale-like or wanting.

c. Seeds naked, destitute of a pericarp.

d. Embryo polycotyledonous.

The exogens form two sub-classes:

Petaliferous. Plants of the endogenous structure, with flowers constructed on the usual plan; perianth of one or more whorls of petals.

Glumiferous. Plants of the endogenous structure, the flowers in imbricated glumes, instead of petals and sepals.

Angiosperms are further divided into

Apetalous, which have calyx, but no corolla.

Monopetalous, corolla entire.

Polypetalous, calyx and corolla.

Endogens, or monocotyledonous, are divided into

Flowers on a spadix.

Flowers not spadicious.

With *simple* or *double* perianth, *regular* or *irregular*.

FLOWERS *imbricated* or with *glumaceous* bracts.

These are again grouped into *herbaceous*, or *trees* and *plants*, *terrestrial* or *aquatic*.

ANTHERS, *introrse* or *extrorse*.

GLUMES, *single* or in *pairs*.

In this division we find the palm, yucca, banana.

You will now recapitulate what you have learned of the natural system:

That it is first divided into phenogamous and cryptogamous plants.

That the phenogamia are further divided into

1. Exogens.

2. Endogens.

That exogens are subdivided into

1. Angiosperms.

2. Gymnosperms.

That the cryptogamia have three divisions:

1. ACROGENS, woody and vascular tissue.

2. ANOPHYTES, cellular tissue only.

3. THALLOPHYTES, with no distinction of stem foliage, but all confounded in a thallus.

Our task is now accomplished. In our conversations upon classification we have only done as we did in previous talks upon vegetable physiology—given you an easy and pleasant introduction to the subject; hoping that the stronger hands of the many botanists of whom America is so proud—Darby, Wood, Gray—may lead you through this glorious kingdom, showing you its great and mighty, its useful and beautiful, its mysterious and awe-inspiring possessions.

INDEX AND GLOSSARY

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PART II.

NOTE.

THE Author must explain that, from the fact that she is indebted to "*Chapman's Southern Flora*" for a large proportion of Texas plants (identified for her by her kind and learned friend, Professor S. D. Buckley, formerly Assistant Geologist and Botanist of Texas), and being compelled to use Dr. Chapman's descriptions of many that she has never seen either growing or in herbarium, that she has copied *verbatim* his arrangement of the Orders (he himself following Gray), and, in the great majority of cases, his description of the same.

Her indebtedness to Professor Buckley is beyond all expression of thanks; suffice it to say, that without his generous aid, her *Flora* could not have attained a fourth of its present fullness.

Also, to Dr. Watson, of the "Botanic Gardens, Cambridge, Mass.," her thanks are gratefully made for his kind assistance in her prosecution of the study of Natural Classification.

She claims no merit for original work: for the most part she has been but a gleaner on others' lands, gathering into one garner, as far as she could, sheaves cut by Chapman, Buckley, Gray, Drummond, Torrey, and others; but left lying bound on their own individual fields.

Neither does she claim to have made an exhaustive collection. Like the instructions given to the learner, this is only to introduce children to the works of the "great masters," Gray and others; also to try and induce some more able one to tell to the outside world of the treasures of beauty, usefulness, wealth, and the curious that abound in the Vegetable Kingdom of the great Southwest.

M. J. Y.

NATURAL CLASSIFICATION.

FLORA OF TEXAS.

CHAPTER I.

IN the first part of this volume you have been told something of Vegetable Physiology, and are now in a degree prepared for the next step in the study of the science of Botany, viz., Classification. You will have to receive a little more instruction concerning some of the organs, and learn a few more technical terms.

SECTION I.—PISTIL.

We will first consider the *essential organs*, the stamens and pistils. The former in their collective character are termed the (1) *andræcium* (as you call the petals collectively the corolla). Opposed to these is the pistil or (2) GYNÆCIUM. This organ (the pistil) presents the most extraordinary application of the theory of *vegetable metamorphosis*, of which you were told in the first part of this volume. You will easily understand the structure and origin of the gynæcium by considering it as the development of a leaf, or the combination of several leaves. The elementary organs, the junction of which form the pistils, were called by De Candolle (3) *carpels*.

A single pistil is a single leaf—a double pistil, two or more leaves. The botanist considers the pistil as consisting of the blade of the leaf curved inward until its mar-

gins meet and adhere, forming in this way a tube or pod. This is the (4) *ovary*. Now the inner surface of the ovary answers to the upper surface of the leaf, while the outer surface is the lower surface of the leaf. The united surface of the leaf bears the (5) *ovules*. The summit or apex of the leaf prolonged into a thread-like summit makes the *style*; while the edges of the leaf turned outward, either at the apex or along the edges of the style, form the *stigma*. The style, you will at once perceive, answers to the midrib of the leaf.

The seam made by the union of the margin of the leaves is called the (6) *ventral* (or inner) *suture* (seam), while that of the midrib, or opposite line, is called the (7) *dorsal* (or outer) *suture*. Now you have the ovary, the style, and the stigma.

You have already been told that the ovary contains the ovules, which when fertilized and developed become the seed. The line which supports the ovules is called the (8) *placenta*; this is usually rather thicker than the surrounding parts, being frequently a cellular growth from the inner suture; and as it is a growth from each margin of the leaf, it consists of two parts, and this accounts for the fact of the ovules being often found occupying two longitudinal rows in a simple pistil, as in the pea. A single pistil can have only one style and one stigma; but can have, and most generally does have, a double row of ovules. When a pistil is thus distinct, it is said to be (9) *apocarpous*. When there are several pistils united, they are (10) *syncarpous*.

The carpels do not always effect their junction in the same way. It may either be by the ovaries alone, or by the ovaries, styles, and stigmas, or by the stigmas alone. When the styles are united, there is found a style which in appearance is single, but, in reality, is a compound of as many partial styles as there are carpels. When the carpels are united by means of the ovaries, an ovary is

formed with as many cells as the ovary. In this compound ovary, the placentæ will all be brought together in the axis of the compound pistil. These cells you at once see are made by the union of the walls of the carpels. These divisions or partition walls are called (11) *dissepiments*. As these are made by the union of two carpels, they consist, in consequence, of two partitions, and often split into two parts. In consequence of abnormal growth from the dorsal suture, these divisions sometimes become greater than the number of the carpels, and are then called (12) *false dissepiments*.

You have been told that a single carpel produces a single cell, two or more carpels two or more cells. In some plants, compound pistils or carpels frequently produce single cells. These are further distinguished as (13) *axile* and *parietal* placentæ. In the first the ovule occupies the center or axis of the pistil; in the second it is borne on the walls.

An ovary that can be seen by looking *into* the bottom of the flower, is said to be (14) *superior*. When only the summit can be seen at the bottom of the flower, and is united with the receptacle, so as to be looked for *underneath* the flower, it is (15) *inferior*.

SECTION II.—OVULE.

The ovule consists of three parts: a small central body called the (16) *nucleus*; this is enveloped in a double covering, the inner, called the (17) *secundine*, the outer (18) *primine*. The nucleus adheres to this sac by its base, its summit being free. This double covering has an aperture corresponding to the free summit of the nucleus, which aperture is called the (19) *micropyle*. The point or base where the nucleus adheres to the double covering, is called the (20) *chalaza*. The point where the ovule is attached to the placenta, by the thread or (21) *funiculus*, is termed the (22) *hilum*.

Ovules vary greatly in number: when one in a cell, they are said to be solitary; when of an uniform number, *definite*; when more than are easily counted, *indefinite*.

Also as to situation: they are *erect* when they arise from the bottom of the cell, *ascending* when fixed above its base and rising obliquely upward; when they project from the side of the cell straight out, neither turning upward nor downward, they are *horizontal*; *pendulous* when they hang obliquely downward, and *suspended* when hanging perpendicularly from the top of the cell.

The (23) Gymnosperms have no ovary or seed-covering, in fact, no pistil except the ovule, which is borne on the upper surface of a carpillary leaf or scale. When the staminate flowers are in bloom these conelike pistil-leaves open, and the pollen is showered down in great quantities upon the uncovered ovules. These scales gradually close and remain so during their growing state. When fully matured, the cone again opens, allowing the ripened seed to escape.

The Coniferæ (firs, pines, cypress, arbor vitæ, etc.) and the Cycadaceæ (zamia, etc.) are the two orders of this subclass.

All ovules are not of the same form. Some are shaped like an egg, with the *hilum* exactly opposite to the *micropyle*; they are then said to be (24) *orthotropal*. When the ovule has its point of attachment near the micropyle, with a cordlike swelling on one of its sides (which reaches all along it and is called a (25) *raphe*), it is said to be (26) *anatropal*. When it has no *raphe*, but is bent, and has its point of attachment near the micropyle, it is (27) *campylotropal*.

ORTHOTROPOUS.

ANATROPOUS.

CAMPYLOTROPOUS.

SECTION III.—FRUIT.

In our talk about the fruit, we forbore crowding your attention with too many divisions; but for your better learning to properly classify, there are one or two things concerning indehiscent fruits that deserve further mention.

You understand that the dry indehiscent fruit of the *Ranunculus*, which contains a single seed adhering to the pericarp, is called an (28) *achenium*. Some achenæ have a membranous appendage, like wings, as in the elm—it is then called a (29) *key* or *samara*; others adhere to the pericarp so as to form one body with it—it is then called a (30) *caryopsis*, as in wheat.

The dehiscent fruits are distinguished by their manner of opening—some *longitudinally*, as peas and beans; some horizontally, as in the cypress-vine and portulaca; some open by the severance of the partitions, each valve corresponding with a carpel—it is then called (31) *septicidal dehiscence*. Others again open by the dorsal suture, and then the dehiscence is said to be (32) *loculicidal*, the splitting opening into the cells.

When the sutures of the pericarp open for a short distance down from the apex, the dehiscence is said to be (35) *circumscissile*.

SECTION IV.—SEED.

In our talk about the seed, you were told of the embryo, plumule, etc. The outer covering of the seed is called the *integument* or (34) *testa*. It varies greatly. In some seeds it is long, in others membranaceous, and again it is papery. This is closely adherent to the nucleus, and again expanded into wings, as in the seed of the trumpet-creeper. Some seeds, besides this integument, are furnished with a covering, partial or entire, made by an

expansion of the apex of the funiculus; this is called an (35) *aril*. Some seeds are formed entirely by the embryo, as in the bean; others again have the embryo packed away with a mass of albumen, as in the four-o'clock. The former seed are said to be (36) *exalbuminous*, the latter (37) *albuminous*.

You were merely told of the three rudimentary parts of the plant as forming the embryo: cotyledons, plumule, and radicle. The radicle of the embryo always points toward and is near to the micropyle of the seed: if the embryo is straight, or merely partakes of the curvature of the seeds, the cotyledons point to the opposite extremity; that is, to the chalaza.

The position of the radicle varies in respect to the *hilum*. In orthotropous seeds the radicle points away from the hilum: in the anatropous form, the extremity of the radicle is brought to the immediate vicinity of the hilum; and this is the case, though in a different way, in the campylotropous seed.

The embryo and the albumen do not always occupy the same relative parts of all seeds. For instance, in wheat, as in all cereal grains, and grasses, the embryo is placed laterally at the base of the albumen; then again, it surrounds it; in other cases, is surrounded by it. When the embryo is external, and curved circularly round the albumen, it is said to be (38) *peripheric*; when bent in such a way that the radicle lies along the edges of the cotyledons, the latter are said to be (39) *acumbent*; when the radicle rests against the back of one of them, or near to it, they are (40) *incumbent*.

The direction of the embryo with respect to the pericarp is also of importance to the student of natural classification. The terms (41) *ascending*, or *radicle superior*, are employed when the latter points to the apex of the fruit; *descending*, or *radicle inferior*, when pointing to the base; (42) *centripetal*, when the radicle is turned toward the

axis of the fruit; (43) *centrifugal*, when turned toward the sides; and *vague*, when it bears no uniform relation to the pericarp.

CHAPTER II.

Classification.

IN classification we commence at the concrete and descend to the individual. Placing all vegetable life in a KINGDOM, this is divided into two grades or series, the *Phænogamous* or flowering plants, and *Cryptogamous* or flowerless plants. The first (*Phænogamous*) is further subdivided, according to their manner of growth, into CLASSES—outside growers, inside growers, and growing at the apex of the plant; termed in botany, *Exogenous*, *Endogenous*, and *Acrogenous*.

Exogens are further divided into SUB-CLASSES: *Angiosperms* (seeds covered) and *Gymnosperms* (seeds naked). Also into DIVISIONS: *Polypetalous*, *Monopetalous*, and *Apetalous*.

Endogens are distinguished into *Spadiceous* and *Glumaceous*.

These are all further divided into ORDERS, based upon the greatest number of general resemblances. Orders are subdivided into TRIBES, grouped together upon more particular relationship. Those with closer resemblances into GENERA; and the differences in color, form of leaves, etc., etc., divide the genus into SPECIES.

You now can see the scale of arrangement :
Kingdom.

Series.

Class.

Sub-class.

Division.

Order.

Tribe.

Genus.

Species.

SECTION I.—BOTANICAL NAMES.

Series, you have been told, are named from their flowers being visible or invisible.

Classes, from their manner of growth.

Sub-classes, from their seeds being covered or naked.

Divisions, from the corolla being divided, undivided, or none.

Orders are Latin adjectives (feminine plural to agree with *plantæ*, plants, understood), named generally from some leading genus, as *Rosaceæ*, the rose family ; *Euphorbiaceæ*, euphorbia family.

Generic names are Latin substantives, as *ranunculus* (from *rana*, a frog, in consequence of the aquatic habit of some of the species).

Specific names are Latin adjectives, and are generally descriptive of some distinguishing character of the plant, as *Ranunculus repens*, creeping ranunculus, *Magnolia grandiflora*.

CHAPTER III.

How to Study a Plant.

For this purpose we will take a little flower found everywhere throughout our State, familiarly known to you as crowfoot.

Our first care shall be to determine what series it is in—flowers visible or invisible. These are visible, and therefore it belongs to the *first series*, Phænogamous or flowering plants.

Is it destitute of true bark, without pith, and with stem composed of cellular tissue and scattered bundles of woody fiber? or, has it a stem with pith in the center, a bark (or skin) on the outside, with a ring of wood between the bark and the pith? It has pith, a ring of wood and bark, and leaves with netted veins; therefore we must place it in the *first class*, Exogenous.

Our next step is to find the sub-class. Removing the petals and stamens, we find in the center of the flower a number of one-seeded pistils—the naked eye can plainly see the ovary containing the young seed, or ovule; therefore this plant bearing seed that are covered must belong to the *first sub-class*, Angiosperm.

We have no trouble in determining the division. Its calyx and corolla of five petals place it in the *first division*, *Polypetalous*.

We find in this division orders that are identified by different characteristics—first those with

* *Stamens and pistils free from the calyx, hypogynous, or nearly so.*

Split the flower through the middle; you find the stamens inserted on the receptacle, free from the calyx. Our flower goes under this description.

Next we find

† *Stamens more than twice as many as the petals.*

We have five petals and any number of stamens; therefore we are evidently thus far on the right road in search of our plant.

Now carefully follow down this list; and first we find a description of leaves :

Leaves "*opposite*."

—— "*dotted*."

—— "*alternate*."

Ours are alternate. Continuing down the page of orders we find "*Herbs*;" our plant is an herb. Then we find *Ovaries*: "*Ovaries embedded in the top of the large receptacle.*" Our ovaries are not embedded, neither is our receptacle very large. The next:

"*Ovaries borne on the receptacle. Sepals and petals deciduous.*"

That is it. The ovaries of our plant were found growing on the receptacle, when we were studying the seed to learn if they were covered or uncovered. But the second part? Sepals and petals deciduous? Yes, here are one or two flowers whose petals have already fallen. We now have the order, RANUNCULACEÆ. Turning to this order, we find five tribes.

In the first the sepals are valvate in the bud; ours are imbricate; so we will pass on. Tribe II., the sepals agree with ours, but there are no petals. Tribe III. contains three genera, the very first of which answers to our flower exactly. So placing it with the Ranunculaceæ, we turn to that, and proceed to find its specific name.

The first paragraph marked § says, "*Petals white, with a yellow pit at the base.*" Ours are yellow; so we go to the next.

"§ *Petals yellow, with a small scale at the base.*"

"* *Achenia muricate.*" That is enough; ours is not *muricate*, it has no wartlike excrescence.

"** *Achenia smooth. † Leaves undivided.*" Ours are divided.

"†† *Leaves divided. †† Petals small, not exceeding the calyx.*" Ours are not very small, and are larger than the calyx. To the next:

"†† *Petals much larger than the calyx. Achenia in globose heads.*" Under this description we find the *Ranunculus repens*, which agrees with our plant in every particular. And we feel as much delighted as if the flower had just been created under our very eye.

In this way you proceed with any flower that you may have in hand. Practice will soon enable you to classify with readiness and precision. *And nothing but practice can.*

SERIES I. PHÆNOGAMOUS OR FLOWERING PLANTS.

Plants with flowers, consisting of stamens and pistils; seeds containing an embryo.

CLASS I. DICOTYLEDONOUS OR EXOGENOUS PLANTS.

Stem consisting of bark, pith, increasing by annual deposition of a new layer between the old wood and the bark. Netted-veined leaves. Floral envelopes in fours or fives. Cotyledons two (sometimes whorled).

SUB-CLASS I. ANGIOSPERMOUS EXOGENOUS PLANTS.

Ovules in an ovary, fertilized by the action of pollen through the stigma. Two cotyledons.

DIVISION I. POLYPETALOUS EXOGENOUS PLANTS.

Floral envelopes double; both calyx and corolla present. Corolla with petals separated.

* *Stamens and petals free from the calyx, hypogenous or nearly so.*

† *Stamens more than twice as many as the petals.*

Leaves opposite entire.

— dotted. Stamens separate. Stigma small.....HYPERICACEÆ.

— dotless. Stamens united below. Stigma radiate-pellate.....CLUSIACEÆ.

— alternate.

Ovaries more than one, each 1-celled.

Stems woody. Petals six or more, in two or more rows.

Petals imbricated in the bud.

 Anthers 4-celled. Diœcious vines.....MENISPERMACEÆ.

 Anthers 2-celled. Flowers perfectMAGNOLIACEÆ.

Petals valvate in the bud. Fruit pulpy. Albumen ru-

minated.ANONACEÆ.

Herbs. Ovaries embedded in the top of the large receptacle.....NELUMBIACEÆ.

- Ovaries borne on the receptacle. Sepals and petals deciduous.....RANUNCULACEÆ.
 Sepals and petals persistent..CABOMBACEÆ.
- Ovary solitary, 1-celled.
- Placentæ central. Sepals 2, deciduous. Anthers intorse.....PORTULACACEÆ.
 Sepals 5, persistent. Anthers extorse.....DROSERACEÆ.
- Placentæ parietal.
- Calyx persistent. Capsule 3-valved; placentæ 3....CISTACEÆ.
 Calyx deciduous. Juice colored. Leaves simple, lobed.....PAPAVERACEÆ.
 Juice watery. Placentæ 1. Leaves 2-3, ternate.....CIMICIFUGEÆ.
 Juice watery. Placentæ 2. Leaves simple or trifoliate..CAPPARIDACEÆ.
- Ovary solitary, 2-many-celled.
- Stamens connected with the base of the petals.
- Stamens united in a column. Sepals valvate.....MALVACEÆ.
 — — in a ring. — imbricated...CAMELLIACEÆ.
 — — in a cluster. — deciduous.....TILIACEÆ.
 — separate. Ovary 5-celled. Leaves tubular.....SARRACENIACEÆ.
 Ovary many-celled. Leaves flat.....NYMPHEACEÆ.
- †† *Stamens twice as many as the petals.*
- Ovary more than one.
- Flowers diœcious. Fruit a drupe. Trees with pinnate leaves....SIMARUBACEÆ.
 — perfect. — dry, indehiscent, 1-3-seeded, aquatic herbs.
 CABOMBACEÆ.
 — a many-seeded follicle. Fleshy herbs...CRASSULACEÆ.
- Ovary solitary, 1-celled.
- Leaves alternate. Fruit a legume. Leaves stipulate.....LEGUMINOSÆ.
 — opposite.
- Fruit a capsule, with parietal placentæ. Leaves entire, dotted.
 HYPERICACEÆ.
 — — with a free central placenta. Leaves dotless.
 CARYOPHYLLACEÆ.
 — a drupe. Shrubs with trifoliate dotted leaves....BURSERACEÆ.
 — a berry. Herbs with two peltate lobed leaves...BERBERIDACEÆ.
- Ovary solitary, 2-celled.
- Flowers irregular: stamens monadelphous. Capsule 2-seeded....POLYGALACEÆ.
 — regular; — separate. — long, many-seeded.TILIACEÆ.
- Ovary solitary, 3-celled. Shrubs, with alternate leaves.
- Flowers monœcious. Fruit 3-seeded, 3-valved. Stamens united..EUPHORBIACEÆ.
 — perfect. — 3-seeded, 3-winged. indehiscent.....CYRILLACEÆ.
 — many-seeded, 3-valved.....ERICACEÆ.
- Ovary solitary, 4-celled. Stamens 8.
- Style single. Low, fleshy root-parasites, with scale-like leaves..MONOTROPEÆ.
 A shrub, with alternate leaves and bractless
 flowers.....CYRILLACEÆ.
- Styles 4. Flowers cymose. Capsule 4-lobed, spreading.....CRASSULACEÆ.
- Ovary solitary, 5-celled. Stamens 10.
- Style single. Stamens separate. Leaves alternate, simple.....PYROLEÆ.
 Styles 5. Cells of the fruit separating into 1-seeded nutlets.....GERANIACEÆ.
 — — united. Leaves trifoliate.....OXALIDACEÆ.
- Ovary solitary, 7-celled. Anthers opening by terminal pores.....ERICACEÆ.

††† *Stamens exceeding the petals in number, but not twice as many.*

Ovary 1-celled. Petals 4; stamens 6.

Sepals 2. Flowers irregular. Embryo minute in fleshy albumen.....FUMARIACEÆ.

— 4. Flowers regular. Embryo large. Albumen none..CAPPARIDACEÆ.

Ovary 2-celled.

Petals 3. Stamens 8, monadelphous.....POLYGALACEÆ.

— 4. — 6. Fruit a silique or silicle.....CRUCIFERÆ.

Ovary 3-celled. Leaves opposite.

Petals 5. Stamens 9. Leaves simple, dotted.....HYPERICACEÆ.

— 4. — 7. — palmately 7-foliolate.....SAPINDACEÆ.

Ovary 3-4-celled. Leaves alternate.

Petals 5-8. Stamens 10. Fruit indehiscent, 3-4-wingedCYRILLACEÆ.

†††† *Stamens (the fertile ones) as many as the petals.*

Ovaries more than one.

Flowers monœcious. Stamens united into a 5-lobed disk.... SCHIZANDREÆ.

— diœcious. Anthers 4-celled. Leaves simple.....MENISPERMACEÆ.

— 2-celled. — pinnate, dotted....RUTACEÆ.

— perfect. Style terminal. Ovules pendulous.....RANUNCULACEÆ.

Ovary solitary, 1-celled.

Flowers irregular. Fruit a legume. Albumen none.....LEGUMINOSÆ.

Capsule 3-valved. Albumen fleshy.. VIOLACEÆ.

Flowers regular.

— monœcious, the fertile ones apetalous. Fruit utricular.EUPHORBIACEÆ.

— perfect.

Stamens opposite the petals.

Anthers opening by uplifted valves.....BERBERIDACEÆ.

— opening lengthwise.

Stamens and petals 3. Stigma many-parted.....CISTACEÆ.

— — 5.

Leaves a pair, opposite. Capsule 3-valved, few-seeded.....PORTULACACEÆ.

Leaves alternate, numerous. Capsule 2-valved.....BYTTNERIACEÆ.

Leaves at the base of a naked stem. Fruit

a utricle.....PLUMBAGINACEÆ.

Stamens alternate with the petals.

Leaves opposite, dotted, exstipulate. Albumen

noneHYPERICACEÆ.

Leaves opposite or whorled, dotless, stipulate.

AlbumenILLECEBREÆ.

Leaves alternate. Capsule 1-celled.

— compound. Fruit a legume.....MIMOSÆ.

Sterile stamens none.....DROSERACEÆ.

Ovary solitary, 2-celled. Trees or shrubs.

Fruit a double samara. Leaves simple, opposite.....ACERACEÆ.

— single samara. — trifoliolate, alternate.....RUTACEÆ.

— a berry. — palmately 5-foliolate.....VITACEÆ.

Flowers diœcious, clustered. Stamens 2.....EMPETRACEÆ.

Ovaries 4-celled, aggregated into a head. Diœcious.....BATIDACEÆ.

Ovary 5-celled. Style single. Petals stalked.....BYTTNERIACEÆ.

Ovary 5-celled, or falsely 10-celled. Styles 5. Petals sessile.... LINACEÆ.

†† ††† *Stamens fewer than the petals.*

- Stamens 2. Petals 4, cruciform. Fruit a silicle.....CRUCIFERÆ.
 — 2-3. — 5. Flowers regular. Leaves opposite....CARYOPHYLLACEÆ.
 — 4. — 5. — irregular. — alternate.....KRAMERIACEÆ.

** *Stamens and petals inserted on the calyx or on a more or less perigynous disk.*

† *Calyx not adherent to the ovary.*

†† *Stamens as many as the petals.*

- Stamens monadelphous around the stalk of the ovary.....PASSIFLORACEÆ.
 — separate opposite the petals.

Calyx truncate. Ovules 2 in each cell. Woody vines.....VITACEÆ.

— valvate. — single in the cells. Trees, shrubs.....RHAMNACEÆ.

Stamens separate, alternate with the petals.

Leaves opposite. Calyx persistent. Capsule 2-4-celled.....LYTHRACEÆ.

Trees or shrubs.

Fruit a double samara. Leaves opposite. Styles 2.....ACERACEÆ.

— a drupe. Ovary 1-celled. Albumen none.....ANACARDIACEÆ.

— 2-5-celled. Seeds with albumen }CELASTRACEÆ.

Fruit a capsule. Capsule fleshy. Seeds ariled..... }
 — 2-celled, 2-beaked. Leaves simple... .ESCALLONIEÆ.

†† †† *Stamens more numerous than the petals.*

Ovaries more than one.

Leaves alternate, stipulate.....ROSACEÆ.

— — exstipulate. Succulent herbs.....CRASSULACEÆ.

— opposite, exstipulate. Sepals and petals numerous..CALYCANTHACEÆ.

Ovary solitary, 1-celled.

Fruit a drupe. Style arising from the base of ovary.....CHRYSOBALANEÆ.

Style terminal. Ovules pendulous... .AMYGDALÆÆ.

Fruit a legume. Flowers mostly irregular.....LEGUMINOSÆ.

Ovary solitary, 2-celled.

Style single. Leaves simple, opposite or whorled LYTHRACEÆ.

— compound, dotless. Petals imbricated....SAPINDACEÆ.

Styles 2. Leaves alternate. Fruit a capsule.....SAXIFRAGACEÆ.

— opposite. Fruit a double samaraACERACEÆ.

Style 2-3, each 2-3-parted. Capsule 2-3-celled.....EUPHORBACEÆ.

†† *Calyx adherent to the ovary.*

Herbs.

Ovary 1-celled. Capsule and 2-lobed calyx, circumscissile....PORTULACACEÆ.

3-valved. Calyx 5-parted. Leaves rough.

LOASACEÆ.

Ovary 2-6-celled.

Style single. Anthers opening by a terminal pore. Leaves ribbed.

MELASTOMACEÆ.

— — lengthwise. Leaves ribless.....ONAGRACEÆ.

Styles or stigmas 2 or more.

Flowers umbelled. Fruit dry, separating into two pieces.....UMBELLIFERÆ.

— a berry-like, of 2-5 nutlets.....ARALIACEÆ.

- Flowers not umbelled.
 — perfect. Fruit capsular. Leaves alternate.....SAXIFRAGACEÆ.
 — monœcious. Fruit nut-like. Leaves whorled.....HALORAGACEÆ.
- Shrubs or trees.
 Leaves opposite.
 Fruit dry, variously dehiscent, many-seededHYDRANGEÆ.
 — indehiscent, 1-2 seeded.
- Stipules none. Leaves dotted. Stamens numerous.....MYRTACEÆ.
 — dotless. — 4. Ovary 2-celled.....CORNACEÆ.
- Leaves alternate.
 Flowers umbelled. Leaves compound.....ARALIACEÆ.
 — not umbelled.
- Leaves stipulate. Fruit fleshy or baccate indehiscent.....POMEÆ.
 — dry, woody, 2-valved.....HAMAMELACEÆ.
- Leaves exstipulate.
 Flowers diœcious. Drupe baccate. Sterile flowers apetalous.....CORNACEÆ.
 Flowers perfect. Ovary 3-celled. Fruit a 2-winged nut. } ... STYRACACEÆ.
 — 2-5-celled. — a 1-5-seeded berry. }
 — 1-celled, with two parietal placentæ...GROSSULACEÆ.
 — 1-celled, with numerous placentæ.....CACTACEÆ.

DIVISION II. MONOPETALOUS EXOGENOUS PLANTS.

Floral envelopes double, consisting of both calyx and corolla; the latter of more or less united petals.

* *Calyx free from the ovary.*

† *Flowers regular.*

†† *Fertile stamens fewer than the lobes of the corolla.*

- Fruit a 1-seeded fleshy drupe. Evergreen trees.....OLEACEÆ.
 — separating into 2-4 nutlets.
 Ovary 4-lobed; the style rising from between the lobes.....LABIATÆ.
 — not lobed; the style terminal.....VERBENACEÆ.

Fruit a 2 celled capsule.

- Capsule circumscissile. Leaves alternate, radicle.....PLANTAGINACEÆ.
 — 2-valved. Corolla-lobes imbricated in the bud...SCROPHULARIACEÆ.
 — — twisted in bud.....ACANTHACEÆ.

††† *Fertile stamens as many as the lobes of the corolla and opposite them.*

- Herbs. Capsule 1-celled, many-seeded.....PRIMULACEÆ.
 Trees or shrubs, rarely herbs.

Anthers intorse. Calyx plaited, glandular. Fruit a utricle..PLUMBAGINACEÆ.

†††† *Fertile stamens as many as the lobes of the corolla and alternate with them.*

Ovaries 2, separate.

Juice milky.

- Stamens united with the stigmas into a mass.....ASCLEPIADACEÆ.
 — separate and free from the stigma.....APOCYNACEÆ.

Ovary solitary.

Fruit indehiscent.

Leaves opposite.

Ovary 2-celled. Drupe 1-seeded, Corolla-lobes long.....OLEACEÆ.

— 4-celled. — 4-seeded — — short.....VERBENACEÆ.

Leaves alternate.

Flowers diœcious. Fruit baccate, 4-9-seeded.....AQUIFOLIACEÆ.

— perfect

Ovary 2-celled. Corolla plaited or valvate.....SOLANACEÆ.

— 4-celled. — mostly imbricated in the bud.....BORRAGINACEÆ.

Fruit a capsule.

Capsule circumscissile. Flowers on a scape.....PLANTAGINACEÆ.

— dehiscent by valves.

Ovary 1-celled. Leaves lobed, hairy or pubescent.....HYDROPHYLLACEÆ.

— entire, smooth.....GENTIANACEÆ.

Ovary 2-5-celled.

Stipules membranous or annular between opposite leaves.....LOGANIÆ.

Stipules none.

Capsule few-seeded.

Stem twining. Leaves alternate }CONVOLVULACEÆ.

— — Leaves none. }

— not twining. Leaves opposite or alternatePOLEMONIACEÆ.

Capsule many-seeded.

Style single.

Capsule 2-celled. Corolla plaited in the budSOLANACEÆ.

— — — imbricated in the budSCROPHULARIACEÆ.

— 5-celled. Stamens elongatedERICACEÆ.

Style 2. Capsule 2-celled.....HYDROLEACEÆ.

†† †† †† *Stamens more numerous than the lobes of the corolla.*

Leaves compound, stipulate. Fruit a legumeMIMOSEÆ.

— simple.

Flowers diœcious. Ovary 8-celled. Fruit a berryEBENACEÆ.

— perfect. Stamens numerous.

Stamens united into a column. Anthers 1-celledMALVACEÆ.

— united into a ring or in clusters at the base.....CAMELLIACEÆ.

Flowers perfect. Stamens twice as many as the corolla-lobes.

Corolla-lobes imbricated in the bud. Capsule many-seededERICACEÆ.

— — valvate in the bud. Drupe 1-seeded.....OLACACEÆ.

†† *Flowers irregular.*

Stamens 6. Calyx of 2 sepals. Capsule 1-celled.....FUMARIACEÆ.

Stamens (the fertile ones) 2 or 4.

Ovary 1-celled. Stamens 2. Corolla spurred.....LENTIBULACEÆ.

— 4. Fruits 1-seeded, reflexed.....PHYMEÆ.

— 4. — many-seeded. Leaves
scaly.....OROBANCHACEÆ.

Ovary 2-celled.

Albumen copious. Corolla imbricated in the bud.....SCROPHULARIACEÆ.

— none.

Placenta with hooked appendages. Corolla twisted in bud.....ACANTHACEÆ.

— not appendaged. Capsule large.....BIGNONIACEÆ.

Ovary 4-celled.

— 4-lobed ; the style rising from between the lobes LABIATÆ.

— not lobed. Style terminal..... VERBENACÆ.

**** Calyx more or less adherent to the ovary.**

Anthers united.

Anthers contorted. Vines climbing by tendrils.... CUCURBITACÆ.

— straight. Flowers in a raceme. Fruit a many-seeded capsule..... LOBELIACÆ.

Flowers in a raceme. Fruit a 1-4-seeded drupe..... RUBIACÆ.

Flowers in a head. Fruit a dry achenium..... COMPOSITÆ.

Anthers separate. Leaves opposite or whorled.

Leaves connected by stipules or whorled..... RUBIACÆ.

Stipules none. Stamens as many as the lobes of the corolla.. CAPRIFOLIACÆ.

— fewer than the lobes of the corolla.. VALERIANACÆ.

Anthers separate. Leaves alternate.

Herbs.

Corolla-lobes valvate in the bud. Capsule opening at the sides. CAMPANULACÆ.

— — imbricate in bud. — valvate..... PRIMULACÆ.

Flowers regular. Anthers opening by a terminal chink..... VACCINIÆ.

— — — — lengthwise..... STYRACACÆ.

DIVISION III. APETALOUS EXOGENOUS PLANTS.

Floral envelopes single, consisting of a calyx, or altogether wanting.

* *Amentaceous trees or shrubs. Flowers monœcious and diœcious.*

† *Sterile flowers only in aments.*

Leaves simple, stipulate. Involucre scaly. Seed entire..... CUPULIFERÆ.

— pinnate, exstipulate. — none. — 4-lobed..... JUGLANDACÆ.

†† *Both the sterile and fertile flowers in aments.*

Ament globose. Calyx none.

Fruit 2-beaked, 2-valved, many-seeded. Sterile aments spiked. HAMAMELACÆ.

— nut-like, 1-seeded, hairy. Ament single..... PLATANACÆ.

Aments oblong or linear.

Ovary 1-celled. Drupe 1-seeded. Stipules none..... MYRICACÆ.

Capsule 2-valved, many-seeded. Seed comose..... SALICACÆ.

Ovary 2-celled. Fruit dry, angled or winged..... BETULACÆ.

— enclosed in the confluent berry-like calyx.... MORACÆ.

**** Flowers not in aments.**

†† *Calyx and corolla none.*

Ovaries 3-4 united below. Flowers perfect, spiked..... SAURURACÆ.

Ovaries single.

Involucre spathe-like. Styles 2. Leaves alternate, parted.... PODOSTEMACÆ.

— 8-12-parted. — 1. — whorled, forked. CERATOPHYLLACÆ.

— 4-5-toothed, cup-like, containing one fertile flower and several sterile ones, each reduced to a single stamen..... EUPHORBACÆ.

†† *Calyx herbaceous or corolla-like.*

Ovaries more than one.

Stamens inserted on the calyx. Leaves stipulate.....ROSACEÆ.

— hypogynous. Stipules none.

Embryo minute.....RANUNCULACEÆ.

— and seeds large, curved.....MENISPERMACEÆ.

Ovary solitary.

Calyx adherent to the ovary.

Ovary 1-celled.

Fruit a 2-valved, many-seeded capsule.....SAXIFRAGACEÆ.

— indehiscent, 1-seeded.

Anthers (and stigma) sessile. Tree-parasites.....LOBANTHACEÆ.

— on filaments.

Drupe berry-like. Stigma decurrent.....CORNACEÆ.

— dry. Albumen copious.....SANTALACEÆ.

Ovary 4-celled, many-ovuled. Stigma capitate

— 3-celled, 3-ovuled. — 3. Leaves dissected }.....ONAGRACEÆ.

— 2-3-celled. Capsule 2-valved. Leaves alternate.....HAMAMELACEÆ.

Fruit a berry. Leaves opposite.....MYRTACEÆ.

Calyx free from the ovary.

Ovary 1-celled.

Ovules and seeds numerous.

Vines. Fruit berry-like.....PASSIFLORACEÆ.

Stems erect. Capsule circumscissile.....CELOSIEÆ.

Ovule and seed solitary. Leaves stipulate.

Stipules sheathing. — alternate.....POLYGONACEÆ.

— scarious. — opposite.....ILLECEBREÆ.

— not sheathing nor scarious.

Flowers perfect. Achenium 2-lobed, spiny.....PETIVERIEÆ.

— imperfect.

Herbs, stems twining. Leaves 3-5-lobed.....CANNABINACEÆ.

— not twining. — serrate or entire.....URTICACEÆ.

Trees or shrubs.

Juice watery. Flowers single or clustered.....ULMACEÆ.

— milky. — included in a fleshy receptacle.....MORACEÆ.

Ovule and seed solitary. Leaves without stipules.

Stamens more numerous than the calyx-lobes.

Anthers opening by valves.....LAURACEÆ.

— opening lengthwise.

Calyx 5-6-parted.....POLYGONACEÆ.

— entire. Berry oval.....THYMELEACEÆ.

Stamens equaling in number or fewer than the calyx-lobes.

Flowers with scarious bracts.....AMARANTACEÆ.

— without scarious bracts.

Calyx corolla-like, plaited.....NYCTAGINACEÆ.

— herbaceous. Styles 2.....CHENOPODIACEÆ.

Ovary 2-12-celled.

Leaves whorled.

A heath-like shrub. Calyx of imbricated scales.....EMPETRACEÆ.

A prostrate annual. — corolla-like.....MOLLUGINEÆ.

Leaves opposite.

- Fruit a single samara. Calyx minute, persistent.....FRAXINÆÆ.
 — a double samara. — deciduous.....ACERACEÆ.
 — a drupe.
 Flowers perfect. Stamens on the calyx.....RHAMNACEÆ.
 — diœcious. — hypogynous.....FORESTIERÆÆ.
 Fruit a many-seeded capsule. Herbs.....LYTHRACEÆ.
 Leaves alternate.
 Ovules and seeds 1-2 in each cell.
 Flowers monodœcious. Fruit a drupe or capsuleEUPHORBIACEÆ.
 — polygamous. Capsule 3-4-wingedSAPINDACEÆ.
 — perfect or polygamous.
 Fruit a berry. Calyx colored.....PHYTOLACCACEÆ.
 — a samara. Leaves stipulateULMACEÆ.
 Ovules and seeds numerous in the cells. Capsule circumscissile.
 Capsule 3-celled. Flowers solitary.....PORTULACACEÆ.
 — 5-celled. — cymose.....CRASSULACEÆ.

SUB-CLASS II. GYMNOSPERMOUS EXOGENOUS PLANTS.

Ovules naked (not contained in an ovary), supported by an open scale or leaf, or else terminating a branch, and fertilized by the direct application of the pollen.

- Stem branching. Leaves simple.....CONIFERÆÆ.
 Stem simple, palm-like. Leaves pinnateCYCADACEÆ.

CLASS II. MONOCOTYLEDONOUS OR ENDOGENOUS PLANTS.

Stem composed of cellular tissue and scattered bundles of woody fiber and vessels, destitute of pith, proper bark or concentric layers, and increasing in diameter by the deposition of new fibrous bundles. Leaves mostly alternate, entire, and parallel-veined, commonly sheathing at the base, seldom falling off by articulation. Floral envelopes usually in threes. Cotyledon single.

* *Floral envelopes none. Flowers on a spadix.*

Stemless, floating herbs.

- Plants frond-like, with no distinction of stem and leaves.....LEMNACEÆ.
 Leaves clustered, spreading. Flowers axillary.....*Pistia* in ARACEÆ.

Caulescent, leafy, rooting herbs.

- Fruit a berry. Spadix enclosed in a spathe.....ARACEÆ.
 — an achenium. Stem immersed, floatingNAIADACEÆ.
 — not immersed, erectTYPHACEÆ.

** *Floral envelopes (perianth) single or double, not glumaceous.*

Ovary adherent to the perianth.

- Stamens and pistils united into a column. Flowers irregular...ORCHIDACEÆ.
 — — separate.
 Flowers monœcious or diœcious.
 — enclosed in a spathe in the bud. Aquatics.....HYDROCHARIDACEÆ.

- Flowers without a spathe. Leaves reticulate. Terrestrial vines.....DIOSCOREACEÆ.
- perfect.
- Ovary 1-celled. Stamens 3. Leaves minute.....BURMANNIACEÆ.
- 3-celled. Stamen 1. Flowers irregular.....CANNACEÆ.
- Stamens 3. Anthers extorse.....IRIDACEÆ.
- Stamens 6. Perianth smooth or hairy.....AMARYLLIDACEÆ.
- Ovary free from the perianth.
- Perianth single (calyx).
- Flowers on a spadix. Ovary solitary.....ARACEÆ.
- Ovaries 4. Stem leafy.....NAIADACEÆ.
- Flowers on a scape, spiked. Leaves rush-like.....JUNCAGINÆÆ.
- Perianth double (calyx and corolla).
- Calyx and corolla alike, or nearly so, and glume-like.....JUNCACEÆ.
- — — — — and not glume-like.
- Leaves ribbed and netted-veined. Fruit a berry.....SMILACEÆ.
- parallel-veined.
- Capsule 1-celled. Stamens, or the fertile ones, 3.....PONTEDERIACEÆ.
- or berry 3- (rarely 4 or 6-) celled.
- Anthers intorse (except *Lilium*) Style single } LILIACEÆ.
- Stigmas 3, nearly sessile }
- Styles 3 }.....MELANTHACEÆ.
- Anthers extorse (exc. *Tofieldia*). Styles 3 or 1 }
- Calyx and corolla unlike.
- Ovaries few or numerous, forming acheniæ in fruit.....ALISMACEÆ.
- Ovary solitary.
- Palms. Calyx tubular. Leaves fan-shaped.....PALMÆ.
- Epiphytes. Plants scurfy.....BROMELIACEÆ.
- Herbs.
- Stamens 6. Leaves in a whorl. Flower single.....TRILLIACEÆ.
- alternate, sheathing.....COMMELYNACEÆ.
- Stamens 3 or 4. Flowers monœcious capitate. Scape leafless.
- ERIOCAULONACEÆ.
- *** *Flowers glumaceous, i. e., with scale-like bracts, in place of proper floral envelopes.*
- Bracts single. Sheaths closed. Fruit an achenium.....CYPERACEÆ.
- by pairs. — open. — a caryopsis.....GRAMINEÆ.

SERIES II. CRYPTOGRAMOUS OR FLOWERLESS PLANTS.

Plants destitute of proper flowers, and producing, in place of seeds, minute bodies (spores) which do not contain an embryo.

CLASS III. ACROGENS.

Plants with a distinct stem, containing woody and vascular tissue, growing from the apex only.

- Fructification borne on the under side of a peltate scale.....EQUISETACEÆ.
- — on the back or margin of the fronds.....FILICES.
- — in the axil of small leaves or bracts.....LYCOPODIACEÆ.
- — at the base of the leaves.....HYDROPTERIDES.

FLORA OF TEXAS.

SERIES I.

PHÆNOGAMOUS OR FLOWERING PLANTS.

CLASS I. DICOTYLEDONS.

SUB-CLASS I. ANGIOSPERMS.

Division I.—Polypetalous Exogenous Plants.

1. CROWFOOT FAMILY. *Order, RANUNCULACEÆ.*

Herbs, sometimes woody climbing plants, with colorless juice, sharp or acrid to the taste. *Leaves* mostly divided, exstipulate, with half-clasping petioles. Parts of the *flower* all separate and distinct, and inserted on the receptacle. *Petals* often wanting. *Stamens* more than 12. *Pistils* more than one (except in larkspur, baneberry, and bugbane), and entirely separate, except in fennel-flower, in fruit becoming akenes or pods, or sometimes berries.

SYNOPSIS OF THE GENERA.

TRIBE I. **Clematideæ.** *Sepals* valvate in the bud, colored. *Petals* stamen-like or none. *Style* elongated, persistent. *Fruit* an achenium.—Chiefly vines. *Leaves* opposite.

1. ATRAGENE. *Petals* small and stamen-like.

2. CLEMATIS. *Petals* none.

TRIBE II. **Anemoneæ.** *Sepals* imbricated in the bud, colored. *Petals* none. *Ovules* solitary. *Fruit* an achenium.—Herbs. Floral leaves often whorled, forming an involucre.

3. ANEMONE. *Involucre* leaf-like and distant from the long peduncled flowers.

4. HEPATICA. *Involucre* calyx-like and close to the flower.

5. THALICTRUM. *Flowers* paniced and without an involucre. *Achenia* ribbed or inflated. *Leaves* compound.

6. TRAUTVETTERIA. *Flowers* corymbed. *Involucre*

none. *Achenia* 4-angled. *Seed* erect. *Leaves* simple, lobed.

TRIBE III. **Ranunculeæ.** *Sepals* imbricated in the bud, mostly herbaceous. *Petals* manifest. *Ovules* solitary. *Fruit* an achenium. *Herbs.* *Leaves* alternate.

7. MYOSURUS. *Sepals* spurred at the base. *Achenia* spiked. *Leaves* radical, linear.

8. RANUNCULUS. *Sepals* spurless. *Achenia* capitate. *Stems* leafy.

TRIBE IV. **Helleborineæ.** *Sepals* imbricated in the bud, colored. *Petals* of various forms or none. *Fruit* a 1-many-seeded follicle. *Leaves* alternate.

9. CALTHA. *Petals* none. *Follicle* many-seeded. *Sepals* yellow. *Leaves* simple.

10. ISOPYRUM. *Petals* none. *Follicle* few-seeded. *Sepals* white. *Leaves* compound.

11. AQUILEGIA. *Sepals* 5, regular. *Petals* 5, spur-shaped, hollow. *Follicle* many-seeded. *Leaves* compound.

12. DELPHINUM. *Sepals* 5, irregular; the outer one spurred. *Petals* 4, small; two of them spurred, the others stalked. *Follicle* many-seeded. *Leaves* lobed.

13. ACONITUM. *Sepals* 5, irregular; the outer one large, hooded, and enclosing two long-stalked, hooked *petals*; the other *petals* stamen-like or wanting. *Follicle* many-seeded. *Leaves* lobed.

14. ZANTHORHIZA. *Flowers* regular. *Sepals* and *petals* 5; the latter 2-lobed. *Follicle* 1-2-seeded. Shrubby. *Leaves* compound.

TRIBE V. **Cimicifugeæ.** *Sepals* imbricated in the bud, colored. *Petals* small and flat, or none. *Fruit* a follicle or berry. *Herbs.* *Leaves* alternate.

15. HYDRASTIS. *Petals* none. *Ovaries* numerous, forming a head of 1-2-seeded berries. *Stems* 1-flowered. *Leaves* simple, lobed.

16. ACTÆA. *Petals* 4-8, entire. *Ovary* solitary, forming a many-seeded berry. *Flowers* in short oblong racemes. *Leaves* compound.

17. CIMICIFUGA. *Petals* 3-5, cleft. *Ovaries* 1-8, forming many-seeded *follicles*. *Racemes* elongated. *Leaves* compound.

1. ATRAGENE.

Sepals 4, colored, membranaceous, spreading, valvate in the bud, deciduous. *Petals* numerous, stamen-like. *Stamens* indefinite. *Ovaries* numerous, 1-ovuled. *Achenia* capitate, bearing the persistent styles in the form of long plumose-bearded tails. *Seeds* suspended. Shrubby vine, climbing by the petioles. *Leaves* opposite, compound, from scaly buds. *Flowers* solitary, showy.

A. ALPINA. New Mexico; April. BIGELOW.

2. CLEMATIS, L. VIRGIN'S BOWER.

Petals none. Persistent *styles*, naked or plumose. Otherwise as Atragene. Herbs or shrubby vines. *Leaves* simple or compound, opposite. Buds not scaly. *Flowers* solitary or paniced, often polygamous or diœcious.

* *Flowers* solitary, nodding; *calyx* thick or leathery.

† Stems erect, mostly simple, herbaceous.

†† Stems climbing, herbaceous.

C. VIORNA, L. Smoothish; *leaves* pinnate; leaflets 5-7, oval or oblong-ovate, mostly acute, somewhat membranaceous, entire or 2-3-lobed, the lowest pair often ternate; *calyx* ovate; *sepals* ovate, tapering into a short recurved point, not margined, rather longer than the stamen; tails of the achenia ($1\frac{1}{2}$ ' long) plumose. River banks. May-August. *Flowers* nodding. *Sepals* thick, reddish purple, 1' long.

C. RETICULATA, Walt. Smooth; *leaves* pinnate; leaf-

lets 7-9, oval, entire or 2-3-lobed, obtuse or mucronate, coriaceous, strongly reticulated; *calyx* ovate; *sepals* ovate-lanceolate, with spreading tips, not margined, longer than the stamens; tails of the achenia ($1\frac{1}{2}'$ long) slender, plumose. Dry sandy soil. May-July. *Calyx* downy, dull purple.

C. PITCHERI. *Leaflets* rough with prominent veins, coriaceous. *Sepals* lanceolate, thick, achenia with short pubescent tails. *Leaves* pinnate, those of the peduncles simple, subsessile. *Leaflets* ovate, acute or obtuse, often subcordate at base. *Sepals* of the nodding flower ovate-lanceolate, dull purple, 8-10" in length, the cuspidate point reflexed. Hills in W. Texas. June. BIGELOW.

C. TEXENSIS, Buckley. *Stem* climbing; *leaves* pedunculate, entire, broad-ovate, acuminate, mucronate, shortly petiolate; cauline leaves unequally pinnate, long petioled, leaflets 1-3-lobed, segments lanceolate, acute, peduncles one-flowered, sepals coriaceous, at the apex a little reflexed. *Leaves* thin, not coriaceous, whole plant smooth; peduncles 2-2 $\frac{1}{2}$ inches long; *flowers* about an inch long, subconical, purple, floral leaves 2-4, near the junction of the peduncle with the stem, large, crowded, and on petioles 2-3 lines long, at the base of which are 2-4 spathular bracts. The unequally pinnated stem-leaflets small, 1-3-lobed, segments lanceolate and acute; part of these stem-leaflets are on long tendril-like petioles. Flowers in May. Near the Colorado River, above Austin.

* * *Flowers* paniced; *calyx* thin, spreading, white; *stems* woody.

C. VIRGINIANA, L. Smooth; *leaves* ternate; *leaflets* ovate or cordate-ovate, lobed or toothed; panicle trichotomous, many-flowered, leafy; *flowers* dioecious or polygamous; sepals obovate, smoothish; tails of the achenia long, plumose. Swamps and meadows. July. Leaflets 2'-3' long.

C. DRUMMONDII. *Flowers* in paniculate corymbs, dioecious; *leaves* pinnate, silky-villous beneath, sparingly hir-

sute on the upper surface; *leaflets* rhombic-ovate, incisely 3-lobed, the lobes acute; *sepals* 4, oblong; *carpels* villous, with very long capillary plumose tails. Along the tributaries of the Rio Grande. *Torr. and Gray.* Drummond describes one closely allied to *C. serica* of Central America. *Stem* slender, angular, somewhat hairy. *Leaflets* mostly 5, about an inch long; the lateral lobes sometimes a little toothed. *Panicles* about as long as the leaves, trichotomously divided. *Sepals* white, villous externally. Tails of the carpels very slender, more than two inches in length, densely plumose.

3. ANEMONE, L. WIND-FLOWER.

Sepals 4-20, colored, imbricated in the bud, deciduous. *Petals* none. *Stamens* indefinite. *Filaments* filiform. *Ovaries* numerous. *Ovule* solitary. *Achenia* capitate, compressed, pointed by a short, naked or woolly, straight or hooked persistent *style*. *Seed* suspended. Perennial herbs with naked *stems*, bearing at the summit 2-3 opposite or whorled and divided *leaves*, which form an involucre remote from the flower. *Radical leaves* lobed or divided.

A. CAROLINIANA, Walt. (Carolina Anemone). *Stem* slender, 1-flowered; *penduncle* many times longer than the small, sessile, 3-leaved, 3-toothed *involucre*; *radical leaves* 2-3, long-petioled, ternate, deeply parted, lobed and toothed; *sepals* 14-20, oblong, white; *achenia* numerous in a cylindrical-oblong head, woolly. March. W. Texas.

A. HETEROPHYLLA. *Leaves* roundish-oval, crenate segments; *involucre* linear-cleft to the base. *Sepals* acute, 5-13; head of *carpels* cylindrical. *Radical leaves* one or few, long-stalked (3-5) ternate, the segments stalked, simple, or incisely 3-lobed or parted. *Scape* 8-16' high, silky pubescent above. Leaves of the involucre totally unlike the others, the segments $1-1\frac{1}{2}'$ by $1'$, placed (in flower) above the middle of the scape. *Flowers* greenish, scentless; se-

pals commonly 8, all linear-oblong, 5-6" long, soon falling. Achenia flattened.

4. HEPATICA, Dill. LIVER-LEAF.

Flowers and fruit as Anemone. Involucre close to the flower, 3-leaved, resembling a calyx; its leaves sessile, ovate, entire. A low, perennial herb, with scape-like, 1-flowered?

5. THALICTRUM, Tourn. MEADOW RUE.

Sepals 4-10, imbricated in the bud, colored, spreading, deciduous. Petals none. Stamens numerous. Filaments filiform, clavate or flattened. Ovaries 3-15, 1-ovuled. Achenia sessile or stalked, furrowed or inflated, pointed by the sessile persistent stigma or short style. Seed suspended. Perennial herbs. Leaves compound.

* *Flowers polygamous or diœious; sepals shorter than the stamens; stigma elongated; achenia nearly sessile, ribbed; leaves alternate, decomposed; involucre none; flowers small, panicked.*

T. DIOICUM, L. *Stems erect; leaves long-petioled; leaflets thin, roundish, crenately 5-7-lobed, smooth; flowers numerous; sepals greenish; stamens and stigma filiform; achenia sessile or distinctly stalked.*

T. DEBILE, Buckley. *Stems low (8'-12'), procumbent or ascending, much branched; leaves long-petioled; leaflets small, stalked, rounded, crenately lobed, smooth; flowers few on axillary or terminal peduncles; achenia oblong, strongly ribbed, short-stalked, as long as the slender style. Stems branching at the base, slender. March-April.*

T. CORNUTI, L. *Radical leaves long-petioled; stem-leaves sessile (the common petiole wanting); leaflets thick, oval or oblong, 3-lobed or entire, often cordate, smooth, or pubescent beneath; sepals white; stamens and stigma slightly clavate; achenia short-stalked. Meadows and woods. June-August. Stems 3'-40' high. Radical leaves very large.*

**** Flowers perfect ; sepals longer than the stamens ; stigma depressed ; achenia sessile, ribbed ; stem-leaves whorled, flowers umbelled.**

T. ANEMONOIDES, Michx. *Radical leaves* biternate, long-petioled ; *leaflets* oval or roundish, cordate, 3-5-lobed ; *stem-leaves* 2-3, sessile, ternate ; the long-stalked *leaflets* forming an *involucre* apparently of 6-9 simple leaves ; *umbel* 3-6-flowered ; *sepals* 6-10, white ; *roots* tuberous, stem 6'-10' high. Flowers $\frac{1}{2}$ '- $\frac{3}{4}$ ' in diameter. Woods. April-May.

6. TRAUTVETTERIA, Fisch. and Mey.

Sepals 3-5, orbiculæ imbricated in the bud, colored, caducous. *Petals* none. *Stamens* indefinite ; *filaments* clavate ; *ovaries* numerous, 1-ovuled. *Stigma* recurved. *Achenia* capitate, gibbous, 4-sided, beaked by the hooked persistent stigma. *Seed* erect. Erect, perennial *herbs*, with alternate, palmately-lobed leaves and corymbose flowers.

7. MYOSURUS, L. MOUSE-TAIL.

Sepals 5-7, imbricated in the bud, spurred at the base. *Petals* 5-7, linear, spatulate. *Stamens* 5-10 ; *filaments* filiform. *Ovaries* numerous, 1-ovuled, *style* subulate. *Achenia* 3-angled, imbricated on the filiform, elongated receptacle. *Seeds* suspended. Small annuals, with linear radical leaves, and small solitary yellowish flowers on a naked scape.

M. MINIMUS, L. *Scapes* 2'-6' long, longer than the leaves ; *achenia* beakless. *Fruiting-spike* linear, 1'-2' long. April. Flower pale-yellow ; prairies and bottom-lands.

8. RANUNCULUS, L. BUTTERCUP.

Calyx of 5 ovate sepals ; *corolla* of 5 roundish shining *petals*, each with a nectariferous scale or pore at the base inside ; *filaments* indefinite. *Achenia* flattened, beaked, with the smooth persistent style.—*Herbs*. *Leaves* alter-

nate, the radical ones long-petioled. *Flowers* axillary or somewhat corymbed, white or yellow.

§ 1. *Petals white, with yellow pit at the base ; achenia rugose.*

R. AQUATILIS, L. *Stems* 1-2 feet or more in length, slender, weak, round, smooth, jointed. *Leaves* petioled, divided into an indefinite number of capillary segments, in outline roundish, and $\frac{1}{2}$ '-1' diameter. *Flowers* axillary, remote, long peduncled. Sluggish streams and ponds. July, August.

§ 2. *Petals yellow, with a small scale at the base.*

* *Achenia muricate ; annuals.*

R. PARVIFLORUS. Silky-pubescent; *leaves* small, the lower ones circular, 3-lobed, acutely toothed; the upper 3-parted or entire; *flowers* quite small, the yellow *petals* 3-5, as long as the reflexed *sepals*; *achenia* narrowly margined, pointed with the short, recurved *style*. Waste places. March-May. *Stem* 6'-12' high, erect, branching. *Leaves* rarely 1' wide.

** *Achenia smooth ; chiefly perennials.*

† *Leaves undivided.*

R. OBLONGIFOLIUS. *Leaves* petiolate, denticulate, lower ones oblong-oval, upper ones linear-lanceolate; *petals* a little longer than the calyx; *carpels* globose, not pointed, smooth.—*Drummond.*

R. TEXENSIS. *Stems* erect, diffuse, branching. *Leaves* lanceolate and lance-ovate. *Flowers* minute, numerous. Stamens about 20. *Petals* yellow, less than 1" long. *Carpel* minute, pointless, in round heads.—*Engl.*

†† *Leaves (at least those of the stem) alternately lobed or divided.*

†† *Petals small, not exceeding the calyx.*

R. AFFINIS. Radical *leaves* petioled, pedately multifid; cauline ones subsessile, digitate, with linear lobes; *stem* erect, few-flowered; *calyx* and *ovary* pubescent; *carpels* with recurved beak, disposed in oblong-cylindrical heads. June-August. New Mexico.—*Bigelow.*

†† *Petals much larger than the calyx ; achenia in globose heads.*

R. REPENS, L. Smooth or hairy ; *leaves* ternate, or the earliest ones 3-lobed ; *leaflets* 3-lobed, toothed ; *achenia* strongly margined, pointed with the broad and straight or slightly curved beak ; *stems* erect or prostrate, often bearing long runners. Rich soil. Varieties to be found in river swamps. March, April.

R. BULBOSUS. Hairy ; *stem* erect (1° – $1\frac{1}{2}^{\circ}$ high) from a bulbous base. *Radical leaves* petioled, 3-parted, and somewhat pinnately divided ; *leaflets* 3-cleft, incisely toothed ; those of the upper leaves lanceolate, entire. *Flowers* large (1' wide) ; *achenia* pointed with a short recurved beak. Low grounds. May.

CALTHA. MARSH MARIGOLD.

Calyx colored, of 5–9 sepals, resembling petals ; *corolla* wanting ; *stamens* indefinite, shorter than the sepals ; *follicles* 5–10, capitate or whorled, sessile, spreading, many-seeded. Aquatic, and very glabrous.

ISOPYRUM, L. FALSE RUE, ANEMONE.

Sepals 5–6, regular, ovate, colored, imbricated in the bud, deciduous. Petals 5, small, tubular, sometimes wanting. *Stamens* numerous. *Ovaries* 2–20. *Style* short, subulate. *Follicles* subsessile, acuminate with the style, membranaceous, 2–several-seeded. *Delicate herbs*, perennial, smooth. *Leaves* compound, alternate. *Flowers* pedunculate, axillary and terminal, white.—*Torr. and Gr.*

I. BITERNATUM. *Stem* (6'–12' high) slender, sparingly branched ; *radical leaves* biternate, on long petioles ; *stem-leaves* ternate, nearly sessile ; *leaflets* ovate and obovate, obtusely 3-lobed ; *petals* none ; *ovaries* 1–5 ; *follicle* 2-seeded. Shady woods. April.—*Torr. and Gr.*

AQUILEGIA, L. COLUMBINE.

Sepals 5, equal, ovate, colored, spreading, caducous. *Petals* 5, tubular, dilated at the mouth, the outer margin erect, the inner attached to the torus, extending behind into a long spurred nectary; *stamens* indefinite, the inner ones longer and sterile; *styles* 5; *follicles* 5, many-seeded. Leaves 2-3, ternate. Flowers nodding.

A. LEPTOCERA. Found among the Organ Mountains, near Doña Ana, New Mexico. - No description given.—*Bigelow*.

DELPHINUM, L. LARKSPUR.

Sepals 5, colored, irregular, the upper one spurred behind. *Petals* 4, very irregular, the 2 upper ones protracted into a tubular nectariferous spur, enclosed in the spur of the calyx; *styles* 1-5; *follicles* 1-5. Showy herbs. *Leaves* pinnately divided. *Flowers* of the cyanic series never yellow.

D. AZUREUM. *Stem* mostly simple, downy; *leaves* 3-5-parted, the divisions cleft 3-5, linear, toothed or entire, acute lobes; *racemes* many-flowered; *pedicels* and *follicles* erect; spur slightly curved, twice as long as the calyx. *Sepals* sky-blue or sometimes whitish, tipped with brown. Lower *petals* 2-cleft, bearded, stem (1°-2°) high. Rich soil. April, May.—*Michx.*, *Buckley*.

D. VIMINEUM. *Leaves* flat, 3-parted, segments cuneiform, obtuse, 3-lobed, mucronulate, uppermost ones linear, undivided or 3-parted; *petioles* scarcely dilated at the base; *racemes* loose, velvety; limb of the inferior *petals* bifid at the summit, *spur* straight, as long as the sepals; *ovaries* silky. *Flowers* middle-sized, bright azure. Blooms in July, August. Velasco (and all the coast prairies).—*Drummond*.

ACONITUM. MONKSHOOD, WOLFSBANE.

Sepals 5, irregular, colored, upper one vaulted; *petals* 5, the 3 lower minute, the 2 upper on long claws concealed beneath the upper sepal, recurved and nectariferous at the apex; *styles* 3-5; *follicles* 3-5. *Leaves* digitate or palmate.

ZANTHORHIZA. YELLOW ROOT.

Sepals 5; *petals* 5, of 2 roundish lobes raised on a *pedicel*; *stamens* 5-10; *ovaries* 5-10, beaked with the styles, 2-3-ovuled; *follicles* mostly 1-seeded, *seed* suspended. Smooth trailing shrub, yellow root. *Leaves* pinnately divided. *Racemes* axillary compound. *Flowers* small, dark purple.

Z. APIIFOLIA. Shady banks. *Stem* short, woody, leafy above. *Leaves* glabrous, about 8' long, including the long petiole. Leaflets 5, 2'-3' long, sessile, incisely lobed and dentate. March and April.—*L'Her.*

The 15th, 16th, and 17th genera, Hydrastis, Actææ, Cimicifuga, have not yet been reported (if found) by botanists, as growing in Texas.

2. MAGNOLIA FAMILY. Order, MAGNOLIACEÆ.

Trees or *shrubs*, with aromatic or strong-scented and bitter bark, and alternate simple leaves, which are never toothed; large, thin stipules form the covering of the buds; fall off early. *Flowers* large, single at the ends of the branches, their leaves in threes, viz., 3 sepals colored like petals, and 6 petals in two rows or 9 in three rows, their margins overlapping in the bud. *Stamens* very many on the receptacle, with long anthers occupying, as it were,

the side of the filament. *Pistils* many, packed and partly grown to make a sort of cone in fruit.

SYNOPSIS.

Suborder I. WINTERÆ.

1. *Illicum*.

Suborder II. SCHIZANDREÆ.

2. *Schizandra*.

Suborder III. MAGNOLIEÆ. Flowers perfect. Stamens numerous, separate.

Ovaries imbricated in a head, 2-ovuled. Fruit fleshy or somewhat woody, in conelike heads or spikes. Chiefly trees. Leaves entire. Stipules large.

3. *Magnolia*. Fruit fleshy, dehiscent, persistent on the receptacle. Anthers intorse.

4. *Liriodendron*.

MAGNOLIA, L.

Sepals 3, caducous; *petals* 6-9; *anthers* longer than the filaments, opening inward; *carpels* 2-valved, 1-2-seeded, aggregated into a hard, conelike fruit; *seeds* berry-like, and suspended from the opening carpels by a long funiculus. *Trees* and shrubs with large fragrant flowers. *Leaves* conduplicate in the bud, embracing and embraced by sheathing stipules.

* *Leaves* perennial.

M. GRANDIFLORA (*Magnolia*). *Leaves* coriaceous, oblong or obovate, smooth and glossy above, rusty-pubescent beneath, flat or concave; *petals* mostly 9, obovate, concave, clawed. Light, fertile soil, in the Gulf counties of Texas. A very large tree. *Leaves* 6'-12' long. *Flowers* 6'-9' wide, white, changing to brown. Cone of the fruit oval, seed crimson, remaining suspended by a white thread for several days after ripening.

M. GLAUCA (*Sweet Bay*). *Leaves* coriaceous, lanceolate and oblong, silky-pubescent, at length smooth above, glaucous beneath; *petals* 9, obovate, concave. Swamps. A

shrub or small tree. *Leaves* partly deciduous. *Flowers* 2' wide, white, very fragrant; cone of *fruit* oval, 1'-1½' long.

** *Leaves deciduous, acute at the base.*

M. ACUMINATA, L. *Leaves* scattered, oval acuminate, downy beneath; petals 6-9, oblong ovate, obtuse. Upper districts, in rich, shaded soil. June, July. Large tree. *Leaves* 6'-9' long. *Flowers* 3'-4' wide, dull yellow and greenish. Cone of *fruit* cylindrical, 2'-3' long.

3. CUSTARD-APPLE FAMILY. *Order*, ANONACEÆ.

Trees or *shrubs*, resembling the Magnolia family, but the three *petals* of each not overlapping each other in the bud; the bark and foliage not aromatic, but disagreeable tasted. *Seeds* with variegated albumen, large, bony. *Leaves* exstipulate, entire, pubescent when young. *Flowers* axillary, mostly solitary.

Petals, and commonly the *leaves*, minutely punctate with pellucid dots.

ASIMINA, Adams. PAPAWE, CUSTARD APPLE.

Petals thick; the outer ones larger and spreading. *Stamens* very numerous, crowded on the globular receptacle. *Ovaries* 3-15, sessile, 1-celled, few-many-ovuled; baccate in *fruit*. *Seeds* horizontal, enclosed in a thin succulent aril. *Shrubs* or small trees. *Leaves* deciduous. *Flowers* nodding.

* *Flowers appearing with or before the leaves.*

A. TRILOBA, Dunal. *Leaves* oblong-obovate, acuminate, covered with a rusty pubescence, as also the branches when young, at length glabrous; outer *petals* round-ovate, dark purple, 3-4 times as long as the hairy *sepals*. A *shrub* or small tree. *Leaves* 8'-12' long. *Flowers* 1'-1½' wide. *Fruit* oblong, yellow, and pulpy when mature; edible.

4. MOONSEED FAMILY. *Order*, MENISPERMACEÆ.

Climbing *shrubs*. *Flowers* diœcious, small, in panicles or racemes. *Sepals* and *petals* often confounded, 4 or 6. *Stamens* monadelphous, or separate, generally of the same number as the *petals*, opposite them, sometimes four times as many. *Anthers* adnate or innate, 4-lobed. *Ovaries* several. *Drupe* baccate, 1-seeded, incurved. *Leaves* alternate, simple, palmately veined, exstipulate.

This order contains, according to Gray and Darby, only 2 genera. Wood has 3.

1. *Stamens* 12 to 20. *Pistils* 2 to 4. *Flowers* white; *leaves* rounded and angled, shield-shaped.

Fruit blue-black. *Menispermum*. MOONSEED.

2. *Stamens* 6, one before each *petal*. *Flowers* greenish; *leaves* heart-shaped.

Cocculus. COCCULUS.

3. *Stamens* 12 in staminate flowers.

Stamens 6 in pistillate flowers, abortive.

Anthers 2-celled.

Ovaries 3.

Sepals 6, *petals* none.

Calyccarpum. CUPSEED.

MENISPERMUM, L. MOONSEED.

Flowers diœcious. *Sepals* and *petals* 4-8. *Stamens* 12-14. *Anthers* 4-celled. *Ovaries* 2-4. *Stigma* dilated, spreading.

Leaves rounded, angular or lobed, slightly cordate and pellate at the base. *Flowers* white, paniced.

M. CANADENSE, L. *Stem* twining. Sterile panicles elongated. *Drupe* black. July. Banks of streams.

COCCULUS, L.

Flowers diœcious or polygamous. *Sepals* and *petals* 6, each in two rows. *Stamens* 6, *anthers* 4-celled, abortive in

the fertile flower. *Ovaries* 3-6, 1-celled, 1-ovuled. *Stigma* subulate, recurved. *Drupe* baccate, campylotropus. *Nut* reniform, rugose. *Seed* conformed to the cavity of the nut. *Embryo* semicircular.

Leaves ovate or slightly cordate, entire or angularly lobed.

C. CAROLINIANA, DC. Pubescent. *Stem* twining, 10°-15° long. *Leaves* very acute, rather rigid. *Racemes* of the fertile flowers simple; of the sterile, compound. *Flowers* white. *Drupe* red. Wet ravines. Valley of the Picos and Rio Grandé.

5. BARBERRY FAMILY. Order, BERBERIDACEÆ.

Herbs or *shrubs*, with alternate, usually exstipulate, simple or compound *leaves*.

Sepals and *petals* in fours, sixes, or eights. *Stamens* the same number as petals, one before each petal (on the receptacle). *Anthers* opening by recurved valves.

Pistil one. *Style* short or none. *Fruit* a berry or capsule, seeds several, albuminous.

SYNOPSIS.

* *Anthers opening by uplifted valves.*

Stamens 6. *Leaves* bristly-serrate. *Shrubs*.....BERBERIS.

— 6. — compound. *Herbs*.CAULOPHYLLUM.

— 6. — peltate, deeply two-cleft, and lobed. *Herb*. DIPHYLLEIA.

** *Anthers opening longitudinally.*

Stamens 12 or more. *Flowers* solitary in the fertile, of two peltate, lobed *leaves*.....PODOPHYLLUM.

BERBERIS. BARBERRY.

Sepals 6, orbicular. *Petals* 6, obovate, often biglandular near the base. *Stamens* 6, irritable. *Stigma* circular, depressed. *Fruit* a 1-9-seeded berry. *Seeds* erect. *Shrubs*

with yellow wood. *Leaves* bristly serrate, often reduced to branching spines. *Flowers* racemose, yellow. *Berries* acid.

B. TRIFOLIATA. *Leaves* coriaceous and rigid; leaflets 1'-2' long, the middle one larger and longer than the other two; *petiole* short, leaves terminating in a spiny apex. *Racemes* short, *berries* red. Austin, thence west to New Mexico.—*Bigelow*.

B. SWASEYII, Buckley. Leaflets 5-9, smooth, light-green above, glaucous below, sessile, the basal smallest, veins irregular, much branched, and reticular, repand, dentate, teeth large and spinose, *leaves* alternate, leaflets opposite, fasciculated at the base of the smaller branches, but rather scattered on the terminal growing ones; *leaf* 2-3 inches long, width 1-1½ inches, leaflets ½-1 inch long and about ½ inch wide, terminal leaflet sometimes petiolate, *fruit* stems 1-2 inches long and 2-3 branched, near the summit bractose, bracts clasping and acute, mucronate, fruit nearly round, about ½ an inch in diameter, juicy, and of a slightly acid agreeable taste, 6-9-seeded, *seeds* smooth, oblong and blunt at both ends, fruit subtransparent, yellowish-white tinged with red. *Shrub*, evergreen, 2-3 feet high, branches small, smooth, and reddish brown; large stems rough and grayish brown. Flowers February and March. Fruit ripe about the first part of June. Western Texas on the Perdinales River. In honor of Dr. Swasey, of Mobile, Ala.

B. TRIFOLIOLATA, Torr. *Leaves* ternate, smooth, rigid, and spinose, petiolate, evergreen, bluish green, with veins of a paler and whitish color. *Flowers* yellow, last of February and first of March. *Pedicels* aggregated in 2's and 5's, 4-6 lines long, *berries* small, red, and edible. Grows in dense clumps 4-6 feet high. Limestone hills, Austin and vicinity.

6. NELUMBO FAMILY. *Order, NELUMBIACEÆ.*

Herbs aquatic, prostrate *rootstock*, *leaves* radical, 1° – 2° in diameter, peltate orbicular. *Flowers* large, pale yellow, solitary, on long upright scapes, 4–5 sepaled; *petals* numerous, arranged in many rows, as are also the *stamens*; *ovaries* separate, each with a simple style and stigma, becoming in *fruit* 1-seeded nuts half sunk in the hollows of the large torus, the *seeds* with largely developed embryo and no albumen.

N. LUTEUM (Water Chinquepin). Aquatic herbs, with peltate leaves depressed in the center, and solitary, hypogynous flowers, 5'–8' wide, pale yellow. Eagle Lake, near Columbus.

7. WATER-SHIELD FAMILY. *Order, CABOMBACEÆ.*

Sepals and *petals* 3–4. *Stamens* 6–18. *Ovaries* 2– ∞ . Capsule 1–3 seeded, indehiscent. *Stems* filiform, branching. Submerged *leaves* opposite, divided into numerous filiform flattened segments; floating ones peltate, entire. *Flowers* small, in the axils of the floating leaves.

C. CAROLINIANA. Floating *leaves* oblong linear; *flowers* white. Ponds and still water. Stem 2° – 4° long. June–August.

BRASENIA. WATER-SHIELD.

Sepals and *petals* 3–4. *Stamens* 12–18, anthers exserted. *Ovaries* 4–18. *Leaves* all peltate and entire, alternate oval, on long petioles. *Flowers* axillary on elongated peduncles, dull purple.

B. PELTATA, Pursh. Stem, petioles, and lower surface of the leaves coated with a gelatinous exudation. Ponds and slow-flowing streams.

8. WATER-LILY FAMILY. *Order, NYMPHÆACEÆ.*

Aquatic herbs. *Leaves* peltate or cordate from a rhizome. *Sepals*, *petals*, and *stamens* numerous, imbricated and gradually passing into each other. *Anthers* adnate, and intorse. *Pistils* many, and united into a many-celled, many-seeded compound ovary.

NYMPHÆA, Tourn. WATER-LILY.

Sepals 4, green outside. *Petals* oblong, inserted into the thin *torus* which envelops the *ovary*, the inner one passing into *stamens*. *Stamens* numerous, inserted above the *petals*, the outer ones petal-like. *Anthers* adnate, intorse. *Ovary* many-celled. *Stigmas* as many as the cells, linear, radiating around a globular central gland. *Berry* globose. *Seed* enclosed in a membranaceous aril. *Leaves* orbicular, cleft at the base to the center, floating. *Flowers* on elongated, often spiral peduncles.

N. ODORATA, Ait. (Pond Lily). Rhizoma large, creeping; leaves 6'-12' wide, entire, the sinus narrow and the lobes acute, or else with an open sinus and obtuse lobes. Ponds and still waters. May.

9. NUPHAR. *Order, YELLOW WATER-LILY.*

Sepals 5-6, obovate, yellow. *Petals* 10-20, stamen-like, hypogynous. *Stamens* numerous, at length recurved, persistent. *Ovary* cylindrical, many-celled. *Stigma* sessile, circular. *Berry* oblong. *Seeds* smooth, without arils. *Leaves* cordate or sagittate, floating or erect. *Flowers* yellow, erect.

N. ADVENA, Ait. (BONNETS. SPATTER-DOCK). *Leaves* thickish cordate, smooth or downy beneath, often emersed

and erect on stout petioles. *Sepals* 6, the outer ones rounded; *petals* numerous, thick and fleshy, truncate. In still water; flowers through the summer. In Devil's River, West Texas.—*Bigelow*.

10. SIDESADDLE-FLOWER FAMILY. Order, SAR-
RACENIACEÆ.

Leaves radical, urn-shaped or trumpet-shaped. *Flowers* large, on scapes. *Sepals* 5, colored, persistent; below the calyx are three bractlets.

Petals 5, incurved, deciduous. *Stamens* numerous, situated on the receptacle. *Styles* 5. *Stigmas* united, forming a five-angled peltate-persistent membrane covering the ovary and stamens. *Capsule* 5-celled, *seeds* many. *Leaves* holding water, with a wing on the front side and a hood at top.

This order contains nine genera.

11. POPPY FAMILY. Order, PAPAVERACEÆ.

Herbs with alternate, exstipulate, *leaves*, and generally a milky or colored juice. *Flowers* solitary, on long peduncles, never blue, hypogynous. *Sepals* 2, rarely 3, caducous, and *petals* 4, rarely 6, all imbricated. *Stamens* indefinite, but some multiple of 4. *Anthers* 2-celled, innate. *Ovary* compound. *Style* short or none. *Stigmas* 2 or more, stellate upon the flat apex of ovary. *Fruit* either pod-shaped with two parietal placentæ, or capsular with several. *Seeds* indefinite, minute.

ARGEMONE. MEXICAN POPPY.

Sepals 2-3, horned or hooded. *Petals* 4-8. *Stigmas* 4-7, free, radiate. *Capsule* oblong-obovate, hispid, opening

at the summit by 3-6 valves, which separate from the filiform persistent placentæ. *Seeds* globular, crested, pitted. Glauous *herbs* with yellow juice, sessile, pinnatifid, bristly *leaves*, and showy white or yellow flowers.

A. MEXICANA, L. Annual. *Leaves* pinnatifid-lobed, bristly and prickly, blotched with white, spinous on the margin, and veins beneath. *Stem* 2°-3° high, branching, armed with prickly spines. *Flowers* axillary and terminal on short peduncles 2'-3' in diameter, white or yellow. All through Southern Texas and West to the Rio Grande.

ESCHSCHOLTZIA, Cham.

Sepals 2, cohering by their edge, caducous. *Petals* 4. *Stamens* indefinite, adhering to the claws of the petals. *Stigmas* 4-7, sessile, 2-3 of them abortive. *Capsule* pod-shaped, cylindric, 10-striate, many-seeded. *Leaves* pinnatifid, glaucous. The juice colorless and exhales an odor of hydrochloric acid.

E. DOUGLASII, Hood. *Stem* branching, leafy; *torus* obconic; *calyx* ovoid, with a very short abrupt acumination; *petals*, bright yellow, with an orange spot at base. Ravines along the Rio Grande from Frontera to Eagle Pass.—*Torr.*

12. FUMITORY FAMILY. Order, FUMARIACEÆ.

Herbs smooth, delicate, with bristle stems, colorless juice. *Leaves* alternate, multifid, often furnished with tendrils.

Flowers irregular, purple, white, or yellow.

Sepals 2, very small; *petals* 4, hypogynous, more or less grown together, the two outside ones larger with small spreading tips; the two inner small, with spoon-shaped tips sticking together face to face, over the anthers and stigma.

Stamens 6, diadelphous, each bundle opposite the larger petals; sometimes all joined in one tube below; the two outer anthers are 1-celled, the two inner 2-celled, of each bundle. *Pistil* 1, like the Poppy family. *Fruit* either an indehiscent nut 1-2-seeded, or a pod-shaped capsule many-seeded; *seeds* ariled and glossy.

CORYDALIS.

Sepals minute. *Petals* separate, deciduous; one of the outer ones saclike at the base. *Filaments* united nearly to the summit, with gland at the base. *Stigma* 2-lobed. *Capsule* many-seeded. *Seed* crested. Caulescent, annual or biennial herbs, with bipinnate dissected leaves, and flowers in lateral and terminal racemes.

C. AUREA, Willd. *Stems* diffuse; *racemes* simple; *capsule* knotted, drooping; crest of the seeds scalloped; flowers yellow. March. Hueco Mountains.—*Thurber*.

C. GLAUCA, Pursh. *Stems* erect; *racemes* compound; *capsule* even, erect; crest of the seeds entire; flowers whitish, tinged with yellow, and reddish. Plant glaucous, 1°-2° high, leaves finely dissected as in *C. aurea*, but coarser.

13. CRUCIFEROUS OR CRESS FAMILY. *Order*, CRUCIFERÆ.

Herbs with watery, pungent juice. *Leaves* alternate, exstipulate. *Flowers* cruciferous, generally in racemes and without bracts. *Sepals* 4, deciduous; *petals* 4, hypogynous, with long claws and spreading limbs.

Stamens 6, the 2 outer opposite ones shorter than the 4 interior. The *pistil* makes a pod which is 2-celled by a false partition, with parietal placenta. When the pod opens, the valves fall away, leaving the seeds attached to the edges of the frame. The whole kernel of the seed is

an embryo. It is always bent and folded up in various ways. The genera of this whole family is distinguished by the pod.

SYNOPSIS.

I. SILIQUOSE. Fruit a silique, few-many-seeded.

* Cotyledons flattened, parallel with the partition, one edge applied to the ascending radicle (accumbent).

* Valves of the fruit nerveless.

Silique short, nearly terete. Seeds in two rows in each cell.....*NASTURTIIUM*.

— linear, compressed. Seeds wingless in a single row.....*CARDAMINE*.

†† Valves of the fruit 1-nerved.

** Cotyledons flat, with one edge turned toward the partition, and the back of one of them applied to the ascending radicle.

Silique sessile, nearly terete.....*SISYMBRIUM*.

II. SILICULOSEÆ.

Silicle compressed, parallel with the broad partition, or globular.

Silicle oval or oblong, many-seeded.....*DRABA*.

— orbicular, few-seeded.....*VESICARIA*.

** Silicle compressed contrary to the narrow partition.

Valves of the silicle boat-shaped. Seeds solitary.....*LEPIDIUM*.

NASTURTIIUM, R. Br. WATERCRESS.

Silique nearly terete, linear or oblong, or short and silicle-like, usually curved upward; the valves nerveless. *Seeds* numerous, small, in two rows in each cell, not margined. *Cotyledons* accumbent.—*Herbs*. *Leaves* pinnately lobed. *Flowers* white or yellow, small.

N. *TANACETIFOLIUM*, Hook and Arn. Smooth; *stems* diffuse; *leaves* pinnately divided, with pinnatifid or toothed lobes; *silique* oblong-linear, pointed with the short style, twice as long as the pedicel. Damp soil. March, April. Stems 6'–12' long. Flowers minute, yellow.

N. *SESSILIFLORUM*, Nutt. Smooth; *stem* stout, erect,

branching; *leaves* oblong-obovate, pinnatifid toward the base, toothed above, obtuse; *siliques* linear-oblong, pointed with the very short and thick style 4-5 times as long as the pedicel. *Flowers* small and yellow.

CARDAMINE, L. BITTER CRESS.

Siliques linear, flattened; the valves nerveless, usually opening elastically from the base. *Seeds* several, wingless, disposed in a single row in each cell, suspended by fili-form stalks. *Cotyledons* accumbent.—*Herbs*. *Leaves* often undivided. *Flowers* purple or white.

* *Perennials*.

C. ROTUNDIFOLIA, DC. Smooth. *Leaves* oval, or orbicular or cordate petiolate; *root* fibrous; *stem* erect, simple, bearing from the root or upper axils long and leafy runners. The lowest *leaves* are very long petioled, and sometimes sparingly pinnatifid. *Siliques* subulate, spreading; *seeds* oval. Cool springs. May and June. Stem 6'-12' high. Runners 2°-3° long. *Flowers* white.

** *Annuals*.

C. LUDOVICIANA, Hook. Low; *stems* branching and hairy at the base; *leaves* lanceolate pinnatifid, with numerous oblong sparingly-toothed lobes, those of the root tufted; *siliques* broadly linear, erect, spreading, pointed with the sessile stigma; *seeds* orbicular, margined. *Stems* 4'-6' high. *Flowers* small and white.

C. HIRSUTA. *Stem* hairy or smooth, erect, 1°-2° high, branching. *Leaves* pinnatifid, with numerous oval or oblong sparingly-toothed lobes, those of the upper leaves linear and entire; *siliques* narrow, linear, erect, pointed with the nearly sessile stigma; *seeds* oval, minute, and marginless. Wet soil. March, April. *Flowers* small and white.

SISYMBRIUM. HEDGE MUSTARD.

Silique linear or oblong, terete or somewhat angled, with 1-3 nerved valves. *Seeds* in a single row in each cell, oblong, marginless. *Cotyledons* linear-oblong, incumbent. *Herbs* with simple or pinnately divided leaves. *Flowers* in racemes, small, white or yellow.

S. CANESCENS, Nutt. Pubescent and somewhat hoary; *stem* simple or sparingly branched; *leaves* bipinnatifid, with small mostly toothed lobes; *racemes* at length elongated; *silique* shorter than the spreading pedicel. March, April. *Stem* 1°-2° high. *Flowers* small, greenish white.

DRABA, L. WHITLOW GRASS.

Silicle oblong or oval, flattened parallel with the broad partition. *Seeds* numerous in two rows in each cell, compressed, wingless. *Cotyledons* accumbent. Small *herbs*, with entire or toothed leaves, and yellow or white *flowers* in terminal racemes.

§ *Petals* entire.

§ *Petals* 2-cleft.

D. BRACHYCARPA, Nutt. Annual; minutely downy; *stem* leafy, simple or branched; radical *leaves* round-ovate, stalked; those of the stem oblong-linear; *silicle* oval, as long as the pedicel. *Stem* 1'-3' high. *Silicle* 4"-6" long. *Flowers* white. March, April.

D. CAROLINIANA, Walt. Annual; *stems* leafy and hispid at the base, smooth above; *leaves* tufted, spatulate-obovate, hispid; *silicle* linear-oblong, two or three times as long as the pedicel. February-April. *Stems* 1'-3' high; *silicle* 4"-6" long. *Flowers* white.

D. CUNEIFOLIA, Nutt. Annual. *Leaves* obovate, wedge-shaped, or the lowest spatulate, toothed; *raceme* somewhat elongated, in fruit 1'-3' long, and at length equaling the

naked peduncle; *petals* emarginate, much longer than the calyx; *silicles* oblong-linear, minutely hairy, longer than the horizontal pedicels. March, April.

LEPIDIUM, L. PEPPER GRASS.

Silicle rounded or obcordate, compressed contrary to the narrow partition; *valves* carinate; cells 1-seeded. *Cotyledons* accumbent and incumbent. *Petals* sometimes wanting. *Stamens* 2, 4, or 6. *Leaves* entire, toothed, or pinnately divided. *Flowers* minute. Very common. March-June. 1°-2° high.

STREPTANTHUS.

Silique very long, compressed or somewhat quadrangular. *Style* short or none. *Seeds* in a single series, flat, marginal. *Sepals* erect, colored. *Claws* of the petals canaliculate, usually twisted. *Filaments* subulate, those of each pair of the longer stamens sometimes united; *anthers* linear; annual or biennial, rarely perennial *herbs*, with purple, rarely white or yellow flowers.

* *Petals* narrow, *calyx* closed.

S. HYACINTHOIDES, Hook. Glabrous; *leaves* oblong, linear, acuminate, *petals* spatulate-linear, the limb reflexed; filaments of the longer stamens united by pairs. Near San Felipe de Austin.—*Drummond*.

** *Limb of petals* broad, *calyx* slightly spreading.

S. MACULATUS. *Leaves* ovate-oblong, broad, clasping, entire, or minutely and remotely repand-denticulate; *petals* obovate, purple; *siliques* somewhat four-sided. *Stem* 1½°-2° high, sometimes much taller, usually simple, sometimes branched, glabrous, glaucous terete. *Leaves* 3'-6' long, 1½' broad, glaucous, rather acute. *Flowers* in simple or paniculate racemes, very showy. *Petals* deep purple,

lighter toward the crenulate edge; claws longer than the limb. Near San Antonio.—*Dr. Leavenworth.*

14. CAPER FAMILY. *Order, CAPPARIDACEÆ.*

Herbs, shrubs, and trees destitute of true stipules. *Leaves* alternate, petiolate, either undivided or palmately lobed. *Flowers* solitary or in racemes, cruciform, hypogynous. *Sepals* 4. *Petals* 4, unguiculate (that is, with long claws). *Stamens* 6 to 12, or some multiple of 4, never tetradynamous, on a disk or separated from the corolla by an internode of the torus. *Germ* with a style of two united carpels. *Style* united into one. *Stigma* discoid. Fruit either pod-shaped and dehiscent, or fleshy and indehiscent.

Cleome. Stamens 6, *not separated from the petals.*

Polanisia. Stamens 8-32; *torus not developed.*

CLEOME, L. SPIDER FLOWER.

Petals long-clawed, 4. *Sepals* sometimes united at base, *torus* not developed between the petals and stamens, which are 6-4; pod stipulate more or less. *Herbs* or *shrubs*. *Leaves* simple or digitate. *Flowers* racemed or solitary.

C. PUNGENS. Glandular pubescent; *stem* simple and with the petioles aculeate. *Leaves* 5-9, lobate, on long petioles, leaflet elliptic-lanceolate, acute at each end, obscurely denticulate; bracts simple; *flowers* racemed; *sepals* distinct; *petals* on filiform claws; *stamens* 6, twice longer than the petals. Plant tall and showy, *flowers* purple. In prairies of South Texas, from May to September.

POLANISIA.

Petals clawed. *Stamens* 8-32, *filaments* free, unequal,

filiform. *Torus* short, bearing a truncated or emarginate gland on the upper side. *Ovary* sessile or short-stipitate. *Style* filiform. *Capsule* silique-like, many-seeded. Annual clammy *herbs* with palmately trifoliate petioled leaves and racemose flowers.

P. TRACHYSERMA. Viscidly pubescent; *leaves* 3, foliate; *leaflets* lanceolate, alternate-acuminate, shorter than the capillary claws of the emarginate petals. *Stamens* usually 16; the filaments deep purple, twice or thrice the length of the petals; *style* about the length of the glabrous ovary; *Pods* linear-oblong, turgid, abruptly attenuate at the base, reticulate, glandular-scabrous; *seeds* turgid, verrucose, muricate.—*Drummond*.

15. VIOLET FAMILY. Order, VIOLACEÆ.

Herbs with stipulate, alternate, simple, often cleft leaf. *Flowers* irregular, spurred at base. *Sepals, petals, stamens* 5. *Filaments* prolonged beyond the anthers. *Pistil* 1, with 1 style. *Pod* 1-celled, with three rows of seeds on its walls. *Roots* and juice rather acrid. The common plants of the family belong to the genus.

VIOLET. VIOLA, Tourn. HEART'S EASE.

Flower nodding on the summit of the flower-stalk. *Style* club-shaped; *stigma* bent over to one side. Flowering in spring, and some species continuing to bloom all summer.

§ *Leaves and peduncles arising from a subterranean rhizoma, without apparent stems; perennials, flowering in early spring, the later flowers apetalous.*

* *Flowers blue.*

V. CUCULLATA, Ait. Smooth or pubescent; *leaves* long-petioled; all undivided, varying from cordate-ovate to reniform, serrate, the sides at the base involute when young; the later ones acutish; lateral petals bearded, stig-

ma beakless. Low ground. Flowers blue, often variegated with white.

** *Flowers white.*

V. PRIMULÆFOLIA, L. Smooth or hairy; *leaves* oblong, mostly acute, crenate, cordate or abruptly decurrent on the winged petiole; *petals* often acute, the lower ones bearded and striped with purple. Low grounds. *Rhizoma* slender and commonly bearing long leafy runners. *Flowers* small.

16. CISTUS FAMILY. Order, CISTACEÆ.

Herbs or low shrubs with opposite, entire, simple *leaves*. *Flowers* perfect, hypogynous, on 1-sided racemes. *Petals* 5 or 3, all alike, overlapping each other in the bud, each with one edge covering the one before it, but covered by that behind it. *Calyx* remaining after blossoming, of 5 sepals, three of them larger and two smaller, often very small, the latter entirely outside in the bud and looking like bracts. *Stamens* from 3 to 20 or more, all separate and borne on the receptacle. *Pistil* 1, making a 1-celled capsule, with the seeds borne on 3 parietal placentæ, which divide the capsule into three valves.

SYNOPSIS.

Helianthemum. Style none. Stigma capitate. Embryo nearly annular.

Lechea. Style none, stigma plumose. Embryo straight.

Hudsonia. Style filiform. Stigma minute. Embryo coiled.

HELIANTHEMUM. ROCK ROSE.

Petals 5, corrugated in the bud, sometimes wanting. *Stigma* sessile or nearly so, capitate, 3-lobed. *Capsule* 3-valved. *Embryo* curved nearly into a ring. Low *herbs* or partly shrubby plants, with fugacious yellow *flowers*.

* *Flowers* perfect; *petals* conspicuous; *stamens* indefinite; *capsule* many-seeded.

H. CAROLINIANUM, Michx. Hirsute; *leaves* lanceolate, denticulate, acute, short-petioled, the lowest obovate, crowded; *flowers* large, solitary, borne above the axils. Dry, sandy soil. March and April. Stem 6'-12' high, ascending from a shrubby base. Flowers 1' wide.

H. POLIFOLIUM; primary or petaliferous *flowers*, small, terminating the slender stem and numerous short branches on filiform peduncles many times larger than the flower. The broadly cuneiform *petals* exceeding the calyx. Secondary flowers very small, apetalous, 3-6-androus, clustered in lateral cymes on the floriferous branches.—*Drummond.*

LECHEA, L.

Petals 3, persistent, not longer than the *sepals*. *Stamens* 3-12. *Stigmas* 3, sessile, plumose. *Capsule* globose, 3-valved, incompletely 3-celled, 6-seeded. *Embryo* slightly curved. Perennial *herbs*, with small greenish flowers in racemes or panicles.

L. MAJOR. Michx. Villous; *leaves* alternate, opposite, or whorled, elliptical, those on the prostrate radical branches roundish; *flowers* on short pedicels, densely crowded in short simple or compound axillary racemes. July, August. *Stem* 2° high, branching toward the summit. *Capsule* as large as a pin's head.

L. MINOR, Lam. Rough, with appressed scattered hairs; the young branches and calyx more or less hoary; *stems* paniculately branched above; *leaves* scattered, linear; *flowers* loosely racemose on distinct, often appressed pedicels. *Stems* $\frac{1}{2}$ °-2° high. *Capsule* larger than in L. minor. *Radical branches* often wanting.

L. DRUMMONDI. Decumbent and much branched at the base, slightly pubescent; *leaves* linear-subulate, scattered; racemes filiform, terminating the numerous branches, loosely flowered; *flowers* unilateral on capillary spread-

ing and at length reflexed pedicels; capsule globose, 3-seeded. Dry places in small prairies. June and July. *Petals* purple.—*Dr. Drummond*.

HUDSONIA, L.

Petals 5, larger than the sepals, fugacious. *Stamens* 9–30. *Style* filiform. *Stigma* minute. *Capsule* oblong, 1-celled, 3-valved, with 2–6 erect seeds attached near the base. Embryo coiled. Low tufted shrubs, with minute, hoary, subulate, imbricated leaves. Flowers yellow.

17. SUNDEW FAMILY. Order, DROSERACEÆ.

Low glandular-hairy marsh herbs, with circinate tufted radical leaves.

Sepals and *petals* 5. *Stamens* 5–15. *Ovary* 1-celled, many-ovuled, with 3 or 5 parietal placentæ. *Styles* separate or united. *Capsule* loculicidally 3–5-valved. *Seeds* anatropous. *Flowers* white or purple, hypogynous, borne on a naked scape.

DROSERA, L. SUNDEW.

Stamens 5. *Styles* 3–5, deeply 2-parted; the divisions 2–many-lobed. *Capsule* 3-valved, many-seeded. *Leaves* dewy and glandular. Scape often forking. *Flowers* racemose.

D. ROTUNDIFOLIA, Pursh. *Leaves* orbicular, abruptly contracted into the hairy petiole; scape erect, smooth, 6–10-flowered. *Calyx* ovoid; seeds covered with a loose membranaceous coat. *Rhizoma* none. *Leaves* 2' long. *Scapes* 6'–9' high. *Flowers* white.

18. PARNASSIA FAMILY. Order, PARNASSIACEÆ.

Perennial smooth herbs, with ovate or reniform chiefly

radical *leaves*, entire, on long petioles, and large solitary *flowers* terminating the scape-like 1-leaved stem. *Sepals* 5, persistent. *Petals* 5, ovate or obovate, veiny imbricated in the bud, deciduous. Fertile *stamens* 5, alternating with the petals. *Ovary* 1-celled, with 3-4 parietal placentæ. *Stigmas* 3-4, sessile, placed over the placentæ. *Capsule* loculicidally 3-4-valved at the apex, many-seeded. *Seeds* anatropous winged, without albumen. Embryo straight, cylindrical.

19. ST. JOHN'S-WORT FAMILY. *Order*, HYPERICACEÆ.

Herbs or low *shrubs* with entire opposite, exstipulate, dotted *leaves*, as if punctured with transparent or dark-colored dots, one or both. *Flowers* hypogynous, perfect, regular, 4 or 5 persistent *sepals*; as many *petals*. *Stamens* few or many, in 3 or 5 clusters, and therefore said to be polydelphous, borne on the receptacle. *Petals* mostly oblique or convoluted in bud. *Styles* 2-5, commonly separate, or sometimes all united into one. *Ovary* a one-celled fruit with parietal placenta, or as many cells when the dissepiments reach the center.

GENERA.

ASCYRUM. *Sepals* 4. *Petals* 4, convolute in the bud, yellow.

HYPERICUM. *Sepals* 5. *Petals* 5, convolute in the bud, yellow.

ELODEA. *Sepals* 5. *Petals* 5, imbricated in the bud, rose-colored.

ASCYRUM, L. ST. PETER'S-WORT.

Sepals 4, the two outer ones much larger. *Petals* 4, convolute in the bud, oblique. *Stamens* numerous. *Styles* 2-4, distinct or united. *Capsules* 2-4-valved, 1-celled, with 2-4 parietal placentæ. Smooth shrubs with 2-edged branches. *Flowers* mostly solitary, yellow.

HYPERICUM, L. ST. JOHN'S-WORT.

Sepals 5, similar. *Petals* 5, oblique, convolute in the bud. *Stamens* mostly numerous, and commonly collected in 3-5 sets without intervening glands. *Styles* 3-5, distinct or united. *Capsule* 1-5-celled. *Herbs* or *shrubs*. *Flowers* mostly cymous, yellow.

Stamens numerous. *Capsule* 3-celled; *styles* united: *shrubs*.

H. PROLIFICUM, L. Branches 2-edged, the barren ones elongated; *leaves* lance-oblong, obtuse or mucronate at the base; *cymes* axillary and terminal, often few-flowered; *capsule* oblong, rarely 4-5-celled. Varies with a more branching stem, smaller and narrower *leaves* and smaller and more numerous *flowers*. *Shrub* 2°-3° high. *Leaves* 1'-2' long, paler beneath. Swamps and river banks.—*Dr. Veatch*. July, August.

Stamens 5-20; *capsule* strictly 1-celled; *styles* separate: *annuals*. *Flowers* in *cymes*.

H. MUTILUM, L. *Stems* slender, branching above, 4-angled; *leaves* oblong or rounded, obtuse, clasping, 5-nerved; *cymes* leafy at the base; *sepals* lanceolate, mostly longer than the small *petals*, and equaling the (green) ovoid *capsule*; *stamens* 6-12. Stem 1° high, with the branches of the cyme filiform. Flowers very small, remote. Ditches and low grounds. June-August.—*Drummond*.

H. CANADENSE, L. *Stems* simple or branched, 4-angled; *leaves* linear or linear-lanceolate, the upper ones acute, sessile; *sepals* lanceolate, acute, longer than the *petals*, shorter than the oblong (brown) *capsule*. Wet, sandy soil. Stem 4'-12' high, with the branches erect. Flowers small, copper-yellow. *Stamens* 5-10. June-October.

Flowers scattered on the slender branches; *flowers* minute.

H. DRUMMONDII, Torr. and Gr. Stem much branched; *leaves* linear or the lower ones oblong, acute, appressed; *sepals* barely shorter than the ovate *capsule*; *flowers* pedi-

celed. Dry soil. Stems and branches stouter than the last. Stamens 10-20. July-August.

ELODEA.

Sepals 5. *Petals* 5, equal-sided, imbricated in the bud. *Stamens* mostly 9, and united in sets of three, with a scale-like between each set; *styles* 3 distinct. *Capsule* 3-celled, 3-valved, many-seeded. Smooth perennial herbs. Flowers rose-colored, in contracted lateral and terminal cymes.

20. BALSAM-TREE FAMILY. Order, CLUSIACEÆ.

Trees or *shrubs*, with resinous yellow juice; opposite, coriaceous, entire, dotless *leaves* articulated with the stem, and regular hypogynous *flowers*. *Sepals* 3-6. *Petals* 4-9. *Stamens* mostly numerous, distinct or variously united. *Ovary* 1-many-celled, few-many-ovuled. Style single, often none. *Fruit* capsular, baccate or drupaceous. Seeds without albumen. Embryo straight. Cotyledons thick, distinct or united.

CLUSIA.

Calyx 2-bracted, of 6 imbricated, colored sepals. *Petals* 4-9. *Stamens* numerous, the filaments united at the base into a thick and fleshy tube. *Ovary* 5-15-celled. *Ovules* numerous, fixed to a central column. *Stigma* large, radiate-peltate. *Capsule* coriaceous, globose-angled, 5-15-celled; the valves separating from the central column at maturity. *Seeds* numerous, ovate. Parasitical tropical trees, with thick opposite, entire and shining *leaves*, and chiefly polygamous cymose showy flowers.

CANELLA, P. Brown.

Sepals 3, rounded, concave, imbricated in the bud, persistent. *Petals* 5, hypogynous, oblong, convolute in the

bud, deciduous. *Stamens* united into a tube. *Anthers* 15, adnate linear. *Ovary* 3-celled. *Style* cylindrical. *Stigmas* 3. Berry globose, 1-3-celled, mostly 2-seeded. Seeds globose reniform. Embryo minute, in fleshy albumen. Large tree, leaves alternate, near the ends of the branches, obovate, emarginate, glabrous, on short petioles. Racemes compound, shorter than the leaves, terminal. Pedicels 1-flowered. Flowers small, purple.

21. PURSLANE FAMILY. Order, PORTULACACEÆ.

Succulent plants, with entire *leaves* and regular hypogynous or perigynous *flowers*. *Sepals* 2-5. *Petals* 3-6, imbricated in the bud, sometimes wanting. *Stamens* as many as the petals and opposite them, or indefinite. *Styles* 3-6, mostly united below, stigmatic along the inside. *Capsule* 1-5-celled, few-many-seeded. Seeds campylotropous, erect from the base of the cell, or attached to a central placenta. Embryo slender, curved around mealy albumen.

GENERA.

* *Sepals* 2. *Petals* 5-6.

CLAYTONIA. *Petals and stamens* 5. *Capsule* 3-valved, 3-6-seeded.

TALINUM. *Petals* 5. *Stamens* 10-30. *Capsule* 3-valved, many-seeded.

PORTULACA. *Petals* 5-6. *Stamens* 8-20. *Capsule* circumscissile.

* *Sepals* 5. *Petals* none.

SESUVIUM. *Stamens* 5-60, inserted on the calyx. *Capsule* circumscissile.

CLAYTONIA, L. SPRING BEAUTY.

Sepals 2, free, persistent. *Petals* hypogynous. *Stamens* 5, inserted on the claws of the petals. *Style* 3-cleft. *Capsule* 1-celled, 3-valved, 3-6-seeded. Smooth *herbs*, with a simple stem bearing two opposite leaves, and terminating with a loose raceme of pale rose-colored, veiny flowers.

C. VIRGINICA, L. Leaves 3'-6' long, linear, acutish;

petals mostly emarginate, but sometimes acute. Damp rich soil. March. Plant 4'-10' long.

C. CAROLINIANA, Michx. *Leaves* 1'-2' long, ovate-lanceolate or oblong, tapering at the base; *petals* obtuse. Mountains. March, April.

TALINUM.

Sepals 2, free, deciduous. *Petals* 5, hypogynous. *Stamens* 10-20. *Style* 3-lobed. *Capsule* 3-celled at the base, 3-valved, many-seeded. Smooth and fleshy herbs, with alternate leaves and cymose flowers.

T. TERETIFOLIUM, Pursh. Stem thick, leafy; leaves linear-cylindrical; cymes on long peduncles; petals purple, fugacious. Stems 2'-4' long, perennial.

PORTULACA, Tourn. PURSLANE.

Sepals 2, united and cohering with the *ovary* below, the upper portion circumscissile and deciduous with the upper part of the *capsule*. *Petals* 4-6, inserted with the 8-20 *stamens*. *Styles* 3-8 parted. *Capsule* globose, 1-celled, and many-seeded. Low, fleshy herbs, with terete or flat, mostly alternate leaves, and fugacious yellow or purple flowers.

P. OLERACEA, L. Leaves flat, cuneate, naked in the axils; flowers yellow; stamens 10-12. Stem prostrate. Cultivated grounds.

22. PINK FAMILY. Order, CARYOPHYLLACEÆ.

Herbs with swollen joints, opposite entire leaves and regular flowers. *Sepals* 4 or 5, persistent. *Stamens* never more than twice as many as the petals or sepals and often fewer. *Petals* 4 or 5, unguiculate or not, bifid or entire, mostly removed from the calyx by a short internode of the receptacle, sometimes wanting. *Style* 2 to 5, stigmat-

ous along the whole length of the inner surface. Fruit a capsule, which is 1-celled (or imperfectly 2- or 5-celled), with seed from the bottom or on the central column, opening at the top or loculicidal. Seeds numerous, with the embryo coiled round the albumen.

TRIBE I. **Illecebreæ**. *Sepals distinct or united below. Petals often stamen-like or wanting. Leaves with scarious stipules.*

* *Fruit indehiscent, 1-seeded (utricle).*

PARONYCHIA. *Sepals united at the base. Stamens inserted on the base of the sepals. Style long. Utricle united.*

ANYCHIA. *Sepals distinct. Stamens inserted on the base of the sepals. Style very short. Utricle partly exerted.*

SIPHONYCHIA. *Sepals united into a tube below the middle. Stamens inserted on the tube of the calyx. Style long.*

** *Fruit valvate, few, many-seeded.*

† *Leaves opposite.*

STIPULICIDA. *Stem-leaves minute; the lowest spatulate.*

SPERGULARIA. *Leaves all linear. Flowers solitary, axillary.*

†† *Leaves whorled.*

SPERGULA. *Styles 5. Stamens 5-10. Capsule 5-valved.*

POLYCARPON. *Styles 3. Stamens 3-15. Capsule 3-valved.*

TRIBE II. **Mollugineæ**. *Stamens alternate with the sepals, when of the same number; when three, alternate with the cells of the ovary. Stipules none.*

MOLLUGO. *Capsule 3-celled. Leaves whorled.*

TRIBE III. **Alsineæ**. *Sepals separate or nearly so. Stamens opposite the sepals, when of the same number. Ovary sessile. Stipules none.*

* *Valves of the capsule as many as the styles,*

SAGINA. *Styles and valves 4-5.*

ALSINE. “ “ 3.

** *Valves of the capsule twice as many as the styles.*

ARENARIA. *Valves of the capsule 2-4 each, soon 2-cleft. Petals entire.*

STELLARIA. *Valves of the capsule 6-10. Petals 2-cleft.*

CERASTIUM. “ “ 8-10, toothed.

TRIBE IV. **Sileneæ.** *Sepals united into a tube. Petals and stamens inserted on the stipe of the ovary. Stipules none.*

SILENE. *Styles 3. Capsule 6-toothed.*

SAPONARIA. *Styles 2. Capsule 4-toothed.*

AGROSTEMMA. *Styles 5. Capsule 5-toothed.*

PARONYCHIA, Tourn.

P. DICHOTOMA, Nutt. Smooth; *stems* slender, erect; *leaves* linear, subulate—those of the barren stems imbricated; *cymes* fastigiate, diffuse; *sepals* linear, 3-ribbed, slender, pointed; *petals* minute, bristle-like. July–November. Stems 6'–12' high.

P. DRUMMONDI. Minutely pubescent; *stem* erect, branching above into numerous cymes; *leaves* (of the branches) linear-oblong, short, the uppermost mucronate; *calyx* turbinate at the base, with a ring of hooked hairs; *sepals* broadly scarious and dilated above, the back produced into a somewhat recurved horn; sterile setæ very minute; *stem* about 10 inches high; *sepals* reddish-brown, the scarious margins and horns white. Annual.—*Drummond.*

ANYCHIA.

Sepals 5, distinct, slightly mucronate at the apex. *Petals* none. *Stamens* 2–3, inserted on the base of the calyx. *Style* very short. *Stigmas* spreading. *Utricle* exserted. *Seed* erect. *Radicle* inferior. An erect, slender annual,

with forking, setaceous, spreading branches. *Leaves* thin, oblong, obtuse, narrowed at the base. *Flowers* minute, solitary or clustered in the forks of the branches, greenish.

A. DICHOTOMA, Michx. Stem 4'-10' high.

SIPHONYCHIA, Torr. and Gray.

Sepals 5, united to the middle, concave and petal-like above, obtuse or mucronate. *Petals* 5, bristle-like, inserted with the 5 *stamens* on the throat of the calyx. *Style* slender, 2-cleft. Utricle included. *Seeds* resupinate. Radicle superior. Erect or diffusely prostrate *herbs*. *Cyme* dense-flowered. *Flowers* white.

S. AMERICANA, Torr. and Gray. *Stems* prostrate, diffuse, pubescent in lines; *leaves* lanceolate, narrowed at the base; the radical ones larger and crowded; *flowers* obovate, solitary in the forks of the stem, and clustered at the end of the branches; *sepals* rounded and incurved at the apex, the tube bristly with hooked hairs; *petals* minute. *Stems* 1°-3° long. *Leaves* sometimes falcate and incrustated with brownish particles. *Stipules* small. June-October.

STIPULICIDA, Michx.

Sepals 5, emarginate, white-margined. *Petals* 5, spatulate, 2-toothed near the base, longer than the sepals, withering, persistent. *Stamens* 3, opposite the inner sepals. *Style* very short, 3-parted. *Capsule* 1-celled, 3-valved, many-seeded. A small perennial, with an erect forking *stem*. Stem-leaves minute, subulate, with adnate, pectinate stipules. Radical *leaves* spatulate, clustered, growing from a tuft of bristly stipules. *Flowers* white, in terminal clusters.

S. SETACEA, Michx. Stem 3'-6' high, branches spreading and curving. Low, sandy counties. April-June.

SPERGULARIA, Pers.

Sepals 5. *Petals* 5, oval, entire. *Stamens* 2-10. *Styles* 3-5. *Capsule* 3-5-valved; the valves, when 5, alternate with the sepals. A low maritime *herb*, with opposite fleshy leaves and conspicuous scarious *stipules*. *Flowers* axillary, solitary, rose-colored.

S. RUBRA, Pers. *Stems* prostrate, much branched. *Leaves* linear, longer than the joints. *Seeds* with or without a membranaceous margin. Sands or marshes. April-May.

SPERGULA, L. SPURREY.

Sepals 5. *Petals* 5, entire. *Stamens* 5 or 10. *Styles* 5. *Capsule* 5-valved, the valves opposite the sepals. *Embryo* forming a ring around the albumen. *Leaves* whorled. *Flowers* cymose, white.

S. ARVENSIS, L. *Stem* erect; *leaves* fleshy, narrow, linear, several in a whorl; cymes loose, long-peduncled; fruiting pedicels reflexed; *stamens* 10, seeds rough.

POLYCARPON.

Sepals 5, carinate. *Petals* 5, emarginate, shorter than the sepals. *Stamens* 3-5. *Styles* 3, very short. *Capsule* 3-valved. Low annuals, with whorled leaves, and minute flowers in terminal cymes.

MOLLUGO, L.

Sepals 5, *petals* none. *Stamens* 5 and alternate with the *sepals*, or 3 and alternate with the cells of the *ovary*. *Styles* 3, short. *Capsule* 3-valved, 3-celled, many-seeded. Prostrate diffusely-branched annuals. *Leaves* whorled. *Flowers* white, on slender axillary peduncles.

M. VERTICILLATA, L. Smooth; *leaves* spatulate-lanceolate, unequal, in whorls of 4-8; fruiting peduncles reflexed; *stamens* 3. May-August.

SAGINA, L.

Sepals 4-5. *Petals* 4-5, entire or wanting. *Stamens* 4-10. *Styles* 4-5, alternate with the sepals. *Capsule* 4-5-valved, the valves entire, opposite the sepals. Small herbs with filiform forking *stems*, subulate *leaves*, and solitary *flowers*.

S. ELLIOTTII, Fenzl. Smooth; *stems* erect or ascending, tufted; peduncles erect; *petals* and *sepals* 5, equal, obtuse; *stamens* 10. Stems 2'-6' high. Peduncles 2-3 times as long as the sharp-pointed leaves. April-June. Annual.

ALSINE, Tourn.

Sepals 5, *petals* 5, *stamens* 10, *styles* 3. *Capsule* 1-celled, 3-valved, the valves entire, opposite the inner sepals. Low, slender *herbs*, with linear or subulate *leaves*, and white cymose or solitary *flowers*.

A. SQUARROSA, Fenzl. *Stems* tufted, 6'-10' high. *Leaves* subulate, rigid, those of the glandular flowering stems distinct, of the sterile ones imbricated with spreading tips; *sepals* ovate, obtuse, shorter than the capsule, cymes few-flowered. Pedicels rigid. April-May. Perennial.

A. BREVIFOLIA. *Stems* smooth, 2'-4' long, not tufted, erect, filiform, simple, 2-5-flowered; *leaves* minute, 1"-2", erect, lance-subulate; *sepals* oblong, obtuse, as long as the capsule; *petals* twice as long as the *sepals*. *Flowers* small, on filiform peduncles.

ARENARIA, L. SANDWORT.

Petals 1-5 or none. *Styles* 2-4. *Capsule* opening above by as many valves as there are styles, each valve soon splitting into two pieces. Otherwise like *Alsine*.

A. DIFFUSA, Ell. Downy; *stem* elongated, prostrate, alternately short-branched; *leaves* lanceolate; peduncles longer than the leaves, lateral reflexed in fruit; *petals* 1-5,

shorter than the *sepals*, often wanting. *Stem* 1°-4° long. May-October. Perennial.

STELLARIA, L. CHICKWEED, STARWORT.

Sepals 4-5. *Petals* 4-5, 2-cleft, or 2-parted. *Stamens* 3-10. *Styles* 3-5, opposite the *sepals*. *Capsule* 1-celled, opening by twice as many valves as there are *styles*, many-seeded. *Stems* weak. *Flowers* white, on terminal peduncles, becoming lateral in fruit.

S. MEDIA, Smith. Annual; *stems* prostrate, forking, pubescent in lines; *leaves* ovate or oblong, acute, the lower ones petioled; *petals* shorter than the *sepals*. March, April.

S. PROSTRATA, Baldw. Smooth or nearly so. *Stems* forking, prostrate; *leaves* ovate, acute, all on slender petioles, the lower ones often cordate; *petals* twice as long as the *sepals*. *Stem* 1°-2° long. Petiole mostly longer than the limb. March, April. Annual.

CERASTIUM, L. MOUSE-EAR.

Sepals 4-5. *Petals* 4-5, obcordate or 2-cleft. *Stamens* 10. *Styles* 4-5. *Capsule* cylindrical, 8-10-toothed, many-seeded. *Flowers* white, solitary or cymose, peduncled. *Herbs*.

C. VULGATUM, L. Villous and somewhat clammy; *stems* ascending; *leaves* oval, remote, the lowest obovate; *cymes* crowded in the bud, spreading in fruit; *sepals* lanceolate, acute, as long as the peduncles, and half as long as the slender capsule. *Stems* 6'-12' high. April, May. Annual.

C. VISCOSUM, L. Hairy and clammy; *stems* ascending; *leaves* lance-oblong, obtuse, the lowest wedge-shaped; *cymes* loose in the bud; *sepals* oblong-ovate, obtuse, shorter than the peduncles. April, May. Annual.

SILENE, L. CATCHFLY.

Sepals united into a 5-toothed tube. Petals 5, long-clawed, inserted with the 10 stamens on the stipe of the ovary, commonly crowned with two scales at the base of the limb. Styles 3. Capsule 1-celled, or 3-celled at the base, opening by 6 teeth, many-seeded. Leaves mostly connate. Flowers cymose, often showy.

* *Perennials; flowers showy.*

† *Petals gash-fimbriate, crownless.*

S. STELLATA, Ait. *Leaves* in whorls of four, lance-ovate, acuminate, the uppermost opposite; *flowers* white, in a large spreading panicle; *calyx* inflated, bell-shaped. *Stems* 2°-3° high, downy, branching above. June-August.

** *Annuals; flowers small, expanding at night.*

S. ANTIRRHINA, L. *Stem* slender, smoothish, clammy below the upper joints; *leaves* linear, acute, sessile, the lowest lanceolate, narrowed into a petiole; *flowers* panicked; *calyx* smooth; *petals* obcordate, rose-colored. *Stem* 6'-2° high, simple or branched. *Flowers* minute. May, June.

SAPONARIA, L. SOAPWORT.

Calyx tubular, terete, 5-toothed. *Petals* long-clawed. *Stamens* 10. *Styles* 2. *Capsule* sessile or short-stiped, 1-celled, or 2-celled at the base, 4-toothed at the apex. *Cymes* dense-flowered.

AGROSTEMMA, L. CORN-COCKLE.

Calyx tubular, with 5 elongated linear deciduous lobes. *Petals* 5, entire, crownless. *Stamens* 10. *Styles* 5. *Capsule* 1-celled, 5-toothed. Annual or biennial herbs, with linear leaves and showy purple flowers on elongated peduncles.

A. GITHAGO, L. Plant 1° – 2° high, whitened with long appressed hairs. *Stem* forking; *petals* obovate, emarginate, shorter than the lobes of the calyx. *Peduncles* 4'–6' long. *Flowers* 1' wide. June and July, annual.

23. MALLOW FAMILY. Order, MALVACEÆ.

Herbs or *shrubs*. *Leaves* alternate and stipulate. *Flowers* with 5 sepals united at the base, valvate in bud, often subtended by an involucl. *Petals* 5, hypogynous, united at the bottom with the tube of the stamen. *Stamens* numerous, monodelphous, *i. e.* united by their filaments into one tube. *Anthers* 1-celled, kidney-shaped. *Pistils* several distinct or united, and stigmas various.

Fruit a several-celled capsule, or a collection of 1-seeded, indehiscent carpels.

This order contains many useful and agreeable plants—Cotton (Gossypium) among clothing plants, and Okra, a food plant; while all are mucilaginous, thus offering a cooling and safe drink to those ill with many of the diseases incidental to our climate, while almost every member of the order is more or less beautiful.

TRIBES AND GENERA.

TRIBE I. **Malvææ.** *Carpels* as many as the stigmas, 1–few-seeded, disposed in a circle around a central axis, separating at maturity from the axis and from each other. *Anthers* borne at the apex of the column.

* *Carpels* 1-seeded.

† *Stigmas* occupying the inner face of the style.

MALVA. *Carpels* leafless. No process within.

CALLIRRHOE. *Carpels* beaked, and bearing a dorsal process above the seed within.

†† *Stigmas* capitate.

MALVASTRUM. *Involucl* 2–3-leaved. *Ovule* peritropous ascending. *Radicle* inferior.

SIDA. *Involucel* none. *Ovule* resupinate-pendulous.
Radical superior.

** *Carpels* 2-few-seeded.

ABUTILON. *Carpels* 1-celled, *involucel* none.

MODIOLA. *Carpels* transversely 2-celled. *Involucel*
 3-leaved.

TRIBE II. **Ureneæ.** *Carpels* half as many as the
stigmas, separating at maturity. *Anthers* borne above the
 middle of the column.

PAVONIA. *Carpels* 5, dry, 1-seeded. *Involucel* 3-leaved.

TRIBE III. **Hibisceæ.** *Carpels* as many as the stig-
mas, united at maturity, and forming a loculicidal capsule.
 Column bearing the *anthers* throughout, or from above the
 middle.

KOSTELETSKYA. Cells of the depressed capsule 1-seeded.

HIBISCUS. Cells of the globose or oblong capsule few-
 many-seeded.

MALVA, L. MALLOW.

* *Leaves* undivided.

Involucel 3-leaved, persistent. *Petals* obcordate. *Styles*
 9-10, filiform, stigmatic on the inner face. *Carpels* broadly
 reniform, beakless, 1-seeded, indehiscent, disposed in a cir-
 cle around the central axis, from which they separate after
 maturity. *Embryo* nearly annular. *Radicle* inferior.
Herbs. *Leaves* rounded. *Flowers* axillary, not yellow.

M. ROTUNDIFOLIA, L. *Stems* several, prostrate; *leaves*
 long-petioled, round-cordate, crenate and crenately-lobed;
flowers single or clustered, white veined with purple; car-
 pels even. Perennial.

** *Leaves* divided.

M. LINEARILOBA. *Stem* clothed with spreading hairs.

Leaves divided nearly to the base, stellately hirsute on both surfaces. *Flowers* axillary in the uppermost leaves, about $1\frac{1}{2}'$ in diameter, scarlet; peduncle $1\frac{1}{2}'$ – $2'$ long. *Sepals* very hirsute, lanceolate, united only a little above the base. *Ovaries* 15–20. *Stigmas* simple. *Carpels* lunate, pointless.—*Drummond*.

M. DIGITATA. Glaucous and nearly glabrous; *leaves* deeply 6–7 parted; segments linear, entire, or 2- rarely 3-cleft, the uppermost entire; *flowers* few, solitary, or somewhat paniculate, on elongated peduncles; *calyx* naked, glabrous, *roots* tuberous, somewhat fusiform. *Stems* 2° – 4° high, terete, slender, with a few branches toward the summit. *Flowers* $1\frac{1}{2}'$ – $2'$ in diameter, purple. Segments of the calyx ovate-lanceolate, acuminate. *Petals* crenulate at the summit. Perennial.—*Drummond*.

CALLIRRHOË, Nutt.

Involucel 1–3-leaved and persistent, or none. *Petals* wedge-shaped, entire or crenate. *Styles* as in *Malva*. *Carpels* numerous, with a short and naked beak, and a ligulate dorsel process below the beak within. *Embryo* curved.

Radicle inferior. Perennial herbs. *Leaves* palmately-lobed, or angled. *Flowers* showy, purple or whitish.

C. TRIANGULATA, Gray. Rough-pubescent. *Stem* ascending from a perpendicular rhizoma, branching above; *leaves* triangular, coarsely and unequally crenate, the lowest ones long-petioled and cordate, the upper ones 3–5-lobed; *flowers* approximate, paniced, longer than the pedicels; *involucel* 3-leaved, the *leaves* linear; *carpels* at length 2-valved. *Stem* 2° – 3° high. *Flowers* $1'$ – $1\frac{1}{2}'$ wide, purple.

C. PAPAVER, Gray. Rough with scattered appressed and rigid hairs; *stems* low, simple; *leaves* 3–5-parted; the lobes oblong or lanceolate, toothed or entire; *flowers* few, solitary, axillary, long-peduncled; *involucel* 1–3-leaved, or none; *petals* finely crenate; *carpels* indehiscent. Rich open

woods. *Stems* 1° high. *Flowers* purple, 2' wide, on peduncles which are sometimes 1° long.

MALVASTRUM, Gray.

Involucel 1-3-leaved or none. *Styles* 5-20. *Stigmas* capitate. *Carpels* beaked or beakless, 1-seeded. *Seed* ascending. *Embryo* curved or annular. *Radicle* inferior. *Herbs* or *shrubby* plants, rough with rigid hairs. *Flowers* yellow.

M. ANGUSTUM, Gray. Annual; *stem* erect, branching; *leaves* lanceolate, sparingly serrate, short-petioled; *stipules* bristle-like; *flowers* axillary, mostly solitary; *involucel* setaceous, 2-3-leaved; *carpels* 5, circular, awnless, at length 2-valved. *Stem* 6'-12' high. *Calyx* enlarged in fruit.

SIDA, L.

Involucel none. *Calyx* angular. *Styles* 5-15. *Stigmas* capitate. *Ovaries* 1-celled. *Carpels* erect, mostly 2-valved and 2-beaked at the apex, separating at maturity from each other, and from the central axis. *Seed* resupinate, suspended, 3-angled. *Embryo* curved. *Radicle* superior. Branching herbs or shrubs, with chiefly undivided leaves, and small yellow or reddish flowers in their axils.

* *Leaves*, at least the lower ones, cordate. *Carpels* 5.

S. SPINOSA, L. Annual; minutely pubescent; *branches* erect; *leaves* oblong-ovate, acute, serrate, the slender petioles often with a tubercular spine at the base, the lower ones cordate; *stipules* setaceous, half as long as the petioles; *flowers* single or clustered, on short, erect peduncles; *carpels* faintly reticulated, each pointed with two erect subulate spines. *Stems* 1°-2° high. *Flowers* $\frac{1}{2}$ ' wide, yellow.

** *Leaves* not cordate.

S. FASCICULATA. Stems about a span high, branching from the base. Leaves $\frac{3}{4}$ ' long and a line wide, mostly with a few serratures toward the apex, nearly glabrous above, stellately hirsute beneath; petiole about $\frac{1}{4}$ the length of the lamina. Calyx hemispherical; segments ovate-acute. Carpels short and broad, strongly roughened with projecting points. Flowers sessile terminal.—*Drummond.*

S. RHOMBIFOLIA, L. Downy; stems erect, much branched; leaves rhombic-oblong, obtuse at each end, serrate, short-petioled, pale beneath; stipules setaceous, longer than the petioles, caducous; peduncles solitary, more than half as long as the leaves; carpels 10-12, even, pointed with a single subulate spine, indehiscent. Annual. Stems 2°-3° high. Leaves 2'-3' long. Flowers yellow. July to October.

S. FILICAULIS. Stems very slender, hispid; leaves ovate-oblong, cordate at the base, serrate; petiole as long as the lamina; flowers axillary; solitary carpels 5, 2-beaked. Stem 2° long, clothed with spreading hairs. Leaves 5"-7" long, $1\frac{1}{2}$ " $2\frac{1}{2}$ " wide, rather obtuse. Peduncles nearly an inch long, very slender. Calyx hemispherical.—*Drummond.*

ABUTILON, Tourn. INDIAN MALLOW.

Involucel none. *Stigma* capitate. *Ovaries* 5 or more, 1-celled, 2-9-ovuled. *Carpels* 1-6-seeded, partly 2-valved, tardily separating from each other or from the central axis. Radicle ascending. Leaves cordate. Flowers yellow, white, or purplish.

A. TEXENSIS. Leaves cordate-ovate, acute, softly pubescent, serrate, 1' long; petiole half as long as the lamina; peduncles somewhat racemose at the upper branches, 1-flowered; carpels 8, pubescent, acute, cohering except at the summit. Capsule ovate. Rocky hills of the Cibola.

July, August. Perennial.—*Drummond, Schott, and Thurber.*

A. CRISPUM, Gray. Hoary-tomentose; *stem* sparingly branched; *leaves* round-cordate, acuminate, finely crenate; *peduncles* axillary, 1-flowered, elongated, filiform, refracted after flowering; *carpels* 10, beakless, inflated, corrugated, hispid, 2-seeded. Stem slender, 1°–2° high. Leaves 1'–2' long, the upper ones nearly sessile. Peduncles as long as the leaves. *Flowers* 4''–6'' wide, white. Rio Grande.—*Thurber.*

MODIOLA.

Not represented in Texas as far as known.

PAVONIA.

Involucel 5–15-leaved, persistent. *Ovaries* 5, 1-celled, 1-ovuled. *Stigmas* 10, capitate. *Carpels* indehiscent or somewhat 2-valved, naked or armed at the apex with three hispid awns, separating at maturity. Embryo incurved. *Radicle* inferior. Chiefly shrubs with petioled stipulate leaves, and solitary flowers on axillary peduncles.—*P. Drummondii.*

KOSTELETZKYA, Presl.

Capsule depressed, the cells 1-seeded. Otherwise as in *Hibiscus*.

• K. VIRGINICA, Presl. Rough-hairy; stem erect, stout, branching; lower leaves ovate, cordate, serrate, mostly 3-lobed, the upper ones narrower and usually entire; flowers in terminal racemes, purple.—*Var. ALTHEÆFOLIA.* Densely stellate-pubescent and somewhat hoary; leaves all undivided, ovate or ovate-lanceolate, acuminate, unequally toothed-serrate; racemes dense-flowered; capsule hirsute.—*Var. SMILACIFOLIA.* (*Hibiscus smilacifolius.*—*Shuttl.*)

Stem more slender, smoothish below; *leaves* all hastate, with lanceolate serrate lobes; racemes few-flowered. July–September. Perennial. *Stem* 2°–4° high. *Flowers* 1½'–2' wide.

HIBISCUS, L. ROSE MALLOW.

Involucel many-leaved or many-cleft, and, like the calyx, persistent. *Stigmas* 5, peltate or capitate. *Capsule* globose or oblong, 5-celled, loculicidally 5-valved, many-seeded. Herbs, shrubs, or trees, with petioled stipulate leaves, and large showy flowers on axillary peduncles.

* *Leaves of the involucel forked.*

H. ACULEATUS, Walt. Muricate-hispid; *leaves* round-cordate, divided into 3–5 coarsely-toothed and spreading lobes, the upper ones narrower and mostly entire; *flowers* yellow, with a purple center, short peduncled; *involucel* 10–12-leaved; *capsule* hispid; *seeds* smooth. Perennial. July. *Stems* 2°–3° high. *Flowers* 4' wide.

** *Leaves of the involucel entire.*

† *Perennial herbs; stipules deciduous.*

H. MOSCHEUTOS, L. Tomentose; *leaves* broadly ovate, acuminate toothed-serrate, mostly 3-lobed above the middle, rounded or slightly cordate at the base, hoary beneath; peduncles often partly adnate to the petioles; *flowers* white or pale rose-color with a crimson center; *seeds* smooth. Wet places. *Stem* 3°–5° high. *Leaves* 3'–5' long. *Flowers* 4'–5' wide.

H. INCANUS, Wendl. *Leaves* lanceolate and ovate-lanceolate, not lobed, slightly cordate-acuminate, finely serrate, hoary on both sides. *Flowers* pale yellow, with a crimson center. *Seeds* smooth. Ponds and marshes. June, July. *Stem* 2°–5° high. *Leaves* 3'–6' long. *Flowers* 6'–8' wide.

H. MILITARIS, Car. Smooth; *leaves* thin, on long and

slender petioles, serrate, slightly cordate, the lower ones roundish, 3-5-lobed, the upper ovate-lanceolate, entire or somewhat hastate, with rounded lobes; peduncles shorter than the petioles; *calyx* inflated; *corolla* tubular-campanulate, pale rose-color, with a red center; seeds silky. River banks. July, August. *Stem* 3°-4° high. Leaves 6'-12' long. *Corolla* 6'-8' wide. Column of stamens naked below.

†† *Trees or shrubs; stipules persistent.*

H. DRUMMONDII. *Stem* and lower surface of the leaves minutely tomentose; *leaves* broadly cordate, 2'-2½' long, and of nearly the same breadth. *Flowers* red. *Column* very slender, a little declined; *stigmas* hairy. *Fruit* red, subglobose, obtuse; composed of 5 closely united *carpels*. —*Drummond.*

24. BYTTNERIA FAMILY. Order, BYTTNERIACEÆ.

Chiefly *trees* or *shrubs*, differing from Malvaceæ in having definite *stamens*, of which those opposite the petals are usually sterile, 2-celled *anthers*, with smooth pollen-grains, and a straight embryo. Ovary 3-5-celled, rarely 1-celled.

AYENIA, L.

Involucel none. *Calyx* 5-parted. *Petals* on long capillary claws, connivent on the stigma. Fertile *stamens* 5, alternating with 1-2 sterile ones, their filaments united into a pedicellate cup. *Style* single. *Stigma* 5-angled. *Capsule* 5-lobed, 5-celled, loculicidally 5-valved, the *cells* 1-seeded. Low, *shrubby plants*, with minute axillary *flowers*. *Capsule* rough. Albumen none.

* A. PUSILLA, L. *Stems* mostly simple prostrate, downy; *leaves* (4"-8" long) roundish or oblong, coarsely serrate; peduncles solitary, reflexed in *fruit*; *capsule* depressed,

muricate. Perennial. *Stems* 6'-12' long. *Flowers* purple.

WALTHERIA, L.

Involucel 3-leaved, deciduous. *Calyx* 5-cleft. *Petals* 5, spatulate, convolute in the bud. *Stamens* 5, united below. *Ovary* 1-celled, 2-ovuled. *Style* single. *Stigma* penicillate or tuberculate. *Capsule* 2-valved, 1-seeded. *Embryo* in the axis of fleshy albumen. *Herbs* or *shrubs* with alternate *leaves*, and small flowers in axillary clusters.

W. AMERICANA, L. *Stems* erect, villous; *leaves* ovate or oblong, acute or obtuse, serrate, plicate, tomentose on both surfaces; heads of *flowers* globose, stalked or sessile and shorter than the petioles, the upper ones often spiked. *Calyx* hirsute; *flowers* yellow. *Stem* 2°-3° high, rigid. *Leaves* 1'-2' long.

MELOCHIA, Lin.

Calyx 5-cleft, persistent, naked or with 1-3 bracteoles at the base. *Petals* 5, spreading. *Stamens* 5, opposite the petals, short, monadelphous at the base. *Styles* 5; stigmas slightly clavate. *Carpels* united into a 5-angled, 5-celled loculicidal *capsule*. *Seeds* 1-2 in each cell. *Cotyledons* flat, foliaceous, reniform. Shrubby plants, with alternate serrated leaves. *Peduncles* several-flowered, terminal, axillary, or opposite the leaves. *Flowers* violet or white.

M. PYRAMIDATA. *Leaves* ovate-lanceolate, toothed, glabrous; *peduncles* 5-6-flowered, longer than the petioles; *petioles* and branches pubescent.—*Drummond*.

Between San Felipe and Brazos.

25. LINDEN FAMILY. Order, TILIACEÆ.

Trees, rarely herbs. *Leaves* alternate, with deciduous stipules. *Flowers* axillary or extra-axillary, hypogynous,

polyandrous. Sepals 4-5 valvate in the bud; deciduous. *Petals* 4-5 convolute or imbricated in the bud. *Stamens* distinct or united in clusters. *Anthers* 2-celled, the pollen-grains smooth. *Style* single; *stigma* 4-10 lobed. *Capsule* 2-5-celled, 1-many-seeded. *Seeds* anatropous. *Embryo* in the axis of fleshy albumen. *Cotyledons* flat, leafy.

TILIA. LINDEN. BASSWOOD.

TILIA AMERICANA, L. *Leaves* smooth and green on both sides, obliquely cordate or truncate at the base, sharply serrate. June. A large tree. Leaves 4'-5' wide.

CORCHORUS, L.

Sepals 5. *Petals* 5, convolute in bud. *Stamens* numerous, separate. *Style* slender. *Stigma* dilated crenulate. *Capsule* mostly elongated, silique-like, loculicidally 2-valved, many-seeded. Herbs or shrubs, with alternate serrate petioled leaves; flowers small, yellow, on short peduncles opposite the leaves. *Stipules* deciduous.

C. SILIQUOSUS, L. Stem much branched, hairy in lines. *Leaves* ovate and lanceolate, compressed, 2-celled, many-seeded. *Stems* 1°-2° high. *Capsule* 2' long.

C. PILOLOBUS. Rocky hills of the Rio Grande.—*Marcy*.

26. CAMELLIA FAMILY. Order, CAMELLIACEÆ.

Trees or *shrubs*. *Leaves* alternate, exstipulate, feather-veined, simple. Flowers large and showy, regular. Calyx, 5 sepals imbricated and persistent, often unequal in size. *Stamens* numerous, more or less coherent at the base into two, three, or five sets, and with the base of the petals. *Anthers* 2-celled. *Fruit*, a woody pod containing few large seeds; little or no albumen. *Cotyledons* large.

Their properties are stimulating and slightly narcotic. To this order belongs the TEA PLANT of China.

27. ORANGE FAMILY. Order, AURANTIACEÆ.

Trees or shrubs, abounding in little transparent receptacles of volatile oil. Leaves alternate, articulated with the petiole, which is frequently winged.

Flowers regular, 3 or 5. Petals and stamens inserted on a hypogynous disk. Stamens with flat filaments. Fruit a berry, thick rind, many-celled, pulpy. Seeds attached to the inner angle of each carpel. Cotyledon thick; no albumen.

ORANGE. *The Orange, though not a native, is so constantly met with in our gardens that we give a conspectus of the order, that the student may exercise his knowledge of analysis by examining it.*

28. PRIDE OF INDIA FAMILY. Order, MELIACEÆ.

Trees or shrubs, pinnate, exstipulate leaves.

Flowers 3 to 5 sepals and petals. Stamens 6-10, coherent into a long tube with anthers sessile. Disk hypogynous, sometimes cup-like. Style 1. Ovary compound, several-celled, 1-4 ovules. Fruit dry or fleshy. Seeds neither winged nor axillate.

CHINA TREE. *This tree is almost naturalized in many parts of our State. The writer has seen it growing in the Brazos bottom, far from any habitation; also below Harrisburg, upon Buffalo Bayou.*

29. FLAX FAMILY. Order, LINACEÆ.

Herbs with entire, exstipulate, simple leaves.

Flowers regular, symmetrical, and perfect, pentamerous (i. e. 5 sepals, petals, stamens, and styles). Sepals im-

bricated. *Corolla* convolute in æstivation, hypogynous. *Stamens* definite, hypogynous, alternate with the petals; *styles* distinct, *stigmas* capitate. *Pod* 10-celled, and splitting when ripe in 10 pieces, with one seed in each cell. Inner bark of tough fibers. *Oily seeds* with a *mucilaginous coat*.

LINUM.

Sepals, petals, stamens, and styles 5. *Capsule* 10-celled. *Cells* 1-seeded; *seeds* oily; *stem* slender; *leaves* narrow and mostly alternate; *peduncle* 1-flowered, borne above or opposite the leaves.

L. VIRGINIANUM, L. (*Wild Flax*.) *Leaves* lanceolate, acute, the lower ones opposite and obtuse; *flowers* scattered in corymbose racemes; *sepals* smooth, ovate, acute; *styles* distinct; *capsule* depressed-globose, 10-celled. Varies with glandular sepals, larger globose-ovate capsules, and linear leaves; perennial. *Flowers* yellow, *stem* slender, branching, 2° high.

L. PERENNE, L. (*Perennial Flax*.) Glabrous, with virgate branches; *leaves* linear, acute, scattered; *flowers* subaxillary and terminal; *sepals* oval, margins membranous, shorter than the globose capsule; *petals* retuse, 3-4 times the length of the *sepals*, blue.—*Torry*.

30. WOOD-SORREL FAMILY. Order, OXALIDACEÆ.

Herbs, with alternate trifoliate leaves, with an acid juice. *Flowers* regular, hypogynous, and symmetrical; 10 *stamens*, somewhat monadelphous, those opposite the petals being the longest. *Sepals* 5, persistent, imbricated. *Petals* 5, convolute in æstivation. *Styles* 5, separate. *Capsule* 5-celled, two or more seeds in each cell.

OXALIS. WOOD-SORREL.

Capsule 5-lobed; the cells loculicidally dehiscent on the

back, 1-few-seeded. *Seed*-coat loose and separating. *Leaves* 3-foliate. *Leaflets* obcordate.

O. VIOLACEA, L. (*Purple Wild Sorrel*.) Stemless; *root* tuberous; *scapes* umbellately 4-6-flowered; *flowers* purple, nodding. *Scapes* and *petioles* 5'-9' high.

O. ACETOCELLA, L. (*White Wood-Sorrel*.) Stemless; *root* creeping, *scape* 1-flowered. *Flowers* white, veined with red. *Scape* and *petiole* hairy.

O. STRICTA. (*Yellow W.-S.*) Branching *stem*, leafy; *axillary peduncles*, 2-6-flowered, longer than the *leaves*; *flowers* yellow. *Capsule* elongated, erect; annual and perennial.

O. VESPERTILIONIS. Stemless; *bulb* solitary, scaly. *Leaves* 3-foliate, and with the whole plant glabrous. *Leaflets* dilated, broadly cuneate at the base, 2-lobed; *scape* 5-8-flowered, longer than the *leaves*. *Sepals* linear-oblong, with 3-4 glands at the top; *petals* violet, narrowly oblong, entire.—*Drummond*.

L. RIGIDUM. *Leaves* erect, linear, rigid, acute. *Flowers* racemed on the corymbose branches. *Stem* angular. *Sepals* 3-veined, ovate-lanceolate, acuminate, with glandular fringed serrated bracts, longer than the globose *capsule*. *Styles* more or less united at the base. *Stems* 10'-16' high. *Leaves* 4"-8" long, scabrous on the margins. *Flowers* yellow, 8" diameter.—*Torry*.

L. BERLANDIERE. Cache Creek.—*Marcy*.

L. BOOTHI. Wichita Mountains.—*Marcy*.

31. GERANIUM FAMILY. Order, GERANIACEÆ.

Herbs or *shrubs*, swollen, separate joints. *Leaves* stipulate, palmately veined. *Flowers* symmetrical, hypogynous, pentamerous. *Sepals* imbricated; *petals* convolute in æstivation; *stamens* 10, monadelphous, the alternate ones often abortive. *Pistils* 5 grown into one, cohering to an

elongated receptacle, from which when ripe they separate and twist up, carrying with them the five little one-seeded pods. There are three genera:

Stamens 10, all perfect, every other one shorter. Petals all alike. Corolla regular. GERANIUM. Crane's Bill.

Stamens 5, perfect; 5 alternate, imperfect. Corolla regular. ERODIUM. Heron's Bill.

Stamens 7, perfect. Corolla irregular.

PELARGONIUM. Stork's Bill.

GERANIUM.

Flowers regular. *Stamens* perfect, the inner ones with a gland at the base. *Styles* at maturity separating with the 1-seeded carpels and coiled upward, the inner face naked.—*Herbs*. *Stems* forking. *Leaves* palmately lobed. *Peduncles* 1-3 flowered.

G. MACULATUM. Perennial, erect, hairy; *leaves* 5-7-parted, the divisions acutely lobed and toothed; *peduncles* 1-2-flowered, the terminal ones often umbellate; *petals* large, entire, 2-3 times longer than the oblonged awned sepals. *Roots* tuberous, astringent. *Stem* 1°-2° high. *Flowers* purple, 1' wide. Mount Bonnell, near Austin.

G. CAROLINIANUM, L. Annual, prostrate, downy. *Leaves* obtusely lobed and toothed, 5-7-parted. *Peduncles* 2-flowered. *Petals* emarginate, as long as the ovate awned sepals. *Stems* forking, 6'-18' long. *Flowers* pale purple.

ERODIUM. HERON'S BILL.

Calyx 5-leaved; *petals* 5; *filaments* 10, the 5 alternate ones abortive; *fruit* rostrate, of 5 aggregated capsules

tipped with the long, spiral style, bearded inside. *Flowers* umbellate.

E. CICUTARIUM. Diffuse hairy. *Leaves* pinnately divided; segments sessile, pinnatifid, acute. *Peduncles* several-flowered. *Petals* unequal. *Leaves* oblong in outline, with many segments. *Flowers* 2'-3' diameter.—*Torrey.*

32. BALSAM FAMILY. *Order, BALSAMINACEÆ.*

Herbs, tender annuals with succulent stems and watery juice. *Flowers* very irregular, and unsymmetrical. *Sepals* 5, deciduous, the upper two connate, the lowest spurred and gibbous. *Petals* 4, hypogynous, united by pairs, or rarely 5, distinct. *Stamens* 5, hypogynous. *Filaments* subulate. *Anthers* 2-celled. *Stigma* 5-lobed, sessile. *Fruit*, a pod, 5-celled, bursting elastically by 5 valves. *Seeds* several in each cell. *Leaves* exstipulate, undivided.

IMPATIENS, L. JEWEL WEED.

Lowest sepal saccate and spurred. *Petals* 4, united in pairs. *Filaments* short, with a scale on the inner face. *Capsule* 5-celled, bursting elastically into 5 valves. *Placentæ* central, persistent. *Stems* branching, somewhat pellucid. *Leaves* serrate. *Peduncles* axillary, 1-several-flowered.

I. PALLIDA, Nutt. (*Pale Touch-me-not.*) *Flowers* pale yellow, lower sepal slightly spotted, dilated, often tipped with a short recurved spur. *Leaves* oval or ovate, obtusely serrate, membranaceous. *Stem* 2°-4° high.

33. RUE FAMILY. *Order*, RUTACEÆ.

Herbs, shrubs, or trees. Leaves strong-scented, sharp-tasted, exstipulate, dotted with transparent dots like punctures, filled with aromatic, acrid, volatile oil. *Flowers* regular, segments 3 or 5, hypogynous, perfect, or polygamous. *Stamens* on the receptacle (hypogynous), as many or twice as many as the petals. *Pistils* 2 to 5, separate or combined into a compound ovary with as many cells, sessile or raised on a stipe (gynophore); *styles* mostly cohering. Fruit, a pod, or separating into its component 1- or 2-seeded carpels.

Trees or shrubs. Stamens 3 or 5, only as many as the petals. *Flowers* dioecious, 2 to 5, making fleshy pods with two black seeds. *Leaves* pinnate; *stems* prickly.

ZANTHOXYLUM. *Prickly Ash.*

Flowers polygamous. *Pistil* one, making a 2-celled, 2-seeded key, winged all round. *Leaflets* 3. *Stems* not prickly.

PTELEA. *Hop Vine.*

ZANTHOXYLUM. PRICKLY ASH.

Flowers monœcious or dioecous. *Sepals* and *petals* 3-5; ovaries; 2-5 sessile or stipulate, 2-ovuled. *Carpels* 2-valved; 1-2-seeded. *Seed* smooth and shining. *Trees* or *shrubs*, commonly armed with stipular prickles. *Leaves* unequally pinnate, the leaflets punctate with pellucid dots. *Flowers* small, greenish.

Z. CAROLINIANUM, Lam. (*Toothache Tree*.) Smooth, the branches armed with prickles. *Leaves* 7-9 foliolate, alternate; *leaflets* ovate-lanceolate, crenate-serrulate, unequal-sided.

Z. FLORIDANUM, Nutt. (*Satin Wood*.) *Branches* and *petioles* unarmed. *Leaflets* 5-7, ovate-lanceolate on the

fertile plant, and elliptical, obtuse, or emarginate on the sterile, slightly crenulate, and like the cymose panicle stellate-pubescent; *stamens* 4-5; *carpels* 1-2, obovate, stipulate; *seed* solitary, obovate, black and shining. *Leaves* 1'-2' long. *Cyme* sessile, divided into three primary branches. *Flowers* minute.

Z. PTEROTA. *Branches* zigzag, armed with short curved prickles; *petiole* winged, jointed; *leaflets* 7-9, small, obovate, coriaceous, crenate above the middle, sessile; *flowers* in axillary clusters, which are single or by pairs, as long as the first joint of the petiole; *stamens* 4; *ovaries* 2; *carpels* solitary, globose, pitted, distinctly stipitate; *leaflets* $\frac{1}{2}$ '- $\frac{3}{4}$ ' long, those on the fertile plant narrower and smaller; *carpels* small, dotted.

Z. HIRSUTUM, Buckley. Young *branches* and *petioles* prickly and strongly hirsute; *leaves* pinnate, 2-3-paired; *leaflets* ovate-lanceolate, crenate, obtuse; *flowers* axillary or terminal, shortly paniculate; *carpels* subcordate, 1-2-seeded; *seeds* subovate.—*Tree* about 25 feet high, and 8-12 inches in diameter; *branches* armed with stout recurved prickles; *leaflets* opposite or subalternate; trunk and old branches gray and smooth. Near Corpus Christi.

PTELEA, L. HOP TREE.

Flowers polygamous; *sepals* and *petals* 4-5, imbricated in the bud, deciduous; *stamens* 4-5; *ovary* 2-celled, with two ovules in each cell; *style* short; *stigma* 2-lobed; *capsule* 2-celled, 2-seeded, surrounded by a broad, circular, reticulated wing.—Unarmed *shrubs*, with trifoliate *leaves*, and small greenish *flowers* in a terminal *cyme*.

P. TRIFOLIATA. Pubescent; *leaves* long-petioled; *leaflets* oval or oblong, mostly acute, obscurely crenulate, paler beneath, the lateral ones unequal-sided; *filaments*

4-5, densely villous below the middle, longer than the style in the sterile flowers, shorter in the fertile ones.—*Shrub* 4°-8° high; *leaflets* 2'-4' long; *fruit* 1' wide.

P. MOLLIS, Curtis. Lateral *leaflets* oval, the terminal obovate, with an abrupt, acute point, the under side with the petioles, panicles, and young branches clothed with soft, white, silky villus; *cymes* compact; *style* long; *filaments* equaling the anthers; *stamens* 4.

P. BALDWINII. *Leaves* very small, glabrous; *leaflets* sessile, oval, obtuse, the terminal one cuneiform at the base; *flowers* tetrandrous; *style* none.—*Shrub* 1° high, with numerous scraggy branches; *leaflets* 1' long.

34. SUMACH FAMILY. Order, ANACARDIACEÆ.

Trees or *shrubs*, with a resinous, caustic, milky juice. *Leaves* alternate, simple or ternate, or unequally pinnate; *flowers* terminal or axillary, with bracts commonly diœcious, small; *sepals* 3 to 5, united at base, persistent; *petals* same number, sometimes wanting, imbricated; *stamens* as many as petals, alternate with them, distinct or cohering, and perigynous; *style* or *stigmas* 3, on a 1-celled ovary, which makes a 1-seeded little stone-fruit (drupe) with a thin flesh.

Some of this order are poisonous even to the touch, as the R. TOXICODENDRON or Poison Oak.

RHUS, L. SUMACH.

Calyx 5-parted; *petals* 5, inserted with the 5 *stamens* on the disk which surrounds the base of the ovary; *stigmas* 3; *drupe* dry; *radicle* superior, incurved.—*Shrubs* or small *trees*. *Leaves* pinnate or trifoliate, rarely simple. *Flowers* greenish, in spikes or panicles.

* *Flowers polygamous, in a close terminal panicle; drupe red, hairy; leaves pinnate.*
(*Not poisonous.*)

R. TYPHINA, L. *Branches, petioles, and drupes villous; leaflets 17-21, lanceolate, acuminate, serrate smooth, pale beneath.*—Large *shrub*.

R. GLABRA. *Smooth and glaucous; leaflets 17-31, oblong-lanceolate, serrate, acuminate, white beneath.* Open woods.—*Shrub 6°-10° high.*

R. COPALLINA. (*Sumach.*) *Branches and wing-margined petioles tomentose; leaflets 9-12, lanceolate or ovate-lanceolate, acute or obtuse, mostly entire, smooth above, paler and downy beneath; panicle often large and spreading.* Margins of fields and open woods.—A *shrub* or small *tree*.

** *Flowers diœcious, in loose axillary panicles; drupe whitish, smooth; leaves pinnate and trifoliate.* (*Poisonous.*)

R. TOXICODENDRON, L. (*Poison Oak.*) *Branches and petioles smooth, leaves trifoliate; leaflets 7-13, ovate or oblong, abruptly acute or acuminate, entire; panicles long-peduncled, narrow, erect.*—*Shrub, 8°-12° high.*

There are four varieties of the *Toxicodendron* in our State:

2d. *Quercifolium.* *Stems low, erect, leaflets variously lobed.*

3d. *Radicans.* *Stems climbing by rootlets; leaflets toothed or entire, more or less pubescent.*

4th. *Trilobate.* *Found in the northern part of Texas.*

*** *Flowers diœcious, in loose panicles; drupe oblong, smooth, scarlet; nut chartaceous; seeds avillate; leaves pinnate.*

**** *Flowers diœcious, in short bracted spikes, appearing with the leaves; drupe red, hairy; leaves trifoliate.*

R. AROMATICA. *Stem low, smooth; leaflets ovate, or the terminal one obovate, obtuse, pubescent when young, toothed above the middle; spikes single or clustered,*

spreading.—*Shrub* 1°–2° high; *spikes* 1' long. *Aromatic, not poisonous.*

R. VIRENS, Lindheimer. Smooth; *leaves* evergreen, pinnate; *leaflets* 3–4 paired with an odd one, each is naked; *leaflets* ovate or oblong-obtuse, acuminate with the margin subrevolute, entire, coriaceous, above shining, beneath pale and slightly tomentose; *flowers* white in thyrsoid panicles; *panicles* axillary, shorter than the leaves; *drupe* red, hirsute. Limestone hills, Western Texas; Mount Bonnel, Austin.—*Shrub*, growing in clumps 3–5 feet high.

35. GRAPE FAMILY. Order, VITACEÆ.

Shrubby plants with a watery and sour juice, climbing by tendrils; known by having a minute *calyx* with scarcely any lobes; *flowers* growing in racemes; *petals* valvate in bud and falling off early; *stamens* 5 or 4, one before each petal, inserted on the disk which surrounds the 2-celled, 1-styled ovary; *fruit* a berry, usually 4-seeded; *seeds* bony.

VITIS, L. GRAPE VINE.

Petals distinct, or remaining united at the apex and separating at the base, inserted into a 4–5-lobed or cup-shaped disk which surrounds the ovary.

SYNOPSIS.

1. § Flowers perfect; petals and stamens 4–5; style conspicuous; stigma minute; leaves single or compound..... **CISSUS.**

2. § Flowers polygamous; petals 5, cohering at the top, free at the base; stamens 5; style short; disk thick, 5-lobed; leaves simple, cordate, entire or variously lobed..... **VITIS.**

* *Leaves and branches woolly.*

** *Leaves and branches smoothish.*

V. BIPINNATA, Willd. *Leaves* bipinnate, smoothish; *leaflets* small, ovate, sharply toothed; *flowers* some-

what cymose on a long forking peduncle; *petals* 4-5, united at the apex, separating at the base; *style* conical; *disk* 4-5-lobed; *berry* 2-4-seeded. No tendrils. *Leaflets* 1' long. Berry small and black.

V. ACIDA, L. *Branches* geniculate; *leaves* trifoliolate, thick and rigid; *leaflets* small, cuneate-obovate, sharply toothed at the apex; *flowers* in compound umbels; *petals* 4, united at the apex, separating at the base; *style* slender; *disk* cup-shaped, entire; *berry* black, 1-seeded; *tendrils* stout and elongated. *Leaflets* $\frac{1}{2}$ ' long. Branches and peduncles flattened and elongated.

V. INCISA, Nutt. Smooth; *stem* climbing, warty; *leaves* trifoliolate, very thick and fleshy; *leaflets* stalked, wedge-shaped, and entire near the base, the lateral ones 2-lobed, the middle 3-lobed, all mucronate-toothed or serrate; *berry* purple, globose-ovate, nodding, pointed with the conspicuous slender style, 1-seeded. Stem 6°-12° long; *leaflets* 1'-3' long; *panicles* cymose.

V. INDIVISA, Willd. *Leaves* simple, undivided, ovate, truncate, or cordate at the base, acuminate, toothed-serrate, pubescent; *peduncles* forking; *petals* and *stamens* 5; *style* slender; *disk* cup-shaped; *berry* 1-3-seeded; *stem* climbing. Berry small, black.

V. LABRUSCA, L. (*Fox Grape*.) *Leaves* broadly cordate, angularly 3-lobed, mucronate-serrate, very woolly when young, at length smoothish above; fertile *panicles* or *racemes* few-flowered; *berry* large; *leaves* 4'-6' wide. Berry $\frac{1}{2}$ ' in diameter, purple or whitish, pleasant-flavored.

V. CARIBÆA, DC. *Leaves* round-cordate, with a broad and shallow sinus, entire or 3-lobed, wavy-serrate, acute or acuminate, soon smooth above, the lower surface like the branches, petioles, and panicles, clothed with soft ash-colored down; *panicles* equaling or longer than the leaves; *pedicels* smooth; *berry* $\frac{1}{2}$ ' in diameter.

V. *ÆSTIVALIS*. (*Summer Grape*.) *Leaves* cordate, entire or 3-5-lobed, or on young plants pinnatifid, mucronate-serrate, covered with a loose cobwebby down, at length smooth or nearly so on both sides; *panicles* long, many-flowered; *berry* small; *stem* climbing high; *leaves* 4'-7' wide; *panicle* 6'-12' long, compound. Berry deep blue, very austere.

V. *MONTICOLA*, Buckley. *Leaves* broad cordate, sparingly hoary, tomentose beneath, coarsely and irregularly toothed, teeth acute and submucronate, entire or slightly 3-lobed near the apex, smooth and subcorrugated above; *racemes* shouldered; *berries* $\frac{1}{2}$ to $\frac{3}{4}$ of an inch in diameter, dull purple or green with a reddish-brown shade, often quite black; pulp white, acid, and rather agreeable to the taste; skin thin; *seeds* 1-4, generally 3; *racemes* 3-4 inches long. Young *branches* have a cottony pubescence; *stem* small, climbing, 8-10 feet high. Fruit ripe August and September. Leaves 2-3 inches long and about the same width. Common in the hilly region northwest of Austin, Texas. *Mountain Grape*.

V. *LINCECUMIL*, Buckley. *Leaves* very large, reniform-cordate, entire or 3-lobed, crenate-dentate, teeth sub-mucronate; above smooth, beneath a rust-colored pubescence which is also on the younger branches and petioles; *racemes* shouldered, shorter than the leaves; *berries* purple, skin thin. Fruit about $\frac{3}{4}$ of an inch in diameter, juicy, and of a pleasant acid taste. This grape has larger leaves than any other American species of grape. Fruit ripens about the 18th of July. "Post-oak Grape." *Stems* small, climbing, rarely more than 8 or 10 feet. Sandy soils. Eastern and Central Texas. Named in honor of Dr. Lincecum, of Texas.

V. *MUSTANGENSIS*, Buckley. *Leaves* cordate, entire or 3-5-lobed, above smooth, beneath covered with a white

cottony pubescence, as is also the fruit and leaf-stems and the younger branches; slightly crenately toothed or entire, teeth mucronate; *berries* large; bluish-black or green with a purple shade. It makes an excellent wine, but is little esteemed for eating on account of an acrid juice beneath the skin, which, if swallowed, gives a burning pain in the throat. *Mustang Grape*. Fruit ripens in July and August.

V. VULPINA, Michx. (*Muscadine*.) *Leaves* broadly cordate, toothed-serrate, smooth and glossy on both sides, or rarely like the branches pubescent, the *sinus* at the base broad and rounded, or narrow and acute; *panicle* small, berry-like; *stem* climbing high, with pale and smooth bark. *Leaves* 2'-3' wide. *Berry* $\frac{1}{2}$ '- $\frac{3}{4}$ ' in diameter, purple, pleasant flavored.

V. RUPESTRIS, Scheele. *Leaves* cordate, smooth on both sides, unequally toothed, teeth submucronate, entire; *plant* smooth; *racemes* small, often not shouldered; *berries* black or greenish purple, small, about $\frac{3}{8}$ of an inch in diameter; *seeds* 3-4, large. On the banks of streams. This grape often grows in thick cane-like patches, and does not climb; but on hills and uplands it climbs to the height of 8 to 15 feet. Associated with the Mountain Grape in the region northwest of Austin. Its smooth leaves, of a different shade of green, etc., enable any one at a glance to distinguish it from the Mountain Grape.

AMPELOPSIS, Michx.

Petals distinct, spreading, concave; *disk* none; *leaves* digitate; *flowers* clustered in corymbose panicles.

A. QUINQUEFOLIA. (*American Ivy*.) *Leaflets* 5, oblong-obovate, serrate above the middle, smooth; *berry* small, dark blue.

A. HEPTAPHYLLA, Buckley. *Leaves* petiolate, palmate, 7-foliate; *leaflets* small, ovate-lanceolate, sessile, or shortly petiolate, apex mucronate-dentate, acuminate; *panicles* cymose, long-pedunculate; *flowers* small; *petals* distinct, oblong-lanceolate, sub-obtuse; *stamens* exsert; *berries* round, 3-4 seeded. Flowers last of April and first of May. Common on the mountains in Burnet and San Saba Counties, climbing sometimes to the height of 25-30 feet.

36. BUCKTHORN FAMILY. Order, RHAMNACEÆ.

Woody plants, or small *trees*, often spiny. *Leaves* simple, alternate; regular *flowers* (sometimes apetalous or otherwise imperfect); *petals* 4 or 5, small; *stamens* same number as the petals, opposite them and alternate with the sepals. Stamens and petals both perigynous (inserted on the calyx), or on a fleshy cup which lines the tube of the calyx; *calyx* valvate (edge to edge) in the bud; *disk* fleshy. Fruit of 2 to 5 cells, and one large seed in each.

SYNOPSIS.

- * *Drupe* baccate, 1-2-celled. *Ovary* immersed on the disk. *Petals* 5. *Drupe* 2-celled. *Calyx* free..... BERCEMIA.
- ** *Leaves* alternate. *Seeds* furrowed on the back. *Flowers* clustered.
RHAMNUS.
- Leaves* alternate. *Seeds* not furrowed on the back. *Flowers* clustered.
FRANGULA.
- *** *Flowers* corymbed. *Calyx* white. *Nutlets* 2-valved..... CEANOTHUS.
- Flowers* cymose. *Calyx* green. *Nutlets* opening at the margin... COLUBRINA.

BERCEMIA.

Calyx 5-cleft, the tube hemispherical; *petals* 5, sessile, as long as the calyx; *ovary* free, 2-celled, half immersed in the fleshy disk; *styles* united; *stigmas* 2; *drupe* oblong, 2-celled, 2-seeded.—Erect or twining *shrubs*, with

alternate pinnately-veined leaves, with minute stipules, and small greenish axillary or panicked flowers.

B. VOLUBILIS. *Stem* twining; *leaves* oblong, acute, wavy on the margin, glossy above, the veins oblique; *flowers* in small terminal panicles; *drupe* purple.

CEANOTHUS, L. JERSEY TEA.

Calyx 5-cleft, colored, tube adnate to the ovary and persistent, lobes connivent, deciduous; *petals* 5, longer than the calyx, hooded, long-clawed; *stamens* exserted; *style* 3-parted; *drupe* dry, composed of three 2-valved, 1-seeded nutlets; *embryo* in fleshy albumen; *cotyledons* flat.—*Shrubby plants*, with alternate, serrulate, minutely stipulate, 3-ribbed leaves, and small *flowers* in lateral and terminal corymbs or panicles.

C. MICROPHYLLUS, Michx. *Stem* erect, diffusely much-branched; *leaves* perennial, small, obovate, slightly crenate, 3-ribbed, glossy above, with scattered hairs beneath, those in the axils clustered; *corymbs* small, terminal. *Leaves* 2"—3" long.—*Shrub*, 1°–2° high, yellowish. *Pedicels* and *flowers* white.

RHAMNUS. BUCKTHORN.

Calyx 4–5-cleft, the tube urceolate, lined with a thin disk; *petals* small, obovate, concave, often wanting; *ovary* free, 2–4-celled; *styles* united below; *stigmas* 2–4; *drupe* baccate, composed of 2–4 somewhat dehiscent nutlets; *seeds* grooved on the back; *raphe* dorsal; *cotyledons* leafy, revolute.—*Shrubs*, with alternate stipulate finely-veined leaves, and small axillary clustered polygamous or diœcious greenish flowers.

R. OBTUSIFOLIUS, Gray and Torrey. Somewhat thorny, glabrous. *Branches* whitish; *leaves* ovate or oblong-ovate,

obtuse, about 3-nerved from the base, obscurely serrate, rather shining above; fascicles of flowers shorter than the petioles.

R. LANCEOLATUS, Pursh. *Leaves* oblong-lanceolate, acute, or those of the flowering branches oblong and obtuse, serrulate; *flowers* clustered on short pedicels, with long *styles*, or the more fruitful ones scattered on longer pedicels and with shorter styles; *petals* emarginate; *drupe* 2-seeded.—A tall *shrub*. *Drupe* black, as large as a grain of pepper.

R. TEXENSIS, Gray and Torrey. Much-branched and straggling; *branches* pubescent; *leaves* ovate or oblong-ovate, somewhat acute, villous-pubescent on both sides, denticulate-serrulate, the veins prominent and very oblique; *fruit* broadly turbinate, 2-3-seeded; *seeds* tumid, without a furrow.

R. DRUMMONDII. *Branches* whitish; *leaves* about $\frac{3}{4}$ " long, somewhat coriaceous, obtuse or a little acute at the base; *petioles* 1'-2' long; *fruit* 3'-4' in diameter, with a very thin pulp, obscurely lobed; *seeds* smooth and shining.

FRANGULA, Tourn.

Seeds not grooved; *raphe* lateral; *leaves* strongly parallel-veined; *flowers* perfect.

F. CAROLINIANA, Gray. (*Carolina Buckthorn*.) *Leaves* oblong, wavy and finely serrulate on the margins, the slender *petioles* and many-flowered short-stalked *umbels* pubescent; *petals* 5, minute; *stigmas* 3; *drupe* globose, 3-seeded.—A *shrub* or small *tree*. *Leaves* 3'-4' long.

37. STAFF-TREE FAMILY. Order, CELASTRACEÆ.

Woody plants with simple alternate or opposite *leaves*; the divisions of the *calyx* and the *petals* both overlapping in

the bud; the *stamens* as many as the petals (4 or 5) and alternate with them, inserted on a thick expansion of the receptacle (*disk*) which fills the bottom of the calyx. Pod colored, of 2 to 5 mostly 1-seeded cells; showy when ripe in autumn, especially when they open and display the seeds enveloped in a pulpy scarlet aril.

EUONYMUS, L. SPINDLE TREE.

Flowers perfect; *calyx* flat, 4-5-cleft; *petals* 4-5, spreading; *stamens* 4-5, very short, inserted with the petals under the broad and fleshy disk which surrounds the ovary; *ovary* 3-5-celled, with 2 erect or resupinate ovules in each cell; *style* very short; *capsule* 3-5-celled, loculicidally 3-5-valved; *seed* enclosed in a red pulpy aril. Erect or trailing *shrubs*, with 4-angled branches, opposite serrate *leaves*, and greenish or purplish *flowers* in axillary peduncled *cymes*.

E. AMERICANUS, L. (*Strawberry Bush*.) *Flowers* greenish, pentamerous; *peduncles* 1-3-flowered; *capsule* warty; *leaves* short-petioled, varying from ovate or obovate to linear-lanceolate, serrulate.—*Shrub*, 3°-6° high; *leaves* 1'-2' long.

E. ATROPURPUREUS, Jaq. *Flowers* purple, tetramerous; *peduncles* many-flowered; *capsule* smooth; *leaves* oblong on rather long petioles, serrulate.—*Shrub*, 8°-12° high; *leaves* 2'-5' long; *flowers* dark purple.

CELASTRUS. STAFF TREE.

Flowers somewhat dioecious; *calyx* cup-shaped, 5-cleft; *petals* 5, spreading; *stamens* 5, inserted with the petals into the edge of the cup-shaped fleshy disk which fills the tube of the calyx, abortive in the fertile flower; *ovary* 2-4-celled, the cells 2-ovuled; *style* thick; *capsule* glo-

bose, commonly 3-celled and 3-valved; *seeds* 1-2 in each cell, enclosed in a fleshy scarlet aril; *embryo* in the axis of copious fleshy albumen.—Climbing *shrubs*, with alternate leaves, and small greenish flowers in axillary or terminal *racemes*.

C. SCANDENS. *Leaves* oblong-ovate or obovate, acuminate, serrate, smooth; *racemes* terminating the branches, nearly simple; *capsule* orange-colored.

38. MAPLE FAMILY. ACERACEÆ.

Trees or *shrubs*, with opposite lobed or pinnate exstipulate *leaves* and regular mostly polygamous or dioecious *flowers*, with an imbricated æstivation. *Calyx* 4-9-lobed; *petals* as many as the lobes of the calyx or none; *stamens* 4-12, inserted with the *petals* into a hypogynous disk; *ovary* 2-celled, with 2 pendulous amphitropous *ovules* in each cell, forming in fruit a double 2-seeded *samara*; *styles* 2; *seeds* with little or no albumen; *embryo* folded or spirally coiled.

* *Flowers* on long and drooping umbellate or corymbose *pedicels*, developed from lateral and terminal buds.

ACER.

A. SACCHARINUM. (*Sugar Maple*.) *Leaves* cordate, with 3-5 acute or acuminate sinuate-toothed lobes, paler and slightly pubescent beneath; *flowers* umbellate-corymbed, appearing with the leaves; *calyx* bell-shaped, fringed on the margin, nearly as long as the *stamens*; *petals* none.—A large *tree*; *leaves* 3'-5' wide.

** *Flowers* on short and erect clustered *pedicels*, developed from lateral buds, and appearing before the leaves; *fruiting pedicels* long and drooping.

A. RUBRUM, L. (*Red* or *Swamp Maple*.) *Leaves* 3-5-lobed, or undivided, smooth or pubescent, either cordate or rounded, or sometimes acute at the base toothed and ser-

rate, white beneath; *petals* oblong or linear; *samara* small, smooth.—A small *tree*; *flowers* and *fruit* red.

NEGUNDO. ASH-LEAVED MAPLE.

A small *tree*, bark green and smooth; *flowers* diœcious; *calyx* minute; *petals* none; *stamens* 4-5, hypogynous; *leaves* pinnately 3-5-foliolate, the *leaflets* ovate, lobed, or toothed. Flowers small, greenish; the sterile ones on long and drooping clustered pedicels; the fertile ones racemose; both from lateral buds appearing with or before the leaves.

N. ACEROIDES. On banks of streams.

39. SOAP-BERRY FAMILY. Order, SAPINDACEÆ.

Trees, shrubs, rarely herbs. Leaves simple or compound, alternate or opposite; *flowers* mostly unsymmetrical and irregular, 4 or 5 divided; *sepals* and *petals* imbricated in the bud; *stamens* 5 to 10, inserted on an hypogynous or perigynous disk; *ovary* 2-3-celled and lobed, with two, sometimes more ovules in each cell.

SYNOPSIS.

TRIBE I. DODONEÆ. *Ovules* 2-3 in each cell. *Embryo* spirally coiled. *Cotyledons* distinct. *Leaves* alternate.

TRIBE II. SAPINDÆ. *Ovules* usually solitary. *Embryo* curved or straight. *Cotyledons* distinct. *Leaves* alternate.

Ovules solitary. *Petals* 5, regular. *Fruit* baccate.....SAPINDUS.

Ovules solitary. *Petals* 4, irregular. *Fruit* a bladder-like capsule.

CARDIOSPERMUM.

Calyx 5-lobed. *Petals* 4-5, unequal. *Leaves* digitate....ÆSCULUS.

SAPINDUS, SOAP-BERRY.

Calyx 5-parted, deciduous; *petals* 5, regular, with a scale at the base of each within; *stamens* 8-10, inserted on

the hypogynous disk; *styles* united; *stigmas* 3; *ovary* 3-celled, the cells 1-ovuled; *fruit* baccate, globose or 2-3-lobed, 1-3-seeded; *seeds* bony; *embryo* incurved.—*Trees*, with abruptly pinnate leaves, and small polygamous *flowers* in axillary or terminal racemes or panicles.

S. MARGINATUS, Willd. (*Wild China*.) *Petioles* wingless; *leaflets* 9-18, opposite or alternate, ovate-lanceolate, unequal-sided, strongly veined above; *panicles* large, dense-flowered; *fruit* globose; *flowers* white.

CARDIOSPERMUM.

Sepals 4, the two outer ones much shorter; *petals* 4, irregular, each with a petal-like scale at the base within, those of the two outer petals entire, the others with a crested appendage on the inner edge; *stamens* 8; *disk* 2-glandular; cells of the *ovary* 1-ovuled; *style* 3-cleft; *capsule* 3-angled, 3-celled, loculicidally 3-valved, inflated; *seeds* furnished with a cordate aril.—*Herbs*, climbing by tendrils; *leaves* biternate.

C. HALICACABUM. *Leaflets* ovate-lanceolate, incisely lobed and toothed; *stem* slender; *capsule* pear-shaped, 1' in diameter. Annual.

ÆSCULUS, L. BUCKEYE, HORSE CHESTNUT.

Calyx 5-lobed, unequal; *petals* 4-5, unequal, clawed; *stamens* 5-8, usually 7, inserted on the annular hypogynous disk; *style* slender; *ovary* 3-celled, the cells 2-ovuled; *capsule* coriaceous, 1-3-celled, loculicidally 2-3-valved, 1-3-seeded; *cotyledons* very large and thick, partly united.—*Trees* or *shrubs*, with opposite long-petioled digitate *leaves* and showy polygamous *flowers* in terminal panicles.

§ *ÆSCULUS PROPER*. Fruit prickly.

§ *PAVIA*. Fruit smooth.

Æ. PAVIA. *Stamens* slightly exserted; claws of the two upper petals as long as the tubular *calyx*; *panicle* oblong; *leaflets* 5, varying from lanceolate to oval, short-acuminate, finely serrate, smooth, or nearly so, on both surfaces. A *shrub* or small *tree*; *flowers* red.

Æ. ARGUTA, Buckley. Fruit covered with prickles; *stamens* erect or slightly curved, much longer than the pale yellow corolla; *calyx* campanulate, divisions obtuse; *pedicels* short; whole *panicle* subpubescent; *flowers* dense; *leaflets* 7, glabrous, ovate-lanceolate, acute at both ends, sharply and unequally serrate.—*Shrub*, 3–5-feet high, with a smooth bark. Flowers in March. Panicles 4–6 inches long. Leaflets 2–4 inches long. Hills in the vicinity of Larissa, Texas.

40. MILKWORT FAMILY. Order, POLYGALACEÆ.

Herbs or *shrubs*, with simple exstipulate *leaves*. *Flowers* irregular, unsymmetrical, hypogynous, perfect; *sepals* 5, very unequal, distinct, 3 exterior, 2 (wings) interior, large, petaloid; *petals* 3, the anterior (keel) larger than the 2 posterior; *stamens* 4 to 8, distinct or cohering in a tube which is split on the upper side; *ovary* superior, compound, with suspended ovules; united *styles* and *stigmas*; *fruit* a 2-celled, 2-seeded pod. *Seeds* pendulous, furnished with a caruncle (a small scale entire or cleft).

POLYGALIA. MILKWORT.

§ *Flowers* in globose or oblong more or less compact spikes.

* *Spikes* corymbose; *biennials*.

P. CYMOSA, Walt. *Stem* tall, simple; *leaves* scattered, linear-acute, the upper bract-like, the lowest long and crowded; *corymbs* simple or compound; *wings* oblong,

abruptly acute; *seeds* minute, globose-obovate, smooth; *caruncle* none; *stems* 2°-4° high; *corymbs* very large and compound, or small and simple; *flowers* yellow; *plant* yellowish

** *Spikes* solitary; *leaves* alternate.

† *Flowers* purple or rose-color; *annuals*, *stems* branching.

P. INCARNATA, L. *Stem* often simple, glaucous; *leaves* scattered, linear, fleshy, sometimes minute and subulate; *spikes* lanceolate, acute, dense-flowered; *petals* united into a tube which is twice as long as the elliptical wings, conspicuously crested; *caruncle* spongy, as long as the stalk of the oval hairy seed; *bracts* deciduous; *flowers* and often the *rachis* purple.

§ *Flowers* in slender racemes or spikes.

* *Leaves* alternate; *perennials* or *biennials*.

P. ALBA, Nutt. *Stems* several from a somewhat woody root, erect or ascending, angular, at length branched above; *leaves* linear, narrowed toward the base, acute or lowest ones obtuse; *spike* long-peduncled, linear-lanceolate, acuminate; *flowers* short pediceled, wings oval, rather longer than the capsule; lobes of the caruncle shorter than the oblong-obovate very hairy seed. *Flowers* white. North Fork of Red River.—Torrey.

41. RHATANY FAMILY. Order, KRAMERIACEÆ.

Silky-pubescent *herbs* or *shrubs*, with diffuse stems, alternate *leaves*, and irregular hypogynous purplish *flowers*, on axillary 2-bracted and jointed peduncles. *Sepals* 5, colored, deciduous; *petals* 5, shorter than the *sepals*; the 3 posterior ones long-clawed, often united; the 2 anterior broad, sessile, and fleshy; *stamens* 4, the posterior ones

distinct or united ; *anthers* 2-celled, opening by a terminal pore ; *ovary* 1-celled, 2-ovuled ; *fruit* 1-seeded, woody, indehiscent, armed with hispid prickles. Albumen none. Radicle concealed in the cotyledons.

KRAMERIA.

K. LANCEOLATA. *Herbaceous.* Stems slender, prostrate, mostly branching ; *leaves* lanceolate or linear, acute ; *peduncles* longer than the leaves, *leafy-bracted* above the middle claws of the posterior petals, and stamens, united ; *fruit* globose, downy, armed with a few strong spreading spines. *Root* long and woody. Stems 1° long.

42. PULSE FAMILY. Order, LEGUMINOSÆ.

Herbs, shrubs, or trees. *Leaves* alternate, usually compound, margins entire ; *stipules* 2 at the tumid base of the petioles ; *sepals* 5, more or less united, often unequal, the odd one anterior ; *petals* 5, either papilionaceous or regular, perigynous, the odd one, when present, posterior ; *stamens* diadelphous, monadelphous, or distinct, inserted on the calyx ; *anthers* versatile ; *ovary* superior, single and simple ; *fruit* a legume, either continuous (1-celled) or (a loment) joined into 1-seeded cells ; *seeds* solitary, or several, destitute of albumen. The papilionaceous corolla (as seen in the pea-blossom) consists of 5 irregular petals—an upper one, generally largest and outside in the bud, called the *standard* or *vexillum*, two side petals, called *wings*, and two lower ones put together and commonly a little joined, forming a kind of pouch which encloses the stamens and style, and which, being shaped somewhat like the prow of an ancient vessel, is named the keel. A few flowers in the family are almost regular, or not papilionaceous. In one case all but one petal is wanting. Another set have perfectly regular blossoms ; the pod and the leaves

give them their place in Leguminosæ. The legume is of every variety of size and shape. The whole kernel of the seed in an embryo, with thick cotyledons.

Sub-order, PAPILIONACEOUS.

TRIBE I. **Loteæ.** Corolla papilionaceous; *stamens* 10 (except *Petalostemon*); *legume* continuous (not jointed); cotyledons leafy in germination; *stems* (except *Wistaria*) not twining, nor climbing.

* *Stamens monadelphous; anthers of 2 forms. Leaves simple or palmately decurrent.*

Calyx 5-lobed. Legume inflated. Upper stipules decurrent.....CROTALARIA.

— 2-lipped — flattened. Stipules not decurrent.....LUPINUS.

** *Stamens diadelphous; anthers alike. Leaves trifoliate, rarely palmate or pinnate, the earliest ones alternate.*

Legume membranaceous, curved or coiled, many-seeded. Flowers racemed.
MEDICAGO.

— coriaceous, straight, rugose or veined, 1-4-seeded. Flowers racemed or spiked.....MELIOLOTUS.

— smooth, membranaceous, 1-4-seeded. Flowers capitate.....TRIFOLIUM.

— straight, many-seeded. Peduncle 1-3-flowered.....HOSACKIA.

*** *Stamens monadelphous or diadelphous. Legume mostly 1-seeded and indehiscent. Plants dotted with small glands. Earliest leaves opposite.*

† *Legume included in the calyx.*

Corolla papilionaceous. Stamens 10, diadelphous; half of the anthers imperfect.
PSORALEA.

Stamens 5, united into a cleft tube, and adnate to the claws of four of the regular petals.....DALEA.

†† *Legume exserted.*

Stamens 10, monadelphous. Wings and keel none.....AMORPHA.

**** *Stamens mostly diadelphous. Legume 1, many-seeded, 1-celled, 2-valved. Leaves pinnate.*

† *Trees or shrubs.*

Legume flat and thin, margined on the edge. Trees or shrubs.....ROBINIA.

— nearly terete, coriaceous, contracted between the seeds. Twining shrubs.
WISTARIA.

†† *Herbs.*

Calyx 5-cleft. Vexillum large. Legume compressed, many-seeded. Leaves unequally pinnate *TEPHROSIA*.

Calyx 5-cleft. Vexillum small. Legume terete or angled, 2-many-seeded. Leaves unequally pinnate..... *INDIGOFEA*.

Calyx truncate. Legume oblong, 2-seeded. Leaves abruptly pinnate. *GLOTTIDIUM*.

Calyx 5-toothed. Legume very long and slender, many-seeded. Leaves abruptly pinnate..... *SESBANIA*.

**** *Stamens diadelphous. Legume 2-celled lengthwise, or 1-celled with one of the sutures turned inward. Leaves pinnate.*

Stamens 10, diadelphous. Legume tumid..... *ASTRAGALUS*.

TRIBE II. Viciæ. Stamens diadelphous, 9 and 1. Legume 2-valved, not jointed. Cotyledons thick and fleshy, remaining underground in germination. Climbing vines; the petioles of the pinnate leaves ending in tendrils.

Style filiform, bearded at the apex, or on the side of the keel..... *VICIA*.

— flattened, bearded on the side facing the vexillum..... *LATHYRUS*.

TRIBE III. Hedysareæ. Stamens monadelphous or diadelphous. Legume separating transversely into 1-seeded indehiscent reticulated joints, or 1-jointed. Stems not twining.

* *Flowers yellow.*

Leaves pinnate. Stamens diadelphous, 5 and 5. Flowers perfect. *ÆSCHYNOMENE*.

— palmately compound. Legume 2-5-jointed. Flowers perfect..... *ZORNIA*.

— trifoliate. Anthers of 2 forms monœcious.

..... *STYLOSANTHES*.

— pinnate. — alike. — monœcious.

CHAPMANNIA.

** *Flowers white or purple.*

Legume 1-jointed. Peduncles axillary..... *LESPEDEZA*.

— 2-6-jointed, bristly. Racemes terminal..... *DESMODIUM*.

TRIBE IV. Phaseoleæ. Stamens monadelphous or diadelphous, 9 and 1. Legume 2-valved, not jointed. Cotyledons thick and fleshy; usually raised aboveground in germination. Chiefly twining vines.

* *Ovary 1-2-ovuled.*

Legume oblong. Flowers yellow. Leaves trifoliate.....RHYNCOSEA.

** *Ovary few or many ovuled.*

† *Keel spirally twisted.*

Leaves pinnate, not stipellate.....APIOS.

—— trifoliate, stipellate.....PHASEOLUS.

†† *Keel straight. Leaves trifoliate.*

†† *Legume terete, tortulose.*

Flowers yellow. Vexillum roundish. Stem twining.....VIGNA.

—— scarlet. —— narrow, elongated. Stem erect.....ERYTHRINA.

†† †† *Legume flattened.*

= *Bracts opposite. Vexillum very large.*

Calyx tubular, 5-toothed. Vexillum spurless at the base.....CLITORIA.

—— short, 5-cleft. —— spurred at the base.....CENTROSEMA.

= = *Bracts alternate.*

Calyx 4-5-toothed. Flowers of two kinds. Bracts persistent.....AMPHICARPÆA.

—— 4-cleft. Bracts deciduous. Legume linear.....GALACTIA.

—— bilabiate. Stamens monadelphous. Hilum linear. Legume 3-ridged on the back.....CANAVALLIA.

—— 5-cleft. Stamens diadelphous. Hilum oval.....DOLICHOS.

TRIBE V. Dalbergiæ. Stamens 10, monadelphous or diadelphous. Legume indehiscent. Cotyledons thick and fleshy. Trees or shrubs.

Legume compressed, 4-winged. Leaves pinnate.....PISCIDIA.

TRIBE VI. Sophoreæ. Stamens 10, separate. Legume not jointed. Erect herbs, shrubs, or trees.

* *Legume dehiscent.*

Stamens deciduous. Legume inflated, stipitate, few-seeded. Leaves simple or trifoliate.....BAPTISIA.

—— persistent. Legume nearly sessile, flattened, many-seeded. Leaves trifoliate.....THERMOPSIS.

—— persistent. Legume flat, few-seeded. Leaves pinnate. Free. CLADASTRIS.

** *Legume indehiscent.*

Legume moniliform. Leaves pinnate. Shrubs.....SOPHORA.

SUB-ORDER II. **Cæsalpinieæ**. Corolla irregular and somewhat papilionaceous, or almost regular, imbricated in the bud; the upper petal interior. Stamens separate. Embryo straight.

Flowers perfect, somewhat papilionaceous. Calyx 5-toothed. Leaves simple.

		CERCIS.
—	irregular, perfect. Calyx deeply 5-parted. Anthers dissimilar. Leaves pinnate.....	CASSIA.
—	polygamous, almost regular. Calyx 3-5-parted. Leaves pinnate and bipinnate.....	GLEDITSCHIA.
—	perfect, somewhat papilionaceous. Calyx 5-parted, rather unequal. Leaves bipinnate.....	HOOPESIA.

SUB-ORDER III. **Mimoseæ**. Corolla regular, hypogynous, valvate in the bud. Stamens distinct or united, often very numerous, inserted with the petals. Embryo straight. Leaves pinnate or 2-4-pinnate. Flowers polygamous.

* *Flowers perfect and staminate. Petals united.*

Filaments distinct. Legume jointed, flat.....	MIMOSA.
— — — — — not jointed, echinate.....	SCHRANKIA.
— — — — — united into a tube below. Legume broad and flat, mealy or pulpy within.....	PITHECOLOBIUM.

** *Flowers perfect and neutral. Petals distinct.*

Sterile filaments filiform. Legume linear, many-seeded.....	DESMANTHUS.
— — — — — flat or petal-like. Legume oblong, few-seeded.....	NEPTUNIA.

PULSE FAMILY. *Sub-order I., PAPILIONACEÆ.*

CROTALARIA, RATTLE-BOX.

Calyx 5-lobed; *vexillum* cordate; *keel* falcate; *stamens* monadelphous; *anthers* alternately oblong and roundish; *capsule* inflated, oblong, many-seeded.—Low *herbs*, with simple leaves; the upper ones with broad decurrent inversely sagittate stipules; *racemes* opposite the leaves; *flowers* yellow; *legumes* dark purple.

C. PURSHII, DC. *Stems* slender, erect, roughened with

scattered appressed hairs; *leaves* thick, smooth above, the lower ones oblong, the upper linear; *racemes* long, 5-10-flowered; *stems* 12'-18' high; *racemes* 6'-12' long; *flowers* distant. Perennial.

LUPINUS. LUPINE.

Calyx 2-lipped, 5-toothed; *vexillum* with the sides reflexed; *keel* falcate, acute; *stamens* monadelphous, with alternate anthers oblong and roundish; *capsule* oblong compressed, many-seeded; the seeds often separated by cellular partitions.—*Herbs*, with simple or palmately 5-many foliolate leaves, and showy flowers in terminal racemes.

L. VILLOSUS, Willd. Biennial; villous and hoary; *stems* thick, prostrate or ascending; *leaves* simple, lanceolate-oblong, mostly acute, long-petioled; *stipules* linear subulate, elongated, adnate below to the petioles; *racemes* erect, densely many-flowered; *flowers* pale red, the *vexillum* dark purple in the center; *legume* very woolly. *Stem* 1°-2° long; *leaves*, with petiole, 6'-8' long.

MEDICAGO, L.

Calyx 5-cleft, the lobes subulate or setaceous; *corolla* deciduous; *vexillum* longer than the partly united wings and keel; *stamens* 10, diadelphous (9 and 1), equal; *style* smooth; *legume* woolly; *stems* 1°-2° high; *leaves* 2'-4' long.

M. LUPULINA. Pubescent; *stem* procumbent; *leaflets* obovate, toothed; *stipules* nearly entire; *spikes* globose, many-flowered; *flowers* minute, *legume* reniform, 1-seeded, black. Annual; *stem* 1°-2° long.

TRIFOLIUM, L. CLOVER.

Calyx 5-cleft, the teeth subulate or setaceous; *corolla* withering or persistent; the keel shorter than the wings,

and united with them by their claws; *stamens* diadelphous (9 and 1); *legume* smooth, membranaceous, 1-6-seeded, oftener shorter than the calyx, scarcely dehiscent.—Tufted or diffuse *herbs*. *Leaves* trifoliolate, the *leaflets* mostly toothed; *stipules* adnate to the petioles; *flowers* capitate.

* *Fruiting calyx erect.*

T. PRATENSE, L. (*Red Clover*.) Hairy; *stems* erect; *leaflets* oblong-ovate or oval, often emarginate, slightly serrulate; *heads* large, ovate; *calyx*-teeth setaceous, hairy; *flowers* purple. *Stems* 1°-2° high; *leaves* usually marked with a pale 3-angled spot above.

** *Fruiting calyx reflexed.*

T. REFLEXUM, L. (*Buffalo Clover*.) Pubescent; *stems* ascending; *leaflets* roundish or obcordate, toothed, the uppermost oblong; *heads* globose; *calyx*-tube very short; the subulate teeth long and hairy; standard broadly ovate, purple; the wings and keel white; *legume* 3-5-seeded. Annual and biennial. *Stems* 6'-12' long; *heads* large.

T. MACROCALYX, Berlander. Slightly hairy; *stems* ascending, slender; *leaves* on slender petioles; *leaflets* obovate-cuneiform, retuse, serrulate; *stipules* ovate-lanceolate; *heads* rather few-flowered, sub-globose, on long peduncles; *flowers* at length deflexed, pedicellate; *calyx* broad, persistent, reticulated, very deeply bilabiate; the lower lip minute, linear-subulate; the upper 4-cleft, nearly as long as the persistent and scarious corolla; vexillum sessile and broadly oval; wings lancinate-denticulate at the apex; the keel small; *legume* 7-9-seeded, ciliate above. Flowers large. Near Bexar.

T. REPENS. (*White Clover*.) Smooth; *stems* creeping; *leaflets* roundish or obcordate; *heads* globose, long peduncled; *calyx*-teeth short; *flowers* white; *legume* 4-seeded. Perennial; *stem* 6'-12' long.

T. PROCUMBENS, L. Pubescent; *stems* slender, erect or procumbent; *leaflets* small, thin, obovate or obcordate, toothed, the middle one stalked; *heads* small ovate; *flowers* yellow; *legume* 1-seeded. Annual; *stems* 6'-12' long.

T. CAROLINIANUM, Michx. Pubescent; *stems* tufted, prostrate; *leaflets* small, obcordate, slightly toothed; *heads* roundish, long-peduncled; *flowers* white, tinged with purple; standard acute; *legume* 4-seeded. Perennial; *stem* 6'-10' long; in shady places erect.

PSORALEA, L.

Calyx campanulate, 5-cleft, with the lobes acute; *stamens* diadelphous or partly monadelphous; half of the *anthers* often imperfect; *legume* often wrinkled, 1-seeded, indehiscent, included in the calyx.—Perennial, usually glandular *herbs*; *stipules* cohering with the petioles; *flowers* axillary or terminal, purplish or white, racemose or spiked.

* *Leaves* 1-3-foliolate.

P. MELILOTOIDES, Michx. Glandular and sparingly pubescent; *leaves* trifoliolate; *leaflets* oblong-lanceolate or elliptical; *stipules* subulate; spikes oblong, on peduncles 3-5 times as long as the leaves; *bracts* ovate, acuminate, veiny; *corolla* violet; *legume* rugose; *stem* 1°-2° high; *leaflets* 1'-2' long.

** *Leaves* palmately 5-7-foliolate.

P. OBTUSILOBA. Canescent; branches spreading; *leaves* 3-rarely 5-foliolate; *leaflets* oblong-obovate, obtuse or slightly emarginate, finely dotted; *stipules* almost none; *racemes* 3 times as long as the leaves, oblong, loose, 10-15-flowered; *bracts* minute, broadly ovate, abruptly acuminate, spreading; *calyx* $\frac{1}{3}$ the length of the *petals*; *legume* nearly glabrous, not wrinkled.—*Drummond*.

P. CRYPTOCARPA. *Stem* somewhat divaricately branched, canescently hairy with an appressed pubescence; *leaves* 5-foliolate; *leaflets* $1\frac{1}{2}$ " long; *stipules* subulate; *peduncles* longer than the leaves; *spikes* ovate, compact; *bracts* lanceolate, cuspidate, shorter than the flower; *calyx* somewhat inflated, gibbous at the base; *legume* membranaceous, slightly tipped with the base of the style, not wrinkled.—*Drummond.*

P. ESCULENTA, Pursh. The whole plant hirsute; *stem* erect, somewhat branched; *leaves* 5-foliolate; *leaflets* slightly dotted; *spikes* capitate; *flowers* pale blue; *vexillum* obovate, marked with 2 callosities toward the base; *legume* covered with the calyx, hirsute; *root* the size of a walnut, scarcely farinaceous, solid and tough. "According to Nuttall the root of this species is the Pomme de Prairie (also called Pomme Blanche) of the Canadian voyageurs."—*Gray and Torrey.* In Texas, *Dr. Leavenworth.*

*** *Leaves pinnate.*

P. SIMPLEX. Grayish pubescent, obscurely glandular, erect; *stem* simple, solitary, or two from the same root, 1° – 3° high; *leaves* 3-foliolate; *leaflets* lanceolate, acute, rugosely veined, mucronate; *peduncles* very long; *spikes* oblong, many-flowered; *bracts* linear-lanceolate, acuminate; teeth of *calyx* oblong-triangular, the lowest one longest and acuminate; *legumes* nearly orbicular; *flowers* purplish. Calyx and petals strongly veined.—*Drummond.*

P. RHOMBIFOLIA. Sparingly pubescent; *stem* slender, decumbent, angular; *leaflets* $\frac{1}{2}$ '– $\frac{3}{4}$ ' long, dotted with scarcely visible glands; *petioles* 1'–2' long; *spikes* 6–8-flowered; *flowers* purplish; *calyx* hirsute; the teeth (except the lowest one) shorter than the tube; *vexillum* obovate.—*Drummond.*

PETALOSTEMON, Michx.

Calyx nearly equally 5-toothed or 5-cleft; *petals* almost regular, on filiform claws, four of them united with the tube of the *stamens*, the fifth free, cordate or oblong, folded; *stamens* 5, united into a cleft tube; *ovary* 2-ovuled; *legume* indehiscent, 1-seeded, included in the calyx. Perennial, glandular *herbs*, with unequally pinnate leaves, and white or purple *flowers* in terminal spikes or heads.

* *Spikes solitary.*

P. CARNEUM, Michx. *Stems* erect, much branched, very leafy; *leaflets* 5-7, linear, acute; *spikes* oblong, long-peduncled; *vexillum* oblong. *Stem* 2°-3° high; *flowers* white or reddish.

** *Spikes corymbose.*

P. CORYMBOSUM, Michx. *Stems* clustered, erect, very leafy; *leaflets* 3-7, filiform; teeth of the *calyx* setaceous, plumose; *vexillum* oblong. *Stem* 2° high; *flowers* white.

P. GRACILE, Nutt. Glabrous; *stem* slender, 1°-2° long, decumbent or assurgent; *spikes* oblong-cylindrical, short; *bracts* acute, as long as the *calyx*; *leaflets* 3 pairs, $\frac{1}{2}$ ' broad, linear-elliptical, slightly dotted beneath; *petals* ovate; *vexillum* broadly cordate; *petals* white.—*Drummond.*

P. MULTIFLORUM, Nutt. Glabrous; *stem* erect, branches fastigiate, about 2° high; *spikes* roundish oblong, $\frac{1}{4}$ ' long; *calyx* with the tube glabrous; the teeth short, pubescent on the margin; *petals* white, rounded or slightly cordate at the base; *leaflets* 4-6 pairs, linear, oblong, with black dots on the surface.—*Drummond.*

P. GRISEUM, Gray and Torrey. Pubescent; *stem* 2°-3° high, terete, of a reddish color, usually branched in a paniculate manner, either near the summit or from the

middle upward; *leaflets* 5"-6" long, rather thinly pubescent on both surfaces, with soft appressed hairs; *spikes* about 2' long; *bracts* subulate, as long as the flowers; *corolla* pale rose-color; *petals* scarcely acute at the base, as long as the vexillum.—*Drummond*.

P. APHLEOIDES. *Stem* pubescent; *leaflets* 4"-5" long, nearly linear; *spikes* cylindrical, about 2' long, on long peduncles; *bracts* awned; *calyx* marked with large resinous glands; *petals* extremely narrow, acute at the base, white; claw of the *vexillum* passing through the deep notch of the calyx.—*Drummond*.

P. OBOVATUM, Gray and Torrey. Whole plant almost woolly, with soft grayish hairs. *Stem* thick; *leaflets* rather remote, more than $\frac{1}{2}$ ' long, 3"-4" wide; *bracts* almost concealing the flowers, concave with a long acuminate point; *vexillum* pale purple, with the claw as long as the limb; teeth of the *calyx* subulate. Remarkable for its large and broad leaflets and very thick subsessile spike.—*Drummond*.

P. VIOLACEUM, Michx. Somewhat pubescent or glabrous; *leaflets* 2 pairs, linear, with a few glands beneath; *spikes* very dense, varying from globose-ovate to oblong-cylindrical, pedunculate; *calyx* silky canescent; teeth about one-third the length of the tube; *petals* oblong, obtuse at the base, with short claws; *vexillum* cordate; *root* thick, somewhat fusiform, perennial. *Leaves* fascicled, *leaflets* 6"-10" long; *flowers* bright purplish-violet.—*Drummond*.

P. EMARGINATUM, G. and T. Annual. *Stem* 2° high; *leaves* numerous, *leaflets* $\frac{1}{3}$ ' long, deeply emarginate; *spikes* compact, on peduncles 6'-10' long; *bracts* silky villous, lower ones much dilated; *calyx* very villous, deeply 5-cleft, the segments lanceolate; *petals* oblong with short claws. Limbs of the *vexillum* somewhat 4-sided.—*Drummond*.

DALEA, L.

Calyx 5-cleft; *corolla* imperfectly papilionaceous; *petals* clawed, four of them united with the tube of stamens below the middle, the fifth (vexillum) free, cordate, and inserted into the bottom of the calyx; *stamens* 10, united into a cleft tube; *legume* 1-seeded, membranaceous, indehiscent, included in the calyx.—Mostly glandular herbs, with spiked or capitate flowers.

D. ALOPECUROIDES, Willd. *Stem* smooth, erect; *leaves* pinnate, with numerous linear-oblong leaflets; *spikes* dense, cylindrical, silky-villous; *corolla* small, pale violet, the standard white. *Stem* 1°-2° high.

D. LAXIFLORA, Pursh. *Stem* with numerous slender somewhat spreading branches, 3°-4° high; *leaflets* 2"-3" long, and $\frac{1}{2}$ " wide, strongly dotted; *racemes* 2'-3' long; *bracts* almost orbicular, glandular, slightly cuspidate; *calyx* deeply cleft, beautifully plumose; *corolla* white, *keel* twice as long as the wings; *vexillum* cordate, very small, sometimes with 4 approximated glands near the middle; segments of the calyx remotely denticulate. Perennial.—Drummond.

D. AUREA. *Stem* 2° high; *leaves* remote; *leaflets* 4"-6" long, when young almost villous beneath, nearly glabrous above, very sparingly dotted; *spikes* 1'-2' long, very thick; *calyx* deeply cleft; *corolla* yellow; *vexillum* small, shorter than the oblong wings and keel-plates.—Drummond.

AMORPHA, L.

Calyx obconical, 5-toothed, persistent; *vexillum* straight, concave; *wings* and *keel* none; *stamens* monodelphous, at the base exserted; *legume* 1-2-seeded, oblong, curved, glandular, roughened, indehiscent or nearly so.—Shrubs, with unequally pinnate *leaves* and numerous *leaflets* which

are punctate with pellucid dots. *Flowers* blue or white, in slender racemes or spikes.

A. FRUTICOSA, L. Pubescent; *leaves* petioled; *leaflets* 15–21, oblong, obtuse or emarginate, sparingly dotted; *flowers* racemed, blue; *calyx*-teeth very short, nearly equal, pubescent; *legume* 1–2-seeded.—*Shrubs*, 6°–15° high; *leaflets* 1'–1½' long; *racemes* mostly paniced.

A. CANESCENS, Nutt. Hoary-tomentose; *leaves* sessile; *leaflets* numerous, small, elliptical, crowded; *spikes* short, paniced, dense-flowered; *calyx*-teeth acute, nearly equal; *legume* 1-seeded.—*Shrub*, 1°–2° high; *flowers* bright blue.—*Drummond*.

A. PANICULATA, G. and T. Whole plant canescently tomentose, except the upper surface, which is shining and nearly glabrous; *flowers* subsessile; teeth of the glandular and tomentose *calyx* unequal, the 2 upper triangular-ovate and shorter, the 3 lower triangular-subulate, the middle one longest; *leaves* 8' to 1° in length; *stipules* short; *panicle* often 1° or more long, compound; *spikes* 6' in length, the flowers much crowded.—*Drummond*.

ROBINIA.

Calyx short, 5-toothed or 5-cleft, the two upper teeth shorter and more or less united; *vexillum* large, roundish; *keel* obtuse; *stamens* diadelphous (9 and 1); *style* bearded on the side facing the vexillum; *legume* compressed, many-seeded, the seed-bearing suture margined; *seeds* flat.—*Trees* or *shrubs*, often with stipular spines, unequally pinnate leaves, and showy white or rose-colored flowers in axillary racemes.

R. PSEUDACACIA. (*Locust*; *False Acacia*.) Smoothish; *spines* small on the older branches, straight; *leaflets* 9–17, oblong-ovate, or elliptical; *racemes* pendulous, oblong, many-flowered; *flowers* white; *legume* 4–6-seeded; *ra*-

cemes 3'-5' long; *calyx* spotted.—A tree, 30°-60° high; *legume* smooth; *flowers* fragrant.

WISTARIA, Nutt.

Calyx campanulate, somewhat 2-lipped, the upper lip broad 2-cleft, the lower 3-cleft; *vexillum* large, with two parallel ridges at the base; *stamens* diadelphous (9 and 1); *legume* coriaceous, nearly terete, contracted between the seeds, at length 2-valved.—Twining *shrubs*, with unequally pinnate *leaves*, and showy purple *flowers*, in a crowded *raceme*.

W. FRUTESCENS, DC. Young *leaves* and *branches* silky pubescent; *leaflets* 9-13, ovate-lanceolate or oblong; *stipels* none; *racemes* on short branches, dense-flowered, 4'-6' long; *leaflets* 1' long; *legume* 1-several-seeded; *bracts* large, caducous.

TEPHROSIA, Pers.

Calyx nearly equally 5-toothed or 5-cleft; *vexillum* large, roundish, spreading or reflexed, usually white within and reddish or purple and silky without; *keel* obtuse, cohering with the wings; *stamens* monadelphous or diadelphous; *style* smooth or laterally bearded; *legume* compressed, linear, many-seeded.—*Perennial herbs*, with unequally pinnate leaves, with the leaflets opposite, mucronate, and straight-veined, and white or purplish flowers.

* *Flowers* single or by pairs in the axils of the leaves; the uppermost often crowded in a dense *raceme*.

T. VIRGINIANA, Pers. (*Goat's Rue*.) Soft hairy and somewhat hoary; *stems* very leafy, clustered, erect, simple; *leaflets* 11-25, oblong or linear-oblong, acute or obtuse, smoothish above; *flowers* yellowish-white tinged with

purple; *stem* 1°-2° high from long and slender roots; *flowers* showy.

****** *Flowers in long-peduncled racemes opposite the leaves; vexillum pubescent externally.*

T. SPICATA, Torr. and Gray. Hirsute or villous with rusty hairs; *stems* simple or diffusely branched; *leaves* scattered, short-petioled; *leaflets* 9-15, oval or cuneate oblong, rounded and strongly mucronate at the apex, smoothish above; *racemes* 2-3 times as long as the leaves, 6-10-flowered; lobes of the *calyx* linear-subulate; *flowers* large, white and purple; *stems* 1°-2° long.

T. HISPIDULA, Pursh. Hoary-pubescent or smoothish; *stems* slender, terete, erect or procumbent; *petiole* shorter than the lowest leaflets; *leaflets* 11-15, small (4"-6" long), oblong, acute or obtuse, often smooth above; *peduncles* slender, terete, commonly longer than the leaves, 2-4-flowered; *flowers* small, purple; *stems* 6'-18' long.

INDIGOFERA, L. INDIGO.

Calyx 5-cleft; *vexillum* roundish; *keel* with a subulate spur on each side, often elastically reflexed; *stamens* diadelphous (9 and 1); *legume* 1-many-seeded; *seeds* usually truncated at each end, often separated by membranaceous partitions.—*Herbs*, with unequally pinnate leaves, and white, brownish, or purplish axillary flowers; legumes drooping.

***** *Racemes longer than the leaves.*

I. CAROLINIANA, Walt. Smoothish; *stem* erect, tall, branching; *leaflets* 10-15, obovate or oblong; *racemes* many-flowered; *calyx*-teeth short, acute; *flowers* yellowish-brown; *legume* oblong, veiny, 2-seeded; *stem* 3°-5° high; *flowers* small; *legume* 4"-5" long.

I. LEPTOSEPALA, Nutt. Rough hairy; *stem* decumbent;
10*

leaflets 7-9, obovate-oblong or cuneate; *racemes* 6-15-flowered; *calyx*-teeth slender, subulate; *flowers* pale scarlet; *legume* linear, even, 6-9-seeded; *stem* 2°-3° long; *legume* 1½' long, straight.

GLOTTIDIUM, Desv.

Calyx campanulate, obliquely truncate, 5-toothed; *vexillum* short, reniform; *stamens* diadelphous (9 and 1); *style* short, incurved at the apex; *stigma* acute; *legume* oblong stipitate, compressed; the membranaceous endocarp at length separating from the coriaceous epicarp, and enclosing the two oblong seeds.—A tall, smooth-branching annual, with abruptly pinnate leaves, and small yellow flowers in axillary often compound racemes.

G. FLORIDANUM, DC. *Stem* 2°-8° high; *leaflets* numerous, oblong linear; *legume* 1'-2' long.

SESBANIA.

Calyx 2-bracted, campanulate, equally 5-toothed; *vexillum* roundish; *keel* obtuse; *stamens* diadelphous (9 and 1), the tube toothed at the base; *legume* slender, elongated, knotted.—*Herbs* or *shrubs*; *leaves* abruptly pinnate; *leaflets* numerous; *flowers* yellowish or reddish, in axillary racemes.

S. MACROCARPA. *Leaflets* oblong-linear, obtuse, mucronate; *racemes* shorter than the leaves, 1-4-flowered; *legume* curved, compressed, 4-sided, many-seeded; *stems* 5°-12° high; *legume* 8'-12' long, pendulous; *flowers* red and yellow, dotted with purple.

ASTRAGALUS, L. MILK VETCH.

Calyx 5-toothed; the two upper teeth separated; *vexillum* as long as the wings and obtuse *keel*; *stamens* 10,

diadelphous; *legume* commonly turgid, few-many-seeded, usually partly or completely 2-celled by the introversion of one or both of the sutures.—*Herbs*, with unequally pinnate leaves, and axillary spiked or racemose flowers.

* *Legume partly or completely 2-celled by introversion of the dorsal suture.*

A. OBCORDATUS, Ell. Smoothish; *stems* prostrate; *leaflets* small, 17–25, obcordate; *peduncles* as long as the leaves, loosely 8–15-flowered; *legumes* crescent-shaped, compressed, veiny, partly 2-celled; *leaflets* 3'–4' long; *flowers* pale purple; perennial.

** *Legume ovate, thick and fleshy.*

A. TRICHOCALYX, G. and T. *Stems* numerous, decumbent, somewhat pilose with appressed hairs; *stipules* lanceolate; *leaflets* 10–16 pairs, elliptical-oblong, obtuse; *peduncles* about the length of the leaves; *racemes* short and crowded; *bracts* a little longer than the pedicels; *calyx* densely villous with mostly whitish hairs; the teeth subulate, scarcely half the length of the tube; *legume* thick and somewhat fleshy, glabrous, finely wrinkled transversely.—*Dr. Leavenworth.*

“*Nuttall says this species is remarkable for its succulent legumes, which are filled with a sweetish and rather agreeable juice, so that they were frequently collected by the party with which he traveled, as an article of food.*”—Gray and Torrey.

*** *Legumes curved.*

A. DISTORTUS, Gray and Torrey. Pubescent, prostrate; *leaflets* 8–12 pairs, oblong or ovate, sometimes elliptical, usually emarginate; *peduncles* longer than the leaves; *spike* roundish or oblong, 10–20-flowered, loose; *calyx* clothed with blackish hairs; the teeth broad acuminate,

half the length of tube; *legumes* oblong, somewhat inflated; abruptly curved in the middle, sessile.—*Drummond*.

**** *Stipules* cohering neither with each other nor with the petiole; *flowers* in dense spikes or heads; *legumes* straight; *root* annual.

A. LEPTOCARPUS, Gray and Torrey. *Stem* about a foot long, with somewhat spreading branches; *leaflets* 4"-5" long, a little hairy on the midrib beneath, glabrous above; *flowers* purplish blue, $\frac{1}{2}'$ long; *calyx* clothed with appressed dark-colored hairs; *vexillum* broadly ovate; *keel* broad obtuse, with a narrow furrow along the back.—*Drummond*.

A. REFLEXUS. *Stem* 1° or more in height, slender, branched; *leaflets* $\frac{1}{2}'$ long, usually truncate and emarginate; *flowers* $\frac{1}{3}'$ long, purplish; *vexillum* narrow, elongated; *keel* obtusely roseate, much longer than the wings; *legumes* $\frac{1}{3}'$ long, somewhat triangular. (Gray and Torrey).—*Drummond*.

***** *Stipules* cohering neither with each other nor the petiole; *flowers* purple or white; *legumes* curved; *root* annual.

A. TRICHOCARPUS, Gray and Torrey. *Stem* 18°-20° high, branched from the base; *leaflets* 4"-5" long, pubescent with appressed hairs beneath; *flowers* $\frac{1}{3}'$ long, blue; *ovary* glabrous; *legume* 8"-10" long and $1\frac{1}{2}'$ wide, slightly curved toward the base, with a short abrupt point; *seeds* somewhat truncate.—*Drummond*.

VICIA, Tourn. VETCH or TARE.

Calyx tubular, 5-cleft, the two upper teeth usually shorter; *style* filiform, hairy at the apex or on the side facing the keel; *legume* 2-many-seeded, 2-valved; *seeds* orbicular; *cotyledons* thick.—Slender climbing *herbs*; *leaves* pinnate; the petiole terminating in a tendril; *stipules* mostly semi-sagittate; *flowers* axillary.

* *Peduncles shorter than the leaves; 1-2-flowered.*

V. SATIVA, L. (*Vetch* or *Tare*.) Pubescent; *stem* simple; *leaflets* 10-12, varying from obovate-oblong to linear, emarginate; *flowers* by pairs, nearly sessile, pale purple; *legume* linear; several-seeded, annual; *corolla* $\frac{1}{2}$ ' long; *stem* 1° - 2° long.

V. MICRANTHA, Nutt. Smooth; *leaflets* 4-6, linear, obtuse or barely acute; *peduncles* 1-2-flowered; *flowers* minute, pale blue; *legume* sabre-shaped, 4-10-seeded; *stem* 2° - 3° long; *seeds* black, annual.

V. CAROLINIANA, Walt. Smoothish; *leaflets* 8-12, linear or linear-oblong, obtuse or barely acute; *stipules* small, *peduncles* many-flowered; *calyx*-teeth shorter than the tube; *flowers* nearly white, the keel tipped with blue; *legume* oblong, several-seeded, perennial; *stems* 3° - 4° long, branching; *flowers* 4''-6'' long.

V. LUDOVICIANA. *Stem* 2° - 3° long, rather stout, strongly angled, climbing; *leaflets* 6'-8' long, 2' wide, commonly emarginate; *stipules* very small; *flowers* blue, often 2 or 6 on a peduncle; *calyx* hairy; *keel* marked with a deep-blue spot at the summit; *legumes* $\frac{3}{4}^{\circ}$ long and 3' wide. (Gray and Torrey.)—*Dr. Leavenworth.*

V. MICRANTHA. *Stem* slender, 2° - 3° long, annual; *leaflets* 1' long, in the lower leaves truncate and often toothed at summit; *flowers* small, pale blue, the peduncles $\frac{1}{3}$ the length of the leaves; *style* short; *legumes* 1' long, slightly pubescent; *seeds* blackish, compressed; the *hilum* extending $\frac{2}{3}$ of its circumference.—*Dr. Leavenworth.*

LATHYRUS, L.

Style flattened, bearded on the side facing the vexillum; otherwise as in *Vicia*.

L. PUSILLUS. *Leaflets* 2, linear-lanceolate, acute; *stipules* sagittate; *peduncles* elongated, 1-2-flowered; teeth of the *calyx* subulate-setaceous, nearly equal; *legume* long, 10-15-seeded.—A small vine; *flowers* purple; annual.—*Leavenworth.*

ZORNIA.

Calyx 2-lipped, the upper emarginate, the lower 3-cleft; *corolla* inserted into the base of the calyx; *stamens* monadelphous, alternately shorter; *anthers* alternately oblong and globose; *legume* compressed with 2-5 roundish hispid joints.—*Herbs*; *leaves* palmately 2-4-foliolate; *stipules* sagittate; *flowers* yellow, in axillary large-bracted racemes.

Z. TETRAPHYLLA, Michx. Perennial; smooth or downy; *leaflets* 4, lanceolate, or oblong-obovate; *racemes* 3-9-flowered, much longer than the leaves; the *flowers* distant and almost concealed by the large ovate bracts; *legume* hispid, 3-4-jointed; *stem* 2° long, prostrate.

STYLOSANTHES, Swartz.

Flowers of two kinds: one kind perfect, but sterile; the other destitute of calyx, corolla, and stamens, and fertile. *Calyx* 2-bracted, 2-lipped, 5-cleft, the tube long and slender; *corolla* inserted on the throat of the calyx; *keel* entire at the apex; *stamens* monadelphous, with the alternate anthers linear and ovate; *style* of the fertile flower hooked; *legume* veiny, 1-2 jointed, the lower joint empty.—Low herbs; *leaves* trifoliolate; *stipules* united with the petioles; *flowers* in a short and dense terminal spike.

S. ELATIOR, Swartz. *Stem* 6'-12' high; pubescent, erect; *leaflets* lanceolate, rigid, strongly veined; *stipules* sheathing; *spike* few-flowered; *bracts* bristly; *flowers*, yellow.

LESPEDeza. BUSH CLOVER.

Calyx 2-bracted, 5-cleft; the teeth subulate; *corolla* inserted on the base of the calyx; *stamens* diadelphous (9 and 1); *anthers* alike; *legume* small, lenticular, indehiscent, 1-seeded.—Perennial *herbs*, with trifoliolate leaves, and small axillary racemes or spikes.

* *Flowers of two kinds, viz., perfect, but mostly sterile, borne in spikes or racemes, and fertile, but destitute of corolla and stamens; the latter commonly in sessile clusters; corolla purple, longer than the calyx.*

L. REPENS, Torrey and Gray. *Stem* slender, prostrate; *leaflets* small, oval, mostly emarginate, the petiole very short, or as long as the lateral leaflets; *racemes* few-flowered, on filiform peduncles much longer than the leaves; *legume* roundish; *plant* 1°-2° long, smooth or tomentose.

L. VIOLACEA, Pers. *Stem* erect, spreading; *leaflets* varying from elliptical to linear; pubescent with appressed hairs beneath; fertile *flowers* in axillary clusters; *legume* ovate, smooth, or with scattered appressed hairs much longer than the calyx.

L. STEUVI, Nutt. *Stem* erect, branching, softly pubescent; *leaflets* oval or roundish, tomentose or silky on both surfaces or only beneath, longer than the petiole; *racemes* axillary, mostly longer than the leaves; *flowers* nearly all perfect; *legume* longer than the *calyx*, ovate, villous.

** *Flowers all perfect and fertile; corolla as long as the calyx, yellowish-white, the vexillum spotted with purple; legume included in the calyx.*

L. HIRTA. *Stem* erect, pubescent or villous; *leaflets* oval or roundish, longer than the petiole, pubescent beneath or on both sides; *spikes* dense on peduncles longer than the leaves; *calyx*-teeth linear-lanceolate, as long as the ovate pubescent *legume*. *Stem* 2°-4° high.

L. CAPITATA, Michx. *Stem* mostly simple, softly pubescent, erect, 2° – 4° high; *leaves* short-petioled, *leaflets* varying from oblong to linear, silky on both sides, or only beneath; *calyx* hairy, longer than the oval villous *legume*.

DESMODIUM, DC. HEDYSARUM, Ell.

Flowers all perfect; *calyx* bilabiate; the upper lip emarginate or entire, the lower 3-cleft; *corolla* inserted on the base of the calyx; *stamens* diadelphous (9 and 1) or more or less monadelphous; *legume* flattened, 2–6-jointed.—Chiefly perennial branching *herbs*; *leaves* trifoliate, petioled, stipulate; the *leaflets* petioled and stipellate; *flowers* small, purple or whitish, in terminal racemes or panicles; *legumes* hispid with hooked hairs.

* *Stamens* monadelphous below; *legumes* conspicuously stipitate, 2–4-jointed, the joints half obovate, concave on the back.

D. NUDIFLORUM, DC. *Stem* smooth, short, leafy at the summit, panicles ascending from the base of the stem, naked, or with one or two leaves near the base, much longer than the stem; *leaves* long-petioled, smooth; *leaflets* ovate, acute or obtuse, white beneath; *legume* long stipitate; *racemes* simple or compound, on peduncles 2° – 3° high.

** *Stamens* diadelphous; *legume* sessile or short stipitate; *stipules* large, acuminate, persistent; *legume* 3–6-jointed, the joints convex on the upper suture, rounded on the lower one.

D. ROTUNDIFOLIUM, DC. *Stem* long, trailing, hairy; *leaflets* orbicular pubescent; lobes of the *calyx* longer than the tube; *legume* with 3–4 rather large obtusely 3-angled joints. *Stem* 2° – 3° high.

D. PANICULATUM, DC. *Stem* slender, mostly smooth, with long and virgate branches; *leaflets* varying from ob-

long to linear-lanceolate, obtuse, smooth or slightly pubescent; *legume* 3-5-jointed, the joints triangular. Stem 2°-4° high.

*** *Stipules* subulate, deciduous; *legume* 2-3-jointed, the joints small, oval, or obliquely obovate; *flowers* small.

D. MARILANDICUM, Boott. *Stem* erect, smooth, mostly simple; *leaflets* small, ovate or roundish, obtuse, smooth, pale beneath, commonly shorter than the petiole; *panicle* rough; *legume* mostly 2-jointed. Stem 2°-3° high.

D. CILIARE, DC. Very much like D. Marilandicum, but the *stem* and *leaves* rough-hairy, and the *leaflets* longer than the petiole.

D. SESSILIFOLIUM, Gray and Torrey. *Stem* erect, rather stout, tomentose-pubescent; *leaves* sessile; *leaflets* linear or oblong, rather coriaceous, obtuse at each end, reticulated, scabrous above, tomentose with soft pubescence beneath; *stipules* subulate, somewhat persistent; *racemes* paniculate, much elongated; *pedicels* very short; *bracts* minute; upper lip of the *calyx* slightly emarginate; the lower tooth a little longer than the triangular lateral ones; *legumes* small, nearly sessile, of 2-3 somewhat semi-orbicular hispid joints.

D. PUBENS. *Stem* puberulent, 1°-2° high; *leaves* oblong-lanceolate, rather rigid, pubescent; *leaflets* 1'-3' high, long, minutely pubescent; *flowers* purple; *legume* rather large, the joints oblong, angled on the back.—Gray and Torrey.

RHYNCHOSIA, DC.

Calyx 2-lipped, with the upper lip 2-cleft and the lower 8-parted, or nearly equally 4-parted; *stamens* diadelphous (9 and 1); *style* smooth, subulate; *legume* oblong or scymetar-shaped, mostly 1-2-seeded; *seeds* carunculate.—Erect or twining *herbs* or *shrubs*, with 1- or 3-foliolate

mostly softly pubescent and resinous-dotted *leaves* and axillary yellow *flowers*.

* *Stems* twining, or low and erect; *flowers* in axillary racemes.

† *Calyx* somewhat 2-lipped, 4-cleft; the teeth subulate; shorter than the corolla, the lowest one longest; *stems* twining.

R. MINIMA, DC. Tomentose; *leaflets* small, roundish or broadly rhombic, barely acute, dotted beneath; *stipules* subulate; *racemes* filiform, much longer than the leaves, loosely 6-12-flowered; *flowers* minute, reflexed; *legume* scymetar-shaped. *Leaflets* $\frac{1}{2}$ '-1' long.

R. PARVIFOLIA, DC. Velvety throughout; *leaflets* ovate, oblong, or obovate-oblong, obtuse, or the upper ones acute, hoary and strongly reticulate beneath, longer than the petiole; *stipules* small, lanceolate; *racemes* equaling or longer than the leaves, slender, loosely 3-5-flowered; lowest tooth of the calyx nearly twice the length of the others; *legume* oblong, obtuse, clothed with soft down and longer hairs intermixed, 2-3-seeded. Stem 1°-2° long; *leaflets* 1' long.

R. CARIBÆA, DC. Velvety throughout; *stem* prostrate or twining; *leaflets* thin, ovate, acute or slightly acuminate; *stipules* ovate; *racemes* slender, shorter than the leaves, loosely 3-5-flowered; teeth of the *calyx* short, nearly equal; *legume* scymetar-shaped, acute. Stem 2°-3° long; *leaflets* $1\frac{1}{2}$ '-2' long, tapering at the base.

†† *Calyx* 4-parted, nearly as long as the corolla, the lobes linear or lanceolate, nearly equal; *stems* twining or erect.

R. MENISPERMOIDEA, DC. *Stems* several from one root, prostrate or twining, downy; *stipules* ovate-lanceolate; *leaflets* solitary, reniform, tomentose; *peduncles* rarely as long as the petiole, with few crowded flowers at the summit; *calyx* deeply parted, the lanceolate acute or acuminate lobes nearly equal; *legume* oblong, acute, tomentose, 2-seeded. Stem 2°-3° long; *leaflets* 1'-2' in diameter.

R. TOMENTOSA, Torr. and Gray. *Leaflets* 1-3, roundish or ovate; *racemes* dense-flowered; *legume* oblong. Red River.—Torrey.

** *Stem* tall, erect, with long virgate branches; *flowers* solitary or by pairs, in the axils of the upper leaves; *calyx* deeply 4-cleft, shorter than the corolla.

R. GALACTOIDES. *Stem* bushy, purplish, closely pubescent; *leaves* very small, almost sessile; *leaflets* 3, oval or obovate, rigid, reticulate, pubescent; *flowers* mostly longer than the leaves, yellow, the vexillum reddish externally; *legume* oblong, 2-seeded. *Stem* 2°-4° high; *leaflets* 3"-9" long; *legume* $\frac{3}{4}$ ' long.

R. TEXANA. Minutely velvety-pubescent; *stems* diffuse, much branched from the base; *stipules* setaceous, minute; *leaflets* rhombic-ovate or ovate-lanceolate, obtuse, mucronulate, rounded or slightly cordate at the base, pubescent and dotted, with minute resinous glands beneath, the upper surface reticulated and nearly glabrous; *peduncles* axillary, mostly 1-flowered, much shorter than the petioles; *teeth* of the calyx attenuate-subulate, rather shorter than the corolla; *legumes* pubescent, oblong, narrowed at the base, nearly straight.—Drummond.

APIOS, Boerh.

Calyx somewhat 2-lipped, the lateral teeth nearly obsolete, the lowest one longest; *vexillum* very broad, reflexed; the *keel* at length twisted; *stamens* diadelphous (9 and 1); *legume* nearly terete, many-seeded.—A smooth, perennial, twining herb, with unequally pinnate leaves, and brownish-purple flowers in dense axillary racemes.

A. TUBEROSA, Mœnch. *Stem* twining, high; *leaflets* 5-7, ovate or ovate-lanceolate; *racemes* often by pairs, shorter than the leaves; *root* bearing small edible tubers; *seeds* black, separated by loose cellular tissue.

PHASEOLUS, L. KIDNEY BEAN.

Calyx 5-toothed, the 2 upper teeth more or less united; *keel* of the corolla spirally coiled or twisted; *stamens* diadelphous; *legume* linear or falcate, few-many-seeded.—Twining or prostrate *herbs*, with trifoliolate stipellate *leaves*; *flowers* commonly large, racemed, or clustered at the summit of the axillary peduncles.

* *Flowers scattered in long racemes; legumes scymetar-shaped.*

P. PERENNIS, Walt. *Stem* climbing, pubescent; *leaflets* ovate, acute, entire, membranaceous; *racemes* often branching, twice as long as the leaves. Perennial; *flowers* purple; *leaflets* 2'-4' long.

** *Flowers clustered at the summit of the peduncle; legumes linear, nearly terete; seed scurfy.*

P. HELVOLUS, L. *Stems* prostrate; *leaflets* varying from ovate to oblong-linear; smooth or hairy; *peduncles* 3-6 times as long as the leaves; *corolla* purple.

VIGNA, Savi.

Calyx 4-toothed, the upper tooth broader, entire or 2-cleft; *vexillum* depressed-orbicular, with thickened knobs near the base; *keel* not twisted; *stamens* included in the keel, diadelphous, and with the style bent upward; *style* hairy above, appendaged below the stigma; *legume* nearly terete, somewhat torulose, the *seeds* separated by cellular tissue.—Twining *herbs*, with trifoliolate *leaves* and racemose; axillary *flowers*.

V. GLABRA, Savi. *Annual*, hirsute; *leaflets* ovate or ovate-lanceolate; *racemes* on stout peduncles longer than the leaves; *flowers* yellow, crowded.

ERYTHRINA, L.

Calyx tubular-campanulate, truncate, toothless; *vexillum* narrow, straight, elongated; *keel* and wings very small; *stamens* and *style* partly exserted; *legume* stipitate, torulose, partly dehiscent.—*Trees, shrubs*, or rarely *herbs*, often armed with prickles; *leaves* trifoliolate, the terminal leaflet long-petiolulate; *flowers* showy, scarlet, in long racemes.

E. HERBACEA, L. *Stems* herbaceous, several from a very thick root, prickly, the flowering ones mostly leafless; *leaves* long-petioled; *leaflets* ovate or somewhat hastate; *vexillum* lanceolate, folded; *seeds* scarlet. *Stems* 2°–4° high; *racemes* 1°–2° long; *flowers* 2' long; *legume* opening by one suture opposite the seeds.

CLITORIA, L.

Calyx tubular, 5-toothed; *vexillum* very large, spurless on the back, obovate, emarginate; *keel* shorter than the wings; *stamens* monadelphous below; *style* curved, hairy; *legume* stipitate, linear-oblong, torulose, veinless.—Perennial *herbs*, with trifoliolate *leaves*, and very large purple *flowers* on axillary peduncles; *bracts* opposite.

C. MARIANA, L. Smooth; *stem* erect or twining; *leaflets* ovate-oblong, pale beneath; *peduncles* shorter than the leaves, 1–3-flowered; *legume* 3–4-seeded. *Stem* 1°–3° long; *flowers* 2' long, pale purple; *bracts* shorter than the calyx; *legume* 1½'–2' long.

CENTROSEMA, DC.

Calyx short, 5-cleft, the two upper lobes more or less united; *vexillum* very large, spurred on the back, orbicular, emarginate; *keel* nearly as long as wings; *stamens*

monadelphous below; *style* smooth; *legume* nearly sessile, linear, compressed, the sutures thickened, the valves lined with an intramarginal vein.—Twining *herbs*, with trifoliate leaves, and very large purple flowers on short axillary peduncles; *bracts* opposite.

C. VIRGINIANA, Benth. Rough, with short hooked pubescence; *stem* very slender, much branched; *leaflets* oblong or linear-oblong, strongly reticulate; *peduncles* single or by pairs, 1-4-flowered; *calyx*-teeth subulate, barely exceeding the ovate bracts; *vexillum* adhesive; *legume* slender, elongated, curved, many-seeded; *flowers* $1\frac{1}{2}$ ' long; *legume* 4'-6' long.

AMPHICARPÆA, Ell.

Flowers of two kinds: those on the upper racemes perfect, but mostly abortive; those near the base of the stem or on the prostrate branches apetalous, but fruitful. *Calyx* tubular, 4-5-toothed; *vexillum* obovate and partly enclosing the wings and the keel; *stamens* diadelphous, or in the fertile flowers distinct or wanting; fertile *legume* obovate, fleshy, 1-2-seeded.—Twining annual or perennial *herbs*, with trifoliate leaves; *flowers* white or purplish, in simple or compound axillary racemes.

A. MONICA, Nutt. Hairy; *stems* much branched; *leaflets* rhombic-ovate; sterile *racemes* single or by pairs, often compound, nodding; *bracts* striate; *calyx*-teeth short, triangular; fertile *legumes* hairy.

GALACTIA, P. Browne.

Calyx 4-parted, the upper one broadest; *vexillum* oblong or ovate, reflexed in flower; *stamens* diadelphous; *legume* more or less compressed, 2-valved, few-many-seeded.—Prostrate or twining, rarely erect, perennial *herbs*, with chiefly

trifoliolate *leaves*, and mostly small purplish or white *flowers* in axillary racemes; *bracts* alternate and deciduous; *leaflets* stipellate.

* *Leaves trifoliolate, with the leaflets stalked; stems twining or prostrate.*

G. MOLLIS, Michx. Villous and somewhat hoary; *stems* mostly prostrate and simple; *leaflets* oval or oblong, obtuse or emarginate at both ends or the upper ones acute; *racemes* single, about twice the length of the leaves, the short-pedicelled *flowers* approximate near the summit of the stout peduncle, acute in bud; *calyx* like the straight 10-seeded compressed legume, very villous and hoary. Stem 2°-3° long; leaflets 1' long; *corolla* reddish purple, one-third longer than the acute calyx-lobes.

G. FLORIDANA, Torr. and Gray. Hoary pubescent; *stem* prostrate; *leaflets* oval or oblong, rarely acute, reticulate; *racemes* simple or branched, often by pairs, many-flowered, rarely longer than the leaves; *flowers* large, approximate; *legume* flat, 10-seeded; *leaflets* acute or emarginate, the few flowers almost sessile in axillary clusters. Stem 2°-4° long; leaflets 1'-2' long; flowers largest of all.

G. GLABELLA, Michx. *Stems* prostrate, minutely pubescent; *leaflets* rather rigid, on short petioles, oblong, rarely acute, smooth and shining above, slightly hairy beneath; *racemes* seldom as long as the leaves, 3-6-flowered; *style* elongated; *legume* slightly falcate, at length smoothish, 4-6-seeded. Stems 2°-3° long; leaflets 1' long; *flowers* large, reddish purple.

DOLICHOS, L.

Calyx campanulate, somewhat 2-lipped, the upper lip of two more or less united teeth, the lower 3-cleft; *vexillum* callous near the base; *keel* more or less falcate; *stamens* diadelphous, the free stamen spurred at the base; *style* bearded; *legume* flattened; *seeds* compressed, with a small

and oval hilum.—Twining *herbs*, with trifoliolate *leaves* and axillary racemose *flowers*.

D. MULTIFLORUS, Torr. and Gray. Pubescent; *leaflets* thin, large orbicular, abruptly acute; *racemes* shorter than the leaves, many and densely flowered at the summit of the stout peduncle; upper lip of the *calyx* entire; *keel* nearly straight; *legume* 4-5-seeded. *Leaflets* 3'-6' in diameter; *stem* 5°-10° long; *flowers* purple; perennial.

BAPTISIA, Vent.

Calyx campanulate, 4-cleft; the upper lobe broader and mostly emarginate; *vexillum* roundish, with the sides reflexed; wings and keel straight; *stamens* 10, distinct, shorter than the wings, deciduous; *legume* stipitate, oval or oblong, inflated, few-seeded, pointed with the persistent style.—Erect, widely branching, perennial *herbs*; *leaves* simple or palmately trifoliolate, withering-persistent; *stipules* deciduous or persistent, rarely wanting; *flowers* showy in terminal racemes, rarely axillary and solitary.

B. PERFOLIATA, Brown. *Leaves* perfoliate, oval, or orbicular, glaucous; *stipules* none; *flowers* axillary, solitary; *legume* small, ovate, coriaceous; *stem* 2° high; *leaves* 2'-3' long; *flowers* small, yellow; *vexillum* orbicular, emarginate; *ovary* and *style* smooth.

** *Leaves* trifoliolate, pellate.

† *Flowers* yellow.

B. LANCEOLATA, Ell. Pubescent when young, at length smoothish; *leaves* on very short petioles, the upper ones nearly sessile; *leaflets* varying from lanceolate to obovate, thick, obtuse, tapering at the base; *stipules* and *bracts* small and caducous; *flowers* large, solitary in the axils, and in short terminal *racemes*, short-pedicel; *ovary* villos; *legume* ovate or globose, coriaceous, slender-pointed. *Stem* 2° high; *leaflets* 1'-2' long.

B. VILLOSA, Ell. Pubescent; *leaves* short-petioled; *leaflets* oblong and obovate, tapering at the base, becoming smooth above; lower *stipules* and lanceolate *bracts* persistent; *racemes* many-flowered, declining; *ovary* villous; *legume* smoothish, coriaceous, oblong, strongly beaked; *stem* 2° high. Leaves and *flowers* larger than *B. lanceolata*.

B. SPHÆROCARPA, Nutt. Glabrous; *leaves* nearly sessile; *leaflets* obovate-oblong, obtuse, minutely pubescent when young; *stipules* and *bracts* minute or almost none; *stem* 2°–3° high, many from the same roots, with erect *branches*; *flowers* large, usually in a long strict spike, deep yellow; teeth of *calyx* short, very acute; the upper ones obtuse; *ovary* glabrous; *stipe* short. Near Fort Townsend.—*Dr. Leavenworth*.

†† *Flowers white*.

B. LEUCANTHA, Nutt., Torr. and Gray. Smooth and glaucous; *branches* spreading; *leaves* short-petioled; *leaflets* oblong and obovate, obtuse; *stipules* lanceolate, as long as the petioles, deciduous; *racemes* central and terminating the branches, long, many-flowered; *ovary* smooth; *legume* large, oblong, much inflated, long-stipitate. Legume 1½' long.

B. LEUCOPHÆA, Nutt. Hairy or smoothish; *stem* stout, angled; *leaves* short-petioled; *leaflets* varying from oblanceolate to obovate, rigid, reticulate, soon smooth above; *stipules* and *bracts* leafy, ovate-lanceolate, persistent; *racemes* stout, declined, 1-sided; *flowers* large, yellowish-white, on long and slender erect pedicels; *ovary* villous; *legume* ovoid, long-pointed. Stem low, with widely spreading branches; *racemes* 4'–12' long; *flowers* 1' long, the *vexillum* spotted with brown.

SOPHORA, L.

Calyx campanulate, obliquely truncated or 5-toothed; *stamens* 10, free or cohering at the base; *style* smooth; *legume* moniliform, wingless, many-seeded, indehiscent; *seeds* subglobose.

S. SPECIOSA, Benth. *Leaves* evergreen, smooth, pinnate; *leaflets* 3-5-paired, ovate, obtuse, or subacuminate, shining above, paler beneath; *flowers* racemose, blue, or yellowish-white tinged with blue, very fragrant; *Pods* large, constricted, tough, covered with a light gray pubescence; *seeds* bean-like, red. Flowers in February and March. Fruit-pods adherent during the summer.—A small *tree* or *shrub*, on hills in Western Texas; Mount Bonnell, Austin; also on the shores of Matagorda Bay, where it is sometimes 30 feet high. Very ornamental.

BRASILETTO FAMILY. Sub-order II., CÆSALPINIÆ.

CIRCIS. RED-BUD.

Calyx campanulate, 5-toothed; *petals* all distinct, the *vexillum* shorter than the wings; *stamens* 10, distinct; *legume* oblong, compressed, many-seeded, the upper suture winged.—*Trees*, with broadly-cordate, simple stipulate leaves, and reddish-purple clustered *flowers* appearing before the leaves.

C. CANADENSIS, L. *Flowers* very numerous from lateral buds.—*Tree*, 15°-20° high.

HOFFMANSEGGIA.

Sepals 5, united into a short obconic base, somewhat equal; *petals* 5, obovate, on short claws, somewhat un-

equal, spreading, the upper one concave, one or more of them often glandular at the base; *stamens* 10, filaments mostly hairy or glandular, and thickened or dilated toward the base, nearly equal; *anthers* oval, nearly uniform; *style* as long as the stamens, somewhat thickened at the apex; *legume* oblong or linear, often falcate, compressed, dry, 2-valved, 2-seeded.—Low perennial *herbs* or suffrutescent plants, often dotted with black glands; *leaves* abruptly or unequally bipinnate; *racemes* opposite the leaves; *flowers* yellow; *glands* either sessile or pedicellate.

H. DRUMMONDII. Glabrous, with a few scattered pedicellate *glands*; *stem* diffuse, suffrutescent; *pinnæ* 3 (digitate), abruptly 8–12 foliolate; *leaflets* elliptical, obtuse or retuse; *legumes* lunate-ovate, glabrous; *plant* low and much branched, with a very few subulate scarcely capitate glands on the lower side of the petioles; *leaves* small, upper *petal* with a reddish spot. In some flowers we have not observed the stipules; *ovules* about 5-seeded. In some flowers the alternate filaments are almost filiform and nearly glabrous, while those opposite the sepals are thickened and clothed with glandular hairs.—Torrey and Gray.

H. CAUDATA, Gray. *Shrubby*; *leaves* bipinnate, *pinnæ* 2–3-paired; *leaflets* small, 20–30-paired, smooth, round or obliquely subcordate, veins glandular; *stipules* and *bracts* caducous; *leaflets* about two lines in length, thickish, obscurely mucronulate, subsessile, oblique. The terminal *pinnæ* are sometimes 2 and 3 inches in length, and bear many pairs of *leaflets*, while the lateral ones are scarcely an inch long; *raceme* sparsely 6–9-flowered; *legume* nearly 2 inches long and $\frac{2}{3}$ of an inch wide. Sandy soil, Western Texas.

H. JAMESII. Canescently pubescent; *stipules* subulate, entire, *pinnæ* 5 (2 pairs and a terminal one), abruptly

10-16-foliolate; *legume* broadly oblong, somewhat lunate; *calyx*, *petals*, and *legumes* sprinkled with sessile black glands.—A low, much-branching, *shrubby plant*; *leaves* with the 3 upper pinnæ arising from the same point; *leaflets* oval, obtuse at both ends, nearly glabrous above; *racemes* elongated, opposite the leaves; *flowers* nodding or reflexed, rather large; *calyx* a little oblique, the 4 upper segments lanceolate, acute, all membranaceous; upper petal marked with reddish spots; *style* subulate, dilated above, and somewhat gibbous at the apex; the *stigma* turned to the upper side and somewhat hooded, the membranaceous upper portion of the style being slit for some distance on that side; *legumes* about an inch long, scabrous, sprinkled with glands, flat, 2-3-seeded; *seeds* oval, compressed.

CASSIA, L. SENNA.

Calyx of 5 nearly distinct sepals; *petals* 5, unequal; *stamens* 5-10; *anthers* mostly of different forms, opening by two terminal pores; *legume* many-seeded; *seeds* often separated by cross partitions.—*Herbs* or *shrubs*; *leaves* abruptly pinnate; *flowers* yellow.

* *Stamens* 10, unequal; *part of the anthers* abortive; *sepals* obtuse; *stipules* deciduous.

C. OCCIDENTALIS, L. Annual, smoothish; *stem* stout, branching; *leaflets* about 10, ovate or ovate-lanceolate, acute; *petiole* with a globular gland at the base; *racemes* 2-4-flowered, the upper ones crowded. — *Stem* 1°-5° high; *legume* linear erect, compressed, slightly curved, 3'-4' long.

C. OBTUSIFOLIA, L. Annual, roughish; *stem* slender; *leaflets* 6, cuneate-obovate, with a tooth-like gland between the lowest pair; *flowers* by pairs; *legume* narrow-

linear, 4-angled, recurved. Stem 1° – 4° high; legume 6'–10' long.

C. MARILANDICA, L. Perennial, smoothish; *leaflets* 12–18, oblong, acute; *petiole* with a club-shaped gland near the base; *racemes* several-flowered, the upper ones crowded, forming a compact panicle; *legume* linear, slightly curved. Stem 3° – 4° high; legume 3'–4' long.

C. BIFLORA, L. Shrubby; *leaflets* 4–10, oblong, narrowed at the base, mucronate, with an obovoid gland between the lowest pair; *racemes* 2–4-flowered, often by pairs, slender, shorter than the leaves; fertile *anthers* 5; *legume* linear, flat, straight or somewhat falcate, smooth, many-seeded. *Leaflets* 1' long; legume 3' long, 2' wide.

** *Stamens* 5–10; *anthers* all perfect; *sepals* acute; *stipules* persistent.

C. CHAMÆCRISTA, L. Annual; *stem* smooth or rusty hairy; *leaflets* small, numerous, linear-oblong, mucronate; *stipules* acuminate, nerved; *flowers* borne above the axils, large, clustered, on long pedicels; *anthers* 10; *styles* slender; *legume* linear, nearly straight; part of the *petals* often purple at the base. Stem 1° – $1\frac{1}{2}^{\circ}$ high.

HOOPIESIA, Buckley.

Calyx ebracteate, deeply 5-cleft or 5-parted; *segments* lanceolate, rather unequal, linear-acute; *petals* 5, subpapilionaceous, long-clawed; *stamens* 10, free; *filaments* at the base lanuginose; *stipe* many-ovuled; *style* dilated at the base, filiform, a little longer than the filaments; *stigma* small; *legume* broad lanceolate, slightly compressed, obtuse, 8–10 seeded; *seed* reniform. If dehiscent, it is late in becoming so.

H. ARBOREA, Buckley. *Leaves* bipinnate, 1–3-paired;

leaflets opposite, obovate, obtuse, 3-6-paired; *flowers* axillary, subsolitary, shortly pedunculate.—A *tree*, with spinose branches, 20-25 feet high and 8-12 inches in diameter; bark of trunk and branches smooth and of a pale green; branches numerous, forming a dense shade; *legume* 4 inches long, 10 lines wide, and 8 lines thick; *seeds* large, divided by septa; *spines* axillary, double, stipular, subulate, and small; *flowers* yellow, with reddish-brown lines near the base of the limb of the petals. Insects destroyed the embryo in our fruiting specimens. Grows on hills near the Gulf, about $1\frac{1}{2}$ miles below Corpus Christi, Texas. Dedicated to Joshua Hoopes, of West Chester, Pennsylvania, a zealous botanist, who has long studied and admired trees.

GLEDITSCHIA, L. HONEY LOCUST.

Flowers polygamous; *sepals* 3-5, united at the base, spreading; *petals* as many, or less by the union of the 2 lower ones; *stamens* 3-5, distinct, inserted with the petal on the base of the calyx; *legume* stipitate, flat, 1-many-seeded; *seeds* compressed.—Thorny *trees*; *leaves* abruptly 1-2-pinnate, with oblong serrate leaflets; *flowers* small, greenish, in short spikes.

G. TRIACANTHUS, L. *Leaflets* lanceolate-oblong; *thorns* mostly compound; *legume* very long, many-seeded, pulpy within.—A large *tree*; *legume* 12'-18' long, 1' wide, twisted.

G. MONOSPERMA, Walt. *Leaflets* ovate or oblong; *thorns* mostly simple; *legume* short, obliquely oval, 1-seeded, not pulpy.—A small *tree*; *legume* 1' long.

MIMOSA FAMILY. Sub-order III., MIMOSEÆ, L.

MIMOSA, L. SENSITIVE PLANT.

Flowers polygamous; *calyx* minute, 4-5-toothed; *petals* united into a 4-5-cleft tubular-campanulate corolla; *sta-*

mens 4–15, distinct, much exserted; *legume* compressed, mostly jointed, 1–many-seeded; the broad valves separating at maturity from the persistent margins.—*Herbs*, *shrubs*, or *trees*; *leaves* bipinnate, sensitive; *flowers* white or rose-color, capitate or spiked, on axillary peduncles.

M. STRIGILLOSA, Torr. and Gray. *Herbaceous*, and rough with scattered appressed rigid hairs; *stem* prostrate; *leaves* long-petioled; *pinnæ*, 5–6 pairs; *leaflets* 10–14 pairs, oblong-linear; *peduncles* longer than the leaves; heads of *flowers* elliptical; *legume* oval or oblong, 1–3-jointed, hispid. Flowers rose-color.

SCHRANKIA, Willd.

Flowers polygamous; *calyx* minute; *corolla* funnel-formed, 5-cleft; *stamens* 8–10, distinct, exserted; *legume* not jointed, prickly, 1-celled, many-seeded; the narrow valves separating at maturity from the broad margins.—Perennial prostrate prickly *herbs*, with bipinnate sensitive *leaves*, and purple *flowers* in globose, axillary, peduncled heads.

S. UNCINATA, Willd. *Stem*, *petioles*, *peduncles*, and *legumes* thickly beset with short and thick recurved prickles; *pinnæ* 5–6 pairs; *leaflets* 26–30, elliptical, reticulated with elevated veins beneath; *peduncles* mostly solitary, usually shorter than the leaves; *legume* oblong-linear, with a short acuminate point, about as long as the peduncle; *seeds* elliptical. Stem 2°–4° long; *legume* 2' long.

DESMANTHUS.

Flowers polygamous; *calyx* 5-toothed; *corolla* of 5 oblong-spatulate *petals*, or tubular and 5-cleft; *stamens* 5–10; *filaments* of the lower flowers filiform, sterile; *legume* linear, continuous 2-valved.—*Herbs* or *shrubs*, with abruptly

pinnate leaves, and heads or spikes of white flowers borne on axillary peduncles; *leaves* sensitive.

D. DEPRESSUS, Humb. and Bonpl. *Stems* slender, prostrate, sprinkled with hairs, shrubby at the base; *pinnæ* 2 pairs; *leaflets* oblong-linear, very obtuse, oblique and almost truncate at the base, hairy on the margins; *peduncles* 2-4-flowered, the two upper flowers (sometimes all) perfect; *stamens* 10; *legume* linear, many-seeded; *seeds* angular, compressed. Stem 1°-2° long; legume 1'-1½' long.

D. DIFFUSUS. *Stem* somewhat shrubby, prostrate; *pinnæ* 4-5 pairs; *spikes* few-flowered, capitate; *flowers* pentandrous; *legume* narrowly linear, 2' long.

D. LEPTOLOBUS. Herbaceous; *stem* ascending, angled; *pinnæ* about 10 pairs, with a small gland at the base of the lowest or two lower pairs; *leaflets* about 24 pairs, linear, slightly ciliate; *stipules* setiform; *peduncles* solitary, few-flowered, not bracteate, much shorter than the leaves; *flowers* pentandrous, all perfect; *legumes* usually several from each head, narrowly linear, subulate-acuminate, slightly falcate, 6-8-seeded, somewhat intercepted between the seeds, thrice the length of the peduncles; *seeds* linear-oblong, nearly glabrous. Stems 2°-3° high; *heads* usually ripening 4-6 legumes, which are 2-3 inches long, and about a line in width; seeds placed lengthwise in the pod.—*Drummond*.

D. STRICTUS. Suffrutescent at the base; *stems* ascending and somewhat angled; *leaves* short; *pinnæ* 3-4 pairs, with an oval concave gland at the base of the lowest pair; *leaflets* 6-8 pairs, linear-oblong, ciliate; *stipules* setiform; *peduncles* solitary, not bracteate, nearly the length of the leaves, few-flowered *heads* subglobose; *flowers* nearly all perfect, decandrous; *legumes* linear, straight or somewhat falcate, acuminate, longer than the peduncles, about 8-seeded; *seeds* oval. Stem 1°-2° long; leaves small and short; legumes 1'-1½' long.—*Drummond*.

* *Sterile filaments flat or somewhat petaloid; legumes oblong, 4-6-seeded, often stipitate; aquatic, prostrate.*

D. LACUSTRIS, Willd. Herbaceous, floating; *leaves* destitute of glands; *pinnæ* 3 pairs; *leaflets* 20-30, alternate and opposite, linear, obtuse; *heads* ovate, many-flowered; *peduncles* 2-3-bracteate; *flowers* decandrous; *legumes* somewhat falcate, oblong, stipitate; *spikes* loose. Flowers small, somewhat pediceled; *filaments* of the lower ones antheriferous; *leaflets* somewhat lanceolate, broader at the base.—*Drummond.*

43. ROSE FAMILY. Order, ROSACEÆ.

Herbs, shrubs, or trees, with alternate stipulate leaves, and regular flowers; calyx of 3-8 (mostly 5) more or less united *sepals*, and often with as many *bracts*; *petals* as many (rarely none), inserted with the few or numerous distinct *stamens* on the edge of the disk which lines the tube of the calyx, mostly imbricated in the bud; *ovaries* 1-several, free, or more or less united with the calyx, and with each other, 1-few ovuled; *seeds* anatropous, and, with few exceptions, without albumen; *embryo* straight, with large and thick *cotyledons*; *fruit* various.

SYNOPSIS.

SUB-ORDER I. **Chrysobalanææ.** Calyx bractless, free from the solitary ovary. Style single, arising from the base of the ovary. Ovules erect. Fruit a drupe. Trees or shrubs. Leaves simple.

1. CHRYSOBALANUS. *Calyx-limb persistent. Stone grooved. Low shrubs.*

SUB-ORDER II. **Amygdalææ.** Calyx bractless, free from the solitary ovary. Style single, terminal. Ovules suspended. Fruit a drupe. Leaves simple.

2. *PRUNUS*. *Calyx-limb deciduous. Stone even, or grooved on the margins.*

SUB-ORDER III. **Rosaceæ**. Calyx 3-5-cleft, the lobes often alternating with as many bracts, free from the 1-several ovaries. Style lateral or terminal. Fruit a 1-10-seeded follicle, or a 1-seeded achenium. Herbs or shrubs. Leaves mostly lobed or compound.

* *Fruit a 1-10-seeded follicle.*

Petals obovate or roundish, imbricated in the bud.....*SPIRÆA*.
 — *linear-lanceolate, convolute in the bud*.....*GILLENIA*.

** *Fruit a 1-seeded achenium.*

† *Fruiting calyx dry, the lobes mostly valvate in the bud. Achenia few, or numerous and collected in the bud.*

†† *Calyx-tube contracted (except NEVIUSIA). Achenia 1-4.*

Petals none.	Stamens indefinite.	Calyx lobes serrate.....	NEVIUSIA.
— 5.	— 5-15.	— bristly	AGRIMONIA.
— none.	— 4.	Style terminal	SANGUISORBA.
— none.	— 1-4.	— lateral	ALCHEMILLA.

††† *Calyx open, bracted. Stamens and dry achenia numerous, the latter rarely 2-4.*

= *Seeds erect.*

Styles persistent. Achenia numerous.....*GEUM*.
 — deciduous. — 2-6

WALDSTEINIA.

= = *Seeds suspended or ascending.*

Receptacle flat or convex, dry.....*POTENTILLA*.
 — conical, enlarged and fleshy in fruit.....*FRAGARIA*.

†††† *Calyx open, bractless. Stamens and juicy achenia numerous.*

Achenia crowded on the conical receptacle.....*RUBUS*.

†† *Calyx-tube fleshy, urn-shaped; the lobes imbricated in the bud. Achenia numerous, inserted on the receptacle which lines the inside of the calyx-tube.*

● Achenia dry and hairy. Prickly shrubs.....*ROSA*.

SUB-ORDER IV. **Pomeæ**. Calyx including and cohering with the 1-5 ovaries, very thick and fleshy in fruit.

Fruit of 1-5 bony 1-seeded nutlets	CRATÆGUS.
— 2-5 cartilaginous or membranaceous 2-seeded cells	PYRUS.
— 3-5 two-seeded cells; seeds separated by false partitions ..	AMELANCHIER.

PRUNUS. PLUM CHERRY.

Calyx 5-cleft, deciduous; *petals* 5, spreading; *stamens* 15-30; *ovary* with 2 collateral suspended ovules; *styles* terminal; *drupe* fleshy; the stone even.—*Trees* or *shrubs*; *leaves* simple; *flowers* white.

PRUNUS. (Plum.) *Drupe* glaucous; *stone* more or less compressed; *leaves* convolute in the bud; *flowers* in lateral clusters, appearing before the leaves; *branches* often spiny.

P. AMERICANA, Marsh. *Leaves* thick, ovate or somewhat obovate, acuminate, rounded or slightly cordate at the base, pubescent beneath, sharply serrate, on glandular petioles; *drupe* large, globose.—A small tree; *leaves* 2'-3' long, smooth when old; *flowers* very numerous; *plum* roundish, $\frac{1}{2}$ '-1' in diameter, pleasantly acid; ripening in September.

P. UMBELLATA, Ell. *Leaves* thin, ovate-lanceolate or oblong, acute at both ends, or the upper ones rounded at the base, finely and sharply serrate, smooth or soft-downy beneath; *calyx*-teeth emarginate, pubescent; *drupe* globose; *stone* slightly compressed; *branches* purple, shining; *leaves* 1'-1 $\frac{1}{2}$ ' long.—Tree or shrub; *plum* rarely $\frac{1}{2}$ ' in diameter, dark-purpled or black, sour and bitter; ripening in August.

P. CHICASA, Michx. *Leaves* thin, lanceolate or oblong-lanceolate, acute, smooth, minutely and sharply serrate, with the glandular and incurved *flowers* short-peduncled; *calyx* smooth; *drupe* yellowish-red, globose.—A shrub or small tree; *leaves* 1 $\frac{1}{2}$ '-2' long; *plum* $\frac{1}{2}$ ' in diameter, thin-skinned, and of an agreeable flavor.

P. GLANDULOSA, Hook. *Shrub* about a foot high, with very crooked branches; *leaves* about 1' in length, rather smooth above; *calyx* segments spreading and very glandular; *umbels* 1-2-flowered; *ovary* pubescent; *style* elongated.—*Drummond*.

LAUROCERASUS. (*Cherry Laurel*.) *Drupe* not glaucous; *stone* globular; *flowers* in racemes from the axil of the ever-green leaves.

P. CAROLINIANA, Ait. (*Mock Orange*; *Wild Peach*.) *Leaves* coriaceous, smooth, and glossy, ovate-lanceolate, acute, mostly entire; *racemes* shorter than the leaves, white; *drupe* ovoid, soon dry, black.—A small tree. February and March.

SPIRÆA, L. MEADOW SWEET.

Calyx 5-cleft, persistent; *petals* 5, roundish, imbricated in the bud; *stamens* 10-50; *follicles* 3-12, 1-10-seeded; *styles* terminal.—*Shrubs* or perennial *herbs*, with simple or compound *leaves*; *flowers* white or rose-color, sometimes diœcious.

* *Shrub*; *flowers* perfect.

† *Flowers* corymbose.

S. OPULIFOLIA, L. *Leaves* broadly ovate or cordate, 3-lobed, doubly crenate-serrate, smooth; *corymbs* umbellate, terminating the short branches, mostly pubescent; *follicle* smooth, inflated, 2-4-seeded.—*Shrub*, 3°-5° high, the old bark separating into thin layers; *flowers* white.

AGRIMONIA, Tourn. AGRIMONY.

Calyx 5-cleft, the tube top-shaped, contracted in the throat, and armed with hooked bristles; *petals* 5; *stamens* 5-15, inserted on the throat of the calyx; *achenia* 2, in-

cluded in the grooved and indurated calyx-tube.—Perennial *herbs*, with unequally pinnate *leaves*, leafy toothed *stipules*, and small yellow *flowers* in long spiked racemes; *fruit* nodding.

A. EUPATORIA, L. *Stem* hairy; *leaflets* 3–7, with smaller ones below or intermixed, oblong-ovate, hairy, sometimes white-downy beneath, coarsely serrate; *petals* twice the length of the calyx. Stem 2°–3° high.

A. PARVIFLORA, Ait. *Stem* and *petiole* hirsute; *leaflets* 9–15, with smaller ones between, lanceolate, coarsely serrate, roughish above, pubescent beneath; *flowers* and *fruit* smaller than A. Eupatoria.

SANGUISORBA, L.

Calyx 4-parted, the tube 4-angled; *petals* none; *stamens* 4, the filaments usually thickened upward; *style* terminal, slender; *stigma* pencil-form; *achenia* 1–2, included in the 4-winged indurated calyx-tube.—*Herbs*, with unequally pinnate leaves; *flowers* in close heads or spikes.

S. ANNUA. Glabrous; *stem* branching; *leaflets* 4–6 pairs, oval, deeply pectinate-pinnatifid; the segments linear and very narrow; *heads* elliptical; *bracteoles* 3, large and scarious; filaments short, not dilated; *flowers* all perfect, brownish-green. Stem 10–20 inches high, slender, leafy; annual.—*Dr. Leavenworth*.

GEUM, L. AVENS.

Calyx campanulate, deeply 5-cleft, and usually with as many bracts as the sinuses; *petals* 5; *stamens* and *achenia* numerous, the latter crowded on the conical or cylindrical dry receptacle; *styles* terminal, long, persistent, jointed and hairy, or straight and smoothish; *seeds* erect; *flowers*

yellow, white, or purple.—Perennial *herbs*, with pinnately divided leaves.

G. ALBUM, Gmelin. Smoothish or downy; *stem* slender, and spreading branches; radical *leaves* pinnate, or the earliest ones nearly simple and rounded; *stem-leaves* 3-parted, lobed or toothed; *petals* white, as long as the calyx; *style* jointed, and bent near the middle, the smooth lower portion persistent and hooked; *receptacle* and *ovaries* bristly-hairy. Stem 2° high.

G. VERNUM. *Stem* 6'-10' high, weak, dichotomous and few-flowered at the summit; *pedicels* elongated in fruit; *calyx*-segments triangular-ovate; *stipe* nearly the length of the head of carpels; *radicla* leaves either roundish-cordate and slightly 3-5-lobed, or pinnate, with the leaflets variously incised and lobed; the cauline mostly 3-5-foliolate or lobed, serrate-toothed, ciliate, the uppermost *leaflets* lanceolate; *carpels* scabrous, in globose heads; *receptacle* glabrous.—Gray and Torrey.

WALDSTEINIA, Willd.

Calyx obconical, 5-cleft, with as many alternate bracts; *petals* 5; *stamens* numerous, inserted into the throat of the calyx; *achenia* 2-6, dry or somewhat fleshy; *style* terminal, filiform, separating from the achenium by a joint; *seeds* erect.—Low perennial *herbs*, with chiefly radical and roundish lobed *leaves*, and yellow *flowers* on scape-like stems.

W. LOBATA, Torr. and Gray. Hairy; *leaves* cordate, crenately 3-5-lobed; *scape* filiform, bracted, 4-8-flowered; *achenia* mostly 2, hoary; *petals* rather shorter than the calyx. Scape and leaves 4'-8' high.

RUBUS, L. BRIER; BRAMBLE.

Calyx concave or flattish, 5-parted, without bracts;

petals 5, deciduous; *stamens* numerous; *achenia* juicy, crowded on the conical or cylindrical receptacle; *style* nearly terminal, deciduous.—Perennial or *shrubby* and nearly prickly plants, with lobed or compound petioled *leaves*, and white or reddish *flowers*.

* *Heads of achenia oval or oblong, persistent; receptacle juicy.*

R. VILLOSUS, Ait. *Stem* erect or bending, tall, shrubby, armed like petioles and peduncles with stout recurved prickles, the branches and 3-7-foliolate *leaves* soft-hairy or nearly smooth; *leaflets* ovate or oblong, doubly serrate; *racemes* leafy below, bracted above; *sepals* acuminate, much shorter than the obovate white petals; *fruit* large, oblong, black. Stem 4°-10° high.

R. TRIVIALIS, Michx. *Shrubby*, and armed with stout, straight, or recurved prickles and bristly hairs; *stem* prostrate, slender; *leaves* 3-5-foliolate, partly persistent; *leaflets* smooth, oblong ovate or obovate, acute, sharply serrate; *racemes* few-flowered, leafy below, mostly longer than the leaves; *flowers* large, white; *fruit* black.

R. HISPIDUS, L. Somewhat *shrubby*, and armed with weak bristle-like prickles; *stem* slender, prostrate; *leaves* trifoliolate, persistent; *leaflets* obovate, obtuse, coarsely serrate, smooth; *racemes* many-flowered, slender, longer than the leaves; *flowers* small, white; *fruit* of few large and black achenia. Fruit sour.

ROSA, Tourn. ROSE.

Calyx 5-cleft, the urn-shaped tube becoming fleshy in fruit; *petals* 5; *stamens* numerous, inserted with the petals on the throat of the calyx; *ovaries* numerous, hairy, inserted on the thin receptacle that lines the inner surface of the calyx-tube; *styles* nearly included; *achenia* bony.—

Prickly *shrubs*; *leaves* unequally pinnate; *stipules* united with the petioles; *flowers* showy.

*** Styles distinct, included; flowers red or white.*

R. CAROLINA, L. *Stem* erect, smooth, armed with stout recurved stipular prickles; *leaflets* 5-9, oblong or elliptical, acute, finely serrate, dull and smoothish above, the lower surface paler, or, like the prickly petioles and caudate *calyx*-lobes tomentose; *flowers* single or corymbose, *calyx*-tube and *peduncles* glandular-hispid. *Stem* 4°-6° high, commonly purplish; *fruit* depressed-globose, glandular.

R. RUBIGINOSA, L. (*Eglantine*.) *Stem* erect or curving, armed with very stout prickles; *leaflets* 5-7, oval or obovate, serrate, glandular beneath; *flowers* mostly solitary, on hispid peduncles; *fruit* obovate. *Branches* yellowish green; *leaves* fragrant.

R. LÆVIGATA, Michx. (*Cherokee Rose*.) *Stem* long, trailing, smooth, the *branches* armed with very stout and curved prickles; *leaves* evergreen, mostly trifoliate; *leaflets* smooth and shining, lanceolate, the midrib hispid; *stipules* deciduous; *flowers* large, solitary, white; *calyx* very bristly.

R. FOLIOLOSA, Nutt. *Branches* slender, glabrous, armed with very weak scattered deciduous prickles, and sometimes with persistent short and nearly straight stipular prickles; *leaflets* 7-11, linear-oblong, glabrous, shining above, sharply serrate, crowded, the lower pair close to the narrow glandular-ciliate stipules (the species described by Leavenworth sometimes only $\frac{1}{2}$ ' in length); *leaves* much crowded on the flowering branches; *petiole* and midrib often setose and pubescent; *flowers* mostly solitary, small, and almost sessile; *calyx* glandular-hispid, the segments reflexed often with lateral appendages; *peduncles* $\frac{1}{4}$ '- $\frac{1}{2}$ ' in length; *fruit* subglobose, somewhat hispid.

CRATÆGUS, L. HAWTHORN.

Calyx urn-shaped ; the limb 5-cleft, persistent ; *petals* 5, orbicular, concave ; *stamens* few or many ; *styles* 1-5, distinct ; *fruit* fleshy, containing 1-5 bony nutlets.—Thorny shrub or tree ; *leaves* simple, serrate or variously lobed ; *flowers* white, axillary and solitary, or in corymbs terminating short lateral branches ; *stipules* on the young branches linear, or lunate and serrate.

* *Corymbs* compound, many-flowered.

† *Fruit* small, not larger than a pea.

C. SPATHULATA, Michx. Young branches tomentose, otherwise nearly smooth and glandless throughout ; *leaves* small, spatulate, crenate at the summit ; those on the young shoots larger and incisely lobed ; *calyx*-lobes very short ; *styles* 5 ; *fruit* very small, red.—A small tree ; *corymbs* sometimes slightly pubescent ; *stipules* lunate on the young branches.

C. APIIFOLIA, Michx. Young branches, leaves, and *corymbs* whitened with soft hairs ; *leaves* small, deltoid, pinnately 5-7-lobed, sharply toothed, nearly smooth when old, truncate or cordate at the base ; *styles* 1-3, filiform ; *fruit* globular, red.—Small tree ; leaves $\frac{1}{2}$ '-1' long.

C. CORDATA, Ait. Young branches, leaves, and *corymbs* pubescent, soon smoothish ; *leaves* large, deltoid-ovate, truncate or cordate at the base, long-petioled, 3-5-lobed and serrate ; *spines* slender ; *fruit* globose, red.—Small tree ; leaves 1'-3' long ; *styles* 5.

C. ARBORESCENS, Ell. Smooth ; *leaves* thin, oval or elliptical, acute at both ends, finely serrate, sometimes obscurely toothed near the apex, on slender nearly glandless petioles ; *corymbs* very numerous ; *styles* 5 ; *fruit* ovoid, red.—Small tree, with ash-colored branches ; *spines* stout

or wanting; leaves 1'-2' long, entire at the base, sometimes hairy in the axils of the veins beneath.

†† *Fruit large ($\frac{3}{4}$ - $\frac{1}{2}$ ' long); leaves, etc., mostly glandular.*

C. CRUS-GALLI, L. *Leaves* thick, oblong-obovate, smooth, shining above, finely serrate from near the glandless base, those on the young branches sometimes slightly lobed; *spines* long and stout, or sometimes wanting; *corymbs* smooth or nearly so; *styles* 1-3; *fruit* pear-shaped or globose, red.—A small *shrub* or small *tree*.

C. TEXANA, Buckley. *Leaves* broadly ovate, cuneate at the base, unequally dentate, teeth acute, smooth above, pubescent beneath; *petioles*, younger *branches*, and *calyx* densely tomentose; *petals* obovate, longer than the calyx; *calyx* lacinate, lanceolate-acuminate; *fruit* red, oblong. *Bark* of trunk and branches dark gray, furrowed and rough (resembling that of the dogwood, *Cornus florida*); *leaves* large, incisely and doubly toothed, nearly as broad as long; *petioles* not margined, about an inch in length; old leaves arachnoid, tomentose beneath; *fruit* large, red, and edible; ripe last of October.—A *tree*, 20-25 feet high, nearly thornless; *trunk* 8-10 inches in diameter. Rich soils, Central and Western Texas.

C. COCCINEA, L. Smooth; *leaves* thin, roundish-ovate, with 3-5 short and sharply serrate lobes on each side, abruptly narrowed into the slender petiole, strongly straight-veined; those on the young branches often truncate or slightly cordate at the base, and more strongly lobed; *spines* stout; *styles* 3-5; *fruit* large, globose or pear-shaped, bright red.—Small *tree* or *shrub*; *leaves* 1'-2' long, bright green.

C. TOMENTOSA, L. *Leaves* large, 3'-5' long, broadly ovate or oval, finely serrate, and slightly lobed above the middle, abruptly narrowed into a short marginal petiole, pubescent, especially beneath, the veins straight and impressed;

corymbs large, tomentose; *styles* 1-3; *fruit* pear-shaped, orange-red.

C. ARBORESCENS. Unarmed; *leaves* lanceolate, acute at each end, deeply serrate, glabrous on the upper surface, hairy underneath at the division of the veins, sometimes slightly lobed toward the summit; *corymbs* many-flowered; *calyx* hairy, the segments subulate, entire; *flowers* pentagynous.—*Drummond*.

** *Corymbs* simple, 1-6-flowered.

C. PARVIFOLIA, Ait. *Leaves* obovate, scarcely petioled, serrate, the lower surface, like the branchlets and calyx, pubescent; *spines* numerous, long and slender; *flowers* mostly solitary; *calyx*-lobes large, serrate; *styles* 5; *fruit* large, globose or pear-shaped, somewhat hairy.—A much-branched *shrub*, 3°-5° high; *leaves* 1' long.

PYRUS, L. PEAR and APPLE.

Calyx urn-shaped, 5-cleft; *petals* 5; *stamens* numerous; *styles* 2-5; *fruit* fleshy or baccate, containing 2-5 cartilaginous 2-seeded carpels.—*Trees* or *shrubs*; *flowers* cymose or corymbose.

* *Leaves* simple, glandular; *fruit* depressed at the base.

P. ANGUSTIFOLIA, Ait. *Leaves* lanceolate or oblong, acute at the base, serrate, short-petioled; *corymbs* simple, few-flowered; *flowers* rose-color, very fragrant; *styles* smooth, distinct.—A small *tree*; *fruit* very sour.

Var., MELANOCARPA. *Stem* low, 2°-4°; *branchlets*, *cymes*, and *leaves* smooth; *leaves* simple, small: *petals* white; *fruit* baccate, globose; *berries* black.

44. CAROLINA-ALLSPICE FAMILY. *Order,*
CALYCANTHACEÆ.

Shrubs, with opposite and entire *leaves*, without stipules or pellucid dots; *sepals* and *petals* numerous and alike, united below into an obconical fleshy cup, imbricated in the bud; *stamens* numerous, short, inserted within the petals, the inner ones often sterile; *anthers* adnate, extorse; *ovaries* several, enclosed in the calyx-tube, and inserted on its inner face, becoming 1-seeded *achenia* in fruit; *seeds* anatropous, without albumen; *cotyledons* convolute.

45. MYRTLE FAMILY. *Order,* MYRTACEÆ.

Trees or *shrubs*; *leaves* opposite, simple, entire, dotted, and commonly with an intramarginal vein; *stipules* none; *calyx* 4-6-cleft, valvate in the bud, the tube adherent to the compound ovary; *petals* 4-6, inserted with numerous stamens on the throat of the calyx, sometimes wanting; *filaments* long, free, or variously combined; *anthers* intorse, roundish, longitudinally dehiscent; *styles* solitary; *seeds* without albumen, fixed to a central placenta.

46. MELASTOMA FAMILY. *Order,* MELASTOMACEÆ.

Herbs, *shrubs*, or *trees*, with opposite 3-9-ribbed *leaves*, without dots or stipules, and showy *flowers*; *calyx* urn-shaped, 4-6-lobed, persistent, cohering with the ovary below or with its angles; *petals* 4-6, twisted in the bud, inserted with the 4-12 *stamens* on the throat of the calyx; *anthers* adnate, often appendaged, usually opening by terminal pores; *ovary* 3-6-celled; *ovules* numerous, attached to the central placenta; *style* solitary; *fruit* baccate and indehiscent, or capsular and loculicidally dehiscent; *seeds* anatropous, without albumen.

RHEXIA. DEER GRASS.

Calyx-tube prolonged and narrowed above the ovary, 4-cleft; *petals* 4, roundish, deciduous; *stamens* 8; *anthers* 1-celled, opening by a terminal pore; *capsule* 4-celled, many-seeded.—Perennial *herbs*; *leaves* 3-5-ribbed; *flowers* cymose, terminal.

* *Anthers* long, linear, curving upward, saccate at the base, and commonly furnished with a bristle-like appendage at the insertion of the filaments; *flowers* purple or whitish.

R. GLABELLA, Michx. *Stem* terete, smooth, mostly simple; *leaves* lanceolate, sessile, entire or slightly serrulate, thick, smooth, and glaucous; *calyx* smooth or bristly; *flowers* large, bright purple. *Root* spongy; *stem* 2°-4° high; *leaves* sweetish.

* *Anthers* short, oblong, erect, not appendaged; *neck* of the *calyx* short.

† *Flowers* purple; *leaves* small, ovate or roundish, bristly serrulate.

R. SERRULATA, Nutt. Low; *stem* simple, 4-angled, smooth; *leaves* smooth above; *calyx* glandular-bristly; *cyme* leafy, 1-6-flowered. *Stem* 2'-6' high; *leaves* and *flowers* smaller than in the preceding.

†† *Flowers* yellow.

R. LUTEA, Walt. *Stem* at length much-branched, 4-angled, bristly; *leaves* smoothish, bristly serrulate, the lower ones obovate and obtuse, the upper lanceolate and acute; *cymes* numerous; *calyx* short and smooth; *flowers* small. *Stem* 1° high; *petals* more persistent than those of the other species.

47. LOOSESTRIFE FAMILY. Order, LYTHRACEÆ.

Chiefly *herbs*, with opposite or whorled and entire leaves, without stipules; *flowers* mostly axillary; *calyx* tubular, persistent, 4-7-toothed, free from the 2-4-celled ovary;

petals as many as the teeth of the calyx and inserted into its throat, deciduous, sometimes wanting; *stamens* as many as the petals; or 2-4 times as many, inserted below the petals; *anthers* short, intorse; *style* solitary; *capsule* enclosed in the calyx, 1-4-celled, few or many seeded; *placentæ* central; *seeds* anatropous, without albumen; *sinuses* of the calyx often appendaged; *stigma* capitate, or rarely 2-lobed.

SYNOPSIS.

* *Calyx regular.*

Calyx hemispherical. Petals none, stigma 2-lobed. Capsule 2-celled.

HYPOBRYCHIA.

— campanulate. Stigma capitate. Capsule 4-celled.....AMMANNIA.

— cylindrical, striate. Capsule oblong, 2-celled.....LYTHRUM.

— short, even. Capsule globose, 3-5-celled. Stamens 10.....NESÆA.

** *Calyx gibbous at the base.*

Calyx tubular, 12-ribbed. Stamens mostly 12. Capsule early ruptured..CUPHEA.

HYPOBRYCHIA.

Calyx hemispherical or campanulate, 4-lobed; *petals* none; *stamens* 2-4; *style* very short; *stigma* 2-lobed; *capsule* globose, 2-celled.—A submerged aquatic herb, with long filiform stems, opposite crowded pellucid linear leaves, and minute sessile axillary flowers.

H. NUTTALLII, Torr. and Gray. Stems 1°-2° long; leaves 1' long, acute; flowers not larger than a pin's head. Ponds and still waters.

AMMANNIA. HOUSTON.

Calyx globular or campanulate, 4-angled, 4-toothed, the sinuses commonly furnished with a small horn-shaped appendage; *petals* 4, small, deciduous, sometimes wanting; *stamens* 4, short; *stigma* capitate; *capsule* globular, 4-celled, many-seeded.—Low annual smooth herbs, with opposite leaves, and solitary or clustered flowers.

A. HUMILIS, Michx. *Stems* branching from the base; *leaves* lanceolate, tapering into a petiole; *flowers* solitary; *style* very short; *petals* 4, purplish. *Varies*, with the *leaves* dilated and somewhat cordate at the base, and the lower *flowers* clustered. *Ditches* and *muddy places*. *Stems* 6'-12' high.

LYTHRUM, L. LOOSESTRIFE.

Calyx cylindrical, striate, 4-7-toothed, usually with minute appendages in the sinuses; *petals* 4-7; *stamens* as many as the *petals*, or twice as many, inserted on the lower part of the *calyx*, nearly equal; *capsule* oblong, 2-celled, many-seeded.—*Herbs*, with opposite or alternate *leaves*, and axillary purple or whitish *flowers*.

L. ALATUM, Pursh. Smooth; *stem* and virgate *branches* 4-angled; *leaves* lanceolate, acute at both ends, opposite, the uppermost alternate, and shorter than the *flowers*; *petals* and *stamens* 6. *Varies*, with *branches* shorter, *leaves* larger, 2' long, broadly lanceolate, sometimes whorled, the uppermost twice as long as the *calyx*. *Stem* 2°-4° high; *flowers* violet-purple.

L. LINEARE, L. Smooth; *stem* 4-angled, much-branched; *leaves* all opposite, linear; *flowers* small, whitish; *petals* and *stamens* 6. *Brackish marshes*. *Stem* 2°-4° high; *calyx*-teeth short.

CUPHEA, Jacq.

Calyx tubular, 12-ribbed, gibbous or spurred at the base on the upper side, 6-toothed, and usually with as many little appendages in the sinuses; *petals* 6, unequal; *stamens* 11-12; *ovary* with a gland at the base next the spur of the *calyx*; *style* filiform; *stigma* 2-lobed; *capsule* 1-2-celled; few-seeded.—Chiefly *herbs*, with branching *stems*, and purplish.

C. VISCOSISSIMA, Jacq. *Annual*, clammy-pubescent; *leaves* thin, opposite, ovate-lanceolate, long-petioled, rough; *flowers* nearly sessile, borne between the petioles, solitary; *petals* violet-purple; *stamens* 12. *Stem* 1° high.

48. EVENING-PRIMROSE FAMILY. *Order*,
ONAGRACEÆ.

Calyx adherent to the ovary, and often produced into a tube beyond it, 2-6-lobed, valvate in the bud; *petals* as many as the lobes of the calyx, inserted into its throat, convolute in the bud, sometimes wanting; *stamens* as many, or twice as many, inserted with the petals; *ovary* 2-4-celled; *placenta* central; *style* solitary; *stigma* capitate or 2-4-lobed; *capsule* loculicidally dehiscent or indehiscent; *seeds* anatropous, with little or no albumen.—Chiefly *herbs*.

SUB-ORDER I. **Onagraceæ**. Styles slender. Fruit 4-valved, indehiscent in *Gaura*. Seeds attached to a central placenta, without albumen.

* *Calyx-tube produced beyond the ovary.*

Capsule nut-like, indehiscent, 1-4-seeded.....GAURA.
—— 4-valved, many-seeded.....GENOTHERA.

** *Calyx-tube not produced beyond the ovary.*

Stamens 8. Petals 4. Seeds comose.....EPILOBIUM.
—— 8-12. Petals 4-6. Capsule long. Seeds naked.....JUSSIEA.
—— 4. — 4, or none. Capsule short, many-seeded.....LUDWIGIA.
—— 2. — obovate, 1-2-seeded.....CIRCEA.

SUB-ORDER II. **Haloragææ**. Styles very short or none. Fruit indehiscent. Seeds suspended, solitary in each cell. Albumen thin. Flowers minute, axillary.

Flowers perfect. Stamens 3. Capsule 3-angled.....PROSERPINACA.
—— monœcious. Stamens 4-8. Capsule 4-angled.....MYRIOPHYLLUM.

GAURA.

Calyx-tube much produced beyond the ovary, the limb

3-4-lobed, reflexed, deciduous; *petals* 3-4-clawed, unequal or turned to the upper side; *stamens* 6-8; *styles* declined; *stigma* 4-lobed; *ovary* 3-4-celled; *fruit* 3-4-angled, mostly 1-celled, 1-4-seeded.—*Herbs*, with alternate leaves, and white or purple *flowers* in a long-peduncled *raceme* or *spike*.

G. BIENNIS, L. Soft-hairy; *leaves* oblong-lanceolate, acuminate, becoming smoothish, wavy-denticulate on the margins; *petals* spatulate, white; *fruit* obtusely 4-angled, acuminate at both ends, sessile. Biennial; *stem* 3°-8° high; *spikes* compound.

G. FILIPES, Spach. Pubescent and somewhat hoary, becoming smoothish; *stem* slender, paniculately branched; *leaves* linear, toothed, wavy; *fruit* ovoid, obtuse, sharply 4-angled, on slender *pedicels*. Biennial; *stem* 2°-3° high, very *leafy*.

G. SINUATA, Nutt. *Stems* suffruticose and branching at the base, naked above, glabrous; *leaves* lanceolate, linear-acute, remotely and acutely sinuate-toothed, rather thick, veinless; *flowering branches* slender, nearly simple, naked, *flowers* loose pediceled; segments of the *calyx* much longer than the obconic tube; *petals* oblong-obovate, on slender claws.—*Drummond*.

G. DRUMMONDII. *Stem* suffruticose at the base, a little hairy below, virgately branched above; *leaves* somewhat canescently puberulent, lanceolate, acute, denticulate or somewhat sinuate; *spikes* slender, few and loosely flowered; *bracts* ovate, caducous, about the length of the ovary; *tube* of the calyx about the length of the segments and rather shorter than the ovary; and terete when mature, ovate pyramidal above, acute, with 4 strong carinate angles.—*Drummond*.

G. PARVIFLORA, Doug. *Stem* tall, erect, and, with the margin of the leaves, villous with very soft white hairs; *leaves* ovate-lanceolate, acute or acuminate, repand-denticu-

late, clothed with a very short velvety pubescence on both sides; *spikes* virgate, strict, very many-flowered, much elongated in fruit; *bracts* lanceolate-subulate; *flowers* very small; tube of the *calyx* shorter than the glabrous ovary and longer than the segments; *fruit* sessile, oblong-clavate, 4-nerved, slightly 4-angled; *petals* spatulate-oblong, scarcely unguiculate, shorter than the calyx-segments, rose-color.—*Drummond.*

CENOTHERA, L. EVENING PRIMROSE.

Calyx-tube produced beyond the ovary, the limb 4-lobed, reflexed and deciduous; *petals* 4; *stamens* 8; *stigma* 4-lobed; *capsule* 4-valved, many-seeded.—*Herbs*, with alternate *leaves* and axillary or racemose chiefly yellow *flowers*. *Pollen* grains triangular, connected by cobwebby hairs.

* *Capsule* cylindrical, sessile; *flowers* expanding at night; *annuals* or *biennials*.

Æ. BIFRONS, Doug. Pubescent; *stem* erect, often branching above; *leaves* oblong or ovate, the upper ones short, closely sessile and somewhat cordate, denticulate; *spikes* elongated; *bracts* ovate-cordate; *tube* of the *calyx* very slender, much longer than the segments, and many times longer than the slightly hairy ovary; *petals* entire, about the length of the *stamens*; *capsules* prismatic-cylindrical, nearly glabrous.—*Drummond.*

Æ. DRUMMONDII, Hook. Softly pubescent; *stem* decumbent; *leaves* ovate-elliptical or oblong, rather obtuse, the lower ones tapering into a petiole, somewhat sinuately toothed, the upper ones obscurely denticulate; *flowers* very large, axillary; tube of the *calyx* equaling in length the segments and the hirsute ovary; *petals* much longer than the slightly declined *stamens*, a little exceeding the calyx-segments; *capsules* cylindrical, elongated, hirsute-pubescent, slightly pediceled.—*Drummond*; *Gray* and *Torrey*.

Æ. RHOMBIPETALA, Nutt. Tall, erect; *leaves* lance-linear, sessile, acute, spreading, lower ones petiolate, becoming somewhat pinnatifid; *spike* strict; *flowers* large, longer than the leafy bracts; *calyx*-tube very slender, 3-4 times longer than the sessile ovary; *petals* rhombic-elliptical, acute or acuminate; *capsule* small. Flowers straw-yellow.—*Marcy*.

Æ. BIENNIS, L. Hairy, hirsute, or smoothish; *stem* tall, often simple; *leaves* lanceolate and ovate-lanceolate, acute, wavy and toothed or serrate on the margins, the earliest ones sometimes pinnatifid; *spikes* leafy, at length elongated; *calyx*-tube longer than the lobes; *flowers* large. (Æ. muricata, Pursh; Æ. grandiflora, Ait.) Stem 2° - 4° high. Varies greatly in pubescence and size of the flower.

Æ. SINUATA, L. Hairy or downy; *stems* ascending or diffuse; *leaves* oblong, pinnately lobed, the lowest pinnatifid; *flowers* small, axillary; *calyx* and *capsule* hairy. Passes through several intermediate forms into Var. HUMIFUSUM, Torr. and Gray. *Stems* prostrate, hoary; *leaves* small, lanceolate, sparingly toothed or entire. Stems $2'$ - 4° high.

** *Capsule* obovate or clavate, furrowed, and more or less peduncled; *flowers* expanding in sunshine.

Æ. SPECIOSA, Nutt. Perennial, puberulent; *stems* erect or ascending, flexuous, often branching; *leaves* lanceolate or oblong-lanceolate, attenuate at the base, the radical and lower cauline ones pinnatifid, or pinnately toothed; *flowers* (large) in a loose at length elongated spike; tube of the *calyx* longer than the ovary, but shorter than the conspicuously acuminate segments; *capsules* slightly pediceled, thick and almost ligneous, clavate-obovate, rather acute, strongly 8-ribbed, the alternate ribs cristate.—*Drummond*.

Æ. SPACHIANA. Annual, minutely pubescent; *stem* simple or branching from the base; *leaves* lanceolate or

linear, obtuse, entire, attenuate at the base; *flowers* (rather small) axillary; tube of the *calyx* shorter than the segments; *petals* nearly entire, much longer than the *calyx*-segments and stamens; *capsules* canescently pubescent, obovate-clavate, the alternate angles carinate or slightly winged toward the summit, tapering to a slender base, nearly sessile.

Æ. LINIFOLIA, Nutt. *Stem* strict, simple or branched above; radical *leaves* oblong-spatulate, petioled, the cauline ones linear-filiform, crowded and fascicled; *spikes* slender, loosely flowered; bracts shorter than the ovary, persistent; *flowers* very small; tube of the *calyx* rather shorter than the ovary; the segments shorter than the *petals*; lobes of the stigma very short; *capsules* obovate, 4-carinate, nearly sessile, hispidly puberulent.—*Drummond*.

Æ. FRUTICOSA, L. Hairy or smoothish; *stem* mostly simple; *leaves* lanceolate, commonly wavy and remotely denticulate on the margins; *raceme* at first corymb-like, at length elongated; *flowers* large; *capsule* 4-winged, with intermediate ribs, oblong-clavate, longer than the pedicel; perennial. *Stem* 1°-2° high; *flowers* 1'-2' in diameter.

Æ. LINIFOLIA, Nutt. Low, smoothish; *stem* at length much branched; *leaves* very numerous, linear-filiform, the lowest spatulate; *racemes* pubescent, few-flowered; bracts shorter than the ovary; *flowers* small; lobes of the stigma coherent into a globular head; *capsule* obovate, 4-angled, nearly sessile. *Stem* 6'-12' high; *flowers* 4"-5" in diameter.

EPILOBIUM, L. WILLOW HERB.

Calyx-tube not prolonged beyond the ovary; the limb 4-cleft, deciduous; *petals* 4; *stamens* 8; *capsule* elongated, many-seeded; *seeds* with a tuft of long hairs at the apex; perennials, with alternate and opposite denticulate *leaves* and chiefly white or purplish *flowers*.

E. ANGUSTIFOLIUM, L. *Stem* tall, simple, smoothish; *leaves* alternate, lanceolate, entire or wavy on the margins, paler beneath; *racemes* elongated, bracted; *flowers* showy; *petals* obovate, purple; *stigma* 4-lobed; *capsule* and *calyx* hoary-tomentose.

JUSSIÆA, L.

Calyx-tube long, 4-angled or cylindrical, not prolonged beyond the ovary; the limb 4-6-lobed, persistent; *petals* 4-6; *stamens* 8-12; *capsule* mostly elongated, 4-6-celled, many-seeded, opening irregularly at the sides. Marsh herbs, with alternate *leaves*, and axillary yellow *flowers*.

J. LEPTOCARPA, Nutt. Hairy; *stem* erect, at length much branched; *leaves* lanceolate, acute; *flowers* small; *calyx*-lobes mostly 6, as long as the petals; *capsule* linear, cylindrical, much longer than the pedicel. Marshes. Stem 2°-5° high; capsule 1½' long, slightly curved; annual.

J. DECURRENS, DC. Smooth; *stem* erect, branched, wing-angled; *leaves* lanceolate, acute, sessile; *flowers* nearly sessile; *calyx*-lobes 4, nearly as long as the petals; *stamens* 8; *capsule* 4-angled, oblong-clavate. (*Ludwigia decurrens*, Ell.) Stem 6'-3° high; annuals.

J. OCCIDENTALIS, Nutt. Pubescent; *stem* erect, angled; *leaves* lanceolate, acute at each end, sessile or with short petioles; *flowers* (rather large) on very sharp mostly bracteolate pedicels; lobes of the *calyx* 4, ovate, acute, shorter than the obovate emarginate petals; *stamens* 8; *capsules* elongated, 4-sided, thrice the length of the pedicels.—*Drummond*.

LUDWIGIA, L. SEED-BOX.

Calyx-tube 4-angled or cylindrical, mostly short, not prolonged beyond the ovary; *petals* 4, roundish or obcor-

date, often wanting; *stamens* 4; *style* short; *stigma* capitate; *capsule* variously dehiscent, 4-celled, many-seeded.— Perennial and mostly stoloniferous marsh *herbs*, with entire *leaves* and yellow *flowers*.

** *Valves of the capsule separating from the concave disk, and irregularly from the persistent partitions and placenta; calyx-lobes persistent; petals small or none; stamens and style short; stems erect or ascending; leaves alternate; flowers sessile.*

† *Petals conspicuous.*

L. LINEARIS, Walt. Smooth; *stem* (1° – 3° high) virgately much branched; *leaves* linear, acute; *flowers* small; *capsule* clavate-oblong, with 4 rounded angles, 2–3 times as long as the triangular-ovate *calyx-lobes*. Bark at the base of the stem spongy.

L. LINIFOLIA, Poir. Smooth; *stem* low (6'–12'), creeping at the base, branching; *leaves* linear or linear-spatulate, often obtuse; *capsule* linear-cylindrical, rather longer than the lanceolate *calyx-lobes*. Swamps in the low country.

† *Petals minute or wanting.*

L. CYLINDRICA, Ell. Smooth; *stem* angled above, often much branched; *leaves* long, lanceolate, obscurely denticulate, acute, tapering into a petiole; *petals* none; *capsules* axillary, often clustered, cylindrical or obscurely 4-sided, many times longer than the small *calyx-lobes*. Swamps. Stem mostly bushy, 2° – 3° high; *leaves* 3'–4' long.

L. PILOSA, Walt. Tomentose; *stem* stout, terete, much branched; *leaves* sessile, lanceolate or oblong, acute; *flowers* in dense terminal spikes; *petals* mostly wanting; *capsule* globose 4-sided, about as long as the spreading *calyx-lobes*. (*L. mollis*, Ell.) Ditches and ponds. Stem 2° – 3° high, the branches spreading; *capsule* whitish.

L. ALATA, Ell. Smooth; *stem* slender, simple or sparingly branched near the summit, strongly angled; *leaves* cuneate-lanceolate, obscurely endiculate; *flowers* few, near

the summit of the branches, white; *petals* none; *capsule* cubic-obconical, with concave sides and winged angles, as long as the *calyx*-lobes; *seeds* ovoid. Stem 2° – 3° high.

L. MICROCARPA, Michx. Smooth; *stem* low, creeping at the base, 3-angled, mostly simple; *leaves* spatulate-obovate, *petals* none; *capsule* minute, cubic-obconical, shorter than the *calyx*-lobes. Stem 6'–12' high; *capsule* scarcely larger than a pin's head.

*** *Stems creeping; leaves opposite.*

† *Petals none.*

L. PALUSTRIS, Ell. Smooth; *stems* diffuse; *leaves* obovate, tapering into a long petiole; *capsule* oblong or obconical, obscurely 4-sided, longer than the *calyx*-lobes. Stems 6'–12' long.

L. SPATHULATA, Torr. and Gray. Pubescent and somewhat hoary; *leaves* spatulate-obovate; *capsule* ovoid.

†† *Petals 4.*

L. NATANS, Ell. Smooth; *stems* diffuse; *leaves* obovate, acutish, tapering into a long petiole; *flowers* short-pedicelled; *petals* roundish, as long as the lobes of the *calyx*; *capsule* obtusely 4-angled, narrowed at the base.

PROSERPINACA, L.

Calyx-tube 3-sided, 3-lobed; *petals* none; *stamens* 3; *stigmas* 3; *fruit* bony, 3-angled, 3-celled, 3-seeded.—*Herbs*, with pinnately dissected leaves, and minute axillary greenish *flowers*.

P. PALUSTRIS, L. *Leaves* lanceolate, sharply serrate, the submerged ones pectinate; *stem* 1° – $2\frac{1}{2}^{\circ}$ long, ascending or floating.

MYRIOPHYLLUM, Vail. WATER-MILLFOIL.

Flowers monœcious or polygamous; *calyx* 4-parted in the sterile flowers, 4-toothed in the fertile ones; *petals* 4 or none; *stamens* 4 or 8; *stigmas* 4, recurved; *fruit* bony, 4-celled, 4-lobed, indehiscent.—Aquatic perennial *herbs*, with the submerged *leaves* pinnately divided into filiform or capillary segments, and commonly whorled; flowers minute in the axils of the upper leaves, the uppermost sterile.

* *Stamens* 8; *fruit* even or warty.

M. LAXUM, Shuttl. *Stem* long, slender; *leaves* 4 in a whorl, the floral ones reduced to minute nearly entire spatulate bracts, shorter than the flowers, which thus form an interrupted almost naked spike; *fruit* roughened with minute warts, with the lobes obtuse. Ponds and lakes.

M. VERTICILLATUM, L. *Leaves* in whorls of 3-4, the floral ones linear, pectinately toothed, much longer than the flowers; *fruit* smooth. Still water. *Stem* 2°-4° long, stouter than the last.

** *Stamens* 4; *fruit* ridged and roughened.

M. HETEROPHYLLUM, Michx. *Stem* thick; *leaves* 4-6 in a whorl, the floral ones crowded, ovate or lanceolate, finely and sharply serrate; the lower ones pinnatifid; *fruit* slightly roughened.

49. CACTUS FAMILY. Order, CACTACEÆ.

Succulent, shrubby, and commonly leafless and prickly *plants*, with globular, or columnar and angular, or flattened and jointed *stems*, and solitary sessile *flowers*; *sepals* and *petals* similar, imbricated in several rows, and adherent to the 1-celled ovary; *stamens* indefinite, with long

filaments, inserted on the base of the petals; *style* single; *stigmas* numerous; *fruit* baccate; *seeds* numerous, campylotropous, borne on several parietal placentæ; *albumen* scanty or none.

CEREUS, Haw.

Sepals and *petals* united into an elongated tube above the ovary; *stamens* inserted on the tube; *style* filiform; *stigma* many-lobed; *seeds* without albumen; *stems* elongated, ribbed or angled, the angles bearing tufts of spines and showy *flowers*.

C. VIRIDIFLORIS. *Stems* 3'-6' and sometimes 8' high, 1'-2' in diameter; *spines* usually 3"-5" or nearly 6" long; central spine, if present, 6"-10" long. In one specimen, on some of the *areolæ* most of the spines are purple, the central one being curved upward, with a purple or white tip; *flower* 1' or less below the top, 1'-1½' long, not quite wide even when fully open; *petals* 2"-3" wide; *fruit* 3"-6" long, crowned with a withered corolla.—Dr. Engelmann.

C. CHLORANTHUS. *Stem* 3'-10' long, 1½'-2' in diameter; *areolæ* 3-4 lines apart, not so much elongated as in the last species; radial *spines* slender, patulous, not strictly radiating, pectinate or appressed to the plant; lower lateral ones the longest, inferior ones shorter, upper ones shortest; no central spines are present in the young plants, next 1-3 appear, and the well-developed flower-bearing plants have always 5; the upper darker and shorter ones are about 6" long, the lower ones 9"-12" or even 15" long; the lowest one is the longest and regularly deflexed, so that the plant seen from above shows as many rays formed by these spines as there are ribs. *Flowers* yellowish green, always low down on the plant, forming a circle round the stem; flowers an inch long, funnel-shaped, not fully opening even in the bright sunshine;

fruit 6" or less in thickness, crowned with the conic remains of the flower; *stamens* very numerous (Mr. Wright counted 400), half as long as the petals; *stigmata* green, much exsert.—*Dr. Engelmann.*

C. DASYACANTHUS. *Stems* 5'-12' high, 2'-4' in diameter, densely covered by the innumerable ashy-gray or reddish spines; lower lateral *spines* somewhat bulbous and compressed at the base, 6"-7" long, upper ones 3"-4", and lower ones 5" long; upper central spines shorter than the lower ones—these are stoutest and of about the length of the lower external spines, or a little longer; *flowers* large and numerous, from the upper axillæ of the past year's growth; *flowers* 3' long, and of the same diameter, very showy, externally greenish yellow, with the center of the sepals red; *petals* bright yellow; *stamens* (counted by Mr. Wright, over 1700) with yellowish-green filaments; *pistil* stout; *stigmata* thick, erect; *flower* opening only in bright sunshine, about middle of the day, closing in the afternoon, but reopening the next, or even the third day; *fruit* subglobose, 1'-1½' in diameter, green or greenish purple; when fully ripe, "delicious to eat, much like a gooseberry." Western Texas.—*Engelmann.*

C. CÆSPITOSUS. This species has 12-18 *ribs*, 20-30 radial *spines*, rarely with 1 or 2 central ones here and there; *flowers* 2'-3' in diameter; *petals* sometimes though rarely curly; *stigmata* 12-18; *fruit* 9"-10" long, oval, generally bursting irregularly; *flower-tube* covered with darkish wool and slender bristles. Western Texas.—*Engelmann.*

C. DUBIUS. *Stems* 5'-8' high, pale green color and soft flabby texture; *ribs* few, broad; *grooves* shallow; radial *spines* 6"-12" or 15" long, lower ones longer than the upper ones; *flowers* 2½' long, of the same diameter; *petals* few and only 6" wide, rose-color, and mostly quite obtuse and almost entire; *fruit* 1'-1½' long, with 20-24 pulvilli,

on each of them 9-12 bristly spines 4"-9" long. Rio Grande.—*Engelmann*.

C. PAUCISPINUS. *Stem* 5'-9' high, 2'-4' in diameter, not cæspitose, but either simple or with few branches from near the base; *ribs* few, grooves wide and shallow; *areolæ* 8"-10" apart; *spines* few and dark-colored, 9"-15" long, upper one often shorter, and central spine when present 15"-20" long; *flower* not described.—*Engelmann*.

C. BERLANDIERI. A spreading procumbent plant, with erect *branches* contracted at the base, and thereby articulated, 1½'-6' long, ¾'-1' thick, either terete with distinct spirally-disposed tubercles, or the tubercles arranged in 5 or 6 ribs; *areolæ* 4"-6" apart; radial *spines* bristle-like (weaker than C. procumbens), 4"-5" long, sometimes a stouter and darker one at the upper end of the areolæ; central spine yellowish brown, shorter on the lower part of each branch, longer toward the top, from 5"-6" to 10"-13" in length; *flower* 3'-4' long, or when fully open spreading 'almost 4', and only 2' in height; *bristles* of the tube below 2"-3", upward 4"-6" long, the tomentum white and short; *petals* long and narrow, 3"-4" or rarely 5" wide, bright rose-purple; *filaments* short, pale rose-colored; *stigmata* long and sub-erect; *berry* 9' long, densely covered with the elongated mottled hairlike spines. Named for Dr. J. L. Berlandier, who found it on the lower Rio Grande. Native of Southern Texas.—*Emory's Reports*.

C. PROCUMBENS. Similar to the last, but more slender; *branches* ½'-3'-4' in length, 6"-8" in diameter; *tubercles* 4"-5" apart, in 4 rows when the branches appear quadrangular, or in 5 rows when they are more terete; radial *spines* 1"-2" long, central one or lower part of joint wanting, or hardly longer than the radial ones, on the upper part 2"-4" wide; *fruit* 6"-8" long; *seed* compressed.—*Engelmann*.

C. TUBEROSUS. *Stem* 1°-2° high, lower part ligneous,

scarcely as thick as a quill; young *branches* 4''-8'' in diameter; *ribs* very little prominent; *areolæ* 1''-2'' apart; radial *spines* a line long or less; central spine 2''-3'' long; in robust plants the entire spine is brown or black, rigidly erect; *flower* over 2' long and of the same diameter, opening for several days, but only in bright sunshine; *ovary* and tube covered with very woolly pulvilli in the axils of the reddish scales, with 6-8 long white or black bristles; *petals* rose-color or purple, 1' long; *fruit* covered with long wool and black and white bristles. Rio Grande.—*Dr. Engelmann* and *Dr. Poselger*.

C. VARIABILIS, Pfeiff. Tall species, 3°-10° high; full-grown *stems* 3-4-angled, with few and stout *spines*; but young shoots with 8 *ribs* and numerous slender *spines*; *flowers* white, nocturnal; *fruit* oval, about 3' long, spinose, crimson externally and internally; *seed* obliquely obovate. Southern Rio Grande.

C. GREGGII. *Root* a dirty, large, fleshy tuber, often 4'-6' in diameter, and about 6'-10' long, generally producing but one *stem* 2°-3° high, with erect branches; stem thin at base, rather terete and ligneous, upward 9''-12'' in diameter, usually 4-5-angled. The acute ribs at first sight seem crenulate, the pulvinate areolæ being separated by a slight depression, and the spines being scarcely visible without close examination; *areolæ* 1''-1½'' long; *spines* remarkably short, and from a disproportionately thick base, only 1' long; the 3 lowest spines are the longest, and run into a fine bristly point, often somewhat curved; *ovary* 9''-12'' long; whole *flower* 6'-8' long, about 2½' in diameter; *bristles* at base of the tube 1''-2'', or upward 4''-6''; *berry* ovate, 1½' long, 1' in diameter. Stem always triangular, of a reddish-brown color.—*Engelmann*.

C. VASMERII. *Calyx*-tube prolonged; three rows of *sepals*, the outside row greenish white, segments long and narrow, lanceolate, acuminate; *stamens* long, the upper

ones much exserted, rising in a long funnel-shaped tube above the corolla; *stigma* 6-cleft; *flower* 9 inches long, and 6 in diameter; *calyx*-tube smooth, with a very few minute spines at the base, and a few imbricated scales scattered at intervals from base to summit, where they form a petal-like crown supporting the pure white corolla. Stem 3° – 4° high, sometimes 4-angled at the base, but upper joints 3-angled, narrow at the base; whole plant rather recumbent; *spines* few, in clusters of 7, six 4 lines long, the seventh about 1' long, curved upward; *flower* white, very fragrant, vesperine, blooming but once. On hills near La Grange. Introduced into gardens by Mrs. T. W. House; named for Mrs. Vasmer.—*Author*.

OPUNTIA, Tourn. PRICKLY PEAR.

Sepals and *petals* not united into a tube; *stamens* inserted into the base of the petals; *style* cylindrical; *stigma* 3–8-lobed; *seeds* with thin albumen; *stems* with flat or rarely cylindrical joints; *leaves* fleshy, with tufts of bristly hairs and commonly strong spines in their axils, deciduous.

O. VULGARIS. *Stem* prostrate; joints obovate, pale; *spines* few and short; *fruit* nearly smooth.

O. STENOPETALA. *Joints* 7'–8' in diameter, pulvilli about $1\frac{1}{4}'$ or $1\frac{1}{2}'$ apart on the surface, much crowded toward the edges, with much dirty-white wool, short dark-brown bristles, and very dark, almost black spines, lighter at the tip; the stouter *spines* $1\frac{1}{2}'$ –2' long, flat on the upper, rounded on the lower surface, often much covered; *ovary* 9" long; *leaves* or *sepals* on the tubercles deciduous, very slender, 2'– $2\frac{1}{2}'$ long; *sepals* and *petals* 4"–6" long, not more than 1' long at the base, very slender, acuminate, fleshy; *sepals* greenish red, *petals* orange; *stamens* numerous, half as long as the petals; *style* very much inflated in the middle,

with a single pointed *stigma*. Lower Rio Grande. Dr. J. Gregg described it in 1848.

O. STRIGIL. *Stems* 2° high, pale green; joints covered with numerous pulvilli, each with a bunch of bright red-brown spines, paler at the tip, which gives the plant a very showy appearance; *joints* 4' or 5' long, 3'-4' wide; *spines* 5-8; *flower* not described; *fruit* 6''-7'' long and about 6'' thick. Around San Antonio.

O. ENGELMANNII. A stout coarse-looking *plant*, 4°-6° high; lower part of the old *stems* woody, with loosely reticulated ligneous fibers, and with a gray back often covered with lichens about 6' in diameter; *joints* in larger species 1° long; *flowers* 2'-3' in diameter; *ovary* short; *petals* comparatively narrow and not emarginate. *Ovary* 1½' long; *fruit* sub-globose, dirty purplish; pulp bright purple; insipid and even nauseous taste. New Braunfels.—*Dr. Lindheimer.*

O. MACRORHIZA. *Roots* large, tuberous; *flower-bud* long-acuminate, and the stigmata always 5. Austin and San Antonio.—*Dr. Lindheimer.*

MAMMILARIA.

Tube of the *calyx* adherent to the ovary; the lobes 5-6, crowning the young *fruit*, colored; *petals* 5-6, scarcely distinct from the calyx, longer than the sepals and united with them into a tube; *stamens* filiform, in several series; *styles* filiform; *stigma* 5-7-cleft, radiate; *berry* smooth. *Plant* roundish or somewhat cylindrical, destitute of a woody axis, often with a somewhat milky juice, covered with conical or mammæform crowded spirally-disposed tubercles, which bear deciduous spines and tomentum at their extremity; *flowers* sessile among the tubercles, usually in a transverse zone.—*De Candolle.*

M. TEXANA. *Heads* 1'-1½' in diameter, 1'-2½' high, usually covered below with young branches, and finally densely caespitose; *tubercles* 3"-4" long, dark green; *axillæ* quite woolly, with several coarse twisted bristles mixed with the wool; exterior hairlike spines covering the whole plant as with a coarse wool, often 6"-8" long, whitish, with dark tops, in robust ones yellow at base, brown upward, and almost black at top; *flowers* 7"-10" long. Along the Rio Grande.—Dr. Poselger.

M. SPHERICA. *Plants* 2' long, 1¾' in diameter above, narrowed below, the old tubercles withering and leaving a short clavate scaly stem; *ovary* exsert; *flowers* quite large. The tubercles soon become proliferous, and the branches increase and reproduce often in such a manner as to form large and hemispherical masses. *Tubercles* 6"-8" long; *spines* 3"-4" long; *flowers* 1½'-2' in length, and fully as widely open in bright sunshine; tube slender, funnel-form, remarkably constricted above the oval ovary. On Gulf prairies.

ECHINOCACTUS, Link and Otto.

Sepals numerous, imbricated, adnate to the base of the ovary and united in a very short tube, the exterior involucriform, the inner petaloid; *stamens* numerous; *style* filiform, many-cleft at the apex; *berry* somewhat squamose with the vestiges of the sepals.—*Plant* simple, ovate or globose, leafless, with alternate vertical ribs and furrows, the former bearing fascicles of spines; *spadix* none; *flowers* from the clusters of spines at the summit of the ribs, similar to those of Cereus, but with scarcely any tube.—De Candolle.

E. TEXENSIS, Hoepf. *Fruit* red and juicy, drying up very soon; *seeds* 1-2—1-4 lines long, somewhat reniform, with a deep indentation including the circular hilum; *testa*

smooth and shining, indistinctly tuberculated; *embryo* curved or hooked, with the foliaceous cotyledons buried in the large albumen.—*Dr. Engelmann.*

E. BICOLOR. *Stem* 4'–6' high, 2'–3' in diameter; grooves rather shallow; floral *areolæ* close to the spiniferous one, without the intervening glands which are so conspicuous in some other species; the 4 upper *radial spines* about an inch long and flat; all the others rounded, red, paler at both ends; the lowest is the weakest and shortest one, and often somewhat curved; *upper central spine* 15''–20'' long, the 3 others shorter; the lower one flat above, rounded below, often reddish like the lower radial spines; *flower* between 2' and 3' long; *petals* bright purple or rose-purple, gradually paler in fading; *filaments* springing from the whole tube down to its base.—*Engelmann.*

E. VIRIDESCENS, Nutt. One foot high, 9'–10' in diameter; they are usually simple, but sometimes they branch from the base, forming quite a pile of prickly balls; *flowers* disposed in a circle around the vertex, greenish, 1½' long, 1¼' in diameter, tube inside naked at the base; *stamina* short; *style* 1' long, more deeply divided than in other species; *fruit* 8''–10'' long, of the shape and taste of a gooseberry, bluish green; *radial spines* 18–20, about 6''–8'' long; *central spine* about 18' long.

50. CURRANT FAMILY. *Order, GROSSULACEÆ.*

Spiny or unarmed *shrubs*, with alternate palmately veined and lobed leaves, without stipules, and with axillary racemose or clustered *flowers*; *calyx*-tube adherent to the ovary, the limb 5-lobed; *petals* 5, small; *stamens* 5; *ovary* 1-celled, with 2 parietal placentæ; *styles* more or less united; *fruit* a 1-celled, many-seeded berry; *seeds* anatropous, with the minute embryo at the base of hard albumen.

RIBES, L. CURRANT; GOOSEBERRY.

Character of genus same as order.

R. AUREUM. *Plant* smooth; *leaves* 3-lobed, lobes divaricate, entire or with a few large teeth; *petioles* longer than the leaves; *bracts* linear, as long as the pedicels; *racemes* lax, with many bright-yellow flowers; *calyx* tubular, longer than the pedicels, segments oblong, obtuse; *petals* linear; *fruit* smooth, oblong or globous, yellow, finally brown.—A beautiful *shrub*, 6–10 feet high; *flowers* numerous, very fragrant. Red River.—*Marcy*.

51. LOASA FAMILY. Order, LOASACEÆ.

Herbs, commonly armed with bristly barbed and stinging hairs; *leaves* alternate, exstipulate; *flowers* solitary or clustered; *calyx*-tube adherent to the 1-celled ovary, the limb 5-parted and persistent; *petals* 5 or 10, inserted on the throat of the calyx; *stamens* mostly indefinite, in several parcels, inserted with the petals; *styles* united; *capsule* irregularly dehiscent; *seeds* few or many, borne on 3–5 parietal placentæ, commonly with scanty albumen.

MENTZELIA, Plum.

Calyx-tube cylindrical or club-shaped; *petals* convolute in the bud; *stamens* commonly 30 or more, the exterior ones often dilated and sterile; *styles* 3, united to the middle; *capsule* 3-valved at the summit, with 3 parietal placentæ; *cotyledons* broad and flat. *Stems* branching; *leaves* toothed or sinuate-pinnatifid; *flowers* yellow.

M. OLIGOSPERMA, Nutt. *Flowers* deep golden-yellow, 8''–10'' in diameter, expanding in sunshine, evanescent; *leaves* lanceolate-ovate, often acuminate, on very short petioles, cuneate at the base, incisely toothed or somewhat

lobed; *petals* cuneate-oblong, cuspidate, entire, a little longer than the numerous *stamens*; *capsule* very narrow, about 3-seeded; *seeds* linear oblong.—*Gray and Torrey.*

M. NUDA. Rough with minute barbed pubescence; *leaves* somewhat lanceolate, interruptedly pinnatifid, the segments obtuse; *flowers* large, terminating the branches, not bracteolate; *petals* 10; *stamens* very numerous; the exterior filaments petaloid and often sterile, the other filiform; *capsules* 3-valved at the summit; *seeds* numerous, winged. Wichita River.—*Marcy.*

52. TURNERA FAMILY. Order, TURNERACEÆ.

Sepals united into an equal 5-lobed calyx, imbricated in æstivation; *petals* 5, equal, inserted on the calyx, with a twisted æstivation; *stamens* 5, alternate with the petals and inserted below them, distinct; *anthers* intorse; *ovary* free from the calyx, 1-celled, with 3 parietal placentæ; *ovules* numerous; *styles* 3, commonly branched; *capsule* 3-valved, loculicidal; *seeds* numerous, anatropous, with a membranaceous arillus on one side.—*Herbaceous* or sometimes suffrutescent plants; *peduncles* 1-flowered; *petals* yellow.

53. PASSION-FLOWER FAMILY. Order, PASSIFLORACEÆ.

Climbing *herbs* or *shrubs*, with alternate mostly stipulate leaves, and axillary often showy flowers; *calyx* of 4–5 more or less united sepals, commonly bearing at the throat 4–5 petals, and a crown of slender filaments in one or more rows; *stamens* 4–5, monadelphous below and enclosing the stipe of the ovary; *ovary* 1-celled, with 3–4 parietal placentæ; *styles* 3–4, clavate; *fruit* fleshy or baccate; *seeds* numerous, anatropous, included in a pulpy sac; *embryo* in the axis of fleshy albumen.

PASSIFLORA, L. PASSION-FLOWER; MAY-POP.

Calyx-tube very short; *filaments* of the crown in 2 or more rows; *fruit* baccate; *tendrils* axillary; *peduncles* jointed, 1-flowered.

P. INCARNATA, L. *Leaves* palmately 3-lobed, acute, serrate; *petioles* biglandular; *peduncles* 3-bracted; *sepals* with a hornlike point below the apex, whitish within; *filaments* of the crown in about 5 rows, the two outer ones as long as the sepals; *berry* large, oval; *fruit* yellowish, as large as a hen's egg; *flowers* purple and white; perennial.

P. LUTEA, L. *Leaves* cordate, broadly 3-lobed at the summit, with the lobes rounded and entire; *petioles* glandless; *flowers* small, greenish-yellow; *peduncles* by pairs, bractless; *filaments* of the crown in 3 rows, shorter than the sepals.

54. GOURD FAMILY. Order, CUCURBITACEÆ.

Herbs, with succulent *stems*, climbing by means of lateral tendrils; *leaves* alternate, palmately veined or lobed; *flowers* axillary, monœcious or diœcious; *calyx* 5-toothed, adnate to the ovary; *corolla* of 5 distinct or more or less united petals, coherent with the calyx; *stamens* 3-5, free or variously united; *anthers* long, straight or tortuous, commonly connate; *ovary* 1-3-celled; *stigmas* 3; *fruit* (a pepo) fleshy or pulpy, 1-3-celled; *seeds* compressed, anatropous, without albumen; *cotyledons* leafy.

SYNOPSIS.

Petals 5, distinct or united at the base. *Ovary* 3-celled. *Fruit* 3-seeded, smooth.

BYRONIA.

Petals 5, united at the base into a flattish nearly rotate corolla. *Ovary* 3-celled.

Fruit fleshy, echinate, 3-6-seeded.....DISCANTHERA.

Petals 5, united at the base, a rotate corolla. *Ovary* 1-celled. *Fruit* 1-seeded, hispid.....SICTOS.

BYRONIA, L.

Flowers monœcious or diœcious; *calyx* 5-toothed; *petals* 5, distinct, or united at the base; *stamens* 5, triadelphous; *anthers* tortuous; *style* mostly 3-cleft; *fruit* ovate or globose, smooth, few-seeded.

B. BOYKINII, Torr. and Gray. Rough pubescent; *leaves* broadly cordate, 3-5-lobed, the lateral lobes entire or toothed, the middle one cuspidate; sterile and fertile *flowers* intermixed, 3-5 in a cluster, short pediceled; *styles* united; *fruit* 3-seeded, the *seed* 3-toothed at the base; *flowers* greenish white; *berry* crimson.

DISCANTHERA, Torr. and Gray.

Flowers monœcious.—STERILE FLOWERS: *Calyx* obsolete; *petals* 5, ovate, united at the base into a flattish nearly rotate *corolla*; *stamens* 2; *filaments* very short, connate; the *anthers* forming a flat peltate disk, opening all around the even continuous margin, both superior and inferior surfaces furnished with a minute ciliate fringe; *disk* and rudiment of the ovary none.—FERTILE FLOWERS: *Calyx* produced beyond the ovary into a filiform tube, the teeth obsolete; *petals* nearly as in the sterile flowers; rudimentary *stamens* none; *disk* none; *ovary* 3-celled, with apparently about 6 erect or ascending ovules; *seeds* 3-4 or 6, large, flat.—A slender trailing or climbing *herb*, with pedately dissected leaves and simple tendrils; *flowers* white, very small; the sterile in filiform often somewhat compound *racemes*, the fertile ones solitary in the same axil on short peduncles.

D. DISSECTA. *Stems* slender; *leaves* ternately divided, the divisions attenuated and linear at the base, or petiolulate, the petiolules slightly margined; the terminal division 3-parted; the lobes irregularly toothed or sinuate, the

middle one oblong, conspicuously mucronate; the lateral ones shorter, and often 2-3-lobed; lateral divisions 2-parted; the segments deeply 2-3-lobed, and sinuate-toothed; sterile *racemes* as long as the leaves; *flowers* scarcely on short pedicels; *peduncle* of fertile flowers scarcely as long as the fruit; *ovary* 3-celled, ovules erect from near the base of the cell; the young fruit thickly clothed with long, weak, and soft smooth prickles.—*Drummond*.

SICYOS, L.

Flowers monœcious; *calyx* flattish, with 5 subulate or minute teeth; *petals* 5, united below in a rotate corolla; *stamens* 5, monadelphous or triadelphous; *ovary* 1-celled, 1-ovuled; *style* slender; *stigma* 3; *fruit* membranaceous, bristly, 1-seeded.—*Annual* herbs; sterile and fertile flowers mostly from the same axil.

S. ANGULATUS, L. *Plant* hairy and clammy; *leaves* thin, cordate, with 3-5 acuminate denticulate lobes; sterile *flowers* racemose; the fertile ones in peduncled clusters, whitish.

55. SURIANA FAMILY. Order, SURIANACEÆ.

A downy *shrub*, with alternate crowded exstipulate leaves, and perfect yellow flowers, in small axillary bracted racemes; *calyx* 5-parted, persistent, the base filled with a fleshy torus, which bears the ovaries, petals, and stamens; *petals* 5, oblong-obovate; *stamens* 10, hairy, the alternate ones short and sterile; *ovaries* 5, distinct, with 2 erect collateral orthotropous ovules in each; *styles* 5, each arising from the central angle of the ovary near the base, thickened upward; *carpels* 1-seeded, indehiscent; *seeds* without albumen; *embryo* hooked.

56. ORPINE FAMILY. *Order*, CRASSULACEÆ.

Succulent *herbs*, with exstipulate leaves, and regular, perfect and mostly cymose flowers; *sepals* 3-20, more or less united at the base, persistent; *petals* as many as the sepals, inserted on the base of the calyx, imbricated in the bud, rarely wanting; *stamens* as many or twice as many, inserted with the petals; *ovaries* as many as the sepals, separate or united below; *carpels* several-seeded, opening along the inner suture; *seeds* anatropous; *embryo* straight, in their albumen.

SYNOPSIS.

Carpels distinct. Sepals 4-5. Stamens 8-10.....	SEDUM.
— united at the base. Sepals 4. Stamens 8.....	DIAMORPHA.
— united above the middle. Sepals 5. Stamens 10.....	PENTHORUM.

SEDUM, L. ORPINE; STONE CROP.

Sepals 4-5; *stamens* 8-10; *carpels* distinct, many-seeded, with an entire scale at the base of each.—*Herbs*, smooth and fleshy.

S. PULCHELLUM. *Stems* ascending (4'-12' long); *leaves* very numerous, alternate, linear, obtuse; *cyme* composed of several recurved or spreading branches; *flowers* pale purple; *sepals* much shorter than the petals; *stamens* 8, those of the central flowers mostly 10; *carpels* tapering into the long and slender *style*.

PENTHORUM, Gron.

Sepals 5; *petals* 5, often wanting; *stamens* 10; *carpels* 5, united into a 5-celled capsule, spreading at the summit, which falls away at maturity; *seeds* numerous.—Perennial *herbs*, with alternate serrate leaves, and yellowish flowers on one side of the revolute branches of the simple *cyme*.

P. SEDOIDES, L. *Stem* erect, 1° – 2° high; *leaves* lanceolate; *petals* commonly none. Ditches and muddy places.

57. SAXIFRAGE FAMILY. *Order*, SAXIFRAGACEÆ.

Calyx of 4–5 more or less united sepals, free, or more or less adherent to the ovary, persistent; *petals* as many as the sepals, rarely wanting; *stamens* as many, or 2–4 times as many, inserted with the petals on the calyx; *ovaries* 2 or sometimes 3–4, commonly united below, and separate at the summit; seeds few–many; *embryo* straight, in the axis of fleshy albumen.

SYNOPSIS.

SUB-ORDER I. **Saxifrageæ.** Herbs. Petals imbricated in the bud. Stipules adnate to the petiole, or none.

* *Stamens twice as many as the sepals.*

† 2-celled.

Flowers perfect. Stamens 10. Leaves entire or lobed.....SAXIFRAGA.

†† *Capsule 1-celled.*

Stamens 10. Petals 5, entire.....TIARELLA.

—— 10. —— 5, *pinnatifid*MITELLA.

—— 8-10. —— *none*.....CHRYSOPLANIUM.

SUB-ORDER II. **Hydrangieæ.** Shrubs. Petals valvate or convolute in the bud. Leaves opposite. Stipules none.

Petals valvate. Stamens 8-10. Styles distinct.....HYDRANGEA.

—— *convolute. — 20 or more. Styles 4. Capsule 4-valved*....PHILADELPHUS.

SAXIFRAGA, L. SAXIFRAGE.

Calyx free, or cohering with the base of the ovary, deeply 5-cleft; *petals* 5, commonly deciduous; *stamens* 10; *styles* 2; *capsule* 2-celled, 2-beaked, opening between the beaks; *seeds* numerous, smooth; lowest *leaves* clustered.

*** Stem naked, scape-like.*

S. VIRGINIENSIS, Michx. Pubescent; *leaves* somewhat fleshy, obovate, crenately or sharply toothed, abruptly contracted into a slender petiole; *scape* slender; *panicle* loosely flowered; *sepals* spreading, half as long as the lanceolate-oblong, white, faintly-spotted petals; *filaments* filiform.

SAXIFRAGA (*Micranthis*) **TEXANA**, Buckley. *Leaves* all radical, glandular pubescent, obovate, entire, shortly and broadly petiolate; *stem* simple, slightly pubescent; *bracts* linear or subspathulate; *flowers* cymose paniculate; *sepals* ovate, subacute; *petals* spathulate-obovate, little longer than the calyx. Stems 4–6 inches high; leaves nearly sessile, and, including petiole, $\frac{3}{4}$ –1 inch long, obtuse, and about an inch wide.

TIARELLA, L. FALSE MITREWORT.

Calyx campanulate, nearly free from the ovary, 5-parted; *petals* 5, entire; *stamens* 10; *styles* 2; *capsule* membranaceous, 2-valved, the valves very unequal, 1-celled, few-seeded; *seeds* globular, smooth.—Perennial *herbs*, with scape-like *stems*, chiefly radical and petioled *leaves*, and small racemose *flowers*.

T. CORDIFOLIA, L. *Leaves* round-cordate, crenately or acutely lobed and toothed, hairy above, pubescent beneath, on long hairy petioles; *scape* (6'–12' high) naked, or bearing 1–2 alternate leaves above the middle; *racemes* simple or branched, many-flowered; *petals* oblong, white or purplish.

MITELLA, Tourn. MITREWORT.

Calyx coherent with the base of the ovary, 5-cleft; *petals* 5, pinnatifid; *stamens* 10; *styles* 2; *capsule* 2-beaked, 1-celled, 2-valved at the apex, many-seeded; *seeds* smooth,

borne on two parietal placentæ.—Perennial *herbs*, with broadly cordate and lobed *leaves*, and small *flowers* in a terminal raceme.

M. DIPHYLLA, L. *Hairy*; radical *leaves* cordate, acute, coarsely serrate and slightly 3-lobed, on long petioles; *stem-leaves* 2, opposite, sessile; *raceme* slender, loosely many-flowered. Shady woods. Stem 6'–12' high; *flowers* white.

CHRYSOSPLENIUM, Tourn. GOLDEN SAXIFRAGE.

Calyx-tube coherent with the ovary, 4–5-lobed, the lobes obtuse and yellow within; *petals* none; *stamens* 8–10, very short, inserted on a conspicuous disk; *styles* 2; *capsule* very short, 2-lobed, 1-celled, with 2 parietal placentæ, 2-valved at the apex, many-seeded.—Smooth and succulent *herbs*, with roundish leaves, and axillary flowers.

C. AMERICANUM, Schweinitz. *Stems* prostrate, forking; *leaves* mostly opposite, roundish, slightly lobed; *flowers* solitary, greenish; perennial.

HYDRANGEA.

Calyx-tube hemispherical, 8–10-ribbed, coherent with the ovary, the limb 4–5-toothed, persistent; *petals* ovate, valvate in the bud; *stamens* 8–10, filiform; *capsule* crowned with the 2 diverging styles, 2-celled, many-seeded, opening at the apex between the styles.—Erect *shrubs*, with opposite petioled *leaves*, without stipules, and whitish or purplish *flowers*, in ample compound *cymes*; the marginal flowers mostly sterile, with the calyx-lobes enlarged and showy.

H. ARBORESCENS, L. Smoothish; *leaves* ovate, acute or acuminate, serrate, mostly rounded or cordate at the base; *cymes* crowded, flat-topped; sterile *flowers* few or none.—*Shrub*, 4°–8° high; *leaves* 3'–6' long.

H. *RADIATA*, Walt. *Leaves* ovate, acuminate, serrate, mostly cordate at the base, white-tomentose beneath; *cymes* flat-topped; sterile *flowers* few.—*Shrub*, 4°–8° high.

H. *QUERCIFOLIA*, Bartram. Young *branches* and *leaves* densely tomentose; leaves oval, sharply 5-lobed, serrate; *cymes* clustered, forming a close oblong panicle; sterile *flowers* large, numerous. Shady banks.—*Shrub*, 3°–6° high; *leaves* 4'–8' long; sterile flowers whitish, turning purple.

PHILADELPHUS, L. SYRINGA.

Calyx-tube turbinate, cohering with the ovary, the limb 4–5-parted, persistent; *petals* 4–5, convolute in the bud; *stamens* 20–40, shorter than the petals; *styles* mostly 4, more or less united; *capsule* mostly 4-celled, loculicidally 4-valved, many-seeded.—*Shrubs*, with simple opposite 3–5-ribbed *leaves*, without stipules, and large white solitary or cymose *flowers*.

P. *GRANDIFLORUS*, Willd. *Branches* and *leaves* pubescent; *leaves* ovate or ovate-oblong, acuminate, sharply serrate; *flowers* solitary, or 2 or more in a terminal cyme; *calyx*-lobes ovate, acuminate, much longer than the tube. Banks of streams, April and May.—*Shrub*, 6°–10° high, with long and slender branches.

58. WITCH-HAZEL FAMILY. Order, HAMAMELACEÆ.

Trees or *shrubs*, with alternate *leaves*, deciduous stipules, and clustered or spiked often polygamous or monœcious *flowers*; *calyx*-tube coherent with the base of the ovary; *petals* 4–5, long and linear, or none; *stamens* twice as many as the petals, with the alternate ones sterile, or numerous and perfect; *styles* 2; *capsule* woody, 2-celled,

opening at the summit; *seeds* anatropous, bony, 1-2 in each cell; *embryo* large and straight, in scarce albumen.

SYNOPSIS.

Calyx-lobes and petals 4. *Fertile stamens* 4. *Ovules solitary in each cell, suspended.*

HAMAMELIS.

Calyx and corolla none. *Flowers polygamous or monœcious, capitate. Stamens numerous. Ovules several.*.....LIQUIDAMBAR.

HAMAMELIS, L. WITCH-HAZEL.

Calyx 2-3-bracted, 4-parted; *petals* 4, long and linear; *stamens* 8, the alternate ones short and sterile; *styles* 2; *capsule* loculicidally 2-valved at the apex, the outer coat separating from the inner one, which encloses the seed, but soon splits elastically into 2 valves; *seeds* large, bony.—*Shrubs*; *leaves* short-petioled; *flowers* yellow, clustered.

H. VIRGINICA, L. A large *shrub*; *leaves* obovate or oval, oblique, crenate-toothed, pubescent; *flowers* appearing when the leaves are falling.

LIQUIDAMBAR, L. SWEET-GUM.

Flowers monœcious, in globular 4-bracted spiked heads; *calyx* and *corolla* none; *stamens* very numerous; *styles* 2; *ovary* 2-celled, with numerous ovules in each cell; *capsule* united in a close head, woody, 2-beaked, opening between the beaks, 1-2-seeded; *seeds* wing-angled.—*Trees*; *heads* of sterile *flowers* sessile, crowded, those of the fertile flowers on long nodding *peduncles*.

L. STYRACIFLUA, L. *Branches* with corky wings; *leaves* roundish, with 5-7 acuminate serrate spreading lobes.—A large *tree*. The exposed juice hardens into a fragrant gum.

59. PARSLEY FAMILY. *Order, UMBELLIFERÆ.*

Herbs, with chiefly hollow and furrowed *stems*, alternate mostly compound *leaves*, with dilated or clasping *petioles*, and umbelled *flowers*; *calyx*-tube coherent with the ovary, the limb 5-lobed or obsolete; *petals* 5, mostly incurved, inserted with the 5 *stamens* on the edge of the disk that crowns the ovary; *styles* 2. *Fruit* composed of 2 indehiscent carpels (*mericarps*), suspended from a filiform axis (*carpophore*), and cohering by their inner face (*commis-sure*), each furnished with 5 primary ribs, and often with as many secondary ones, the intervening spaces (*intervals*) usually containing channels (*vittæ*), which are filled with aromatic oil. *Seed* solitary, suspended; *embryo* minute, at the base of horny albumen; *umbels* and partial umbels (*umbellets*) commonly subtended by an involucre or involucl.

SYNOPSIS.

§ 1. *Inner face of the seed flat, or nearly so.*

* *Umbels simple, or one growing from the summit of another; stems creeping.*

Fruit orbicular, flattened. Leaves rounded.....HYDROCOTYLE.

Fruit globular. Leaves linear, fleshy.....CRANTZIA.

** *Umbels capitate; flower sessile.*

Fruit bristly, globular. Flowers polygamous. Involucl none... ..SANICULA.

Fruit scaly, turbinate. Flowers perfect, bracted. Heads involuclled...ERYNGIUM.

*** *Umbels compound; flowers pediceled.*

† *Fruit with bristly ribs, the bristles in a single row.*

Fruit 9-ribbed. Leaves finely 2-3-pinnate.....DAUCUS.

†† *Fruit smooth or slightly roughened.*

‡ *Fruit wingless, laterally compressed, or twin.*

Flowers white. Fruit subglobose. Calyx-limb 5-toothed.....CICUTA.

Flowers white. Fruit oblong. Calyx-limb obsolete. Divisions of the leaves lanceolate.....CRYPTOTENIA.

Flowers white. Fruit ovate, rough. Calyx-limb obsolete. Divisions of the leaves filiform.....LEPTOCAULIS.

- Flowers white. Fruit ovoid. Calyx-limb 5-toothed. Divisions of the leaves filiform.....DISCOPLEURA.
- Flowers white. Fruit oblong. Calyx-limb obsolete. Involucre 1-3-leaved, or none.....HELOSCIADIUM.
- Flowers white. Fruit globose. Calyx-teeth minute or none. Involucre 5-6-leaved. Leaves pinnate.....SIUM.
- Flowers yellow. Fruit ovoid-oblong. Leaves simple.....BUPIEURUM.
- Flowers yellow. Fruit ovoid-oblong, the intervals with 3 vittæ.....ZIZIA.
- Flowers yellow or dark purple. Fruit ovoid or oblong, the intervals with single vittæ.....THASPIUM.
- Flowers white. Fruit elliptical, with several vittæ in each interval..LIGUSTICUM.

†† *Fruit dorsally compressed, winged on the margins.*

|| *Margins of the fruit double-winged ; flowers white ; leaves pinnately compound.*

- Carpels 3-ribbed on the back, the intervals with single vittæ.....ANGELICA.
- Carpels 3-ribbed on the back, the intervals with 2 or more vittæ...ARCHANGELICA.
- Carpels 3-winged on the back, the intervals with 2-3 vittæ.....CONIOSELINUM.

|| *Margins of the fruit single-winged.*

- Fruit broadly-winged. Marginal wings remote from the 3 dorsal ones. Leaves simple, terete.....TIEDEMANNIA.
- Fruit as in No. 19. Leaves pinnate or ternate.....ARCEMORA.
- Fruit with all the ribs equidistant. Marginal flowers sterile. Plant woolly.
HERACLEUM.

§ 2. *Inner face of the seed concave.*

- Fruit linear-oblong, narrowed toward the apex.....CHÆROPHYLLUM.
- Fruit linear-clavate, narrowed toward the base.....OSMORRHIZA.

HYDROCOTYLE, Tourn. MARSH PENNYWORT.

Calyx-teeth obsolete ; petals not incurved ; fruit laterally compressed, orbicular ; carpels 5-ribbed, the dorsal and lateral ones often obsolete, the intermediate ones enlarged ; vittæ none.—Low marsh *herbs*, with slender creeping *stems*, and peltate or reniform *leaves* ; *umbels* small, axillary ; *flowers* white.

H. AMERICANA, L. Smooth ; *leaves* orbicular-reniform, crenately 7-lobed ; *umbels* sessile, 3-5-flowered ; *fruit* 2-ribbed ; *stems* stoloniferous ; *leaves* very thin, glossy.

H. UMBELLATA, L. Smooth; *leaves* orbicular, peltate, obscurely lobed, crenate; *umbels* globose, on peduncles commonly longer than the petioles; *fruit* 2-ribbed on each side. Wet places. Leaves 1' wide.

H. RANUNCULOIDES, L. Smooth; *leaves* orbicular-reniform, crenately 3-5-lobed; *umbels* few-flowered, on peduncles much shorter than the petioles, mostly nodding in fruit; *fruit* obscurely ribbed. Springs and muddy places. *Petioles* 6'-12' long; *peduncles* 1' long.

H. INTERRUPTA, Muhl. Smooth; *leaves* orbicular, peltate, crenate; *umbels* proliferous, the nearly sessile clusters forming an interrupted spike; *fruit* strongly ribbed. Wet places. *Petioles* longer than the peduncles.

H. REPANDA, Pers. Pubescent; *leaves* broadly ovate, truncate or slightly cordate at the base, glandular-serrate; *umbels* capitate, few-flowered, shorter than the petioles; *fruit* strongly ribbed. Low grounds.

CRANTZIA, Nutt.

Calyx-teeth obsolete; *petals* roundish; *fruit* globular; *carpels* 5-ribbed, the lateral ribs thickened and corky; *vittæ* single in the intervals, with 2 on the commissure.—Small creeping marsh *herbs*, with fleshy linear *leaves*, and small whitish *flowers* in axillary umbels.

C. LINEATA, Nutt. (*Hydrocotyle lineata*, Michx.) Muddy banks, near the coast. *Leaves* 1' long, with cross partitions, narrowed toward the base, obtuse; *involucre* 5-6-leaved.

SANICULA, Tourn.

Calyx 5-toothed, persistent; *fruit* globose, without ribs, armed with hooked prickles; the *carpels* not separating spontaneously, each with 5 *vittæ*.—Perennial erect branch-

ing *herbs*, with palmately-divided long-petioled leaves, and polygamous *flowers* in small heads, disposed in a loose expanding cyme.

S. MARILANDICA, L. *Leaves* 5-7-parted, the divisions lobed and toothed; *heads* many-flowered; sterile *flowers* numerous on slender pedicels; *styles* long, recurved. Dry woods. *Stem* 2°-3° high.

S. CANADENSIS, L. *Leaves* 3-5-parted, the divisions lobed and toothed; *heads* few-flowered; the sterile *flowers* (1-3) nearly sessile; *styles* short and straight. Dry woods, common. May. *Stem* 1°-2° high; branches of the *cyme* long and spreading.

ERYNGIUM, Tourn. BUTTON SNAKEROOT.

Calyx 5-toothed, persistent; *styles* slender; *fruit* turbinate, covered with scales or tubercles, without ribs or vittæ. — *Herbs*, with spiny or bristly mostly lobed or toothed leaves, and white or blue bracted *flowers*, closely sessile, in dense heads.

* *Fruit scaly; stems erect.*

E. VIRGINIANUM, Lam. *Leaves* linear-lanceolate, flat, the lowest ones spiny-serrate with the teeth incurved, or nearly entire, veiny; the upper narrower, spiny or pinnatifid; *leaves* of the involucre (blue), 3-5-cleft, longer than the head; *bracts* 3-cleft, as long as the flowers. Perennial; *stem* 2°-3° high; *flowers* blue.

E. VIRGATUM, Lam. *Leaves* short, oblong or oblong-ovate, serrate, the upper ones toothed or divided; *leaves* of the involucre entire, or with 2-4 bristly teeth, longer than the head; *bracts* 3-toothed; *stem* 1°-2° long; *leaves* 2'-3' long, sometimes cordate; *flowers* blue.

** *Fruit granular; stems diffuse.*

E. BALDWINII, Spreng. Small, prostrate, branching;

leaves thin; the earliest ones ovate, sharply serrate or toothed, long-petioled, the other 3-parted, with the middle segment lanceolate and commonly 3-toothed; *leaves* of the involucre subulate, longer or shorter than the oblong head; *bracts* spatulate, obtuse, barely exceeding the *calyx*. Annual; *stems* 5'-10' long; *flowers* blue.

E. DIFFUSUM. *Leaves* all sessile and palmately parted; *segments* oblong, incisely serrate and spinose; *stem* dichotomously branched, diffuse; *heads* subglobose, nearly sessile; *leaflets* of the involucre 4-6, 3-cleft, a little longer than the heads; *scales* lanceolate, entire. Wichita Mountains.—*Marcy*.

E. CORONATUM. *Cauline leaves* palmately 5-7-parted; divisions pinnatifid-lanceolate, with narrow spinose segments; *leaflets* of the involucre 9-12, lanceolate, entire, spiny at the tip, twice as long as the flowers; the terminal ones leafy and crowning the head; *stem* about 3°-4° high, with erect branches; *cauline leaves* 2'-4' in diameter; *heads* $\frac{1}{2}$ ' in diameter, crowned with several foliaceous spinose-dentate scales; *calyx*-tube clothed with acute vesicular scales.—*Drummond*.

E. LEAVENWORTHII. *Stem* stout, about 1°-2° high; *cauline leaves* palmately 5-7-parted, 2' long; *peduncles* 1' long; *heads*, exclusive of crown, 1'-1 $\frac{1}{2}$ ' long and nearly 1' in diameter, the axis proliferous and bearing a tuft of leaves at the summit resembling those of the involucre; *calyx*-lobes pinnatifidly 3-5-cuspidate, clothed with obtuse scales; the heads and upper part of the stem usually of a bright violet-purple color.—*Drummond*.

E. AQUATICUM, Linn. (*Button Snakeroot*.) *Leaves* broadly linear, with straight and simple parallel veins, remotely ciliate with soft spines; *leaflets* of the involucels mostly entire, shorter than the ovate-globose pedunculate heads; *scales* entire. Variable in size and in breadth of

leaves; sometimes scarcely 1° high, with leaves $2''$ – $3''$ wide; then again in favorable situations attaining the height of 4° – 6° , and the leaves $1'$ – $2'$ in breadth; *calyx*-tube with acute scales.—*Torrey and Gray*.

E. VIRGINIANUM, Lam. *Leaves* linear-lanceolate and linear-uncinately-serrate; leaves of the involucre 7–8, usually longer than the heads, 3-cleft or dentate-spiny; *scales* tricuspidate; *stem* $1\frac{1}{2}^{\circ}$ – 5° high, cymosely branched, and often compound at the summit, fistulous; radical and lower cauline leaves usually $5''$ – $10''$ wide, but sometimes very narrow, tapering at each end; the *teeth* remote and indistinct; *heads* numerous, $\frac{3}{4}'$ in diameter, pale blue or nearly white; *calyx*-tube imbricated with acute lanceolate vesicles.—*Torrey and Gray*.

DAUCUS. CARROT.

Calyx 5-toothed; *corolla* irregular; *fruit* oblong or ovate; *carpels* with 9 unequal bristly or prickly ribs, and a single vitta under the larger ribs.—Annual or biennial *herbs*, with pinnately finely-dissected leaves and involucre, and yellowish or white blossoms.

D. PUSILLUS, Michx. *Stem* rough with reflexed rigid hairs; *leaves* twice pinnate, with the divisions linear; *bristles* of the fruit barbed. *Stem* 1° – 3° high; umbels long-peduncled.

CICUTA. WATER HEMLOCK.

Calyx 5-toothed; *carpels* with 5 flattish equal ribs, the intervals with single vittæ, and 2 on the inner surface.—Smooth perennial marsh *herbs*, with hollow *stems*, and twice pinnately or ternately divided *leaves*; *involucels* many-leaved; *flowers* white; *fruit* roundish.

C. MACULATA, L. *Stem* large, 3°-6° high, purplish; *leaflets* ovate-lanceolate, acute, coarsely serrate; *umbels* large, many-rayed. Marshes and low places. Very poisonous.

LEPTOCAULIS, Nutt.

Calyx-teeth obsolete; *fruit* ovate, compressed on the sides, often rough or bristly; *carpels* 5-ribbed, the intervals with single vittæ, and 2 on the face.—Slender smooth *herbs*, with finely-dissected *leaves* and white *flowers*; *umbels* few-rayed; *involucre* none; *involucel* few-leaved.

L. DIVARICATUS, DC. *Stem* widely branched; *leaves* 2-3 pinnatifid, with the divisions filiform; *umbel* 3-4-rayed; *fruit* very small, roughened with minute scales. Annual; *stem* 18' high.

L. DIFFUSUS, Nutt. *Plant* 8'-15' high, very slender, with divaricate branches; *rays* of the umbel 1' or 1½' long; *fruit* roughened with minute tubercles, terminating in scales or branches; *pedicels* filiform, two-thirds as long as the rays of the umbel.—*Drummond*.

L. PATENS, Nutt. *Muricate* with minute tubercles; *rays* of the umbel and umbellets (4-8) very unequal, erect, spreading; *stem* 1°-2° high, branching above; *rays* of the umbel 5"-10" long, of the umbellets 2"-4".—*Dr. Leavenworth*.

L. ECHINATUS, Nutt. *Fruit* echinate with spreading uncinatè bristles; *rays* of the umbel (5"-6" long) 4-6, of the umbellets 6-10, slightly diverging.—*Plant* about a span high; *fruit* armed with stiff, whitish bristles, which are distinctly uncinatè.—*Drummond*.

DISCOPLEURA, DC.

Calyx-teeth subulate, persistent; *petals* ovate, entire, with a minute inflexed point; *fruit* ovate, somewhat didymous; *carpels* with the 3 dorsal ribs filiform, prominent, and rather acute, the 2 lateral ones united with a thin corky accessory margin; intervals with single vittæ; *carpopphore* bifid; *seed* somewhat terete; *leaves* much dissected, with setaceous segments; *leaflets* of the involucre pinnately 3-5-parted, or nearly entire; *flowers* white.—Annual, glabrous *herbs*.—Torrey.

D. NUTTALLII, DC.—Division of the *leaves* somewhat verticillate; *involucre* commonly less than half the length of the rays; the *leaflets* sometimes 3-cleft, those of the involucre mostly entire; *umbels* about 20-rayed; *fruit* rather broader than long. Plant erect.—Gray and Torrey.

D. CAPILLACEA, DC. *Umbels* 3-10-rayed; *leaves* of the involucre mostly 3-5-cleft; *fruit* ovate. *Stem* 1°-2° high, much branched. Brackish marshes.

THASPIUM, Nutt.

Perennial *herbs*, with 1-2 ternately-divided leaves; involucre, none; *flowers* yellow or purple; *calyx*-teeth short or obsolete; *fruit* ovoid or oblong, somewhat flattish at the sides; *carpels* commonly equally and strongly 5-ribbed.

Calyx-teeth obsolete.

T. TRIFOLIATUM, Gray. *Stem* 1°-2° high; *leaves* crenate, the lowest usually simple and cordate, the others trifoliate; *leaflets* ovate-lanceolate, obtuse at the base; *fruit* roundish, ribbed or winged; *flowers* yellow or dark purple.

TIEDEMANNIA, DC.

Margin of *calyx* 5-toothed; *petals* broadly ovate, with a narrow, inflexed point; *fruit* much compressed dorsally, obovate; *carpels* with 5 filiform somewhat carinate approximated equal ribs, the lateral ones dilated into a membranaceous margin nearly as broad as the dorsal disk; intervals with single large vittæ; *seed* flat.—A glabrous biennial; fistulous *stems*, and *leaves* reduced to terete petioles; *flowers* white.

T. TERETIFOLIA. *Stem* 2°–6° high, erect, fistulous, branching above; *leaves* or rather petioles 4'–8' long, 2"–4" in diameter, tapering to the summit, divided by numerous transverse membranous partitions; principal *umbel* of 10–15 slender rays; *fruit* about 3" long.—Gray and Torrey.

CHÆROPHYLLUM, L.

Margin of the *calyx* obsolete; *petals* obovate, emarginate, with an inflexed point; *carpels* with 5 obtuse equal ribs; intervals with single vittæ.—Perennial, biennial, or annual *herbs*; *leaves* decompose, the segments toothed or many-cleft; *fruit* oblong or linear, tapering at the apex, contracted at the base; *involucl* many-leaved; *involucre* few-leaved or none; *flowers* white, rarely yellow.

C. PROCUMBENS. *Stem* 6'–18' long, usually decumbent, but sometimes erect or oblique, when young more or less hairy, but often nearly glabrous, except the sheath and margin of the leaves; *lobes* of the leaves 1"–2" wide, mostly obtuse; *umbels* opposite the leaves, usually sessile, of 2–3–4 rays; *involucre* none; *involucels* of 4–5 ovate-oblong leaflets; *fruit* narrowly oblong, abruptly contracted at the summits; ribs scarcely as broad as the intervals.—Gray and Torrey.

C. TAINTURIERI, Hook and Arn. *Stem* decumbent or

erect; *leaves* bipinnately divided; segments pinnatifid; the lobes linear-oblong, rather acute; *umbels* opposite the leaves, usually sessile; *umbel* 2-3 rays; *involucel* of 4-5 ovate leaflets; *fruit* linear-oblong, attenuated upward; ribs very prominent, much broader than the intervals. Prairies and along rivers.—*Gray* and *Torrey*.

POLYTÆNIA, DC.

Margin of the *calyx* 5-toothed; *petals* oblong, with a long inflexed emarginate point; *fruit* oval, lenticularly compressed on the back, glabrous, with a broad and even tumid corky margin; the dorsal *disk* impressed; *ribs* obscure, nearly immersed in the corky pericarp; *intervals* with 2 vittæ, the thickened corky margin filled with resiniferous tubes; *carpophore* free, 2-cleft; *seed* plano-convex.—A glabrous *herb*, with bipinnately-divided *leaves*, the uppermost opposite and often 3-cleft; *umbels* terminal and opposite the leaves; *involucre* none; *involucel* of several setaceous leaflets; *flowers* bright yellow.

P. NUTTALLII. *Plant* 2°-3° high; *root* fusiform; *stem* rather stout, usually scabrous leafy; *leaves* on long petioles; the segments pinnately incised or toothed, those at the base of the peduncles often only 3-cleft, with entire or sparingly-toothed lobes; *rays* of the umbel 12-20, about an inch in length; *fruit* 3' long, entire at each end. Wichita Mountains.—*Marcy*.

60. GINSENG FAMILY. Order, ARALIACEÆ.

Shrubs, trees, or perennial herbs, with compound or simple exstipulate leaves; *flowers* mostly umbellate, the umbels often paniculate or racemed; *calyx* adherent to the ovary; the limb usually very small, entire or toothed; *petals* 5-10, valvate in æstivation, very rarely none; *stamens* as many as the petals and alternate with them;

filaments short; *anthers* intorse; *ovary* crowned with an epigynous disk, 2-15-celled, with a solitary suspended ovule in each cell; *styles* erect and connivent, or spreading; *stigmas* simple; *fruit* drupaceous or baccate, sometimes nearly dry, but the carpels not separating; *seeds* solitary in each cell, anatropous.

ARALIA, L.

Calyx-limb short, 5-toothed or entire; *petals* 5, spreading; *stamens* 5, alternate with petals; *filaments* short; style 5, at length divaricate; *drupe* baccate, 5-lobed, 5-celled, the endocarp chartaceous.—*Shrubs* or *herbs*; *leaves* compound; *petioles* sheathing at the base.

A. RACEMOSA, L. (*Spikenard*.) *Stem* herbaceous, smooth, leafy, divaricately branched; *leaves* ternately and quinate compound; *leaflets* cordate-ovate, acuminate, doubly serrate, slightly pubescent; *umbels* small, numerous, disposed in large doubly-compound racemose panicles; *involucre* minute or almost none.—*Gray* and *Torrey*.

* *Shrubby or arborescent, prickly.*

A. SPINOSA. *Stem* aborescent, prickly, as also the petioles; *leaves* bipinnately compound; *leaflets* ovate, acuminate, serrate, mostly glabrous, glaucous beneath; *umbels* in very large and branched panicles, somewhat racemose on the branches; *involucre* small and few-leaved.—*Gray* and *Torrey*.

61. DOGWOOD FAMILY. Order, CORNACEÆ.

Trees or *shrubs*, with simple, entire or rarely toothed exstipulate *leaves*, and perfect or polygamous *flowers*; *calyx* coherent with the 1-2-celled ovary, 4-5-toothed; *petals* 4-5, valvate in the bud, sometimes wanting; *sta-*

mens 4-10, inserted into the margin of the disk that crowns the ovary; *ovules* solitary, anatropous, pendulous; *fruit* a berry-like 1-2-celled, 1-2-seeded drupe; *embryo* nearly as long as the fleshy albumen; *cotyledons* large and foliaceous.

CORNUS, Tourn. Dogwood; CORNEL.

Flowers perfect; *calyx* 4-toothed; *petals* and *stamens* 4; *stigma* capitate; *drupe* 2-celled, 2-seeded.—*Shrubs* or low *trees*; *leaves* and branches opposite; *flowers* in naked spreading cymes, or capitate, and subtended by a colored involucre.

* *Flowers* white, in a loose open cyme; *involucre* none.

ALTERNIFOLIA, L'Herit. *Leaves* oval, abruptly acute at each end, pale and pubescent beneath, long-petioled, and, like the greenish striped branches, alternate; *drupes* deep blue. Banks of streams.—A widely branching *shrub* or small *tree*.

C. STRICTA, Lam. *Leaves* ovate or oblong, abruptly acute or acuminate, smooth, whitish beneath; *cymes* flat or depressed at the summit; *drupes* and *anthers* pale blue. Swamps.—A *shrub* or small *tree*; *branches* brown.

C. PANICULATA, L'Herit. *Leaves* smooth, ovate-lanceolate, acuminate, paler beneath; *cymes* convex at the summit, somewhat paniced, loose-flowered; *drupes* white, depressed-globose.—*Shrub* 4°-8° high; *branches* gray.

C. SERICEA, L. *Leaves* ovate or elliptical, smooth above, the lower surface, like the purplish *branches* and close depressed *cyme*, silky-pubescent; *drupes* pale blue. Low woods.—*Shrub* 6°-10° high.

** *Flowers* capitate, subtended by a white 4-leaved involucre.

C. FLORIDA, L. *Leaves* ovate-lanceolate or ovate, at

length smooth on both sides; *flowers* greenish; *drupes* ovoid, red. Oak woods, common.—A small *tree*; *wood* hard and close-grained; leaves of the involucre emarginate and thickened at the summit, showy.

NYSSA, L. SOUR GUM.

Flowers diœcio-polygamous; sterile *flowers* in many-flowered heads or cymes; *calyx* 5-parted; *stamens* 5-10; *petals* and pistil none; fertile *flowers* single or few in a head; *calyx*-limb 5-toothed or obsolete; *petals* 5, minute, or wanting; *stamens* 5-10, mostly sterile; *style* long, revolute; *stigma* decurrent; *ovary* 1-celled; *drupe* 1-seeded.—*Trees* or *shrubs*; *leaves* alternate, entire or rarely toothed, finely reticulated. Flowers small, greenish, on axillary or lateral peduncles.

* *Sterile flowers in loose clusters.*

N. MULTIFLORA, Wang. *Leaves* oval or obovate, mostly acute, tomentose when young, at length shining above; fertile *peduncles* long and slender, 3-8-flowered; *drupes* ovoid, dark blue. Rich upland woods.—A *tree* 30°-50° high, with widely spreading branches; leaves rather thick, dark green, 2'-5' long; fertile *peduncles* 1½'-3' long; *drupe* ½' long,

N. AQUATICA, L. *Branches*, leaves, etc., tomentose when young, at length nearly smooth; *leaves* short-petioled, varying from lanceolate to orbicular, obtuse, sometimes slightly cordate; *peduncles* short, the fertile ones 1-2-flowered; *drupes* oval, blue. Ponds and swamps.—A large *tree*, or in pine-barren swamps sometimes a mere *shrub*; leaves 1'-2' long; *peduncles* ½'-1' long; *drupe* smaller than in the last.

N. UNIFLORA, Walt. *Leaves* large, long-petioled, ovate or oblong, acute, entire or sharply toothed, tomentose be-

neath, the lower ones often cordate; fertile *peduncles* elongated, 1-flowered; *drupes* ovate-oblong, dark blue. (*N. tomentosa*, Michx.; *N. grandidentata*, Michx. f.) Deep swamps and ponds.—A large *tree*; leaves 4'-6' long; *drupe* 8"-12" long.

*** Sterile flowers capitate.*

N. CAPITATA, Walt. (*Ogeechee Lime*.) *Leaves* large, short-petioled, oblong, oval or obovate, mucronate or acute, tomentose beneath; *flowers* below the leaves, the fertile ones perfect, solitary, on very short peduncles; *drupe* oblong, red. Swamps, near the coast.—A small *tree*; leaves 3'-5' long; *drupe* 1' long, agreeably acid.

Division II.—Monopetalous Exogenous Plants.

Floral envelopes double. *Calyx* and *corolla* both present ; the latter of more or less united petals.

62. HONEYSUCKLE FAMILY. *Order, CAPRIFOLIACEÆ.*

Shrubs, rarely *herbs*, often twining, with opposite exstipulate leaves ; *calyx* adherent to the ovary, the limb 4 or 5-toothed or lobed ; *corolla* tubular or rotate, 4-5-parted ; *flowers* clustered, often fragrant ; *stamens* inserted on the corolla-tube, as many as and alternate with the lobes of the corolla (rarely one less than the lobes) ; *ovary* 2-5-celled, with 1-many pendulous ovules in each cell ; *style* 1 ; *stigmas* 3-5 ; *fruit* baccate drupe, or capsule ; *embryo* small, in the axis of fleshy albumen.

SYNOPSIS.

* *Corolla tubular, with filiform style ; capitate stigma.*

<i>Corolla campanulate.</i>	<i>Berry</i> 4-celled, 2-seeded. Erect shrubs..	SYMPHORICARPUS.
—— <i>tubular.</i>	—— 1-3-celled. Chiefly woody vines.....	LONICERA.
—— ———	<i>Drupe</i> bony, 3-5-seeded. Herbs.....	TRIOSTEUM.

** *Corolla rotate. Stigmas 3-5, sessile. Flowers in cymes.*

<i>Leaves pinnate.</i>	<i>Berry</i> 3-5-seeded	SAMBUCUS.
—— <i>simple.</i>	<i>Drupe</i> 1-seeded	VIBURNUM.

SYMPHORICARPUS, Dill. SNOW-BERRY.

Calyx-tube globous, limb 4 to 5-toothed ; *corolla* funnel-shaped or bell-shaped, the limb in 4 to 5 subequal lobes ;

stamens inserted on the corolla, and as many as its lobes; *stigma* capitate; *berry* globous, 4-celled, 2-seeded (2 opposite cells abortive).—Small *shrubs*, with entire oval *leaves* and small rose-colored *flowers*.

S. VULGARIS, Michx. *Leaves* roundish-oval; *spikes* axillary, subsessile, capitate and crowded; *corolla* campanulate, lobes nearly glabrous; *stamens* and bearded style included; *berries* dark red. River banks.—*Shrub*, 2° to 3° high; *branches* purplish and often pubescent; *leaves* 1' to 2' by $\frac{3}{4}$ ' to $1\frac{1}{2}$ ', somewhat pubescent; *corolla* greenish red.

LONICERA, L. WOODBINE; HONEYSUCKLE.

Calyx ovoid, 5-toothed; *corolla* tubular, 5-cleft, often bilabiate, and gibbous near the base; *stamens* 5; *ovary* 2-3-celled, with several ovules in each cell; *berry* 1-3-celled, several-seeded; *seeds* bony.—Erect or twining *shrubs*, with entire, often connate *leaves*; *flowers* by pairs or in spiked whorls.

L. SEMPERVIRENS, Ait. *Stem* twining; *leaves* oblong or lanceolate, pale and tomentose beneath, the upper pair shorter and connate; *spikes* terminal; *whorls* distinct; *corolla* nearly equally 5-lobed, scarlet or orange without, yellow within. Margins of swamps. *Leaves* perennial; *corolla* 2' long.

L. GRATA, Ait. *Stem* twining; *leaves* obovate, glaucous beneath, the 2 or 3 upper pairs connate; *whorls* of flowers axillary and terminal; *corolla* bilabiate, the tube long and slender; young *branches* often hairy; *corolla* $1\frac{1}{2}$ ' long, with a red or purplish tube and a white limb, changing to yellow; *berry* orange-red.

L. FLAVA, Sims. Smooth and somewhat glaucous; *stem* scarcely twining; *leaves* oval or obovate, the upper pairs connate; *whorls* of flowers crowded, terminal; *corolla*

slender, bilabiate. Banks of rivers; corolla 1' long, bright yellow; the 4-cleft limb nearly as long as the tube.

L. PARVIFLORA, Lam. Smooth; stem twining; leaves elliptical, glaucous beneath, all more or less connate; whorls of flowers crowded, peduncled; corolla short, bilabiate, gibbous at the base; stamens hairy below. Mountains. Corolla 8"-10" long, yellow and purplish.

TRIOSTEUM, L. FEVERWORT.

Calyx ovoid, with 5 leafy linear-lanceolate persistent lobes; *corolla* tubular, equally 5-lobed, rather longer than the calyx; *stamens* 5; *ovary* 3-celled, with a single ovule in each cell; *fruit* a dry drupe containing 3 bony nutlets. —Perennial hairy herbs, with large leaves, narrowed but connate at the base, and sessile axillary flowers.

T. PERFOLIATUM, L. Stem soft-hairy; leaves oval, acuminate, entire, hairy above, tomentose beneath; flowers commonly clustered, brownish purple. Shady woods. Stem 2°-4° high; leaves 4'-7' long.

SAMBUCUS, Tourn. ELDER.

Calyx-lobes minute or none; *corolla* rotate, 5-lobed; *stamens* 5; *fruit* a globular baccate drupe, containing three 1-seeded nutlets. —Shrubs, with pinnate leaves, and white flowers, in ample terminal cymes.

S. CANADENSIS, L. Leaflets 7-11, oblong, serrate, smoothish, acute, the lower ones often 3-parted; cymes flat, 5-parted; fruit black. Low grounds, common. Stem 4°-16° high, the straight young shoots with large pith.

S. PUBENS, Michx. Leaflets 5-7, oblong, serrate, pubescent beneath; cymes paniculate, pyramidal; fruit red. Mountains. Shrub 6°-10° high; cymes smaller than in the last.

VIBURNUM, L. HAW; SLOE.

Calyx minute, 5-toothed; *corolla* rotate or somewhat campanulate, 5-lobed; *stamens* 5; *ovary* 1-3-celled, one of the cells containing a single ovule, the others empty; *drupe* baccate, containing a single compressed bony nut.—*Shrubs* or small *trees*; *leaves* lobed or undivided, the petioles sometimes winged; *flowers* in terminal *cymes*, small, white, the marginal ones occasionally radiant and sterile.

* *Sterile and radiant flowers none.*

† *Cymes sessile.*

V. PRUNIFOLIUM, L. *Leaves* thin, obovate or roundish, mostly obtuse, finely and sharply serrate, smooth and glossy, or the veins beneath and more or less dilated petioles rusty-pubescent; *cymes* large, 4-5-rayed; *drupe* oblong-ovoid, black.—A small *tree*; *fruit* edible.

V. LENTAGO, L. *Leaves* thin, ovate, acuminate, finely and sharply serrate, smooth above, the lower surface and dilated wavy petioles roughened with minute scales when young; *cymes* 4-rayed; *fruit* oval, black. May.—A small *tree*.

63. MADDER FAMILY. Order, RUBIACEÆ.

Trees, shrubs, and herbs; *leaves* opposite, somewhat verticillate, entire; *stipules* between the petioles, sometimes resembling the leaves; *calyx*-tube more or less adherent to the ovary; limb 4 to 5-cleft; *corolla* regular, inserted upon the calyx-tube, and of the same number of divisions; *stamens* inserted upon the tube of the corolla, equal in number and alternate with its segments; *ovaries* 2- (rarely more) -celled; *style* single or partly divided; *fruit* various; *seeds* one, few, or many in each cell.

SYNOPSIS.

SUB-ORDER I. **Coffeæ.** Ovules and seed solitary in the cells. Calyx-tube adherent to the ovary.

* *Leaves (and leaflike stipules) whorled; ovary adherent.*

Corolla rotate, 4-parted, valvate in the bud. Fruit 2-celled. Herbs......**GALIUM.**
Carpels 2, one of them closed by partition. Flowers clustered......**SPERMACOCE.**
 ——— both open on the inner face. *Flowers clustered.*.....**BORRERIA.**
 ——— 2-3, bony, and closed. *Style 2-cleft. Albumen fleshy.*.....**DIODIA.**
 ——— 2, somewhat fleshy, closed. *Style entire. Abumen horny.*.....**ERNODEA.**

** *Shrubs; fruit dry; flowers in globular peduncled heads.*

Carpels 2-4, separating at the base, closed......**CEPHALANTHUS.**
Flowers by pairs. Stamens 4. Berry 4-seeded......**MITCHELLA.**

SUB-ORDER II. **Cinchonæ.** Ovules and seeds numerous in the cells. Calyx-tube adherent to the ovary. Leaves opposite.

* *Fruit capsular; loculicidally dehiscent.*

Herbs. Capsule often free from the calyx above. Seeds wingless.
OLDENLANDIA.

SUB-ORDER III. **Loganiæ.** Ovules and seeds numerous in the cells. Calyx free from the ovary. Fruit capsular. Leaves opposite.

** *Herbs.*

Corolla short, 5-lobed. Styles 2, united above......**MITREOLA.**
 ——— 4-lobed. ——— single.....**POLYPREMUM.**

** *Evergreen woody vines.*

Corolla campanulate. Seeds winged......**GELSEMIUM.**

GALIUM, L. CLEAVERS; BEDSTRAW.

Calyx-limb minutely 4-toothed; corolla rotate, 4-cleft; stamens 4, short; styles 2; carpels 2, united, separating into two 1-seeded indehiscent nutlets.—Herbs, with slender, 4-angled stems; verticels of 4, 6 or 8 leaves, rarely of 5.

* *Fruit baccate ; peduncles 1-3-flowered ; leaves 4 in a whorl.*

G. HISPIDIUM, Michx. *Stem* much branched, slightly roughened, hairy at the joints; *leaves* small, rigid, lanceolate-ovate, rough on the margins and veins beneath, acute; *berry* roughened, bluish black; *stem* 1°-2° long; *root* yellow; *flower* greenish white.

G. UNIFLORUM, Michx. *Smooth ; stems* mostly simple, slender, erect; *leaves* linear, acute, rough on the margins, punctate beneath; *berry* smooth, black. *Dry rich soil.* *Stems* numerous, 1° high; *flowers* white.

** *Fruit dry ; peduncles commonly 3-many-flowered.*

G. TRIFIDUM, L. *Stems* slender, weak, smooth or rough-angled, at length diffuse; *leaves* 4-6 in a whorl, unequal, varying from linear to spatulate-lanceolate, obtuse, smooth, or rough on the margins and midrib, the upper ones often opposite; *peduncles* 1-3-flowered; *corolla*-lobes and *stamens* often 3; *fruit* smooth. (G. tinctorium, L.) *Wet places.* *Stems* 1°-2° long; *flowers* white.

G. CIRCÆZANS, Michx. *Stems* erect, smooth or nearly so; *leaves* large (1'-1½'), 4 in a whorl, oval, mostly obtuse, 3-nerved, pubescent; *peduncles* forking, then spreading and spike-like; *fruit* bristly with hooked hairs, nearly sessile, nodding. *Dry open woods.* *Stems* several, sparingly branched, 1° high; *flowers* purple.

SPERMACOCE, L.

Calyx 2-4-parted, persistent; *corolla* salver-shaped or funnel-shaped, 4-lobed, valvate in the bud; *stamens* 4, inserted on the throat of the corolla; *stigma* simple or 2-cleft; *fruit* composed of two 1-seeded carpels, separating from the apex downward, one of them closed by the partition, the other open; *seeds* grooved on the inner face.—Low

herbs; *leaves* obliquely straight-veined, their bases connected by the bristly-fringed sheathing stipules; *flowers* small, in axillary sessile clusters.

S. GLABRA, Michx. *Stem* 4-angled, smooth, erect; *leaves* lanceolate or oblong, acute, roughened on the margins and veins beneath; *clusters* globose, dense, many-flowered; *corolla* barely longer than the lanceolate calyx-teeth, white woolly within; *stamens* and *style* included; *fruit* obovate. *Stem* 1°-2° high; perennial.

BORRERIA.

Like *Spermacoce* in character and habits, differing only in the *carpels* of the fruit separating from the apex downward, both opening lengthwise on the inner face.

B. MICRANTHA, Torr. and Gray. Annual; *stem* slender, erect, simple, branched above, 4-angled, smooth; *leaves* lanceolate, mostly obtuse, narrowed at the base, the upper surface and margins rough, the lateral veins obscure; *clusters* dense, globose, axillary and terminal; *calyx*-teeth 4, subulate, longer than the very small *corolla*; *fruit* ovoid, hairy. *Plant* 6'-18' high, pale green; *leaves* 1' long.

DIODIA, L.

Differing from *Spermacoce* in having the two bony indehiscent *carpels* closed on the inner face.—*Herbs*; *corolla*-tube often long and slender; *flowers* axillary, solitary, and few; *leaves* narrow.

D. VIRGINIANA, L. *Stem* and *leaves* smooth, pubescent or hirsute; *stem* prostrate, 4-angled; *leaves* fleshy lanceolate, acute, sessile; *flowers* single, or 2-6 clustered; *corolla* hairy within, the tube long and slender; *fruit* ovoid, strongly ribbed, crowned with the 2-4 linear or lanceolate *calyx*-teeth. *Flowers* white or purplish.

CEPHALANTHUS, L. BUTTON-BUSH.

Calyx obconical, 4-toothed; *corolla* tubular, 4-cleft, imbricated in the bud; *stamens* 4; *style* slender, exserted; *stigma* capitate; *fruit* dry, obconical, separating from the base into 2-4 one-seeded carpels; *seeds* pendulous; *albumen* horny.—Aquatic *shrubs*, with oval or lanceolate *leaves*, short entire *stipules*, and white *flowers* collected into a globose long-peduncled head; *receptacle* hairy.

C. OCCIDENTALIS, L. Smooth, or the young branches and lower surface of the ovate-oblong acute *leaves* pubescent; *peduncles* terminal, and in the upper axils. Ponds and marshes. *Stem* 4°-12° high; *leaves* petioled, 3'-5' long, sometimes 3 in a whorl; *heads* 1' in diameter.

MITCHELLA, L.

Flowers by pairs, with their ovaries united; *calyx* 4-toothed; *corolla* funnel-shaped, 4-lobed, hairy within, valvate in the bud; *stamens* 4; *style* slender; *stigmas* 4; *fruit* composed of two 4-seeded fleshy drupes united, crowned with the 4-toothed *calyx*.—A smooth creeping evergreen *shrub*, with small broadly-ovate *leaves*, minute *stipules*, and fragrant white terminal *flowers*.

M. REPENS, L. Shady woods. *Stem* 1°-2° long; *leaves* 6"-10" long, mostly somewhat cordate, shining above, on slender petioles; *corolla* $\frac{1}{2}$ ' long; *fruit* red.

OLDENLANDIA, Plum. BLUEETS.

Flowers tetramerous; *calyx* 4-toothed, persistent; *corolla* funnel-shaped, salver-shaped, or wheel-shaped, 4-lobed, imbricated in the bud; *stamens* 4; *stigma* mostly 2-lobed; *capsule* roundish or obcordate, 2-celled, opening loculicidally at the apex, which is often free from the calyx; *seeds*

few or many, wingless.—Chiefly small *herbs*, with opposite leaves; *stipules* united with the petioles, sometimes fringed with bristles; *flowers small*, white or purplish.

* *Corolla salver-shaped, longer than the calyx, smooth; flowers dimorphous, some of them bearing exerted stamens and an included style, while others bear included stamens and an exerted style; peduncles axillary, solitary; capsule broad, free at the apex.*

O. CÆRULEA, Gray. Annual or biennial, smooth; *stems* tufted, forking; *leaves* lanceolate, those at the base spatulate, clustered; *peduncles* elongated, erect or spreading. (*Houstonia cœrulea*, L.; *H. patens*, Ell.) Moist banks. Stems 3'-6' high; *corolla* blue or white, yellow in the throat.

O. SERPYLLIFOLIA, Gray. Perennial, smooth; *stems* filiform, prostrate, branching; *leaves* ovate or roundish, abruptly contracted into a long and slender petiole; *peduncles* elongated, terminal and in the forks of the stem. (*Houstonia serpyllifolia*, Michx.) High mountains. Stems 6'-12' long; *peduncles* 1'-2' long.

** *Corolla funnel-shaped; flowers dioeciously dimorphous; capsule free at the apex; stem 4-angled; flowers in terminal cymes.*

O. PURPUREA, Gray. Pubescent; *stem* branching, erect; *leaves* ovate or lanceolate-ovate, sessile, 3-5-ribbed; *calyx*-lobes longer than the capsule; *corolla* purple or nearly white, slightly hairy within; capsule roundish. (*Houstonia purpurea*, L.) Woods. *Stems* 8'-12' high; *calyx*-lobes occasionally 3-4 times the length of the capsule.

O. ANGUSTIFOLIA, Gray. Smooth; *root* woody; *stems* clustered, erect, branching above; *leaves* linear; *cymes* crowded, with the central flowers nearly sessile; *corolla* white, very hairy within; *capsule* ovoid, as long as the calyx-teeth. (*Hedyotis stenophylla*, Torr. and Gray.) Sandy pine-barrens. *Stems* 1°-2° high. Red River.—*Marcy*.

Var. FILIFOLIA. *Stem* shrubby at the base, diffusely branched; *leaves* filiform, remote; *cymes* scattered, 3-flow-

ered, the slender pedicels equal and spreading; *capsule* obcordate, rather longer than the calyx-teeth, the upper half free. Stem slender, 6'-10' long; *flowers* and *capsules* very small.—*Marcy*.

*** *Corolla* wheel-shaped, shorter than the calyx-lobes; *flowers* axillary and terminal, single or clustered, sessile; *stamens* and *style* very short; *capsule* included in the calyx-tube; *perennial*; *stipules* fringed.

O. BOSCH. Stem smooth, diffuse, 4-angled; *leaves* linear; *flowers* single or 2-3 together; *corolla* white or purplish; *capsule* ovoid; stem 6'-10' long.

**** *Corolla* funnel-form, 5-lobed, longer than the calyx-teeth; *flowers* axillary and terminal, pentamerous; *capsule* top-shaped, included in the calyx-tube; *stipules* fringed; *annual*.

O. HALEI. Stem diffuse, forking, weak; *leaves* oval-oblong, acute at each end, somewhat fleshy; *flowers* solitary, or in short 3-5-flowered cymes, white.

MITREOLA, L. MITREWORT.

Calyx 5-parted; *corolla* short, 5-lobed, valvate in the bud, the tube roundish, bearded in the throat; *stamens* 5, included; *anthers* ovate; *styles* 2, short, united above; *stigma* capitate; *capsule* 2-parted, mitre-shaped, many-seeded, the two lobes opening on the inner face near the apex; seeds oval, concave.—Smooth *herbs*, with opposite *leaves*, and small white *flowers* in terminal and axillary cymes, with the simple branches recurved in the bud.

M. PETIOLATA, Torr. and Gray. Stem branching; *leaves* thin, oblong, acute, narrowed into a petiole. (*Ophiorhiza lanceolata*, Ell.) Muddy banks. Stem 4-angled, 1°-2° high; *leaves* 2'-3' long; *annual*.

M. SESSILIFOLIA, Torr. and Gray. Stem simple, 4-angled; *leaves* thick, ovate or roundish, strongly veined, sessile, rough on the margins; *flowers* and *capsule* very small. (*Ophiorhiza mitreola*, Michx.) Varies with lanceolate

obscurely-veined leaves, and larger *flowers* and fruit. Grassy swamps. Stem 6'-18' high; leaves 6''-10'' long; *plant* pale green; annual.

POLYPREMUM, L.

Calyx deeply 4-parted, persistent; *corolla* wheel-shaped, bearded in the throat, 4-lobed, imbricated in the bud; *stamens* 4; *style* single, very short; *stigma* ovoid, entire; *capsule* ovoid, compressed, 2-celled, loculicidally 2-valved, many-seeded.—A low smooth perennial *herb*, with 4-angled forking *stems*, linear acute *leaves*, their bases united by the membranaceous *stipules*, and solitary sessile white *flowers* in the forks of the stem.

P. PROCUMBENS, L. Waste places. *Stems* 6'-10', erect or prostrate, clustered; *flowers* very small, the *corolla* barely longer than the *calyx*-lobes.

GELSEMIUM, Juss. YELLOW JESSAMINE.

Flowers dimorphous; *calyx* 5-parted, persistent; *corolla* funnel-shaped, 5-lobed; the lobes rounded, emarginate, spreading, quincuncial in the bud, the sinuses impressed; *stamens* 5, inserted near the base of the *corolla*; *anthers* oblong-sagittate, extrorse; *styles* united, filiform, partly persistent; *stigmas* 4, linear, spreading; *capsule* oblong, compressed, 2-celled, opening septicidally to the middle, and loculicidally at the apex, each valve tipped with the persistent base of the styles; *seeds* several, oval, flat, winged, obliquely imbricated in two rows.—A smooth, woody *vine*, with opposite evergreen *leaves*, minute *stipules*, and large yellow fragrant *flowers*, in axillary bracted and cluster-like racemes.

G. SEMPERVIRENS, Ait. On margins of swamps and river-banks. *Stem* twining, purplish; *leaves* lanceolate or ovate, acute or subcordate at the base, short-petioled; *racemes* few-flowered; *pedicels* scaly; *corolla* 1'-1½' long.

64. VALERIAN FAMILY. *Order, VALERIANACEÆ.*

Herbs with opposite exstipulate leaves, and cymose flowers; *calyx*-tube adherent to the ovary; *corolla* tubular or funnel-shaped, mostly 5-lobed, imbricated in the bud; *stamens* distinct, fewer than the corolla-lobes, and inserted into its tube; *ovary* 3-celled, two of which are empty, the third containing a single suspended anatropous ovule; *style* slender; *stigmas* 1-3; *fruit* 1-3-celled, 1-seeded; albumen none.

VALERIANA, Tourn. VALERIAN.

Limb of the *calyx* composed of several plumose bristles, at first incurved, afterward spreading; *corolla* gibbous at the base, 5-lobed; *stamens* 3; *fruit* 1-celled, 1-seeded. Perennials.

V. SCANDENS, L. Smooth; *stem* climbing; *leaves* on slender petioles, ternately divided; *leaflets* ovate, entire; *cymes* paniculate, diffuse, axillary and terminal; *corolla* very short.

FEDIA, Mœnch. LAMB LETTUCE.

Calyx-limb toothed or obsolete; *corolla* funnel-shaped, 5-lobed; *stamens* 3; *fruit* 3-celled, two of the cells empty and sometimes confluent into one, the other 1-seeded.—Annual *herbs*, with forking *stems*, opposite entire or lobed *leaves*, and white or purplish *flowers* in crowded bracted *cymes*.

F. RADIATA, Michx. *Leaves* oblong, the upper ones clasping and toothed at the base; *fruit* mostly downy, ovoid, with a furrow between the parallel and contiguous empty cells; *flowers* white; *stem* 6'-12' high.

65. COMPOSITE FAMILY. *Order, COMPOSITÆ.*

Flowers clustered in a dense head (compound), surrounded by an involucre of many bracts (scales), with 5 united anthers, and the fruit an achenium; *leaves* alternate, or opposite, exstipulate, simple, yet often much divided; *florets* numerous, crowded, sessile on the receptacle, with or without pales (chaff); *calyx* adherent, the limb wanting or divided into bristles, hairs, etc. (pappus); *corolla* tubular, of 5 lobes, with a marginal vein, often ligulate or bilabiate; *stamens* 5, alternate with the lobes of the corolla; *anthers* cohering into a tube; *ovary* 1-celled, with 1 erect ovule; *style* single, with 2 stigmas at the summit; *fruit* dry, indehiscent, 1-seeded, often crowned with a pappus.

(The author has followed Dr. Chapman's analysis of this Order verbatim, finding it easy for the student, clear, and comprehensive.)

ARTIFICIAL SYNOPSIS OF THE GENERA.

SUB-ORDER I. **Tubulifloræ.** Corolla of the perfect flowers tubular, equally 5- (rarely 3-4) -lobed. Ray-flowers, when present, ligulate, either pistillate or neutral.

§ 1. *Heads discoid.*

* *Heads with the flowers all perfect.*

Pappus none. Leaves resinous-dotted. Flowers yellow.....**FLATERIA.**

Pappus bristly or hairy.

Flowers yellow.

Receptacle pointed.....**BIGELOVIA.**

Receptacle flat.....Nos. 1 and 33 in **SOLIDAGO.**

Receptacle convex.....**RUGELIA.**

Flowers white, blue, or purple.

Receptacle chaffy.

Leaves opposite. Flowers white.....**MELANTHERA.**

Leaves alternate. Flowers purple.....**CARPHEPHORUS.**

Receptacle bristly.

Leaves spiny.....CIRSIIUM.

Leaves not spiny, cordate.....LAPPA.

Receptacle naked.

Scales of the involucre in a single row.....CACALIA.

Scales of the involucre in 2 or more rows.

Pappus double, the outer row very short.....VERNONIA.

Pappus single.

Achenia ribbed or striate.

Pappus plumose. Flowers cream-colored.....KUHNIA.

Pappus scabrous. Leaves cordate.....BRICKELLIA.

Pappus scabrous. Leaves not cordate.....LIATRIS.

Achenia not ribbed, 5-angled

Receptacle conical.....CONOCLINIUM.

Receptacle flat. Stems climbing.....MIKANIA.

Receptacle flat. Stems erect.....EUPATORIUM.

Pappus scaly.

Flowers blue or purple.

Pappus a cup-shaped border of united scales.....CÆLESTINA.

Pappus slender, almost bristly.

Pappus deciduous. Heads large and single.....STOKESIA.

Pappus persistent. Heads small, in 3-bracted clusters.....ELEPHANTOPUS.

Pappus of 5 oval almost bony scales. Leaves whorled... ..SCLEROLEPIS.

Flowers white.

Receptacle naked.

Leaves entire, linear or lanceolate.....PALAFOXIA.

Leaves entire, ovate or cordate.....AGERATUM.

Leaves pinnately lobed.....HYMENOPAPPUS.

Receptacle chaffy.

Achenium top-shaped. Scales of the pappus 5-6.....MARSHALLIA.

Achenium flat. Pappus 2-awned.....ACTINOMERIS.

Flowers yellow. Pappus 2-4-awned.

Awns of the pappus deciduous.....HELIANTHUS.

Awns of the pappus persistent, hispid upward.....COREOPSIS.

Awns of the pappus persistent, hispid downward.....BIDENS.

**** Heads with flowers variously imperfect.**

Marginal flowers pistillate. Central flowers perfect.

Pappus bristly.

Scales of the involucre in a single row.....ERECHTHITES.

Scales of the involucre in 2 or more rows.

Involucre persistent. Leaves sinuate-lobed.....CONYZA.

Involucre persistent. Leaves entire. Anthers tailed.....PLUCHEA.

Involucre persistent. Leaves entire. Anthers tailless.....GNAPHALIUM.

Involucre deciduous. Heads spiked.....PTEROCAULON.

Pappus not bristly, 5-lobed.....TANACETUM.

Pappus none.....ARTEMISIA.

Marginal flowers pistillate. Central flowers staminate.

Pappus none. Style rigid, persistent.....SOLIVA.

Pappus none. Style deciduous. Heads nodding.....IVA.

Marginal flowers neutral. Central flowers perfect.....CENTAUREA.

*** *Heads dioecious or monœcious.*

Staminate and pistillate heads on the same plant.

Fruiting involucre 1-seeded, naked or tubercled.....AMBROSIA.

Fruiting involucre 2-seeded, armed with hooked spines.....XANTHIUM.

Staminate and pistillate heads on separate plants.

Anthers tailed. Hoary herbs.....ANTENNARIA.

Anthers tailless. Smooth shrubs.....BACCHARIS.

§ 2. *Heads radiate.*

Rays pistillate.

Flowers all fertile.

Receptacle naked.

Rays yellow. Leaves opposite.

Pappus none.....FLAVERIA.

Pappus scaly.....PECTIS.

Rays yellow. Leaves alternate.

Scales of the involucre in 1 row.....SENECIO.

Scales of the involucre in 2 rows.....HELENIUM.

Scales of the involucre in several rows.....INULA.

Rays white or purple.

Pappus none.....LEUCANTHEMUM.

Pappus bristly.....ERIGERON.

Receptacle pitted.

Rays white or purple.

Pappus double.....DIPLOPAPPUS.

Pappus single. Rays about 5. Achenia silky.....SERICOCARPUS.

Pappus single. Rays numerous. Pappus bristly.....ASTER.

Pappus single. Rays numerous. Pappus scaly.....BOLTONIA.

Rays yellow.

Pappus double, of the ray and disk flowers alike.....CHRYSOPSIS.

Pappus double, of the ray flowers none.....HETEROTHECA.

Pappus single.

Leaves opposite. Heads large, single or corymbose.....ARNICA.

Leaves alternate. Heads racemed or clustered.....SOLIDAGO.

Leaves alternate. Heads panicled.....ISOPAPPUS.

Receptacle chaffy.

Involucre double, the outer 4-leaved, 4-angled.....TETRAGONOTHECA.

Involucre imbricated or spreading.

Maritime shrubs. Pappus 4-toothed.....BORRICHIA.

Herbs.

Receptacle conical or elongated.

Rays persistent. Corolla-lobes velvety.....ZINNIA.

Rays deciduous. Achenia 3-4-angled.....HELIOPSIS.

Rays deciduous. Achenia compressed.....SPILANTHES.

Receptacle flat.

Leaves lobed, alternate.....ACHILLEA.

Leaves not lobed. Pappus 2-awned.....VERBESINA.

Leaves not lobed. Pappus none.....ECLIPTA.

Flowers of the disk sterile.

Rays yellow. Pappus none.....POLYMNIA.

Rays yellow. Pappus a toothed crown.....CHRYSOGONUM.

- Rays yellow. Pappus 2-toothed or awned. Achenia winged.....SILPHIUM.
 Rays yellow. Pappus 2-toothed or awned. Achenia wingless...BERLANDIERA.
 Rays white. Receptacle conical.....PARTHENIUM.
 Rays neutral (without pistils).
 Receptacle naked, or nearly so.
 Achenia villous. Pappus scaly, long-awned.....GAILLARDIA.
 Achenia smooth or the angles hairy. Pappus awnlessLEPTOPODA.
 Receptacle deeply pitted.
 Margins of the pits entire. Perennial.....BALDWINIA.
 Margins of the pits toothed. Annual.....ACTINOSPERMUM.
 Receptacle chaffy throughout.
 Involucre double. Pappus 2-4-awned.
 Awns of pappus hispid upward.....COREOPSIS.
 Awns of pappus hispid downward. Achenia beakless.....BIDENS.
 Awns of pappus hispid downward. Achenia beaked.....COSMOS.
 Involucre simple or imbricate.
 Pappus a cup-shaped border, or none.
 Chaff of the receptacle elongated, spine-pointed.....ECHINACEA.
 Chaff of the receptacle not elongated nor spine-pointed.....RUDBECKIA.
 Pappus 2-4-awned.
 Achenia winged. Leaves divided.....LEPACHYS.
 Achenia winged. Leaves undivided.....ACTINOMERIS.
 Achenia wingless. Awns of the pappus deciduous.....HELIANTHUS.
 Achenia wingless. Awns of the pappus persistent.....HELIANTHELLA.
 Receptacle chaffy. Achenia ribbed.....MARUTA.

SUB-ORDER II. Labiatifloræ. Corolla of the perfect flowers 2-lipped; the outer lip 3-lobed, the inner 2-lobed.

Herb stemless. Scape 1-flowered. Flower nodding.....CHAPTALIA.

SUB-ORDER III. Ligulifloræ. Corolla of all the flowers ligulate.

- Pappus none. Achenia many-ribbedAPOGON.
 Pappus scaly and bristly.
 Scales of the pappus 5, with 5 intermediate bristles.....KRIGIA.
 Scales of the pappus and bristles numerous.....CYNTHIA.
 Pappus hairy.
 Pappus tawny or dirty white.
 Flowers erect, rose-color. Leaves filiform.....LYGODESMIA.
 Flowers erect, yellow. Achenia beakless.....HIERACIUM.
 Flowers erect, yellow. Achenia long-beaked.....PYRRHOPAPPUS.
 Flowers nodding, whitish or purplish.....NABALUS.
 Pappus clear white (except in one Mulgedium).
 Achenia conspicuously beaked.
 Achenia ribbed. Stemless herbsTARAXACUM.
 Achenia flat. Stems leafy.....LACTUCA.
 Achenia beakless, or nearly so.
 Flowers blue. Achenia slightly beaked.....MULGEDIUM.
 Flowers yellow. Achenia beakless.....SONCHUS.

SUB-ORDER I. **Tubulifloræ.**

TRIBE I. **Vernoniaceæ.** *Heads* discoid; the *flowers* all tubular and perfect; *branches* of the style terete, filiform, hairy all over; the *stigmatic* lines only on the lower part. —*Herbs*, with alternate *leaves* and purple flowers. *Pectis* alone has pistillate rays and yellow flowers.

VERNONIA, Schreb. IRON-WEED.

Heads many-flowered, the *flowers* all equal and tubular; involucre shorter than the flowers, the scales closely imbricated in several rows; *receptacle* naked; *achenia* cylindrical, ribbed; *pappus* double, the exterior consisting of very short scale-like bristles, the interior of copious capillary bristles.—Perennial *herbs*, with alternate *leaves*, and corymbose purple flowers.

V. NOVEBORACENSIS, Willd. *Stem* more or less pubescent, branched above; *leaves* lanceolate, serrate, mostly roughish above, smooth or pubescent beneath; *corymbs* spreading, involucre hemispherical, the scales fringed, ovate, ending in a long filiform point, or simply acute. (V. tomentosa, Ell.; V. præalta, Willd.) River-banks and low ground. Stem 3°–6° high; scales of the involucre purple, and usually covered with web-like hairs.

V. FASCICULATA, Michx., var. ALTISSIMA, Torr. and Gray. *Stem* tall, and, like the lanceolate serrate *leaves*, smoothish; *involucre* small, hemispherical; the *scales* ovate, acute or mucronate, fringed, appressed. (V. altissima, Nutt.) Low ground. Stem 6°–10° high; leaves 6'–12' long.

V. ANGUSTIFOLIA, Michx. *Stem* slender, smooth or hairy, very leafy; *leaves* linear or linear lanceolate, smoothish, or pubescent and roughish, the lowest ones sparingly denticulate, the upper entire, with the margins revolute; *corymbs* mostly unbel-like; *involucre* bell-shaped; the *scales* lanceolate, fringed, acute or conspicuously mucronate. (V. scaberrima, Nutt.) Dry pine-barrens. Stem 2°–3° high.

STOKESIA, L'Her.

Heads many-flowered; the marginal *flowers* much larger, deeply split on the inside, and ray-like; *involucre* subglobose, bracted, the outer scales prolonged into a leafy bristly-fringed appendage, the inner ones lanceolate and entire; *receptacle* naked; *achenia* short, 3-4-angled, smooth; *pappus* composed of 4-5 filiform chaffy deciduous scales.—A sparingly branched downy-stemmed perennial; *leaves* smooth, lanceolate, entire, the upper ones sessile, and, like the bracts, fringed at the base, the lowest narrowed into a slender petiole; heads few or solitary, large, terminal; flowers blue.

S. CYANEA, L'Her. Wet pine-barrens. *Stems* 1°-1½° high; *heads* 1' wide.

ELEPHANTOPUS, L. ELEPHANT'S-FOOT.

Heads 3-5-flowered, crowded in terminal 3-bracted clusters; *flowers* all equal and similar; *involucre* compressed; scales 8, in 2 rows, dry, oblong, acute, dotted; *receptacle* naked; *corolla* deeply split on one side, palmate; *achenium* oblong, ribbed, hairy; *pappus* bristly from a dilated base, double or single.—Erect hairy corymbose-branched perennials, with alternate ample *leaves*, and purple or white flowers.

E. TOMENTOSUS, L. Rough-hairy; *stem* nearly naked; radical *leaves* spreading, obovate-oblong, narrowed into a petiole; *stem-leaves* (1-2) small, lanceolate; *bracts* ovate or cordate, usually shorter than the heads; scales of the involucre very hairy. (E. nudicaulis, Ell.) Dry sandy soil. *Stem* 1°-2° high; *radical leaves* 4'-10' long, 2' wide, spreading on the ground; *flowers* pale purple.

TRIBE II. **Eupatoriaceæ.** *Heads* discoid; the *flowers* all tubular and perfect; branches of the style usually elongated, club-shaped, minutely pubescent; the stigmatic lines obscure; flowers white, blue, or purple.

CÆLESTINA, Cass.

Heads many-flowered; *involucre* nearly hemispherical, the scales numerous, imbricated; *receptacle* naked or chaffy; *achenia* 5-angled; *pappus* cup-shaped, truncate or more or less prominently toothed; *leaves* opposite, toothed; heads in close corymbs; *flowers* blue or purple.

C. MARITIMA, Torr. and Gray. *Stem* diffuse, somewhat shrubby at the base, smooth; *leaves* ovate, abruptly contracted into a slender petiole; corymbs few-flowered; *receptacle* naked; *pappus* a whitish truncated margin. Stem 1°-2° long; *flowers* blue.

AGERATUM, L.

Receptacle always naked; *pappus* composed of 5-10 distinct scales. Otherwise like Cælestina.

A. CONYZOIDES, L. *Leaves* ovate, rhombic, or cordate, on rather long petioles; scales of the *pappus* 5, slightly serrate, awn-pointed from a broad base. Wet places. Pubescence and form of the leaves variable; *flowers* white or blue.

CARPHEPHORUS, Cass. (LIATRIS, Ell.)

Heads about 20-flowered; *receptacle* chaffy; *pales* narrow, 3-veined and rigid, shorter than the flowers; *stem* simple, leafy, corymbous at top, with middle-sized head of purple flowers; *achenia* 10-ribbed; *leaves* alternate; scales of the involucre imbricated in three rows, ovate or lanceolate, appressed.

C. TOMENTOSUS, Torr. and Gray. *Stem* erect, downy; *leaves* cuneate-lanceolate, 3-ribbed, narrowed into a clasping petiole; cauline *leaves* lance-ovate; scales of the involucre lance-ovate, nearly smooth. Stem 2° high, bear-

ing a loose spreading corymb; *pales* linear; *pappus* purplish.

C. CORYMBOSUS, Torr. and Gray. *Stem* stout, erect, hairy, single; *leaves* slightly hairy, obtuse, oblanceolate, tapering at the base; *heads* about 20, 20-flowered in a dense corymbose *cyme*; *scales* smooth, oblong oval. *Stem* 3° high; *flowers* purple.

LIATRIS. BUTTON SNAKEROOT.

Heads few to many (5-60) flowered; *flowers* all perfect, tubular; *involucre* oblong imbricated; *receptacle* naked; *pappus* abundant and bristly; *achenia* tapering to a slender base; *styles* much exserted.—Perennial *herbs*, erect *stems*, alternate *leaves*; *flowers* rose-color, sometimes white.

* *Scales of the involucre colored, and petioled at their ends.*

L. ELEGANS, Willd. *Leaves* glabrous, the radical oblanceolate, 3-5-veined, cauline, linear, the upper bract-like, spreading; *spike* or raceme dense; *heads* oblong-cylindrical, 4-5-flowered; *scales* of the involucre petal-like, purple; *stem* tomentose.

L. SQUARROSA. (*Blazing Star*.) *Leaves* linear, smooth or scabrous-pubescent; *racemes* flexuous, leafy; *heads* few, 20-40-flowered, sessile or nearly so; *involucre* ovate-cylindrical; *scales* large, squarrous-spreading, outer larger, leafy, inner mucronate-acuminate, scarcely colored.

** *Heads 3-7-flowered, in one-sided spikes or racemes; pappus densely bearded.*

L. GRACILIS. *Stem* pubescent, slender, simple; *leaves* linear, 1-veined, the lower lanceolate, obtuse, all glabrous, ciliate at the base, long petioled; *heads* 3-7-flowered on divaricate, slender, hairy pedicels, in a long virgate raceme, rarely paniculate; *scales* few and appressed, shorter

than the purple barbellate pappus. *Plant* 3°–5° high, grayish; heads small; *fruit* villous.

L. ACIDOTA. Found on the Washita; mentioned but not described by *Engelmann*.

L. SPICATA. *Leaves* lance-linear, smooth, lower ones narrowed at the base; *scales* of involucre oblong, obtuse; *flowers* 8; *pappus* scabrous-plumose; *heads* numerous, with bright purple *flowers*.

L. SCARIOSA, *L.* (*Gay Feather*.) *Stem* pubescent; *leaves* mostly pubescent, the lower large, lanceolate or oblong, the upper ones linear acute; *heads* large, 15–40-flowered, roundish, sessile or pediceled; *scales* of involucre spatulate or obovate, rounded at the apex, usually with broad and colored margins, the outer ones with spreading tips.

*** *Root* not tuberous; *leaves* obovate or oblong; *heads* few-flowered, corymbed or paniced; *pappus* minutely bearded.

L. ODORATISSIMA, Willd. (*Deer's Tongue*.) *Stem* herbaceous, smooth; *leaves* smooth and often glaucous, obtuse, the lowest spatulate-obovate, 3–5-ribbed, the upper oval or oblong, small, sessile; *heads* 7–8-flowered, disposed in an ample, spreading corymb or panicle. *Stem* 2°–3° high. Withering, it exhales an odor like vanilla. Abundant in the prairies around Houston.

KUHNIA, L.

Herb; *leaves* lanceolate or linear, dotted; *achenium* cylindrical, many-striate; *heads* 10–25-flowered; *flowers* all similar and perfect; *scales* of involucre few and loosely imbricated in 2–3 rows; *pappus* a single row of strongly plumose bristles.

K. EUPATOROIDES. *Corymbs* loose or crowded; *stem*

2°–4° high, branched, pubescent, somewhat viscid; *leaves* toothed or entire, pubescent, or smoothish beneath, the lower sometimes opposite.

BRICKELLIA, Ell.

Herbs with opposite leaves, three-ribbed and dotted; *heads* large, purple, in terminal corymbs; scales of *involucre* imbricated, outer ones shorter; *receptacle* flat, naked; *corolla* 5-toothed; *achenia* cylindrical, 10-striate; *pappus* a single row of bearded bristles. Perennial.

B. CORDIFOLIA, Ell. *Heads* large, from 30–40-flowered; *achenia* nearly smooth; *stem* erect, branching; *leaves* ovate, serrate, mostly cordate, petioled, the upper ones mostly alternate. Stem 2°–4° high; *flowers* conspicuous and gay.

EUPATORIUM. THOROUGHWORT.

Herbs, resinous dotted, opposite or whorled *leaves*; *flowers* purple and white; *involucre* bell-shaped or cylindrical; *scales* in a single row or imbricated in two or more rows; *receptacle* flat, naked; *corolla* 5-toothed; *achenia* 5-angled, the sides smooth; *pappus* a single row of rough bristles; *heads* corymbed.

* *Scales of the involucre* purplish, scarious, obtuse, imbricated in several rows, the outer ones much shorter; *leaves* whorled; *flowers* purple.

E. PURPUREUM. *Stem* simple, tall, often dotted; *leaves* 3–6 in a whorl, varying from lanceolate to ovate, coarsely serrate, roughish; *corymbs* large, compound; *heads* 5–10-flowered. Stem 3°–10° high, solid or hollow, even or grooved, smooth or pubescent.

** *Scales of the involucre* green or white, imbricated in several rows; *heads* 5–10-flowered; *leaves*, *achenia*, etc., dotted with resinous glands; *flowers* white.

† *Heads* 5-flowered; *leaves* undivided, sessile, or narrowed into a stalk-like base.

E. HYSSOPIFOLIUM, L. *Stem* 2°–3° high; *leaves* lanceo-

late or ovate-lanceolate, serrate or toothed, 3-ribbed at the base, pubescent, opposite or alternate; scales of the involucre lanceolate, mucronate, shorter than the flowers.

E. CUNEIFOLIUM. Leaves 1' long; scales of the involucre obtuse, shorter than the flowers; leaves obovate-oblong, serrate or entire, 3-ribbed; stem 2°-3° high; plant pubescent.

E. TEUCRIFOLIUM. Stem virgate, 2°-3° high; leaves 1'-1½' long, the base rounded or truncate, ovate or oblong-ovate, coarsely serrate, the upper ones small; flowers in dense corymbs, depressed in the center; scales of the involucre lanceolate, shorter than the flowers.

†† Leaves petioled.

E. SEROTINUM, Michx. Heads 12-15-flowered; scales of involucre linear-oblong, obtuse; achenia smooth; stem 3°-6°; leaves 4'-9' long, ovate-lanceolate, acuminate, 3-ribbed, long-petioled.

*** Scales of the involucre green, equal, in a single row; heads 8-30-flowered; leaves, achenia, etc., not resinous-dotted; leaves on slender petioles.

† Heads in a paniced raceme; leaves pinnately divided.

E. FENICULACEUM. Heads 3-5-flowered; scales of the involucre smooth, margined, notched at the apex, mucronate; achenia smooth; stem 3°-8° high; flowers white. leaves filiform, smooth.

MIKANIA, Willd.

Heads 4-flowered; scales of the involucre 4; receptacle naked, flat; anthers partly exserted; corolla, achenia, etc., as in *Eupatorium*.—Chiefly climbing herbs, with opposite mostly cordate leaves, and whitish flowers.

M. SCANDENS, Willd. Smooth or pubescent; leaves on slender petioles, acuminate, toothed or entire; corymbs numerous, on short axillary branches or peduncles; scales

of the involucre linear, acute; *achenia* minutely glandular; *stem* twining.

CONOCLINIUM, DC.

Heads many-flowered; *scales* of the involucre nearly equal, imbricated in 2-3 rows; *receptacle* conical, naked; *corolla* 5-toothed; *anthers* included; *achenia* angled, smooth.—Perennial *herbs*, with opposite petioled serrate *leaves*, and *heads* of purple or blue flowers in a terminal corymb.

C. CÆLESTINUM, DC. Smoothish; *leaves* deltoid-ovate, the lowest often cordate, acuminate, coarsely serrate; *heads* 30-60-flowered; *flowers* bluish-purple; *stem* 2° high.

TRIBE III. **Asteroidæ.** *Heads* discoid or radiate, the rays pistillate; branches of the *style*, in the perfect flower, flattened, linear or lanceolate, equally pubescent above on the outside; the conspicuous stigmatic lines terminating where the exterior pubescence commences.

SERICOCARPUS, Nees.

Heads 12-15-flowered; the *ray-flowers* about 5, white, pistillate; those of the disk tubular and perfect; *involucre* somewhat cylindrical or club-shaped; the *scales* cartilaginous, whitish, closely imbricated in several rows, with greenish and more or less spreading tips; *receptacle* pitted, toothed; *achenia* short, obpyramidal, silky; *pappus* simple, composed of numerous capillary bristles.—Perennial *herbs*; *leaves* alternate; *heads* crowded in a dense corymb; disk-flowers yellow.

S. TORTIFOLIUS. *Stem* 1°-2° high; *leaves* 1' long, obovate, rarely serrate, vertical; *involucre* top-shaped, *scales* oblong and spreading slightly at the tips; *pappus* copious, white.

ASTER, Tourn. ASTER; STARWORT.

Heads many-flowered, the rays (white, blue, or purple) in a single series, pistillate; *scales* of the involucre more or less imbricated, mostly with herbaceous or leafy tips; *receptacle* flat, pitted; *achenia* usually compressed; *pappus* a single row of numerous rough capillary bristles.—Perennial (rarely annual) *herbs*; *leaves* alternate; disk-flowers yellow, often changing to purple.

ASTER proper.—*Scales* of the involucre imbricated in various degrees, with herbaceous tips; *rays* numerous; *achenia* flattened; *pappus* of soft capillary bristles, not thickened upward.—Autumnal plants.

* *Leaves* uniform, small, sessile, entire, silky or silvery on both sides, mucronate; *scales* of the involucre imbricated in 3-several rows; *rays* violet-purple.

A. SERICEUS, Vent. *Stem* with numerous branches, bearing the large heads (single or 3 in a cluster) at their summits; *leaves* oblong-lanceolate, silvery; *scales* of the involucre leafy and spreading; *achenia* smooth. Stem 10'–20' high; leaves $\frac{1}{2}$ '–1' long; *heads* showy.

A. CONCOLOR, L. *Stem* mostly simple, slender, bearing toward the summit, the middle-sized heads in a long often compound *raceme*; *leaves* lanceolate, silky when young, the lowest ones oblong; *scales* of the obovoid involucre lanceolate, appressed, the subulate tips spreading; *achenia* silky; *root* sometimes tuberous. Stem 1°–3° high; *leaves* erect, $\frac{1}{2}$ '–1' long.

† *Leaves* all clasping and auricled at the base; *heads* large; *scales* of the involucre linear.

A. PATENS, Ait. *Stem* pubescent, loosely paniced above; *leaves* ovate-oblong, with very rough and wavy margins, those on the slender and spreading branchlets very small.—Var., PHLOGIFOLIUS. *Leaves* larger, thinner, and less

roughened, contracted below the middle; *heads* often racemose on the short lateral branches. Stem 1° – 3° high; leaves $1'$ – $2'$ (in the var. $3'$ – $6'$) long; heads showy.

** *Leaves (and stems) smooth, the lowest tapering into a petiole, the others sessile or clasping; heads middle-sized, showy; scales of the obovoid involucre whitish, the short green tips scarcely spreading; rays bright blue; achenia mostly smooth.*

A. CONCINNUS, Willd. *Stem* nearly smooth, somewhat loosely corymbose; the branches virgate, dichotomous-paniculate; *leaves* lanceolate, partly clasping, remotely and sharply serrate, with scabrous margins, those of the branchlets oblong, entire; *scales* of the involucre linear, acute, closely imbricated. Stem 2° – 3° high; *achenia* pubescent.

*** *Lower leaves large, cordate, on long petioles; heads middle-sized or small, racemed or panicled; scales of the involucre somewhat membranaceous, with short green tips; rays blue or violet.*

† *Leaves entire, or nearly so.*

A. UNDULATUS, L. Pubescent; *stem* racemose-panicled above; *leaves* varying from lanceolate to broadly ovate, often wavy or slightly serrate on the margins, roughish on the upper surface, the lowest on long and slender petioles which are dilated and clasping at the base, the upper on broadly winged petioles or sessile and clasping; *scales* of the obovoid involucre linear, appressed, acute. Stem 2° – 3° high; *heads* small; *rays* pale blue.

A. ASPERULUS, Torr. and Gray. Roughish; *stem* racemose-panicled above, or simple; lowest *leaves* oblong-ovate, obtuse or slightly cordate at the base, sparingly serrate, on slender (not clasping) petioles; the upper oblong, narrowed at the base, sessile or on short winged petioles; those of the branches minute; *heads* loosely racemed or panicled, small; *scales* of the hemispherical involucre lanceolate, acute. Stem 2° high; *rays* pale blue.

*** *Leaves linear or lanceolate, entire, sessile; radical leaves stipulate-lanceolate, serrate; heads small and numerous, racemed; scales of the involucre in several rows, rigid, with spreading or recurved green tips.*

A. MULTIFLORUS, Ait. *Stem* 1°-2°, very leafy and much branched; *leaves* linear, obtuse at each end, often bristly-pointed, spreading or recurved, the upper ones sessile or somewhat amplexicaul; *scales* of the involucre broadest at the apex, obtuse or short-pointed; *heads* densely racemose on the short and very leafy branches, or sometimes solitary at their summits; *rays* white; *plant* whitish-pubescent.

ERIGERON, L. FLEABANE.

Heads mostly hemispherical, many-flowered; *rays* very numerous, pistillate; *scales* of the involucre nearly equal, in 1-2 rows; *receptacle* flat, naked; *achenia* compressed; *pappus* a single row of capillary bristles, or with an outer row of short chaffy scales or bristles.—*Herbs; leaves* alternate; *rays* white or purplish.

* *Pappus double.*

E. STRIGOSUM, Muhl. *Annual*, rough pubescent; *stem* slender, corymbose-panicled above; *leaves* entire or sparingly serrate, the lowest oblong, tapering into a slender petiole, the upper lanceolate or linear, sessile, distant; *heads* small, corymbose-panicled; *rays* white or rose-color; outer *pappus* short and chaffy. *Stem* 2° high.

** *Pappus single.*

† *Annual; rays shorter than the disk.*

E. CANADENSE, L. *Hirsute* or smooth; *stem* much branched; *leaves* linear-lanceolate; *heads* very numerous, in panicled racemes, small, cylindrical; *rays* white; *disk-flowers* 4-toothed. *Stem* 1°-3° high.

†† *Perennial; rays conspicuous.*

E. BELLIDIFOLIUM, Muhl. Hairy or villous; *stem* simple; lowest *leaves* spatulate or obovate, toothed above the middle, the upper oblong, sessile and entire; *heads* large, solitary or corymbose; *rays* broadly linear, bluish purple. *Stem* 1° high, stoloniferous.

E. VERNUM, Torr. and Gray. Smooth or nearly so; *stem* simple, scape-like; radical *leaves* clustered, thick, spatulate or obovate, entire or slightly toothed, the others small and remote; *heads* corymbed; *rays* (about 30) white. (*E. nudicaule*, Michx.) Rhizoma thick; *stem* 1°–2° high.

DIPLOPAPPUS, Cass.

Heads many-flowered; *rays* 8–12, pistillate; *scales* of the involucre imbricated, without herbaceous tips; *receptacle* flat, alveolate; *pappus* of capillary bristles in two rows, the outer row much shorter.—Perennial erect *herbs*; *leaves* alternate; *heads* single or corymbose; *rays* white or purple.

* *Rays purple.*

D. LINARIIFOLIUS, Hook. *Stem* rigid, simple, closely pubescent; *leaves* numerous, linear, spreading, the margins very rough; *heads* solitary or somewhat racemose; *scales* of the involucre imbricated in several rows, linear, appressed; *achenia* silky. *Stem* 1° high; *leaves* 1' long.

** *Rays white.*

D. CORNIFOLIUS, Darl. *Stem* pubescent; *leaves* elliptical, tapering at each end, hairy on the margins and veins beneath; *heads* few, on slender spreading peduncles; *achenia* smooth. *Stem* 1°–2° high; *leaves* 2'–4' long.

D. AMYGDALINUS, Torr. and Gray. *Stem* roughish and corymbose above; *leaves* oval or oblong, acute at each end,

nearly smooth ; *heads* numerous, corymbed ; *scales* of the involucre obtuse ; *achenia* hairy. Stem 2° – 4° high ; the branches spreading ; leaves $1\frac{1}{2}$ '–2' long.

BOLTONIA, L'Her.

Heads many-flowered ; *rays* pistillate ; *scales* of the hemispherical involucre imbricated in two rows, not longer than the disk ; *receptacle* hemispherical or conical, obscurely alveolate ; *achenia* flattened, obovate, wing-margined ; *pappus* composed of several short chaffy scales, that of the disk-flowers mostly with 2–4 longer awns.—Perennial *herbs*, resembling *Asters*.

B. DIFFUSA, Ell. *Stem* with long and slender branches ; *leaves* linear, entire ; *heads* small, terminal ; *achenia* narrowly margined, hairy ; *pappus* very short, 2-awned. Stem 3° – 4° high ; *rays* purplish.

B. GLASTIFOLIA, L'Her. *Stem* paniculate ; *leaves* rigid, lanceolate, sparingly serrate, the upper ones linear, entire ; *heads* rather large ; *achenia* broadly margined ; *pappus* of few short bristles, and 2–4 long awns. Stem 3° – 5° high ; *rays* white.

SOLIDAGO, L. GOLDEN ROD.

Heads few or many flowered ; *rays* 1–16, rarely wanting, pistillate ; *disk-flowers* tubular, perfect ; *scales* of the involucre imbricated, rarely with spreading tips ; *achenia* terete, many-ribbed ; *receptacle* flat ; *pappus* simple, of numerous scabrous mostly capillary bristles.—*Plant* erect ; *leaves* alternate ; *perennial* ; flowers yellow.

CHRYSASTRUM.—*Scales* of the involucre with herbaceous spreading tips ; *bristles* of the *pappus* unequal, some of them thickened upward ; *racemes* short, forming a long and narrow leafy panicle.

S. DISCOIDEA, Torr. and Gray. *Stem* 3°–5° high, simple or branched, pubescent or hairy; *leaves* ovate, acute, abruptly narrowed into a petiole, lower ones serrate; *achenia* smooth; *racemes* 3–6, large, 10–15-flowered heads; *rays* none; *flowers* yellowish white.

VIRGAUREA. *Scales* of the involucre appressed; *rays* mostly fewer than the disk-flowers, rarely wanting; *racemes* racemose-corymbose, or paniced.

* *Racemes* not 1-sided; *leaves* feather-veined.

† *Racemes* crowded in racemose or pyramidal terminal panicles, longer than the leaves; lowest leaves large, commonly tapering into a petiole, the uppermost small, sessile and entire.

S. PETIOLARIS, Ait. Minutely pubescent; *stem* mostly simple, straight, very leafy; *leaves* oblong-lanceolate or elliptical, acute, rough on the margins, all but the lowest entire, and nearly sessile; *panicle* racemose or oblong; *heads* large, 20–25-flowered; *rays* about 10, showy; *scales* of the involucre linear, pubescent, the outer ones more or less spreading; *achenia* smoothish. *Stem* 2°–3° high; *leaves* 1'–2' long.

S. SPECIOSA, Nutt. *Stem* stout, mostly simple, smooth below, pubescent above; *leaves* smooth, the lowest large (5'–8' long, 1½'–2' wide), serrate, the upper ones lanceolate; *panicle* compact, pyramidal; *heads* rather large, crowded, 15–20-flowered; *rays* 6–8, showy; *scales* of the involucre lanceolate, obtuse; *achenia* smooth.—Varies, with the stem and lower surface of the broader (2'–3') leaves villous; the fewer, larger, and more scattered heads about 30-flowered; or every way smaller; the short racemes forming a narrow racemose panicle. The first variety only in the upper districts. *Stem* 3°–5° high, often purplish.

Racemes 1-sided, mostly compound, spreading or recurved, often erect, commonly disposed in a pyramidal panicle.

Smooth species, growing in marshes; stems virgate; leaves very numerous, more or less fleshy, the lowest elongated and tapering into a marginal petiole, the upper small and passing into bracts; heads middle-sized; achenia pubescent.

S. MISSOURIENSIS. *Stem* 1° - 2° high; *leaves* smooth and shining, the lower 3"-4" by 3'-5', gradually reducing upward into small bracts, lance-linear, tapering to each end, 3-veined; *radical leaves* oblong-lanceolate, petiolate; *racemes* small in a dense pyramidal or somewhat corymbose panicle; *scales* with greenish tips; *heads* small, 12-15-flowered; *rays* about 8. On Wichita River.

Leaves very numerous, gradually diminishing in size upward, veiny, sessile, or the lowest narrowed into a short petiole; heads small.

S. ULMIFOLIA, Muhl. *Stem* smooth, or softly pubescent above; *leaves* ovate-lanceolate, acuminate, serrate, smooth on the upper surface, paler and pubescent on the veins beneath; *panicle* loose, spreading; *heads* about 10-flowered; *rays* 4-5; *scales* of the involucre acutish; *achenia* nearly smooth. *Stem* 2° - 3° high; *leaves* thin, 2'-3' long.

S. ELLIOTTII, Torr. and Gray. *Smooth; stem* mostly simple; *leaves* oblong-lanceolate or elliptical, sessile, acute, finely serrate, the upper often entire; *racemes* crowded, forming a pyramidal panicle; *scales* of the 13-20-

S. ODORA, Ait. *Stem* 2° - 3° high, mostly simple, pubescent in lines; *leaves* entire, linear-lanceolate or oblong-ovate, smooth, rough margins, dotted; *panicle* pyramidal, mostly one-sided; *heads* 5-7-flowered; *rays* 3, showy; *achenia* hairy; *leaves* 1'-2' long; *plant* anise-scented. Wichita Mountains.

Leaves more or less prominently 3-ribbed.

S. CANADENSIS, L. *Stem* 3° - 8° high, pubescent and often rough; *leaves* acute or acuminate, serrate, lanceolate, rough above, pubescent beneath; *panicle* pyramidal, dense; *heads* small; *rays* very short; *achenia* pubescent.

BIGELOVIA, DC.

Heads 3-4-flowered, the *flowers* all tubular and perfect; *involucre* cylindrical-club-shaped, as long as the flowers; the *scales* linear, rigid, appressed, somewhat viscid; *receptacle* narrow, cuspidate; *achenia* terete, striate, hairy; *pappus* simple, of numerous scabrous capillary bristles; *styles* scarcely exerted.—A smooth erect perennial *herb*, with narrow obtuse and entire *leaves*, and small heads of yellow flowers, disposed in a compound corymb.

B. NUDATA, DC. *Stem* mostly simple, virgate; lowest *leaves* spatulate-lanceolate, obscurely 3-nerved, the others scattered, linear. *Stem* 2° high.

ISOPAPPUS, Torr. and Gray.

Heads several-flowered; *rays* 5-12, pistillate; *involucre* cylindrical-campanulate; the *scales* lanceolate-subulate, imbricated in 2-3 rows, appressed; *receptacle* alveolate; *achenia* terete, silky; *pappus* a single row of nearly equal capillary bristles. Biennials. *Stems* paniculate; *leaves* alternate, narrow; heads scattered, on slender peduncles; rays yellow.

I. DIVARICATUS, Torr. and Gray. Hispid and glandular; *stem* erect, the slender branches spreading; *leaves* linear-lanceolate, sparingly toothed; *involucre* soft-hairy; *rays* 5-8. *Stem* 1°-4° high; *panicle* large; *heads* 15-20-flowered.

HETEROTHECA, Cass.

Heads many-flowered; *rays* pistillate; *scales* of the involucre imbricated in few rows, linear; *receptacle* alveolate, bristly; *achenia* of the rays oval, destitute of pappus, those of the disk-flowers obovate, compressed, hairy, with a double pappus, the outer one short and chaffy, the inner

bristly.—Biennial rough-hairy branching *herbs*, with irregularly toothed or entire alternate *leaves*, and corymbose-panicled heads of yellow *flowers*.

H. SCĀBRA, DC. *Leaves* oblong, toothed, commonly sessile or clasping, the lowest petioled, obtuse or somewhat cordate at the base; *involucre* thick, shorter than the brownish inner pappus. *Stem* rigid, 1° – 2° high; leaves 1'–2' long.

CHRYSOPSIS, Nutt.

Pappus of the ray and disk flowers alike, double; the exterior row chaffy, or of chaffy bristles, the interior longer, capillary; otherwise like *Heterotheca*.—Biennial or perennial hairy or silky *herbs*, with linear or oblong mostly entire *leaves*; *heads* mostly corymbd; *flowers* yellow.

* *Leaves* narrow, *nerved*, *entire*; *achenia* oblong-linear, narrowed at each end, *pubescent*; *perennials*.

C. GRAMINIFOLIA, Nutt. *Stem* leafy, white with appressed silky shining hairs, as also the linear *leaves*; *heads* numerous, rather small, on slender and more or less glandular peduncles; *involucre* top-shaped, the linear scales glandular. *Stem* 1° – 2° high; lowest leaves 4'–8' long.

C. OLIGANTHA, Chapm. *Stem* nearly naked and glandular above, the lower part, like the linear or lanceolate *leaves*, silky with appressed shining hairs; *heads* 1–4, on long erect glandular peduncles, rather large; *involucre* bell-shaped, the scales glandular-pubescent. *Stem* 1° high; stem-leaves clasping, those of the root elongated.

C. PINIFOLIA, Ell. Smooth; *stem* rigid; *leaves* linear, crowded, rigid; *corymb* large; *scales* of the involucre woolly at the summit. *Stem* $1\frac{1}{2}^{\circ}$ – 2° high; stem-leaves 4'–6' long, the uppermost filiform; *heads* large; exterior *pappus* somewhat chaffy.

**** Leaves** *veiny, oblong or lanceolate; the lowest narrowed at the base, the upper sessile; achenia obovate, compressed.*

C. MARIANA, Nutt. Perennial; *stem* simple, covered with loose silky deciduous hairs; lowest *leaves* spatulate-oblong, entire or slightly serrate, the upper ones lanceolate, sessile, entire; *corymb* small, mostly simple and umbellate, cone-like in the bud; *peduncles* and *involucre* glandular. Stem 1°–2° high.

BACCHARIS, L.

Heads dioecious, many-flowered, the *flowers* all tubular; *corolla* of the sterile flowers 5-cleft; of the fertile ones filiform, nearly entire, without anthers; *style* exserted; *scales* of the oblong or hemispherical involucre imbricated in several rows; *receptacle* naked or somewhat chaffy; *achenia* ribbed; *pappus* of the sterile flowers capillary, in a single row, as long as the involucre; of the fertile flowers in 1–several rows, commonly much longer than the involucre.—Smooth and resinous *shrubs*; *leaves* alternate; flowers white.

B. HALIMIFOLIA, L. *Branches* angled; *leaves* obovate, or oblong-obovate, toothed above the middle, the uppermost lanceolate, entire; *heads* peduncled, the terminal ones clustered; *pappus* of the fertile flowers 3–4 times as long as the involucre.—*Shrub*, 2°–12° high.

B. GLOMERULIFLORA, Pers. *Branches* angled; *leaves* wedge-obovate, coarsely-toothed, rigid, the uppermost obovate, entire; *heads* very numerous, in dense sessile axillary clusters; *pappus* of the fertile flowers twice as long as the involucre.—*Shrub*, 6°–12° high.

B. ANGUSTIFOLIA, Michx. *Branches* numerous, angled; *leaves* linear, entire; *heads* single, or 2–4 in a terminal cluster; *achenia* smooth.—*Shrub*, 4°–8° high; *heads* small.

PLUCHEA, Cass.

Heads many-flowered; the central *flowers* mostly perfect, but sterile, with the corolla dilated and 5-cleft, the others pistillate, slender, slightly toothed; *anthers* bicaudate; *scales* of the involucre imbricated; *receptacle* flat, mostly naked; *achenia* grooved or angled; *pappus* a single row of capillary slightly scabrous bristles.—Odorous mostly pubescent and glandular *herbs*, with alternate ovate or oblong serrate *leaves*; heads of purplish flowers corymbose.

P. BIFRONS, DC. *Stem* simple, or sparingly branched; *leaves* oblong, acute, denticulate, strongly reticulated and rugose, cordate and clasping; *heads* clustered; *involucre* pubescent and viscid. *Stem* 1°–2° high; *flowers* pale purple or white.

P. FÆTIDA, DC. Minutely pubescent and glandular; *leaves* large, membranaceous, ovate-lanceolate, acuminate, serrate, tapering into a petiole; *corymbs* axillary and terminal; *heads* rather small, numerous, on slender pedicels; *involucre* smoothish, often purplish. *Stem* 2°–5° high; *leaves* 5'–8' long, resinous-dotted; *flowers* purple.

PTEROCAULON, Ell.

Heads spiked; *scales* of the involucre lanceolate, imbricated in several rows, caducous; *leaves* lanceolate, tomentose and hoary beneath, the margins decurrent on the stem; *receptacle* hairy; *achenia* angled, pubescent; *pappus* of numerous capillary bristles, longer than the involucre. Heads many-flowered, central *flowers* mostly perfect, but sterile, with the corolla dilated and 5-cleft, the others pistillate.

P. PYCNOSTACHYUM, Ell. *Leaves* wavy, smooth; *stem* 1°–2° high; *spike* thick, woolly; *flowers* white.

SILPHIUM, L.

Heads many-flowered; the *rays* numerous, pistillate, fertile, in a single row; *disk-flowers* cylindrical, sterile; the *style* undivided; *scales* of the involucre leafy, imbricated in several rows, the innermost smallest, chaff-like; *receptacle* small, with linear acutish chaff; fertile *achenia* in 3-4 rows, round or obovate, flat, broadly winged, 2-toothed or emarginate at the apex; the sterile ones slender; *pappus* none, or represented by the two teeth of the achenia.—'Tall resinous *herbs*, with alternate opposite or whorled *leaves*, and large heads of yellow flowers in corymbose panicles.

* *Stems terete, nearly naked; leaves alternate, the lowest large, serrate or variously lobed, long-petioled, the others small and scattered.*

S. LACINIATUM, L. *Stem* hispid or smooth; *leaves* very rough or hispid, on clasping petioles, pinnately parted; the divisions oblong or lanceolate, acute, lobed or toothed; *heads* large, spicate or racemose; *scales* of the involucre ovate, tapering into a long and spreading point, ciliate; *achenia* round-obovate, emarginate.—Varies with the more numerous sessile and clasping leaves less deeply parted.—Stem 6°-8° high; lowest leaves 1°-2° long; heads 1½'-2' in diameter.

S. TEREBINTHINACEUM, L. *Stem* smooth, naked above; *leaves* rough-hairy, undivided, cordate-oval or oblong, coarsely serrate, on slender petioles; *heads* small, loosely paniced; *scales* of the involucre oval or obovate, obtuse, smooth; *achenia* obovate, emarginate or 2-toothed. Stem 4°-8° high; radical leaves 2° long; heads 1' wide.

S. COMPOSITUM, Michx. Smooth; *leaves* cordate-ovate or reniform, angularly toothed or variously lobed, long-petioled; *heads* small, corymbosely paniced; *scales* of the involucre obovate or oblong, obtuse; *achenia* roundish, deeply emarginate; *rays* 6-10. Stem 3°-6° high; leaves 6'-12'; heads ½' in diameter.

** *Stems leafy; leaves undivided, alternate, opposite, or whorled.*

† *Stems terete.*

S. ASTERISCUS, L. *Stem* smooth or hirsute; *leaves* rough, opposite or alternate, or the lower ones sometimes 3 in a whorl, lanceolate or oblong, toothed, on short hirsute petioles; the upper ones sessile and commonly entire; *heads* somewhat corymbose, rather large; exterior *scales* of the involucre ovate, acute, short-ciliate, the interior oblong, obtuse; *achenia* broadly obovate, 2-toothed. Stem 2°-4° high; *leaves* 3'-5' long; *rays* showy.

S. SCABERRIMUM, Ell. *Stem* rough-hairy; *leaves* mostly opposite, ovate, acute, serrate, rigid, very rough on both sides, on short petioles; *heads* corymbose; *scales* of the involucre ovate, ciliate; *achenia* nearly orbicular, broadly winged, deeply notched at the apex. Stem stout, 3°-4° high, becoming smoothish; *leaves* 3'-4' long; *heads* larger than in the last.

†† *Stems square.*

S. PERFOLIATUM, L. *Stem* and *branches* smooth or hairy; *leaves* large, opposite, ovate or ovate-oblong, coarsely toothed, rough on both sides, or pubescent or hairy beneath, their bases, or winged petioles, united, the uppermost commonly entire, simply serrate; *corymb* trichotomous; the central *heads* long-peduncled; *scales* of the involucre ovate, obtuse; *achenia* broadly obovate, emarginate. Stem 4°-6° high; *leaves* 6'-12' long; *heads* large.

BERLANDIERA, DC.

Heads many-flowered; *ray-flowers* few, pistillate; those of the disk tubular, 5-toothed, sterile; *scales* of the involucre in three rows, the innermost largest, membranaceous, adherent to the fertile achenia; *receptacle* chaffy, the chaff dilated upward, obtuse, hooded, partly embracing the sterile achenia, the inner ones gradually narrower; fertile

achenia in a single row, obovate, flattened, wingless, pubescent on the inner face, the apex entire.—Perennial downy or hoary *herbs*, with alternate *leaves*, solitary or corymbose heads, and yellow rays.

B. TOMENTOSA, Torr. and Gray. *Stem* leafy, hoary-tomentose; *leaves* oblong-obovate, crenate, hoary beneath, closely pubescent above, the lowest tapering into a petiole, the upper cordate, sessile; *heads* at length numerous, corymbose-panicled. Stem 1° – 3° high; leaves 2'–3' long.

PARTHENIUM, L.

Herbs; *heads* many-flowered; *ray-flowers* 5, in a single row, short obcordate, pistillate; *disk-flowers* tubular, 5-toothed, sterile; *anthers* slightly united; involucre *scales* oval; *receptacle* conical, chaffy, the chaff dilated upward; *achenia* compressed, thick-margined; flowers white; *pappus* of two roundish scales; alternate *leaves*.

P. INTEGRIFOLIUM, L. *Stem* 1° – 2° high, erect, rough; *panicle* dense, corymbose; *involucre* hoary; *pappus* awn-like; conspicuous *rays*; *leaves* undivided, oblong-ovate, serrate.

IVA, L.

Flowers tubular, marginal, with short corolla, pistillate, fertile; central ones 5-toothed, sterile; *anthers* nearly distinct; *involucre* scales 3–5 in a single row, oval or obovate, distinct or partly united, or 6–9 and imbricated; *chaff* of the small receptacle linear or spatulate; *heads* few or many-flowered; *achenia* obovate; *pappus* none.—*Herbs* or *shrubs*; *leaves* opposite or alternate, mostly fleshy; *flowers* small, nodding, axillary, white.

* *Scales of the involucre* 3–5, single row.

I. MICROCEPHALA, Nutt. *Heads* minute, 6–12 flowered;

stem 1°-2° high, slender, much branched; annual, stiff hairs; *involucre* scales 4-5, obovate, ciliate; *fertile flowers* 1-3; *leaves* entire, narrow-linear.

** *Scales of the involucre* 6-9, imbricated, in 2-4 rows.

I. IMBRICATA, Walt. *Stem* 1°-2° high; *leaves* fleshy, lanceolate, lower ones slightly serrate, upper ones alternate and entire; outer *scales* of the involucre orbicular, inner obovate, toothed-margined; *fertile flowers* 2-4, the short corolla 5-parted. Somewhat shrubby; *leaves* 1' long.

AMBROSIA, Tourn.

Heads monœcious, in racemes or spikes, the upper ones sterile, nodding, the lower pistillate and fertile; *involucre* of the sterile flowers hemispherical, composed of 7-12 united scales, 5-20 flowered; *receptacle* naked or with slender chaff; *corolla* 5-toothed; *involucre* of the fertile flowers 1-flowered, ovoid or turbinate, entire, closed, pointed, commonly with a row of tubercles or spines near the apex; *corolla* and *stamens* none; *achenia* globose or ovoid; *pappus* none.—*Herbs*; *leaves* mostly pinnately lobed; *fertile flowers* single or clustered at the base of the sterile spike, or in the axils of the upper leaves, bracted; *flowers* whitish.

* *Leaves* undivided or 3-5-lobed, opposite; *receptacle* naked.

A. TRIFIDA, L. *Stem* tall (6°-10°), 4-sided, rough-hairy; *leaves* rough, palmately 3-5 lobed, with the lobes ovate-lanceolate and serrate, or all undivided; *fruit* obovate, 6-toothed around the base of the conically beaked apex, clustered.

* *Leaves* pinnately lobed; the upper ones mostly alternate; *receptacle* commonly chaffy.

A. CRITHMIFOLIA, DC. *Stem* prostrate and shrubby at the base; the *branches* velvety pubescent; *leaves* bipinnatifid, thickish, softly pubescent; *spikes* few, the terminal

one elongated; *fruit* downy, unarmed. Sandy shores at Key West, forming large clusters.

A. ARTEMISIÆFOLIA, L. Annual, erect, hairy or smoothish; *leaves* bipinnatifid, with linear lobes, the upper often entire; *spikes* single or paniced; fertile *flowers* single, clustered, or sometimes spiked; *fruit* nearly globose, armed with six short teeth. *Stem* 1°–4° high.

XANTHIUM, Tourn. COCKLEBUR.

Heads monœcious, spiked, the upper ones many-flowered, sterile, with the scales of the involucre separate, in a single row; the *receptacle* oblong, chaffy, and the short corolla 5-toothed; the lower ones fertile, consisting of two pistillate flowers, inclosed in a 2-celled oblong closed involucre, which is armed externally with numerous hooked spines or bristles, and terminated by one or two stout beaks; *corolla* filiform; *achenium* oblong, solitary in each cell.—Coarse annual *herbs*; *leaves* alternate, lobed and petioled.

X. STRUMARIUM. *Stem* 1°–4° high, spineless, rough, branched; *leaves* broadly cordate, large, lobed, the lobes toothed-acute, rough on both sides; *fruit* oval, pointed by two straight and smooth beaks.

ECLIPTA, L.

Annuals, rough, branching; *heads* small, axillary-peduncled; *flowers* white; *receptacle* flat, chaff bristly; *achenia* 3–4-angled, hairy at the apex; many-flowered, the *ray-flowers* short pistillate, in a single row; *disk-flowers* tubular, 4-toothed, perfect; *pappus* none; *scales* of the involucre 10–12 in two rows; *white*.

E. ERECTA. *Stem* 1°–2° high, erect or diffuse, terete, tumid below the joints; *leaves* oblong-lanceolate, acute, serrate, narrowed into a petiole, covered like the stems with hairs; *peduncles* 2–3 together.

ZINNIA, L.

Annual *herbs*; *heads* many-flowered; *ray-flowers* pistillate, *disk-flowers* tubular, perfect, 5-lobed; *ray-flowers* oblong, rigid, persistent; *leaves* sessile, 3-ribbed; *scales* of involucre imbricated, oval or roundish; *chaff* of the conical receptacle clasping the disk-flowers; *achenia* of the disk compressed, with a 1-2-awned pappus; those of the rays 3-angled, destitute of pappus.

Z. MULTIFLORA. *Stem* erect, 1°-2° high, hairy, branching; *leaves* oblong-lanceolate; *rays* red or purple; *chaff* of the receptacle obtuse; *pappus* of the disk-flowers 1-awned.

Z. GRANDIFLORA. Mentioned by Engelmann as found on the Red River and its tributaries; description not given.

HELIOPSIS, Pers.

Perennial *herbs*; *heads* many-flowered; *ray-flowers* pistillate; *disk* tubular, perfect, 5-toothed; *achenia* truncate; *scales* of the involucre in 2-3 rows; exterior leafy; *chaff* lanceolate, clasping the achenia; *receptacle* conical; *pappus* none; *rays* yellow.

H. LÆVIS, Pers. *Stem* 2°-5° high, smooth, slender, branching; *leaves* ovate-lanceolate, acuminate, serrate, on slender petioles; *scales* of the involucre obtuse; *rays* deciduous; *peduncles* elongated; *leaves* 3-ribbed at the base.

ECHINACEA, Mœnch.

Heads many-flowered; the *ray-flowers* pistillate, but sterile, drooping; those of the *disk* tubular and perfect; *scales* of the involucre lanceolate, imbricated in three or more rows, spreading; *receptacle* at length conical; *chaff* of the receptacle rigid, spine-pointed, longer than the disk-

flowers; *achenia* short, 4-sided, crowned with a cup-shaped toothed pappus.—Perennial sparingly branched *herbs*, with alternate undivided 3–5-ribbed leaves, and large heads terminating the peduncle-like summit of the stem or branches; *rays* red, purple, or white.

* *Rays elongated, purple or white.*

E. *ANGUSTIFOLIA*, DC. Hirsute; *stem* simple; *leaves* lanceolate, entire, 3-ribbed; the lowest tapering into a long petiole; *scales* of the involucre imbricated in 2–3 rows; *rays* 12–15, narrow, pale purple. Stem 1°–3° high; lowest leaves $\frac{1}{2}$ ° long.

RÜDBECKIA, L.

Heads many-flowered; the *ray-flowers* neutral; those of the *disk* tubular, perfect; *scales* of the involucre in about two rows, leafy, spreading; *receptacle* conical or cylindrical; the *chaff* not rigid, and mostly shorter than the disk-flowers; *achenia* smooth, angled, truncated; *pappus* a narrow border, or none.

* *Disk ovate or globose.*

† *Leaves undivided; stem simple or sparingly branched.*

R. *HIRTA*, L. Hirsute; *stem* and *branches* naked at the summit; *leaves* 3-ribbed, lanceolate or oblong, serrate, the upper ones sessile, the lowest narrowed into a petiole; *disk* roundish, purplish brown; *chaff* of the receptacle acute, hairy at the apex; appendages of the style subulate. Stem rigid, 1°–2° high; *rays* longer or shorter than the involucre.

†† *Leaves divided; stem paniculately or corymbosely branched.*

R. *TRILOBA*. *Stem* much branched, rough hairy; lower *stem-leaves* 3-lobed, the upper sessile, simple, entire; *heads* small, numerous; *scales* of involucre narrow-lanceolate, shorter than the rays; *disk* almost black; *chaff* of receptacle awl-pointed, smooth, as long as the flowers.

LEPACHYS, Raf.

Scales of the involucre few and small; *chaff* of the oblong or columnar receptacle truncate and thickened at the apex; *achenia* flattened and margined; *pappus* 2-toothed or none. Perennials. *Leaves* pinnately divided; *rays* large, drooping, yellow.

L. PINNATA, Torr. and Gray. Rough with short appressed hairs; *stem* sparingly branched; divisions of the leaves 3-7, lanceolate, acute, serrate or entire; *disk* yellowish, oval or oblong, shorter than the rays; *pappus* obscurely 2-toothed. Stem 3°-4° high; *rays* 2' long.

HELIANTHUS, L. SUNFLOWER.

Heads many-flowered; the *ray-flowers* neutral; those of the *disk* tubular and perfect; *scales* of the involucre imbricated in three or more rows, with or without leafy spreading tips; *receptacle* flat or convex, chaffy; *achenia* 4-angled, usually compressed; *pappus* of 2 (rarely 3-4) caducous chaffy scales or awns.—Annual or perennial *herbs*, with opposite or alternate, commonly 3-ribbed, undivided leaves; heads solitary, terminating the stem or branches; *disk* yellow or dark purple; *rays* yellow.

* Annual; *disk* dark purple; *chaff* of the receptacle 3-toothed; *leaves* on long and slender petioles; *achenia* pubescent.

H. PRÆCOX, Gray and Engel. Rough with scattered rigid hairs, villous when young; *stem* erect, paniculately branched, somewhat spotted; *leaves* thin, coarsely serrate, acuminate, undulate, the lowest deltoid-ovate, cordate, opposite, the upper ones ovate-lanceolate; *scales* of the involucre lanceolate-subulate; *rays* 15-20. Stem 2°-3° high.

** Perennial; *disk* dark purple.

†† Rays conspicuous.

H. ANGUSTIFOLIUS, L. *Stem* rough-hairy or smoothish,

paniculately branched; *leaves* linear, elongated, entire, with the margins revolute, the lowest ones opposite; *scales* of the involucre lanceolate, acuminate; *chaff* of the receptacle 3-toothed; *rays* 12-18, showy.—Varies, with broader leaves, and the disk at first yellow. Stem 2°-6° high; leaves 3'-6' long.

H. HETEROPHYLLUS, Nutt. Hirsute or hispid; *stem* slender, mostly simple, naked above; *leaves* opposite, thick, entire; the lower ones lanceolate or oblong, tapering into a petiole; the others linear, remote; *scales* of the involucre lanceolate, acuminate, ciliate; *chaff* of the receptacle 3-toothed, the middle tooth cuspidate; *rays* 15-20, elongated. Stem 2°-4° high; lowest leaves 2'-6' long; rays 1½' long.

H. ATRORUBENS, L. Hirsute or hispid; *stem* sparingly branched and somewhat naked above; *leaves* opposite, oval, serrate, the lowest large and long-petioled; the upper small, sessile, distant; *scales* of the involucre oval or oblong, obtuse; *chaff* of the receptacle acute; *rays* about 12; *achenia* pubescent at the apex. Stem 2°-5° high; lowest leaves 4'-6' long; *heads* rather small.

H. TOMENTOSUS. *Stem* 4°-8° high, stout, hirsute, branching; *leaves* all alternate, or lowest ones opposite, very rough above, tomentose beneath, slightly serrate, lowest ones large, ovate, on short-winged petioles; the upper ones oblong; *heads* large; *scales* of the involucre numerous, lanceolate, acuminate, villous, spreading; *rays* 15-20.

*** Perennial; disk yellow; heads small; leaves narrow.

H. LONGIFOLIUS, Pursh. *Stem* 3°-4°, slender, branching; *leaves* lanceolate, sessile, entire, opposite, lowest contracting in slender petioles and serrate; *heads* few; *rays* small; *scales* of involucre ovate-lanceolate, as long as the disk. Leaves 6'-8' long. Resembles an aquatic Coreopsis.

ACTINOMERIS, Nutt.

Heads many-flowered; the *ray-flowers* 4-14, neutral, or wanting; *scales* of the involucre in 1-3 rows, leafy; *receptacle* convex or conical, chaffy, the chaff embracing the outer edge of the laterally compressed obovate mostly winged achenia; *pappus* of two persistent awns.—Perennial *herbs*, with ovate or lanceolate serrate often decurrent *leaves*; flowers yellow or white.

* *Stems* tall, branching; *pappus* 2-awned.

A. HELIANTHOIDES, Nutt. *Stem* 2°-4° high, hirsute, strongly winged; *leaves* 3' long, ovate-lanceolate, alternate, sessile, hairy above, downy beneath; *involucre-scales* in 3-4 rows, broadly lanceolate, appressed; *heads* few; *rays* 8-14, yellow; *achenia* winged, awns bristly; *flowers* in corymbs.

COREOPSIS, L. TICKSEED.

Heads many-flowered; the *ray-flowers* commonly 8, neutral, rarely wanting; *involucre* double, each row of about 8 scales, the outer ones narrow and spreading, the inner membranaceous and appressed; *receptacle* flat, chaffy; *chaff* membranaceous, mostly deciduous with the achenia; *achenia* compressed, often winged, not narrowed nor beaked at the apex, awnless, or with a pappus of two upwardly hispid or serrulate awns or scales.—*Herbs*; *leaves* entire or pinnately divided; heads solitary or corymbose; *disk* dark purple or yellow; *rays* yellow, rarely rose-color.

* *Rays* entire, or emarginate at the apex, yellow.

† *Leaves* petioled; *achenia* narrowly wedge-shaped, 2-toothed or awned; *scales* of the involucre equal, the outer ones separate.

C. AUREA, Ait. *Stem* smooth, much branched; *leaves* smooth or slightly pubescent, 5-7-parted, the divisions oblong or lanceolate, serrate, toothed or lobed, or all linear

and entire; exterior scales of the *involucre* linear-spatulate; *achenia* smoothish, with two short triangular teeth. (*C. mitis*, Michx.; *C. arguta*, Pursh.) Stem 2° – 4° high; leaves polymorphous, the uppermost commonly undivided; rays showy.

†† *Leaves petioled; achenia elliptical or obovate, emarginate, awnless; exterior scales of the involucre shorter than the interior.*

C. TRIPTERIS, L. Stem smooth, branching; leaves smooth, or rough above, the upper and lower ones entire, the middle ones 3- (rarely 5) -parted, with the divisions lanceolate and entire; exterior scales of the involucre 5–6, obtuse, united at the base; *achenia* elliptical, smooth, incurved, narrowly winged. Stem 3° – 6° high.

††† *Leaves sessile, 3-parted to the base, seemingly 6 in a whorl, the divisions entire or variously divided; scales of the involucre equal, the exterior ones linear-oblong, united below; achenia oblong, narrowly winged, naked or minutely 2-toothed at the apex.*

C. VERTICILLATA, L. Smooth; stem branching, slender; divisions of the pinnately or bipinnately divided leaves linear or filiform; disk yellow; *achenia* minutely 2-toothed at the apex. Stem 1° – 3° high.

†† *Rays yellow; achenia nearly straight, oblong, 2-awned, the margins with a serrulate or pectinate wing; exterior scales of the involucre shorter than the interior; disk dark purple.*

C. ANGUSTIFOLIA, Ait. Stem 2° – 3° high, slender, 4-angled, branched, smooth; leaves linear, alternate or opposite, obtuse, entire, the lower ones spatulate-lanceolate; heads corymbose; rays 3-toothed, $\frac{1}{2}'$ long; *achenia*-wings pectinately toothed.

††† *Rays purple or rose-color.*

C. ROSEA, Nutt. Smooth; stem low, branching; leaves opposite, linear; heads small; rays slightly 3-toothed; *achenia* wingless, unawned. Stem 8'–12' high; rays rose-color.

BIDENS, L. BEGGAR-TICKS.

Chiefly like *Coreopsis*, but the exterior involucre often long and leaf-like; the achenia compressed, or 3-4 angled (not narrowed at the apex), and crowned with 2-4 persistent downwardly barbed or hispid awns; *leaves* serrate, or pinnately divided, opposite; *rays* yellow or white, often wanting; *disk* yellow.

* *Achenia* flattened, narrowly wedge-shaped.

B. FRONDOSA, L. *Stem* tall, branched; *leaves* thin, long-petioled, pinnately 3-5-divided, the divisions ovate or ovate-lanceolate, acuminate, sharply serrate; *heads* discoid; exterior *scales* of the involucre large, leafy; *achenia* 2-awned. *Stem* 2°-5° high; margins of the achenia upwardly ciliate.

B. CHRYSANTHEMOIDES, Michx. Smooth; *stem* erect or ascending; *leaves* undivided, oblong-lanceolate, obscurely serrate, connate; *heads* radiate, showy; *achenia* 2-4-awned; annual. *Stem* thick, 1°-2° high.

** *Achenia* 3-4-angled, linear; *heads* radiate; *scales* of the involucre nearly equal.

B. BIPINNATA, L. *Stem* tall, 4-angled, much branched; *leaves* bipinnate, the divisions small, ovate or lanceolate, acute; *heads* small; *rays* 2-3, yellow; *achenia* 3-4 awned; annual. *Stem* 2°-5° high.

VERBESINA, L.

Heads many-flowered; *scales* of the involucre in 2 rows, imbricated; *ray-flowers* few, sometimes none; *receptacle* flat, or somewhat convex, the chaff concave; *achenia* wingless, 2-awned, laterally compressed; *stems* winged by the decurrent lobed or serrated leaves; *heads* corymbose; flowers white or yellow.

V. SIEGESBECKIA. *Stem* 4°-6° high, 4-winged, branching; *leaves* lanceolate-ovate, acuminate, serrate, opposite,

3-ribbed; *rays* 1-5, yellow; *achenia* wingless; *corymbs* trichotomous.

GAILLARDIA, Foug.

Heads many-flowered, the rays neutral, deciduous; *scales* of the involucre in 3 rows, acute, spreading above; *receptacle* convex or hemispherical, naked or fimbriate; *rays* wedge-shaped, palmately 3-lobed; *corolla* of the disk with subulate lobes; *achenia* top-shaped, hairy; *pappus* of 6-10 membranaceous 1-nerved awned scales.—Pubescent branching *herbs*, with alternate *leaves*, and solitary heads of yellow or purple flowers terminating the branches.

G. LANCEOLATA, Michx. *Stem* (1° - 2°) with long and slender branches; *leaves* narrow-lanceolate, mostly entire, sessile, the lowest narrowed at the base; *rays* yellow, sometimes wanting; *disk-flowers* purple; *receptacle* naked; *scales* of the pappus 7-9.

PALAFIXIA, Lagasca.

Heads many-flowered, the *ray-flowers* pistillate or none; *scales* of the obconical involucre in 2 rows, membranaceous at the summit; *receptacle* flat, naked; *achenia* slender, 4-angled, tapering at the base; *pappus* of 6-12 membranaceous denticulate scales, pointed by the prolonged rigid midrib.—*Herbs* or *shrubs*, with narrow entire leaves, and heads of white or purple flowers in a terminal corymb.

P. INTEGRIFOLIA, Torr. and Gray. *Stem* (2° high) branched above, smoothish; *leaves* lanceolate, rough, the lower ones often opposite; *rays* none; *flowers* purplish; *scales* of the pappus 8-9, linear subulate.

HYMENOPAPPUS, L'Her.

Heads many-flowered, the *flowers* all tubular and perfect;

scales of the involucre 6-12, oval or obovate, membranaceous, white; *receptacle* naked; *corolla* slender; *achenia* top-shaped, 4-angled; *pappus* of 10-20 short obtuse thin scales.—Hoary or woolly *herbs*, with alternate pinnately lobed or divided leaves; heads corymbed; *flowers* commonly white.

H. SCABIOSÆUS, L'Her. Hoary-tomentose; *stem* corymbosely branched; *leaves* pinnatifid or the lowest bipinnatifid, with lanceolate or oblong divisions; *scales* of the involucre broadly obovate, longer than the disk; *pappus* minute. Stem 2° high; leaves at length smoothish above.

HELENIUM, L.

Heads many-flowered, radiate, the rays pistillate, wedge-shaped, 3-5 cleft; *scales* of the involucre in 2 rows, the outer ones linear or subulate, spreading, the inner fewer and chaffy; *receptacle* naked, convex, globose, or oblong; *corolla* of the disk 4-5-toothed; *achenia* top-shaped, furrowed, hairy; *pappus* of 5-8 membranaceous pointed or awned 1-nerved scales.—Erect branching *herbs*, with the *stem* winged by the alternate decurrent leaves; *heads* terminating the branches; *flowers* mostly yellow.

* *Disk* globose; *corolla* of the disk mostly 5-cleft.

H. AUTUMNALE, L. Smooth or minutely pubescent; *leaves* lanceolate or oblong, serrate, strongly decurrent; *scales* of the involucre linear-subulate; *scales* of the pappus ovate-lanceolate, denticulate, awn-pointed; *rays* 3-5 cleft, longer than the disk. Stem 2°-4° high; *achenia* hairy.

H. TENUIFOLIUM, Nutt. Smooth; *stem* slender, very leafy; *leaves* narrow-linear, entire; *heads* on long and slender peduncles; *scales* of the involucre subulate; *scales* of the pappus ovate, entire, abruptly awned; *achenia* villous. Stem 1°-2° high; *branches* erect.

LEPTOPODA, Nutt.

Heads many-flowered, radiate, the rays neutral, 3-4-cleft; *disk-flowers* 4-5-toothed; *scales* of the involucre in 1-2 rows, spreading, the exterior leafy, numerous, the interior short and chaffy; *receptacle* conical or hemispherical, naked; *achenia* short, truncate at each end, striate; *pappus* of 6-12 scarious toothed or fimbriate scales.—Perennial *herbs*; *stems* mostly simple, naked above; *leaves* alternate; heads solitary; flowers yellow or purple.

* *Stems commonly simple, dilated under the head; disk-flowers yellow; rays 20 or more.*

† *Achenia smooth.*

L. INCISA, Torr. and Gray. Smooth; *leaves* lanceolate, rather obtuse, sessile, not decurrent, sinuate-pinnatifid or incised; *scales* of the pappus lacerate, or slightly fimbriate at the summit; *rays* about 40, in 2-3 rows.

†† *Achenia hairy on the angles.*

L. FIMBRIATA, Torr. and Gray. Stem smooth, sometimes branching, the peduncle slightly pubescent; *leaves* linear-lanceolate, acute, entire or obscurely serrate, decurrent; *scales* of the pappus fimbriate. Stem 1°-2° high.

L. PUBERULA, Macbride. Closely pubescent; *leaves* somewhat fleshy, linear-lanceolate, sessile but not decurrent, denticulate, the lowest spatulate-lanceolate, toothed or pinnatifid; *scales* of the pappus obtuse, with slightly lacerated margins. Stem 2° high.

MARSHALLIA, Schreb.

Heads many-flowered; the *flowers* all tubular and perfect; *corolla* pubescent, with linear spreading lobes; *scales* of the involucre oblong-linear or lanceolate, in 1-2 rows; *chaff* of the convex or conical receptacle narrow-linear,

rigid; *achenia* oblong, narrowed downward, 5-angled, mostly hairy; *pappus* of 5-6 ovate or triangular acuminate entire membranaceous scales.—Perennial *herbs*, with simple and scape-like or branching *stems*, smooth entire 3-nerved alternate *leaves*, and a solitary head of white or purplish flowers terminating the stem or branches; *anthers* blue.

M. LANCEOLATA, Pursh. *Stem* naked above, simple, pubescent; *leaves* lanceolate, obtuse, the lowest spatulate; *scales* of the involucre oblong-linear, obtuse; *achenia* pubescent.—Var., PLATYPHYLLA, Curtis. *Stem* leafy to the middle; *leaves* longer and broader, the lowest (5'-6') on long and slender petioles. *Stem* 6'-12' high; *leaves* 2'-3' long.

M. ANGUSTIFOLIA, Pursh. *Stem* simple or branched, leafy below, puberulent above; *leaves* linear, acute, the lowest spatulate; *scales* of the involucre linear and acute; *disk* at length ovate or oblong; *achenia* with hairy angles. *Stem* 2°-3° high.

MARUTA, Cass. MAY-WEED.

Heads many-flowered; the *rays* neutral; *scales* of the hemispherical involucre imbricated in few rows, shorter than the *disk*; *receptacle* conical, chaffy throughout, or only at the summit; *achenia* obovoid, ribbed, smooth; *pappus* none.—Branching annuals; *leaves* alternate, thrice pinnately divided; *heads* solitary, terminal; *rays* white.

M. COTULA, DC. *Stem* 1° high; divisions of the *leaves* linear; *scales* of the involucre with scarious margins; *disk* yellow.

ACHILLEA, L. YARROW.

Heads many-flowered, the *rays* pistillate, few and short; *scales* of the involucre imbricated; *receptacle* flat or elongated, chaffy; *achenia* oblong, compressed, margined;

pappus none.—Perennial *herbs*; *leaves* alternate, commonly pinnately divided; heads small, corymbose.

A. MILLEFOLIUM, L. *Stems* (1° high) simple, pubescent, tufted; *leaves* lanceolate, bipinnatifid, the division linear, 3–5-cleft; *corymbs* dense, compound; *rays* 4–5, white.

TANACETUM, L. TANSY.

Heads many-flowered, discoid, the *flowers* all fertile; the marginal ones chiefly pistillate, 3–5-toothed; *scales* of the involucre imbricated, dry; *receptacle* convex, naked; *achenia* angled or ribbed; *pappus* a narrow border, or none.—*Herbs* with alternate dissected *leaves*, and solitary or corymbose heads of yellow flowers.

T. VULGARE, L. *Stem* smooth, erect; *leaves* bipinnately divided, the lobes serrate; heads corymbose, numerous; *pappus* 5-lobed. *Stem* 1°–2° high.

ARTEMISIA, L. WORMWOOD.

Heads few or many flowered, discoid; the central *flowers* perfect, 5-toothed (sometimes abortive), the marginal ones pistillate, 3-toothed; *scales* of the involucre imbricated, mostly with scarious margins; *receptacle* convex, naked or villous; *achenia* obovoid; *pappus* none.—Aromatic *herbs* or *shrubs*; *leaves* alternate, pinnately divided; heads small, in paniced spikes or racemes.

A. CAUDATA, Michx. Smooth; *stem* slender, branching; lowest *leaves* 2–3-pinnately divided, the upper ones pinnate, with the divisions filiform; *heads* globular, in small racemes, forming an elongated panicle; *receptacle* naked; *disk-flowers* abortive.

GNAPHALIUM, L. EVERLASTING.

Heads many-flowered, discoid, the exterior and pistillate

ones very slender, mostly in several rows, the central ones perfect; *scales* of the involucre imbricated, appressed, scarious; *receptacle* flat, naked; *achenia* terete or more or less flattened; *pappus* a single row of capillary bristles.—Woolly or downy *herbs*; *leaves* alternate, undivided; heads in crowded spikes or corymbs; *involucre* colored.

G. POLYCEPHALUM, Michx. *Stem* woolly, white, branching above; *leaves* linear, sessile, undulate, white beneath; *heads* corymbose; *scales* of the involucre white, obtuse. Stem 2° high; perfect *flowers* few.

G. PURPUREUM, L. Woolly or tomentose and hoary throughout; *stems* branching at the base, ascending simple; lowest *leaves* spatulate-lanceolate, the upper ones linear; *heads* in crowded spikes. Stems 4'–12' high.

ANTENNARIA, Gært. EVERLASTING.

Heads many-flowered, diœcious, discoid; the corolla of the sterile *flowers* 5-cleft, of the pistillate ones filiform; *scales* of the involucre imbricated, scarious, colored; *receptacle* convex or flat; *achenia* nearly terete; *pappus* a single row of capillary bristles, which, in the staminate flowers, are thickened at the apex.—Perennial downy or woolly *herbs*, with alternate entire *leaves*, and corymbose rarely single heads.

A. MARGARITACEA, R. Br. *Stem* corymbose above, woolly; *leaves* linear-lanceolate, with revolute margins, tomentose; *heads* corymbose; *involucre* white. Stem 1°–2° high.

A. PLANTAGINIFOLIA, Hook. Stoloniferous; *stems* scape-like; radical *leaves* spatulate or obovate, hoary, becoming smooth above, 3-ribbed, those of the stem few, linear or lanceolate; *heads* small, in a terminal cluster, sometimes single and larger; *involucre* white or purplish. Stem 6'–12' high.

ERECHTHITES, Raf. FIREWEED.

Heads many-flowered; discoid; the marginal *flowers* pistillate, very slender, 2-3-toothed; the others perfect, 4-5-toothed; *scales* of the cylindrical involucre in a single row, linear, acute, bracted; *receptacle* naked; *achenia* oblong, striate; *pappus* of copious soft hairs.—Erect annual *herbs*, with alternate simple *leaves*, and corymbose heads of greenish flowers.

E. HIERACIFOLIA, Raf. *Stem* mostly branched, smooth or hairy; *leaves* lanceolate, sessile, sharply serrate or toothed, the upper somewhat clasping; *bracts* subulate, minute; *pappus* white. (Senecio hieracifolius, L.) *Stem* 1°-5° high.

CACALIA, L.

Heads 5-many-flowered; the *flowers* all tubular and perfect, 5 cleft; *scales* of the involucre 5-30, in a single row; *receptacle* flat, naked, or with a tubercular prominence in the center; *achenia* oblong, smooth; *pappus* of numerous capillary bristles.—Perennial, mostly smooth and tall *herbs*, with alternate entire or lobed *leaves*, and corymbose heads of white flowers.

* *Receptacle* flat; *involucre* about 12-leaved, 25-30-flowered.

C. SUAVEOLENS, L. Smooth; *leaves* ovate, hastate, acute, toothed-serrate, on winged petioles, the uppermost sessile; *bracts* filiform. *Stem* 3°-5° high.

** *Receptacle* tubercular in the center; *scales* of the involucre and *flowers* 5.

C. RENIFORMIS, Muhl. *Stem* angled; *leaves* not glaucous, angularly toothed, on slender petioles, the lowest large, reniform, the upper ones roundish; *corymb* compound. *Stem* 4°-9° high; radical *leaves* sometimes 2° in diameter, the teeth mucronate.

C. ATRIPLICIFOLIA, L. *Stem* terete, corymbosely branch-

ed above; *leaves* glaucous beneath, angularly lobed, the lobes mostly entire, mucronate, the lowest ones reniform, the upper rhomboid; *corymbs* compound. Stem 4°-8° high; leaves smaller and thicker than the last.

SENECIO, L. GROUNDSEL; BUTTER-WEED.

Heads many-flowered; the *flowers* all tubular and perfect, or with pistillate rays; *scales* of the involucre in a single row, often bracted; *receptacle* naked or alveolate; *achenia* not beaked nor winged; *pappus* of copious soft hairs.—*Herbs*, with entire or pinnately divided *leaves*; heads corymbose; flowers yellow; pubescence mostly webby and deciduous.

* *Annual; heads radiate.*

S. LOBATUS, Pers. Smooth; *stem* furrowed, hollow; *leaves* tender, lyrate-pinnatifid, with rounded toothed lobes, the earliest orbicular, long-petioled; *rays* about 12. Stem 1°-3° high; lobing of the leaves variable.

** *Perennial; heads radiate; lowest leaves petioled, undivided, the others pinnately lobed or toothed, the uppermost sessile.*

S. AUREUS, L. Smooth, or more or less woolly when young; *stem* (2° high) slender; radical *leaves* long-petioled, round-cordate, crenate; the others lanceolate or oblong-lanceolate, pinnatifid; *rays* 8-12; *achenia* smooth.

Var. BALSAMITÆ. Radical *leaves* spatulate-lanceolate or obovate; lower part of the *stem* often densely woolly; *achenia* hairy.

CENTAUREA, L. STAR-THISTLE.

Herbs, with alternate *leaves*; *heads* solitary, many-flowered; marginal *flowers* large and sessile; *receptacle* bristly; *involucre* imbricated; *achenia* compressed; *pap-*

pus sometimes wanting, when present of one or two rows of rough bristles.

C. AMERICANA. *Stem* 2°-4° high, erect, sparingly branched; *lower leaves* oblong-ovate, repand-dentate, upper ones lanceolate, acute, sessile, glabrous; *heads* few or solitary, very large; *ray-flowers* twice longer than the disk; *scales* with pectinate-pinnate, reflexed appendage. *Flowers* large, showy pale-purple heads. Red River.—Engelmann.

* *Leaves sessile.*

† *Scales of the involucre tipped with spreading spines.*

C. VIRGINIANUM. *Stem* 2°-3° high, tall, branching, commonly hairy; *leaves* with scattered hairs above, pubescent or at length nearly smooth beneath, bristly ciliate on the margins, deeply pinnatifid; the *lobes* lanceolate, 2-3-toothed, spiny; *scales* of the involucre unarmed, webby, viscid; *flowers* purple; *heads* 1' in diameter.

SUB-ORDER II. **Labiatifloræ**, not represented in any floral report.

SUB-ORDER III. **Ligulifloræ.**

TRIBE VII. **Cichoraceæ.** *Style* cylindrical above and pubescent, like the rather obtuse branches; the stigmatic lines terminating below or near the middle of the branches.—*Plants* with milky juice; *leaves* alternate.

KRIGIA, Schreb.

Heads 15-30-flowered; *scales* of the involucre 6-15, somewhat in 2 rows, equal; *receptacle* naked; *achenia* top-shaped, 5-angled; *pappus* double, the outer of 5 broad chaffy scales, the inner of 5 rough bristles.—Small annual *herbs*, branching at the base, with naked peduncle-like *stems*, each terminated by a small head of yellow flowers; *leaves* chiefly radical, mostly lyrate or toothed.

K. CAROLINIANA, Nutt. *Stem* short; *scapes* pubescent or somewhat hispid near the apex; *leaves* linear-lanceolate, acute at each end, entire or sparingly toothed, or the upper ones variously lobed; *scapes* 3'-12' high.

HIERACIUM, Tourn.

Heads many-flowered; *scales* of the involucre imbricated, or in 2 rows, the outer row short; *receptacle* nearly naked; *achenia* not beaked, commonly terete or spindle-shaped, ribbed; *pappus* a single row of persistent brownish-white hairs.—Perennial *herbs*, with alternate entire or toothed *leaves*, and single, corymbose, or paniced heads of yellow *flowers*. *Involucre*, in our species, in 2 rows, the outer short and bract-like.

H. SCABRUM, Michx. *Stem* stout, leafy, hirsute below, rough above; panicle somewhat corymbose; *leaves* oval, sessile, the lowest spatulate-oblong, hirsute; *peduncles* and involucre tomentose and glandular-hispid; *achenia* cylindrical. *Stem* 1°-3° high; *heads* large, many-flowered.

H. GRONOVII, L. *Stem* leafy and hirsute below, naked and smoother above; *leaves* entire or denticulate, hirsute, the lowest spatulate-oblong, the upper small, sessile; panicle narrow, elongated; *achenia* narrowed upward. *Stem* 1°-2° high; lowest leaves spreading on the ground.

NABALUS, Cass.

Heads 5-20-flowered; *involucre* cylindrical, composed of 5-14 linear scales, and several short exterior ones; *receptacle* naked; *achenia* linear-oblong or cylindrical, furrowed, glabrous, not narrowed upward; *pappus* of numerous straw-colored or brownish bristly hairs.—Perennial *herbs*, with bitter tuberous roots, entire or variously lobed *leaves*, and nodding heads of yellowish white or purplish *flowers*, in short racemes or clusters.

N. VIRGATUS, DC. *Stem* 2°–4°, smooth, virgate, simple; *leaves* lanceolate, acute, sessile, amplexicaul; upper leaves small, entire, the lowest pinnatifid on margined petioles; *heads* small clusters, racemed; *involucre* smooth, purplish, of 8 scales, 8–12-flowered; *pappus* straw-colored; *flowers* purplish.

LYGODESMIA, Don.

Heads solitary, 5–10-flowered; *leaves* linear or filiform; *receptacle* naked; *achenia* linear, elongated, smooth, striate, not narrowed upward; *pappus* of copious hairs, white, in several rows; *flowers* rose-color.—Perennial *herbs*.

L. APHYLLA, DC. *Stem* 1°–2°, simple or forking; *leaves* filiform, elongated, on the lower part of the stem; the upper are remote, small, and bract-like; *heads* showy.

PYRRHOPAPPUS, DC.

Heads many-flowered; *involucre* double, of numerous subulate scales, the inner ones erect and partially united, often with a callous appendage at the apex; *receptacle* flat, naked; *achenia* oblong, nearly terete, 5-furrowed, the apex narrowed into a long filiform beak; *pappus* of copious soft reddish or brownish hairs.—Smooth annual *herbs*; *leaves* oblong or lanceolate, commonly toothed or pinnatifid; *heads* solitary, terminating the naked stem or peduncle-like branches; *flowers* yellow.

P. CAROLINIANUS, DC. *Stem* branching; *leaves* lanceolate, mostly toothed or pinnatifid; *achenia* shorter than the filiform beak. *Stem* 1°–2° high.

LACTUCA, L. LETTUCE.

Heads few or many-flowered; *scales* of the cylindrical involucre imbricated, the outer ones short; *receptacle* naked; *achenia* compressed parallel to the scales, smooth,

abruptly narrowed into a filiform beak; *pappus* of copious soft white hairs.—Tall *herbs*, with entire or pinnatifid *leaves*; *heads* paniculate; *flowers* white, purple, blue, or yellow.

L. ELONGATA, Muhl. Smooth or nearly so; *stem* tall (4° – 8°), simple or paniculate; *leaves* elongated, lanceolate, sessile or partly clasping, the upper ones mostly entire, the lower pinnatifid; *panicle* long, leafless; *flowers* yellow.—Var. INTEGRIFOLIA. *Leaves* all undivided, or the lowest pinnatifid; *flowers* yellow or purplish.—Var. GRAMINIFOLIA. Smaller (2° – 3°); *leaves* linear or linear-lanceolate, rather rigid, all entire, or the lowest ones sparingly toothed or pinnatifid; *flowers* purple.

MULGEDIUM, Cass.

Heads many-flowered; *scales* of the involucre imbricated, the outer ones short; *receptacle* naked; *achenia* smooth, laterally compressed, narrowed into a short beak, which is expanded into a ciliate disk at the apex; *pappus* of copious white or tawny hairs.—Tall *herbs*; *leaves* pinnatifid or undivided; *flowers* mostly blue.

* *Pappus* tawny.

M. LEUCOPHÆUM, DC. Smoothish; *stem* panicled above; *leaves* numerous, irregularly pinnatifid, with coarsely-toothed lobes, the terminal lobe 3-angled, or in the upper leaves often linear and entire; *racemes* panicled. Stem 3° – 12° high; *leaves* 6'–12' long; *flowers* pale blue.

SONCHUS, L.

Heads many-flowered; *scales* of the involucre imbricated; *receptacle* naked; *achenia* compressed, ribbed, not beaked nor narrowed at the apex; *pappus* of copious soft white hairs. Annuals. *Leaves* entire or pinnatifid; *heads* somewhat umbelled; *flowers* yellow.

S. OLERACEUS, L. Smooth; *stem* branching; *leaves* pinnatifid, with spiny-toothed lobes, clasping, the lowest petioled; *achenia* transversely roughened. Stem 1°-2° high.

66. LOBELIA FAMILY. Order, LOBELIACEÆ.

Chiefly *herbs*, with milky juice; *leaves* alternate, without stipules; *flowers* irregular; *calyx* 5-lobed, the tube adherent to the 2-celled ovary; *corolla* unequally 5-lobed, valvate in the bud; the *tube* split on one side to the base; *stamens* 5, inserted on the calyx; the *anthers*, and commonly the filaments, united into a tube; *style* solitary; *stigma* 2-lobed, surrounded with a ring of hairs; *fruit* bacate and indehiscent, or capsular and 2-3-valved, many-seeded; *seeds* anatropous; *embryo* straight in fleshy albumen.—Acrid, poisonous *plant*.

LOBELIA, L. LOBELIA.

Corolla bilabiate, the upper lip small, erect or reflexed, 2-parted, the lower spreading, palmately 3-cleft; the *tube* straight; *anthers*, or a part of them, bearded at the apex, curved; *capsule* 2-celled, 2-valved at the apex, many-seeded. *Stems* erect; *leaves* undivided, the serratures glandular; *flowers* blue, white, or scarlet, in terminal racemes or spikes.

* *Flowers* scarlet.

L. CARDINALIS, L. (*Cardinal-flower*.) Smooth or slightly pubescent; *stem* stout, simple; *leaves* lanceolate, denticulate; *bracts* leafy; *stamens* and style much longer than the corolla; *raceme* many-flowered; *flowers* very elegant and showy. Perennial. Stem 2°-4° high. Common on the banks of Buffalo Bayou in the neighborhood of Houston.

** *Flowers blue and white.*

† *Sinuses of the calyx with deflexed appendages.*

L. SYPHILITICA, L. Hairy; *leaves* thin, lanceolate, acute at each end, coarsely serrate; *racemes* leafy, many-flowered; *calyx* hairy; the lanceolate denticulate lobes half as long as the large (1' long) light-blue corolla. Perennial. *Stem* 1°-3° high. Buffalo Bayou.

L. BREVIFOLIA, Nutt. *Stem* thick, virgate, angled, smooth or pubescent; *leaves* short (4''-12'' long), fleshy, oblong-linear, obtuse, toothed, spreading or reflexed, the lowest wedge-shaped; *calyx* hirsute, the ovate-lanceolate lobes strongly toothed, the 5 appendages obtuse; *corolla* pale blue. *Stem* 1°-1½° high; leaves very numerous.

†† *Sinuses of the calyx without appendages.*

L. INFLATA, L. Pubescent or hairy; *stem* leafy, branching from the base; *leaves* oblong, obtuse, toothed, sessile; *racemes* leafy below; *corolla* small.

L. PALUDOSA, Nutt. Smooth; *stem* mostly simple, nearly leafless; radical *leaves* fleshy, spatulate-lanceolate or linear, obtuse, crenulate, the others small, linear, and remote; *racemes* slender, loose; *bracts* minute; *corolla* small, white or pale blue. *Stem* 2°-4° high; lowest leaves 3'-9' long; *corolla* ½' long.

67. GOODENIA FAMILY. Order, GOODENIACEÆ.

Herbs or *shrubs*, with watery juice, alternate exstipulate *leaves*, and irregular *flowers*; *calyx* tubular, 3-5-lobed or entire, more or less adherent to the 1-4-celled ovary; *corolla* irregular, unequally 5-lobed, induplicate in the bud; the tube split on one side, or 5-parted; *stamens* 5, free from the corolla, the filaments and anthers rarely united; *style* commonly single; *stigma* thick, surrounded with a

cup-shaped mostly ciliate membrane; *fruit* capsular or drupaceous; *embryo* straight, in the axis of fleshy albumen.

68. CAMPANULA FAMILY. Order, CAMPANULACEÆ.

Herbs, with milky juice, alternate *leaves*, and regular mostly blue *flowers*; *calyx* 3-5-lobed, adherent to the ovary; *corolla* 5-lobed, valvate in the bud; *stamens* 5, free from the corolla, the broad filaments and anthers distinct; *style* single, hairy above; *stigmas* 2 or more; *capsule* 2-several-celled, many-seeded, splitting at the apex, or opening by lateral valves or holes; *embryo* straight in fleshy albumen.

CAMPANULA, L. BELL-FLOWER.

Calyx 5-lobed; *corolla* 5-lobed, mostly bell-shaped; *filaments* dilated at the base; *stigmas* 3, slender; *capsule* short, 3-celled, opening by lateral valves; *flowers* spiked or paniced.

* *Flowers* paniced, on slender spreading pedicels; *corolla* small (3'-4'), bell-shaped.

C. APARINOIDES, Pursh. *Stem* weak, reclining, the angles, as also the margins and midrib of the linear nearly entire leaves, hispid backward; *panicle* few-flowered; *calyx*-lobes triangular; *corolla* white. (C. erinoides, Muhl.) Swamps among the mountains, Georgia, and northward. July and August. Stem 1°-1½° high; lowest *leaves* narrowly obovate.

** *Flowers* spiked, single or 2-3 together; *corolla* large, somewhat wheel-shaped.

C. AMERICANA, L. *Stem* tall, smooth or hairy, mostly simple; *leaves* ovate-lanceolate, acuminate, serrate; *spike* elongated, leafy; *corolla* (1' wide) blue. Stem 2°-4° high; *spike* 1°-2° long; *style* exserted.

SPECULARIA, Heist.

Calyx 3-5-lobed; *corolla* wheel-shaped, 5-lobed; *stamens*

free, the filaments membranaceous, hairy, shorter than the anthers; *stigmas* 3; *capsule* prismatic, 3-celled, opening by 3 lateral valves. Low annuals. *Flowers* axillary; *corolla* blue.

S. PERFOLIATA, A. DC. Pubescent; *stem* angled, simple or branched; *leaves* round-cordate, crenate, clasping, the lowest narrowed at the base; *flowers* single or clustered, sessile, the lower ones apetalous. Stem 1° high.

69. HEATH FAMILY. Order, ERICACEÆ.

Shrubs or small *trees*, rarely *herbs*, with undivided alternate exstipulate *leaves*, and regular *flowers*; *calyx* 4-5-parted; *corolla* 4-5-parted or toothed, or 4-5-petalous, imbricated in the bud; *stamens* free from the corolla, and as many or twice as many as its divisions; *anthers* 2-celled, often variously awned, opening commonly by terminal pores; *style* 1; *stigma* entire or 3-lobed; *fruit* 3-10-celled; *seeds* anatropous, attached to a central placenta; *embryo* small, in fleshy albumen.

SYNOPSIS.

SUB-ORDER I. **Vaccinieæ.** *Calyx-tube* adherent to the ovary; *corolla* superior; *anther-cells* prolonged into a slender tube; *fruit* a berry.—*Shrubs*; *corolla* monopetalous.

Berry 4-5-celled, or partially 8-10-celled by false partitions, many-seeded.. **VACCINIUM.**

SUB-ORDER II. **Ericineæ.** *Calyx* free from the ovary. *Corolla* hypogynous. *Fruit* a capsule. *Shrub* or *tree*.

TRIBE I. **ANDROMEDEÆ.** *Capsule* loculicidally dehiscent.

* *Anther-cells* opening at the apex; *corolla* monopetalous.

Calyx valvate in the early bud. *Capsule* globular. *Seeds* pendulous.. **ANDROMEDA.**
 — valvate in the bud. — pyramidal. — ascending.. **OXYDENDRUM.**

** *Anthers* inverted in the bud, opening by terminal pores; *corolla* 5-petalous.

Stamens 10. *Style* 3-cleft. *Capsule* 3-celled, 3-valved..... **CLETHRA.**

SUB-ORDER III. **Monotropa.** *Indian-Pipe Family.*

Calyx of 4-5 scale-like or bract-like sepals; *corolla* 5-lobed or 5-petalous; *seeds* very minute.—Fleshy scaly *herbs*, parasitic on roots, and destitute of green foliage.

Corolla 4-5-petalous. *Anthers* kidney-shaped, opening across the top... **MONOTROPA.**

VACCINIUM, L. HUCKLEBERRY; BLUEBERRY.

Corolla cylindrical, urceolate, or campanulate, 4-5 toothed or parted; *stamens* 8-10; *anthers* awnless, or 2-awned on the back; the cells prolonged into a tube, and opening at the apex; *berry* 4-5-celled, or by false partitions 8-10-celled, many-seeded.—*Shrubs*; *flowers* nodding, solitary, clustered, or racemed, white or reddish; *pedicels* 2-bracted.

BATODENDRON. *Ovary* more or less 10-celled by false partitions; *corolla* bell-shaped, 5-cleft; *stamens* 10, hairy; *anthers* 2-awned on the back; *flowers* in leafy racemes, seemingly axillary.

V. ARBOREUM, Michx. Arborescent, smoothish; *leaves* evergreen, oval or obovate, shining above, the veins beneath more or less pubescent; *corolla* large, angled, white; *anthers* included; *berry* globose, black. *Stem* 8°-15° high; *flowers* very numerous; *berry* mealy, ripening in the winter.

ANDROMEDA, L.

Calyx deeply 5-parted, valvate in the early bud; *corolla* 5-toothed; *stamens* 10; *anther-cells* opening by a terminal pore; *capsule* 5-celled, 5-valved, many-seeded; *seeds* pendulous or spreading.—*Shrubs*; *leaves* alternate; *flowers* in lateral and terminal racemes or clusters, nodding.

Flowers in umbel clusters; *capsule* more or less ribbed at the sutures, the ribs separating at maturity.

Corolla ovate, cylindrical, or somewhat bell-shaped; *anthers* or filaments awned; *capsule* ovate, truncate; *shrubs* smooth.

A. MARIANA, L. *Corolla* large ($\frac{1}{2}$ ' long), cylindrical,

white; *leaves* oblong, obtuse or acute, entire, deciduous; *calyx*-lobes lanceolate acute, half the length of corolla; flowering *stems* commonly leafless; *filaments* 2-awned. *Stem* 2°-4° high; leaves 2'-3' long.

OXYDENDRUM, DC. SOUR-WOOD; SORREL-TREE.

Calyx 5-parted; *corolla* ovate, 5-toothed; *stamens* 10; *anthers* awnless, opening by terminal chinks; the cells acuminate; *capsule* conical, 5-angled, 5-celled, many-seeded; *seeds* ascending.—A small *tree*, with deciduous oblong serrulate acuminate *leaves*, on slender *petioles*, and white *flowers* in long and slender 1-sided terminal paniced *racemes*.

O. ARBOREUM, DC. *Tree* 15°-40° high; *leaves* 4'-6' long, sour; *corolla* pubescent.

CLETHRA, L.

Calyx 5-parted, imbricated in the bud; *corolla* 5-petalous; *stamens* 10; *anthers* obcordate, inverted in the bud, opening by terminal pores; *style* slender, 3-cleft; *capsule* 3-celled, 3-valved, many-seeded.—*Shrubs* or small *trees*; *leaves* alternate, oblong or obovate, serrate, deciduous; *flowers* white, in terminal *racemes*; *stamens* and *style* exserted.

C. ALNIFOLIA, L. Shrubby; *branches* and *racemes* tomentose; *leaves* short-petioled, obovate or wedge-oblong, acute, smooth on both sides; *racemes* simple or paniced; *style* and *filaments* smooth; *bracts* partly persistent. (C. paniculata, Pursh.)—Varies, with the *leaves* hoary beneath, rough above (C. tomentosa, Lam.), or on both sides (C. scabra, Pers.); *style* hairy; *bracts* caducous, 4°-8° high; leaves 2'-3' long; *flowers* fragrant.

ARBUTUS.

A. TEXANA, Buckley. *Leaves* ovate, acute, serrate,

smooth, a little paler beneath; *flowers* capitate, subracemose; *corolla* campanulate, smooth, twice the length of the calyx; *filaments* included, at base lanuginose, about $\frac{1}{3}$ the length of the corolla; *calyx* laciniate, ovate, acute; *style* long, cylindrical; *berries* round. Fruit ripe in November, of a deep scarlet or red color; *trunk* and *branches* very smooth, brownish red, the outer bark peeling off; *wood* very brittle.—*Tree*, 20–25 feet and 8–12 inches in diameter; leaves evergreen, $1\frac{1}{2}$ – $2\frac{1}{2}$ inches long; *petioles* 1 inch long. Flowers in March; highly ornamental. Hills northwest of Austin. Rare.

MONOTROPA, L. INDIAN PIPE.

Calyx of 2–5 deciduous sepals; *corolla* 4–5-petalous, gibbous at the base, deciduous; *stamens* 8–10; *anthers* reniform, opening across the apex; *stigma* broad, 4–5-rayed; *capsule* ovoid, 8–10-furrowed, 4–5-celled; *seeds* very numerous, minute. *Stems* low, fleshy, white or reddish, scaly; *flowers* solitary or racemose, nodding; *capsules* erect; *herbs* parasitic on roots, or decayed vegetable matter.

§ 1. MONOTROPA, Nutt. *Stem* 1-flowered; *sepals* 2–4; *petals* 5; *anthers* opening by 2 chinks; *style* short and thick.

1. M. UNIFLORA, L. Shady woods. *Stem* smooth, 4'–10' high, white, turning black in drying; *flower* showy.

§ 2. HYPOPITYS, Dill. *Stem* several-flowered, the upper flower commonly with 5 petals and 10 stamens, the others with 4 petals and 8 stamens; *sepals* as many as the petals; *anthers* opening by 2 unequal valves, the smaller one erect; *style* longer than the ovary.

2. M. HYPOPITYS, L. (M. LANUGINOSA, Michx.) August. *Stems* 4'–8' high, pubescent, reddish.

70. GALAX FAMILY. Order, GALACINÆ.

Calyx small, 5-sepalous, persistent; *petals* 5, hypogynous, obovate-spatulate, deciduous; *stamens* hypogynous;

the filaments united into a 10-toothed tube, those opposite the petals sterile, the 5 alternate ones shorter and bearing a roundish 1-celled anther, which opens across the top; *style* short; *stigma* 3-lobed; *capsule* ovoid, 3-celled, loculicidally 3-valved; *seeds* numerous, fixed to the central placenta; *embryo* straight, in fleshy albumen.—A smooth perennial stemless *herb*, erect from a creeping scaly rhizoma; *leaves* all radical, evergreen, round-cordate, crenate, petioled; scape (1°–2° high) simple, bearing a long spiked raceme of small white *flowers*.

This order, with one or two others not thus far found in Texas, have been placed here to assist the student, because they are well represented by the flora of the other Gulf States.

71. HOLLY FAMILY. Order, AQUIFOLIACEÆ.

Trees or shrubs, with alternate simple *leaves*, and small white or greenish *flowers*; *calyx* 4–9-toothed; *corolla* hypogynous, rotate, 4–9-parted, imbricated in the bud; *stamens* 4–9, alternate with the lobes of the corolla, and inserted on its base; *anthers* opening lengthwise; *ovary* free from the calyx, 4–9-celled; *stigma* lobed, nearly sessile; *drupe* berry-like, composed of 4–9 one-seeded nutlets; *seeds* anatropous, suspended; *embryo* minute, in fleshy albumen.

ILEX, L. HOLLY.

Flowers perfect or diœciously polygamous, of 4–9 parts; *drupe* containing 4–9 *nutlets*; *leaves* evergreen or deciduous; *fertile flowers* commonly solitary on the young branches, the *sterile* ones mostly in sessile or peduncled clusters or cymes.

AQUIFOLIUM. *Parts of the flower* 4; *drupe* red; *nutlets* ribbed or veiny on the back; *leaves* evergreen.

I. OPACA, Ait. (*Holly*.) Smooth; *leaves* oval, concave,

wavy and spiny on the margins ; *sterile flowers* cymose, on slender peduncles ; *calyx*-lobes acute.—A small *tree*.

I. CASSINE, L. (*Yaupon*.) *Leaves* small ($\frac{1}{2}$ '–1' long), oval or oblong, obtuse, crenate ; *clusters* very numerous, nearly sessile ; *calyx*-lobes minute, obtuse. Light sandy soil along the coast.—*Shrub*, 8°–12° high, slender, the short spreading branches often spine-like ; *fruit* clustered, abundant.

PRINOIDES. *Parts of the flower* 4–6 ; *drupe* red or purple ; *nutlets* 4–6, ribbed on the back ; *shrubs* ; *leaves* deciduous.

I. DECIDUA, Walt. *Leaves* lanceolate or oblong, obtusely serrate, pubescent on the veins beneath, tapering into a short petiole ; *flowers* on short pedicels, in sessile clusters ; *calyx*-teeth smooth, acute. (I. prinoides, Ait.) Varies, with the leaves smooth on both sides, and the flowers on longer pedicels. River swamps.—A large *shrub* ; leaves thin, 1'–2' long ; *drupe* red.

I. AMBIGUA. Branches slender ; *leaves* oval or oblong, acute or somewhat acuminate, finely and sharply serrate, smooth on both sides, or rarely, like the branchlets, softly pubescent ; *pedicels* of the sterile flowers clustered, longer than the petioles ; those of the fertile ones very short, solitary ; *calyx*-teeth obtuse, ciliate ; *leaves* 1'–4' long.—*Shrub* or *tree*.

72. STORAX FAMILY. Order, STYRACACEÆ.

Trees or *shrubs* ; *leaves* alternate, without stipules ; *flowers* perfect ; *calyx* 4–8-toothed, or entire, free, or adherent to the 2–5-celled ovary ; *corolla* hypogynous, or inserted on the calyx, 4–8-lobed or 4–8-petalous ; *stamens* inserted on the base of the corolla, twice as many as its divisions, or more numerous, separate, or monadelphous or polyadelphous at the base ; *style* single ; *fruit* capsular or drupaceous, 1–5-celled ; *seeds* anatropous, mostly solitary

in each cell; *embryo* nearly as long as the albumen; *cotyledons* flat; *radicle* slender.

SYNOPSIS.

Drupe drupaceous, 2-4-winged, 2-4-celled. Ovary wholly united with the calyx.
HALESIA.
 Flowers in sessile clusters. Fruit baccate.....SYMPLOCOS.

HALESIA, Ellis. SNOWDROP TREE.

Calyx obconical, slightly 4-8-toothed, adnate to the 3-4-celled ovary; *corolla* inserted on the calyx, 4-lobed or 4-petalous; *stamens* 8-16, separate or united below, free from the corolla; *anthers* linear; *ovules* 4 in each cell, 2 of them erect, and 2 pendulous; *drupe* dry, 2-4-winged, 1-3-seeded; *seeds* cylindrical.—*Shrubs* or small *trees*; *leaves* ample; *flowers* in short lateral racemes, appearing with the leaves, white, drooping.

* Ovary 3-celled; corolla 4-petalous; stamens mostly 8, distinct; drupe 2-winged

H. DIPTERA, L. *Leaves* oval, coarsely serrate, pubescent, 4'-5' long; *racemes* 2-4-flowered, the *flowers* on long pedicels; *corolla* 1' long; *anthers* spreading; *drupe* compressed, 1' long. Rich woods, Florida and Georgia. March and April.

SYMPLOCOS, Jacq.

Calyx 5-cleft, more or less adherent to the 2-5-celled ovary; *corolla* 5-10-petalous; *stamens* 15 or more, monadelphous or polyadelphous, inserted at the base of the corolla; *anthers* roundish; *ovules* 2-4 in each cell, suspended, anatropous; *style* slender; *stigma* entire or 3-5-parted; *berry* 1-5-seeded.—*Trees* or *shrubs*; *leaves* alternate, serrate; *flowers* axillary, in racemes or clusters.

S. TINCTORIA, L'Her. *Leaves* smooth, coriaceous, oblong, partly persistent; *clusters* sessile, 6-12-flowered; *calyx* smooth, top-shaped, the lobes obtuse; *corolla* yellow;

stamens in 5 sets; *stigma* entire; *berry* 1-seeded.—A small tree; leaves 3'-4' long, sweetish; *flowers* very numerous.

73. CYRILLA FAMILY. Order, CYRILLACEÆ.

Trees or *shrubs*, with alternate evergreen *leaves*, without stipules, and perfect white *flowers* in lateral or terminal racemes; *calyx* of 4-5 sepals; *petals* 5-8, hypogynous, imbricated in the bud; *stamens* 5-10, inserted with the petals; *anthers* introrse, opening lengthwise; *ovary* 2-4-celled, with a single suspended ovule in each cell; *stigma* entire or 2-4-lobed; *fruit* 2-4-seeded; *embryo* straight in the axis of fleshy albumen; *radicle* superior.

74. EBONY FAMILY. Order, EBENACEÆ.

Trees or *shrubs*, with watery juice; *leaves* alternate, entire, without stipules; *flowers* polygamous, the sterile cymose, the fertile ones larger, solitary; *calyx* free from the 3-12-celled ovary, persistent, 3-7-lobed; *corolla* 3-7-lobed, imbricated in the bud, deciduous; *stamens* mostly 16, inserted on the base of the corolla, often united by pairs, the filaments short and hairy; *anthers* introrse; *ovules* 1-2 in each cell, anatropous, suspended; *styles* distinct, or united below; *fruit* baccate, roundish, few-seeded; the seeds large, compressed; *embryo* in the axis of hard albumen; *radicle* superior.

DIOSPYROS, L. PERSIMMON.

Calyx 4-6-lobed; *corolla* bell-shaped, 4-6-cleft; *stamens* in the sterile flower mostly 16; in the fertile 8, with the anthers sterile; *styles* 2 or 4, united below; *ovules* solitary in the cells; *berry* 4-8-seeded.

D. VIRGINIANA, L. *Leaves* ovate-oblong, mostly smooth, petioled; *calyx* 4-parted; *corolla* 4-cleft; *styles* 4, each

2-lobed; *ovary* 8-celled. Woods and old fields.—A small tree; *flowers* greenish; *berry* eatable when fully ripe.

D. TEXANA, Scheele. *Leaves* obovate, obtuse, sessile or shortly petiolate, dark green above, paler below, and densely tomentose; *corolla* bell-shaped, clefts recurved; *calyx* about $\frac{1}{2}$ length of *corolla*; *sepals* recurved; *flowers* aggregated or solitary. Flowers in March or April; fruit ripe in August.—A small tree or large shrub, growing in clumps often; *fruit* dark brown or black when ripe; sweet and juicy; some like it, others think it insipid. Limestone hills, Central and Western Texas.

75. SAPODILLA FAMILY. Order, SAPOTACEÆ.

Trees or *shrubs*, with milky juice, alternate entire exstipulate short-petioled *leaves*, and regular perfect (small) *flowers*, commonly in sessile axillary clusters; *calyx* free from the 3-12-celled ovary, 4-8-parted, persistent; *corolla* hypogynous, 4-8-cleft, mostly with one or two appendages between each lobe; *fertile stamens* as many as the lobes of the *corolla* and opposite them, alternating with as many scale-like or petal-like sterile ones, inserted on the tube of the *corolla*; *anthers* extrorse; *ovules* anatropous, single, suspended from the central angle of each cell, or ascending from its base; *fruit* a drupe or berry; *seeds* few; albumen fleshy or oily, or none; *embryo* straight.

Seeds without albumen. Sterile stamens entire. Ovary hairy.....BUMELIA.

BUMELIA, Swartz.

Calyx 5-parted; *corolla* 5-cleft, with two appendages between the lobes; *stamens* 5, alternating with a petal-like sterile one; *ovary* 5-celled, hairy; *berry* ovoid, 1-seeded; *leaves* oblong, narrowed into a petiole, deciduous.—*Shrubs*, with hard wood, spiny; *flowers* white or greenish, clustered.

B. LYCIOIDES, Gært. *Leaves* 2'-4' long, obovate-oblong,

smooth; *corolla* twice as long as the calyx; *pedicels* twice as long as the flower, shorter than the petioles.—A large *shrub* or small *tree*; *berry* ovoid; *flowers* green.

B. LANUGINOSA, Pers. *Corolla* white, twice as long as the calyx; *leaves* 2'-3' long, obovate-lanceolate or obovate, coriaceous, the lower surface, like the branchlets and many-flowered clusters, covered with a dense rusty villous pubescence; *berry* small, ovoid.—A *tree* or *shrub*.

76. THEOPHRASTA FAMILY. Order, THEOPHRASTACEÆ.

Trees or *shrubs*, with watery juice; *leaves* coriaceous, often resinous-dotted, without stipules; *flowers* perfect, thick, white, orange, or red; *calyx* 5-parted; *corolla* 5-cleft, with a single appendage between the lobes; *stamens* 5, fertile, opposite the lobes of the corolla; *anthers* extrorse, 2-celled, the thickened connective prolonged above the cells; *ovary* free, 1-celled, many-ovuled; *placenta* central, globose; *stigma* capitate; *fruit* globose; *seeds* few, inclosed in gelatinous pulp; *embryo* in the axis of copious albumen; *radicle* inferior.

77. MYRSINE FAMILY. Order, MYRSINACEÆ.

Trees or *shrubs*, often glandular-dotted, with alternate exstipulate mostly entire *leaves*, and regular, often monœcious or dicecious, white or rose-colored *flowers*; *calyx* 4-6-parted; *corolla* 4-6-cleft; *stamens* 4-6, opposite the lobes of the corolla; *anthers* 2-celled, introrse; *ovary* mostly free, 1-celled, smooth; *ovules* 1-many, imbedded in the cavities of the central placenta; *style* simple; *fruit* drupaceous, globose, somewhat fleshy, commonly 1-seeded; *seeds* roundish, concave at the base; *embryo* transverse, in hard albumen.

78. PLANTAIN FAMILY. *Order, PLANTAGINACEÆ.*

Chiefly stemless *herbs*, with radical mostly ribbed *leaves*, and small whitish spiked or capitate *flowers*, borne on a naked scape; *calyx* of 4 imbricated sepals, with scarious margins; *corolla* salver-shaped, 4-parted, withering; *stamens* 2-4, included or exserted, inserted on the tube of the corolla, and alternate with its lobes; *anthers* 2-celled, deciduous; *style* slender; *ovary* free, 2-4-celled; *capsule* 2-celled, few-many-seeded, opening transversely; *seeds* attached to the deciduous partition; *embryo* straight in fleshy albumen.

PLANTAGO, L. PLANTAIN.

Characters same as the order.

* *Flower perfect.*

P. MAJOR, L. *Leaves* ovate or oval, smooth or pubescent, 5-7-ribbed, mostly toothed, narrowed into a broad concave petiole; *scape* pubescent; *spike* long-cylindrical, densely many-flowered; *bracts* ovate; *capsule* many-seeded. Low ground around dwellings. Scape 6'-12' high; leaves 4'-6' long.

P. LANCEOLATA, L. *Leaves* lanceolate, denticulate, acute, long-petioled, and 3-ribbed, pubescent; *spikes* dense, oblong or ovate; *capsule* 2-seeded. Spikes 1'-2' long; *scapes* 1°-2° high.

** *Flowers dioecious; annuals.*

P. VIRGINICA, L. *Leaves* lanceolate or oblong, entire or toothed; *petioles* short, 3-5-ribbed; *stamens* 4; *capsule* 2-4-seeded; *spike* cylindrical, densely-flowered; *scapes* 1'-1°; leaves $\frac{1}{2}$ '-6' long.

P. HETEROPHYLLA, Nutt. Smooth or pubescent; *scape* 2'-6' high, longer than the leaves; *leaves* somewhat fleshy,

entire, or with scattered spreading teeth, linear; *spikes* linear, closely flowered, the lower flowers scattering; *stamens* 2, exserted; *capsule* twice the length of calyx, many-seeded.—*Torrey*.

P. GNAPHALOIDES. On the Big Medicine River. Description not given.—*Torrey*.

79. LEADWORT FAMILY. Order, PLUMBAGINACEÆ.

Calyx funnel-form or tubular, 5-toothed, plaited, persistent; *corolla* salver-shaped, 5-petalous, or 5-lobed; *stamens* 5, opposite the lobes or petals, inserted on their claws or on the receptacle; *styles* 5, united or distinct; *ovary* 1-celled; *ovule* anatropous, solitary, suspended from the apex of the filiform cord rising from the base of the cell; *fruit* capsular or utricular, variously dehiscent; *embryo* straight in mealy albumen.—*Herbs* or *shrubs*; *leaves* scattered, or radical and clustered.

STATICE, L. MARSH ROSEMARY

Perennial *herbs*, growing in saline marshes, with fleshy radical *leaves* and scape-like *stems*; *calyx* bracted, the limb scarious, 5-lobed; *petals* 5, united or distinct; *stamens* 5, inserted on the claws of the petals; *style* nearly or entirely separate; *stigmas* slender; *utricle* variously dehiscent.

S. CAROLINIANA, Walt. *Scape* $\frac{1}{2}^{\circ}$ – 2° high, scaly, and widely branched; *leaves* 3'–6' long, obovate or oblong, tapering into a long petiole; *flowers* mostly single, in 1-sided spreading spikes; *calyx* funnel-shaped, smooth, lobes of the scarious limb alternating with 5 smaller ones.

80. PRIMROSE FAMILY. Order, PRIMULACEÆ.

Stamens 4–5, opposite the lobes of the corolla, and inserted on its tube; *corolla* 4–5-lobed; *calyx* 4–5-lobed, per-

sistent; *ovary* free or partly adherent to the calyx, 1-celled, many-ovuled; *placenta* central, globose; *style* single; *capsule* 1-celled, many-seeded, valvate or circumscissile; *seeds* anatropous or amphitropous; *embryo* straight in fleshy albumen.

SYNOPSIS.

Ovary free from the calyx.

† *Capsule opening by valves or teeth.*

<i>Corolla salver-shaped.</i>	<i>Leaves pectinately dissected</i>	HOTTONIA.
— <i>wheel-shaped.</i>	— <i>opposite, entire. Stems leafy</i>	LYSIMACHIA.
— ————	— <i>radical. Stemless</i>	DODECATHEON.

†† *Capsule opening transversely.*

<i>Parts of the flower 5.</i>	<i>Leaves opposite. Stamens bearded</i>	ANAGALLIS.
————— 4:	— <i>alternate. ——— beardless</i>	CENTUNCULUS.

** *Ovary partly adherent to the calyx.*

Stamens 5, with sterile filaments interposed. Capsule valvate..... SAMOLUS.

HOTTONIA, L.

Calyx 5-parted; *corolla* 5-lobed, salver-shaped; *stamens* 5; *style* slender; *capsule* globose, at length splitting into 5 valves, which cohere at the base and apex; *seeds* anatropous, fixed by the base; *flowering stems* mostly clustered, nearly leafless, inflated, bearing at the joints whorls of small white *flowers*.—*Aquatic* perennial *herbs*, with pectinately dissected *leaves*.

H. INFLATA. *Flowering stems* 3-several in a terminal cluster, much inflated; upper *stem-leaves* crowded, with filiform divisions; *bracts* entire. Ponds and ditches.

LYSIMACHIA, L. LOOSESTRIFE.

Calyx 5-parted; *corolla* 5-lobed, wheel-shaped; *stamens* 5; *filaments* often monadelphous at the base, and commonly

with the rudiment of a sterile one interposed; *style* slender; *capsule* globose, 5-10-valved, few-many-seeded; *seeds* amphitropous.—Perennial *herbs*, with entire opposite or whorled leaves, and axillary or racemose yellow *flowers*.

* *Flowers in terminal racemes or panicles.*

L. STRICTA, Ait. *Leaves* 2' long, very numerous, lanceolate, acute at both ends, dotted, opposite; *flowers* small; *racemes* long, leafy at the base; *pedicels* slender; *corolla*-lobes lanceolate-oblong, obtuse, entire, marked with dark lines; *filaments* monadelphous, unequal; sterile ones none; *capsule* 5-valved, 3-5-seeded; *stem* 1°-2° high.

** *Flowers axillary.*

L. QUADRIFOLIA, L. *Stem* 2° high, pubescent, simple; *leaves* 4-5 in a whorl, ovate-lanceolate, dotted, acute, sessile; *peduncles* filiform; *corolla*-lobes ovate-oblong, dotted; *filaments* monadelphous.

L. CILIATA, L. *Stem* 1°-2° high, mostly branching, smooth; *leaves* lanceolate-ovate, cordate or rounded at the base, on ciliate petioles, opposite; *corolla* longer than the *calyx*, with broadly ovate or roundish denticulate lobes; *peduncles* opposite.

DODECATHEON, L. AMERICAN COWSLIP.

Stemless *herbs*; *leaves* radical, clustered, spatulate or oblong; *flowers* umbellate, terminating the naked scape, white or purple; *calyx* 5-cleft, the lobes reflexed; *corolla*-tube very short, the 5-parted limb reflexed; *stamens* 5; the *filaments* monadelphous at the base; *anthers* long and linear, erect; *capsule* oblong-ovate, 5-valved at the apex, many-seeded; *leaves* spatulate or oblong, radical, clustered.

D. MEADIA, L. *Scape* 1° high; *leaves* 4'-6' long, entire, or remotely crenate, smooth; *flowers* showy, nodding, in many-bracted umbels. *Perennial*.

ANAGALLIS, L. PIMPERNEL.

Low *herbs*, with whorled or opposite leaves, and axillary peduncles; *calyx* 5-parted; *corolla* 5-parted, wheel-shaped, longer than the calyx; *stamens* 5; *filaments* bearded; *capsule* globose, opening transversely, *many-seeded*.

A. ARVENSIS, L. *Stem* 6' long, branching, spreading, 4-angled; *leaves* ovate, sessile; *peduncles* longer than the leaves, nodding in fruit; *flowers* red. *Annual*.

CENTUNCULUS, L.

Small *annuals*; *leaves* minute, nearly sessile, axillary, alternate; *flowers* white; *calyx* 4-parted; *corolla* 4-cleft, bell-shaped, shorter than the calyx; *stamens* 4, beardless; *capsule* globose, many-seeded, opening transversely.

C. MINIMUS. *Stem* 1'-5' long, ascending, branched, 3-angled; *leaves* obovate, acute; *flowers* often clustered.

SAMOLUS, L.

Marsh *herbs*, smooth and somewhat fleshy; *leaves* alternate, entire; *flowers* small, white, in terminal racemes; *calyx* 5-cleft; the tube adherent to the base of the ovary; *corolla* 5-parted, salver-shaped, commonly with slender *filaments* interspersed; *stamens* 5, included; *capsule* 5-valved at the apex, many-seeded.

S. FLORIBUNDUS, Kunth. *Plant* 6'-12' high, pale green, at length much branched; *leaves* obovate, the lowest tufted, spreading, the others scattered; *racemes* many-flowered; *pedicels* long, filiform, minutely bracted in the middle; *capsule* longer than the *calyx*, globose; *flowers* minute. Brackish marshes.

S. EBRACTEATUS, Kunth. *Stem* 1°-2° high, simple or

sparingly branched, naked above; *leaves* spatulate-obovate; *pedicels* bractless; *racemes* few-flowered; *capsule* shorter than the *calyx*; *flowers* conspicuous. Saline marshes.

81. BLADDERWORT FAMILY. *Order*, LENTIBULACEÆ.

Aquatic or marsh *herbs*, with showy bilabiate *flowers* on *scapes*; *corolla* irregular, bilabiate, personate spurred; *calyx* 2-lipped, inferior; *stamens* 2, inserted on the upper lip of *corolla*; *anther* 1-celled; *ovary* 1-celled; *style* 1; *capsule* many-seeded; *seeds* minute; *embryo* straight and thick; *albumen* none.

UTRICULARIA, L. BLADDERWORT.

Lips of the *calyx* entire; throat of the *corolla* nearly closed by the projecting palate; the lips entire or slightly lobed, the lower one with an appressed or depending spur at the base.—*Herbs*, floating in still water by means of small air-bladders attached to the finely dissected leaves (or roots), or rooting in damp earth, with entire leaves, and few or no air-bladders; *scapes* or peduncles 1-many-flowered.

* *Stem floating*; upper leaves whorled, on inflated petioles, the others scattered and finely dissected; flowers yellow.

U. INFLATA, Walt. *Scape* 5–10-flowered; *corolla* large ($\frac{3}{4}$ ' wide); the lower lip 3-lobed, twice as long as the appressed conical notched spur, the upper concave, nearly entire; *fruit* nodding.—Var., MINOR. Every way smaller; *scape* 2-flowered. Ponds and ditches. *Stem* 2° long; *scape* 6'–12' high.

** *Stems floating*; leaves all scattered and finely dissected; flowers yellow.

U. VULGARIS, L. *Leaves* decompose; *scape* scaly, 5–12-flowered; throat of the *corolla* closed by the prominent palate; the lobes nearly entire, with reflexed margins, longer than the conical obtuse somewhat spreading spur; *fruit* nodding. Ponds and still water. *Stem* 2°–3° long; *scapes* 6'–12' high; *corolla* $\frac{1}{4}$ ' wide.

PINGUICULA, Tourn. BUTTERWORT.

Calyx 3-lobed on the upper lip, lower 2-lobed; *corolla* somewhat 2-lipped, the upper lip 2-lobed, the lower 3-lobed, spurred at the base; palate hairy; *leaves* all radical, clustered, entire, with the margins commonly involute; *scape* naked, commonly viscid. *Stemless herbs*.

* *Flowers yellow.*

P. LUTEA. *Corolla* 1'-1½' wide, nodding, large, lobes rounded, 2-4-cleft; spur subulate; *leaves* oblong-obovate; *scape* 6'-12' high; *plant* yellowish, clammy pubescent.

* *Flowers purple, often changing to blue.*

P. PUMILA, Michx. *Corolla*-lobes obcordate; spur somewhat saclike, obtuse; *leaves* roundish or obovate; *scape* 2'-6' high; *corolla* ¼'-¾' wide.

82. BIGNONIA FAMILY. Order, BIGNONIACEÆ.

Herbs, shrubs, or trees, with simple or compound leaves, and regular or somewhat irregular showy flowers; calyx 2-lipped, 5-lobed, or truncate and entire; *corolla* tubular or bell-shaped, mostly 2-lipped; *fertile stamens* 2, or 4 and didynamous, inserted on the corolla; *anther-cells* diverging; *ovary* 2-celled, many-ovuled, the base surrounded with a glandular disk; *style* filiform; *stigma* 2-lipped; *capsule* 2-valved, 2 or 4 celled, many-seeded; *embryo* flat; *albumen* none.

SYNOPSIS.

SUB-ORDER I. Bignoniææ. *Trees, shrubs, or woody vines. Capsule* 2-celled, the valves separating from the partition. *Seeds* flat, winged. *Cotyledons* notched at each end. *Leaves* opposite.

Valves of the capsule parallel with the partitions. Leaves compound.....BIGNONIA.

————— *contrary to the partitions. Leaves compound*.....TECOMA.

————— *contrary to the partitions. Leaves simple*.....CATALPA.

SUB-ORDER. **Sessameæ.** *Herbs.* Capsule 4-celled.
Seeds wingless. *Cotyledons* thick, entire.

Capsule woody, beaked. *Leaves* simple, alternate, or opposite. **MARTYNIA.**

BIGNONIA, Tourn. CROSS-VINE.

Calyx cup-shaped, truncate or slightly 5-toothed; *corolla* tubular-bell-shaped, 5-lobed; *fertile* stamens 4, didynamous; *anthers* smooth; *valves* of the capsule flattened parallel with the partition, and separating from it at maturity; *seeds* flat, winged.—Climbing woody vines; *leaves* opposite, compound.

B. CAPREOLATA, L. *Leaves* evergreen; the short *petiole* terminated by 2 cordate-oblong entire stalked leaflets, with a branched tendril between; *pedicels* clustered, axillary, elongated. *Stem* climbing high; *leaflets* 3'–6' long; *corolla* 2' long, red without, yellow within; *capsule* $\frac{1}{2}$ ° long.

TECOMA, Juss. TRUMPET-FLOWER.

Calyx bell-shaped, 5-toothed; *corolla* funnel-shaped, 5-lobed; *fertile* stamens 4, didynamous; *valves* of the capsule convex, contrary to the partition; *seeds* winged.—*Shrubs* or woody vines; *leaves* opposite, compound, deciduous.

T. RADICANS, Juss. *Stem* climbing by rootlets; *leaves* pinnate, more or less pubescent; *leaflets* 9–11, ovate or ovate-lanceolate, acute or acuminate, serrate; *racemes* terminal, few-flowered (*Bignonia radicans, L.*); *corolla* 2'–3' long, scarlet without, yellow within; *capsule* 4'–5' long.

CATALPA, Scop.

Calyx 2-lipped; *corolla* bell-shaped, somewhat 2-lipped, 5-lobed; *fertile* stamens 2; *valves* of the cylindrical capsule contrary to the partition; *seeds* flat, with fimbriate wings.—Small trees; *leaves* simple, opposite; *flowers* in terminal panicles.

C. BIGNONIOIDES, Walt. *Leaves* large, cordate, entire or

angularly lobed, acuminate, long-petioled, pubescent; *panicle* trichotomous, many-flowered; *calyx* purple; *corolla* white, variegated with yellow and purple within, the lobes undulate; *capsule* slender, elongated, pendulous (*C. cordifolia*, Ell.); *corolla* 1' long; *capsule* 1° long.

MARTYNIA, L. UNICORN-PLANT.

Calyx 5-cleft, 2-3-bracted; *corolla* irregular, tubular-bell-shaped, unequally 5-lobed; fertile *stamens* 2 or 4; *capsule* woody, falsely 4-celled, ending in two long recurved horns, and opening between them; *seeds* wingless.—Viscid branching *annuals*; *leaves* petioled, entire, roundish, the upper ones alternate; *flowers* racemed.

M. PROBOSCIDEA, Glox. *Stem* thick, at length prostrate; *leaves* round-cordate; *corolla* 1½' long, whitish, spotted with yellow and purple; *capsule* crested on one side, shorter than the beaks.

83. BROOM-RAPE FAMILY. Order, OROBANCHACEÆ.

Low, leafless, scaly *herbs*, parasitic on roots, with bilabiate didynamous *flowers*; *calyx* 4-5-toothed or parted; *corolla* withering-persistent, tubular, the upper lip 2-cleft or entire, the lower 3-lobed; *stamens* inserted on the tube of the corolla; *anthers* persistent; *ovary* free, 1-celled, with 2-4 parietal placentæ; *style* simple, curved at the apex; *stigma* thick, 2-lobed; *capsule* 2-valved, many-seeded; *seeds* very small, anatropous, with the minute embryo at the base of transparent albumen; *flowers* perfect or polygamous, solitary or spiked.

SYNOPSIS.

- Flowers polygamous, spiked; the lower ones fertile, the upper sterile. *Calyx* 2-bracted, 5-toothed. *Stem* branching.....EPIPHYGUS.
 Flowers perfect, spiked. *Calyx* 2-bracted, cleft on the lower side. *Stem* simple, thick, and fleshy.....CONOPHOLIS.
 Flowers solitary, perfect. *Calyx* bractless, 5-cleft. *Corolla* nearly equally 5-lobed.....APHYLLON.

EPIPHEGUS, Nutt. BEECH-DROPS.

Flowers polygamous, the upper ones slender and sterile, the lower abbreviated and fertile; *calyx* 5-toothed; *capsule* 2-valved at the apex, with 2 placentæ on each valve. *Stem* smooth, slender, much branched, purplish; flowers small, in loose slender spikes; *corolla* purplish.

E. VIRGINIANA, Bart. *Stems* 6'-12' high; *flowers* scattered; *corolla* of the sterile flowers 4''-6'' long, 4-toothed, curved.

CONOPHOLIS, Wallr. SQUAW-ROOT.

Flowers perfect, densely spiked; *calyx* 2-bracted, tubular, 4-toothed, cleft on the lower side; upper lip of the *corolla* arching, notched, the lower short, 3-toothed; *stamens* exerted; *capsule* 2-valved, with 2 placentæ on each valve.—A thick and fleshy whitish simple *herb*, covered with imbricated scales; flowers yellowish, spreading.

C. AMERICANA, Wallr. (*Orobanche*, L.) *Stems* clustered from matted roots, 4'-6' high, $\frac{1}{2}$ ' thick.

APHYLLON, Mitchell.

Flowers solitary, perfect; *calyx* 5-cleft, bractless; *corolla* tubular, curved, nearly equally 5-lobed; *stamens* included; *capsule* 2-valved, with 4 equidistant placentæ. Stemless or nearly so; flowers purplish, on a long scape or peduncle.

A. UNIFLORUM, Torr. and Gray. *Stem* very short and scaly; *peduncles* 1-several, 3'-5' high, pubescent; *calyx*-lobes lanceolate-subulate.

84. FIGWORT FAMILY. Order, SCROPHULARIACEÆ.

Chiefly *herbs*; *leaves* commonly opposite, without stipules; *calyx* 4-5-cleft or parted; *corolla* 4-5-lobed, regular,

or bilabiate, the lobes imbricated in the bud; fertile *stamens* 4 (sometimes 2, rarely 5), mostly didynamous, inserted on the tube of the corolla; *anther-cells* often separate, opening lengthwise; *ovary* free, 2-celled, many-ovuled; *placentæ* central; *style* simple or 2-cleft; *capsule* 2-celled, many- (rarely 1-few) -seeded; *seeds* anatropous; *embryo* small, in copious albumen.

SYNOPSIS.

Upper lip of the corolla exterior in the bud (except MIMULUS). Capsule commonly septicidally dehiscent.

* *Stamens 5, all perfect. Corolla regular.*

Corolla wheel-shaped. Filaments, or part of them, bearded. Leaves alternate.
VERBASCUM.

** *Fertile stamens 4, the fifth sterile, or rudimentary. Flowers cymose. Leaves opposite.*

*Corolla globose or oblong; four of the lobes short and erect. Fifth stamen scale-like.....*SCROPHULARIA.

*Corolla tubular, inflated, contracted at the throat. Fifth stamen shorter than the others. Seeds winged.....*CHELONE.

Corolla dilated upward. Fifth stamen as long as the others. Seeds wingless.
PENTSTEMON.

*** *Fertile stamens 4; sterile ones none. Flowers axillary or racemed.*

*Corolla spurred at the base. Capsules toothed at the apex.....*LENARIA.

—— *large. Calyx tubular, 5-angled, 5-toothed.....*MIMULUS.

—— *short. — 5-parted; the three outer lobes much larger.....*HERPESTIS.

**** *Fertile stamens 2; sterile ones 2 or none.*

Calyx 5-parted. Sterile filaments entire, included. Capsule ovate or globose.
GRATIOLA.

*Calyx 5-parted. Sterile filaments 2-cleft, exserted. Capsule oblong.....*ILYSANTHUS.

*Calyx 4-parted. A scale-like appendage below the filaments.....*MICRANTHEMUM.

Upper lip of the corolla interior in the bud. Capsule commonly loculicidally dehiscent.

* *Corolla regular or slightly 2-lipped; the lobes nearly equal.*

† *Stamens 2, distant. Capsule mostly obcordate.*

*Style simple. Flowers in leafy racemes or spikes.....*VERONICA.

†† Stamens 4-5, equal. Peduncles axillary, 2 or more together.

Corolla bell-shaped, 5-cleft. Capsule loculicidal. Leaves alternate.....CAPRARIA.

††† Stamens 4. Flowers racemed or spiked.

‡ Anthers 2-celled. Stamens equal.

Corolla salver-shaped. Stamens didynamous. Flowers spiked.....BUCHNERA.

‡‡ Anthers 2-celled. Stamens equal.

Corolla bell-shaped, yellow. Stamens included.....SEYMERIA.

—— tubular, orange. Stamens long-exserted.....MACRANTHERA.

‡‡‡ Anthers 2-celled. Stamens didynamous.

Anthers equal, awned at the base. Corolla funnel-shaped, yellow. Leaves mostly pinnatifid.....DASYSTOMA.

Anthers equal, pointed at the base. Corolla bell-shaped, purple. Leaves narrow, entire.....GERARDIA.

** Corolla tubular, 2-lipped; the upper lip arching, and inclosing the 4 didynamous stamens.

† Anther-cells unequal.

Anther-cells separate. Leaves alternate, the floral ones colored.

†† Anther-cells equal.

Calyx 10-12-ribbed, the upper teeth smaller. Capsule oblong, many-seeded. Leaves entire, alternate.....SCHWALBEA.

Capsule sword-shaped, few-seeded. Leaves pinnatifid.....PEDICULARIS.

VERBASCUM, L. MULLEIN.

Calyx 5-parted; *corolla* rotate, 5-lobed, the lobes nearly equal, roundish; *stamens* 5, declined, all, or a part of them, bearded; *stigma* simple; *capsule* globose, many-seeded.—Tall biennial herbs; leaves alternate; flowers in racemes.

V. BLATTARIA, L. Stem smooth below, pubescent above, sparingly branched or simple; leaves smooth, oblong, acute, serrate or pinnately lobed, the lowest petioled, the upper clasping; racemes elongated, glandular, the flowers scattered; corolla bright or pale yellow; filaments all bearded with purple hairs. Stem 2°-3° high.

SCROPHULARIA, L. FIGWORT.

Calyx 5-parted ; *corolla* globose or oblong, 5-cleft ; the 4 upper lobes erect, with the two uppermost longer, the lowest spreading ; *stamens* 4, declined ; the fifth sterile and scale-like, placed near the orifice of the tube of the corolla ; *anther-cells* transverse and confluent into one ; *capsule* many-seeded.—Tall herbs, with opposite leaves, and greenish-purple flowers in loose cymes, forming a narrow panicle.

S. NODOSA, L. Smooth ; stem 4-sided ; branches elongated, spreading ; leaves ovate or oblong, or the uppermost lanceolate, acute, serrate, rounded or cordate at the base ; flowers small. Stem 2°–5° high.

CHELONE, Tourn. SNAKE-HEAD.

Calyx 5-parted or 5-sepalous, bracted ; *corolla* inflated-tubular, contracted at the throat, bilabiate ; the upper lip concave, emarginate ; the lower obtusely 3-lobed, woolly in the throat ; *stamens* 4, with the filaments and cordate anthers woolly, and a fifth sterile one shorter than the others ; seeds imbricated, broadly winged.—Smooth perennial herbs, with opposite serrate leaves, and large white or purple flowers in short dense bracted spikes.

C. GLABRA, L. Stem simple or branched, 4-sided ; leaves lanceolate or oblong, acute or acuminate, on very short petioles ; spike terminal, imbricated, nearly sessile, simple or branched ; bracts and sepals ovate ; corolla white or rose-color. September. Stem 2° high ; leaves 2'–4' long, sometimes pubescent beneath ; corolla 1'–1½' long, concave beneath.

PENTSTEMON, L'Her.

Calyx 5-parted ; *corolla* inflated-tubular, or somewhat

bell-shaped, open at the throat, bilabiate; the upper lip rounded, concave, emarginate or 2-lobed; the lower lip 3-lobed; *stamens* 4, declined at the base, and a fifth sterile one as long as the others, and commonly bearded above; *capsule* 2-valved, many-seeded; *seeds* wingless.—Erect perennial *herbs*, with opposite *leaves*, and white or purple *flowers* in axillary and terminal cymes, forming a close or open narrow terminal panicle.

* *Leaves undivided.*

P. PUBESCENS, Solander. Pubescent or smooth; *leaves* lanceolate, acute, serrate or entire, sessile or clasping, the lowest ovate or oblong, tapering into a slender petiole; *cymes* spreading; few-flowered; tube of the *corolla* gradually dilated above the middle; the lower lip longer than the upper; sterile *stamen* bearded down one side; *anthers* smooth. *Stem* 2° high; lowest leaves 3'–5' long; corolla 1' long, pale purple.

P. GRANDIFLORIS. Found on the Red River by Marcy's Expedition.—*Torrey.*

LINARIA, Juss. TOAD-FLAX.

Calyx deeply 5-parted; *corolla* personate, spurred at the base; the upper lip emarginate or 2-lobed; the lower 3-lobed; the throat commonly closed by the prominent palate; *stamens* 4, didynamous; *capsule* globose or ovoid, opening at the apex, with few or several tooth-like valves, many-seeded.—*Herbs*, with alternate or (on the radical branches) opposite or whorled *leaves*, and axillary or racemose *flowers*.

* *Stems with prostrate branches at the base, which bear broader opposite or whorled leaves.*

L. CANADENSIS, Spreng. Smooth; *stem* erect, slender, mostly simple; *leaves* linear, flat, scattered, those on the radical branches oblong; *racemes* straight; *pedicels* erect,

as long as the calyx; lobes of the small (3"-4") blue and white *corolla* rounded; spur filiform, curved, as long as the pedicels. (*Antirrhinum Canadense*, L.) Biennial. Stem 1°-2° high.

MIMULUS, L. MONKEY-FLOWER.

Calyx tubular, 5-angled, sharply 5-toothed; *corolla* bilabiate; the upper lip 2-lobed, erect or reflexed; the lower 3-lobed, spreading; *stamens* 4, didynamous; *anther-cells* somewhat confluent; *stigma* ovate, 2-lipped; *capsule* loculicidally 2-valved, many-seeded.—Erect smooth perennial *herbs*, with opposite *leaves*, and axillary purple *flowers*.

M. ALATUS, Ait. *Stem* square, with winged angles; *leaves* oblong-ovate, acuminate, serrate, tapering at the base into a petiole; *peduncles* shorter than the *flowers*. Stem 2° high; leaves 2'-5' long; *calyx*-teeth small.

HERPESTIS, Gærtn.

Calyx 5-parted, the three outer lobes, especially the upper one, broader; *corolla* bell-shaped, 5-lobed or bilabiate, with the upper lip 2-lobed or emarginate, the lower 3-lobed; *stamens* 4, didynamous; *anther-cells* contiguous or divaricate; *style* dilated and flattened at the apex; *capsule* 2-valved, many-seeded.—Low *herbs*, with opposite *leaves*; *flowers* opposite, axillary, or in leafy terminal racemes.

* *Stems* 4-angled; *leaves* serrate; *peduncles* 2-bracted at the base; exterior *calyx*-lobes oblong; *corolla* white.

H. NIGRESCENS, Benth. Smooth; *stem* erect, simple or branched; *leaves* oblong or oblong-obovate, rather obtuse, serrate above the middle; lower *peduncles* as long as the leaves, the upper much longer; tube of the *corolla* striped with blue; the upper lip rounded. Stem 1°-1½° high; leaves 1'-2' long.

** *Stems terete, succulent, creeping; leaves ovate or roundish, entire; exterior calyx-lobes cordate or ovate; peduncles 2-bracted at the apex.*

H. AMPLEXICAULIS, Pursh. *Stem* villous, ascending from a creeping base; *leaves* smoothish, ovate, cordate and clasping, obtuse; *peduncles* shorter than the flowers; exterior *calyx-lobes* cordate; base of the ovary surrounded by a 12-toothed disk. (H. rotundifolia, Ell., not of Pursh.) *Flowering* stems 6'–8' high; leaves $1\frac{1}{2}'$ long, crowded; *flowers* blue; *plant* odorous; perennial.

GRATIOLA, L. HEDGE-HYSSOP.

Calyx 5-parted, the lobes nearly equal, narrow; *corolla* bilabiate, with the upper lip entire or emarginate, the lower 3-cleft; fertile *stamens* 2, included, the anterior ones sterile or wanting; *stigma* 2-lipped; *capsule* 4-valved, many-seeded.—Low perennial *herbs*, with opposite *leaves*, and solitary axillary white or yellow *flowers*; calyx mostly 2-bracted.

* *Connective of the anthers dilated, the cells transverse; stems tender; flowers peduncled.*

† *Sterile stamens minute or none.*

G. VIRGINIANA, L. *Stem* branching from the base, glandular-pubescent above; *leaves* lanceolate, acute, sparingly serrate, sessile, the lower ones narrowed at the base; *peduncles* slender, the upper ones longer than the leaves; *corolla* white, with the yellowish tube twice as long as the calyx; *capsule* ovate, acute. *Stem* 6'–12' high; leaves 1' long; *corolla* 5''–6'' long, hairy within.

G. FLORIDANA, Nutt. *Stem* simple or branched, smooth; *leaves* lanceolate or oblong, obtuse, entire or nearly so, narrowed at the base, sessile, the lowest slightly petioled; *peduncles* filiform, longer than the leaves; *lobes* of the *corolla* emarginate, white; the slender yellowish tube three times as long as the calyx. *Stem* 1° high; leaves 1' long; *corolla* 8'' long; *capsule* globose.

†† *Sterile stamens manifest.*

G. QUADRIDENTATA, Michx. Pubescent and somewhat viscid; *stem* decumbent at the base, ascending, simple or branched; *leaves* lanceolate, sessile, 4-toothed; *peduncles* mostly longer than the leaves; *corolla* yellowish-white; *capsule* small, globose, much shorter than the linear unequal *calyx*-lobes; *bracts* minute. Stem 4'-6' high; leaves $\frac{1}{2}$ ' long; corolla 5" long.

G. AUREA, Muhl. Smooth; *stem* decumbent, creeping, the flowering branches ascending, 4-angled; *leaves* sessile, oblong-lanceolate, slightly serrate; *peduncles* as long as the leaves, or the upper ones longer; *bracts* as long as the calyx; *corolla* bright yellow. Stem 1°-2° long; leaves $\frac{1}{2}$ '-1' long; corolla 6" long.

ILYSANTHES, Raf.

Calyx 5-parted, bractless; *corolla* bilabiate, the upper lip short, erect, 2-cleft, the lower larger, spreading, 3-cleft; *fertile stamens* 2, included, the two anterior ones sterile, 2-lobed, with one of the lobes tipped with a gland, the other smooth, acute; *capsule* ovate or oblong, as long as the calyx. —Smooth *annuals*, growing in wet or muddy places. *Stems* 4-angled; *leaves* opposite; *peduncles* axillary, often reflexed in fruit; *flowers* small, purplish.

I. GRATIOLOIDES, Benth. *Stem* erect, at length diffusely branched; *leaves* lanceolate, oblong, or ovate, the lowest narrowed into a petiole, the upper sessile, acute, obscurely toothed or entire; lower *peduncles* mostly shorter than the leaves, the upper much longer, spreading; *corolla* pale blue, twice as long as the calyx; *capsule* oblong, acute, scarcely longer than the calyx. Stem 6'-12' long; leaves $\frac{1}{2}$ '-1' long; corolla 3"-4" long.

I. REFRACTA, Benth. *Stem* erect, very slender, forking; radical *leaves* tufted, oblong, obtuse, entire, narrowed at

the base, the others remote, small, lanceolate, sessile; *peduncles* filiform, many times longer than the leaves, reflexed in fruit; *corolla* pale blue variegated with purple; *capsule* oblong linear, twice as long as the calyx. Stem 6'-12' high; radical leaves 1' long; *corolla* 3''-4'' long.

MICRANTHEMUM, Michx.

Calyx 4-parted, or 4-cleft; *corolla* somewhat bilabiate, the upper lip shorter, entire, the lower 3-lobed, with the middle lobe longer; *stamens* 2, included; the filaments with a gland-like appendage at the base; *anther-cells* diverging; *style* short; *stigma* capitate; *capsule* 2-valved, few-seeded, the delicate partition vanishing at maturity; *seeds* oblong, reticulate.—A small smooth perennial *herb*, with diffuse creeping *stems*, roundish opposite entire *leaves*, and minute nearly sessile axillary white *flowers*.

M. ORBICULATUM, Michx. (M. emarginatum, Ell.; Hemianthus micranthemoides, Nutt.; Herpestis micrantha, Ell.? not of Pursh.) *Stem* 6'-12' long; *leaves* 3''-5'' long, sometimes emarginate; *corolla* not longer than the minute ($\frac{1}{2}$ '') calyx.

VERONICA, L. SPEEDWELL.

Calyx 4-5-parted; *corolla* wheel-shaped, or salver-shaped, 4-5-lobed; *stamens* 2, one each side of the upper lobe of the corolla; *stigma* capitate; *capsule* compressed and obcordate, or oblong and obtuse, septicidal or loculicidal; *seeds* few or many, flattened or concave on the inner face.—Chiefly *herbs*, with the *stem-leaves* opposite or whorled, the floral ones alternate; *flowers* small, axillary, racemed or spiked, blue or white.

* *Leaves* whorled; *corolla* tubular; *capsule* oblong.

V. VIRGINICA, L. Perennial, smooth or pubescent; *stem* tall, erect; *leaves* 4-7 in a whorl, lanceolate, serrate, short-

petioled; *flowers* very numerous, crowded in axillary (whorled) and terminal spikes; *stamens* long-exserted; *corolla* white or purple. Stem 2°-4° high; leaves 2'-4' long.

** *Stem-leaves opposite; corolla wheel-shaped; capsule obcordate.*

†† *Flowers scattered, in leafy terminal racemes.*

V. SERPYLLIFOLIA, L. Perennial, smoothish; *stem* ascending, diffusely branched; *leaves* oval or roundish, crenate, short-petioled, the *floral ones* lanceolate and entire; *pedicels* as long as the calyx; *corolla* blue. Stem 4'-6' long; leaves 4''-6'' long.

V. PEREGRINA, L. Annual, smooth; *stem* erect, simple or branched; *leaves* sessile, oblong, toothed, the lowest narrowed into a petiole, the *floral ones* entire; *peduncles* shorter than the calyx; *corolla* white, minute. Stem 2'-12' high; leaves $\frac{1}{2}$ '-1' long.

CAPRARIA, L.

Calyx 5-parted, equal; *corolla* bell-shaped, equally 5-lobed, smooth within; *stamens* 4-5; *anthers* sagittate; *style* slender; *stigma* thick, ovate, at length 2-lobed; *capsule* coriaceous, ovate, septicidally 2-valved, the valves 2-cleft at the apex; *seeds* numerous, reticulate.—Perennial herbs or shrubby plants; *leaves* alternate, serrate; *peduncles* axillary, single or by pairs, mostly 1-flowered.

C. BIFLORA, L. Shrubby, smooth or pubescent; *stem* erect, branching; *leaves* lanceolate or oblong, sharply serrate, narrowed and entire below the middle; *peduncles* filiform, mostly by pairs, shorter than the leaves; *calyx*-lobes linear; *corolla* deeply 5-cleft; *stamens* 5, included. Stem 2°-3° high; leaves 1'-1 $\frac{1}{2}$ ' long; *flowers* white?

BUCHNERA, L.

Calyx tubular, 5-toothed; *corolla* salver-shaped, 5-lobed,

the lobes wedge-obovate; *stamens* 4, didynamous, included; *anthers* 1-celled; *style* simple, club-shaped at the apex; *capsule* coriaceous, straight, loculicidally 2-valved, the valves entire; *seeds* numerous, reticulate. — Rough *herbs*, turning black in withering; *leaves* opposite, toothed or entire, the uppermost small, and passing into the bracts of the many-flowered spike; *flowers* blue.

B. ELONGATA, Swartz. Rough with short rigid hairs; *stem* mostly simple; *leaves* entire or slightly toothed, 1-nerved or obscurely 3-nerved, the lowest obovate or obovate-oblong, obtuse; the lower *stem-leaves* narrowly lanceolate, the uppermost distant, acute; *spikes* interrupted, long-peduncled; *flowers* opposite or alternate. Low pine-barrens. Stem 1°–2° high; *corolla* 4'–5" long.

SEYMERIA, Pursh.

Calyx 5-parted; *corolla* bell-shaped, 5-lobed, the lobes oblong; *stamens* 4, equal, the filaments woolly; *anthers* oblong, opening at the apex, awnless; *style* simple, obtuse; *capsule* ovate, flattened above, loculicidally 2-valved; *seeds* numerous, covered by the loose hyaline testa. — Chiefly *annuals*; *stems* erect, branching; *leaves* opposite, pinnately divided; *flowers* yellow, in terminal leafy-bracted racemes.

S. TENUIFOLIA, Pursh. Smooth or nearly so; *stem* with elongated erect-spreading branches; *leaves* pinnate, the entire or lobed divisions filiform; *capsule* smooth, acute at the base, shorter than the pedicel. Low pine-barrens. Stem 2°–4° high.

S. PECTINATA, Pursh. Viscid-pubescent; *stem* with ascending branches; *leaves* pinnatifid, the entire obtuse divisions oblong-linear; *capsule* hairy, obtuse at the base, as long as the pedicel. Stem 6'–18' high.

MACRANTHERA, Torr.

Calyx 5-cleft, the lobes elongated; *corolla* cylindrical, 5-toothed, the teeth reflexed; *stamens* 4, equal, long-exserted, woolly; *anthers* large, oblong, approximate; *style* simple, filiform, elongated; *stigma* minute, flat; *capsule* ovate, loculicidally 2-valved, many-seeded.—A tall *biennial*, with pinnatifid opposite *leaves*, and showy orange-colored *flowers*, in terminal *leafy racemes*.

M. FUCHSIOIDES, Torr. Smoothish; *stem* branching, 4-sided; earliest *leaves* ovate-oblong, entire, those of the stem lyrate-pinnatifid, with the lobes denticulate, the uppermost toothed-serrate; *pedicels* slender, recurved, the upper ones longer than the floral leaves; *flowers* erect; *calyx-lobes* lanceolate, denticulate, rather shorter than the corolla.—Var. LECONTEI has the shorter and narrower lobes of the *calyx* entire. Stem 3°–5° high; earliest leaves 6'–8' long, those of the stem 2'–4' long; *corolla* 9"–12" long. The plant turns black in drying.

DASYSTOMA. (See page 454.)

GERARDIA, L.

Calyx bell-shaped, 5-toothed, the teeth short, acute, entire; *corolla* tubular-bell-shaped, 5-lobed, the lobes rounded, spreading, the throat oblique; *stamens* 4, didynamous, the longer ones commonly woolly; *anthers* woolly, connivent in pairs, the cells diverging and pointed at the base; *style* slender, dilated, and flattened upward; *capsule* ovoid or globose, smooth, loculicidal; *seeds* numerous, angled, reticulated.—Chiefly slender branching *annuals*; *leaves* opposite, or rarely alternate, narrow, entire; *flowers* in the axils of the upper leaves, showy, purple; the *tube* of the corolla mostly dotted with red and yellow, often woolly at the throat.

* *Perennial*.

G. LINIFOLIA, Nutt. Smooth; *branches* elongated, erect;

leaves erect, linear; *peduncles* as long as the leaves, or the uppermost longer; *calyx* truncate, with minute teeth; lobes of the *corolla* nearly equal, fringed on the margins; *capsule* large (3" wide), globose, one-third longer than the calyx. *Stem* 2°-3° high; leaves 1' long; corolla 1' long, pubescent.

†† Lobes of the corolla nearly equal, spreading.

‡ Pedicels as long or twice as long as the calyx, shorter than the leaves.

G. APHYLLA, Nutt. *Stem* 2°-3° high, smooth, 4-angled sparingly branched near the summit; *leaves* minute, 1" long, subulate, appressed; *flowers* mostly alternate, on one side of the spreading branches; *pedicel* as long as the calyx; *calyx*-teeth minute, obtuse; *corolla* $\frac{1}{2}$ ' long, hairy within, the upper lobes reflexed; *capsule* globose, 2" long, twice as long as the calyx.

G. PARVIFOLIA. *Stem* rough, striate, 12'-18' high, the slender branches erect; *leaves* 4"-6" long, opposite or alternate, linear, very rough, rather obtuse; *pedicels* filiform, 2-4 times as long as the minute floral leaves; *calyx*-teeth minute, obtuse; *corolla* $\frac{1}{2}$ ' long, pale purple or white. Unlike the other species, this remains unchanged in drying.

CASTILLEIA, L.

Calyx tubular, compressed, cleft at the summit, the lobes entire or 2-cleft; *tube* of the corolla included in the calyx; the upper lip long, narrow, curved, laterally compressed, and inclosing the four didynamous *stamens*; the lower lip short, 3-lobed; *anther-cells* oblong-linear, unequal, the outer one fixed by the middle, the inner pendulous; *capsule* loculicidal, many-seeded.—*Herbs*, with alternate entire or incisely lobed *leaves*, the uppermost colored; *flowers* in leafy spikes or racemes.

C. COCCINEA, Spreng. *Stem* hairy; *radical leaves* clustered, nearly entire; those of the stem pinnatifid, with the

lobes linear; the *floral ones* 3-lobed, bright scarlet at the summit; *corolla* greenish yellow. Stem 1° - $1\frac{1}{2}^{\circ}$ high.

PEDICULARIS, L.

Calyx tubular, more or less cleft at the apex, variously 2-5-toothed; *corolla* bilabiate; the upper lip compressed, curved and bearded at the apex, inclosing the 4 didynamous stamens; the lower lip 2-crested above, 3-lobed, with the lateral lobes larger and rounded; *anthers* transverse; *capsule* ovate or lanceolate, compressed, the upper portion empty.—*Herbs*, with finely and pinnately divided *leaves*; *flowers* in leafy racemes or spikes.

P. CANADENSIS, L. *Stem* simple, hairy (6'-9' high); *leaves* alternate, smooth, oblong or lanceolate, pinnatifid, the lobes oblong, simply or doubly crenate; *spike* dense, capitate, elongated in fruit; *corolla* pale yellow and purple; the upper lip hooked, 2-awned under the apex; *capsule* lanceolate, exserted. Stem bearing slender leafy and rooting runners; fruiting spike 3'-5' long. *Perennial*.

P. LANCEOLATA, Michx. *Stem* tall (1° - 3°), smooth, simple or sparingly branched; *leaves* nearly opposite, lanceolate, pinnately toothed, the teeth crenate; *spike* dense; *corolla* pale yellow, the upper lip curved, awnless, the lower erect; *capsule* ovate, scarcely exserted.

85. ACANTHUS FAMILY. Order, ACANTHACEÆ.

Chiefly *herbs*, with opposite (rarely alternate or clustered) undivided exstipulate *leaves*, and bracted, often showy *flowers*; *calyx* 5-parted; *corolla* more or less bilabiate, 5-lobed, twisted in the bud; *fertile stamens* 2 or 4, inserted on the tube of the corolla; *anthers* 2-celled; *ovary* free; *style* single; *stigma* entire or 2-lobed; *capsule* loculicidally 2-valved, 2-celled, 4-several-seeded, opening elastically;

seeds anatropous, flat, rounded, without albumen, mostly supported by curved appendages of the placentæ; *radicle* inferior. *Stems* commonly swollen between the joints.

SYNOPSIS.

* *Capsule* oblong, bearing the seeds at the base; appendages of the placentæ none.

Spike borne on a closely-bracted scape. *Leaves* radical.....ELYTRARIA.

** *Capsule* club-shaped, bearing the seeds above the base appendaged.

Corolla nearly regular. *Stamens* 4. *Flowers* axillary, solitary or clustered.

DIPTERACANTHUS.

Corolla bilabiate. *Stamens* 2. *Cells* of the anthers placed one lower than the other.

Flowers in long-peduncled axillary spikes.....DIANTHERA.

Corolla bilabiate, resupinate. *Stamens* 2. *Cells* of the anthers placed one behind the other. *Flowers* in leafy-bracted heads or clusters.....DICTYPTERA.

ELYTRARIA, Vahl.

Calyx 4-5-parted, the lateral lobes narrower; *corolla* salver-shaped or bilabiate, 5-lobed; *fertile stamens* 2, the 2 anterior ones sterile; *anther-cells* parallel; *stigma* 2-cleft; *capsule* sessile, about 8-seeded, the seeds fixed near the base of the capsule, without appendages.—Low *herbs*; *leaves* all radical, clustered; *scape* covered with imbricated bracts; *flowers* spiked, 2-bracted.

E. VIRGATA, Michx. *Leaves* oval or oblong, narrowed downward, entire or wavy on the margins, smooth or pubescent; *bracts* of the scape alternate, rigid, lanceolate, acuminate, clasping, those of the *spike* ovate; *corolla* white, salver-shaped, the lobes nearly equal; *capsule* cylindrical. *Scapes* 6'-12' high; *leaves* 2'-4' long.

DIPTERACANTHUS, Nees.

Calyx 2-bracted, 5-parted, with linear or bristle-like lobes; *corolla* funnel-shaped, 5-lobed, the lobes equal, rounded; *stamens* 4, didynamous, included; *anthers* sagit-

tate; *style* simple, or 2-cleft at the apex; *capsule* narrowed below the middle, flattened contrary to the partition, 4-12-seeded; *seeds* borne above the middle, supported by curved appendages of the placentæ. *Herbs*, with tumid joints; *leaves* entire, opposite; *flowers* axillary or clustered, nearly sessile; *corolla* white, blue, or purple. Perennial.

D. OBLONGIFOLIUS. Pubescent and somewhat hoary; *stem* 4-angled, erect from a creeping base, simple or sparingly branched; *leaves* nearly sessile, oval or obovate; *flowers* solitary or 2-3 in a cluster; *calyx*-lobes subulate-setaceous, as long as the oblong bracts, and tube of the spotted corolla; *anther-cells* pointed at the base; *style* simple; *capsule* 4-seeded. Stem 6'-12' high; leaves $\frac{1}{2}$ '-1' long; *corolla* 1' long, rather exceeding the leaves.

DIANTHERA, Gron.

Calyx 5-parted; *corolla* bilabiate, the upper lip emarginate, the lower 3-lobed, rugose or veiny in the middle, spreading; *stamens* 2; *anther-cells* separated, one placed lower down than the other; *stigma* simple, acute; *capsule* flattened, narrowed downward, bearing the seeds above the middle; *seeds* mostly 4, supported by the appendages of the placentæ.—Perennial smooth *herbs*, with opposite entire *leaves*, and short-bracted mostly alternate *flowers* in long-peduncled axillary spikes.

D. AMERICANA, L. *Stem* tall, angled; *leaves* long, linear-lanceolate; *spikes* oblong, dense or somewhat capitate, on peduncles as long as the leaves. (*Justicia ensiformis*, Ell.? *J. pedunculosa*, Michx.) In slow-flowing streams. July and August. Stem 2° high; leaves and peduncles 4'-6' long; spike $\frac{1}{2}$ ' long; *flowers* pale purple.

DICLIPTERA, Juss.

Herbs, with simple leaves; *flowers* purple, scarlet, or

white, in axillary or terminal heads or spike-like cymes; *calyx* 5-parted, mostly leafy-bracted; *corolla* bilabiate, mostly reversed, the *lower lip* 3-lobed, the *upper* 2-cleft or entire; *stamens* 2; *anther-cells* equal, one placed behind the other; *capsule* oblong or oval, bearing 2 or 4 seeds below the middle; the partitions at length free from the valves.

D. BRACHIATA, Spreng. *Leaves* thin, oblong-ovate, acuminate, abruptly contracted into a long and slender petiole; *stem* 6-angled, with numerous spreading branches; *spikes* solitary or 2-3 together, interrupted, unequal; *bracts* oblong, mucronate, narrowed at the base, at length inflated; *corolla* small, purple. Stem 1°-2° high; *plant* smooth or nearly so.

DREJERA.

D. PARVIFLORA, Buckley. *Leaves* opposite, lanceolate, shortly petiolate, acuminate, obtuse at base; *spikes* terminal, naked; *calyx* deeply 5-cleft; *segments* long-subulate; tube of *corolla* narrow, twice the length of the calyx; *flowers* opposite, sessile, shortly interrupted on the spikes. —*Shrub*, 3-4 feet high, with slender branches; the young branches and calyx glandular pubescent, the rest of the plant smooth; *petioles* about 1 line long; *flowers* 6-8 lines long; *bracts* lanceolate, shorter than the calyx. Western Texas. June.

86. VERVAIN FAMILY. Order, VERBENACEÆ.

Chiefly *herbs* or *shrubs*, with 4-angled mostly rough *stems*, and opposite and exstipulate *leaves*; *flowers* spiked, capitate, or cymose; *calyx* 4-5-cleft or parted, free; *corolla* regular and salver-shaped, or more or less bilabiate, 4-5-lobed; *stamens* 4-5, inserted on the tube of the corolla; *anthers* 2-celled; *ovary* entire, 1-8-celled, with 1 or (in *Avicennia*) 2 ovules in each cell; *style* simple, terminal;

fruit dry or baccate, 1-8-celled, commonly separable into as many 1-seeded indehiscent nutlets; *albumen* scarce or none; *embryo* straight.

SYNOPSIS.

TRIBE I. **Verbeneæ.** *Ovule* solitary, erect from the base of the cell, anatropous. *Radicle* pointing downward. *Flowers* in spikes or heads.

* *Herbs*; *fruit* dry.

Stamens 4. *Fruit* of 2-celled nutlets, inclosed in the inflated calyx..... VERBENA.
 ——— 4. ——— 2-celled nutlets. *Flowers* capitate..... LIPPIA.

** *Shrubs*; *fruit* fleshy or pulpy.

Fruit of 2-celled nutlets. *Flowers* capitate LANTANA.

TRIBE II. **Viteæ.** *Ovule* solitary, suspended from the inner angle of the cell, amphitropous. *Radicle* pointing downward. *Flowers* in cymes. *Fruit* baccate.

Fruit of 4 separate 1-celled nutlets. *Shrubs*..... CALLICARPA.

TRIBE III. **Phrymeæ.** *Ovule* solitary, erect from the base of the 1-celled ovary, orthotropous. *Radicle* pointing upward. *Cotyledons* convolute around their axis. *Flowers* in elongated slender spikes. *Fruit* a caryopsis.

Corolla bilabiate. *Stamens* 4, didynamous. *Fruit* reflexed..... PHRYMA.

VERBENA, L. VERVAIN.

Herbs, with small *flowers* in lengthened slender spikes; *leaves* serrate or pinnately divided; *calyx* tubular, 5-ribbed, 5-toothed; *corolla* salver-shaped, bearded in the throat, the limb somewhat bilabiate, 5-lobed; *stamens* 4, didynamous, included; *stigma* 2-lobed; *ovary* 4-celled; *fruit* of 4 separate 1-seeded nutlets.

* *Anthers* of the longer *stamens* tipped with a gland-like appendage; *flowers* showy.

V. AUBLETIA, L. Hairy; *stem* creeping at the base, ascending, forking; *leaves* ovate-oblong, 3-cleft, with the

lobes toothed, narrowed into a slender petiole, the lower ones smaller, rounded, toothed; *spikes* terminal and in the forks of the stem, long-peduncled, closely flowered; *calyx* long, slender, the unequal teeth subulate; *corolla* showy, purple. Stem 6'-12' high; corolla $\frac{1}{2}$ ' long.

** *Anthers without appendages; flowers small.*

† *Leaves undivided.*

V. URTICIFOLIA, L. Rough-hairy; *stem* tall, branching; *leaves* ovate-oblong, acute or acuminate, mucronate-serrate, contracted at the base into a long petiole; *spikes* very long, filiform, axillary and terminal; *flowers* minute, white or pale blue. Low ground. Stem 2°-5° high; leaves very rough, 2'-6' long.

V. HASTATA, L. Rough-hairy; *stem* branching; *leaves* oblong-lanceolate, acuminate, coarsely and sharply serrate, tapering into a long petiole, the lowest broader, and often hastate-lobed at the base; *spikes* linear, short, close-flowered; *flowers* violet. (V. paniculate, Lam.) Low ground. Stem 2°-3° high; flowers larger than in V. urticifolia.

V. ANGUSTIFOLIA, Michx. Rough-hairy; *stem* simple or branched above; *leaves* lanceolate or linear-lanceolate, rather obtuse, coarsely serrate, tapering from near the apex to the sessile base; *spikes* linear, terminal, close-flowered; *flowers* purple. Dry woods. Stem 6'-12' high; flowering spikes 2'-3' long.

LIPPIA, L.

Herbs, with 4-angled *stems*, opposite or whorled, simple *leaves*; *flowers* in dense spikes or heads; *calyx* tubular, membranaceous, 2-4-toothed; *corolla* tubular-funnel-formed, somewhat bilabiate, 5-cleft; *stamens* 4, didynamous, included; *ovary* 2-celled, 2-ovuled; *style* short; *stigma* obliquely capitate; *fruit* of two 1-seeded separable nutlets.

L. NODIFLORA, Michx. *Flowering stems* 6'-12' high; *leaves* 1' long, obovate, lanceolate or oblong, rough, tapering and entire below the middle, serrate above; *stem* creeping, finely pubescent, the flowering stems erect; *heads* dense, globose in flower, oblong or cylindrical in fruit, on axillary peduncles, which are 2-3 times as long as the leaves; *flowers* white or purple.

L. CUNEIFOLIA. Found on the Wichita by *Torrey*.

LANTANA, L.

Calyx minute, slightly 4-toothed; *corolla* bilabiate, the upper lip notched or entire, the lower 3-lobed; *stamens* 4, didynamous, included; *style* short; *stigma* oblique; *fruit* fleshy or berry-like, of two mostly rugose or tuberculate 1-seeded nutlets, inclosed in the enlarged membranaceous calyx.—*Shrubs*, with simple rugose serrate leaves, and axillary peduncled capitate bracted flowers.

L. INVOLUCRATA, L. Var., FLORIDANA. *Stem* much branched, pubescent; *leaves* small ($\frac{1}{2}$ '-1'), oval or obovate, crenate, rounded at the apex, densely pubescent when young, at length rough above, contracted into a slender petiole; *peduncles* 2-3 times as long as the leaves, the upper ones corymbose; *heads* small; *bracts* ovate, as long as the tube of the small (2"-3") white (?) *corolla*; the outer ones empty and narrower, involucrate.

CALLICARPA, L. FRENCH MULBERRY.

Shrubs with a glandular or scurfy mostly stellate pubescence; *leaves* undivided, serrate, petioled, opposite; *flowers* in axillary forked cymes; *calyx* 4-toothed, cup-shaped, small; *corolla* 4-cleft, funnel-form; *stamens* 4, equal, exserted; *ovary* 4-celled; *style* slender; *stigma* capitate; *drupe* baccate, of four separate 1-seeded nutlets.

C. AMERICANA, L. *Branches and leaves* scurfy; *leaves* ovate-oblong, acute at each end, crenate, serrate, rough above, hoary beneath, becoming smoothish; *cymes* many-flowered, as long as the petioles; *corolla* blue; *drupe* purple.—*Shrub*, 3°–8° high; leaves 4"–6" long. On Buffalo Bayou.

PHRYMA, L. LOPSEED.

Perennial, branching pubescent *herbs*, with opposite, ovate or oblong, coarsely-serrate, long-petioled *leaves*, and small opposite purplish *flowers*, in a slender terminal *spike*; *fruit* reflexed, oblong, pointed by the persistent style; *calyx* tubular, bilabiate, the upper lip notched, the lower longer, 3-lobed; *stamens* 4, didynamous, included; *style* slender; *stigma* 2-cleft.

P. LEPTOSTACHYA. *Stem* 1°–3° high, tumid above the joints; *leaves* 3'–5' long.

87. MINT FAMILY. Order, LABIATÆ.

Herbs or *shrubs*, with opposite 4-angled *branches*, and opposite exstipulate *leaves*; *flowers* opposite, solitary, or oftener in close axillary spiked or capitate cymes (whorls); *calyx* 3–10-cleft or toothed; *corolla* more or less bilabiate, 4–5-lobed; *stamens* inserted on the tube of the corolla, diandrous or didynamous; *ovary* 4-cleft or 4-parted, the lobes surrounding the base of the single style; *ovule* solitary, erect, anatropous; *fruit* of 1–4 one-seeded nutlets; *albumen* scarce or none; *embryo* straight or (in *Scutellaria*) curved; *radicle* short, inferior.—*Plants* commonly dotted with minute glands, which are filled with an aromatic volatile oil.

SYNOPSIS.

TRIBE I. **Ocimoideæ.** *Stamens* 4, didynamous; the

lower pair longer, reclining on the lower lobe of the corolla. *Anthers* 2-celled. *Nutlets* smooth, distinct.

Calyx-teeth nearly equal. *Lowest lobes of the corolla* longest, saccate, bent downward.

HYPTIS.

TRIBE II. **Satureiæ.** *Stamens* 2 or 4, straight and spreading, or connivent under the upper lip; the upper pair shorter or abortive. *Anthers* 2-celled. *Nutlets* smooth, distinct.

* *Corolla-lobes* nearly equal. *Stamens* distinct.

Fertile *stamens* 4. *Whorls* spiked. *Nutlets* obtuse.....MENTHA.
 ————— 2. ——— axillary. ——— truncate.....LYCOPUS.

** *Corolla* 2-lipped. *Stamens* straight, distinct, spreading.

Stamens 4. *Calyx* 2-lipped or 5-toothed, naked in the throat.....PYCNANTHEMUM.
 ——— 2 or 4. ———; upper lip truncate, 3-toothed. *Corolla* fimbriate.
 COLLINSONIA.

*** *Corolla* 2-lipped. *Stamens* ascending and spreading above, or connivent under the upper lip.

† Fertile *stamens* 4. *Calyx* 13-nerved.

Calyx 2-lipped. *Flowers* in cymes. *Anthers* awnless. *Chiefly shrubs*...CALAMINTHA.
 ————— *Anther-cells* awned. *Branching annuals*.....DICEBRANDIA.

TRIBE III. **Monardeæ.** *Stamens* 2, ascending and parallel. *Anthers* 1-celled, or with 2 confluent cells. *Calyx* and *corolla* 2-lipped. *Nutlets* smooth, distinct.

Connective of the anther elongated, oblique; the upper cell fertile, the lower abortive or wanting.....SALVIA.

Anthers 2-celled, the cells confluent. *Calyx-teeth* equal.....MONARDA.
 ————— ——— 2-lipped, upper teeth awned....BLEPHILIA.

TRIBE IV. **Nepeteæ.** *Stamens* 4, the upper pair longer. *Nutlets* smooth, distinct.

Stamens all ascending. *Anther-cells* parallel.....CEDRONELLA.

TRIBE V. **Stachydeæ.** *Stamens* 4, the lower pair longer, parallel, ascending. Upper lip of the *corolla* concave or keeled. *Calyx* 3-10-toothed or lobed. *Nutlets* smooth, distinct.

* *Calyx 2-lipped, closed in fruit.*

Lips of the calyx entire; the upper one appendaged. Flowers single, opposite.

SCUTELLARIA.

** *Calyx not 2-lipped; the teeth or lobes spineless.*

Calyx 3-lobed. Flowers capitate, in crowded 4-flowered whorls.....MACBRIDEA.

*** *Calyx not 2-lipped; the teeth rigid or spiny.*

Calyx-teeth 10, nearly equal. Stamens included. Herbs woolly.....MARRUBIUM.

——— 5. *Nutlets truncate, sharp-angled. Leaves undivided.....STACHYS.*

TRIBE VI. **Ajugeæ.** *Stamens 4, ascending, parallel, exserted. Nutlets reticulated and pitted, their bases partially united within.*

Lobes of the corolla and calyx nearly equal. Peduncles 1-3-flowered.. ..ISANTHUS.

** *Stamens long-exserted, didynamous.*

Lobes of the corolla nearly equal. Calyx 5-cleft. Flowers solitary.....TRICHOSTEMA.

HYPTIS, Jacq.

Calyx tubular, with 5 equal subulate teeth; *corolla* 5-lobed, the four upper lobes short, spreading or reflexed, the lowest longer, saccate, abruptly deflexed, thickened at the base; *stamens* 4, didynamous, included in the bud in the lower lobe of the corolla; *nutlets* smooth, ovoid.

H. **RADIATA**, Willd. Herbaceous; *stem* erect, mostly simple, pubescent above; *leaves* ovate-lanceolate, serrate or toothed, tapering into a petiole, smooth; *heads* peduncled, in the axils of the upper *leaves*, globose, surrounded by an involucre of several lanceolate whitish bracts, pubescent; *corolla* small, white, dotted with purple. Low ground. Stem 2°-4° high.

MENTHA, L. Mint.

Calyx tubular, nearly equally 5-toothed; *corolla* equally 4-lobed, the upper lobe notched or entire; *stamens* 4, equal, distant, straight; *anther-cells* parallel; *style* 2-cleft at the apex; *nutlets* smooth, obtuse.—Pungent aromatic

herbs; *whorls* (in our species) approximate, forming a dense or interrupted terminal spike.

M. VIRIDIS, L. *Stem* and *leaves* smooth; *leaves* ovate-lanceolate, unequally serrate, nearly sessile; *bracts* leafy, and like the calyx, smooth or hairy; *spike* cylindrical, interrupted below; *calyx-teeth* linear-subulate. (*M. tenuis*, Michx.) Damp soils. Stem 1° – 2° high; *flowers* pale blue.

M. ROTUNDIFOLIA, L. Soft-hairy; *stem* erect; *leaves* roundish, rugose, crenate, sessile, hoary beneath; *spikes* oblong, interrupted; *bracts* lanceolate; fruiting *calyx* roundish; the teeth short and acute. Stem 1° – 2° high; *corolla* white.

LYCOPUS, L.

Calyx bell-shaped, equally 4–5-toothed, naked at the throat; *corolla* bell-shaped, exserted, equally 4-cleft; *fertile stamens* 2, exserted, the upper pair sterile, included or wanting; *anther-cells* parallel; *style* 2-cleft at the apex; *nutlets* 3-angled, truncate at the apex, narrowed at the base.—Marsh or aquatic *herbs*, with long runners at the base; *leaves* mostly toothed or pinnatifid; *whorls* dense, axillary; *flowers* small, sessile.

L. VIRGINICUS, L. *Stem* smoothish; *leaves* ovate-lanceolate, toothed-serrate, acute or acuminate at each end, roughened above; *calyx-teeth* 4, ovate, obtuse; *corolla* small, exserted; *sterile stamens* minute. Ponds and ditches. September. Stem 1° – 2° high; *leaves* 1'–2' long; *flowers* white.

PYCNANTHEMUM, Michx. HORSE-MINT.

Calyx tubular, 13-nerved, naked in the throat, equally 5-toothed, or slightly 2-lipped; *corolla* 2-lipped, the upper lip notched or entire, the lower 3-cleft; *stamens* 4, nearly equal, straight, spreading, commonly exserted; *anther-cells* parallel; *style* 2-cleft at the apex; *nutlets* smooth.—Peren-

nial mostly pubescent or hoary *herbs*, with erect branching *stems*; *floral leaves* often white-tomentose; *cymes* mostly terminal, bracted; *corolla* small, white or purplish.—*Plants* aromatic and pungent.

Calyx-teeth nearly equal.

Calyx as long as the *corolla*; the *teeth* subulate and awn-pointed, like the rigid *bracts*; *cymes* dense-flowered.

P. ARISTATUM, Michx. Tomentose and hoary, or sometimes hairy; *stem* branched; *leaves* ovate or oblong, acute, sparingly serrate, rounded at the base, short-petioled, the uppermost somewhat whitened; *cymes* mostly terminal; *ovary* bearded.—Var., HYSSOPIFOLIUM, Gray. *Stem* simple or corymbose above; *leaves* rigid, linear-oblong, obtuse, entire. *Stem* $1\frac{1}{2}^{\circ}$ – 3° high; *leaves* 1'–2' long.

COLLINSONIA, L. HORSE-BALM.

Calyx obovate, enlarged and deflexed in fruit, 2-lipped, the upper lip flattened, truncate, 3-toothed, the lower 2-cleft; *corolla* funnel-shaped, 2-lipped, dilated at the throat; the four upper lobes equal, the lowest larger, declining, toothed or fimbriate; *stamens* 2 or 4, long-exserted, spreading; *anther-cells* diverging; *nutlets* smooth.—Strong-scented perennial *herbs*; *leaves* large, coarsely serrate, dotted beneath; *flowers* yellowish, solitary, opposite, in racemes or panicles; *petioles* tumid at the base.

Fertile stamens 4.

C. ANISATA, Pursh. Viscid pubescent; *stem* 1° – 2° high; stout, simple or branched; *leaves* 4'–8' long, large, oval or ovate, mucronate-crenate, mostly rounded or cordate at the base, the uppermost sessile; *corolla* large, yellow; *panicle* many-flowered; *bracts* ovate; *calyx-lobes* large, ovate-lanceolate, nearly equal.

HEDEOMA, Pers.

Herbs, with small *leaves*, and axillary few-flowered *cymes*; *calyx* tubular, somewhat gibbous under the base, equally 5-toothed or bilabiate, with the *upper lip* 3-toothed, the *lower* 2-cleft, hairy in the throat; *corolla* 2-lipped, the *upper lip* notched or entire, the *lower* 3-cleft; *stamens* 2, ascending; *anther-cells* diverging; *nutlets* smooth.

H. PULEGIOIDES, Pers. *Stem* 1° high, much-branched; *leaves* 1' long, oblong-ovate, obtuse, sparingly serrate, pale beneath, contracted into a slender *petiole*; *whorls* 6-flowered, shorter than the leaves; *lower lip* of the calyx hispid; *corolla* small, pale blue.—Annual, pubescent *plants*.

CALAMINTHA, Benth.

Herbs or shrubby *plants*, with white, scarlet, or purple *flowers*; *calyx* tubular, 13-nerved, 2-lipped, the *upper lip* spreading, 3-toothed, the *lower* 2-cleft, bearded or naked in the throat; *corolla* 2-lipped, open at the throat, the upper lip notched or entire, the lower 3-lobed, the tube commonly exserted; *stamens* 4, didynamous, arching inward; *anther-cells* at length diverging; *nutlets* smooth.

Shrubs; *cymes* nearly sessile, axillary, few-flowered, often leafy-bracted; *pedicels* elongated; *throat* of the calyx bearded; *flowers* showy.

C. COCCINEA, Benth. *Stem* 2° high, the outer *bark* loose and shreddy; *leaves* $\frac{1}{2}$ ' long, obovate-oblong, obtuse, entire or obscurely crenate, tapering into a short *petiole*; smooth or minutely pubescent; *flowers* solitary, or in 3-flowered bracted *cymes*; *corolla* large, scarlet.

DICERANDRA, Benth.

Calyx tubular, 13-nerved, 2-lipped, the upper lip entire or minutely 3-toothed, the lower scarcely longer, 2-cleft, the

throat bearded; *corolla* 2-lipped, the upper lip erect, the lower spreading, 3-cleft; *stamens* 4, didynamous, spreading, exserted; *anther-cells* distinct, diverging, awned at the apex; *nutlets* smooth.—Smooth annuals, with narrow *leaves*; *cymes* loose, spreading, several-flowered, forming a leafy terminal raceme; *flowers* purple.

D. LINEARIFOLIA, Benth. *Stem* mostly branching, erect; *leaves* linear or lanceolate, serrate or entire, obtuse, sessile; *cymes* peduncled, 3-9-flowered; *calyx* purple, declined in fruit. (*Ceranthera linearifolia*, Ell.) Dry sandy pine-barrens. October and November. Stem 1° high; leaves 1' long; *flowers* very numerous, purple, dotted; *style* hairy.

SALVIA, L. SAGE.

Calyx tubular or bell-shaped, 2-lipped, the upper lip entire or 3-toothed, the lower 2-cleft, beardless in the throat; *corolla* 2-lipped, the upper lip entire or notched, the lower spreading, 3-lobed, with the middle lobe larger, entire or notched; *stamens* 2, short; *anther-cells* linear, widely separated by the elongated oblique connective, the upper one fertile, the lower imperfect or wanting; *cymes* in spikes, racemes or panicles.

* *Upper lip of the calyx entire; lower anther-cell wanting.*

S. AZUREA, Lam. Smooth; *stem* simple or branched; *leaves* lanceolate or linear, obtuse, entire, or the lower ones serrate, tapering at the base; *racemes* elongated; *whorls* nearly sessile, 6-12-flowered; *calyx* longer than the pedicel, the teeth ovate, acute; *corolla* 2-3 times as long as the calyx. white or blue; *style* bearded. Dry light or sandy soil. July and August. Stem 2°-4° high; leaves 1½'-3' long; *corolla* 6"-8" long.

** *Upper lip of the calyx broad, 3-toothed; lower anther-cell pollen-bearing, but sterile.*

S. LYRATA. Hairy; *stem* erect, sparingly branched;

leaves chiefly radical, spreading, lyrate-pinnatifid, mostly discolored; *stem-leaves* 2 or 4, smaller, the upper pair lanceolate and entire; *raceme* many-flowered; *whorls* 6-flowered, distant in fruit, longer than the ovate-lanceolate *bracts*; upper lip of the bell-shaped *calyx* truncate, with short erect teeth; *corolla*-tube elongated, widening upward, the middle lobe of the lower lip dilated and notched. Stem 1° high; leaves 3'-6' long, commonly purple beneath; *racemes* in fruit 6'-12' long; corolla 9''-12'' long, blue, white-spotted in the throat.

MONARDA, L. HORSE-MINT.

Calyx tubular, elongated, 15-nerved, nearly equally 5-toothed, bearded in the throat; *corolla* nearly equally 2-lipped, the upper lip notched or entire, the lower 3-toothed; *stamens* 2, ascending under the upper lip, and oftener exserted; *anther-cells* linear, diverging, confluent; *nutlets* smooth.—*Herbs*; *leaves* undivided; *whorls* large, dense-flowered; *bracts* colored.

* *Upper lip of the corolla linear, acute.*

M. DIDYMA, L. *Stem* smoothish; *leaves* ovate-lanceolate, acuminate, serrate, rounded at the base, petioled, smooth or hispid; *whorls* mostly solitary, terminal; *calyx* smooth, incurved; *corolla* large, bright red. Mountains. August and September. Stem erect, 2° high; leaves 2'-3' long; *bracts* lanceolate, red; corolla 1' long.

M. FISTULOSA, L. *Stem* branching, more or less pubescent, commonly hairy at the joints; *leaves* petioled, ovate-lanceolate, acute, sharply serrate, mostly rounded or truncate at the base; *whorls* terminal; *calyx* slightly incurved, hispid in the throat; *corolla* slender, rose-color. (M. clinopodia, and M. mollis, L.) August and September. Stem 2°-5° high; leaves smoothish, tomentose, or hispid, 1'-3' long; *bracts* pale purple.

** *Upper lip of the corolla broader, notched.*

M. PUNCTATA, L. Closely and finely pubescent; *Stem* much branched; *leaves* lanceolate or oblong, acutish, slightly serrate, narrowed into a petiole; *whorls* lateral and terminal; *bracts* ovate or oblong, purple; *corolla* yellowish, the lower lip dotted with brown, the upper keeled; *stamens* not exerted. Dry sandy soil. August–October. Stem 1°–3° high; leaves 1'–2' long.

M. GRACILIS, Pursh. Very smooth; *whorls* lateral and terminal; exterior *bracts* linear, ciliate; *corolla* short; *leaves* linear-lanceolate, acuminate, serrate. Mountains. *Stem* obtuse-angled; *whorls* small, naked; *calyx* pubescent, ciliate; *corolla* very slender, smooth, yellowish-white.

BLEPHILIA, Raf.

Calyx ovate-tubular, 13-nerved, beardless in the throat, 2-lipped; the upper lip with three awned teeth, the lower 2-cleft, awnless or short-awned; *anthers* 1-celled. Otherwise like *Monarda*. *Stem* erect; *whorls* several, lateral and terminal, the upper ones crowded.

B. HIRSUTA, Benth. *Stem* hirsute; *leaves* long-petioled, oblong-ovate, serrate, smooth or hirsute; *whorls* globose, distinct, or the upper ones crowded, the lower axillary; *bracts* linear-subulate, long-ciliate; *corolla* slightly pubescent. (*Monarda hirsuta*, Pursh.) Damp woods. July and August. Stem 2°–3° high, branching; leaves thin, 3'–4' long; *corolla* pale blue.

CEDRONELLA, Mœnch.

Calyx bell-shaped, nearly equally 5-toothed, the mouth oblique; *corolla* dilated at the throat, 2-lipped, the upper lip straight, 2-cleft, the lower 3-cleft, with the middle lobe largest; *stamens* 4, ascending, the upper pair longest; *anther-cells* parallel · *nutlets* smooth; *flowers* in a terminal spike or raceme.

C. CORDATA, Benth. *Stem* low, pubescent, bearing long runners; *leaves* long-petioled, cordate, crenate, smoothish, the floral ones ovate; *raceme* few-flowered, 1-sided; *cymes* 1-3-flowered; *calyx* and pale-blue *corolla* large. (*Dracocephalum cordatum*, Nutt.) May and June. Stem $\frac{1}{2}$ ' high, creeping at the base; leaves 1' long; corolla $1\frac{1}{2}$ ' long. Plant pleasant-scented.

BRUNELLA, Tourn. SELF-HEAL.

Calyx tubular-bell-shaped, 10-nerved, flat above, 2-lipped, upper lip broad, truncated, 3-toothed, the lower 2-cleft; *corolla*-tube slightly inflated under the throat, 2-lipped, the upper lip roundish, arching, entire, the lower 3-lobed, with the middle lobe rounded, concave, crenate; *stamens* 4, exerted, the smooth filament prolonged above the anther; *anther-cells* spreading.—*Herbs*, with 6-flowered densely-spiked whorls; *floral leaves* orbicular, imbricated, persistent.

B. VULGARIS, L. Pubescent or smoothish; *stem* erect, mostly simple; *leaves* ovate or oblong, serrate, petioled; *spikes* oblong or cylindrical; *flowers* purple. Low grounds. Stem 6'-12' high; spikes thick, lateral and terminal.

SCUTELLARIA, L. SKULLCAP.

Calyx bell-shaped, 2-lipped, entire and closed after flowering, the upper lip furnished with a helmet-shaped appendage on the back, and falling away at maturity, the lower persistent; *corolla*-tube recurved-ascending, dilated at the throat, 2-lipped, the upper lip arching, entire or notched, with the small lateral lobes united with its sides, the lowest lobe large and spreading; *stamens* 4, ascending; *anthers* ciliate, approximate by pairs, those on the shorter filaments 1-celled, on the longer ones 2-celled, cordate.—*Perennial* mostly inodorous *herbs*; *flowers* opposite, soli-

tary, in the axils of the upper, mostly bract-like leaves, rarely in lateral racemes; corolla blue or white.

* *Flowers in terminal racemes.*

† *Leaves cordate, ovate or oblong, crenate, petioled; the floral ones shorter than the flowers, entire.*

S. PILOSA, Michx. Hairy; *stem* simple or sparingly branched; *leaves* distant, ovate, obtuse, coarsely crenate, the lowest rounded at the base, the upper ones abruptly short-petioled, the floral ones spatulate, obtuse; *racemes* short, few-flowered; *corolla* pale blue. Dry sandy soil. July and August. Stem 1°-2° high; leaves 1'-2' long; corolla 8"-9" long.

†† *Upper and floral leaves alike, entire, nearly sessile; the lower broader, petioled, and mostly crenate.*

S. INTEGRIFOLIA, L. Pubescent throughout; *stem* mostly simple (6'-12' high); *leaves* small ($\frac{1}{2}$ '-1' long), lanceolate, obtuse, entire, tapering downward, sessile, the lowest ovate or obovate, short-petioled, crenate or entire, the lower floral ones sometimes longer than the flowers; *racemes* leafy, few-many-flowered. Dry sandy soil.

** *Flowers solitary, in the axils of the upper leaves.*

S. PARVULA, Michx. *Stem* low, pubescent; *leaves* ovate or roundish, obtuse, mostly entire, nearly sessile, strongly veined; *flowers* small, peduncled; *fibers* of the *root* often bearing small tubers. Stem 6'-9' high; leaves 4"-6" long; *corolla* blue, 2"-3" long.

MACBRIDEA, Ell.

Calyx tubular-bell-shaped, 3-lobed, the upper lobe lanceolate, entire, the two lower ones oblong, notched or entire; *corolla* inflated, 2-lipped, the upper lip arching, concave, the lower broadly 3-lobed, spreading; *stamens* 4, ascending under the upper lip; *filaments* hairy; *anthers* approximate by pairs, the cells diverging, hairy within, den-

ticulate on the margins; *nutlets* smooth.—Erect mostly simple perennials; *whorls* crowded in a dense cone-like terminal head; corolla large, white or purple.

M. PULCHRA, Ell. Smooth or hairy; *leaves* lanceolate, acute, serrulate, dotted, the lower ones narrowed into a petiole, the upper sessile, the floral ones ovate, acute; *whorls* 4-flowered; *calyx* striate, the lobes entire; *corolla* purple, the tubes striped with purple and white, the upper lip entire. Pine-barren swamps. August and September. Stem 1° – $1\frac{1}{2}^{\circ}$ high; corolla $1\frac{1}{2}'$ long.

MARRUBIUM, L. HOREHOUND.

Calyx tubular, 5–10-nerved, nearly equally 5–10-toothed, the teeth spiny, mostly spreading in fruit; *corolla*-tube included in the calyx, 2-lipped, the upper lip erect, the lower 3-lobed, with the middle lobe largest; *stamens* 4, included; *anther-cells* diverging; *lobes* of the style short, obtuse; *nutlets* obtuse at the apex.—Chiefly tomentose or woolly perennial *herbs*, with rugose *leaves*, and axillary *whorls*.

M. VULGARE, L. Woolly; *stems* branching at the base, ascending; *leaves* petioled, ovate or roundish, crenate, the floral ones smaller, but longer than the capitate many-flowered *whorls*; *calyx*-teeth 10, recurved-spreading; *corolla* small, white. Waste ground and roadsides. Stems 1° – 2° high.

LEONOTIS, R. Brown.

Calyx tubular, 10-nerved, incurved, unequally 8–10-toothed, the teeth straight, spiny, the upper one largest; *corolla* slender, 2-lipped, the upper lip long, arching, entire, the lower very short, 3-cleft, spreading; *stamens* 4, ascending under the upper lip; *anther-cells* diverging; *nutlets* 3-angled, truncate.—Tall *herbs*, with very large globose *whorls* in the axils of the upper leaves; *flowers* yellow or scarlet.

L. NEPETÆFOLIA, R. Br. Annual; *stem* tomentose,

simple or branched; *leaves* remote, long-petioled, broadly ovate, crenate, the floral ones lanceolate; *whorls* 1-several; *calyx* 8-toothed; *corolla* villous, scarlet. Waste grounds. June-August. Stem 1° - 6° high; whorls 1'-2' in diameter; corolla 1' long.

STACHYS, L. HEDGE-NETTLE.

Calyx tubular-bell-shaped, 5 or 10-nerved, 5-toothed, the teeth equal, or the upper one larger, more or less spiny (in our species), spreading in fruit; *corolla* hairy within, 2-lipped, the upper lip erect, the lower spreading, 3-lobed, with the middle lobe much larger; *stamens* 4, ascending; *anthers* 2-celled; *nutlets* not truncate.—Chiefly hairy or hispid *herbs*, with few-flowered *whorls* in terminal racemes.

* *Perennial*.

S. ASPERA, Michx. *Stem* erect, with the angles rough with recurved bristly hairs, rarely smoothish; *leaves* short-petioled, ovate-oblong or ovate-lanceolate, acute, serrate, rounded at the base, smooth, or sprinkled with hairs above, the floral ones longer than the calyx; *whorls* 6-10-flowered, the lower ones distant; *calyx*-teeth spine-pointed. (*S. hispida*, Pursh; *S. tenuifolia*, Willd.) Swamps. June-August. Stem $1\frac{1}{2}^{\circ}$ - 2° high; leaves 2'-3' long; *corolla* purple.

S. HYSSOPIFOLIA, Michx. Smooth or nearly so; *stem* erect, slender; *leaves* sessile, lanceolate or linear, obtuse, entire or sparingly serrate; *raceme* short, of few 4-6-flowered whorls; *calyx* smooth, with spiny spreading teeth, $\frac{1}{3}$ - $\frac{1}{2}$ as long as the smooth violet *corolla*. Wet pine-barrens. June-August. Stem 1° - $1\frac{1}{2}^{\circ}$ high; leaves 1'-2' long.

ISANTHUS, Michx.

Calyx bell-shaped, 10-nerved, 5-cleft; *corolla* bell-shaped, equally 5-lobed; *stamens* 4, incurved-ascending, exerted; *anthers* 2-celled; *nutlets* obovoid, impressed-reticulated,

laterally cohering at the base.—An annual pubescent and somewhat viscid branching *herb*, with lanceolate entire or sparingly toothed acute *leaves*, and small pale blue *flowers*, on 1-3-flowered axillary peduncles.

I. CÆRULEUS, Michx. Dry soil. July–August. *Stem* terete, 1° – $1\frac{1}{2}^{\circ}$ high; *leaves* 1'– $1\frac{1}{2}'$ long, 3-nerved below the middle.

TRICHOSTEMA, L. BLUE-CURLS.

Calyx short, reversed, oblique, 5-toothed, the 3 lower teeth long, connate, the 2 upper ones very short; *corolla* slender, nearly equally 5-cleft; *stamens* 4, long-exserted, partly coiled; *anther-cells* diverging; *nutlets* pitted, united at the base.—Branching annuals, with entire *leaves*, and solitary blue *flowers* on lateral peduncles.

T. DICHOTOMUM, L. Pubescent and somewhat viscid, or nearly smooth; *stem* much branched, obscurely 4-angled; *leaves* oblong or lanceolate, obtuse, narrowed into a petiole. (T. lineare, Nutt., is a smoother form, with linear leaves.) Dry sandy soil. August and September. *Stem* 1° – 2° high.

88. BORAGE FAMILY. Order, BORRAGINACEÆ.

Herbs or *shrubs*, with terete or irregularly angled *stems*, and alternate entire exstipulate mostly rough-hairy *leaves*; *flowers* usually in 1-sided spikes or racemes, which are coiled in the bud; *calyx* free, 5-cleft or 5-parted, valvate in the bud, persistent; *corolla* regular, hypogynous, 5-lobed, imbricated or (in *Myosotis*) convolute in the bud; *stamens* 5, equal, inserted on the tube of the corolla and alternate with its lobes; *ovary* 4-celled, with a single ovule in each cell; *style* single; *fruit* various; *albumen* scarce or none; *cotyledons* flat or folded; *radicle* superior.

SYNOPSIS.

TRIBE I. **Borrageæ.** *Ovary* deeply 4-parted, inclos-

ing the base of the simple style. *Fruit* of 1-4 one-seeded nutlets. *Herbs*.

* *Throat of the corolla naked ; nutlets not hispid.*

† *Corolla irregular.*

Corolla funnel-shaped, unequally lobed..... ECHIUM.

†† *Corolla regular.*

Lobes of the corolla erect, acute. Nutlets smooth and stony..... ONOSMODIUM.

———— *rounded. ————— or rugose*..... LITHOSPERMUM.

———— *———— somewhat fleshy*..... MERTENSIA.

———— *convolute in the bud. Nutlets smooth*..... MYOSOTIS.

** *Throat of the corolla closed with scales ; nutlets hispid.*

Corolla funnel-formed. Nutlets depressed..... CYNOGLOSSUM.

ECHIUM, Tourn.

Calyx 5-parted; *corolla* funnel-form, unequally 5-lobed, naked at the throat; *stamens* 5, unequal, mostly exserted; *style* filiform; *nutlets* 4, closed at the base, uneven or rough.—*Herbs*, with alternate *leaves*, and blue or purple *flowers* in spiked often panicled racemes.

E. VULGARE, L. Hispid with bristly spreading hairs; *stem* simple, erect (1°-2° high); *leaves* linear-lanceolate, sessile; *flowers* large, in short axillary racemose spikes; *corolla* purple, pubescent, twice as long as the lanceolate calyx-teeth, shorter than the stamens and style. June-August. Biennial.

ONOSMODIUM, Michx.

Calyx 5-parted, the lobes linear and acute; *corolla* ovate-tubular, naked in the throat, with five acute, connivent lobes; *anthers* nearly sessile, sagittate, included; *ovary* 4-parted; *style* smooth, exserted; *nutlets* 1-4, ovoid, shining.—Erect hispid *herbs*, with entire somewhat ribbed sessile *leaves*, and greenish *flowers* in a terminal bracted raceme or spike.

O. VIRGINIANUM, DC. Rough with appressed bristly hairs; *stem* slender, sparingly branched; *leaves* lanceolate or oblong-lanceolate, obtuse or acute; *lobes* of the *corolla* lanceolate-subulate, bristly; *calyx-lobes* 3-4 times as long as the white polished nutlets. (*O. hispidum*, Michx.) Dry pine-barrens. May and June. Stem 1°-2° high; leaves 2' long; corolla twice as long as the calyx; *racemes* leafy. Perennial.

LITHOSPERMUM, L. GROMWELL.

Calyx 5-parted, the lobes equal; *corolla* funnel or salver form, obtusely 5-lobed, smooth, gibbous or hairy in the throat; *anthers* oblong, nearly sessile, included; *stigma* capitate, somewhat 2-lobed; *nutlets* 1-4, ovate, stony, truncate at the base.—Chiefly rough-hairy *herbs*, with red *roots*, alternate entire *leaves*, and variously colored *flowers* in leafy-bracted racemes or spikes.

* *Perennials*; *nutlets smooth, white*.

L. HIRTUM, Lehm. Hispid with rigid glossy hairs; *stem* mostly simple, erect; *leaves* linear-lanceolate, obtuse, sessile, the lowest scale-like, the floral ones ovate-lanceolate; *corolla* large, yellow, the tube hairy at the base within, rather longer than the linear *calyx-lobes*; *nutlets* ovate, polished. (*Batschia Gmelini*, Michx.) Dry pine-barrens. April and May. Stem 1°-1½° high; leaves 1'-2' long; corolla 6"-8" long.

L. CANESCENS, Lehm. *Stem* villous, erect, nearly simple; *leaves* lanceolate, sessile, obtuse, somewhat silky with appressed glossy hairs, the lowest small and scale-like; *corolla* large, yellow, the tube 2-3 times as long as the calyx. Dry soil. April and May. Stem 6'-12' high; corolla smaller than in the preceding.

MERTENSIA, Roth.

Calyx 5-parted; *corolla* funnel-shaped, 5-lobed, naked, or with 5 folds in the throat; *stamens* partly exserted; *style* filiform; *nutlets* somewhat fleshy, not flattened at the base.—Smooth or soft hairy perennial *herbs*, with entire *leaves*, and showy purplish-blue *flowers* in corymbed or paniced racemes, the upper ones bractless.

M. VIRGINICA, DC. Smooth; *stem* erect, simple; *leaves* membranaceous, elliptical or obovate-oblong, the lower ones narrowed into a petiole; *racemes* corymbose; *corolla* large, naked and expanding at the throat, slightly lobed, the tube 4 times as long as the calyx, villous at the base within; *filaments* longer than the anthers. (Pulmonaria Virginica, L.) River-banks and along mountain streams. May. Stem 1°–2° high; leaves 2'–3' or the lowest 4'–6' long; corolla 1' long, sometimes white.

MYOSOTIS, L. FORGET-ME-NOT.

Calyx 5-cleft; *corolla* salver-form, 5-lobed, convolute in the bud, the tube as long as the calyx, with 5 obtuse appendages in the throat; *stamens* very short, included; *nutlets* 4, elliptical, compressed, smooth, with a minute scar at the base.—Low hairy *herbs*, with entire alternate *leaves*, and small white or blue *flowers* in terminal bractless racemes.

M. VERNA, Nutt. Hirsute with rigid spreading hairs; *stem* erect (4'–8' high), branching above; *leaves* lanceolate, sessile, the lower ones spatulate, obtuse; *calyx* longer than the appressed pedicel, hispid, with the hairs near the base hooked, the teeth unequal, acute.—Var. MACROSPERMA is every way larger (1°–1½° high;) calyx with all the hairs hooked, the lower teeth twice as long as the upper ones. Dry places. March and April. Annual. *Corolla* white or pale blue.

M. SUFFRUTICOSA, Torr. Very hispid and canescent with spreading hairs; throws up several *stems* from a thick *root* or *caudex*; *leaves* linear-spatulate and obtuse; *flowers* on conspicuous pedicels; fructiferous *calyx* broadly ovate, nearly erect; the *segments* ovate-lanceolate and closed over the fruit; *nutlets* truncate at the summit, very smooth and shining.

This plant was collected by Marcy on the Red River. Torrey declares it a genuine *Eritrichium*, and in the Flora of Marcy's Expedition calls it *E. JAMESI*, though in Ann. Lyc., N. York, 2, p. 225, he gives it the name above, *M. suffruticosa*.

CYNOGLOSSUM, Tourn. HOUND'S-TONGUE.

Calyx 5-parted; *corolla* funnel-form, with the throat closed with 5 obtuse scales; *racemes* with the lower flowers commonly bracted, the upper ones bractless; *stamens* included; *nutlets* 4, fixed near the apex to the base of the style, covered all over with barbed or hooked bristles.

C. VIRGINICUM, L. Hispid; *stem* 2°-3° high, simple, stout, naked above; *racemes* single or corymbose, bractless; *pedicels* slender, recurved in fruit; *leaves* oval or oblong, the lowest petioled, the upper auriculate and amplexicaul; *nutlets* rounded anteriorly; *corolla* pale blue.

89. WATERLEAF FAMILY. Order, HYDROPHYL- LACEÆ.

Herbs, with alternate or opposite palmately or pinnately divided *leaves*, and regular *flowers*, either solitary in the axils, or in 1-sided recurved spikes or racemes; *calyx* 5-parted, persistent, the lobes imbricated in the bud, and often with reflexed appendages in the sinuses; *corolla* obtusely 5-lobed, imbricated or convolute in the bud; *stamens* 5, inserted into the base of the corolla, and alternate with

its lobes; *anthers* versatile; *ovary* free, 1-celled, with 2 parietal placentæ, each bearing 2 or more amphitropous ovules; *style* slender, 2-cleft; *capsule* globose or oblong, loculicidally 2-valved; *seeds* reticulated; *embryo* small, in the axis of the hard albumen.

SYNOPSIS.

* *Lobes of the corolla convolute in the bud.*

Calyx without appendages. *Stamens* exserted. *Stems* erect.....HYDROPHYLLUM.

— *appendaged at the sinuses.* *Stamens* included. *Stems* prostrate.NEMOPHILA.

** *Lobes of the corolla imbricated in the bud.*

Calyx without appendages. *Capsule* 4-many-seeded.....PHACELIA.

HYDROPHYLLUM, L. WATERLEAF.

Calyx 5-parted, the lobes subulate, without appendages; *corolla* broadly tubular, 5-cleft, about as long as the calyx, with 5 linear appendages on the tube within, opposite the lobes; *stamens* and *style* exserted; *anthers* linear; *ovary* hispid; *placentæ* 2, thick and fleshy, connected with the pericarp at the base and apex, each 2-ovuled; *style* filiform, 2-cleft; *capsule* globose, 2-valved, 1-4-seeded.—Erect perennial mostly hairy *herbs*, with long-petioled pinnately or palmately divided *leaves*, and white or blue *flowers* in peduncled cymes, without bracts.

H. VIRGINICUM, L. *Stem* leafless below, sprinkled, like the leaves, with rigid hairs; *leaves* pinnately divided into 5-7 ovate cleft or toothed lobes, paler beneath; *peduncles* forking, longer than the petioles; *cymes* dense; *calyx*-lobes linear, hispid; *filaments* slightly hairy. Low woods along the mountains. June. Stem 1°-2° high.

NEMOPHILA, Nutt.

Calyx 5-parted, with reflexed appendages in the sinuses; *corolla* tubular or short bell-shaped, with 10 scale-like ap-

pendages at the base of the filaments; *stamens* included; *anthers* ovoid; *ovary* hispid, 2-12-ovuled; *placentæ* large, lining the walls of the pericarp; *style* 2-parted; *capsule* globose, 1-2-seeded.—Tender prostrate annual *herbs*, with divided *leaves*, and solitary long-peduncled *flowers* opposite the leaves.

N. MICROCALYX, Fisch. and Meyer. Pubescent, or at length smoothish; *stem* filiform, diffuse; *leaves* thin, long-petioled, alternate, 3-lobed, the lobes obovate or wedge-shaped, crenately toothed, the lowest ones mostly opposite, and 3-5-lobed; *flowers* minute, white, on slender spreading peduncles, which are shorter than the petioles; *ovary* 4-ovuled; *capsule* 1-2-seeded. Shady woods. April-June. Stem 3'-1° long; leaves $\frac{1}{2}$ '-1' long; *corolla* 1" long; *seeds* bony.

PHACELIA, Juss.

Calyx 5-parted, not appendaged in the sinuses; *corolla* bell-shaded, 5-lobed, imbricated in the bud; *stamens* included or exserted; *anthers* ovoid or oblong; *ovary* 2-many-ovuled, the 2 narrow *placentæ* often projecting inward, and forming an imperfect partition in fruit; *style* 2-cleft; *capsule* 2-valved, 4-many-seeded.—Low chiefly annual *herbs*, with alternate mostly pinnately divided *leaves*, and white or blue *flowers* in one-sided racemes.

EUTOCA. *Ovules more than 4; corolla usually with minute appendages within, the lobes entire.*

P. PARVIFLORA, Pursh. Pubescent; *stems* several, spreading, branching; *leaves* petioled, the lowest 3-7-lobed, the upper 3-parted; *racemes* loosely 5-15-flowered; *pedicels* slender, much longer than the calyx; *calyx-lobes* linear-oblong, bristly-ciliate; *corolla* small, pale-blue or white. Shady banks. April and May. Stems 3'-8' high; *corolla* 3''-4'' wide; *capsule* few-seeded.

P. PUSILLA, Buckley. Pubescent and somewhat glau-

cous ; *stems* ascending, *branched* ; *leaves* sessile, pinnatifid, the segments obovate, abruptly acuminate ; *pedicels* short or elongated ; *sepals* linear-oblong, acute, two-thirds the length of the pale-blue or white *corolla* ; *stamens* exserted. Prairies.—*Buckley*.

90. HYDROLEA FAMILY. Order, HYDROLEACEÆ.

Glandular-pubescent or bristly *herbs*, with entire alternate *leaves* ; *flowers* regular, axillary and solitary or clustered, or in terminal corymbs or coiled bracted spikes ; *calyx* 5-parted ; *corolla* somewhat bell-shaped, 5-lobed, imbricated in the bud ; *stamens* 5, inserted on the tube of the corolla, and alternate with its lobes, the filaments oftener hairy ; *styles* 2, separate ; *stigmas* capitate ; *ovules* numerous, anatropous ; *capsule* many-seeded, more or less 2-celled by the meeting of the two parietal placentæ, 2 or rarely 4 valved, opening through the middle of the cells, or at their margins ; *embryo* straight, in fleshy albumen.

HYDROLEA, L.

Calyx 5-parted ; *corolla* short, bell-shaped, 5-cleft, the lobes spreading ; *stamens* somewhat exserted, with the filaments dilated at the base ; *anthers* sagittate ; *styles* 2 (rarely 3), separate ; *capsule* globose, 2-celled, or imperfectly 4-celled by the introversion of the placentæ, 2-valved.—*Herbs*, growing in water or muddy places, with entire *leaves*, often with spines in their axils, and blue axillary or corymbose *flowers*.

H. QUADRIVALVIS, Walt. Spiny ; *stem* ascending from a creeping base, hispid, mostly simple ; *leaves* lanceolate, acute, pubescent on the veins, tapering into a petiole ; *flowers* axillary, the lower ones clustered, the upper solitary, short-peduncled ; *calyx-lobes* linear, nearly as long as the corolla ; *stamens* included ; *capsule* almost 4-celled, by the introversion of the placentæ, 2-valved. July and

August. Stem 1°-3° long; leaves 3'-4' long. In ponds and ditches around Houston.

91. POLEMONIUM FAMILY. *Order, POLEMONIACEÆ.*

Chiefly *herbs*, with opposite or alternate *leaves*, and regular solitary or cymose *flowers*; *calyx* 5-cleft or 5-parted, with membranaceous-margined lobes, imbricated in the bud; *corolla* 5-lobed, convolute or imbricated in the bud; *stamens* 5, inserted on the tube of the corolla; *ovary* 3-celled, with 3-many amphitropous ovules attached to the central placenta; *style* 3-cleft; *capsule* 3-celled, loculicidally 3-valved; *seeds* angular; *embryo* straight in the axis of copious albumen; *cotyledons* leafy; *radicle* inferior.

SYNOPSIS.

TRIBE I. **Polemonieæ.** *Lobes* of the corolla convolute in the bud. *Anther-cells* parallel, opening lengthwise.

Corolla salver-form. *Filaments* unequally inserted on the tube. *Leaves* entire.

PHLOX.

— *tubular-funnel-form.* *Filaments* equally inserted near the throat of the corolla. *Leaves* pinnately divided.....GILIA.

— *short-bell-form.* *Filaments* inserted on the throat of the corolla. *Leaves* pinnate.....POLEMONIUM.

TRIBE II. **Diapensieæ.** *Lobes* of the corolla imbricated in the bud. *Anther-cells* opening transversely.

Anther-cells awned at the base. *Leaves* entire. *Flowers* solitary..PYXIDANTHERA.

PHLOX, L.

Calyx cylindrical or bell-shaped, 5-cleft; *corolla* salver-form, with a long and slender tube, and obovate or roundish lobes; *stamens* 5, included, unequally inserted on the tube; *style* filiform; *ovules* solitary in the cells; *capsule* ovoid, 1-3-seeded, the valves at length separating from the central placenta; *seeds* erect.—Mostly perennial *herbs*, with

opposite or (the upper) alternate entire *leaves*, and showy purple or white *flowers* in terminal paniced cymes.

Stems herbaceous, erect or ascending.

* *Style long, filiform ; calyx-teeth lanceolate-subulate, not awn-pointed ; lobes of the corolla entire.*

P. GLABERRIMA, L. Smooth; *stem* erect or ascending, sparingly branched above; *leaves* lanceolate or linear, acute, the lower tapering to the base, the upper broader and rounded at the base; *cymes* usually 3, terminal, few-flowered; *calyx-lobes* lanceolate, acute; *corolla* large, with the lobes wedge-obovate. July. Stem 1° – 2° high; leaves 3'–4' long; *pedicels* as long as the calyx; corolla 1' long, pale purple.

** *Style short, scarcely longer than the ovary ; calyx-teeth linear-subulate, tapering into an awn-like point ; lobes of the corolla often notched ; stems pubescent.*

P. PILOSA, L. Pubescent or villous; *stem* erect, mostly branching; *leaves* linear, or linear-lanceolate, spreading, distant, acute, the uppermost rounded at the base; *cymes* corymbose, loose-flowered; *calyx-teeth* $\frac{2}{3}$ as long as the tube of the corolla, prolonged into long and spreading bristle-like points, hairy. (*P. aristata*, Michx.) April and May. Stem rather slender, 1° – $1\frac{1}{2}^{\circ}$ high; leaves 2'–4' long; *corolla* $\frac{1}{2}$ ' long, purple. On the Trinity River.

P. FLORIDANA, Benth. *Stem* erect, simple, closely pubescent; *leaves* uniform, linear-lanceolate, acute, spreading or recurved, the upper ones often alternate; *cymes* crowded or corymbose; *calyx-teeth* spreading, somewhat bristle-pointed, glandular-pubescent, $\frac{1}{3}$ – $\frac{1}{2}$ as long as the tube of the large corolla. Dry open woods, Middle Florida. May. Stem $1\frac{1}{2}^{\circ}$ – 2° high; leaves 2'–3' long; *corolla* 1' broad, pale purple, the lobes round-obovate and entire.

Stems shrubby, tufted, creeping ; leaves subulate, rigid, leafy in the axils ; style short.

P. SUBULATA, L. Pubescent; flowering *stems* erect;

leaves very numerous, the upper ones linear and mostly alternate; *calyx*-teeth subulate, erect, spiny-pointed; *lobes* of the corolla notched or entire. (*P. setacea*, L.; *P. Hentzii*, Nutt.) April and May. Stems 4'-12' long; leaves 4''-6'' long; *corolla* $\frac{1}{2}$ '-1' broad, purple or white.

P. DRUMMONDII, Hook., is an annual species, common in gardens.

GILIA, Ruiz and Pavon.

Calyx tubular or bell-shaped, 5-cleft; *corolla* funnel-shaped, 5-lobed; *stamens* inserted equally near the mouth of the corolla; *ovules* commonly numerous in the cells; *capsule* oblong or obovoid; *seeds* angled or compressed.—*Herbs*, with finely divided *leaves*, and showy *flowers*.

G. CORONOPIFOLIA, Pers. *Stem* tall, simple, pubescent or hairy, very leafy; *leaves* pinnately divided into many filiform very acute segments; *flowers* scarlet, crowded in a long compound raceme or narrow panicle; *corolla* tubular-funnel-shaped, with the oval-oblong obtuse lobes about $\frac{1}{3}$ as long as the tube; *stamens* exserted. (*Cantua Florida*-na, Nutt.?) Dry sandy soil. July. Stem 2°-4° high; *corolla* 1' long, yellow and spotted with red within. Biennial.

91. CONVULVULUS FAMILY. Order, CONVULVULACEÆ.

Chiefly twining or prostrate *herbs*, with alternate exstipulate *leaves*, and regular mostly showy and fugaceous *flowers*; *calyx* 5-sepalous, imbricated; *corolla* bell-shaped, funnel-shaped, or salver-form, 5-plaited or 5-lobed, convolute in the bud; *stamens* 5, inserted on the tube of the corolla; *anthers* 2-celled, sagittate; *ovary* free, single or double, 1-4-celled, with 1-2 erect anatropous ovules in each cell; *styles* 1 or 2, entire or 2-cleft; *stigmas* capitate, ovate, or acute; *capsule* 2-6-seeded; *embryo* large, coiled or curved in mucilaginous albumen.

SYNOPSIS.

TRIBE I. **Convolvuleæ**. *Ovary* single. *Embryo* with leafy cotyledons. *Capsule* opening by valves. *Flowers* axillary, single or cymose.

* *Style* single; *stigmas* globose.

Capsule 4-celled, 4-seeded. *Corolla* (red) salver-shaped. *Stamens* exserted.

QUAMOCLIT.

—— 3-celled, the cells 2-seeded. *Corolla* bell-formed PHARBITIS.

** *Style* single; *stigmas* ovate or cylindrical.

Capsule imperfectly 2-celled, 4-seeded. *Stigmas* cylindrical. *Calyx* included in the membranaceous bracts CALYSTEGIA.

Styles separate, 2-parted or 2-cleft EVOLVULUS.

*** *Styles* 2, separate or partly united; *ovary* 2-celled.

Styles separate or partly united, entire STYLISMA.

TRIBE II. **Cuscutææ**. *Ovary* single. *Embryo* destitute of cotyledons. *Capsule* closed.

Twining parasites, with scale-like leaves. *Styles* 2 CUSCUTA.

QUAMOCLIT, Tourn. CYPRESS-VINE.

Sepals 5; *corolla* salver-form, 5-plaited, with the tube elongated; *stamens* inserted at the base of the tube, dilated at the base, exserted; *ovary* 4-celled; *style* single; *stigma* globular, 2-lobed; *capsule* 4-valved, 4-seeded.—Twining annual *herbs*, with cordate entire or pinnatifid *leaves*, and red *flowers*, on axillary peduncles.

Q. COCCINEA, Mœnch. *Leaves* petioled, cordate, acuminate, angled at the base; *peduncles* as long as the petioles, 3–5-flowered; *sepals* awned; *corolla* slightly lobed, scarlet. (*Ipomœa coccinea*, L.) Cultivated ground, in Middle and Upper Texas, and northward. July and August. *Corolla* 1' long, sometimes yellowish.

PHARBITIS, Chois. MORNING-GLORY.

Sepals 5; *corolla* bell-shaped or funnel-shaped, 5-plaited; *stamens* dilated at the base, included; *style* simple; *stigma* globose; *capsule* 3-4-celled, 3-4-valved, 6-8-seeded.—Twining *herbs*, with petioled cordate entire or lobed *leaves*, and single or cymose blue or purple *flowers*, on axillary bracted peduncles.

P. HISPIDA, Chois. Annual; *stem* glandular-roughened and hairy; *leaves* entire, round-cordate, acuminate; *peduncles* mostly longer than the leaves, 3-5-flowered; *sepals* ovate-lanceolate, acute, mostly hairy; *corolla* showy, blue, purple, or variegated. (*Convolvulus purpureus*, Linn.) Around dwellings. Introduced. June-September.

P. NIL, Chois. Annual, hairy; *leaves* membranaceous, broadly cordate, 3-lobed, the lobes acuminate; *peduncles* shorter than the leaves, 2-3-flowered; *sepals* densely hispid, ending in a long subulate point; *bracts* linear; *corolla* purple. (*Convolvulus Nil*, L.) Cultivated ground. July-September. Corolla $1\frac{1}{2}'$ long.

CALYSTEGIA, R. Brown.

Sepals 5, included in the two large membranaceous bracts; *corolla* bell-shaped; *style* single; *stigmas* 2, oblong or cylindrical; *capsule* imperfectly 2-celled, 4-seeded. *Leaves* petioled, cordate or sagittate; *peduncles* 1-flowered.

C. SEPIUM, R. Br. Smooth; *stem* twining; *leaves* broadly sagittate, acute, the wide lateral lobes obliquely truncated and often toothed; *peduncles* 4-angled, as long as the petioles; *bracts* cordate-ovate or oblong, strongly keeled on the backs; *sepals* acute; *corolla* white or rose-color; *leaves* 2'-4' long; *corolla* $1\frac{1}{2}'$ -2' long; *stigmas* oblong-ovate; *stamens* dilated and flattened below. Perennial.

EVOLVULUS, L.

Sepals 5; *corolla* bell-shaped or somewhat wheel-shaped, mostly hairy; *stamens* included; *styles* 2, distinct, 2-cleft or 2-parted; *stigma* obtuse; *capsule* 2-celled, 4-seeded.—Small perennial *herbs*, with chiefly silky or hairy prostrate *stems*, entire *leaves*, and small *flowers* on axillary peduncles; capsules nodding.

* *Common peduncles very short or none; the pedicels shorter than the leaves.*

E. SERICEUS, Swartz. Silky with appressed hairs throughout, except the upper surface of the leaves; *stem* dividing at the base into numerous prostrate or ascending simple filiform branches; *leaves* sessile, linear, or linear-lanceolate, acute at each end, erect; *peduncle* almost wanting, 1-flowered, rarely 2''–3'' long and 2–3-flowered; *sepals* ovate-lanceolate, acuminate, $\frac{1}{2}$ as long as the white wheel-shaped *corolla*.—Varies with shorter (4'–6' long) and more rigid stems, and oblong or elliptical and obtuse leaves. Damp soil. June–October. Stems 6'–12' long; leaves 6''–9'' long; *corolla* 4''–5'' in diameter.

** *Peduncles longer than the leaves.*

E. GLABRIUSCULUS, Chois. *Stem* creeping, simple, sprinkled with appressed hairs; *leaves* rigid, elliptical-obovate, mucronate, nearly sessile, smooth above, pubescent on the veins beneath; *peduncles* bristle-like, rather longer than the leaves, 1–3-flowered; *sepals* ovate-lanceolate, acute, hairy, as long as the pedicel; *corolla* very small. Stem 1° long; leaves 4''–6'' long; *corolla* 2'' wide.

STYLISMA, Raf.

Sepals 5; *corolla* bell-shaped, hairy; *stamens* included; *styles* 2, distinct or united below, entire; *stigmas* peltate; *ovary* 2-celled, 4-ovuled; *capsule* 1–4-seeded.—Perennial

prostrate pubescent *herbs*, with entire *leaves*, and small *flowers* on axillary peduncles which are longer than the leaves.

S. HUMISTRATA. Hairy and roughish; *leaves* petioled, oblong, slightly cordate, obtuse or emarginate at the apex, mucronate; *peduncles* filiform, 1-7-flowered; *sepals* ovate, acute, smooth, fringed on the margins; *capsule* smooth, nodding; *bracts* minute; *corolla* white; *filaments* hairy; *styles* united below.—Varies with linear or lanceolate, often acute, nearly sessile leaves, shorter and uniformly 1-flowered peduncles, and more pubescent sepals. (*Convolvulus humistratus*, Walt.; *C. tenellus*, Ell.) Dry sandy pine-barrens. July–September. *Stems* 2°–3° long; *leaves* 1'–3' long; *corolla* 10'' long; *capsule* ovate, commonly 1-seeded, crowned with a tuft of hairs when young.

S. PICKERINGII, Gray. *Stem* 2°–3° long, soft-pubescent; *leaves* 12''–15'' long, linear, obtuse, narrowed at the nearly sessile base; *peduncles* 1–3-flowered; *bracts* linear, as long as the flower; *sepals* ovate-lanceolate, very hairy, longer than the pedicel; *corolla* small, white; *styles* united nearly to the apex; *stamens* slightly exserted; *corolla* 5'' long.

CUSCUTA, Tourn. DODDER.

Calyx 4–5-cleft, or 4–5-sepalous; *corolla* globular-urn-shaped, bell-shaped, or somewhat tubular, 4–5-cleft; *stamens* 4–5, with fimbriate mostly confluent scales at the base; *ovary* 2-celled, 4-ovuled; *styles* 2; *stigmas* capitate (in our species); *capsule* 4-seeded; *embryo* filiform, coiled around fleshy albumen; *cotyledons* none.—Twining *parasites*, germinating in the ground, but early decaying at the root; *stems* filiform, yellow or reddish, without leaves, or with minute scales in their place; *flowers* white, small, variously clustered.

* *Flowers pediceled, with few and distant bracts; calyx 4-5-cleft; corolla bell-shaped, persistent at the base of the capsule.*

C. ARVENSIS, Beyrich. Low; *flowers* small, 5-parted, in loose umbel-like cymes; *lobes* of the corolla lanceolate, acuminate, spreading or reflexed, longer than the tube; *scales* ovate, often partly exserted; *capsule* globose, thin, yellowish. Fields and sterile soil, on small herbs. June and July. *Stems* 1° high; flowers the smallest of our species.

C. GRONOVII, Willd. *Stem* climbing high; *flowers* mostly 5-cleft, in loose paniculate cymes; *lobes* of the corolla ovate, obtuse, spreading, mostly shorter than the tube; *scales* large, confluent at the base; *capsule* globose, brown. (C. Americana, Pursh., DC.) Low shady places, on coarse herbs. August-October.

C. NEUROPETALA, Engelm. *Stem* branching; *flowers* rather large, 5-parted, in smooth umbel-like cymes; *lobes* of the *calyx* ovate-lanceolate, acute; *lobes* of the *corolla* ovate, acuminate, crenulate, 1-nerved, spreading, as long as the tube; *scales* ovate, incurved, as long as the tube. Damp soil. May.

C. ROSTRATA, Shuttl. *Stem* twining high; *flowers* large, 5-parted, in umbel-like cymes; *lobes* of the *calyx* ovate, obtuse; *lobes* of the *corolla* ovate, obtuse, spreading and at length reflexed, half as long as the tube; *scales* connate at the base; *capsule* large, acute. Shaded moist places on tall herbs, on the mountains.

** *Flowers sessile, in compact clusters; calyx of 5 separate sepals, surrounded by several similar bracts; corolla persistent at the apex of the capsule.*

93. NIGHTSHADE FAMILY. Order, SOLANACEÆ.

Herbs or *shrubs*, with colorless juice, alternate *leaves*, and regular axillary or supra-axillary *flowers*; *calyx* 4-7-cleft, or 4-7-toothed, persistent, often inflated in fruit;

corolla 5-10-lobed, plaited and valvate, convolute, or imbricated in the bud; *stamens* 4-7, inserted on the tube of the corolla; *anthers* 2-celled, opening lengthwise or by terminal pores; *style* and *stigma* single; *fruit* a 2-celled (rarely 3-5-celled) many-seeded capsule or berry; *placentæ* adnate to the partition and projecting into the cells; *seeds* campylotropous or amphitropous; *embryo* mostly slender and curved in fleshy albumen. Chiefly narcotic poisons.

SYNOPSIS.

§ *Fruit a berry.*

** *Corolla wheel-shaped or short bell-shaped.*

† *Anthers connivent. Calyx unchanged in fruit.*

Anthers opening by terminal pores. Berry juicy.....SOLANUM.
 ————— *lengthwise.* ————— *juiceless*.....CAPSICUM.

†† *Anthers separate, opening lengthwise; fruiting calyx inflated.*

Berry juicy. Calyx entire at the base.....PHYSALIS.
 — *dry.* — *10-toothed at the base*.....NICANDRA.

Corolla funnel-form; fruit a capsule.

Calyx prismatic or terete, circumsessile. Capsule sipy.....DATURA.

SOLANUM, L. NIGHTSHADE.

Calyx 5-toothed or 5-cleft; *corolla* wheel-shaped, 5-lobed, valvate, with the margins turned inward; *stamens* 5, inserted on the throat of the corolla, exserted; the *filaments* very short; *anthers* opening by 2 terminal pores, connivent; *stigma* obtuse; *berry* juicy, 2-celled, many-seeded.—*Herbs* or *shrubs*, often armed with prickles; *leaves* alternate or in pairs; *flowers* opposite the axils, or above them.

* *Unarmed; cymes or racemes corymbed; corolla 5-parted.*

S. VERBASCIFOLIUM, L. Shrubby, and hoary throughout with dense soft stellate hairs; *leaves* large, ovate-oblong, acute at each end, entire; *cymes* on long and very stout peduncles, forking, compactly many-flowered; *flowers* globose-obovate in the bud; *calyx*-lobes ovate, acute; *co*-

rolla-lobes oblong, obtuse; *anthers* oblong, twice as long as the slender filaments; *ovary* woolly. October–December. —*Shrub* 4°–5° high; leaves 6'–9' long; corolla $\frac{1}{2}$ ' wide.

** *Prickly; flowers racemed; corolla mostly angularly lobed.*

S. CAROLINENSE, L. Hirsute with stellate hairs; *stems* erect; *leaves* ovate-oblong, angularly lobed or toohted, abruptly contracted into a short petiole; the veins and petiole, like the stem, armed with straight yellow prickles; *racemes* simple, slender, 3–several-flowered; *calyx*-lobes acuminate.—Var. FLORIDANA (S. Floridana, Dunal) is less hairy; *stems* ascending from a creeping base; leaves narrower, sinuate-lobed or toothed, with more numerous and stronger prickles. June–September. Stem 1°–1 $\frac{1}{2}$ ° high; leaves 3'–5' long; *corolla* 9''–12'' wide, blue or white. Perennial.

S. HIRSUTUM, Nutt., not of Dunal. Dwarf, hirsute; *leaves* broadly obovate, very obtuse, nearly entire, narrowed at the base, prickly on the midrib; *racemes* 3-flowered; *peduncles* filiform; *roots* profusely creeping; *stem* a span high, beset with yellowish hairs; *calyx*, very rough; *flowers* purple?

S. PSEUDO-CAPSICUM, L., the *Jerusalem Cherry*, is sometimes spontaneous near dwellings.

S. TUBEROSUM, L., is the *Irish Potato*, as it is here called; S. MELONGENA, L., the *Egg-Plant*; and S. LYCOPERSICUM, L. (*Lycopersicum esculentum*, Mill.), the *Tomato*.

CAPSICUM, Tourn. RED PEPPER.

Calyx cup-shaped, 5–7-toothed; *corolla* wheel-shaped, 5–7-cleft, plaited; *stamens* 5–7, inserted on the throat of the corolla, exserted; *anthers* connivent, opening lengthwise; *stigma* obtuse; *berry* juiceless, partly 2–3-celled,

many-seeded.—*Herbs* or *shrubs*, with acrid juice, solitary *flowers*, and red berries.

C. FRUTESCENS, L. Shrubby, smooth; *stem* branching; *leaves* oblong-ovate, obtuse, entire, acute or rounded at the base, petioled, often by pairs; *calyx* obscurely 5-toothed, long-peduncled, erect; *berry* oblong, shorter than the peduncle. Stem 1°–3° high; leaves 6' long; berry 4'–8' long. (*Bird Pepper*, or *Mexican Pepper*.)

PHYSALIS, L. GROUND-CHERRY.

Calyx 5-toothed, inflated in fruit, and inclosing the juicy berry; *corolla* short-bell-shaped, plaited, 5-lobed or 5-angled; *stamens* 5, inserted on the tube of the corolla; *anthers* separate, opening lengthwise; *stigma* obtuse; *seeds* flat, kidney-shaped.—Diffusely branching *herbs*, with alternate petioled *leaves*, which are often by pairs, and solitary nodding *flowers* in their axils, or in the forks of the branches.

* *Perennial*; *peduncles* commonly longer than the *petiole*; *corolla* 8"–10" in diameter, spotted in the throat with brown or purple.

P. VISCOSA, L. Pubescent or hairy; *root* slender, elongated; *stems* erect, at length diffusely branched, angled; *leaves* ovate, entire or angularly toothed, acute or obtuse, rounded or cordate at the base; *calyx* hairy, with triangular-ovate lobes; *corolla* pubescent, yellow, with 5 large brown spots in the throat; *style* and *filaments* purple; *anthers* yellow; *fruiting calyx* oblong-ovate, sharply 5-angled, concave or truncate at the base; *berry* globose, viscid. (*P. heterophylla*, Nees; *P. Pennsylvanica*, L.) Dry light or sandy soil. July–October. Stems $\frac{1}{2}$ °–2° high, sometimes purple; the pubescence often viscid, jointed, or rough; leaves 1'–2' long, the uppermost rarely acute and unequal at the base; *corolla* obscurely lobed; *fruiting calyx* 1'–1½' long.

P. LANCEOLATA, Michx. Pubescent; *leaves* ovate-lanceolate or oblong, obtuse, but often attenuate at the apex, entire, wavy, or coarsely and obtusely toothed on the margins, acute and commonly very unequal at the base; *calyx* pubescent, the lobes long-acuminate from an ovate base; *corolla* 5-lobed, or somewhat 10-lobed or toothed, yellow in the throat; *fruiting calyx* ovate or globose-ovate, 5-angled. (*P. Elliottii*, Kunze; *P. maritima*, M. A. Curtis?) Dry sandy soil. July–October. *Stem* 1° high, erect or diffuse; *leaves* 1'–3' long; *fruiting calyx* 1'–1½' long, smooth or hairy.

**** Annual; peduncles shorter than the petiole; corolla 4''–6'' in diameter, yellow, spotted in the throat with green or brown.**

P. PUBESCENS, L. Tomentose or villous with soft often viscid hairs, rarely smoothish; *stem* diffusely branched, 4-angled, with one side rounded; *leaves* long-petioled, mostly acute, obtusely toothed, wavy-margined, or entire, ovate, and mostly slightly cordate and unequal at the base; *calyx*-teeth subulate, twice as long as the tube; *corolla* bright yellow, 5 or somewhat 10-toothed, brown in the throat; *filaments* hairy; *anthers* purplish; *fruiting calyx* oblong-ovate, sharply 5-angled, truncate at the base. (*P. hirsuti*, Dunal; *P. pruinosa*, Ell.; *P. obscura*, Michx.) Fields and waste grounds, common. July–October. *Stems* 1°–3° long; *leaves* 1'–2' long.

NICANDRA, Adans.

Calyx 5-parted, inflated, 10-toothed at the base; *corolla* bell-shaped, plaited, obscurely 5-lobed; *stamens* 5; *anthers* separate, opening lengthwise; *berry* juiceless.—A smooth erect branching annual, with ovate-oblong toothed or lobed petioled *leaves*, and solitary axillary nodding purple *flowers*.

N. PHYSALOIDES, Gært. (*Atropa physaloides*, L.) Waste and cultivated ground. July–September.

Stem 1°–3° high, with angled branches; *leaves* 2'–5' long, decurrent on the petiole; *corolla* white in the throat; *fruiting calyx* 5-angled, inclosing the globose berry.

DATURA, L. JAMESTOWN-WEED; THORN-APPLE.

Calyx tubular, terete or angled, 5-cleft, separating near the base, the upper portion deciduous; *corolla* funnel-shaped, the limb plaited, 5-lobed, convolute in the bud; *stamens* 5; *anthers* opening lengthwise; *capsule* spiny, imperfectly 4-celled, 4-valved, many-seeded.—Strong-scented poisonous *herbs*, with petioled oblong or ovate mostly toothed *leaves*, and large solitary *flowers* in the forks of the branches.

D. STRAMONIUM, L. Smooth; *stem* stout, forking; *leaves* ovate or oblong ovate, acute, sinuate-toothed; *corolla* sharply 5-toothed, white, twice as long as the 5-angled calyx; *capsule* erect.—Var., TATULA. Larger; leaves often cordate; stem and corolla purplish.—Waste ground, very common. June–October. Stem 1°–3° high; leaves 4'–8' long; corolla 3'–4' long.

D. METEL, L. Pubescent; *stem* stout, branching; *leaves* ovate, entire or slightly toothed; *corolla* white, 10-toothed; *calyx* loose, terete; *capsule* nodding. Stem 3°–4° high; leaves 6'–8' long; corolla 6' long.

The *Night-blooming Jessamine* (Cestrum), *Tobacco* (Nicotiana), and *Petunia*, belong to the Nightshade Family.

93. GENTIAN FAMILY. Order, GENTIANACEÆ.

Chiefly smooth and bitter *herbs*, with colorless juice, opposite entire partly sheathing exstipulate *leaves*, and regular often showy *flowers*; *calyx* 4–12-parted, or 4–12-cleft; *corolla* 4–12-lobed, convolute, rarely valvate or imbricated in the bud, hypogynous; *stamens* alternate with the

lobes of the corolla, and inserted on its tube; *anthers* 2-celled; *ovary* single, with numerous anatropous ovules; *stigmas* 1-2; *capsule* 1-celled, or imperfectly 2-4-celled by the introversion of the margins of the valves, septicially 2-valved; *placentæ* parietal; *seeds* numerous; *embryo* minute, in the axis of fleshy albumen.

SYNOPSIS.

* *Corolla convolute, or (in Obolaria) imbricated in the bud; testa membranaceous; leaves sessile.*

Style conspicuous, deciduous. Stigma linear. Corolla wheel-shaped, 5-12-parted.

SABBATIA.

*Style persistent. Stigma roundish. Corolla tubular, 4-5-parted.....*EUSTOMA.

*Stigma sessile, flat persistent. Corolla bell or funnel-form, 4-5-lobed, mostly with plaited appendages between the lobes.....*GENTIANA.

*Calyx and corolla 4-lobed. Stigma sessile. Leaves scale-like.....*BARTONIA.

— *2-leaved. Corolla 4-lobed, imbricated in the bud.....*OBOLARIA.

Corolla wheel-shaped, 4-parted, the lobes with a large depressed gland in the middle.

FRASERA.

** *Corolla folded in the bud; flowers clustered on the petiole.*

*Leaves floating, cordate. Flowers clustered on the petiole.....*LIMNANTHEMUM.

SABBATIA, Adans. AMERICAN CENTAURY.

Calyx 5-12-parted; *corolla* wheel-shaped, 5-12-parted, withering-persistent; *stamens* 5-12, inserted on the throat of the corolla; *anthers* sagittate, mostly recurved; *style* conspicuous; *stigmas* linear or oblong, twisted; *capsule* globose, 1-celled, 2-valved, many-seeded.—Annual or biennial branching *herbs*, with cymose or panicled white or purple showy *flowers*.

* *Calyx and corolla mostly 5-parted.*

† *Flowers in corymbose cymes, white, turning yellowish; branches opposite.*

S. MACROPHYLLA, Hook. Glaucous; *stem* terete, corymbosely branched above; the branches opposite; *leaves* thick, erect, ovate-lanceolate, acute, clasping, 3-5-nerved; *cymes* large, flat-topped; *corolla* small, the lobes thrice as long as

the very short bristle-like calyx-lobes. July and August. Stem rigid, hollow, 2° - $2\frac{1}{2}^{\circ}$ high; leaves $1\frac{1}{2}$ '-3' long; corolla 5''-6'' wide.

†† *Flowers scattered, on long peduncles, white or purple; branches alternate.*

S. STELLARIS, Pursh. *Stem* obscurely 4-angled, slender, paniculately branched, the branches elongated; *leaves* somewhat fleshy, the lowest lanceolate or oblong, obtuse, the upper linear, acute; *flowers* on very long peduncles; lobes of the *corolla* oblong, longer than the filiform calyx-lobes. Salt marshes. August and September. Stem 1° - 3° high; leaves 1'-2' long; *peduncles* 1'-4' long; corolla $1\frac{1}{2}$ ' wide.

** *Calyx and corolla 7-12-parted; flowers purple.*

S. GENTIANOIDES, Ell. *Stem* erect, simple, slender; lowest *leaves* lanceolate or oblong, narrowed at the base, the others long, linear, sessile; *flowers* large, in axillary and terminal clusters, or terminal and solitary; *corolla* 8-10-parted, 2-3 times as long as the subulate calyx-lobes; *anthers* straight. Low pine-barrens. July and August. Stem 1° - 2° high; leaves $1\frac{1}{2}$ '-3' long; corolla 2' wide.

EUSTOMA, Don.

Calyx bell-shaped, 4-5-parted, sharply 4-5-angled, the lobes subulate, keeled; *corolla* tubular, 4-5-lobed, membranaceous at the base, withering-persistent, the lobes erect, lanceolate-oblong, acute; *stamens* 4-5, partly exserted, inserted on the middle of the tube of the corolla; *anthers* sagittate, introrse, opening lengthwise; *style* conspicuous, erect, persistent; *stigmas* round-ovate, thick, at length spreading, with the margins revolute; *capsule* oblong, obtuse, 1-celled, the margins of the valves slightly inflexed; *placentæ* spongy, sutural; *seeds* minute, globose, sessile.—*Herbs*, with oblong glaucous clasping *leaves*, and *panicled* showy purple or blue *flowers*.

E. RUSSELLIANUM. *Stem* 2° high, square, glaucous, paniculately forking; *leaves* ovate-lanceolate, 4' long, 2'-3' broad, amplexicaul; *calyx* bell-shaped, 5-cleft; *corolla* bell-shaped, 5-cleft, withering-persistent, long-peduncled, terminating the branches, rich purplish blue, 4'-5' long; *stamens* 5, slightly exserted, inserted on the middle of the tube of the corolla; *anthers* sagittate; *capsule* oblong, 1-celled; *style* erect, conspicuous; *stigmas* round-ovate, spreading; *seeds* minute. *Around Independence, and in all the rich, black prairies from Washington County to Austin.*

GENTIANA, Tourn. GENTIAN.

Calyx 4-5-parted; *corolla* bell-shaped or funnel-shaped, 4-5-lobed, often with plaited toothed appendages between the lobes; *stamens* 4-5; *stigmas* 2, sessile, compressed, persistent; *capsule* 1-celled, 2-valved, many-seeded, the seeds sutural, or covering the inner face of the valves; *flowers* showy, solitary or clustered, axillary and terminal.

* *Annual; corolla funnel-shaped, destitute of appendages; anthers versatile; capsule sessile; seeds wingless.*

G. ANGUSTIFOLIA, Michx. *Stem* low, smooth, 1-flowered; *leaves* linear, fleshy; *calyx*-lobes linear, erect, half as long as the corolla; *corolla* large, bright blue, the lobes ovate, twice as long as the broad toothed appendages.—Varies with the corolla green without and white within.—Low pine-barrens. November and December. *Stem* 4'-10' high; *corolla* 2' long.

BARTONIA, Muhl.

Calyx 4-parted; *corolla* 4-parted; *stamens* 4; *anthers* small; *stigmas* sessile; *capsule* 1-celled, 2-valved, septical; *seeds* covering the inner surface of the valves.—Small annual herbs, with erect filiform stems, scale-like subulate leaves, and white flowers.

B. TENELLA. *Stem* 6'-12' high, branched; *branches* alternate, opposite or alternate, many-flowered; *calyx*-lobes subulate, as long as the tube of the greenish-white *corolla*; *lobes* of the *corolla* erect, acute; *anthers* globose; *capsule* oblong-lanceolate; *leaves* alternate or opposite.

OBOLARIA, L.

Low sparingly-branched perennial *herb*, with opposite wedge-obovate *leaves*, and single or clustered axillary and terminal purplish-flowers; *calyx* of 2 spatulate bract-like sepals; *corolla* bell-formed, 4-cleft, imbricated in the bud; *stamens* 4; *anthers* round-cordate; *style* short; *stigma* 2-lipped; *capsule* ovoid, 1-celled; *seeds* numerous, covering the base.

O. VIRGINICA, L. *Plant* smooth, purplish, 3'-8' high; *branches* generally 3-flowered.

LIMNANTHEMUM, Gmel.

Perennial aquatic *herbs*, with floating circular or cordate spongy *leaves*, and white peduncled *flowers* clustered near the summit of the long petiole; *calyx* 5-parted; *corolla* wheel-shaped, 5-parted, the lobes infolded in the bud, ciliate, and glandular-crested at the base; *stamens* 5; *style* short or none; *stigma* 2-lobed, persistent; *capsule* 1-celled, opening irregularly; *seeds* few or many; *testa* woody.

L. TRACHYSpermum, Gray. *Leaves* (3'-5' wide) circular, crenate, rough and pitted beneath; *petioles* stout, dotted, elongated; *seeds* glandular roughened. Ponds in deep water. April-June.

95. DOGBANE FAMILY. Order, APOCYNACEÆ.

Herbs or *shrubs*, with acrid milky juice, mostly opposite entire exstipulate *leaves*, and regular cymose or panicled

flowers ; *calyx* free, 5-parted, imbricated in the bud, persistent ; *corolla* bell-shaped, funnel-shaped, or salver-form, 5-lobed, convolute in the bud ; *stamens* 5, distinct, inserted on the tube of the corolla ; *anthers* mostly sagittate, erect, introrse ; *pollen* granular ; *ovaries* 2, distinct, their styles united ; *fruit* few-many-seeded ; *seeds* anatropous or amphitropous, naked, or bearing a tuft of down at the apex (*comose*) ; *embryo* straight in scarce albumen.

SYNOPSIS.

* *Fruit a many-seeded follicle.*

† *Seeds comose ; leaves opposite.*

Corolla bell-shaped, with scale-like appendages at the base of the lobes. Herbs.

APOCYNUM.

†† *Seeds naked ; leaves opposite or alternate.*

Corolla funnel-formed. Flowers panicked. Leaves alternate AMSONIA.

APOCYNUM, Tourn. INDIAN HEMP.

Calyx 5-parted ; *corolla* bell-shaped, 5-lobed, with scale-like appendages at the base of the lobes ; *stamens* inserted on the base of the corolla ; *anthers* sagittate ; *stigma* sessile, 2-lobed ; *follicles* long and slender ; *seeds* numerous, obovoid, comose.—Perennial erect branching *herbs*, with opposite oval or oblong mucronate petioled *leaves*, and small white *flowers* in lateral and terminal cymes.

A. CANNABINUM, L. *Stem* smooth, with erect branches ; *leaves* oval or oblong, mucronate, pubescent beneath ; *cymes* terminal, close-flowered, shorter than the leaves ; *calyx*-lobes lanceolate, as long as the tube of the greenish-white *corolla* ; *lobes* of the corolla erect. *Stem* 2°–3° high ; *leaves* 2'–3' long ; *corolla* 2'' long.

AMSONIA, Walt.

Calyx small, 5-parted ; *corolla* funnel-form, 5-lobed,

bearded within; *stamens* inserted above the middle of the tube, *anthers* oblong, obtuse; *stigma* globose, surrounded by a cup-shaped membrane; *follicles* slender; *seeds* in a single row, terete, truncated at each end, naked.—Erect branching perennial *herbs*, with alternate *leaves*, and small pale-blue *flowers* in a terminal panicle.

A. CILIATA, Walt. *Stem* hairy, at length much branched above; *leaves* very numerous, linear or linear-lanceolate, acute at each end, fringed on the margins; *corolla* smooth. Dry sandy soil. April and May. *Stem* at length 2°–3° high; *leaves* 1'–2' long; *corolla* pale blue or white; *follicles* more slender than those of the preceding.

A. SALICIFOLIA, Ph. Very glabrous and lance-elliptic, acuminate at each end, conspicuously petiolate; *calyx*-segments triangular acute; *corolla*-tube glabrous outside or more or less woolly; *flowers* blue.

96. MILKWEED FAMILY. Order, ASCLEPIADACEÆ.

Erect or twining *herbs* or *shrubs*, with milky juice, entire commonly opposite *leaves* without stipules, and umbellate or cymose *flowers*; *calyx* 5-parted, persistent; *corolla* 5-parted, mostly valvate in the bud, hypogynous, deciduous; *stamens* 5, inserted on the base of the corolla, the *filaments* united in a tube (*gynostegium*) which incloses the ovaries, and bears appendages of various forms, which are collectively termed the *stamineal crown*; *anthers* erect, 2–4-celled, expanding above into a thin membrane; *pollen* united in flattened waxy pear-shaped masses, which are equal in number to the cells of the anthers, and fixed to the five angular processes of the stigma by a slender stalk, pendulous or horizontal; *styles* 2, the thick and fleshy stigma common to both; *fruit* a follicle; *seeds* anatropous, imbricated on the thick and at length free placenta, and commonly bearing at the hilum a tuft of hairs (*coma*); *embryo* straight in thin albumen; *cotyledons* leafy.

SYNOPSIS.

TRIBE. **Asclepiadeæ.** *Pollen*-masses 10, fixed by pairs to the cleft processes of the flat or conical stigma, pendulous.

* *Stamineal crown single, 5-leaved.*

† *Lobes of the corolla reflexed or spreading.*

Leaves of the crown inclosing a horn-like appendage.....ASCLEPIAS.

—————*without appendages*.....ACERATES.

ASCLEPIAS, L. MILKWEED; SILKWEED.

Calyx 5-parted; *corolla* wheel-shaped, deeply 5-parted, reflexed; *crown* composed of 5 hooded leaves, each containing an incurved horn-like appendage; *pollen*-masses 10, by pairs, each pair occupying the contiguous cells of adjacent anthers, and suspended by a slender stalk from the projecting angles of the stigma; *follicle* many-seeded; *seeds* obovate, flat, usually comose.—Perennial *herbs*, with mostly simple (not twining) *stems*, and opposite alternate or whorled *leaves*; *flowers* in lateral (between the leaves) and terminal umbels.

§ *Stems herbaceous; seeds comose.*

* *Follicles spiny; leaves opposite.*

A. CORNUTI, Decaisne. Softly pubescent; *stem* stout, erect, obscurely 4-angled; *leaves* oval-oblong, short-petioled, mucrotena, soon smooth above, the lowest somewhat cordate; *umbels* numerous, many-flowered, long-peduncled; *corolla* greenish purple, one-fourth as long as the pedicels; *leaves* of the crown pale purple, ovate, obtuse, longer than the incurved horn; *follicle* ovate-oblong, woolly, armed with soft spines. Stem 3°–4° high, sometimes branched; leaves 4'–8' long; *pedicels* 1'–1½' long, purplish; *corolla* ½' wide.

** *Follicles spineless.*

† *Leaves opposite, oval or oblong, narrowed into a petiole.*

A. PURPURASCENS, L. *Stem* smooth; *leaves* ovate-oblong, acute, short-petioled, paler and pubescent beneath; *umbels* 1-2, terminal, *peduncled*, many-flowered; *pedicels* half as long as the peduncle, and twice as long as the dark-purple *corolla*; leaves of the crown oblong, abruptly contracted above, twice as long as the incurved horn and nearly sessile gynostegium. Thickets and borders of woods. June and July. Stem 2°-3° high; leaves 4'-7' long; pedicels 9"-15" long, pubescent.

A. INCARNATA, L., var. PULCHRA. Hairy; *stem* erect, branching; *leaves* oblong or oblong-lanceolate, acute, nearly sessile; *umbels* numerous, somewhat corymbose, long-peduncled, often compound; *pedicels* erect, much shorter than the peduncle; *corolla* small, reddish purple; leaves of the crown flesh-color, ovate, as long as the slender incurved horns, and twice as long as the short-stalked gynostegium. A. pulchra, Willd.) Swamps. June and July. Stem 3°-4° high; leaves 4'-6' long.

†† *Leaves opposite, lanceolate or linear, narrowed into a petiole.*

A. CINEREA, Walt. *Stems* erect, slender, pubescent in lines; *leaves* long, narrowly linear, distant, spreading; *umbels* 3-6, commonly longer than the leaves, 5-7-flowered, the slender drooping pedicels longer than the peduncle; *flowers* small, purple without, ash-color within; leaves of the crown obliquely truncated, 2-toothed at the inner angle, shorter than the gynostegium, longer than the thick horn; *follicle* smooth, linear. Flat sandy pine-barrens. June-August. Stem 1°-2° high; leaves 2'-3' long, 1" wide, somewhat glaucous, the uppermost often minute; *corolla* 3"-4" wide; follicle 3'-4' long.

A. PAUPERCULA, Michx. *Stem* smooth, tall; *leaves* elongated, linear or linear-lanceolate, acuminate, rough-mar-

gined, the upper ones small and remote; *umbels* 2-5, corymbose, 6-10-flowered; *pedicels* pubescent, about as long as the peduncle; *corolla* deep red; leaves of the crown oblong, erect, bright orange, more than twice as long as the subulate incurved horn and the short-stalked gynostegium; *follicle* lanceolate, minutely pubescent. June and July. Stem 2°-4° high; leaves 6'-12' long; corolla 3"-4" long. In marshes and low places.

+++ *Upper and lower leaves mostly opposite, the middle ones whorled.*

A. QUADRIFOLIA, Jacq. Somewhat pubescent; *stem* slender, simple; *leaves* thin, ovate or ovate-lanceolate, acuminate, contracted into a petiole, pale beneath; *umbels* 2-5, many-flowered, the slender peduncle longer than the pedicels; *corolla* pale pink; leaves of the crown white, oblong, obtuse, twice as long as the gynostegium and stout horn. June-August. Stem 1°-1½° high; leaves 2'-3' long.

++++ *Leaves alternate, or the lowest opposite.*

A. TUBEROSA, L. Hirsute; *stem* erect or declining, widely branched above, very leafy; *leaves* varying from linear to oblong, acute, short-petioled; *umbels* numerous, corymbose; *corolla* yellowish orange; leaves of the crown bright orange, erect, oblong-lanceolate, twice as long as the gynostegium, and rather longer than the slender incurved horn. Light dry soil, common. June and July. Stem 1°-2° long. Red River.

A. SPECIOSA. Red River.—Torrey.

ACERATES, Ell.

Leaves of the crown destitute of a horn-like appendage. Otherwise like *Asclepias*.

* *Leaves opposite.*

A. VIRIDIFLORA, Ell. Pubescent; *stem* stout, simple;

leaves varying from oval or obovate to lanceolate, acute, obtuse, or emarginate, undulate, short-petioled; *umbels* lateral and terminal, nearly sessile, densely many-flowered; *flowers* small, greenish; *leaves* of the crown oblong, erect, as long as the sessile gynostegium. Dry sterile soil. June and July. Stem 1° – $1\frac{1}{2}^{\circ}$ high; leaves $1\frac{1}{2}'$ – $2\frac{1}{2}'$ long. Red River.—*Torrey*.

A. *CONNIVENS*, Decaisne. *Stem* stout, simple, pubescent above; *leaves* nearly sessile, erect, mucronate, the lower ones approximate, oblong or oblong-obovate, the upper more distant, smaller and lanceolate; *umbels* 3–6, 6–9-flowered, the stout peduncle and pedicels nearly equal, pubescent; *flowers* large, greenish; leaves of the crown oblong, incurved, twice as long as the gynostegium, with their rounded summits connivent over it. June and July. Stem 1° – 2° high; leaves 1'–2' long, somewhat fleshy; *corolla* 8''–10'' wide.

** *Leaves alternate.*

A. *PANICULATA*, Decaisne. Closely pubescent; *stem* angular, often branching; *leaves* oblong or lance-oblong, acute or obtuse at each end, short-petioled; *umbels* corymbose, often compound; *corolla* large, greenish, spreading or nearly erect; leaves of the crown oblong, obtuse, ascending, shorter than the nearly sessile gynostegium. (*Podostigma viridis*, Ell.) Dry pine-barrens. July. Stem 1° – $1\frac{1}{2}^{\circ}$ high, leafy to the summit; leaves 3'–4' long; *corolla* 1' wide.

A. *DECUMBENS*. Found in Northern Texas by Marcy's Expedition.

97. OLIVE FAMILY. *Order*, OLEACEÆ.

Trees or *shrubs*, with opposite entire or pinnate exstipulate *leaves*, and perfect polygamous or diœcious *flowers*; *calyx* 4-toothed; *corolla* 4-lobed or 4-petalous, valvate in

the bud, sometimes wanting; *stamens* 2-7; *ovary* 2-celled, with 2 suspended anatropous ovules in each cell; *style* single or none; *fruit* 1-2-seeded; *embryo* straight, in hard albumen.

SYNOPSIS.

TRIBE I. **Oleineæ.** *Fruit* a drupe or berry. *Flowers* with both calyx and corolla. *Leaves* simple, entire.

Flowers polygamous. *Corolla* salver-formed with short lobes.....OLEA.
 ——— perfect. ——— wheel-shaped, with elongated lobes....CHIONANTHUS.

TRIBE II. **Fraxineæ.** *Fruit* a samara. *Flowers* diœcious, apetalous. *Leaves* pinnate.

Flowers in lateral and terminal panicles. *Calyx* minute or rarely wanting. *Trees*.
 FRAXINUS.

TRIBE III. **Forestiereæ.** *Fruit* a drupe. *Flowers* diœcious or perfect, apetalous. *Leaves* simple.

Flowers mostly diœcious, from scaly axillary buds. *Shrubs*.....FORESTIERA.

OLEA, Tourn. OLIVE.

Calyx 4-toothed; *corolla* short-salver-form, 4-lobed; *stamens* 2; *style* short; *stigma* globose or 2-lobed; *drupe* mostly 1-seeded, oily.—*Trees* or *shrubs*, with opposite coriaceous entire *leaves*, and small white fragrant *flowers*, in axillary racemes or panicles.

O. AMERICANA, L. Smooth; *leaves* oblong or obovate-oblong, narrowed into a petiole; *racemes* compound, shorter than the *leaves*; *flowers* polygamo-diœcious, bracted; *drupe* ovoid, dark purple. Light soil, near the coast. March and April.—A *shrub* or small *tree*, with whitish bark and evergreen *leaves*; *drupe* as large as a pea, bitter and astringent.

CHIONANTHUS, L. FRINGE-TREE.

Calyx small, 4-cleft; *corolla* wheel-shaped, 4-parted, with long and linear lobes; *stamens* 2-4, included; *style* very short; *stigma* notched; *drupe* fleshy, 1-seeded.—A *shrub*, with oblong entire deciduous *leaves*, and delicate white *flowers* in slender axillary panicles, appearing with the leaves.

C. VIRGINICA, L. Light soil. April and May. *Shrub* 6°-10° high; *leaves* smooth or pubescent, narrowed into a petiole; *panicles* longer than the leaves, leafy-bracted; *flowers* on slender drooping pedicels; *corolla-lobes* linear, 1' long; *drupe* ovoid, purple. Near Houston on Buffalo Bayou.

FRAXINUS, Tourn. ASH.

Flowers diœcious and (in our species) apetalous; *calyx* 4-lobed or toothed, minute, sometimes wanting; *stamens* 2-4; *filaments* shorter than the large anthers; *stigma* 2-cleft; *fruit* (samara) dry, winged above, 1-2-seeded; *cotyledons* elliptical; *radicle* slender.—*Trees*; *leaves* petioled, odd-pinnate, deciduous.

* *Fruit* naked and terete or barely margined and 2-edged at the base, winged above; *leaflets* 7-9, stalked.

F. AMERICANA, L. (*White Ash*.) *Branches* and petioles smooth; *leaflets* ovate-oblong or lanceolate-oblong, acuminate, entire, or slightly serrate above, smooth on the upper surface, pubescent or glaucous beneath; *fruit* terete, striate, dilated at the apex into a cuneate-linear or lanceolate obtuse or notched wing.—A large *tree*; *fruit* 1½' long.

F. PUBESCENS, Lam. (*Red Ash*.) *Branchlets* and *petioles* velvety-pubescent; *leaflets* oblong-ovate or ovate-lanceolate, gradually acuminate, bright green above, pale and more or less pubescent beneath; *fruit* acute at the base,

flattish and somewhat 2-edged, gradually dilated upward into a long lanceolate and often notched wing. (*F. tomentosa*, Michx.) Swamps. March and April.—A small *tree*.

F. VIRIDIS, Michx. (*Green Ash*.) Glabrous throughout; *leaflets* ovate or oblong-ovate, more or less toothed, smooth and green both sides; *fruit* as in *Pubescens*, of which it may be a variety. Swamps. March and April.—A small *tree*.

**** Fruit winged all round the seed-bearing portion; leaflets 5-9, short-stalked.**

F. QUADRANGULATA, Michx. (*Blue Ash*.) *Branchlets* square, smooth; *leaflets* oblong-ovate or oblong, acuminate, sharply serrate, when young pubescent beneath; *fruit* linear-oblong, obtuse at both ends. May.

F. PLATYCARPA, Michx. (*Water Ash*.) *Branchlets* terete, smooth or pubescent; *leaflets* ovate or elliptical, serrate or almost entire, often pubescent beneath; *fruit* broadly winged, oblong-obovate or oblong with a tapering and acute base, sometimes 3-winged. (*F. triptera* and *F. pauciflora*, Nutt.) Deep river-swamps. March and April.—A small *tree*.

FORESTIERA, Poir. ADELIA, Michx.

Flowers dicæcious or polygamous, from axillary scaly buds; *corolla* none; *calyx* minute, 4-lobed; *sterile-flowers* single or 3 together in the axils of imbricated scaly bracts; *stamens* 3-7; *fertile-flowers* peduncled; *styles* slender; *stigma* capitate; *ovary* 2-celled; *drupe* ovoid, 1-seeded, black or blue.—*Shrubs*; *leaves* opposite, petioled, serrulate; *flowers* minute, greenish, preceding the leaves.

F. PORULOSA, Poir. *Leaves* coriaceous, smooth at maturity, nearly sessile, ovate-lanceolate or oblong, obtuse, entire, punctate underneath, the margins entire and revolute; *drupe* short-ovoid. Coast.—*Michaux*; *Leitner*.

F. LIGUSTRINA, Poir. More or less pubescent; the *branchlets* roughened with fine tubercles; *leaves* rather membranaceous, obovate or obovate-oblong, mostly obtuse, serrulate (1' long), contracted at the base into a distinct petiole; *drupe* oval-oblong. Rocky banks.

DASYSTOMA, Raf. FALSE FOXGLOVE. (See page 398.)

Calyx bell-shaped, 5-cleft, the lobes often toothed; *corolla* tubular-bell-shaped, woolly within, 5-lobed, the lobes rounded; *stamens* 4, didynamous; *anthers* oblong; the *cells* parallel and awned at the base; *style* filiform, thickened and slightly 2-lobed at the apex; *capsule* ovate, acute, loculicidally 2-valved, many-seeded.—Tall *herbs*, with opposite ovate or oblong mostly pinnately divided or lobed *leaves*, and large yellow *flowers* in a leafy raceme; *filaments* woolly.

D. QUERCIFOLIA, Benth. Smooth and glaucous; *stem* simple or branched; lowest *leaves* twice-pinnatifid, the others pinnatifid, or the uppermost lanceolate and entire; *calyx* shorter than the pedicel, with lanceolate or subulate acute lobes. (*Gerardia quercifolia*, Pursh.) Rich woods and river-banks. Stem 3°–6° high. *Lobes* of the leaves toothed; *corolla* 2' long, the tube more slender and with smaller lobes than the preceding.

D. PEDICULARIA, Benth. Smooth or somewhat pubescent; *leaves* ovate-lanceolate, pinnatifid, the lobes finely toothed; *flowers* opposite; *calyx* shorter than the pedicel, the toothed lobes as long as the tube. (*Gerardia pedicularia*, L.) Dry sandy soil, chiefly in the upper districts. *Stem* 2° high, much branched; *leaves* about 2' long, the lobes numerous and short; *corolla* 12"–15" long, with a rather slender tube and short lobes.

D. PECTINATA, Benth. Pubescent or somewhat villous; *leaves* lanceolate or ovate-lanceolate, finely pinnatifid and toothed, the earliest ones entire; *flowers* alternate, scattered on the outside of the ascending branches; *calyx* longer than the pedicel, the pinnatifid lobes longer than the tube. Dry sand-ridges in the pine-barrens.

Division III.—Apetalous Exogenous Plants.

Floral envelope consisting of a calyx only, or altogether wanting.

98. BIRTHWORT FAMILY. *Order*, ARISTOLOCHIACEÆ.

Herbs or woody *vines*, with alternate petioled mostly cordate and entire *leaves*, and solitary peduncled dull-colored *flowers*; calyx adherent to the 6-celled ovary, tubular, valvate in the bud; *stamens* 6–12, more or less united with the styles; *anthers* adnate, extrorse; *fruit* 6-celled, few-many-seeded; *seed* anatropous; *embryo* minute, at the base of fleshy albumen.

ASARUM, Tourn. ASARABACCA.

Calyx regular, 3-lobed; *stamens* 12, the filaments partly united with the style, and usually prolonged beyond the anthers; *capsule* fleshy, globose, opening irregularly.—Aromatic perennial *herbs*, with creeping *stems*, long-petioled cordate or kidney-shaped *leaves*, and axillary peduncled *flowers*.

The Asarabacca grows in South-eastern Texas. Variety not described by the friend who found it.

99. FOUR-O'CLOCK FAMILY. *Order*, NYCTAGINACEÆ.

Herbs or *shrubs*, with tumid joints; *leaves* mostly opposite, simple, petioled, without stipules; *calyx* colored and resembling a corolla, tubular-bell-shaped or funnel-shaped, free from the 1-celled and 1-ovuled ovary, plaited in the bud, contracted in the middle, with the upper portion de-

ciduous; *stamens* 1-several, hypogynous; *anthers* 2-celled, roundish; *ovule* erect; *style* simple; *stigma* simple or branched; *achenium* inclosed in the indurated, mostly ribbed, often glandular base of the calyx; *embryo* coiled or folded around copious mealy albumen; *cotyledons* leafy; *radicle* inferior.

SYNOPSIS.

* *Flowers surrounded by a calyx-like involucre.*

*Involucre open, membranaceous, 5-lobed. Herbs.....*OXYBAPHUS.

** *Flowers without an involucre.*

* *Flowers perfect. Embryo coiled. Herbs.....*BOERHAAVIA.

OXYBAPHUS, Vahl.

Flowers perfect, 1-5 in a cluster, surrounded by an open cup-shaped 5-lobed involucre; *calyx*-tube very short, the bell-shaped limb 5-lobed, deciduous; *stamens* 3, exserted; *style* slender; *stigma* capitate; *achenium* inclosed in the indurated ribbed persistent base of the calyx.—Erect *herbs*, from thick perennial roots; *leaves* opposite; flowers terminal, purple or rose-color.

O. ANGUSTIFOLIUS, Sweet. *Stem* smoothish, branching above; *leaves* linear-lanceolate, smooth, obtuse at the sessile base, the upper ones distant, acute; *flowers* loosely paniced; *involucre* with rounded hairy lobes, at length enlarged and strongly nerved, 3-flowered; base of the *calyx* villous. Stem 3°-4° high; leaves 2' long; calyx 4''-5'' long, whitish, veiny.

O. NYCTAGINEUS, Sweet. Nearly smooth, erect, with alternate or forked *branches*; leaves broadly ovate or oblong, subcordate, acute; *peduncles* solitary, axillary and terminal; *involucre* pubescent, 3-5-flowered; *perennial*. Red River.—*Marcy*.

O. COCCINEUS. *Roots* ligneous, black and tortuous; *stems*

12'-18' high, slender, terete, paniculately branched above; *leaves* 2'-3' long, mostly about a line wide, but sometimes 2 lines; *inflorescence* a loose cymose panicle; *involucres* sometimes solitary in upper axils and the pedicels recurved; *perianth* $\frac{3}{4}$ ' in length, funnel-form, with a long narrow tube; the limb of a bright crimson, 5-lobed, with the lobes notched; *stamens* and *styles* exerted; *fruit* pubescent, strongly 5-ribbed and slightly rugose.—*Torrey*. High-lands between Nueces River, west to San Pedro.

O. AGGREGATUS, Vahl. MIRABILIS AGGREGATA, Cav. Smith's Run, Western Texas.

O. ALBIDUS, O. HIRSUTUS, O. ANGUSTIFOLIUS, are all found in Western Texas, but the writer has been informed of nothing concerning their distinctive characteristics.

BOERHAAVIA, L.

Flowers perfect; *involucre* none; *calyx*-tube cylindrical or obconical, 5-ribbed, the limb colored, funnel-shaped, 5-lobed, deciduous; *stamens* 1-4; *anthers* minute, roundish; *style* slender; *stigma* obtuse; *embryo* folded.—Annual *herbs*, with diffuse branching *stems*, and opposite ovate or rounded *leaves*; flowers small, in solitary or panicled clusters.

B. ERECTA, L. *Stems* ascending, branched from the base, smooth, tumid at the joints; *branches* alternate; *leaves* ovate or roundish, acute or mucronate, often more or less cordate, wavy along the margins, whitened and minutely dotted with black beneath; *clusters* 3-5-flowered, in ample panicles; *stamens* 2; *fruit* smooth, obconical, truncate, strongly ribbed. July-September. Stem 1°-3° long; leaves rather thick, 2'-3' long; *flowers* small, purple.

B. HIRSUTA, Willd. *Stem* diffuse, alternately branched, minutely pubescent, hirsute above; *leaves* ovate or oblong-ovate, mucronate, obtuse at the base, undulate, smooth,

and similarly colored on both sides, ciliate on the margins; *clusters* 3-6-flowered, forming a loose spreading panicle; *flowers* minute; *calyx-limb* hairy at the apex; *fruit* obconical, rounded at the apex, with the ribs glandular-viscid. Stem stout, 2°-3° long; leaves 1'-2' long.

100. POKEWEED FAMILY. Order, PHYTOLACCACEÆ.

Calyx composed of 4-5 nearly equal *sepals*, more or less united at the base, unchanged in fruit; *stamens* hypogynous, as many as the sepals and alternate with them, or numerous, free or united at the base; sterile ones none; *anthers* 2-celled, introrse; *ovary* simple or compound; *ovules* amphitropous or campylotropous, solitary, erect; *styles* as many as the ovaries; *fruit* of 1-many carpels; *albumen* copious or none; *embryo* annular, rarely straight; *radicle* inferior.—*Herbs* or *shrubs*, with alternate entire *leaves*, and apetalous 3-bracted racemed or spiked *flowers*.

SYNOPSIS.

SUB-ORDER I. **Petiveriæ.** *Fruit* simple. *Cotyledons* convolute. *Leaves* stipulate.

Fruit a berry. *Embryo* forming a ring around the albumen.....RIVINA.

SUB-ORDER II. **Phytolacceæ.** *Fruit* compound. *Cotyledons* flat. *Leaves* exstipulate.

Fruit a berry, composed of numerous carpels arranged in a circle.....PHYTOLACCA.

RIVINA, Plum.

Calyx remotely 3-bracted, 4-parted, colored; *stamens* 4-8; *anthers* ovate or oblong; *ovary* simple; *ovule* solitary, amphitropous; *stigma* capitate or many-cleft; *berry* nearly globose, at length dry; *embryo* forming a ring around the copious albumen; *cotyledons* somewhat leafy, convolute.—

Shrubs, with alternate minutely stipulate petioled *leaves*, and small white or rose-colored *flowers* in axillary and terminal racemes; *bracts* deciduous.

R. HUMILIS, L. Closely pubescent; *stem* with spreading branches; *leaves* oblong-ovate, rounded at the base, tapering but obtuse at the summit, on long filiform petioles; *racemes* slender, longer than the leaves; *calyx*-lobes obovate, pale rose-color; *berry* rounded, compressed.—*Shrub* 1°–2° high; leaves 1'–3' long; *flowers* and *berries* 1''–1½'' long.

PHYTOLACCA, Tourn. POKEWEED.

Calyx 3-bracted, 5-parted, the lobes petal-like, rounded; *stamens* 5–25, the filaments subulate; *anthers* elliptical; *ovary* compound; *styles* 5–12, short, distinct, recurved at the apex, stigmatic within; *fruit* a depressed globose berry, containing 5–12 one-seeded indehiscent carpels united in a circle; *embryo* forming a ring around the central albumen; *cotyledons* linear.—Erect branching *herbs*, with entire petioled *leaves*; *flowers* in racemes opposite the leaves.

P. DECANDRA, L. Smooth; *stem* very stout (2°–12° high); *leaves* ovate-lanceolate, acute; *racemes* many-flowered, as long as the leaves; *flowers* white, turning purplish; *stamens*, *styles*, and carpels 10. Margins of fields and uncultivated ground. July–September. *Root* large; *berry* black. Perennial.

101. GOOSEFOOT FAMILY. Order, CHENOPODIACEÆ.

Unsightly *herbs*, with exstipulate *leaves*, inconspicuous *flowers*, and the characters mostly of the preceding family; but the green *calyx* often becoming succulent in fruit, 5 (rarely 1–2) *stamens* opposite the sepals, a solitary *ovary* forming an *achenium* or utricle in fruit, two short and spreading *styles*, a horizontal or vertical lenticular *seed*,

and the *embryo* forming a ring around the albumen, or spirally coiled with little or no albumen.

SYNOPSIS.

TRIBE I. **Cyclolobeæ.** *Embryo* curved in a ring around the albumen.

Calyx 3-5-parted, the lobes commonly keeled in fruit. *Seeds* horizontal, rarely vertical.....CHENOPODIUM.

Bracts of the fertile flower united. *Radicle* superior.....OBIONE.

TRIBE II. **Spirolobeæ.** *Embryo* spirally coiled, with little or no albumen. *Seeds* horizontal.

Calyx 5-parted, not keeled. *Leaves* terete, fleshy.....CHENOPODINA.

— at length transversely winged. *Leaves* spiny.....SALSOLA.

CHENOPODIUM, L. PIGWEED; GOOSEFOOT.

Calyx 5- (rarely 3-4) -parted, bractless, the lobes mostly keeled; *stamens* 5, the filaments filiform; *styles* 2-3, distinct, or united at the base; *utricle* depressed, inclosed in the globose or 5-angled calyx; *seed* horizontal (rarely vertical), lenticular; *embryo* forming a more or less perfect ring around the copious mealy albumen.—Glandular or powdery-coated *herbs*, with alternate *leaves*, and clusters of small greenish *flowers* disposed in paniced spikes.

* *Annuals.*

C. BOSCIANUM, Moq. *Stem* erect, with angular branches; *leaves* small, spreading, lanceolate-linear, very acute, entire, or the lower ones somewhat toothed, more or less mealy and whitened beneath; *spikes* loose, leafy; *seed* acute on the margins, slightly roughened, shining, inclosed in the acute-angled calyx. (Carolina, Bosc.) *Stem* slender, 2° high; *leaves* 5"-12" long, on petioles, 2"-3" long; *calyx*-lobes elliptical-ovate, acutish.

C. ALBUM, L. *Stem* erect, branched, slightly furrowed;

leaves ascending, rhombic-ovate, acute at the base, toothed, the upper ones lanceolate and entire, more or less coated with a white powder; *spikes* paniced, the small clusters scattered or crowded, nearly leafless; *seed* inclosed in the 5-angled calyx, acute on the margins, smooth and shining.—Varies (*C. viride*, L.) with nearly entire and less mealy leaves, and the larger clusters more scattered. Cultivated grounds. July–September. Stem 2°–6° high; *petioles* long and slender.

C. MURALE, L. *Stem* ascending, branched; *leaves* long-petioled, ovate-rhombic, acute, unequally and sharply toothed, bright green on both sides; *spikes* slender, spreading, corymbose, scarcely exceeding the leaves; *seed* not shining, acute on the margins, nearly inclosed in the slightly angled calyx. Waste places. Stem 6'–18' high.

C. BOTRYS, L. *Stem* erect, branched; *leaves* oblong, somewhat pinnatifid-lobed, with the lobes obtuse and glandular-pubescent, the upper ones minute; *racemes* numerous, axillary, spreading, cymose; *seeds* with rounded margins, not wholly included in the open and even calyx. Waste places. Stem 6'–12' high.

C. SUBSPICALUM. Diffuse and much branched, clothed with furfuraceous scales; *leaves* petiolate, broadly rhombic-ovate, with one or two coarse teeth on each side. (Neither flower nor fruit described.)—*Torrey* (Marcy's Expedition).

** *Perennial*.

C. ANTHELMINTICUM, L. (*Wormseed*.) *Stem* stout, erect, branching; *leaves* oblong or lanceolate, acute at each end, sharply toothed; *flowers* in narrow panicles terminating the branches; *seeds* with obtuse margins, smooth and shining, included in the even calyx. Waste grounds. Stem 2°–3° high.

OBIONE, Gærtn.

Chiefly as *Atriplex*, both in character and habit; but the two indurated *bracts* more or less united, often toothed on the edges and crested on the sides, and the *radicle* superior.

O. ARENARIA, Moquin. *Plant* coated with silvery scales; *stem* branching from the base, ascending; lowest *leaves* opposite, obovate, entire, tapering into a petiole, the others alternate, nearly sessile, lanceolate or oblong, acute, wavy and slightly toothed; *sterile flowers* in close terminal spikes; the *fertile* ones in axillary clusters; *bracts* 3-toothed at the summit, and with two mostly toothed knobs at the sides. (*Atriplex arenaria*, Nutt.) Drifting sands along the coast. July–September. Annual. Stem 1°–2° high; leaves 1'–1½' long.

O. CANESCENS. On the Red River.—*Marcy*.

SALICORNIA, Tourn. SAMPHIRE.

Flowers perfect, lodged in excavations of the thickened upper joints of the stem, spiked; *calyx* thin, with a denticulate border, at length spongy, and surrounded at the apex by a circular wing; *stamens* 1–2; *styles* united below; *utricle* included in the calyx; *embryo* coiled, or bent into a ring.—Smooth and succulent saline *plants*, with jointed leafless *stems*; flowers three together, the lateral ones sometimes sterile, minute.

S. HERBACEA, L. Annual; *stem* erect, much branched; the joints thickened upward, obtusely 2-toothed at the apex; *spikes* long, tapering to the summit.—Salt marshes along the coast, Georgia, and northward. August. *Stem* 6'–12' high.

CHENOPODINA, Moquin.

Flowers perfect, bracted; *calyx* 5-parted, fleshy, inflated

and berry-like in fruit; *stamens* 5; *stigmas* 2-3, spreading; *utricle* depressed, inclosed in the calyx; *seed* horizontal, lenticular; *embryo* flat-spiral, dividing the scanty albumen into 2 portions.—Smooth saline *plants*, with fleshy terete alternate *leaves*, and axillary clustered *flowers*.

C. MARITIMA, Moquin. Annual; *stem* diffusely much branched; *leaves* linear, acute; *calyx*-lobes obtuse, keeled; *stamens* exserted. Low sandy places along the coast. September. Stem 1°-3° high; leaves 1'-2' long; *flowers* minute.

SALSOLA, L. SALTWORT.

Flowers perfect, 2-bracted; *calyx* 5-parted, the lobes at length transversely winged; *stamens* 5, slightly united at the base; *style* slender; *stigmas* 2; *utricle* flattened at the apex, inclosed in the persistent calyx; *embryo* conical-spiral; *albumen* none.—Saline *plants*, with alternate and fleshy leaves and axillary flowers.

S. KALI, L. Smooth; *stem* spreading, ascending; *leaves* subulate, spine-pointed, like the ovate bracts; *flowers* solitary; *calyx*-lobes connivent, with the dilated, membranaceous wing rose-colored. (S. Caroliniana, Walt.) Sandy shores. August. Stem 1°-1½° high. Annual.

102. AMARANTH FAMILY. Order, AMARANTACEÆ.

Chiefly *herbs*, with simple exstipulate *leaves*, and inconspicuous scarious-bracted *flowers*, which are commonly crowded in spikes or heads; *sepals* 3-5, free, or united at the base, scarious, imbricated in the bud; *stamens* 3-5, hypogynous, opposite the sepals, free, or united below, often with sterile filaments interposed; *anthers* 1-2-celled, introrse; *ovary* single, ovate, compressed, 1-many ovuled; *stigmas* 1-3; *utricle* closed or circumscissile; *embryo* coiled into a ring around the central albumen.

SYNOPSIS.

TRIBE I. **Achyrantheæ.** *Anthers* 2-celled. *Ovary* 1-ovuled. *Leaves* alternate. *Stamens* free. *Sterile filaments* none.

* *Utricle* circumscissile.

Flowers monœcious. *Sepals* 3-5.....AMARANTUS.

TRIBE II. **Gomphreneæ.** *Anthers* 1-celled. *Ovary* 1-ovuled. *Leaves* opposite. *Stamens* below.

Calyx 5-cleft. *Stamens* wholly united. *Anthers* sessile. *Sterile filaments* entire.

FRÉLICHIA.

CELOSIA, L.

Flowers perfect, 3-bracted; *sepals* 5; *stamens* 5, united at the base into a cup; *sterile filaments* none; *anthers* 2-celled; *style* short or elongated; *stigmas* 2-3, recurved; *utricles* many-seeded, circumscissile.—Smooth *herbs* or *shrubs*, with alternate petioled *leaves*, and glossy *flowers*, crowded in axillary and terminal spikes or panicles.

C. PANICULATA, L. *Stem* shrubby, erect; *leaves* deltoid-ovate, acute, abruptly petioled; *spikes* cylindrical, simple or branched, mostly shorter than the leaves; *sepals* oblong, rigid, several times longer than the bracts; *stigmas* 3; *utricles* many-seeded. *Leaves* 2' long; *seeds* minute, lenticular, shining.

AMARANTUS, Tourn. AMARANTH.

Flowers polygamo-monœcious, 3-bracted; *sepals* 5, rarely 3, smooth, erect; *stamens* 5 or 3, free; *sterile filaments* none; *anthers* oblong, 2-celled; *style* none; *stigmas* 2-3, slender, spreading; *utricles* 1-seeded, ovate, 2-3-toothed at the apex, circumscissile, commonly included in the calyx; *pericarp* mostly membranaceous; *radicle* inferior.—Unsightly annual *herbs*, with erect or diffuse stems, alternate mostly

petioled entire mucronate *leaves*, and greenish or purplish flowers, crowded in axillary and terminal spikes or clusters; *bracts* longer than the sepals.

* *Flowers in small axillary clusters; sepals and stamens 3.*

A. ALBUS, L. *Stem* erect, branching from the base, smooth; *leaves* small, long-petioled, oblong-obovate, very obtuse or emarginate, wavy at the margins; *clusters* shorter than the petioles; *sepals* awl-pointed, much shorter than the subulate spine-pointed spreading bracts, and half as long as the rugose utricle. Cultivated grounds. May-September. Stem 1° high; leaves $\frac{1}{2}$ '-1' long.

** *Flowers (green) crowded in terminal and axillary spikes; sepals and stamens 5; leaves long-petioled.*

A. HYBRIDUS, L. Smooth or nearly so; *stem* erect, branching; *leaves* thin, ovate or ovate-oblong, obtuse, notched, or tapering at the apex, long-mucronate, the pale veins prominent beneath; *spikes* numerous, paniced, the terminal one elongated, the lower axillary ones short and roundish; *sepals* oblong, acuminate, rather shorter than the subulate bracts, and equaling the slightly rugose utricle. Cultivated grounds. August and September. Stem 2°-3° high; leaves 2'-5' long.

A. SPINOSUS, L. Smooth; *stem* stout, succulent, often purplish; *leaves* ovate or ovate-oblong, obtuse or emarginate, long-petioled, often blotched with purple, spiny in the axils; *terminal spike* elongated, bending, the lower axillary ones short and roundish; *sepals*, *bracts*, and rugose *utricle* nearly equal. Fields and waste places. July-October. Stem 1°-3° high.

FRÉLICHIA, Moench.

Flowers perfect, 3-bracted; *calyx* tubular, 5-cleft, indurated and spiny-crested in fruit; *stamens* 5, united into a long tube; *sterile* filaments entire; *anthers* sessile; *stigma*

capitate or many-cleft; *utricle* indehiscent, 1-seeded, included in the calyx; *seed* vertical; *radicle* ascending.—Woolly or hairy annuals; *leaves* opposite; *spikes* opposite, and terminating the naked peduncle-like summit of the stem.

F. FLORIDANA, Moquin. White-tomentose or woolly; *stem* erect, simple or branched; *leaves* varying from linear to oblong; *spikes* ovate or oblong, lengthening with age; *bracts* mostly blackish, shorter than the woolly calyx; *style* short; *stigma* capitate; *fruiting calyx* round-ovate, compressed, toothed along the margins, and minutely tubercled at the base. Dry sandy places. July–September. Stem $\frac{1}{2}$ °–3° high; spikes solitary, few, or numerous.

102. BUCKWHEAT FAMILY. Order, POLYGONACEÆ.

Herbs, shrubs, or (tropical) trees, with simple mostly alternate and stipulate *leaves*, and perfect or dioecious *flowers*; *calyx* 3–6-cleft, or 3–6-sepalous, persistent; *stamens* 4–12, inserted on the base of the calyx; *anthers* 2-celled; *ovary* single, 1-celled, with the solitary orthotropous ovule erect from the base of the cell; *styles* 2–3, distinct or partly united; *fruit* (achenium) lenticular or 3-angled, rarely ovoid; *embryo* mostly on the outside of mealy albumen; *radicle* pointing upward; *stipules* sheathing, annular, or wanting.

SYNOPSIS.

SUB-ORDER I. **Polygoneæ.** *Involucre* none. *Calyx* 5-cleft or 5-sepalous. *Stamens* 4–9 (mostly 5–8). *Ovules* sessile. *Embryo* curved on the outside of the albumen, rarely straight in its center. *Stipules* sheathing.

* *Calyx* 5-sepalous, the inner sepals erect, mostly enlarged in fruit.

Calyx green, often grain-bearing. *Stigma* many-cleft.....RUMEX.
 — *corolla*-like. — *entire*.....POLYGONELLA.

** *Calyx* 5-sepalous, the sepals all erect, unchanged in fruit, free from the achenium.
Sepals entire. *Embryo* curved on the outside of the albumen.....POLYGONUM.

SUB-ORDER II. **Eriogoneæ.** *Flowers* surrounded by an involucre. *Calyx* 6-parted. *Stamens* 9. *Ovule* sessile. *Embryo* included in scarce albumen. *Stipules* none.

Involucre toothed. *Woolly or silky herbs*.....**ERIOGONUM.**

RUMEX, L. Dock.

Flowers perfect or diœcious; *calyx* herbaceous, 6-parted, the 3 outer lobes spreading or recurved, the inner ones (valves) mostly enlarged in fruit, and inclosing the 3-angled achenium, often bearing grain-like prominences on the outside; *stamens* 6; *anthers* erect; *styles* 3; *stigmas* many-cleft; *achenium* 3-angled; *embryo* curved on the outside of the albumen.—*Herbs*, with alternate *leaves*, smooth truncated *sheaths*, and small green *flowers* in racemed or panicked clusters.

* *Flowers* perfect or polygamous.

† *Valves* entire.

R. CRISPUS, L. Smooth; *leaves* lanceolate, wavy-crisped, acute at both ends, or the lowest truncate or slightly cordate at the base, and long-petioled, the uppermost linear; *panicle* leafy at the base; *whorls* crowded in fruit; *valves* broadly cordate, obtuse, one or all grain-bearing. Waste ground around dwellings. June and July. *Stem* 2°–3° high; lowest leaves 1° long. Perennial.

R. FLORIDANUS, Meisner. Smooth; *stem* stout, branching; *leaves* lanceolate, acute at each end; *panicle* naked, dense-flowered; *pedicels* about twice as long as the valves, thickened upward, reflexed in fruit; *valves* deltoid-ovate, obtusely pointed, each bearing a narrow grain, which is much narrower than the reticulate valve. Deep river-swamps. June. *Stem* 2°–3° high; leaves $\frac{1}{2}$ °–1 $\frac{1}{2}$ ° long.

†† *Valves* toothed or bristly on the margins.

R. MARITIMUS, L. Pubescent; *stem* low, diffusely branched; *leaves* lanceolate, wavy-margined, the lower ones

somewhat cordate or hastate at the base, the upper linear; *whorls* compactly crowded in leafy spikes; *valves* small, bristly on the margins, nearly covered by the large grain. (*R. persicarioides*, L.) Sea-shores. August and September. Stems 6'-12' high; *spikes* yellowish. Annual.

** *Flowers dioecious; herbs with sour juice.*

† *Calyx not enlarged in fruit.*

R. ACETOSELLA, L. *Root* creeping; *stems* low, erect or ascending; *leaves* oblong, lanceolate, or linear, entire or hastate-lobed; *panicle* slender, leafless; *whorls* scattered, few-flowered; *valves* ovate, grainless, appressed to the achenium. Old fields and sterile soil, common. June and July. Stems 6'-12' long; *leaves* and *flowers* small. Perennial.

†† *Inner calyx-lobes dilated in fruit.*

R. HASTATULUS, Baldw. *Stems* clustered, erect; *leaves* glaucous, lanceolate or linear, or the lowest oblong, entire or hastate-lobed; *whorls* few-flowered, scattered, or the upper ones crowded; *valves* round-cordate, entire, membranaceous, reticulated, red or white, grainless. Dry sands, along the coast. May and June. Stem 1°-1½° high; *leaves* 1'-2' long, the upper ones mostly entire.

POLYGONELLA, Michx.

Flowers perfect or diceiously polygamous; *calyx* corolla-like, deeply 5-parted or 5-sepalous, the three inner sepals mostly enlarging and inclosing the 3-angled achenium, glandless; *stamens* 8; *anthers* roundish; *stigmas* 3, capitate; *embryo* straight, or nearly so, in the center, or at one side of the mealy albumen.—Smooth and commonly glaucous *herbs* or *shrubs*, with slender branching *stems*, small alternate *leaves*, and small flowers in spiked racemes; sheaths smooth; *bracts* imbricated, top-shaped, mostly 1-flowered; *pedicels* nodding in fruit.

EUPOLYGONELLA. *Filaments all alike, subulate; stigmas nearly sessile; flowers dieciously polygamous; embryo in the center of the albumen.*

P. GRACILIS, Meisner. Annual; *stem* tall and slender, paniculately branched above; *leaves* remote, wedge-oblong, obtuse, often wanting; *sheaths* truncate, pointless; *racemes* slender, scattered, forming a large and spreading panicle on the sterile plant, more crowded on the fertile; *bracts* truncate; *flowers* white or pale rose-color, the fertile ones greenish; *sepals* all erect; *valves* oval or elliptical, unequal (the interior longer), shorter than the ovate-lanceolate acuminate achenium. (*Polygonum gracile*, Nutt.) Dry sand-ridges in the pine-barrens. September and October. Stem 2°-5° high; leaves 1' long; racemes linear, 1'-3' long.

P. ARTICULATA, Meisner. Annual; *stem* much branched, slender; *leaves* narrowly linear, obtuse, deciduous; *sheaths* truncate, pointless; *racemes* numerous, erect, slender; *bracts* truncate, open, the lowest ones pointed; *flowers* bright rose-color; *sepals* oval or roundish, nearly equal, unchanged in fruit; *interior filaments* rhombic-ovate at the base. Dry sandy soil. August. Stem 6'-12' high; leaves 4'-8' long; racemes 1' long.

POLYGONUM, L. KNOTWEED.

Flowers perfect; *calyx* 5- (rarely 4) -parted, corolla-like, the lobes nearly equal, erect and unchanged in fruit; *stamens* 3-9; *anthers* roundish; *styles* 2-3, distinct or partly united; *stigmas* entire; *achenium* 3-angled or lenticular, inclosed in the persistent calyx; *embryo* curved on the outside of the albumen; *radicle* slender.—*Herbs*, with alternate, simple *leaves*, and sheathing *stipules*; flowers commonly white or rose-color, variously disposed.

AMBLYGONON. *Flowers in closely-bracted spikes; stamens 7; style 2-cleft; achenium lenticular; cotyledons incumbent; albumen mealy.*

P. ORIENTALE, L. Hairy; *stem* tall, branching; *leaves*

ovate, acuminate, petioled; *sheaths* loose, salver-form; *spikes* paniced, cylindrical, dense, nodding; *bracts* ovate; *flowers* large, bright rose-color. June–September. Stem 3°–5° high; *spikes* 2'–3' long.

PERSICARIA. *Flowers* in closely-bracted *spikes*; *stamens* 4–8; *styles* 2–3, or 2–3-cleft; *achenium* 3-angled or lenticular; *cotyledons* accumbent; *albumen* horny; *sheaths* cylindrical, truncate.

* *Sheaths* naked; *style* 2-cleft or 2-parted; *achenium* lenticular.

P. INCARNATUM, Ell. *Stem* smooth below, the summit of the branches, peduncles, and calyx sprinkled with glandular dots; *leaves* lanceolate, long-acuminate, petioled, rough on the margins and veins; *sheaths* slender, appressed; *spikes* racemed, linear, nodding; *bracts* spreading, acute, longer than the pedicels; *flowers* small, flesh-color; *stamens* 6; *style* 2-parted; *achenium* ovate, with the sides concave. Ponds and ditches. July–October. Stem 2°–3° high; leaves 6'–8' long; spikes 1'–2' long. Annual.

** *Sheaths* fringed with bristly hairs; *achenium* 3-angled, or sometimes lenticular; *stamens* mostly 8.

P. PERSICARIA, L. *Stem* smooth, branching from the base, erect or diffuse; *leaves* lanceolate or oblong, obtuse or acutish, the margins and veins roughened; *sheaths* short, nearly smooth, fringed with a few short bristles; *spikes* short, oblong, obtuse, dense-flowered; *flowers* rose-color; *stamens* 6–7; *style* half 2-cleft; *achenium* lenticular or 3-angled, smooth and shining. Low places around dwellings and along roads. July. Stem 1°–1½° high; leaves 2'–4' long, often with a dark triangular spot in the middle; spikes ½'–1' long. Annual.

P. SETACEUM, Baldw. *Stem* erect, sparingly branched, smooth below, the upper portion, like the peduncles and lanceolate glandless *leaves*, rough with appressed hairs; *stipules* appressed-hirsute, copiously fringed with long bristles; *spikes* filiform, by pairs, loose-flowered; *flowers* white, glandless; *stamens* 8; *style* 3-cleft; *achenium*

3-angled. Low ground. July–September. Stem 2° – 3° high; leaves 3'–5' long; *spikes* 1'–2' long. Perennial.

AVICULARIA. *Flowers axillary, single or 2-3 together; stamens 8, rarely fewer; stigmas 3, nearly sessile; achenium 3-angled; cotyledons incumbent; albumen horny; sheaths scarious, 2-3-parted, lacerated; leaves small.*

P. AVICULARE, L. *Stem prostrate, diffuse, short-jointed; leaves sessile ($1\frac{1}{2}'$ long), oblong-linear or lanceolate, obtuse, longer than the 3-cleft sheaths; flowers clustered, nearly sessile, greenish white, longer than the dull achenium; stamens mostly 5.* Waste places and along roads, common.
—**Var., ERECTUM.** (*P. erectum, L.*) *Stem stouter, erect or ascending, leaves larger ($1'$ – $1\frac{1}{2}'$ long), oblong.* With the preceding.—**Var., LITTORALE.** (*P. maritimum, L.; P. glaucum, Nutt.*) *Stem long (1° – 2°), prostrate, rigid, short-jointed; leaves small ($4''$ – $6''$), oblong-linear, glaucous, the uppermost imbricated and scarcely longer than the more conspicuous silvery sheaths; calyx reddish white, shorter than the smooth achenium.* Sea-coast sands, and northward.

ECHINOCAULON. *Flowers in terminal clusters; calyx 4-5-parted; stamens 6 or 8; styles 2-3; achenium lenticular or 3-angled; cotyledons accumbent; stems weak, branching, armed on the angles, petioles, etc., with recurved prickles.*

P. SAGITTATUM, L. *Leaves small, sagittate, acute, short-petioled, smooth; peduncles elongated, smooth; flowers white, capitate; stamens 8; styles 3; achenium 3-angled.* Wet places. June–October. *Stem* 1° – 3° long; leaves 1'–2' long. Annual.

ERIOGONUM, Michx.

Flowers perfect or polygamous, surrounded by an involucre; calyx deeply 6-cleft; stamens 9; ovary free, 3-sided; styles 3; stigmas capitate; achenium 3-angled or 3-winged; embryo straight in the axis of the albumen, or more or less

curved.—Downy or woolly *herbs*; *leaves* alternate, opposite or whorled; *sheaths* none; inflorescence various.

E. LONGIFOLIUM, Nutt. *Stem* erect, tomentose, corymbose above, leafy below; *leaves* smooth or villous above, white-tomentose beneath, the lowest clustered, oblong-linear, long-tapering at the base, the upper scattered, the uppermost bract-like; *involucre* stalked, many-flowered, obtusely 5-toothed; *calyx* herbaceous, equal, woolly without. Sand-ridges. Stem 2°–3° high; lowest leaves 3'–5' long. Perennial.

E. TOMENTOSUM, Michx. *Stem* erect, tomentose, corymbose above, leafy throughout; *leaves* smooth above, white-tomentose beneath, the lowest clustered, obovate-oblong, long-petioled, the others in whorls of 3–4, elliptical, sessile; *involucre* sessile, obtusely 5-toothed; *calyx* white, unequal, woolly without. Dry pine-barrens. July–September. Stem 2°–3° high; lowest leaves 4'–6' long; *flowers* very numerous on one side of the spreading branches. Perennial.

103. LAUREL FAMILY. Order, LAURACEÆ.

Aromatic *trees* or *shrubs* (except *Cassya*), with alternate simple minutely dotted *leaves*, without stipules, and perfect or polygamous clustered *flowers*; *calyx* 6–9-parted, imbricated in 2 rows; *stamens* 6 or more, in 1–4 rows; *anthers* adnate, 2–4-celled, opening by lid-like valves; *ovary* free, 1-celled, with a solitary anatropous suspended ovule; *style* simple, thick; *stigma* obtuse; *fruit* a drupe or berry; *seed* without albumen; *embryo* large; *radicle* superior.

SYNOPSIS.

TRIBE I. **Laurineæ**. *Fruit* naked. *Trees* or *shrubs*.

* *Flowers* perfect; *stamens* 12, the 3 inner ones sterile.

Anthers 4-celled, 4-valved. *Trees* with evergreen leaves.....PERSEÆ.

** *Flowers dioecious ; stamens 9, all fertile.*

<i>Anthers 4-celled.</i>	<i>Involucre none</i>	SASSAFRAS.
— 2-celled.	— 4-leaved.....	BENZOIN.
— 4-celled.	— 2-4-leaved	TETRANTHERA.

PERSEA, Gærtn. RED BAY.

Flowers perfect; *calyx* deeply 6-parted, persistent; *stamens* 12, in 4 rows, the inner ones sterile and gland-like; *filaments* pubescent, the inner fertile ones biglandular; *anthers* 4-celled, those of the two outer rows introrse, of the inner row extrorse; *stigma* disk-like; *drupe* ovoid.—*Trees* or *shrubs*, with evergreen entire petioled *leaves*, and greenish or white *flowers* in axillary peduncled clusters or panicles.

P. CAROLINENSIS, Nees. *Branchlets* smoothish; *leaves* oblong or lanceolate-oblong, smooth and deep green above, glaucous beneath, obscurely veined; *flowers* silky, in cymose clusters, on peduncles shorter than the petioles; *calyx*-lobes unequal, persistent; *drupe* blue. (*Laurus Carolinensis*, L.) Rich shady woods. July.—A *tree*, 20°–40° high; leaves 2'–3' long.

SASSAFRAS, Nees.

Involucre none; *flowers* dioeciously polygamous; *calyx* 6-parted, spreading; *stamens* of the sterile flowers 9, in 3 rows, all fertile, the 3 inner ones biglandular at the base, those of the fertile flowers 6, sterile; *anthers* linear, 4-celled, 4-valved, introrse; *style* subulate; *stigma* disk-like; *drupes* blue, on thick red pedicels.—*Trees*, with entire or 2–3-lobed deciduous *leaves*, and greenish flowers in clustered racemes, appearing before the leaves.

S. OFFICINALE, Nees. *Leaves* ovate, entire or 2–3-lobed, smooth or pubescent; *racemes* short, silky; *flowers* sometimes white. (*Laurus Sassafras*, L.) Dry open woods and old fields. March.—A small *tree*, with spicy bark.

BENZOIN, Nees. SPICE-BUSH.

Involucre 4-leaved; *flowers* dioeciously polygamous; *calyx* 6-parted; *stamens* of the sterile flowers 9 (more numerous and rudimentary in the fertile flowers), in 3 rows; *filaments* slender, the inner ones lobed and glandular at the base; *anthers* ovate, 2-celled, 2-valved, introrse; *style* short; *drupe* obovoid, red, the pedicels not thickened.—*Shrubs*, with entire deciduous *leaves*, and dull-yellow flowers in lateral sessile clusters, appearing before the leaves.

B. ODORIFERUM, Nees. *Branches* slender, smooth; *leaves* oblong-obovate, acute at the base, paler and pubescent beneath, soon smooth; *clusters* numerous, smooth. (*Laurus Benzoin*, L.) Banks of streams and low woods. February and March.—A *shrub*, 6°–10° high, with spicy bark; leaves 3'–5' long.

TETRANTHERA, Jacq.

Involucre 2–4-leaved; *flowers* dioecious; *calyx* 6-parted, deciduous; *stamens* of the sterile flowers 9, in 3 rows, those of the fertile flowers numerous and rudimentary; *anthers* 4-celled, 4-valved, introrse; *stigma* peltate; *drupe* globose.—*Trees* or *shrubs*, with entire *leaves*, and small flowers in clustered umbels.

T. GENICULATA, Nees. *Branchlets* smooth, zigzag, spreading; *leaves* small, oval or oblong, soon smooth, deciduous; *involucre* 2–4-flowered; *flowers* yellow, appearing before the leaves; *drupe* red. (*Laurus geniculata*, Walt.) Shallow pine-barren ponds. February and March.

104. MEZEREUM FAMILY. Order, THYMELACEÆ.

Shrubs, with acrid juice, tough bark, simple entire dotless *leaves*, without stipules, and regular perfect *flowers*, with a tubular or bell-shaped 4–5-cleft rarely entire *calyx*;

stamens commonly twice as many as the calyx-lobes, in 2 rows; *anthers* 2-celled, opening lengthwise; *style* simple; *stigma* capitate; *drupe* with a single suspended anatropous seed, containing little or no albumen; *cotyledons* plano-convex; *radicle* superior.

DIRCA, L. LEATHERWOOD.

Calyx bell-shaped, entire, or obscurely 4-toothed; *stamens* 8, unequal, exserted; *style* filiform; *albumen* none.—A low branching *shrub*, with alternate petioled oblong or obovate at length smooth and deciduous *leaves*, and light-yellow *flowers* from hairy buds, appearing before the leaves.

D. PALUSTRIS, L. Shady banks of streams. February and March.—*Shrub*, 2°–3° high, with pale spreading jointed *branches*; *leaves* 2' long, silky when young; *flowers* three in a cluster, on short pedicels; *drupe* small, red.

105. SANDALWOOD FAMILY. Order, SANTALACEÆ.

Herbs, shrubs, or trees, with simple entire exstipulate *leaves*; *calyx* tubular, 4–5-cleft, valvate in the bud, the tube coherent with the ovary; *stamens* 4–5, opposite the lobes, and inserted on the fleshy disk at their base; *anthers* introrse, opening lengthwise; *ovary* 1-celled, with 2–4 anatropous ovules suspended from the apex of the free central placenta; *style* single; *fruit* 1-seeded; *embryo* small, at the apex of copious albumen; *cotyledons* cylindrical; *radicle* superior.

SYNOPSIS.

* *Flowers perfect.*

Anthers connected with the calyx-lobes by a tuft of hairs. Leaves alternate.

COMANDRA.

** *Flowers diœcious; shrubs.*

Calyx-limb double, each 4-lobed. Stamens 4. Anthers free. Albumen fleshy. Leaves nearly opposite. Flowers terminal......BUCKLEYA (Torrey).

COMANDRA, Nutt.

Flowers perfect; *calyx* bell-shaped, 5-cleft, the persistent lobes alternating with the lobes of the disk; *stamens* 5; anthers connected with the calyx-lobes by a tuft of hairs; *stigma* capitate; *fruit* nut-like, 1-seeded.—Smooth perennial *herbs*, with alternate *leaves*, and small greenish-white *flowers*, in axillary and terminal umbel-like peduncled clusters.

C. UMBELLATA, Nutt. *Stem* branching above; *leaves* sessile, lanceolate or oblong; *peduncles* several, corymbose, 3-5-flowered, mostly longer than the leaves; *style* slender; fruiting *calyx* urn-shaped. (*Thesium umbellatum*, L.) Dry soil. April and May. Stem 8'-10' high; leaves $\frac{1}{2}$ '-1' long.

106. MISTLETOE FAMILY. Order, LORANTHACEÆ.

Parasitical shrubby *plants*, with evergreen almost veinless *leaves*, without stipules, and perfect or dioecious *flowers*; *calyx* of 2-8 sepals, distinct or united into a tube, valvate in the bud, sometimes wanting; *stamens* as many as the sepals and opposite them; *ovary* 1-celled, commonly with a single suspended ovule; *style* simple or none; *fruit* berry-like; *seeds* anatropous; *embryo* longer than the fleshy albumen.

PHORADENDRON, Nutt. MISTLETOE.

Flowers dioecious, in short jointed spikes; *calyx* of the sterile flower globular, 2-4-lobed; *anthers* sessile at the base of the lobes, transversely 2-celled; *calyx* of the fertile flower adnate to the ovary; *stigma* sessile; *berry* globose, pulpy, 1-seeded.—Evergreen *shrubs*, growing on the branches of various trees, with brittle jointed *stems*, thick, persistent *leaves*, and small *flowers* in axillary spikes.

P. FLAVESCENS, Nutt. (*Viscum flavescens*, Pursh.) April and May. *Plant* yellowish, 2°-3° long; *branches* opposite or whorled; *leaves* obovate, fleshy; *spikes* shorter than the leaves; *berry* white, glutinous.

107. LIZARD'S-TAIL FAMILY. Order, SAURURACEÆ.

Perennial marsh *herbs*, with jointed stems, alternate entire *leaves*, with sheathing *stipules*, and perfect *flowers* in bracted spikes or racemes; *calyx* and *corolla* none; *stamens* few or many, hypogynous; *anthers* introrse, opening lengthwise; *ovaries* 3-5, more or less united; *ovules* few, orthotropous, ascending; *embryo* minute, cordate, contained in a cavity at the apex of the albumen; *fruit* follicular, 1-few-seeded.

SAURURUS, L. LIZARD'S-TAIL.

Stamens 4-8, with long club-shaped filaments; *fruit* somewhat fleshy, composed of 3-4 partly united 1-2-seeded carpels, pointed with as many stigmas; *flowers* white.

S. CERNUUS, L. *Stem* erect, branching; *leaves* petioled, cordate-ovate, or oblong-ovate, acuminate; *spikes* white, terminal, nodding at the apex; *flowers* numerous, each from the axil of a small bract. Marshes and muddy banks. May-August. *Rhizoma* creeping; *stem* 1°-2° high; *spikes* 4'-6' long.

108. HORNWORT FAMILY. Order, CERATOPHYLLACEÆ.

Submerged aquatic *herbs*, with filiform jointed and branching *stems*, finely dissected whorled *leaves*, and small axillary monœcious *flowers*, destitute of floral envelopes, but surrounded by an *involucre* of 8-12 linear leaves; *anthers* 12-24, oblong, 2-3-toothed, sessile; *ovary* solitary, simple, with a single suspended orthotropous ovule; *achenium* compressed, pointed with the slender persistent style; *albumen* none; *cotyledons* 4; *plumule* conspicuous. Consisting of the single genus

CERATOPHYLLUM, L. HORNWORT.

C. DEMERSUM, L. *Leaves* rigid, 6-9 in a whorl, once or twice forking, with the lobes spiny-toothed; *achenium* oval, compressed, tubercular-roughened on the sides, and armed near the base with 2 lateral widely-spreading slender spines. In still water. September and October. *Stems* 1°-4° long; leaves near the end of the branches much crowded.

109. STARWORT FAMILY. Order, CALLITRICHACEÆ.

Small aquatic *annuals*, with opposite entire *leaves*, and solitary axillary polygamous *flowers* without floral envelopes; *stamen* mostly solitary, 2-bracted in the sterile flower; *filament* slender; *anther* reniform, the cells confluent; *styles* 2, slender; *stigmas* acute; *capsule* 4-angled, 4-celled, with a single suspended anatropous seed in each cell, indehiscent; *embryo* straight, in copious fleshy albumen; *radicle* long, superior. Consisting of the single genus

CALLITRICHE, L. WATER-STARWORT.

C. VERNA, L. *Leaves* floating, obovate or spatulate, lower ones crowded. *Fruit* sessile, keeled on the back. *Stems* several, 6'-12' long; leaves $\frac{1}{2}$ ' long.

110. RIVER-WEED FAMILY. Order, PODOSTEMACEÆ.

Moss-like aquatic *plants*, with minute *flowers*, from a *spathe*-like involucre, and destitute of floral envelopes; *stamens* 5-12; *anthers* 2-celled; *capsule* 2-3-celled, and pointed by as many persistent styles; *seeds* numerous, on a thick central placenta, destitute of albumen.

PODOSTEMON, Michx. RIVER-WEED.

Spathe 2-leaved; *flowers* pediceled; *filaments* elongated, borne on one side of the stalk of the ovary, united below, and bearing only a single anther; *styles* 2, simple; *capsule* ribbed, 2-celled, 2-valved; *seeds* imbricated.—Submerged aquatic *plants*, attached to rocks and pebbles by disk-like expansions of the stem; *leaves* 2-ranked, divided into filiform segments.

P. CERATOPHYLLUM, Michx. *Leaves* rigid, sparingly divided, sheathing at the base; *flowers* solitary, on slender pedicels; *capsule* oval, 8-ribbed. Rocky places in rivers. July. *Plant* olive-green, 1'–4' long.

P. ABROTANOIDES, Nutt. *Leaves* much divided, with hair-like segments; *flowers* 2–3 together, on short pedicels; *capsule* oblong, 10-ribbed. Gravelly places in rivers.—Nuttall. *Plant* larger than the last.

111. SPURGE FAMILY. Order, EUPHORBIACEÆ.

Plants commonly with acrid milky juice, and monœcious or diœcious often petalous *flowers*; *calyx* 2–8-lobed, mostly valvate in the bud, sometimes wanting; *stigmas* 2–several, simple or divided; *fruit* of 2–several (mostly 3) 1–2-seeded carpels united around a central axis, separating at maturity, rarely 1-celled or indehiscent; *seeds* suspended, anatropous; *embryo* in fleshy albumen; *cotyledons* flat.

SYNOPSIS.

§ *Ovules* and *seeds* solitary in the cell; *flowers* monœcious.

* *Flowers* without floral envelopes, inclosed in a common cup-shaped involucre.

Fertile *flowers* solitary in the 4–5-toothed involucre. Sterile *flowers* several, each reduced to a single stamen.....EUPHORBIA.

** *Flowers* in bracted spikes or racemes; the upper ones sterile, the lowest fertile.

† *Flowers* apetalous.

†† *Stigma* and cells of the capsule 6–7.

Calyx 2–3-toothed. *Anthers* erect. *Staminate* *flowers* clustered.....STILLINGIA.

— 3-parted. — pendulous. *Staminate* *flowers* single.....EXCÆCARIA.

- Stigmas many-parted. Flowers spiked. Bracts of the pistillate flowers leafy, toothed.*
 ACALYPHA.
- Stigmas 3, simple. Flowers racemed. Bracts small and entire.....*TRAGIA.
- †† *Staminate flowers (except CROTON MARITIMUM), or the pistillate flowers also furnished with petals.*
- Pistillate flowers apetalous, or with minute petals. Stamens 6 or more, distinct..*CROTON.
 ————— *apetalous. Capsule 1-celled. Stamens 5, distinct.....*CROTONOPSIS.
- *** *Flowers cymose or paniced, apetalous.*
- Flowers cymose. Calyx white, corolla-like.....*CNIDOSCOLUS.
 ——— *in crowded panicles. Calyx herbaceous.....*RICINUS.
- § *Ovules, and commonly the seeds, 2 in the cells.*
- * *Flowers monœcious, apetalous; ovary 3-celled; herbs.*
- Flowers axillary. Calyx 5-6-parted. Stamens 3, monadelphous.....*PHYLLANTHUS.
 ——— *spiked. ——— 4-parted. ——— 4, distinct.....*PACHYSANDRA.
- ** *Flowers diœcious, apetalous; ovary 2-celled; shrubs.*
- Flowers in axillary clusters. Fruit drupaceous, 1-celled, 1-seeded.....*DEYPETES.

EUPHORBIA, L. SPURGE.

Flowers monœcious, destitute of calyx and corolla, the single pistillate, and several monandrous staminate ones included in a cup-shaped or top-shaped 4-5-toothed involucre, which has commonly thick and often colored glands between the teeth; styles 3, 2-cleft; capsule exserted, 3-celled; carpels 2-valved, 1-seeded.—A polymorphous genus of plants with acrid milky juice.

§ *Leaves without stipules.*

* *Stem erect, umbellately branched above; involucre solitary, terminal and in the forks of the branches; leaves of the stem alternate, those of the branches opposite or whorled.*

† *Glands of the involucre 5, with white petal-like appendages; leaves entire; perennials.*

E. COROLLATA, L. *Stem smooth or pubescent; branches 4-6, twice or thrice forking, mostly short and fastigiate; leaves thick, oblong or oval, obtuse, pale and mostly hairy beneath; involucre pediceled; appendages of the (green) glands orbicular, showy; capsule and seed smooth. (E.*

paniculata, Ell.)—Var., *ANGUSTIFOLIA*, Ell. *Stems* slender; *branches* mostly 3, forking, elongated, spreading; *leaves* varying from linear to obovate; involucre small, scattered; appendages of the glands transversely oblong. Dry rich soil; the var. in sandy pine-barrens. July–September. Stem 1°–2° high.

E. *MARGINATA*, Pursh. *Leaves* oblong-lanceolate, subcordate; *umbel* 3-rayed, once or twice dichotomous; *involucre-leaves* oblong, cordate, colored and membranaceous at the margin; *inner segments* of the floral involucre roundish; *capsules* hoary-pubescent. A handsome species, remarkable for the variegated leaves.

E. *HELIOSCOPA*, L. (*Sun Spurge*.) Erect; *floral leaves* obovate, cauline, wedge-shaped, sharply serrate, smooth; *umbel* 5-rayed, then 3-rayed and forked; *fruit* smooth and even; *seeds* reticulated.—A large annual *weed*, remarkable for its symmetry. *Stem* smooth, erect, 8'–16' high; *leaves* scattered, $\frac{2}{3}$ '–1 $\frac{1}{2}$ ' long, $\frac{2}{3}$ as broad at the rounded or retuse apex, tapering to the base; umbels subtended by a large involucre of 5 obovate leaves. Each of the 5 rays is pilous with scattered hairs, and subdivided into an umbellet of 3 rays with a 3-leaved involucre, and these finally into 2 or more pedicellate fascicles.

†† Glands of the involucre 5, without appendages.

‡ Annuals.

E. *COMMUTATA*, Engelm. Smooth; *stems* erect or ascending, umbellately or alternately branched; *leaves* thin, obovate, entire, the lower ones petioled, those of the branches round-kidney-shaped, sessile; *involucres* nearly sessile, shorter than the floral leaves; *glands* crescent-shaped or 2-horned; *capsule* smooth, round-angled; *seeds* ovoid, pitted. Stem 6'–12' high; leaves $\frac{1}{2}$ '–1' long; plant pale green.

STILLINGIA, Gard.

Flowers monœcious, apetalous, spiked; *sterile flowers* clustered, cup-shaped, 2-4-toothed or crenate; *stamens* 2-3, exserted; *anthers* erect; *fertile flowers* few at the base of the spike; *calyx* 3-lobed; *style* short; *stigmas* 3, entire, spreading; *capsule* roundish, of three 1-celled, 1-seeded, 2-valved carpels.—Smooth *herbs*, *shrubs*, or *trees*, with milky juice; *leaves* alternate, stipulate; *bracts* with a fleshy gland on each side.

S. SYLVATICA, L. (*Queen's Delight*.) *Herbaceous*; *stems* clustered, erect or ascending from a thick woody root, umbellately branched; *leaves* somewhat crowded, nearly sessile, thickish, varying from linear-lanceolate to obovate, obtuse or acute, crenate-serrulate; *spikes* yellowish, terminal, and in the forks of the stem, longer than the leaves; *glands* cup-shaped; *stamens* 2; *capsule* roughish; *seed* globose. Light dry soil. April-September. Stems 1°-3° high; leaves 1'-2' long; spikes 2'-3' long.

S. LIGUSTRINA, Michx. Shrubby; *branches* alternate, slender; *leaves* petioled, ovate-lanceolate or oblong-ovate, mostly obtuse, narrowed at the base, entire; *stipules* ovate; *spikes* short, often by pairs, shorter than the leaves, lateral and terminal; *stamens* 3; *capsule* and oval seed smooth. River-swamps. May-August. *Shrub* 6°-12° high; branches spreading; leaves 1'-3' long.

ACALYPHA, L.

Flowers monœcious, apetalous, in axillary and terminal spikes; *staminate flowers* clustered, minutely bracted; *calyx* 4-parted; *stamens* 8-16, with the filaments united at the base; *anthers* pendulous; *pistillate flowers* at the base of the staminate ones, or on separate spikes, surrounded by a leafy toothed bract; *calyx* 3-parted; *styles* 3, many-cleft; *capsule* roundish, of three 1-celled, 1-seeded, 2-valved carpels.—*Herbs* with watery juice, and alternate serrate *leaves*.

* *Staminate and pistillate flowers on the same spike.*

A. VIRGINICA, L. Annual, smoothish or hairy; *stem* erect, branched; *leaves* thin, long-petioled, rhombic-ovate or oblong-ovate, acute, coarsely serrate above the middle; *staminate spikes* few-flowered, mostly shorter than the large 5-9-lobed bracts, with 1-3 pistillate *flowers* at the base; *capsule* pubescent. Stem 1° - 2° high; leaves, with the petiole, 4'-5' long. Near Austin.

** *Staminate and pistillate flowers on separate spikes.*

A. CAROLINIANA, Walt. Annual; *stem* erect, much branched, pubescent; *leaves* thin, smooth, cordate-ovate, sharply serrate, long-petioled; *staminate spike* lateral, small, the minute white flowers pediceled; *pistillate spike* terminal, stout, many-flowered; *bracts* cut into several subulate lobes; *capsule* bristly; *seeds* silvery, pitted. Cultivated ground. July-September. Stem 1° - 2° high; leaves 2'-3' long.

TRAGIA, Plum.

Flowers monœcious, apetalous, in slender racemes; *sterile flowers* few or numerous, caducous; *calyx* 3-4-parted; *stamens* 2-4, with short and separate filaments;—*fertile flowers* few or solitary at the base of the raceme; *calyx* 5-8-parted; *style* 3-cleft; *stigmas* entire; *capsule* bristly, of three globose 1-celled, 1-seeded, 2-valved carpels.—Pubescent or bristly *herbs*, with watery juice; *leaves* alternate; *racemes* opposite the leaves and terminal; *bracts* small, entire, persistent; flowers minute, greenish.

T. URENS, L. Low, downy or hairy; *stem* at length much branched; *leaves* nearly sessile, varying from broadly ovate or oblong-ovate, and serrate or toothed throughout, or only at the apex, to linear and entire, obtuse, paler beneath; *racemes* shorter than the leaves and few-flowered, or elongated and many-flowered. (T. linearifolia, Ell., the narrow-leaved form.) Dry sandy soil. May-August. Stem 6'-12' high; leaves 1'-2' long. Perennial.

T. URTICIFOLIA, Michx. Bristly, with stinging hairs; *stem* erect, sparingly branched; *leaves* petioled, deltoid-ovate or oblong, coarsely serrate, truncate or cordate at the broad base, pale beneath; *racemes* shorter than the leaves, the *sterile flowers* somewhat crowded; *capsule* very bristly. Dry soil. June–September. Stem 1°–2° high; leaves 1'–2' long. Perennial.

T. RAMOSA. Red River.—*Marcy*.

CROTON, L.

Flowers monœcious, in spikes or racemes; *calyx* of the sterile flowers 4–6-cleft or 4–6-parted; *petals* 4–6; *stamens* 5–20, distinct; *anthers* erect, introrse; *glands* as many as the calyx-lobes and opposite them; fertile flowers at the base of the sterile spike; calyx 5–8-cleft or 5–8-parted; *petals* minute or wanting; *styles* 2–3, once–thrice 2-cleft; *capsule* of 3 (rarely 1–2) 1-celled, 1-seeded, 2-valved carpels; *glands* as many as the calyx-lobes or none.—*Herbs* or *shrubs*, with watery juice, stellate pubescence, and alternate petioled leaves; flowers terminal, and at the divisions of the stem.

* *Styles* very short; *stigmas* 18–20; *petals* none; *stamens* mostly 12; *capsule* 3-celled.

C. MARITIMUM, Walt. *Herbaceous*; whole plant covered with a rough scurfy stellate and somewhat hoary pubescence; *stem* stout, bushy, umbellately branched; *leaves* thick, long-petioled, ovate, obtuse, entire, rounded or slightly cordate at the base, hoary beneath; *spikes* long-peduncled, capitate, few-flowered, the sterile and fertile ones mostly separate; *calyx* 5-cleft, with ovate-obtuse lobes; *capsule* much longer than the calyx; *seeds* ovoid, mottled. Drifting sands along the coast. July–October. Stem 2°–3° high; leaves 2'–3' long; *flowers* occasionally polygamous.

** *Styles* 3, twice 2-parted or 2-cleft; *stigmas* 12; *petals* of the sterile flowers 5–6, of the fertile none; *stamens* 8–15; *capsule* 3-celled.

C. BALSAMIFERUM, Willd. *Shrubby*; *stem* smooth,

whitish ; *branches* stellate-pubescent, roughish ; *leaves* slender-petioled, ovate, acute, crenulate, sprinkled with rigid stellate hairs, hoary when young ; *spikes* woolly, at length elongated ; *sterile flowers* numerous, the *fertile* ones few ; *calyx* of the sterile flower 5-parted, longer than the woolly-margined petals ; *style* twice 2-parted, the divisions long, filiform ; *stamens* about 15 ; *capsule* much longer than the calyx ; *seed* ovoid, smooth.—*Shrub* 1°–2° high ; leaves thin, 1'–1½' long. Prairies around Houston.

C. ARGYRANTHEMUM, Michx. *Herbaceous*, perennial, covered throughout with stellate silvery scales ; *stem* erect, umbellately branched ; *leaves* obovate or oblong, obtuse, entire, silvery beneath, narrowed into a petiole ; *racemes* sessile, oblong, obtuse ; the *fertile flowers* numerous and crowded ; *calyx* 5–6-parted, with the lobes acute ; *stamens* 10–12, hairy ; *styles* long and slender, 4-cleft at the apex ; *capsule* much longer than the calyx. Dry sandy pine-barrens.

C. LINDHEIMERI, Eng. and Gray. *Shrubby*, erect, trichotomously branched, clothed with a dense hoary tomentum ; *leaves* oblong-lanceolate, rounded or subcordate at the base, acute, entire ; lower *petiole* elongated ; *spikes* terminal and in the forks, mixed or separate ; *sterile flowers* many, sessile, *fertile* larger, 2 or 3 at the base or alone ; *calyx* very woolly ; *pistillate* flowers 7 or 8-parted ; *styles* 3, twice or thrice forked, red ; *ovary* very villous ; *pistillate* flowers a mass of rusty wool, 5" broad.—*Shrub* 2°–4° high ; leaves 2'–3' long.

*** *Styles* 2, 2-parted ; *stigmas* 4 ; *petals* 5 in the sterile flowers, none in the fertile ; *stamens* 5–10 ; *capsule* 1–2-celled.

C. MONANTHOGYNUM, Michx. Annual ; *stem* erect, twice or thrice umbellately branched, the spreading forking branches, like the leaves and racemes, stellate-tomentose ; *leaves* on slender petioles, ovate or oblong, entire, obtuse, whitish beneath ; *racemes* in the forks of the branches, few-flowered ; the *sterile flowers* corymbose ; the *fertile*

(1-2) nodding. Dry sterile soil. June-September. Stem 1° high; leaves 1' long.

CROTONOPSIS, Michx.

Flowers monœcious, in terminal and axillary clusters; *calyx* of the sterile flowers 5-parted; *petals* and *stamens* 5; *filaments* separate, dilated upward; fertile flowers below the sterile; *calyx* 3-5-parted; *petals* none; petal-like glands 5, opposite the calyx-lobes; *ovary* 1-celled, 1-ovuled; *stigmas* 3, each 2-cleft; *fruit* globose, indehiscent, 1-seeded. —A low and slender branching *annual*; *leaves* linear or lanceolate, short-petioled, entire, green and hairy above, the lower surface, like the branches, covered with silvery scales; *flowers* minute.

C. LINEARIS, Michx. Dry sandy soil. August-September. *Stem* 6'-12' high, alternately branched or forking; *leaves* $\frac{1}{2}$ '-1' long, alternate or opposite.

CNIDOSCOLUS, Pohl.

Flowers monœcious, apetalous, cymose; *calyx* corolla-like; *calyx* of the sterile flower salver-shaped, 5-lobed; *stamens* 10, the 5 inner ones with monadelphous filaments; *fertile flowers* intermingled with the sterile ones; *calyx* of 5 sepals, convolute in the bud; *styles* 3, many-parted; *capsule* of three 1-celled, 1-seeded, 2-valved carpels.—*Herbs* or *shrubs*, with alternate *leaves*, and white flowers.

C. STIMULOSUS, Gray. Herbaceous, bristly with stinging hairs; *stem* erect, simple or branched; *leaves* long-petioled, round-cordate in outline, palmately 3-5-lobed or parted, the divisions toothed, pinnatifid, or somewhat bipinnatifid, often discolored; *calyx* showy; *capsule* oblong; *seed* oblong, smooth, spotted. (*Jatropha stimulosa*, Michx.) Dry pine-barrens. April-September. Stem $\frac{1}{2}$ °-2° high; *flowers* sometimes dioecious. Perennial.

RICINUS, Tourn. CASTOR-OIL PLANT.

Flowers monœcious, apetalous, in a dense oblong panicle, the upper ones fertile; *calyx* 3-5-parted; *corolla* none; *stamens* numerous, the filaments much branched; *anther-cells* distinct, pendulous; *styles* 3, 2-parted; *capsule* spiny or bristly, of 3 oblong 1-celled, 1-seeded, 2-valved carpels. — *Herbs*, or (tropical) *shrubs* or *trees*, with petioled peltate lobed *leaves*; *panicles* lateral and terminal.

R. COMMUNIS, L. *Stem* large, glaucous; *leaves* orbicular in outline, palmately 7-9-lobed, the lobes oblong or ovate, acuminate, unequally serrate, smooth; *petioles* glandular; *panicles* in the forks of the stem, and opposite the leaves, dense, glaucous; *capsules* oblong, spiny. Waste places. June-October. *Stem* 3°-10° high; *leaves* 1° in diameter; *stipules* large, deciduous; *panicle* 6'-12' long. Annual.

PHYLLANTHUS, Swartz.

Flowers monœcious, apetalous, axillary; *calyx* 5-6-parted; *stamens* 3, monadelphous; *glands* 5-6; *ovary* 3-celled, with two ovules in each cell; *styles* 3, 2-cleft; *capsule* globose, of three 1-celled, 2-seeded, 2-valved carpels. — Smooth *herbs*, with 2-ranked *leaves* and *branches*; flowers small, greenish.

P. CAROLINENSIS, Walt. Annual; *branches* erect-spreading; *leaves* oblong, oval, or obovate, entire, short-petioled; *flowers* mostly by pairs, one sterile, the other fertile, on short nodding pedicels; *calyx* 6-parted, the lobes oblong, obtuse, strongly 1-nerved, membranous on the margins; *capsule* smooth; *seed* semicircular, 3-angled, striped with lines of minute raised points. Low ground. August-September. *Stem* 8'-16' high; *leaves* $\frac{1}{2}$ '-1' long.

PACHYSANDRA, Michx.

Flowers monœcious, apetalous, spiked; *calyx* bract-like,

4-parted; *sterile flowers* numerous; *stamens* 4, with club-shaped exserted filaments; *fertile flowers* few, at the base of the sterile spike; *ovary* 3-celled, with two ovules in each cell; *styles* 3, thick, recurved; *capsule* of three 1-celled, 2-seeded, 2-valved carpels.—A pubescent creeping perennial *herb*, with erect simple *branches*, bearing at the summit several large ovate toothed alternate abruptly long-petioled *leaves*, and near the base several thick bracted *spikes*.

P. PROCUMBENS, Michx. February and March. *Flowering stems* 1° high; *leaves* 3'-4' long, often discolored; *flowers* odorous.

DRYPETES, Vahl.

Flowers diceious, apetalous, in axillary clusters; *calyx* 4-6-parted, lined in the center with a wavy-lobed disk; *stamens* 4-10, inserted under the disk; *anther-cells* distinct; *ovary* resting upon the disk, 2-celled, the cells 2-ovuled; *styles* 2, short, spreading; *fruit* drupaceous, 1-2-celled, 1-2-seeded.—Tropical *trees* or *shrubs*, with alternate coriaceous entire smooth petioled *leaves*, and minute many-bracted *flowers*.

D. CROCEA, Poit. *Branches* smooth; *leaves* oblong, acute at each end, somewhat coriaceous, finely veined; *clusters* many-flowered, shorter than the petioles; *calyx* 4-parted, and like the ovary and slightly 4-angled 1-seeded drupe tomentose; *stamens* 4, exserted; *styles* thick, obtuse.—A small *tree*; *leaves* 3'-4' long, smooth and shining; *flowers* greenish-white.

D. GLAUCA, Vahl. *Branches* whitish, warty; *leaves* glaucous, oblong, obtuse or gland-pointed, coriaceous; *clusters* few-flowered, as long as the petioles; *calyx* 5-parted; *stamens* 10; *drupes* oval, tomentose. *Leaves* 2'-3' long.

112. CROWBERRY FAMILY. Order, EMPETRACEÆ.

Shrubs, with evergreen linear alternate or whorled *leaves*,

without stipules, and small dioecious or polygamous *flowers*; *calyx* bract-like, of 2-3 sepals, imbricated; *corolla* of 2-3 petals similar to the calyx, hypogynous; *stamens* 2-3, alternate with the petals, exserted; *anthers* 2-celled, extrorse; *ovary* 2-9-celled, the cells 1-ovuled; *style* short or none; *stigma* lobed or incised; *drupe* berry-like, globose, of 2-9 one-seeded nutlets; *seeds* erect; *embryo* in the axis of copious fleshy albumen.

CERATIOLA, Michx.

Calyx bracted, of two fringed sepals; *corolla* 2-petaled; *stamens* 2; *anther*-cells globose; *ovary* resting on a fleshy disk, 2-celled, 2-ovuled; *style* short; *stigma* many-cleft; *drupe* 2-seeded.—A heath-like erect verticillately much-branched *shrub*, with small linear shining whorled *leaves*, and axillary (whorled) reddish *flowers*.

C. ERICOIDES, Michx. Dry barren sands. November. *Shrub* 2°-5° high, the young branches pubescent; *leaves* 3 in a whorl, 4"-6" long, the margins revolute; *petioles* yellowish, appressed; *drupe* yellowish, somewhat persistent.

113. BATIS FAMILY. Order, BATIDACEÆ.

Represented only by

BATIS, P. Browne.

Flowers dioecious, in axillary fleshy conical spikes; *bracts* of the sterile flowers round-cordate, persistent; *calyx* cup-shaped, somewhat compressed, unequally 2-lipped; *petals* 4, rhombic-ovate, clawed; *stamens* 4, alternate with the petals, partly exserted; *anthers* oblong, introrse; *fertile flowers* consolidated; *bracts* deciduous; *calyx* and *corolla* none; *ovary* 4-celled, with a single erect anatropous ovule in each cell; *stigma* sessile, broad, obscurely 2-lobed; *drupe* 4-seeded; *seed* oblong, without albumen; *cotyledons* fleshy; *radicle* inferior.—A smooth

maritime *shrub*, with the habit of *Salicornia*; *leaves* opposite, fleshy, club-shaped, semi-terete; *stipules* none; *petals* white.

B. MARITIMA, L. Salt marshes. June–September. *Plant* pale green, strong-scented; *stems* prostrate, 2°–3° long, the short branching flowering-stems erect; *leaves* 1' long; *spikes* 3"–5" long.

114. NETTLE FAMILY. Order, URTICACEÆ.

Herbs, with watery juice, often armed with stinging hairs; *leaves* undivided, stipulate; *flowers* monœcious or diœcious, apetalous, clustered, cymose, spiked, or paniced; *calyx* of the sterile flower 4–5-parted or 4–5-sepalous; *stamens* as many as and opposite the sepals; *filaments* inflexed in the bud, expanding elastically; *anthers* 2-celled, introrse; *calyx* of the fertile flower 2–4-sepalous; *ovary* sessile, free, 1-celled, with a single erect orthotropous ovule; *stigma* simple or tufted; *achenium* commonly inclosed in the dry persistent calyx; *embryo* straight in the axis of fleshy albumen.

SYNOPSIS.

* *Plants armed with stinging hairs.*

Stamens 4. *Stigma* tufted. *Achenium* straight.....URTICA.

** *Plants destitute of stinging hairs.*

† *Flowers in cymose clusters.*

Clusters naked. *Calyx-lobes* unequal. *Leaves* opposite.....PILEA.

— involucrate. — equal. — alternatePARIETARIA.

†† *Flowers in spiked clusters.*

Stigmas subulate, *leaves* opposite or alternate.BOEHMERIA.

URTICA, Tourn. NETTLE.

Flowers monœcious or diœcious; *calyx* of the sterile flower 4-parted; *stamens* 4, inserted around the abortive

ovary; *calyx* of the fertile flower 4-sepalous, unequal, the inner ones dilated in fruit, and inclosing the achenium; *stigma* sessile, tufted; *achenium* straight, ovate, smooth, compressed.—*Herbs*, with stinging hairs, opposite *leaves*, and greenish *flowers*, in paniced spikes or close clusters.

* *Flowers in paniced or simple spikes.*

U. GRACILIS, Ait. *Stem* tall, 4-angled, smoothish, slender; *leaves* long-petioled, ovate-lanceolate, coarsely serrate, acute, rounded at the base, 3-5-nerved, smoothish, the petioles bristly; *spikes* very slender, loosely paniced. (U. procera, Willd.) Low ground in the upper districts, and northward. July and August. Stem 3°-4° high, mostly simple; leaves thin, 4'-6' long. Perennial.

U. DIOICA, L. Hispid throughout; *stem* 4-angled, pubescent above, branching; *leaves* rather short-petioled, ovate, cordate, acuminate, coarsely serrate, pubescent beneath; *spikes* much branched; *flowers* often diœcious. Waste places. Introduced. June-August. Stem 2°-3° high; leaves 3'-4' long, thicker than in the preceding and flowers larger. Perennial.

U. CAPITATA, Willd. *Stem* 4-angled, roughish; *leaves* large, long-petioled, rough, oblong-ovate, slightly cordate, coarsely serrate, 3-nerved, those on the branches alternate; *spike* solitary, leafy at the summit. Wet shaded places. July and August. Stem 3°-5° high.

** *Flowers in simple clusters shorter than the petioles.*

U. URENS, L. *Stem* 4-angled, hairy; *leaves* ovate, coarsely serrate, 5-nerved, hairy; *clusters* by pairs in each axil, loose, peduncled. Damp soil. December-February. Stem 1° high. Annual.

U. CHAMÆDROIDES, Pursh. *Stem* smooth; *leaves* small, nearly sessile, ovate, coarsely serrate, hairy beneath, hairy and bristly above; *clusters* nearly sessile, globose, dense; *calyx* hairy. February and March. Stem 4'-6' high.

PILEA, Lindl.

Flowers monœcious or dioecious; *calyx* of the sterile flower 3-4-parted; *stamens* 3-4; *calyx* of the fertile flowers 3-lobed, the lobes unequal or nearly equal, commonly with an inflexed scale-like sterile stamen at the base of each; *stigma* sessile, tufted; *achenium* ovate, compressed, straight.—Low *herbs*, destitute of stinging hairs; *leaves* opposite, long-petioled; flowers in axillary cymose clusters.

P. PUMILA, Gray. *Stem* angular, simple, smooth, pellucid; *leaves* membranaceous, ovate or elliptical, acuminate, coarsely serrate, 3-nerved, slightly hairy above; *cymes* much shorter than the petiole. (*Urtica pumila*, L.) Wet shaded places. July–September. Stem 6'–12' high; upper leaves 1'–2' long, the lower not longer than the petiole. Annuals.

P. HERNIARIOIDES, Lindl. *Stems* erect or creeping, branched, tender, pellucid; *leaves* small, round-obovate, entire, opaque, transversely marked on the upper surface with white raised lines; *clusters* shorter than the petiole; *flowers* minute. Shaded moist places. November. Stems 2'–4' long; leaves 1''–2'' long, rather longer than the petiole; *achenium* very minute, oblong, terete.

PARIETARIA, Tourn. PELLITORY.

Flowers polygamous, in axillary cymose clusters, supported by a bract-like involucre; *calyx* of the sterile flowers 4-5-sepalous; *stamens* 4-5, inserted around the abortive ovary; *calyx* of the fertile flowers 4-parted; *stigma* tufted; *ovary* surrounded by four sterile or sometimes perfect stamens; *achenium* ovoid.—Weak downy *herbs*, without stinging hairs; *leaves* alternate, entire, long-petioled; flowers minute, greenish.

P. PENNSYLVANICA, Muhl. Pubescent with straight hairs; *stem* simple or sparingly branched; *leaves* thin, ob-

long-lanceolate, obtuse, roughened with minute elevated dots; *clusters* dense; *flowers* shorter than the involucre. Shaded rocks in the upper districts. May-July. Stem 4'-12' high; leaves 6"-9" long. Annual.

BEHMERIA, Jacq. FALSE NETTLE.

Flowers monœcious or diœcious, in spiked clusters; *calyx* of the sterile flowers 4-5-cleft; *stamens* 4-5; *calyx* of the fertile flowers tubular, 4-5-toothed or entire; *stigma* subulate, hairy; *achenium* elliptical, inclosed in the persistent calyx.—Rough *herbs*, with alternate or opposite petioled *leaves*.

B. CYLINDRICA, Willd. Pubescent and rough with straight and hooked hairs; *leaves* opposite and alternate, ovate and ovate-lanceolate, acuminate, serrate, rounded and 3-nerved at the base, on long or short petioles; *spikes* axillary, mostly leafy at the summit, the fertile ones compactly flowered, short, the sterile interrupted, and sometimes longer than the leaves. Swampy thickets. July-September. *Stem* 1°-3° high, mostly simple; leaves 2'-5' long. Perennial.

115. HEMP FAMILY. Order, CANNABINACEÆ.

Erect or twining *herbs*, with opposite incised or lobed and stipulate *leaves*, and diœcious *flowers*; sterile flowers racemose or paniced; *calyx* 5-sepalous; *stamens* 5, opposite the sepals, not inflexed in the bud; *fertile flowers* in bracted spikes; *calyx* 1-leaved, embracing the 1-celled ovary; *ovule* solitary, erect; *stigmas* 2, subulate, pubescent; *fruit* indehiscent; *albumen* none; *embryo* coiled or curved.

HUMULUS, L. Hop.

Sterile flowers paniced; *fertile flowers* in short axillary and solitary spikes; *bracts* leafy, imbricated, 2-flowered,

forming in fruit a membranaceous cone; *calyx* enlarged in fruit; *embryo* spirally coiled.—A rough perennial twining herb, with cordate 3-5-lobed leaves, and greenish-yellow flowers.

H. LUPULUS, L. Low grounds along the mountains. June and July. *Stem* 6°-10° high; *leaves* petioled, serrate; *achenium* covered with resinous yellowish odorous grains.

116. MULBERRY FAMILY. Order, MORACEÆ.

Trees or *shrubs*, with milky juice, alternate leaves, with large deciduous *stipules*, and monœcious or diœcious *flowers*, crowded in spikes or heads, or inclosed in the fleshy receptacle; *calyx* of the sterile flowers 3-4-lobed; *stamens* 3-4, inserted on the base of the calyx; *filaments* inflexed in the bud, elastic; *calyx* of the fertile flowers 3-5-sepalous; *ovary* 1-2-celled, 1-2-ovuled; *styles* 2; *achenium* 1-seeded; *embryo* curved, in fleshy albumen.

MORUS, Tourn. MULBERRY.

Flowers monœcious, spiked, the sterile and fertile flowers in separate spikes; *calyx* 4-parted; *stamens* 4; *ovary* 2-celled; *styles* filiform; *achenium* ovate, compressed, covered by the succulent berry-like calyx.—*Trees*, with rounded leaves, and axillary spikes.

M. RUBRA, L. *Leaves* cordate-ovate, acuminate, serrate, petioled, rough above, white-tomentose beneath, on young shoots 3-5-lobed; *stipules* linear; *sterile spikes* slender, drooping; the *fertile* ones ovoid or oblong, resembling a blackberry in fruit. Rich woods. March.—A small tree.

M. ALBA, L. *Leaves* cordate-ovate, acute, serrate, oblique at the base, smooth and shining, sometimes lobed; *fruit* whitish. Introduced.—A small tree.

M. MICROPHYLLA, Buckley. *Leaves* cordate-ovate or 3-lobed, serrate, teeth mucronate, smooth, veins and mar-

gins slightly ciliate; *stipules* small, linear, membranaceous, caducous; *fruit* ripe last of May, black and sour, with little juice and deep sinuses between the achenia, which are a little compressed; *styles* divaricate and obtuse; *leaves* generally entire, 1-1½ inches, and of about the same width; the lobed leaves are about 2½ inches long, the middle lobe prolonged and acuminate. *Stem* and *branches* smooth, with a light-gray bark.—A large *shrub* or small *tree*, 12-20 feet high, growing in clumps. Western Texas, on hills in vicinity of Austin.

FICUS, Tourn. FIG.

Flowers monœcious or diœcious, lining the inside of the fleshy closed receptacle; *calyx* of the sterile flowers 3-parted; *stamens* 3; *calyx* of the fertile flowers 5-cleft, pediceled; *styles* lateral, slender; *achenium* fragile; *embryo* hooked.—*Trees* or *shrubs*, with entire or lobed *leaves*, and large convolute *stipules*; *flowers* axillary.

BROUSSONETIA PAPYRIFERA, Vent., the *Paper Mulberry* of our yards, belongs to this family.

117. ELM FAMILY. Order, ULMACEÆ.

Trees, with watery juice, alternate undivided stipulate *leaves*, and perfect or polygamous apetalous *flowers*; *calyx* 4-9-lobed; *stamens* 4-9, inserted on the base of the calyx, erect in the bud; *ovary* 1-2-celled; *ovules* solitary, suspended; *styles* 2, spreading; *fruit* membranaceous or drupaceous; *embryo* straight or curved, without albumen; *cotyledons* leafy.

SYNOPSIS.

* *Fruit* dry; *anthers* extrorse.

Flowers perfect. *Ovary* 2-celled. *Fruit* winged.....ULMUS.

—— *polygamous*. *Ovary* 1-celled. *Fruit* wingless.....PLANERA.

** *Fruit* a drupe; *anthers* introrse.

Flowers polygamous. *Ovary* 1-celled. *Cotyledons* curved.....CELTIS.

ULMUS, L. ELM.

Flowers perfect; *calyx* bell-shaped, 4-9-cleft; *stamens* 4-9, slender, exserted; *anthers* extrorse; *ovary* 2-celled; *styles* short; *fruit* 1-celled, 1-seeded, surrounded by a broad membranaceous wing; *embryo* straight.—*Trees*; *leaves* short-petioled, mostly oblique, doubly serrate, straight-veined; *stipules* deciduous; flowers greenish or purplish, clustered, appearing before the leaves.

U. FULVA, Michx. (*Slippery Elm*.) *Branchlets* pubescent; *leaves* thick, ovate-oblong, acuminate, broadly serrate, slightly oblique at the base, very rough above, pubescent beneath; *calyx* and short pedicels pubescent; *fruit* orbicular, pubescent on the sides, smooth on the margins, with the obtuse teeth erect; expanding *buds* rusty-tomentose. Rich woods. February, March.—A small *tree*; leaves 4'-8' long; fruit 8"-9" wide; inner bark very mucilaginous.

U. AMERICANA, L. (*Elm*.) *Branchlets* and *buds* smooth; *leaves* thin, obovate-oblong, or oval, oblique at the base, sharply serrate, abruptly acuminate, smooth above, pubescent, or at length smooth beneath; *pedicels* clustered, slender, smooth, like the calyx; *fruit* oval or obovate, downy on the margins, with the sharp teeth connivent. Low grounds. February and March.—A large *tree*, with spreading branches; leaves 2'-4' long; fruit 6" long.

U. ALATA, Michx. (*Whahoo*.) *Branches* corky-winged; *leaves* small, ovate-lanceolate, acute, sharply serrate, commonly even and rounded at the base, rough above, pubescent beneath, nearly sessile; *flowers* clustered, on slender pedicels; *fruit* oval, downy on the margins. Rich soil.—A small *tree*; leaves 1'-1½' long.

PLANERA, Gmel. PLANER-TREE.

Flowers polygamous, clustered; *calyx* bell-shaped, 4-5-cleft; *stamens* 4-5; *anthers* extrorse; *ovary* 1-celled;

styles short; *fruit* nut-like, coriaceous, wingless; *embryo* straight, without albumen.—Small *trees*, with the foliage of the Elm.

P. AQUATICA, Gmel. *Leaves* ovate, short-petioled, acute, serrate, roughish; *flowers* in small, roundish clusters, appearing before the leaves; *nut* ovate, covered with warty scales. River-swamps. February and March.—A *tree*, 20°–30° high; leaves 1'–1½' long.

CELTIS, Tourn. NETTLE-TREE.

Flowers perfect or polygamous, apetalous; *calyx* of five sepals; *stamens* 5; *anthers* introrse; *ovary* 1-celled; *styles* 2, slender, pubescent; *drupe* globose; *embryo* curved around scanty gelatinous albumen; *cotyledons* wrinkled.—*Trees*; *leaves* petioled, commonly oblique at the base; *flowers* axillary, solitary or few in a cluster, greenish.

C. OCCIDENTALIS, L. Young *leaves* and *branchlets* silky; *leaves* (2' long) ovate, acuminate, sharply serrate, abruptly contracted at the base, soon smooth, ferruginous beneath; *fertile flowers* mostly solitary, on drooping peduncles; the *sterile* ones 2–4 in a cluster; *drupe* dark purple, with a thin sweet pulp. March. A *tree*, 40°–60° high.—Var., *INTEGRIFOLIA*. (*C. integrifolia*, Nutt.) *Leaves* ovate or ovate-lanceolate (2'–3' long), acuminate, entire, rounded, or the lower ones cordate at the base, roughened with minute elevated points. Sandy soil. A small *tree*; *branches* and *leaves* 2-ranked.—Var., *PUMILA*. (*C. pumila*, Pursh.) *Shrubby*; *leaves* (1'–1½' long) ovate, acute, serrate, obtuse at the base, pale beneath, very rough above; *drupe* glaucous. Shady woods. March and April. *Stem* 5°–10° high.

118. PLANE-TREE FAMILY. Order, PLATANACEÆ.

Large *trees*, with alternate palmately-lobed petioled *leaves*, and monœcious *flowers*, in axillary long-peduncled

globose heads; *calyx* and *corolla* none; *anthers* on short club-shaped filaments, numerous, 2-celled, adnate to the truncated connective; *ovaries* numerous, obconical, hairy at the base; *ovules* 1-2, orthotropous, pendulous; *style* subulate; *nut* 1-seeded; *seed* cylindrical; *embryo* in the axis of scarce fleshy albumen; *flowers* intermixed with copious club-shaped scales. Consisting of scales.

PLATANUS, L. PLANE-TREE; SYCAMORE.

P. OCCIDENTALIS, L. *Leaves* (4'-9' wide) round-cordate, angularly lobed and toothed, covered when young with dense whitish down, soon smooth; *stipules* toothed; *heads* pendulous (8"-12" in diameter). River-banks. March and April. A large tree, with the white bark separating in thin plates.

119. WALNUT FAMILY. Order, JUGLANDACEÆ.

Trees, with alternate odd-pinnate exstipulate *leaves* and monœcious apetalous or minutely petaled *flowers*; *sterile* flowers in pendulous aments; *calyx* 2-6-parted, the stamens few or numerous; *fertile* flowers single or clustered; *calyx* 3-5-parted, the tube adherent to the incompletely 2-4-celled ovary; *fruit* drupaceous, with a bony endocarp; *seed* 4-lobed, without albumen, orthotropous; *cotyledons* oily, 2-lobed; *radicle* short, superior

CARYA, Nutt. HICKORY; PIGNUT.

Aments of the *sterile* *flowers* mostly three together, on a common peduncle, lateral; *calyx* unequally 3-parted; *stamens* 3-6; *fertile* *flowers* terminal; *calyx* 4-parted; *petals* none; *stigma* large, 4-lobed; *nut* smooth, 4-6-angled, incompletely 4-celled; the coriaceous epicarp (husk) partly or completely 4-valved.—*Trees*, mostly with scaly buds; *leaflets* serrate; *fruit* roundish.

* *Epicarp* very thick, 4-valved ; *seed* thick, edible.

C. ALBA, Nutt. (*Shellbark Hickory*.) *Leaflets* 5-7 (mostly 5), lanceolate-oblong, or the upper ones obovate-oblong, acuminate, pubescent beneath ; *fruit* depressed-globose ; *nut* roundish, thin-shelled, compressed, 4-angled, slightly pointed. Rich woods. March and April. A large *tree*, with shaggy and scaly bark.

C. SULCATA, Nutt. *Leaflets* 7-9, obovate-oblong, acuminate, pubescent beneath ; *fruit* oval, 4-angled above ; *nut* oblong, thick-shelled, conspicuously pointed, slightly compressed. Rich woods. March and April.—A large *tree*, with scaly bark.

C. OLIVÆFORMIS, Nutt. (*Pecan-nut*.) *Leaflets* 13-15, lanceolate-oblong, serrate falcate, acuminate ; *nut* olive-shaped, smooth, thin-shelled, somewhat 4-angled. River-bottoms.—A large *tree*, with smoothish bark.

** *Epicarp* partly 4-valved ; *seed* thin ; *bark* not scaly.

C. TOMENTOSA, Nutt. (*Hickory*.) *Leaflets* 7-9 (mostly 7), large, oblong-obovate, acute, pubescent beneath ; *sterile aments* tomentose ; *fruit* large, globose ; *epicarp* thick, coriaceous, parted nearly to the base ; *nut* thick-shelled, oval, somewhat 6-angled. Rich soil. March and April.—A large *tree*, with rough bark.

C. GLABRA, Torr. (*Pignut*.) *Leaflets* 5-7 (mostly 7), ovate-lanceolate, acuminate, smooth ; *fruit* obovate, obcordate, or pear-shaped ; *epicarp* thin, parted to the middle, coriaceous ; *nut* thick-shelled, sometimes angled. (C. porcina, Nutt.) Woods. March and April.—A large *tree*, with smoothish bark.

C. MICROCARPA, Nutt. *Leaflets* 5-7, oblong-lanceolate, smooth, glandular beneath, acuminate ; *aments* smooth ; *fruit* roundish ; *epicarp* thin ; *nut* thin-shelled, slightly 4-angled. April and May.—A large *tree* ; *fruit* $\frac{3}{4}$ ' in diameter.

C. MYRISTICÆFORMIS, Michx. *Leaflets* 5, ovate-lanceolate, acuminate, smooth, the terminal one sessile; *fruit* oval, rugose, rough; *nut* oval, slightly acuminate, furrowed, very hard. Nuts resembling nutmegs.

C. AMARA, Nutt. (*Bitter-nut*.) *Leaflets* 9-11, oblong-lanceolate, acute, smoothish; *fruit* globular; *epicarp* thin, parted to the middle; *nut* thin-shelled, obcordate; *seed* much wrinkled. Low ground. March and April.—A *tree* of moderate dimensions, with smooth bark, and very bitter and astringent seeds.

C. AQUATICA, Nutt. *Leaflets* 9-13, lanceolate, acuminate, slightly serrate, smooth; *fruit* roundish, 4-ribbed; *epicarp* thin, 4-parted to the base; *nut* compressed, thin-shelled, 4-angled; *seed* much wrinkled. River-swamps. March and April.—A small *tree*, with rough bark; seeds very bitter and astringent.

C. BUCKLEYII, Durand. *Leaflets* 7-9, broad ovate, or ovate-lanceolate, sharply serrate, smooth on both sides, paler beneath, acute at apex, subobtusely or acute at base; *staminate* and *pistillate catkins* subpubescent; *fruit* globular, slightly 4-angled; *shell* thin, separating to the base.—*Tree*, 3-4 feet in diameter, and 30-40 feet high; *bark* of trunk very thick, deeply and irregularly furrowed, not scaly; *leaflets* 6-8 inches long, and 2-3 inches wide. Dry hills, among post-oak and black-jack, Texas.

JUGLANS, L. WALNUT; BUTTERNUT.

Sterile aments lateral, solitary; *calyx* 5-6-parted; *stamens* numerous; *fertile flowers* terminal; *calyx* 4-cleft; *petals* 4, minute; *stigmas* 2, long, recurved; *fruit* oblong or globose; *epicarp* indehiscent; *nut* incompletely 4-celled, furrowed or sculptured.—*Trees*, with naked buds; *leaflets* serrate.

J. NIGRA, L. (*Black Walnut*.) *Leaflets* 11-21, ovate-

lanceolate, pubescent beneath, acuminate, slightly cordate at the base, or oblique; *fruit* globose, rough-dotted; *nut* furrowed. March and April.—A *tree*, 30°–50° high.

120. OAK FAMILY. *Order*, CUPULIFERÆ.

Trees or *shrubs*, with alternate entire or lobed straight-veined *stipulate leaves*, and monœcious *apetalous flowers* : *sterile flowers* in pendulous slender or capitate aments ; *calyx* scale-like, or regular and 4-6-lobed ; *stamens* few ; *fertile flowers* single or clustered, furnished with an involucre which incloses the fruit, or forms a cup at its base ; ovary 2-7-celled, with 1-2 pendulous anatropous ovules in each cell ; *stigmas* as many as the cells ; *fruit* 1-celled, 1-seeded ; *albumen* none ; *cotyledons* thick and fleshy ; *radicle* superior.

SYNOPSIS.

* Fertile flowers single, or few in a cluster.

Nut solitary, with the base inclosed in a scaly involucre..... QUERCUS.

— 1-3, inclosed in a 4-valved spiny involucre; sterile aments elongated, erect.

CASTANEA.

— 2-3-angled, inclosed in a somewhat spiny 4-valved involucre; sterile aments
capitate, pendulous FAGUS.

— solitary, bony, inclosed in a leafy lacerated involucre..... CORYLUS.

** *Fertile flowers spiked.*

Nuts 1-2, in the axil of an open leafy involucre..... CARPINUS.

— solitary, inclosed in a membranaceous inflated involucre.....OSTRYA.

QUERCUS, L. OAK.

Sterile ament slender, bractless, pendulous; *calyx* unequally 6-8 parted; *stamens* 6-12, slender; *anthers* 2-celled; *fertile flowers* axillary, solitary, or few in a cluster; *calyx* 6-cleft or denticulate, adnate to the 3-4-celled ovary; *ovules* 2 in each cell; *stigmas* obtuse; nut (*acorn*) oblong or hemispherical, partly (rarely wholly) inclosed in the cup-shaped scaly involucre; *cotyledons* very thick,

plano-convex.—*Trees* or *shrubs*, with simple entire or lobed *leaves*; *stipules* caducous.

§ *Fruit biennial.*

* *Leaves entire, short-petioled; those on vigorous shoots often lobed or toothed.*

Q. PHELLOS, L. (*Willow Oak*.) *Leaves* (2'-3' long) lanceolate or linear-lanceolate, bristle-awned, scurfy, like the branchlets, when young, becoming smooth on both sides; *fruit* small, sessile; *cup* flattish, inclosing the base of the hemispherical nut. Margins of swamps and streams.—A slender *tree*, 40°-50° high.

Var., LAURIFOLIA. (Q. laurifolia, Michx.) *Leaves* larger (3'-4' long), oblong-lanceolate; *cup* deeper and more pointed at the base. Light uplands.—A *tree*, commonly larger than the preceding.

Var., ARENARIA. (Q. myrtifolia, Willd.?) *Shrubby* (4°-8° high); *leaves* small ($\frac{1}{2}$ '-1 $\frac{1}{2}$ ' long), rigid, oblong or obovate, obtuse or barely pointed, with the margins revolute. Dry sand-ridges, along the coast.

Q. IMBRICARIA, Michx. (*Shingle Oak*.) *Leaves* lanceolate-oblong, acute or obtuse at each end, mucronate, pale and downy beneath, deciduous; *fruit* middle-sized; *cup* narrowed at the base, inclosing one-half or one-third of the nearly hemispherical nut, the broad and whitish scales closely appressed. Mountains.—A *tree*, 40°-50° high; *leaves* 3'-5' long.

Q. CINEREA, Michx. (*High-ground Willow Oak*.) *Leaves* perennial, oblong-lanceolate, obtuse or acute, mucronate, white-tomentose beneath; *fruit* small, sessile; *cup* shallow, narrowed at the base, pale, inclosing one-third of the hemispherical nut. Dry sandy pine-barrens.—A small *tree*, fruiting abundantly; *leaves* 2'-3' long, scurfy, like the branchlets, when young.

Var., PUMILA, Michx. (Q. pumila, Walt.) *Shrubby* (1°-3° high); *branches* slender; *leaves* lanceolate, wavy, at

length smooth on both surfaces. Flat or dry pine-barrens.

Roots creeping.

Q. VIRENS, Ait. (*Live Oak*.) *Branchlets* tomentose; *leaves* coriaceous, perennial, oblong, obtuse, somewhat rugose, smooth and shining above, hoary-tomentose beneath, the margins revolute; *fruit* long-peduncled; *cup* top-shaped, hoary, inclosing the base of the oblong chestnut-brown nut. Dry or wet soil.—Commonly a large *tree*, with spreading branches; leaves 2'-4' long.

** *Leaves 3-lobed at the summit, bristle-awned.*

Q. AQUATICA, Catesb. (*Water Oak*.) *Leaves* perennial, short-petioled, obovate-oblong or wedge-shaped, smooth on both sides, obtusely 3-lobed at the summit, often entire, or on young shoots pinnatifid-toothed or lobed, mostly awnless when old; *fruit* small, mostly sessile; *cup* shallow, flat, inclosing the base of the hemispherical downy nut. Swamps and wet banks.—A small *tree*, with smooth bark; *leaves* 2'-3' long, with tufts of down in the axils of the veins when young.

Var., *HYBRIDA*. Smooth, with ash-colored *branchlets*; *leaves* oblong or wedge-oblong, entire, emarginate, or 3-lobed at the summit, tapering or abruptly contracted into a short petiole; *fruit* very small, closely sessile; *cup* shallow, flattened, inclosing the base of the ovate nut.—A lofty *tree*; leaves 3'-4' long; fruit 4''-5'' long.

Q. NIGRA, L. (*Black Jack*.) *Leaves* short-petioled, coriaceous, broadly wedge-shaped, rounded at the base, mostly 3-lobed at the summit, bristle-awned, smooth above, rusty-pubescent beneath, deciduous; *fruit* middle-sized, on short and thick peduncles; *cup* top-shaped, with coarse truncate scales, inclosing one-third or one-half of the oblong-ovate nut. (*Q. ferruginea*, Michx.) Dry gravelly or sandy soil.—A small *tree*; leaves 4'-9' long.

*** *Leaves long-petioled, sinuate-pinnatifid, bristle-awned, deciduous.*

† *Leaves smooth or nearly so.*

Q. CATESBÆI, Michx. (*Turkey Oak*.) *Leaves* some-

what coriaceous, broad, narrowed into a short petiole, deeply pinnatifid, the lobes very acute from a broad base, spreading, mostly falcate and entire; *fruit* rather large, short-peduncled; *cup* thick, turbinate, with broad obtuse scales, inclosing half of the *ovoid nut*; the upper scales inflexed and lining the inner edge of the cup. Dry pine-barrens.—A small *tree*; leaves 6'–9' long.

Q. TINCTORIA, Bartr. (*Black Oak*.) *Leaves* obovate-oblong, with deep or shallow open sinuses, and about 6 sharply-toothed lobes, obtuse or truncate at the base, pubescent when young, at length only in the axils of the veins beneath; *cup* top-shaped, with broad scales, inclosing about half of the roundish *depressed nut*. (Q. discolor, Ait.) Dry woods.—A large *tree*, with the outer bark dark brown, the inner thick and yellow; leaves turning light brown after frost; nuts 6"–8" long.

Q. COCCINEA, Wang. (*Scarlet Oak*.) *Leaves* long petioled, oval or oblong, with deep and broad sinuses, and 6–8 entire or sparingly toothed lobes, truncate at the base, smooth and shining on both sides; *cup* top-shaped, with coarse scales, inclosing one-half or one-third of the ovoid *nut*. Dry woods, more abundant in the upper districts.—A large *tree*, not easily distinguished from the preceding, and probably only a form of it; leaves turning bright scarlet after frost.

Q. RUBRA, L. (*Red Oak*.) *Leaves* oblong, with open shallow sinuses, and 8–12 entire or sharply toothed lobes, smooth on both sides, paler beneath; *fruit* large; *cup* shallow, flat, with fine scales, inclosing the base of the ovate or oblong *nut*. Rocky woods.—A large *tree*; leaves turning dark red after frost; *nut* 1' long.

Q. GEORGIANA, M. A. Curtis. Shrubby; *leaves* small, very smooth, somewhat obovate, wedge-shaped at the base, with deep or shallow open sinuses, and 3–5 triangular-lanceolate entire acute or obtuse lobes; *fruit* short pedun-

cled; *cup* smooth and shining, saucer-shaped, inclosing one-third of the oval-globose nut.—*Shrub*, 6°–8° high, growing in clusters; leaves 3'–4' long; fruit abundant; nut $\frac{1}{2}$ ' long.

†† *Leaves tomentose beneath.*

Q. FALCATA, Michx. (*Spanish Oak*.) *Leaves* oblong, rounded at the base, 3–5-lobed; the lobes entire or sparingly toothed at the apex, the terminal one commonly narrow and elongated; *fruit* rather small; *cup* somewhat top-shaped, with coarse scales, inclosing half of the *globular nut*.—Var. PAGODÆFOLIA, Ell., has larger leaves, with 11–13 nearly opposite and spreading lobes. Dry woods.—A large *tree*; leaves 4'–5' long, entire near the base; nut $\frac{1}{2}$ ' long.

§ *Fruit annual; leaves awnless, deciduous.*

* *Leaves sinuate-lobed.*

Q. OBTUSILOBA, Michx. (*Post Oak*.) *Leaves* with 5–7 broad rounded or notched lobes separated by wide open sinuses, narrowed at the base into a short petiole, pubescent beneath; *cup* hemispherical, inclosing one-third or one-half of the oval nut. Cold clayey soil.—A *tree*, 40°–50° high; nut $\frac{1}{2}$ ' long; leaves 4'–6' long.

Var., PARVIFOLIA. *Leaves* smaller ($1\frac{1}{2}$ '–3' long), oblong, obtuse, entire or sinuate-toothed, nearly smooth on both sides, rusty-pubescent, like the branchlets, when young; *nut* larger. Sand-ridges near the coast.—A *shrub* or small *tree*.

Q. ALBA, L. (*White Oak*.) *Leaves* oblong or obovate-oblong, with 7–9 mostly obtuse and entire narrow lobes separated by narrow sinuses, narrowed into a petiole, densely tomentose, like the branchlets, when young, at length smooth or glaucous beneath; *fruit* large, nearly sessile; *cup* hemispherical, inclosing one-third of the *oblong-ovate nut*. Damp woods.—A large *tree*, with white bark; leaves 4'–6' long; nut about 1' long.

Q. MACROCARPA, Michx. (*Mossy-cup Oak*.) *Leaves* thin, obovate-oblong, pubescent or pale beneath, acute at the base, short-petioled, slightly or strongly few-many-lobed; the lobes rounded, entire or obtusely toothed; *fruit* large; scales of the *cup* thick, the upper ones produced into long awns; *nut* ovoid, included, or half inclosed in the cup. Woods and river-banks.—A middle-sized *tree*; leaves 6'-15' long; nut 1'-1½' long.

Q. LYRATA, Walt. (*Over-cup Oak*.) *Leaves* crowded at the end of the branchlets, obovate-oblong, acute at the base, 7-9-lobed, white-tomentose beneath, or at length smoothish, shining above, the lobes triangular, acute, and entire; *fruit* sessile; *cup* round-ovate, with rugged scales, almost covering the roundish *nut*. River-swamps.—A large *tree*; leaves 5'-8' long, short-petioled; fruit 1' long.

** *Leaves toothed.*

Q. PRINUS, L. (*Swamp Chestnut-Oak*.) *Leaves* oblong or obovate-oblong, obtuse, with rounded teeth, smooth and shining above, pale and pubescent beneath, acute at the base, short-petioled; *fruit* large, short-peduncled; *cup* hemispherical, rugged with tubercular scales, inclosing the base of the roundish or *oblong-ovate nut*. Low grounds.—A large *tree*; nut about 1' long.

Q. CASTANEA, Willd. (*Chestnut Oak*.) *Leaves* oblong, varying to lanceolate, acuminate, sharply toothed, with the points incurved, mostly acute at the base, smooth above, paler and minutely pubescent or glaucous beneath; *fruit* small, sessile or short-peduncled; *cup* hemispherical, with flat scales, inclosing one-third of the *oblong nut*. Rocky woods.—A large or middle-sized *tree*; leaves 3'-6' long; nut 7"-9" long. Eastern Texas.

Q. PRINOIDES, Willd. (*Chinquapin Oak*.) Shrubby; *leaves* lanceolate-oblong, acute at each end, acutely toothed, smooth above, white tomentose beneath; *fruit* small,

mostly sessile; *cup* hemispherical, with flat scales, inclosing about one-half of the *round-ovate nut*. (*Q. chinquapin*, Pursh.)—*Shrub* 2°–6° high; leaves 3'–4' long; nut 8"–9" long. San Jacinto and eastward.

Q. TEXANA, Buckley. *Leaves* ovate-oblong in outline, smooth, deeply sinuate-pinnatifid, with broad, divergent sinuses, 3–5 on each side, lobes 1–3 toothed, teeth acute, setaceous; *nut* ovoid, oblong, acute; *cup* shallow, hemispherical, slightly turgid; *scales* acute, closely appressed; *bark of trunk* of a dark slate-color and slightly furrowed; *limbs* smooth; *wood* close-grained, white or of a light red-color.—*Tree*, 1–3 feet in diameter, and 40–50 feet high. Hills in the vicinity of Austin.

Q. DURANDII, Buckley. *Leaves* obovate or lanceolate, entire or slightly 3-lobed at the apex, with rudiments of one or more lobes at the margins, lobes very obtuse; when mature, smooth on both sides; *acorn* ovoid and often enlarged toward the apex; *cup* very shallow, scales acute, closely appressed; leaves 3–4 inches long, 1–2 inches broad; acorns $\frac{1}{2}$ – $\frac{5}{8}$ of an inch long, and about $\frac{1}{2}$ an inch wide, scarcely $\frac{1}{8}$ of an inch being included in the cup.—*Tree*, 2–3 feet in diameter, and 40–50 feet high; *bark of trunk* and branches light-gray, scaly, resembling the White Oak. Banks of streams, Middle and Southern Texas.

Q. SAN-SABEANA, Buckley. *Leaves* broad ovate, irregularly and sparingly lobed, lobes very obtuse, upper surface smooth and bright green, beneath glaucous and subpubescent; *acorn* oblong-ovoid; *cup* shallow, $\frac{1}{3}$ the length of the acorn; *bark of trunk* and branches scaly and light gray.—A large *shrub* or small *tree*, growing on limestone hills in Burnet and San Saba Counties, where it is called "Shin Oak." It often forms dense thickets.

CASTANEA, Tourn. CHESTNUT.

Sterile flowers in separate clusters, in long erect cylin-

drical aments; *calyx* 5-6-parted; *stamens* 8-15; *anthers* 2-celled; *fertile flowers* 1-3, inclosed in the bell-shaped at length globose 4-valved and very prickly involucre; *calyx* 5-6-lobed, superior; *abortive stamens* 5-12; *ovary* 3-6-celled; *ovules* single or by pairs in each cell; *stigmas* 3-6, bristle-like, spreading; *nuts* 1-3, roundish, compressed, or plano-convex; *cotyledons* very thick.—*Trees* or *shrubs*, with oblong petioled sharply-serrate and straight-veined *leaves*.

C. VESCA, L. (*Chestnut*.) *Leaves* oblong-lanceolate, acuminate, coarsely serrate, smooth on both sides; *nuts* mostly 3, the middle one flattened, the 2 outer ones plano-convex, dark brown. Dry woods. April.—A large *tree*; leaves 6'-7' long.

C. PUMILA, Michx. (*Chinquelin*.) *Leaves* oblong, acute, or obtuse, finely serrate, hoary-tomentose beneath; *nuts* solitary, nearly globular. (C. nana, Muhl., a form with larger leaves and nuts.) Dry sandy soil. April-May.—A large *shrub* or small *tree*; leaves, involucre, and nut smaller than those of the preceding.

FAGUS, Tourn. BEECH.

Sterile flowers capitate, on long and drooping peduncles, with deciduous bracts; *calyx* bell-shaped, 5-6-cleft; *stamens* 8-12; *anthers* 2-celled; *fertile flowers* solitary or by pairs, peduncled, surrounded with numerous linear bracts and a 4-lobed involucre; *calyx* of 4-5 subulate lobes; *ovary* 3-celled, with two ovules in each cell; *styles* 3, filiform; *nuts* commonly 2, acutely 3-angled, inclosed in the soft-spiny 4-valved involucre; *cotyledons* thick and fleshy.—*Trees*, with whitish bark, and straight-veined *leaves* expanding with the flowers.

F. FERRUGINEA, Ait. *Leaves* oblong-ovate or rhombic, acute, finely serrate, silky on both sides when young, when

old only on the veins beneath; *spines* of the involucre short, recurved. Damp sandy soil. April.—A large tree, with widely spreading branches.

CORYLUS, Tourn. HAZEL-NUT.

Sterile flowers in cylindrical pendulous bracted aments; *calyx* 2-cleft, partly united with the bract; *stamens* 8; *anthers* 1-celled; *fertile flowers* clustered; *ovary* 2-celled, 2-ovuled; *stigmas* 2, filiform; *involucre* tubular at the base, leafy and lacerated at the summit, inclosing a single bony (edible) nut.—*Shrubs*, with broadly cordate doubly serrate petioled leaves; flowers appearing before the leaves.

C. ROSTRATA, Ait. (*Beaked Hazel-nut.*) *Branchlets* smooth; *leaves* ovate or oblong-ovate, slightly cordate, acuminate, finely serrate, rather thin, pubescent; *involucre* bristly, prolonged into a tube above the nut, 2-cleft and toothed at the summit; *fruit* nearly globular. Rich soil. March–April.—*Shrub*, 4°–6° high.

CARPINUS, L. HORNBEAM.

Flowers destitute of floral envelopes, supported by scale-like bracts; *sterile flowers* in drooping cylindrical aments; *stamens* 8–14; *filaments* short; *anthers* 1-celled, hairy at the apex; *fertile flowers* spiked; *bracts* 2-flowered, deciduous; *ovary* 2-celled, 2-ovuled; *stigmas* 2, filiform; *nut* solitary, angular, sessile in the axil of an open 3-lobed, leaf-like involucre.—*Trees*, with simple ovate or oblong straight-veined deciduous *leaves*, folded in the bud; flowers expanding before the leaves.

C. AMERICANA, Michx. (*Hornbeam.*) *Branchlets* smooth and slender; *leaves* oblong-ovate, acute or slightly acuminate, sharply and doubly serrate, rounded at the base, more or less pubescent; *fertile spikes* terminal, long-peduncled,

6-12-flowered; *involucre* unequally 3-lobed, the middle lobe longer and serrate on one side; *nut* small, ovate, compressed, 8-ribbed. Rich woods. March.—A small *tree*, with hard and close-grained wood.

OSTRYA, Micheli. HOP HORNBEAM.

Sterile flowers in drooping cylindrical aments, each in the axil of a scale-like bract, destitute of a calyx; *stamens* with the filaments irregularly united; *fertile flowers* in a short terminal crowded spike, each inclosed in a membranaceous involucre; *ovary* 2-celled, 2-ovuled, bearded at the apex; *stigmas* 2, filiform; *fruiting* involucre inflated, nerved, hairy or bristly at the base, inclosing the solitary pointed nut.—Small *trees*, with ovate or oblong serrate short-petioled deciduous *leaves*; flowers appearing with the leaves.

O. VIRGINICA, Willd. (*Hop Hornbeam*.) *Leaves* ovate-oblong, sharply and simply serrate, acuminate, rounded or slightly cordate at the base, pubescent; *fertile spike* cone-like, short-peduncled; the *imbricated involucre*s oblong, mucronate, bristly at the base. Rich woods. March.—A small *tree*, with hard and close-grained wood.

121. WAX-MYRTLE FAMILY. Order, MYRICACEÆ.

Chiefly *shrubs*, with simple alternate *leaves*, with or without stipules, and monœcious or dioecious *flowers*, disposed in aments, destitute of calyx or corolla, each in the axil of a simple bract; *stamens* 2-10; the short filaments free or partly united; *anthers* 2-celled; *ovary* solitary, 1-celled, surrounded at the base with a row of scales; *ovule* solitary, orthotropous or amphitropous; *involucre* none; *stigmas* 1-2, elongated; *fruit* a dry 1-seeded drupe; *albumen* none; *cotyledons* fleshy; *radicle* superior.

SYNOPSIS.

* *Seed orthotropous; plants dotted with resinous glands.*

Flowers diœcious. *Filaments* united below. *Leaves* serrate or entire. *Stipules* none. MYRICA.

Flowers monœcious. *Filaments* forking. *Leaves* pinnatifid. *Stipules* half-cordate. COMPTONIA.

** *Seeds amphitropous. Plant destitute of glands.*

Flowers diœcious. *Filaments* distinct. *Stigma* solitary. *Leaves* entire. *Stipules* none. LEITNERIA.

MYRICA, L. WAX-MYRTLE; BAYBERRY.

Flowers in short axillary aments, diœcious, each in the axil of a scale-like bract; *calyx* and *corolla* none; *stamens* 2-10, with the filaments united below; *ovary* inclosed in a cup of 3-5 rounded scales; *ovule* orthotropous; *stigmas* 2 (rarely 4), flattened on the inner face, widely spreading; *nut* globose, covered with waxy grains.—*Shrubs* or small *trees*, dotted with minute resinous and odorous glands; *branches* clustered; *leaves* short-petioled, serrate or entire; *stipules* none.

M. CERIFERA, L. (*Wax-Myrtle; Bayberry.*) *Branchlets* pubescent; *leaves* lanceolate or oblong-lanceolate, mostly obtuse, entire, or with a few sharp serratures near the apex, smooth, or pubescent on the veins beneath, tapering into a petiole; *sterile aments* very numerous, oblong; *bracts* wedge-shaped; *stamens* 4; *fertile aments* small; bracts rounded, obscurely 3-lobed; scales of the ovary 4, ciliate; *stigmas* 2; *fruit* abundant, white. Margins of swamps. March and April.—A *shrub* or small *tree*; leaves persistent along our southern limits, but northwardly deciduous, 1½'-4' long.

M. INODORA, Bartr. Smooth; *leaves* perennial, coriaceous, oblong, obtuse, very entire, tapering into a petiole, with the margins revolute; *sterile aments* oval or oblong,

with the roundish bracts transversely ridged on the back; *stamens* about 10, monadelphous; *fertile aments* small, elongated in fruit; *stigmas* 2 or 4; scales of the *ovary* 5; *nuts* large, black, commonly solitary. Margins of pine-barren ponds and swamps. February–March.—A *shrub* or small *tree*, with whitish bark; leaves about 2' long, sparingly dotted; nuts ovoid, 3" long.

122. BIRCH FAMILY. Order, BETULACEÆ.

Trees or *shrubs*, with alternate simple straight-veined *leaves*, deciduous stipules, and monœcious amentaceous *flowers*, placed 2–3 together in the axil of a 3-lobed bract; *stamens* 4; filaments distinct; *ovary* 2-celled, with a single suspended anatropous ovule in each cell; *stigmas* 2, elongated; *fruit* a winged or angled 1-celled 1-seeded nut, forming, with the imbricated persistent bracts, a cone-like spike.

BETULA, Tourn. BIRCH.

Sterile aments drooping; *bracts* 3-flowered, 2-bracteolate, peltate; *calyx* scale-like; *stamens* short; *anthers* 1-celled; *fertile aments* oblong or cylindrical; *bracts* 3-flowered; *calyx* none; *stigmas* filiform; *nut* broadly winged; *cotyledons* oblong.—*Trees* or *shrubs*, with the outer bark often separable into thin papery sheets; *leaves* petioled, serrate; fruiting bracts membranaceous.

B. NIGRA, L. (*Black Birch*.) *Leaves* rhombic-ovate, acute, doubly serrate, smooth above, hoary-tomentose beneath, like the short petioles and branchlets, becoming rusty or smoothish; *sterile aments* long and drooping; the *fertile* ones oblong, short-peduncled, with the woolly bracts cleft into three linear-oblong nearly equal lobes. (B. rubra, Michx.) Banks of rivers. March.—A middle-sized *tree*, with reddish-brown bark, and long spreading branches.

ALNUS, Tourn. ALDER.

Sterile aments elongated, drooping; *bracts* peltate, 5-bracteolate, 1-3-flowered, *calyx* 4-parted or scale-like; *stamens* 4; *anthers* 2-celled; *fertile aments* short, erect; *bracts* fleshy, 2-flowered; *calyx* of four minute scales, adherent to the bracts; *bracts* of the fruiting aments woody, persistent; *nut* angled or winged.—*Shrubs* or small *trees*; *leaves* petioled, serrate, the stalked buds covered with a single scale; *fertile aments* racemed.

A. SERRULATA, Ait. *Leaves* obovate, obtuse or abruptly pointed, serrulate, commonly pubescent beneath, acute at the base, short-petioled; *stipules* oval, obtuse; *fruiting aments* ovoid, short-peduncled; *fruit* ovate, wingless. Banks of streams. January–March.—*Shrub* 3°–12° high; leaves 2'–4' long, thickish, and partly persistent at its southern limits; *calyx* of the *sterile flowers* 4-parted.

A. VIRIDIS, DC. *Leaves* oval, rounded at both ends, slightly oblique at the base, finely and sharply serrate, softly pubescent on the lower surface, or only on the veins and petiole; *stipules* ovate; *calyx* of the sterile flowers scale-like; *fruiting aments* ovoid, long-peduncled; *fruit* winged. April.—A low much-branched *shrub*; leaves 1'–2' long. Mountains.

123. WILLOW FAMILY. Order, SALICACEÆ.

Trees or *shrubs*, with soft wood, alternate simple stipulate *leaves*, and dioecious amentaceous *flowers*, destitute of calyx and corolla, each solitary in the axil of a simple bract; *stamens* 2–many; *ovary* 1-celled or imperfectly 2-celled, with numerous erect anatropous ovules in each cell; *styles* 2, very short, more or less united; *stigmas* 2-lobed; *fruit* a 2-valved many-seeded capsule; *seeds* minute, clothed with long silky hairs; *albumen* none; *cotyledons* elliptical, flattened; *radicle* pointing downward.

SALIX, Tourn. WILLOW.

Bracts of the aments entire; *flowers* each with 1-2 small glands; *stamens* 2-6, free, or their filaments cohering at the base; *stigmas* short, 2-lobed; *leaves* commonly narrow, short-petioled; stipules scale-like and deciduous, or leafy and persistent; *buds* covered with a single scale; *aments* mostly erect, appearing with or before the leaves.

Aments large cylindrical, on leafy peduncles or branchlets, appearing with the leaves; ovaries smooth and stalked.

S. NIGRA, Marshall. *Leaves* lanceolate, acute at each end, serrate, petioled, pubescent when young, becoming smoothish and green on both surfaces; *stipules* small and caducous, or sometimes lunate, toothed, and persistent; *aments* elongated, the fertile ones slender, loose-flowered; *bracts* deciduous; *stamens* 3-6, hairy below; *capsule* ovate, acuminate, pointed by the conspicuous style. (S. Houstoniana, Pursh.) Swamps and muddy banks of rivers. A shrub or small tree, with brittle branches; leaves 2'-3' long, sometimes pubescent at maturity, like the branchlets; fertile aments 3'-4' long.

The WEEPING WILLOW (S. Babylonica, Tourn.), and the YELLOW WILLOW or GOLDEN OSIER (S. vitellina, Smith), are introduced species.

POPULUS, Tourn. COTTONWOOD; POPLAR; ASPEN.

Bracts of the aments toothed or lobed; *flowers* from an oblique cup-shaped disk; *stamens* few or numerous, with the filaments free; *stigmas* elongated, 2-parted.—*Trees*; *leaves* ovate or roundish, on long and often laterally compressed petioles; *buds* covered with imbricated, often resinous-coated scales; *aments* slender, drooping, appearing before the leaves.

P. ANGULATA, Ait. *Branches* thick, smooth, and sharply

angled; *leaves* large, smooth, deltoid-ovate, acute or slightly acuminate, truncate at the base, obtusely serrate with incurved teeth; the conspicuous veins and compressed petiole yellowish. Banks of rivers. March and April.—A large tree; leaves 6'–8' long, longer than the petiole.

SUB-CLASS II. **Gymnospermæ.**

Ovules naked (not inclosed in an ovary), commonly supported by an open scale or leaf, and fertilized by the direct application of the pollen. *Cotyledons* often more than two.

124. PINE FAMILY. *Order, CONIFERÆ.*

Trees or *shrubs*, with branching *stems*, composed of glandular or disk-bearing woody tissue without ducts, resinous juice, linear or needle-shaped mostly persistent *leaves*, and monœcious or diœcious amentaceous *flowers*; *calyx* and *corolla* none; *ovules* orthotropous; *fruit* a cone or drupe; *embryo* in the axis of the albumen; *cotyledons* 2 or more.

SYNOPSIS.

SUB-ORDER I. **Abietinæ.** *Fertile flowers* consisting of numerous bracted imbricated carpellary scales, bearing two collateral inverted ovules at their base, and forming a cone in fruit. *Buds* scaly.

Leaves 2-5 in a cluster, mostly elongated, sheathed at the base.....PINUS.

SUB-ORDER II. **Cupressinæ.** *Fertile flowers* consisting of few bractless mostly peltate carpellary scales, bearing one or several erect ovules at their base, becoming fleshy or indurated, and forming in fruit a drupe or cone. *Buds* naked.

Fruit a drupe. *Leaves* minute, imbricated.....JUNIPERUS.

— a globular cone, with peltate scales. *Leaves* imbricated, persistent..CUPRESSUS.

- Fruit a globular cone, with peltate scales. Leaves spreading on slender deciduous branchlets*.....TAXODIUM.
Fruit an oblong cone, with imbricated oblong scales. Leaves minute, imbricated on the flattened branches, persistent.....THUJA.

SUB-ORDER III. **Taxineæ.** *Fertile flower* solitary, without a carpellary scale. *Fruit* a drupe. *Buds* scaly.

- Drupe surrounded by a fleshy cup. Albumen homogeneous*.....TAXUS.
 — *naked. Albumen ruminated*.....TOBREYA.

PINUS, Tourn. PINE.

Flowers monœcious; *sterile aments* spiked or clustered; *stamens* numerous on the axis, with very short filaments; *anthers* with a scale-like connective, 2-celled, opening lengthwise; *fertile aments* terminal, single or clustered; *carpellary scales* in the axils of deciduous bracts, each bearing two collateral inverted ovules at the base, indurated in fruit, and forming a cone, the apex commonly thickened, angular, and spiny; *seeds* nut-like, lodged in an excavation at the base of the scale, and furnished with a thin deciduous wing; *embryo* in the axis of oily albumen; *cotyledons* 3-12, linear.—*Trees*; *leaves* evergreen, needle-shaped, 2-5 in a cluster, their bases inclosed in a thin scarious sheath.

* *Leaves two in each sheath.*

P. MITIS, Michx. (*Short-leaved Pine.*) *Leaves* from a long sheath, crowded, very slender, concave on the inner face, dark green; *cones* small, mostly solitary, oval or conical-oblong, the thin scales flattened at the apex, and armed with a weak incurved spine. (P. variabilis, Pursh.) Light clayey soil.—A large *tree*, with rough bark, and fine-grained valuable wood; *leaves* 3'-5' long, sometimes three in a sheath; *cones* light-brown, about 1½' long, opening at maturity; *wings* of the seed reddish.

** *Leaves three in each sheath.*

P. TÆDA, L. (*Loblolly or Old-field Pine.*) *Branches*

scaly; *leaves* from a long sheath, slender, elongated; *cones* large, solitary, oblong-conical, with the scales armed with a short and rigid straight spine. Light and mostly damp soil.—Commonly a lofty *tree*, with very thick and furrowed bark, and valuable but sparingly resinous wood, but in old fields low, with spreading branches; leaves 6'–10' long, rarely 2 or 4 in a sheath, dark green; cones 3'–5' long.

P. AUSTRALIS, Michx. (*Long-leaved* or *Yellow Pine*.) *Leaves* very long, from long sheaths, crowded at the summit of the thick and very scaly branches; *cones* large, cylindrical or conical-oblong, the thick scales armed with a short recurved spine. (P. palustris, L., the prior but inappropriate name.) Sandy soil, constituting almost the entire growth of the Pine Barrens.—A lofty *tree*, with thin-scaled bark, and very valuable resinous wood, dividing near the summit into few spreading branches; leaves 10'–15' long; leaf-bracts scarious, fimbriate; cones 6'–10' long.

JUNIPERUS, L. JUNIPER.

Flowers mostly dioecious; *aments* lateral and terminal, small, few-flowered; *stamens* several; *anther*-cells 3–6, inserted beneath the peltate scale, opening lengthwise; *carpellary* scales 3–6, 1–3-ovuled, partly united, fleshy, and forming in fruit a berry-like drupe containing 1–3 erect bony seeds; *cotyledons* 2, oblong.—*Trees*, with subulate or scale-like persistent *leaves*.

J. VIRGINIANA, L. (*Red Cedar*.) *Branches* terete; *leaves* opposite or by threes, minute, rhombic-ovate, closely imbricated, depressed on the back, those on young shoots subulate and spreading; *drupes* small, blue, 1–2-seeded. Dry, rocky, or even wet soil. March.—A small *tree*, with reddish, fine-grained, durable, and odorous wood, and spreading branches; leaves dark green.

TAXODIUM, Richard. CYPRESS; BALD CYPRESS.

Flowers monœcious; *sterile aments* small, in a long drooping spiked panicle; *scales* peltate; *anther-cells* 2-5, opening lengthwise; *fertile aments* single or by pairs, with the peltate scales 2-ovuled; *cone* globular; *scales* very thick, angular, slender-stalked, separating at maturity; *seeds* 3-angled, wingless; *cotyledons* 6-9, linear.—*Trees*, with distichous deciduous *leaves*.

T. DISTICHUM, Rich. *Leaves* alternate, opposite, or whorled, on very numerous short and slender deciduous branchlets, linear, acute, 2-ranked or imbricated. (*Cupressus disticha*, L.) Ponds and deep swamps. February and March.—A very large *tree*, with pale smoothish bark, light durable wood, and few fastigiate branches at the summit; *leaves* 4"-6" long; *cones* $\frac{3}{4}$ '-1' in diameter. Attached to the roots are hollow conical knobs called cypress-knees.

THUJA, Tourn. ARBOR VITÆ.

Flowers monœcious; *aments* small, terminal; *anther-cells* 4, with a scale-like connective; *carpellary scales* imbricated in four rows, with two erect ovules at the base; *cone* oblong, the few scales imbricated, expanding at maturity, persistent; *seed* winged; *cotyledons* 2, oblong.—*Trees* or *shrubs*, with scale-like imbricated persistent *leaves*.

T. OCCIDENTALIS, L. (*Arbor Vitæ*.) *Branches* flat, distichous; *leaves* ovate, obtuse, with a gland on the back, imbricated in four rows; *cones* oblong, nodding, with the outer scales oblong, obtuse; *seeds* broadly winged, emarginate at each end. Rocky banks on the mountains.—A small or middle-sized *tree*; *cones* $\frac{1}{2}$ ' long.

125. CYCAS FAMILY. Order, CYCADACEÆ.

Trees or *shrubs*, with simple trunks, increasing by a terminal bud, like the Palms, and composed of a large pith,

mixed with woody bundles or plates, inclosed in a cylinder of woody fiber and spiral vessels; *leaves* pinnate, coiled in the bud, like Ferns; *flowers* diœcious, destitute of calyx and corolla; *sterile flowers* consisting of 1-celled anthers inserted under the peltate scales of a cone-like ament; *fertile flowers* consisting of naked ovules inserted under the scales like the sterile flowers, or on the margins of contracted leaves; *seed* nut-like; *embryo* in the axis of the albumen; *radicle* ending in a long spiral cord; *cotyledons* 2.

ZAMIA, L.

Flowers in cone-like aments, with the peltate scales inserted on all sides of the common rachis; *anthers* numerous; *ovules* by pairs, pendulous; *seed* roundish, drupe-like.—*Leaflets* thickened at the base and articulated with the petioles, with numerous simple veins.

Class II.—Monocotyledonous or Endogenous Plants.

Stems composed of cellular tissue and scattered bundles of woody fiber and vessels, destitute of proper pith, bark, or concentric layers, and increasing in diameter by the deposition of new fibrous bundles. *Leaves* mostly alternate, entire, and parallel-veined, commonly sheathing at the base, seldom falling off by an articulation. *Floral* envelopes usually by threes. *Cotyledons* single.

126. PALM FAMILY. Order, PALMÆ.

Chiefly *trees*, with a thick woody *stem* (caudex), growing by a terminal bud, pinnate or fan-shaped *leaves*, which are plaited in the bud, and a spadix of small perfect or polygamous *flowers*; *sepals* and *petals* 3, free, or more or less united, persistent; *stamens* mostly 6, hypogynous or perigynous; *anthers* 2-celled, introrse; *ovary* 3-celled, commonly with a single erect orthotropous or anatropous ovule in each cell; *styles* 3, mostly united; *stigmas* entire; *fruit* a drupe or berry; *embryo* cylindrical, placed in a cavity of the hard albumen, near the circumference of the seed. *Stems* erect or creeping; *leaves* long-petioled; *spadix* axillary.

SABAL, Adans. PALMETTO.

Flowers perfect, sessile, bracted; *calyx* cup-shaped, 3-cleft; *corolla* 3-petaled; *stamens* 6, hypogynous, the filaments subulate, distinct; *anthers* cordate-ovate, horizontal; *ovary* 3-celled; *styles* united, 3-angled; *stigma* capitate or obtuse; *fruit* a 1-seeded drupe; *embryo* dorsal; *albumen* homogeneous, horny. *Stems* simple or branched, erect or creeping; *leaves* fan-shaped, long-petioled, with the divi-

sions 2-cleft at the apex and often with long thread-like filaments interposed; *spadix* long, branching, with sheathing spathes at the joints; flowers small, whitish, rigid; *drupe* oblong or globose; *sheaths* of the leaves commonly composed of dry interlaced fibers.

S. PALMETTO, R. and S. (*Cabbage Palmetto*.) *Stem* erect, tall, simple, leafy at the summit; *leaves* large, cordate in outline, pinnatifid-fan-shaped, recurved at the summit, mostly shorter than the smooth concave petiole, the very numerous divisions deeply cleft, and with thread-like filaments at the sinuses; *spadix* smooth and spreading, commonly shorter than the leaves; *petals* slightly united at the base; *style* thick; *drupe* globose. (*Chamærops Palmetto*, Michx.) Sandy soil along the coast. June. Stem 20°–40° high; leaves 5°–8° long, their bases long-persistent; *drupe* black, 4"–5" in diameter.

CHAMÆROPS, L.

Flowers polygamous, bracted; *calyx* 3-cleft; *corolla* 3-petaled; *stamens* 6–9, with the filaments connate at the base; *anthers* oblong; *ovaries* 3, more or less united; *stigmas* acute, stigmatic on the inner face; *drupes* 1–3, one-seeded; *embryo* dorsal, in horny somewhat ruminated albumen.—Low *palms*, with fan-like, long-petioled *leaves*, destitute of thread-like filaments; *sheaths* soon dry and net-like; *spadix* dense-flowered, branching; *spathe* 2–4-leaved; flowers yellowish; *drupe* globose or ovoid.

C. HYSTRIX, Fraser. (*Blue Palmetto*.) *Stem* short, proliferous; *leaves* circular in outline, with numerous 2–4-toothed divisions, on triangular rough-edged petioles; *sheaths* persistent, composed of oblique fibers interwoven with numerous erect strong spines; *spadix* small, short-peduncled; *spathes* about 4, oblong, woolly, acutely 2-lipped; *petals* ovoid; *drupe* ovoid. Low shady woods. June and July. Stem 2°–3° long, erect or creeping; leaves

somewhat glaucous, 3° – 4° high; spadix 6'–12' long; partial spathes none; drupe 6''–9'' long.

127. ARUM FAMILY. *Order, ARACEÆ.*

Acrid chiefly *stemless herbs*, from tuberous or creeping rootstocks, with entire or divided often veiny *leaves*, and perfect or monœcious *flowers*, borne on a spadix, and commonly inclosed in a spathe; *calyx* and *corolla* wanting, or the former with scale-like sepals; *stamens* short, hypogynous; *anthers* extrorse, commonly sunk in the thick connective; *ovary* 1–several-celled, with 1–several ovules in each cell; *stigma* sessile; *fruit* fleshy, indehiscent; *embryo* straight; *albumen* mealy or fleshy, sometimes wanting.

SYNOPSIS.

* *Calyx* and *corolla* none; *spadix* inclosed in a spathe; *flowers* monœcious.

† *Fertile flowers* numerous; *spadix* free.

Spatha thin, convolute at the base, arching above. *Spadix* barren above. *Leaves* 3–several-lobed.....ARISÆMA.

Spatha green, thick, convolute throughout, wavy on the margin. *Spadix* flowering throughout. *Leaves* sagittate.....PELTANDRA.

†† *Fertile flowers* solitary; *spadix* adnate to the *spatha*.

Free-floating aquatics. *Fertile flowers* solitary.....PISTIA.

** *Calyx* manifest; *flowers* perfect.

† *Spadix* naked.

Spadix attached to the side of the flattened leaf-like scape.....ACORUS.

ARISÆMA, Mart. INDIAN TURNIP.

Spathe convolute below, dilated and commonly arched above, withering; *spadix* covered below with monœcious *flowers* (the lower ones fertile), elongated and naked above; *calyx* and *corolla* none; *stamens* 4 in a whorl, very short; *anther*-cells 2–4, opening at the top; *ovary* 1-celled, with 5–6 erect orthotropous ovules; *stigma* sessile; *fruit* a

1-few-seeded scarlet berry; *embryo* in the axis of mealy albumen; *root* tuberous; *petioles* of the commonly divided and veiny leaves elongated and sheathing the scape; *fruit-clusters* naked.

A. DRACONTIUM, Schott. (*Dragon-root*.) *Leaf* solitary, pedately 9-13-foliolate; *leaflets* petioled, entire, lanceolate or oblong, acuminate; *spathe* tubular (green), concave and erect above, much shorter than the very slender spadix. (*Arum Dracontium*, L.) Rich woods. March and April.—*Plant* 1°-1½° high; *berries* numerous on the flat rachis, 1-3-seeded.

PELTANDRA, Raf. ARROW ARUM.

Spathe elongated, fleshy, convolute throughout, wavy on the margins, curved at the apex, persistent at the base; *spadix* long, wholly covered by the monœcious flowers; *calyx* and *corolla* none; *anther-cells* 5-6, imbedded in the thick peltate connective, opening by a terminal pore; *ovary* 1-celled, with several orthotropous ovules; *berry* 1-3-seeded; *seed* gelatinous, without albumen; *embryo* large; *plumule* conspicuous, curved.—A fleshy stemless marsh herb, from a creeping rhizoma; *leaves* sagittate, with the petiole sheathing the base of the thick scape; *fruit-clusters* inclosed in the fleshy persistent base of the spathe.

P. VIRGINICA, Raf. *Leaves* several, oblong, acute, finely veined, and with 2-3 intramarginal nerves, the lobes obtuse; *scapes* shorter than the leaves recurved in fruit; *spathe* lanceolate, acute, longer than the cylindrical spadix, both early decaying above the fertile flowers; *berries* green, in a globose cluster, 1-seeded. (*Arum Virginicum*, L.) Marshes and wet places. April and May.—*Plant* 1° high; *spathes* 2'-4' long.

PISTIA, L.

Spathe tubular at the base, spreading above, united with the spadix; *flowers* few, monœcious, the upper ones stami-

nate and supported by a cup-shaped involucre, the fertile solitary; *calyx* and *corolla* none; *anther*-cells 3-8, opening transversely; *ovary* 1-celled, with several erect orthotropous ovules; *style* thick; *stigma* disk-like; *berry* few-many-seeded; *embryo* at the apex of the albumen.—Small free-floating aquatic *herbs*, with fibrous *roots*, and entire clustered spreading *leaves*, with the flowers in their axils.

P. SPATHULATA, Michx. *Leaves* arranged in a circle, round-ovate, abruptly contracted into a short petiole, with the nerves projecting beneath (lamelliform); *roots* numerous, elongated; *spathe* short-peduncled, white. In still water. *Leaves* 1'-2' long.

ACORUS, L. CALAMUS; SWEET FLAG.

Scape flattened, leaf-like, with the lateral sessile spadix covered with the perfect *flowers*; *spathe* none; *sepals* and *stamens* 6; *corolla* none; *filaments* slender; *anthers* kidney-shaped, 1-celled, opening transversely; *ovary* 2-3-celled, with several orthotropous suspended ovules in each cell; *stigma* minute; *fruit* dry, gelatinous within, 1-few-seeded; *embryo* in the axis of the albumen.—Perennial *herbs*, from a creeping aromatic rhizoma; *leaves* erect, long, flattened, 2-edged; *scape* leaf-like, elongated above the spadix.

A. CALAMUS, L. Wet places. April. *Rhizoma* rather slender, pungent; *leaves* 1°-2° high, linear-lanceolate; *scape* narrower than the leaves; *spadix* cylindrical, yellowish, 2'-3' long, spreading.

128. DUCKWEED FAMILY. Order, LEMNACEÆ.

Minute aquatic floating *plants*, with lenticular proliferous *stems* (fronds), and usually simple *roots* pendent from beneath; *flowers* monœcious, mostly from a marginal cleft of the stem; *spathe* membranaceous, pitcher-shaped, bursting into two unequal lobes, soon vanishing, commonly inclosing

two sterile flowers, which are reduced to single slender filaments bearing a 2-celled *anther*, and a single sessile 1-celled *ovary*, which forms in *fruit* a 1-7-seeded *utricle*; *embryo* straight, in the axis of fleshy albumen.

LEMNA, L. DUCKWEED.

Spathes marginal, 3-flowered; *anthers* opening transversely; *stigma* funnel-form; *ovules* erect from the base of the cell, anatropous or half-anatropous; *stems* increasing by lateral buds; *roots* terminating in a calyptré-like appendage. The *flowers* of these plants are seldom seen.

L. MINOR, L. *Stems* pale, round-obovate, flattened, single or variously clustered; *root* single; *ovule* solitary, half-anatropous; *seed* horizontal. Ponds, ditches, etc.; common near the coast. *Stems* 1"-2" long.

L. POLYRHIZA, L. *Stems* roundish or obovate, flat and pale above, convex and dark purple beneath, clustered; *roots* numerous, clustered; *ovules* 2. Ponds; less common than the preceding. *Stems* 2"-4" long.

129. CAT-TAIL FAMILY. Order, TYPHACEÆ.

Simple-stemmed marsh herbs, with elongated strap-shaped *nerved leaves*, and monœcious *flowers*, on a globular or cylindrical *spadix*, destitute of floral envelopes, but enveloped in copious pappus-like hairs or scales; *spathe* bract-like or none; *anthers* single or 2-4 together, on long and slender filaments; *ovary* 1-celled, with a single suspended anatropous *ovule*; *style* slender; *fruit* nut-like; *embryo* straight in copious albumen; *sterile spadix* placed above the fertile, continuous or distant.

TYPHA, Tourn. CAT-TAIL.

Flowers densely crowded on a long cylindrical terminal *spadix*, enveloped in copious pappus-like hairs; the *sterile*

ones sessile on the upper part of the spadix, the *fertile* on slender stalks; *style* filiform; *stigma* lateral; *embryo* cylindrical, in the axis of fleshy albumen. *Stems* straight, from a thick rhizoma, clothed below with the sheathing bases of the elongated linear *leaves*; *spathes* bract-like and deciduous, or none.

T. LATIFOLIA, L. *Stem* terete, jointed below; *leaves* nearly as long as the stem, erect, flat, reticulated and somewhat glaucous; sterile and fertile portions of the spadix contiguous, cylindrical. Margins of ponds and rivers. July and August. Stem 4°-6° high, scape-like above; leaves about 1' wide; *spadix* about 1° long.—T. angustifolia, L., if found within our limits, may be known by narrower leaves which are channeled near the base, and by the interval which separates the sterile and fertile portions of the spadix.

SPARGANIUM, L. BUR-REED.

Flowers densely crowded in globular heads, surrounded by several scales like a calyx; the upper *heads* sterile, naked, the lower fertile and commonly bracted; *ovary* sessile, pointed by the short persistent style; *stigma* lateral; *fruit* nut-like; *embryo* cylindrical, in the axis of fleshy albumen.—Marsh or aquatic *plants*, with erect *stems*, and long strap-shaped sessile *leaves*, the lowest ones sheathing; heads of flowers scattered.

S. RAMOSUM, Huds.? *Leaves* flat, obtuse, the upper ones gradually shorter, concave and clasping at the base, the lower sheathing and elongated; *heads* 5-9, disposed in axillary and terminal interrupted spikes, the lowest one larger and pistillate, the others wholly staminate; *scales* wedge-shaped; *stigma* subulate, simple. (S. Americanum, Ell.) Lagoons and ditches. July. *Stem* 2°-3° high; *leaves* as long as the stem, 8"-12" wide; heads of fertile flowers 8"-10" in diameter.

130. PONDWEED FAMILY. *Order, NAIADACEÆ.*

Aquatic herbs, with slender jointed leafy immersed *stems*, and perfect monœcious or diœcious *flowers*, destitute of floral envelopes, or with a scale-like calyx; *stamens* 1-4; *anthers* 1-4-celled; *ovary* 1-celled, forming a 1-seeded achenium in fruit; *stigmas* 1-4; *seed* without albumen; *embryo* straight, curved, or coiled; *leaves* sheathing, or with sheathing stipules; flowers commonly inclosed in a spathe.

SYNOPSIS.

* *Flowers monœcious or diœcious.*

- Stigma* 2-4. *Flowers* naked. *Leaves* opposite or whorled.....NAIAS.
 ——— 2. ——— inclosed in a spathe. *Leaves* alternate.....ZOSTERA.
 ——— single peltate. *Ovaries* 4, from a cup-like involucre.....ZANNICHELLIA.

** *Flowers perfect.*

- Fruit* long-peduncled, umbellate. *Calyx* and *corolla* none.....RUPPIA.
 — sessile, spiked. *Calyx* 4-leaved.....POTAMOGETON.

NAIAS, L.

Flowers monœcious or diœcious, axillary, sessile, destitute of calyx and corolla; *sterile* flower monandrous, inclosed in a spathe; *anther* 4-celled, opening at the apex, the filament lengthening; *fertile* flower naked, the sessile ovary pointed with the slender style; *stigmas* 2-4, subulate; *ovule* erect; *achenium* minute; *embryo* straight; *radicle* inferior. *Stems* filiform, forking; *leaves* opposite or whorled, linear, dilated into a short sheath at the base; flowers solitary, minute.

N. FLEXILIS, Rostk. *Stem* immersed (1°-2° long); *leaves* 3 in a whorl, narrow-linear, membranaceous, spreading, minutely denticulate on the margins, the lower ones often remote; *stigmas* 3-4; *achenium* elliptical, acute, smooth, yellowish. (*Caulinia flexilis*, Willd.) In ponds and still water. July and August, Leaves about 1' long.

Var. ? FUSIFORMIS. *Stem* (6'-12' long) almost capillary, very leafy throughout; *leaves* opposite, approximate, spreading or recurved (2"-4" long); *achenium* narrowly spindle-shaped, finely reticulated, brownish. Brackish water along the coast. July and August.

ZOSTERA, L. EEL GRASS.

Flowers monœcious, naked, the sterile and fertile ones alternately arranged on the anterior edge of a flattened membranaceous spadix, and inclosed in the sheath-like base of the leaves; *anthers* oblong, 1-celled, filled with fine filaments instead of pollen-grains; *ovary* fixed near the apex, containing a single pendulous orthotropous ovule, and pointed with the subulate persistent style; *stigmas* 2, capillary; *utricle* bursting irregularly; *seeds* striate; *cotyledons* inflexed-curved, received in a longitudinal cleft of the embryo.—*Marine herbs*, with creeping *stems*, and narrowly linear obtuse and elongated sheathing *leaves*.

Z. MARINA, L. *Stem* slender, terete, jointed; *leaves* thin and tender, faintly 3-5-nerved; *flowers* in two rows on the linear spadix. Deep salt-water coves. August and September.

ZANNICHELLIA, L.

Flowers monœcious, axillary; *sterile* flower consisting of a solitary naked filament bearing a 2-4-celled anther; *fertile* flower from the same axil, composed of 2-6 sessile 1-celled ovaries, surrounded by a cup-shaped involucre, and pointed with the slender style; *stigma* obliquely peltate; *ovule* suspended, orthotropous; *achenium* oblong, stalked; *embryo* slender, coiled.—*Submerged aquatic plants*, with filiform branching *stems*, and very narrow and entire alternate *leaves*, with sheathing stipules.

Z. PALUSTRIS, L. *Stems* tufted, filiform, alternately branched; *leaves* narrowly linear, entire, acute, 1-nerved;

anther 2-celled, on a long and slender filament; *achenia* 3-6 in a cluster, commonly raised on a short common peduncle, each stalked, linear-oblong, somewhat compressed and curved, smooth and wingless, about one-third longer than the persistent style. Fresh or brackish water. May-August. Stems 1°-3° long; leaves 1'-2' long.

RUPPIA, L. DITCH GRASS.

Flowers perfect, naked, two or more on a slender spadix, inclosed in the spathe-like sheaths of the leaves, but soon long-exserted; *stamens* 2, closely sessile; *anther*-cells large, distinct; *ovaries* 4, sessile, containing a single suspended campylotropous ovule; *stigma* peltate; *achenium* stalked, obliquely ovate; *embryo* pointed by the short plumule.—Salt-water *herbs*, with filiform branching *stems*, and alternate linear or bristle-like sheathing *leaves*.

R. MARITIMA, L. In shallow water, along the coast. May-August. *Stems* immersed, 1°-3° long, mostly creeping at the base; *leaves* filiform, 1'-3' long, with dilated membranaceous sheaths; *fruiting* peduncles 1'-4' long; *achenium* pointed.

POTAMOGETON, Tourn. PONDWEED.

Flowers perfect, spiked; *sepals* 4, roundish, valvate in the bud; *stamens* 4, opposite the sepals; *filaments* short; *anthers* 2-celled; *ovaries* 4, sessile; *ovules* ascending, campylotropous; *style* short or none; *stigma* peltate; *achenia* 1-4, compressed; *embryo* curved or coiled.—Aquatic *herbs*, with immersed slender and jointed stems; *leaves* stipulate, alternate and opposite, either all immersed and commonly membranaceous, or the upper ones floating and more rigid; *spikes* peduncled, axillary and terminal.

* *Leaves* all immersed and alike.

† *Leaves* lanceolate or cordate; *stipules* free, sheathing.

P. PERFOLIATUS, L. *Stem* terete, branching, very leafy;

leaves ovate, cordate, clasping, obtuse, many-nerved, those at the branches and peduncles opposite; *spikes* lateral and terminal, oblong, densely many-flowered, on stout peduncles 2-3 times as long as the leaves; *achenium* obliquely obovate, rounded on the back, short-pointed. Fresh or brackish water. July-September. Stems 1°-2° long; leaves 6"-8" long.

P. LUCENS, L.? *Stems* sparingly branched; *leaves* lanceolate, acute, contracted and sessile at the base, pellucid, 5-9-nerved, wavy on the margins; *stipules* (white) connate, rounded on the back; *spikes* cylindrical, many-flowered, on stout peduncles shorter than the leaves; *achenium* (immature) oval, compressed, rounded on the back, short-pointed. Fresh water. August. Stems 2°-3° long; leaves 2'-3' long, equaling the spikes.

** *Leaves of two forms; the immersed ones thin and pellucid, the floating ones long-petioled and somewhat coriaceous.*

P. FLUITANS, Roth. *Stem* simple; *leaves* many-nerved, the floating ones varying from oblong-lanceolate to ovate, acute at each end, or obtuse or cordate at the base, the others large, oblong, gradually or abruptly short-petioled, undulate; *stipules* connate and keeled on the back; *peduncles* stout, thickened upward; *spikes* long, cylindrical, dense-flowered; *achenium* smooth, 1-3-keeled on the back. Fresh-water ponds and streams. June-August. Leaves 2'-9' long.

P. NATANS, L., probably occurs within our limits, but I have not seen specimens. It may be known by longer-petioled (4'-12') *leaves*, more slender *peduncles*, and rounded *stipules* and *achenia*.

P. HETEROPHYLLUS, Schreber. *Stem* slender, branching; *floating leaves* small, thin, elliptical or oblong-linear, on filiform petioles; *immersed leaves* long, sessile, linear or lanceolate; *stipules* connate, 2-ribbed; *peduncles* thickened upward; *spikes* narrowly cylindrical; *achenium* smooth,

slightly keeled on the back. Shallow ponds. July. Floating leaves 1'-2' long; immersed leaves 4'-6' long.

131. WATER-PLANTAIN FAMILY. *Order*, ALISMACEÆ.

Marsh herbs, usually with creeping runners or rootstocks, nerved and reticulated *sheathing leaves*, and *scape-like stems*, bearing the perfect or monœcious *flowers* in spikes or whorled racemes; *sepals* and *petals* 3, or the latter sometimes wanting; *stamens* few or numerous; *anthers* 2-celled; *ovaries* 3 or many, with 1-2 anatropous or campylotropous erect ovules; *style* short or none; *achenium* coriaceous, 1-2-seeded; *embryo* straight or curved, without albumen.

SYNOPSIS.

SUB-ORDER I. **Juncagineæ.** *Sepals* and *petals* (when present) greenish. *Ovule* anatropous. *Embryo* straight.

Leaves rush-like. *Flowers* in spiked racemes.....TRIGLOCHIN.

SUB-ORDER II. **Alismeæ.** *Petals* white, deciduous. *Ovule* campylotropous. *Embryo* curved or hooked.

Flowers perfect. *Achenia* whorled. *Racemes* compound.....ALISMA.

———— clustered in a head.....ECHINODORUS.

———— monœcious. *Achenia* clustered in a head.....SAGITTARIA.

TRIGLOCHIN, L.

Flowers perfect, in a spiked raceme; *sepals* 3; *petals* 3, and greenish, like the sepals, or none; *anthers* 3-6, nearly sessile, oval; *ovaries* 3-6, united around a central axis, from which they separate at maturity, 1-ovuled; *stigmas* plumose; *embryo* straight; *leaves* rush-like, fleshy, 2-ranked; flowers small, bractless.

T. TRIANDRUM, Michx. *Leaves* erect, linear-subulate, semi-terete, dilated at the base and sheathing the base of the terete scape; *flowers* very numerous, on short pedicels;

sepals oval, deciduous; *petals* none; *anthers* and *ovaries* 3; *fruit* globose-triangular, pointless, when dry 3-winged by the compressed 3-ribbed *achenia*; *embryo* oblong. Salt marshes along the coast. August–September. *Scape* and leaves $\frac{1}{2}^{\circ}$ – 1° high.

ALISMA, L. WATER PLANTAIN.

Flowers perfect in a whorled panicle; *sepals* 3; *petals* 3, involute in the bud, deciduous; *stamens* 6–12; *ovaries* numerous in a simple whorl; *style* short; *achenium* 1-seeded, 2–3-keeled on the back; *roots* fibrous; *leaves* mostly oval or cordate, nerved, shorter than the scape; flowers white.

A. PLANTAGO, L. *Leaves* long-petioled, ovate or oblong, acute, rounded or cordate at the base, 3–9-nerved; *panicle* large, lax, the whorled branches and elongated filiform pedicels bracted at the base; *achenia* obtuse, 15–20 in a whorl. (A. *trivialis*, and A. *parviflora*, Pursh.) Ditches and margins of ponds. July and August. Leaves 2'–4' long; panicle 1° – 2° long.

ECHINODORUS, Richard.

Flowers perfect, mostly in whorled racemes; *sepals* 3; *petals* 3, imbricated in the bud, withering; *stamens* few or numerous; *ovaries* few or many, imbricated, forming ribbed *achenia* in fruit, usually beaked with the persistent style.—*Herbs*, with petioled nerved *leaves*; *heads* mostly bur-like.

E. PARVULUS, Engelm. Small; *leaves* lanceolate or spatulate, mostly acute, finely nerved and somewhat pinnately-veined, commonly shorter than the single or clustered 1–6-flowered scapes; *flowers* mostly clustered or umbelled, on long bracted pedicels which are recurved in fruit; *stamens* 9; *achenia* few, shorter than the ovate sepals, obovate,

flattened at the sides, and surrounded with 5 prominent ribs, beakless. Margins of shallow ponds. July and August. *Scapes* 1'-4' high; *achenia* black and shining.

E. RADICANS, Engelm. *Leaves* large, long-petioled, ovate, cordate or truncate at the base, obtuse, 7-9-ribbed; *scape* elongated, prostrate, rooting and proliferous; *whorls* several, remote; *pedicels* slender, spreading, or recurved; *stamens* about 20; *style* shorter than the ovary; *heads* globose, longer than the many-nerved sepals; *achenia* very numerous, short-beaked, ribbed, and slightly denticulate on the back. (*Alisma radicans*, Nutt.) Swamps. July-September. *Scape* 2°-4° long; *leaves* 3'-8' long; *flowers* 8"-12" wide.

SAGITTARIA, L. ARROW GRASS.

Flowers monœcious, in a whorled raceme, the upper ones sterile; *sepals* 3, persistent; *petals* 3, imbricated in the bud, withering; *stamens* few or many; *ovaries* crowded in a globular head; *achenia* flat, membranaceous, winged.—Marsh or aquatic *herbs*, with scape-like *stems*, and variously-shaped nerved and reticulated sheathing *leaves*, which are often without a blade; *flowers* white, commonly 3 in a whorl from the axils of persistent bracts.

* *Filaments* long and slender.

S. FALCATA, Pursh. Tall; *leaves* erect, rigid, broadly lanceolate, acute at each end, pinnately nerved, on long and stout petioles; *scape* longer than the leaves, often branching above; *pedicels* of the sterile flowers slender, longer than those of the fertile ones; *bracts* and *sepals* ovate, obtuse, granular-roughened; *stamens* numerous with hairy filaments; *achenia* obliquely obovate, wing-keeled, strongly beaked. (*S. lancifolia*, Michx.) Lakes and rivers. June-September. *Scape* 2°-5° high; *leaves* 1°-2° long; *flowers* 1'-1½' wide.

** *Filaments short, thickened at the base.*

S. SIMPLEX, Pursh. *Scape* slender, commonly prostrate in fruit, simple or branched; *leaves* linear or lanceolate, acute at each end, 3-nerved, erect, the earliest mostly destitute of a blade; *bracts* membranaceous; *flowers* small, all on long filiform pedicels; *stamens* 10-12, hairy at the base; *achenia* obovate, wing-keeled, beakless. (*S. graminea*, Michx.) Shallow ponds in the pine-barrens. May-October. *Scape* 10'-15' high, usually longer the leaves.

132. FROG'S-BIT FAMILY. Order, HYDROCHARIDACEÆ.

Aquatic herbs, with monœcious or diœcious *flowers*, from a membranaceous spathe; *sepals* and *petals* 2, or the latter wanting, distinct in the sterile flower, united into a tube in the fertile, and coherent with the 1-9-celled ovary; *stamens* 3-12; *ovules* numerous, ascending, orthotropous; *stigmas* 3-9; *fruit* indehiscent, many-seeded; *embryo* straight, without albumen.

SYNOPSIS.

* *Ovary* 1-celled; *stigmas* 3.

Flowers diœcious. *Spathe* peduncled. *Stamens* 3. *Leaves* long, linear.. *VALLISNERIA*.

* *Cells of the ovary* and *stigmas* 6-9.

Flowers monœcious. *Stamens* 6-9, monadelphous. *Leaves* cordate, petioled.. *LIMNOBIUM*.

VALLISNERIA, Micheli. TAPE GRASS.

Flowers diœcious; *sterile* flowers numerous, minute, crowded on a spadix, which is inclosed in an ovate 3-leaved short-stalked spathe; *calyx* 3-parted; *corolla* none; *stamens* 3; *fertile* flowers solitary, inclosed in a tubular spathe, and borne on a very long and mostly spiral scape; *sepals* and small *petals* 3, united and coherent with the cylindrical 1-celled many-ovuled ovary; *stigmas* 3, each

2-lobed; *seeds* numerous, fixed to three parietal placentæ. — *Aquatic herbs*, with creeping stems, and elongated *strap-shaped leaves*. Fertilization effected mostly as in *Anacharis*.

V. SPIRALIS, L. Slow-flowing streams and ponds. July–September. *Plant* creeping, proliferous; *leaves* strap-shaped, obtuse, 5–9-nerved, sharply serrulate, 1° – 3° long, 6"–12" wide; *scape* of the *sterile flowers* 1'–4' long, of the *fertile* ones 2° – 5° long; *fruit* 1'–3' long, often curved. Perennial.

133. BURMANNIA FAMILY. Order, BURMANNIACEÆ.

Small *herbs*, with filiform *stems*, scale-like *leaves*, and regular perfect *flowers*; *sepals* and *petals* united to form a tubular unequally 6-cleft corolla-like perianth, with the tube coherent with the 1 or 3-celled many-ovuled ovary; *stamens* 3 or 6, inserted on the tube of the perianth; *anther*-cells separate, 2-lobed, opening crosswise; *style* slender; *stigmas* 3, dilated; *placentæ* 3, central or parietal; *capsule* many-seeded; *seeds* minute, with a loose or reticulated testa.

BURMANNIA, L.

Tube of the perianth mostly 3-angled or 3-winged, 6-cleft, withering-persistent, the three interior lobes smaller; *stamens* 3, very short, inserted opposite the interior lobes of the perianth; *ovary* 3-celled, with three thick 2-lobed central placentæ; *stigmas* globose, dilated or 2-lobed; *capsule* splitting at the apex into 3 valves; *radical leaves* crowded and grass-like, or none; those of the stem minute, scale-like; *flowers* racemose or clustered.

APTERIA, Nutt.

Perianth terete, tubular-bell-shaped, 6-cleft, with the 3

interior lobes smaller; *stamens* 3, very short, opposite the interior lobes of the perianth, the filaments flat and orbicular at the apex; *anthers* closely adhering to the globose stigmas; *ovary* 1-celled, with three 2-winged parietal placentæ; *capsule* obovate, splitting from the base into three valves, which remain attached to the apex of the persistent placentæ; *seeds* ovoid.—A small perennial *herb*, with subulate bract-like *leaves*, and scattered nodding *flowers*.

A. SETACEA, Nutt. Deep shady woods, along the margins of swamps. September and October. *Stem* erect or ascending, purple, filiform, simple or branched, 2'-8' high; *leaves* scattered; *flowers* few, distant, on nodding pedicels; *perianth* white, 5" long.

134. ORCHIS FAMILY. Order, ORCHIDACEÆ.

Perennial *herbs*, with simple *stems*, from thick fibrous or tuberous *roots*, nerved *leaves*, and irregular often showy *flowers*; *perianth* 6-parted, united below with the 1-celled ovary, the three outer divisions (calyx) and commonly two of the inner ones (petals) similar in form, but the third posterior, or, by the twisting of the ovary, anterior one (*labellum* or *lip*), differs from the others in form, and often bears a spur or prominence at the base beneath; *stamens* 3, united with the style into a column, one or (in *Cypripedium*) two only bearing a 2-celled anther; *pollen*-grains cohering in 2, 4, or 8 waxy or powdery masses (*pollinia*); *capsule* with three parietal placentæ, splitting at the sides into three valves; *seeds* very numerous, minute, covered with a loose membranaceous testa; *albumen* none.—*Plants* mostly smooth and more or less succulent; leaves almost always alternate, sheathing and entire; stems leafy or scape-like; flowers bracted, solitary, spiked, or racemed, and remarkable for their various and singular forms.

SYNOPSIS.

Anther solitary, fixed to the apex of the column like a lid, deciduous.

TRIBE I. **Malaxideæ.** *Pollen* in smooth waxy masses, without stalks or connecting tissue. *Roots* tuberous.

* *Stems* leafy.

*Lip cordate or sagittate. Column minutely 2-toothed at the apex.....*MYCROSTYLIS.

— *entire. Column elongated, incurved, margined at the apex.....*LIPARIS.

** *Stems* sheathed.

Spur of the lip short and adnate to the ovary. Root branching, toothed.

CORALLORHIZA.

TRIBE II. **Neottieæ.** *Anther* attached to the back of the column, parallel with the stigma, the cells approximate. *Pollen* powdery.

* *Pollen-masses* 2.

*Lip nearly entire, clasping the column, obtuse.....*SPIRANTHES.

— *2-cleft. Stem with a pair of ovate opposite leaves.....*LISTERA.

MICROSTYLIS, Nutt. ADDER'S MOUTH.

Sepals oblong, spreading; *petals* filiform; *lip* cordate or sagittate, entire or nearly so, sessile; *column* minute, 2-toothed at the apex; *anther* lid-like; *pollen-masses* 4, collateral, united by pairs at the apex.—Low *herbs*, from bulbous roots; *stem* 1-2-leaved, sheathed below; *flowers* racemed or spiked, minute, greenish.

M. OPHIOGLOSSOIDES, Nutt. *Leaf* solitary near the middle of the 5-angled *stem*, ovate, clasping; *raceme* short, with the unexpanded *flowers* crowded in a globular head, elongated in fruit; *pedicels* slender, much longer than the flowers; *lip* auricled at the base, 3-toothed at the apex. (Malaxis ophioglossoides, Muhl.) Low shady woods. July and August. *Stem* 4'-8' high; *leaf* 1'-2' long; *flowers* ½" wide.

LIPARIS, Richard. TWAYBLADE.

Sepals spreading; *petals* linear or filiform, spreading or reflexed; *lip* entire, flat, often with two tubercles above the base; *column* long, semi-terete, incurved, margined at the apex; *pollen-masses* 4, collateral, united by pairs at the apex.—Low *herbs*, from bulbous *roots*; *leaves* 2, sheathing the base of the scape-like *stem*; *flowers* racemed, greenish or purplish.

L. LILIIFOLIA, Richard. *Leaves* elliptical, obtuse, sheathed at the base; *scape* 3-angled, 10–20-flowered, longer than the leaves; *sepals* linear, whitish; *petals* filiform, reflexed, yellowish; *lip* large, wedge-obovate, concave, abruptly pointed, brownish purple. (*Malaxis liliifolia*, Swartz.) Low shady woods and banks. June and July. Scape 5'–10' high; leaves 2'–4' long; lip $\frac{1}{2}$ ' long.

CORALLORHIZA, Haller. CORAL-ROOT.

Sepals and *petals* alike, oblong or lanceolate, connivent; *lip* clasping the base of the straight 2-edged column, spreading and concave above, 2-ridged near the base, spurless, or with the spur adnate to the ovary; *anther* lid-like; *pollen-masses* 4, incumbent.—Low dull-colored leafless *herbs*, with coral-like *roots*, sheathed *stems*, and racemose *flowers*.

C. ODONTORHIZA, Nutt. *Root* pinnately branched and toothed; *stem* tumid at the base, slender above; *sheaths* 3, elongated; *racemes* 10–15-flowered; *sepals* and the rather shorter spotted *petals* erect, lanceolate, obtuse; *lip* entire, longer than the sepals, distinctly clawed, the spreading limb oval, concave, 3-nerved, with two tooth-like ridges in the throat, white spotted with purple; the margins crenulate below the middle and involute above; margins of the column thickened and incurved at the base; *capsule* oval, nodding. Shady woods. February and March. Stem 8'–16' high; lip 4" long.

SPIRANTHES, Richard. TWISTED ORCHIS.

Sepals and *petals* nearly equal, the lateral sepals diverging, dilated at the base, the upper one connivent with the petals; *lip* clawed, concave, furnished with two callosities near the base, clasping the short column below; *stigma* ovate, beaked; *anther* attached to the back of the column; *pollen-masses* 2, obovate, 2-cleft, fixed to a common gland of the stigma, powdery. *Root* composed of few clustered tubers or fleshy fibers; *stem* leafy at the base, sheathed above; *flowers* small, white, in a regular 1-sided or spirally twisted spike. Near Houston.

* *Flowers on all sides of the untwisted spike.*

S. CERNUA, Richard. *Stem* smooth below, the upper portion and thick crowded spike pubescent; lowest *leaves* long, linear-lanceolate, the others bract-like and sheathing; *bracts* ovate-lanceolate, acuminate, longer than the capsule; *flowers* recurved; *lip* longer than the sepals, contracted above the middle, wavy at the recurved obtuse apex, 2-toothed at the base. Grassy swamps and meadows. October. Stem 6'-12' high; leaves 4'-8' long; flowers yellowish white, 3"-4" long. All the coast prairies.

** *Spikes twisted, bringing the flowers into a single straight or spiral row.*

S. BREVIFOLIA, n. sp. *Stem* pubescent above; *leaves* all bract-like and sheathing, or the lowest expanding into a short (1'-2') lanceolate or linear early withering blade; *flowers* all on one side of the rachis or sparingly spiral, horizontal, pubescent; *bracts* ovate, acute, scarcely longer than the ovary; *sepals* and *petals* equal; *lip* oblong or elliptical, very entire, wavy on the margins, recurved at the acute or obtuse apex, and with two tooth-like prominences at the base. Open grassy swamps in the pine-barrens. October and November. *Root* of 3 fleshy fibers; *stem* 1° high; flowers 10-20, 3"-4" long, white.

S. GRACILIS, Bigelow. *Stem* very slender, smooth throughout, scape-like; lowest *leaves* (early withering) lanceolate or elliptical, spreading; *spike* very slender; *flowers* minute, on one side of the rachis or sparingly spiral, smooth; *bracts* ovate-lanceolate, clasping, shorter than the capsule; *lip* finely crenulate on the margins, recurved and acute at the apex, with two raised ear-like prominences at the base; *anthers* 4-cleft. April and May. *Stem* sheathed, 6'-12' high; lowest *leaves* 1'-2' long; *flowers* 1" long. In the pine woods near Houston.

LISTERA, R. Br.

Sepals and *petals* alike, spreading or reflexed; *lip* longer than the *sepals*, 2-cleft; *column* short; *stigma* with a rounded beak; *anther* ovate, attached to the dorsal summit of the *column*; *pollen-masses* 2, powdery. *Stems* low, from clustered fibers, bearing two opposite sessile *leaves*, and a loose raceme of small *greenish flowers*.

L. AUSTRALIS, Lindl. *Leaves* ovate or oblong-ovate, closely sessile; *raceme* smoothish, few-several-flowered; *bracts* minute; *lip* linear, 3-4 times as long as the *sepals*, deeply 2-cleft, the divisions filiform; *column* very short. Wet shady woods. July. *Stem* 4'-8' high; *leaves* $\frac{1}{2}$ '-1' long.

135. CANNA FAMILY. Order, CANNACEÆ.

Perennial herbs, destitute of aroma, with alternate sheathing *leaves*, the very numerous nerves parallel, and diverging from the strong midrib, and superior irregular monandrous flowers; *sepals* 3; *corolla* 6-parted, the three exterior divisions alike, the three interior ones very unequal and often variously imperfect; *stamen* and *stigma* mostly petal-like; *anther* 1-celled; *ovary* 1-3-celled, with 1-many anatropous or campylotropous ovules; *embryo* straight or hooked, in hard albumen; *rhizoma* often tuberous, and abounding in starch.

THALIA, L.

Calyx minute; *corolla* tubular, the three exterior divisions similar and equal, the interior unequal, the anterior one broad and hooded, the interior lateral one elongated and clawed, the exterior lateral one furnished with two bristles on one side, and partly adnate to the slender stamens on the other; *style* thick, spiral; *stigma* perforated, 2-lipped, the lower lip long and pendent; *capsule* utricular, 1-celled, 1-seeded; *seed* ovoid, erect, campylotropous; *embryo* hooked, in hard albumen.—Stemless *herbs* from fibrous roots; *scape* elongated; *petioles* terete, dilated and sheathing at the base; *flowers* in bracted paniced spikes, commonly two together, and included in a 2-valved spathe.

T. DEALBATA, Roscoe. *Plant* dusted over with a minute white powder, otherwise smooth; *leaves* distichous, long-petioled, cordate-ovate, acute; *scape* terete, reed-like; *panicle* erect, dense, smooth, the branches not longer than the lanceolate deciduous bracts at their base; *spikes* erect; *valves* of the *spathe* unequal, ovate, coriaceous; *flowers* small, purple. Ponds and marshes. June–September. Scape 3°–5° high; leaves 6'–9' long, on petioles 1°–2° long.

136. AMARYLLIS FAMILY. Order, AMARYLLIDACEÆ.

Chiefly stemless smooth and succulent *herbs*, with linear *leaves*, and smooth (not scurfy or woolly) often showy *flowers*; *sepals* and *petals* united to form a 6-parted corolla-like perianth, imbricated in the bud, the tube adnate to the 3-celled ovary; *stamens* 6; *anthers* introrse; *ovules* anatropous, attached to the central placentæ; *style* single; *fruit* 1–3-celled, valvular or indehiscent; *embryo* straight in fleshy albumen, the radicle resting on the umbilicus.

SYNOPSIS.

* *Root bulbous.*

Tube of the perianth elongated. Stamens connected with a cup-shaped crown. Stigma entire.....PANCRACTIUM.

Tube of the perianth elongated, crownless. Stigma entire.....CRINUM.

** *Root tuberous.*

Capsule 3-valved. Flowers spiked. Leaves thick and fleshy.....AGAVE.

—— *circumscissile. Flowers umbelled. Leaves grass-like*.....HYPOXYSS.

PANCRACTIUM, L.

Perianth corolla-like, 6-parted, the narrow divisions spreading, the tube slender and elongated; *stamens* united below with a cup-shaped or funnel-shaped variously toothed crown, exserted; *anthers* versatile, linear; *style* elongated, declining; *stigma* entire; *capsule* membranaceous, 3-celled; *seeds* often bulb-like; *scape* from a coated bulb, compressed or 2-edged, bearing the large and fragrant leafy-bracted *flowers* in a cluster at the apex; *leaves* strap-shaped.

§ PANCRACTIUM. *Tube of the perianth dilated and funnel-shaped at the apex; crown almost wholly adnate to the tube, the border divided into six 2-cleft teeth, alternating with the stamens; capsule many-seeded, loculicidally 3-valved.*

P. MARITIMUM, L. *Leaves* glaucous, erect, longer than the slightly compressed many-flowered *scape*; divisions of the *perianth* linear-lanceolate, shorter than the slender (3'-4') tube, greenish without; *stamens* short. (P. Carolinianum, L.) July-September. *Scape* 1°-1½° high. Marshes on the coast.

P. CORONARIUM, Leconte. *Bulb* without runners; *leaves* linear-strap-shaped, flat above, half-cylindrical near the base; *scape* solitary, green, 2-edged, 4-flowered; divisions of the *perianth* linear, spreading, white; *crown* large, funnel-shaped, with six truncate lobes at the stamens, and several fine teeth at the sinuses. *Scape* and *leaves* 2° long. Prairies of Gulf coast.

P. OCCIDENTALE, Leconte. *Bulb* without runners; *leaves* linear-strap-shaped, obtuse, concave, and, like the 2-edged, 6-flowered scape, glaucous; divisions of the *perianth* white, linear, spreading and recurved at the apex; *crown* funnel-shaped, with six toothed lobes alternating with the filaments; *capsule* many-seeded. *Stem* and leaves 2° long. Upland prairies and hills in Burleson County.

CRINUM, L.

Tube of the *perianth* crownless at the apex. Otherwise like *Pancratium* both in character and habit.

C. AMERICANUM, L. *Leaves* strap-shaped, concave, obtuse, remotely denticulate, spreading; *scape* compressed, with rounded edges, 2-4-flowered; *bracts* lanceolate recurved; *ovaries* sessile, with a linear bractlet at the base of each; *flowers* large, fragrant; leaves of the *perianth* white, lanceolate, shorter than the green tube; *filaments* and *style* purple above; *stigma* truncate, entire; *ovules* 3 in each cell, erect; *capsule* globose, membranaceous, indehiscent, 1-6-seeded, pointed with the long persistent tube of the *perianth*; *seed* large, corm-like; *embryo* oblong, in the axis of copious fleshy albumen; *radicle* inferior. May-September. Scape 1°-2° high; *perianth* 6'-8' long. On the banks of Buffalo Bayou.

AGAVE, L.

Perianth corolla-like, funnel-shaped, 6-parted, persistent; *stamens* exserted; *anthers* linear, versatile; *style* filiform, exserted; *stigma* 3-angled or 3-lobed; *capsule* coriaceous, 3-lobed, 3-celled, loculicidally 3-valved, many-seeded; *seeds* flat, black and shining, attached to the central placenta; *scape* bracted; *leaves* fleshy, spiny or cartilaginous on the margins; *flowers* in simple or paniced spikes, bracted. South-western Texas.

A. VIRGINICA, L. *Leaves* lanceolate, thick and rigid, spine-pointed, denticulate on the margins; *scape* simple, smooth; *flowers* small, yellowish, scattered in a simple spike; *perianth* strongly nerved; *filaments* and *style* spotted. Sterile soil. July. Scape 3°-5° high; leaves 6'-12' long; *capsule* globose, 3-lobed.

HYPOXYS, L. STAR GRASS.

Perianth 6-parted, persistent, the spreading divisions colored within; *stamens* short, unequal; *anthers* erect; *ovary* 3-celled, with the numerous amphitropous ovules attached to the central placentæ in two rows; *style* short and thick; *stigmas* 3; *capsule* top-shaped, many-seeded, opening transversely near the summit, the upper portion, with the withered perianth, falling off like a lid; *seeds* globular, with a beak-like projection near the base; *radicle* inferior.—Low pubescent *herbs*, from a tuberous root, with grass-like *leaves*, and a naked *scape*, bearing the few yellow *flowers* in a terminal bracted umbel.

H. ERECTA, L. Hairy; *leaves* linear, channeled; *scapes* 1-4, filiform, 2-4-flowered; *bracts* subulate, much shorter than the slender unequal pedicels; divisions of the *perianth* oblong, greenish and hairy without, yellow within; *capsule* 8-celled. Varies with the more rigid leaves nearly smooth, the 2-3-flowered scape flattened, and the bristle-like *bracts* longer than the nearly sessile almost woolly perianth. Low ground. March and April. Scapes 2'-9' long; leaves at length much longer than the scape; *flowers* 8' wide.

H. JUNCEA, Smith. Sparingly hairy; *leaves* filiform; *scapes* 1-3, filiform, 1-2-flowered; *bracts* bristle-like, shorter than the villous pedicels; divisions of the *perianth* oblong, the three exterior ones greenish and hairy without; partitions of the *capsule* vanishing at maturity; *seeds* black, minutely pitted. (H. filifolia, Ell.) Low pine-bar-

rens. March and April. Scape 4'-9' long, at length procumbent; *flowers* 9"-12" wide.

137. BLOODWORT FAMILY. *Order, HÆMODO-
RACEÆ.*

Perennial fibrous-rooted *herbs*, with leafy or scape-like *stems*, mostly equitant and sword-shaped *leaves*, and regular woolly or scurfy *flowers*; *perianth* tubular, 6-cleft, more or less cohering with the 3-celled ovary; *stamens* 3 or 6; *anthers* adnate, introrse, 2-celled; *ovules* mostly few, anatropous or amphitropous, attached to the central placentæ; *styles* 3, united, deciduous, or persistent and separating; *stigma* entire; *capsule* inclosed in the persistent perianth, loculicidally 3-valved at the apex; *embryo* small, in hard albumen.

138. PINE-APPLE FAMILY. *Order, BROMELIACEÆ.*

Chiefly scurfy *epiphytes*, with fibrous *roots*, rigid *leaves*, and regular conspicuously bracted mostly spiked *flowers*; *perianth* free, or more or less adnate to the 3-celled ovary, 6-parted, imbricated, the three outer divisions calyx-like; *stamens* 6; *anthers* 2-celled, introrse; *ovules* numerous, anatropous, erect or pendulous; *placentæ* central; *style* single; *stigmas* 3; *fruit* berry-like, or 3-celled, 3-valved capsule; *seeds* stalked; *embryo* small, at the base of copious mealy albumen.

TILLANDSIA, L. LONG MOSS; AIR-PLANT.

Sepals rigid; *petals* imbricated and tube-like below, spreading above; *stamens* filiform, hypogynous; *ovary* free; *style* slender; *capsule* linear or linear-oblong, cartilaginous, septicidally 3-valved, each valve separating into 2 plates; *seeds* erect, club-shaped, pointed, raised on a long and hairy stalk; *radical leaves* mostly crowded, imbricated; *petals* fugacious.

* *Stem rigid, erect ; flowers spiked, blue.*

† *Leaves broad at the base, gradually narrowed upward.*

T. UTRICULATA, Leconte. *Leaves* scurfy and glaucous, subulate and recurved at the summit, very much dilated, concave and imbricated at the base, shorter than the rigid mostly branching stem, the uppermost small and sheathing ; *flowers* scattered ; *sepals* oblong-linear, obtuse, longer than the oblong pubescent membranaceous bracts, much shorter than the capsule ; *petals* pale blue, twice as long as the sepals, slightly spreading at the apex ; *stamens* exserted. June and July. *Stem* 2°-3° high. The dilated and imbricated bases of the leaves form a kind of cup which commonly contains a considerable quantity of water.

* *Leaves linear or filiform, from an abruptly dilated base.*

** *Stems filiform, pendent ; flowers solitary, green.*

T. USNEOIDES, L. (*Long Moss*.) Scurfy and hoary ; *stems* (1°-2° long) branching ; *leaves* 2-ranked, linear-awl-shaped, recurved ; *flowers* sessile at the summit of the branches, small ; *sepals* longer than the bracts, half as long as the linear recurved green petals. Humid situations. June-September.

139. IRIS FAMILY. Order, IRIDACEÆ.

Herbs, with linear or sword-shaped equitant nerved *leaves*, and fugacious often showy *flowers* from a 2-leaved *spathe* ; *perianth* 6-parted, the divisions spreading and equal, or the inner ones smaller, convolute in the bud ; *stamens* 3, distinct or united ; *anthers* extrorse ; *ovary* adnate to the tube of the perianth, 3-celled ; the numerous anatropous *ovules* fixed to the central placentæ ; *style* single ; *stigmas* 3 ; *capsule* loculicidally 3-valved ; *embryo* in the axis of fleshy albumen.

SYNOPSIS.

<i>Stigmas</i> petal-like, covering the stamens. Capsule angular.....	IRIS
<i>Stigmas</i> filiform. Capsule globular. Stem flat.....	SISYRINCHIUM.
<i>Stigmas</i> filiform, 2-parted. Stem terete.....	NEMASTYLIS.

IRIS, L. BLUE FLAG ; FLOWER-DE-LUCE.

Perianth corolla-like, 6-parted, the exterior divisions recurved, and often crested or bearded within, the interior mostly smaller and erect; *stamens* 3, opposite the outer divisions of the perianth, concealed by the dilated petal-like 2-lipped spreading stigmas; *style* 3-angled; *capsule* 3-6-angled; *seed* numerous, flattened, packed in 2 rows in the cells.—Perennial *herbs*, with creeping or tuberous *root-stocks*, simple or branched *stems*, linear or sword-shaped *leaves*, and showy *flowers* from a scarious spathe.

* *Stems* tall, leafy; *divisions of the perianth* unequal.

I. VERSICOLOR, L. *Stem* nearly terete, simple or branched; *leaves* sword-shaped; *flowers* terminal, single or spiked, crestless; *perianth* pale blue, variegated with white, yellow, and purple, the inflated tube shorter than the obtusely 3-angled ovary; *stigmas* 2-toothed at the base, with the lips entire, or slightly crenate; *capsule* oblong, obtusely 3-angled. Wet places. April and May. Stem $1\frac{1}{2}$ °–2° high; lowest leaves $1\frac{1}{2}$ °–2° long, 1'–1½' wide; perianth 2' long.

SISYRINCHIUM, L. BLUE-EYED GRASS.

Perianth corolla-like, 6-parted, the divisions nearly equal, spreading; *stamens* 3, monadelphous; *anthers* sagittate; *style* short; *stigmas* 3, simple, filiform and involute; *capsule* and *seeds* roundish.—Grass-like *herbs*, with fibrous roots, and scape-like, 2-edged stems; *flowers* small, in an umbellate cluster, successively developed from a rigid 2-leaved spathe.

S. BERMUDIANA, L. *Leaves* linear, erect; *stem* simple or sparingly branched, naked or 1-2-leaved, more or less

broadly 2-winged; leaves of the *spathe* equal and shorter than the flowers, or the lower one much longer than the flowers; *perianth* blue, yellow in the center; the divisions notched and bristle-awned at the apex. (*S. mucronatum*, Michx.) Prairies. July and August. Stem 6'–18' high; leaves mostly shorter than the stem; *flowers* 4–6 in a *spathe*, $\frac{1}{2}$ ' wide, opening in the evening.

NEMASTYLIS, Nutt.

Perianth 6-parted, the divisions nearly equal and spreading; *stamens* 3, distinct, with the subulate filaments much shorter than the elongated linear anthers; *style* short, 3-lobed, with the lobes 2-parted, each division produced into filiform radiating stigmas; *capsule* oblong, truncated. — *Herbs*, with coated bulbous roots, linear plicate leaves, and very fugacious flowers from a 2-leaved *spathe*.

N. CÆLESTINA, Nutt. *Bulb* small, roundish; *radical leaves* few, elongated, sheathing, those of the stem diminishing upward, the uppermost bract-like; *flowers* mostly solitary, terminal; divisions of the *perianth* oblong-obovate; *capsule* obtusely 3-angled; *seeds* angular, brown. (*Ixia cœlestina*, Bartram.) Pine-barrens. May and June. *Stem* $1\frac{1}{2}$ °–2° high; flowers bright blue.

N. GEMMIFLORA. *Flowers* on pedicels shorter than the *spathe*, the *sepals* 1' long, obovate-spatulate, bluish purple, the azure *petals* about half as large. A handsome flower, 15'–20' high; *leaves* of the same length, 3" to 5" wide, tapering at each end. Woods below Houston.

N. ACUTA. Head-waters of the Trinity.—*Marcy*.

140. YAM FAMILY. Order, DIOSCOREACEÆ.

Twining *herbs*, with tuberous roots, ribbed and reticulated leaves, and small regular diœcious flowers, in axillary spikes or panicles; *perianth* 6-parted, the tube (in the fer-

tile flower) adherent to the 3-celled ovary; *stamens* 6; *anthers* 2-celled, introrse; *ovules* anatropous, 1-2 in each cell; *styles* 3, more or less united below; *fruit* mostly capsular, 3-6-seeded; *embryo* minute, in hard albumen.

DIOSCOREA, Plum. YAM.

Tube of the perianth 3-winged; *stamens* inserted at the base of the limb; *capsule* 6-seeded, membranaceous, 3-winged, opening septicidally through the wings; *seeds* flat, broadly winged; *leaves* petioled, mostly cordate and entire; *petioles* tumid at the base.

D. VILLOSA, L. *Stem* smooth (10°-15° long); *leaves* alternate, opposite, or whorled, broadly cordate, acuminate, 7-9-nerved, smooth, or pubescent beneath, mostly longer than the slender petiole; *flowers* very small, whitish, the sterile ones in scattered clusters on the very slender branches of the axillary panicles, the fertile in a simple spike; *stigmas* notched at the apex; *capsule* oval or obovate, strongly 3-winged, nodding. (*D. quaternata*, Walt.) Margins of swamps. July.

141. SMILAX FAMILY. Order, SMILACEÆ.

Herbs or climbing *shrubs*, not essentially distinct from the Lily Family, but with ribbed and veiny reticulated leaves, and separate *styles* or *stigmas*; *leaves* not sheathing, often bearing tendrils; *fruit* baccate.

SUB-ORDER I. Eusmilaceæ. (SMILAX FAMILY.)
Flowers diœcious, in axillary and umbel-like clusters. *Anthers* 1-celled. *Stigmas* 1-3, sessile or nearly so. *Ovules* 1-2 in each cell of the ovary, orthotropous, suspended.—Tendril-bearing *vines*. Flowers small. Leaves alternate.

Cells of the ovary 1-ovuled. Woody vines. SMILAX.
 ————— 2-ovuled. Climbing vines. COPROSMANTHUS.

SUB-ORDER II. **Trilliaceæ.** (TRILLIUM FAMILY.)
Flowers perfect, terminal. *Anthers* 2-celled. *Styles* or
stigmas 3. *Ovules* several in each cell of the ovary, ana-
 tropous, horizontal.—Erect *herbs*. *Leaves* whorled.

*Exterior leaves of the perianth calyx-like, persistent. Stem 1-flowered. Leaves 3 in
 a whorl, terminal.....*TRILLIUM.

*Leaves of the perianth alike, deciduous. Stem few-flowered. Leaves 3-7 in a whorl,
 lateral and terminal.....*MEDEOLA.

SMILAX, Tourn. CHINA BRIER.

Flowers diœcious; *perianth* bell-shaped, 6-leaved, the
 leaves nearly equal and alike, deciduous; *stamens* 6, in-
 serted on the base of the perianth; *anthers* erect, 1-celled;
ovary free from the perianth, 1-3-celled, with a single or-
 thotropous pendulous ovule in each cell; *stigmas* 1-3
 (mostly 3), sessile or nearly so, slender, spreading, or re-
 curved; *berry* 1-3-celled, 1-3-seeded; *seeds* globular or
 angled; *embryo* minute, in horny albumen.—Woody and
 commonly thorny or prickly *vines*, climbing by means of
 a pair of tendrils attached to the petioles; *leaves* alternate,
 ribbed, and reticulate-veined, mostly smooth and shining;
flowers small, greenish, in stalked axillary clusters.

* *Peduncles* not longer than the petioles.

† *Berries* red.

S. WALTERI, Pursh. *Stem* low, armed with a few scat-
 tered prickles near the base, otherwise unarmed; *branches*
 obscurely 4-angled; *leaves* deciduous, membranaceous,
 varying from oblong-lanceolate to oval, mucronate, acute,
 rounded or rarely slightly cordate at the base, 5-ribbed;
peduncles flattened, as long as the petioles and pedicels;
perianth rather large (3" long), brownish; *stigmas* 3;
berry (acuminate, Walt.) globular, 3-seeded. (S. caduca,
 Ell.) Pine-barren ponds and swamps. March and April.

Rhizoma creeping; stem seldom more than 6° long; leaves 2'-4' long.

†† *Berries black.*

S. AURICULATA, Walt. *Stem* commonly low and straggling, slender, armed with short prickles; *branches* flexuous, 4-angled; *leaves* evergreen, rigid, small, strongly 3-ribbed, varying from lanceolate to ovate, entire or hastate-3-lobed, acute at each end; *peduncles* shorter than the pedicels, many-flowered; *stigmas* 2-3; *berry* small, globular 2-3-seeded. (*S. ovata*, Pursh? Ell.) Dry sand-ridges along the coast. May and June. Stem trailing, or covering small bushes; leaves 1'-2' long, strongly reticulated; *flowers* small, very fragrant.

S. ROTUNDIFOLIA, L. *Stem* climbing high, armed with scattered prickles; *branchlets* 4-angled; *leaves* thin, ovate or round-ovate, entire, abruptly pointed, mostly rounded or slightly cordate at the base; *peduncles* few-flowered, rather longer than the pedicels, flattened; *berry* globular, 3-seeded, blue-black. (*S. caduca*, L.; *S. quadrangularis*, Muhl.) Swamps. June. *Plant* yellowish green; leaves 2'-4' long.

COPROSMANTHUS, Torr.

Cells of the ovary 2-ovuled; *stems* herbaceous, unarmed; *peduncles* and *petioles* elongated; *berry* blue-black. Otherwise like *Smilax*.

C. HERBACEUS, Kunth. *Stem* erect (1°-3° high), mostly simple, leafy above; *leaves* few, oblong or oval, mucronate, pubescent, 5-nerved, the upper ones whorled, the lower bract-like; *peduncles* few (3'-4' long), below the leaves; *berry* 2-3-seeded. (*Smilax herbacea*, L.) Dry fertile soil. June. *Flowers* fetid.

C. PEDUNCULARIS, Kunth. *Stems* curving or climbing (3°-5° long), branched, leafy; *leaves* alternate, round-cordate, acuminate, smooth; *peduncles* numerous, axillary (4'-6' long); *berry* 6-seeded. (*Smilax peduncularis*, Muhl.) June. *Flowers* fetid.

TRILLIUM, L.

Flowers perfect; *perianth* 6-leaved, the three exterior leaves calyx-like, persistent, the interior withering; *stamens* 6, inserted at the base of the perianth; *filaments* short; *anthers* adnate, linear, 2-celled; *ovary* 6-ribbed, 3-celled, with numerous anatropous horizontal ovules in each cell; *styles* or *stigmas* 3, slender, stigmatic within, recurved, persistent; *fruit* a roundish 6-sided many-seeded purple berry.—Low perennial *herbs*, with tuberous *rootstocks*, and simple *stems*, which are sheathed at the base, and terminated with a whorl of three broad *leaves* and a single sessile or peduncled showy *flower*.

* *Flowers on erect or declining peduncle.*

T. ERYTHROCARPUM, Michx. *Stem* solitary; *leaves* ovate, long-acuminate, rounded at the base, short-petioled; *peduncle* (1'-2' long) erect, longer than the widely-spreading flower; *petals* oblong, acutish, wavy, much longer than the lanceolate *sepals*, white, striped with purple at the base; *stigmas* slender, longer than the anthers; *berry* red. Rich shady woods. April and May. Stem 1° high; leaves 3'-5' long; *flowers* 9"-12" long.

T. TEXANUM, Buckley. *Leaves* ovate-oblong, obtuse, sessile, smooth above, subpubescent beneath, longer than the peduncle; *petals* white, ovate-lanceolate, acute, nearly equal or shorter than the sepals; *sepals* oblong-ovate, obtuse.—*Plant* six to nine inches high; *leaves* 1½-2 inches long, 5 lines wide; *peduncle* 6 lines long; *sepals* 6 lines long and 2 lines wide. Such is the size of a medium specimen. Flowers in March. Banks of streams and low grounds, Panola County, Texas.

MEDEOLA, Gron.

Flowers perfect; *leaves* of the perianth 6, similar, deciduous; *stamens* 6, erect, hypogynous; *anthers* linear-

oblong, fixed near the base, introrse; *ovary* globose, 3-celled, with six anatropous ovules in each cell; *styles* 3, slender, recurved, stigmatic within; *berry* globose.

M. VIRGINICA, L. *Rhizoma* horizontal, tuberous; *stem* simple, slender, clothed with loose deciduous wool, bracted below, bearing above the middle a whorl of 6-8 oblong-lanceolate acute *leaves*, and at the summit a smaller whorl of 3-4 ovate leaves, which surround the 2-8 small greenish nodding *flowers*; *styles* red. Shady banks. June. Stem 2° high.

142. ROXBURGHIA FAMILY. Order, ROXBURGHACEÆ.

Herbs or twining *shrubs*, with petioled parallel-nerved reticulated *leaves*, and perfect axillary racemose *flowers*; *perianth* 4-leaved or 4-parted; *stamens* 4, hypogynous; *anthers* 2-celled, introrse; *ovary* free, or united with the base of the perianth, 1-celled; *stigma* sessile; *ovules* few or numerous, anatropous; *placenta* parietal; *capsule* 2-valved; *seeds* fixed to hairy or fibrillous cords, erect or pendulous; *embryo* minute or slender, in fleshy albumen.

CROOMIA, Torr.

Perianth deeply 4-parted, persistent, the spreading nerveless oval divisions imbricated in the bud; *filaments* separate, thick, erect, inserted on the base of the perianth opposite its lobes; *anthers* short, oblique, with the connective minute or wanting; *ovary* globose-ovate, sessile; *stigma* 2-lobed; *ovules* 4-6; *fruit* follicular, beak-pointed, at length 2-valved; *seeds* 1-4, obovate, suspended from the apex of the nerve-like at length free placenta, nearly covered by the fibers of the cord; *embryo* minute, obovate.—A low perennial *herb*, from a slender creeping rhizoma; *stem* simple, sheathed at the base, leafy at the summit; *leaves* 4-6, alternate, oblong-cordate, 5-9-ribbed; *peduncles*

few-flowered; *flowers* small, greenish, on jointed nodding pedicels, which are thickened upward.

143. LILY FAMILY. *Order, LILIACEÆ.*

Chiefly *herbs*, with sessile or sheathing parallel-nerved *leaves*, and perfect *flowers*; *perianth* corolla-like, 6- (rarely 4)-leaved or lobed, free from the 2-3-celled ovary; *stamens* 6 (rarely 4), hypogynous or perigynous; *anthers* introrse; *styles* united; *stigmas* 3, distinct or united; *fruit* a capsule or berry, few-many-seeded; *seeds* anatropous or amphitropous; *embryo* small, in fleshy or hard albumen.

SYNOPSIS.

TRIBE I. **Asparageæ.** *Fruit* a berry. Divisions of the *perianth* more or less united. *Leaves* broad.

Flowers in terminal raceme. *Perianth* spreading. *Stems* leafy.....SMILACINA.

TRIBE II. **Asphodeleæ.** *Fruit* a capsule. Divisions of the *perianth* united at the base. *Stems* scape-like. *Leaves* linear, rarely lanceolate.

* *Root* a coated bulb.

Flowers umbelled, from a scarious spathe. *Seeds* smooth and black.....ALLIUM.

— in racemes, blue or purple. *Seeds* roundish black.....SCILLA.

** *Palm-like arborescent plants*; *seeds* black.

Stigma 3, nearly sessile. *Capsule* dry or pulpy. *Leaves* spiny-pointed.....YUCCA.

SMILACINA, Desf. SOLOMON'S SEAL.

Perianth 4 or 6 parted, spreading, deciduous; *stamens* 4 or 6, inserted on the base of the *perianth*; *anthers* ovate; *ovary* 2-3-celled, with two ovules in each cell; *style* short and thick; *stigma* obscurely 3-lobed; *berry* globular, 1-2-seeded. *Stems* simple, erect, leafy; *flowers* small, white, in a terminal raceme or panicle.

§ SMILACINA. *Divisions of the perianth and stamens 6; ovary 3-celled.*

S. RACEMOSA, Desf. Pubescent; *rhizoma* thick; *stem* flexuous, curving and leafy above; *leaves* numerous, 2-ranked, oblong, acuminate, nearly sessile, strongly ribbed; *flowers* numerous, in a close raceme or panicle; *berry* red, spotted. Rich soil. June and July. Stem 1°-2° high; leaves 3'-5' long.

ALLIUM, L. ONION.

Perianth 6-parted, spreading, persistent; *stamens* 6, inserted on the base of the perianth; *filaments* subulate, the interior ones more or less dilated at the base; *ovary* 3-celled; *style* filiform; *stigma* entire; *capsule* loculicidally 3-valved; *seeds* anatropous or campylotropous, single or few in each cell, angled, black.—Strong-scented stemless *herbs*, with bulbous *roots*, and a naked *scape*, ending in an umbel of small *flowers*, from a 2-3-leaved spathe; flowers sometimes changed into bulblets.

* *Ovules 2 in each cell.*

A. CERNUUM, Roth. *Leaves* linear, channeled; *scape* angled; *umbel* many-flowered, nodding; *leaves* of the perianth acute; *stamens* exserted; *ovary* 6-toothed. July. Scape 1°-1½° high; *flowers* rose-color, on slender pedicels.

A. CANADENSE, Kalm. *Leaves* narrowly linear, concave; *scape* terete; umbel erect, bearing a cluster of bulblets, intermingled with a few stalked rose-colored flowers; *spathe* 1-2-leaved; *leaves* of the perianth obtuse, as long as the stamens; *ovary* 6-toothed. June. Scape 1° high; outer coats of the *bulb* white and scarious.

A. MUTABILE, Michx. *Leaves* very narrow, concave; *scape* terete; umbel erect, many-flowered; *spathe* 3 leaved; leaves of the perianth acute, as long as the stamens. white changing to rose-color. Dry sandy soil. May and June.

Scape 1° high; outer coats of the *bulb* composed of a network of fine fibers.

*** Ocules several in each cell.*

A. STRIATUM, Jack. *Leaves* linear, concave; *umbel* erect, 3-10-flowered; *spathe* 2-leaved; *perianth* longer than the stamens, white, the exterior leaves green on the keel. Low pine-barrens. March and April. *Scape* 6'-12' high; *pedicels* 1'-2' long; *flowers* 5' long; *leaves* streaked on the back.

SCILLA, L. SQUILL.

Perianth 6-parted, *petals* and *sepals* similar, spreading blue or purple; *filaments* 6, subulate or filiform, smooth, hypogynous; *style* filiform-clavellate; *capsule* free, 3-celled, 3-valved, obtusely 3-angled; *cells* with one or several roundish black *seeds*; *bulb* coated, bearing several linear *leaves*, and a *scape* with a raceme.

S. ESCULENTA. (*Quamash*.) *Leaves* linear, flaccid and recurved, tapering at both ends, shorter than the scape; *bracts* solitary, subulate, scarious, longer than the pedicels, about the length of the flower; *filament* filiform; *stigma* 3-toothed. *Bulb* nutritious, about 1' in diameter, resembling a small onion. *Scape* 1°-2° high; *leaves* as long, grass-like; *raceme* 2'-3' long. Head-waters of Trinity River.—Torrey.

YUCCA, L. SPANISH BAYONET.

Perianth cup-shaped, corolla-like, 6-leaved; *sepals* and *petals* nearly alike, late-deciduous; *stamens* 6, with thick granular club-shaped filaments; *anthers* small, oval; *ovary* 3-celled, 3-sided, grooved at the angles; *stigmas* 3, nearly sessile, oblong, concave, 2-cleft; *ovules* numerous, in two rows, the rows separated by a false partition; *capsule* oblong, 6-celled, pulpy and indehiscent, or dry and loculi-

cidally 3-valved at the apex; *seeds* numerous, flat, horizontal, smooth and black.—*Plants*, with thick palm-like leafy *stems* (caudex), numerous rigid and spine-pointed *leaves*, and white showy paniced *flowers*.

* *Stem short*; *capsule dry*, 3-valved.

Y. FILAMENTOSA, L. (*Bear Grass*.) *Stem* short and leafy; *leaves* rather rigid, spreading or recurved, varying from linear to broad-lanceolate, green or glaucous, with thread-like filaments on the margins; *scape* elongated, branching and pubescent above; *leaves* of the perianth ovate-lanceolate, white tinged with yellow or purple; *capsule* with 3 rounded angles, loculicidal at the apex, and at length separating at the inflexed sutures into three 2-celled carpels. (Y. puberula and Y. glaucescens, Haw.) Light or sandy soil. June. Stem rarely more than a foot above the ground; leaves 1°–2° long; scape 4°–6° high.

** *Stem tall*; *capsule pulpy*, 6-angled, indehiscent.

Y. ALOIFOLIA, L. *Stem* mostly branching, leafy above; *leaves* linear-lanceolate, very rigid, strongly spine-pointed, very rough on the margins, the lower ones reflexed; *panicle* short, smooth, densely flowered, nearly sessile; divisions of the *perianth* ovate-lanceolate, white tinged with purple. (Y. Draconis, L.; Y. serrulata, Haw.) Sands along the coast. May and June. Stem 4°–8° high; leaves and panicle 1°–1½° long.

Y. LONGIFOLIA, Buckley. *Stem* erect, 8–15 feet high; *leaves* smooth, ensiform-lanceolate, rigid, sharply acuminate, crowded on the stem, lower ones reflexed often when dead with their points in the ground; *panicles* very large, terminal; *flowers* campanulate; *sepals* ovate-acute; *bracts* ovate-lanceolate, acute; margin membranaceous; *capsule* oblong, cylindrical, obtuse at summit and base. Leaves 2½–3 feet long, with curved margins; *fruit* 4–5 inches long. Western Texas. Flowers in March. Ornamental.

144. COLCHICUM FAMILY. *Order*, MELANTHACEÆ.

Perennial *herbs*, with parallel-nerved *leaves*, and regular *flowers*; *perianth* of 6 nearly equal divisions, free from or coherent with the base of the 3-celled ovary; *stamens* 6, inserted on the base of the perianth; *anthers* extrorse (except in *Tofieldia*); *styles* 3, distinct or more or less united; *fruit* a capsule or berry; *seeds* anatropous; *embryo* minute in copious albumen.

SYNOPSIS.

SUB-ORDER. **Melanthieæ.** (THE COLCHICUM FAMILY.) *Perianth* spreading, the divisions mostly distinct, often clawed, withering-persistent. *Styles* separate. *Fruit* a 3-celled capsule. *Stems* leafy at the base, simple or branched. *Flowers* in racemes or panicles, sometimes polygamous or diœcious.

Stamens 6. *Anthers* erect. *Bracts* short.....TOFIELDIA.

TOFIELDIA, Hudson.

Flowers perfect; *leaves* of the perianth spreading, sessile, oblong or obovate; *filaments* subulate; *anthers* innate or introrse, 2-celled; *styles* subulate; *stigmas* terminal; *capsule* 3-angled, septicidally 3-partible, many-seeded; *seeds* oblong. *Stems* simple, scape-like, from creeping rootstocks; *leaves* linear, 2-edged, equitant; *flowers* small, whitish, in spikes or racemes; *pedicels* commonly minutely 3-bracted under the flower.

§ 1. TOFIELDIA proper. *Racemes* simple, the flowers successively open from the base upward (centripetal); *anthers* introrse; *seeds* without appendages. Smooth herbs.

T. GLABRA, Nutt. *Stem* leafy at the base, and sparingly above; *leaves* linear; *racemes* densely flowered; *stamens* slightly exerted; *styles* very short. (T. glaberrima, Macbride.) Low pine-barrens. October. Stem 1°-2° high; raceme 2'-4' long; *flowers* white.

§ 2. TRIANTHA. *Racemes compound, the flowers successively opening from the apex downward (centrifugal); anthers innate; seeds with tail-like appendages at each end. Pubescent herbs.*

T. PUBENS, Ait. *Stem and pedicels rough-puberulent; leaves long, linear; racemes (3'-6' long) loosely flowered; pedicels mostly three in a cluster, longer than the greenish white flowers; capsule as long as the perianth. September. Stem 1°-1½° high; leaves 6'-12' long.*

T. GLUTINOSA, Willd. *Stem and pedicels clammy-pubescent; leaves short, linear-sword-shaped; racemes (1' long) dense-flowered; pedicels 3-5 in a cluster, shorter than the yellowish flowers; capsule longer than the perianth. June. Stem 1°-1½° high; leaves 4'-6' long.*

145. RUSH FAMILY. Order, JUNCACEÆ.

Tough grass-like *herbs*, with naked or leafy and jointed *stems*, flat or terete *leaves*, and regular cymose-clustered or paniced *flowers*; *perianth* of six nearly equal calyx-like persistent divisions; *stamens* 3 or 6, inserted on the base of the sepals; *anthers* 2-celled, introrse, fixed at the base; *ovary* free from the perianth, 1-3-celled, 3-many-ovuled; *style* single; *stigmas* commonly 3, hairy; *capsule* septi-
cidally 3-valved; *seeds* anatropous; *embryo* minute at the base of the albumen.

SYNOPSIS.

Capsule 1-celled, 3-seeded. Leaves mostly hairy.....LUZULA.
 — *many-seeded, the placenta separating into the partitions. Smooth herbs, with alternate leaves.....JUNCUS.*

LUZULA, DC. WOOD-RUSH.

Sepals flat; *stamens* 6; *style* very short; *stigmas* filiform, villous; *capsule* 1-celled, 3-valved, 3-seeded; *seeds* erect from the base of the cell.—Perennial *herbs*, with flat mostly hairy *leaves*, and umbellate or spiked *flowers*.

L. CAMPESTRIS, DC. *Stem* leafy; *leaves* linear, hairy; *flowers* in dense ovoid umbellate spikes; *capsule* roundish; *seeds* with a conical appendage at the base. (*Juncus campestris*, L.) Dry woods and banks. March and April. Stems clustered, 1° high.

JUNCUS, L. RUSH.

Outer sepals keeled; *stamens* 3 or 6; *style* very short; *stigmas* villous; *capsule* 3-celled, or imperfectly 3-celled, the partitions adherent to the valves, and bearing the placenta at their inner edges; *seeds* numerous, often appendaged, horizontal. Chiefly perennial. *Leaves* alternate, often knotted by cross partitions; *flowers* mostly green, clustered, cymose, or paniced.

§ 1. *Stems* scape-like, jointless, sheathed or leafy at the base; *stamens* 6 or (in *J. effusus*) sometimes 3.

* *Panicles* lateral; *stem* sheathed at the base.

J. EFFUSUS, L. *Stem* soft and spongy; *sheaths* dark brown; *panicle* diffuse or contracted; *flowers* single; *sepals* lanceolate, as long as the obovate obtuse obscurely 3-angled light-brown capsule. Bogs and swamps. May–September. Stems tufted, 2°–4° high.

** *Panicles* lateral; *stem* leafy at the base; *leaves* terete, pungent.

J. SETACEUS, Rostk. *Stem* and *leaves* slender; *sheaths* light brown; *panicle* simple, few-flowered; *flowers* single; *sepals* rigid, lanceolate-ovate, rather longer than the globose pointed green capsule. Low grounds and swamps. May–July. Stems growing in small tufts, 1°–3° high; *capsule* coriaceous.

J. MARITIMUS, Lam. *Stem* and *leaves* stout and rigid, hard-pointed; *panicle* compound; *flowers* small, 4–8 in a cluster; *sepals* lanceolate, as long as the small obovate obtuse dark-brown capsule. (*J. acutus*, Muhl.) Brackish marshes along the coast. April and May. Stem 4°–5° high.

*** *Panicles terminal, forking; leaves channeled or grooved, the upper ones forming an involucre under the panicle.*

J. TENUIS, Willd. *Stems* tough, not tumid at the base, several-leaved; *leaves* narrowly linear, channeled; *involucre* longer than the panicle; *flowers* single; *sepals* lanceolate, very acute, one-third longer than the ovoid capsule. Low grounds. May and June. Stem 6'-12' high; *panicle* small, the flowers mostly on one side of the branches; *capsule* light green.

J. DICHOTOMUS, Ell. *Stem* tumid at the base, 1-3-leaved; *leaves* filiform, nearly terete, slightly grooved on the inner side; *involucre* mostly shorter than the cymose panicle; *flowers* single; *sepals* rigid, ovate-lanceolate, very acute, as long as the globose dark-green capsule. Low grounds. May and June. Stem 1°-3° high; *panicle* dense or elongated.

J. FILIPENDULUS, Buckley. *Stems* erect, slender, 1-2-leaved; *leaves* numerous at the root; *flowers* terminal; *fascicles* 6-12-flowered; *bracts* ovate, broadly membranaceous, acuminate, or long subulate; leaves of the perigynium 6, equal, lanceolate or ovate, broadly membranaceous, subulate; *capsule* 3-angled; *style* short; *stigmas* 3-twisted and brown pubescent. In the Western part of Llano County, along streams, in dense tufts, with weak single stems, and long slender thread-like branches (hence the specific name), terminated by 1-4 sub-hemispherical heads of flowers, which when later with mature fruit are of a light straw-color. *Seeds* ovate, with reddish-brown points; *heads of flowers* about 5 lines in diameter; *radical leaves* 3-5 inches long.

§ 2. *Stems jointed, leafy; clusters or panicles terminal.*

* *Leaves terete or somewhat flattened, knotted; stamens 3.*

J. SCIRPOIDES, Lam. Rigid; *stem* stout, erect; *leaves* terete, panicle erect, contracted, the few large globose green or brownish heads composed of several more or less

distinct smaller ones; *sepals* lanceolate-subulate, as long as the lanceolate taper-pointed 3-angled capsule; *seed* ovoid, reticulated, without appendages. (*J. echinatus*, Ell.) Varies with the smaller more numerous and crowded *heads* conspicuously lobed by the more distinct clusters, and with broader and shorter *sepals* and capsules. Sandy swamps. July–September. Stem 2° high, from a thick and creeping rhizoma; heads 4"–7" in diameter.

J. ACUMINATUS, Michx. *Stem* erect, terete, like the slender leaves; *panicle* mostly simple, erect; *heads* (2"–3' long) 3–8-flowered; *sepals* linear-lanceolate, half as long as the lanceolate-oblong abruptly pointed 3-angled light-brown capsule; *seeds* with a short appendage at each end. Sandy wet places. July–September. Stem 8'–15' high; *root* fibrous; *capsule* 2" long.

** *Leaves knotless, concave or flattened.*

J. BUFONIUS, L. Annual; *stems* low, 2'–8' high, tufted, often branched; *leaves* very narrow; *panicles* forking; *flowers* solitary or 3–6 in a cluster; *sepals* whitish, lanceolate, acute, longer than the oblong obtuse pale *capsule*. April, May.

146. PICKEREL-WEED FAMILY. Order, PONTE- DERIACEÆ.

Perennial aquatic or marshy *herbs*, with perfect mostly irregular *flowers* from a 1-leaved spathe; *perianth* corolla-like, unequally 6-cleft or 6-parted, imbricated in the bud, withering-persistent; *stamens* 3–6, more or less unequal, and unequally inserted on the throat of the perianth; *anthers* 2-celled, erect, introrse; *ovary* free; *style* single; *stigma* 3–6-lobed; *capsule* 1–3-celled, 1-many-seeded; *seeds* anatropous; *embryo* slender in mealy albumen.

PONTEDERIA, L. WAMPEE; PICKEREL-WEED.

Perianth funnel-shaped, 2-lipped, with the upper lip 3-lobed, the lower 3-parted, the curved tube fleshy and coiled in fruit; *stamens* 6, unequally inserted, the three lower ones exserted, the three upper short and often imperfect; *anthers* oval, blue; *ovary* 3-celled, two of the cells empty, the other with a single suspended ovule; *style* slender; *capsule* (utricle) 1-seeded; *rhizoma* thick and creeping. *Stem* erect, bearing above the middle a single short-petioled leaf, and at the summit a hairy spike of blue flowers, from a 1-leaved spathe; *radical leaves* long-petioled, sheathing.

P. CORDATA, L. *Stem* and terete *petioles* erect (2° – 3° high); *leaves* (3'–8' long) varying from round-cordate to lance-oblong, obtuse, finely nerved; *spike* dense, cylindrical (2'–4' long), the peduncle inclosed in the convolute spathe; upper lobe of the hairy *perianth* spotted with yellow, the tube 6-ribbed. (*P. lancifolia*, Muhl., and *P. angustifolia*, Pursh, are narrow-leaved forms.) Miry margins of ponds and rivers. July–September.

SCHOLLERA, Schreb.

Perianth salver-form, nearly equally 6-lobed, the tube elongated and filiform; *stamens* 3, nearly equal; *filaments* subulate; *anthers* sagittate-oblong, yellow; *style* long and slender; *capsule* oblong, 1-celled, loculicidally 3-valved, with three parietal placentæ many-seeded.—A small aquatic *herb*, with slender branching *stems*, linear sessile *leaves*, and a small terminal yellow *flower*.

S. GRAMINEA, Willd. *Stem* submerged, forking; *leaves* thin, pellucid; *flowers* expanding at the surface of the water; *spathe* convolute; *lobes* of the *perianth* linear, spreading. (*Leptanthus*, Mich.) In flowing water. July

and August. Stems 1° - 2° long; leaves 3'-6' long; *tube* of the perianth $1\frac{1}{2}'$ long.

147. SPIDERWORT FAMILY. Order, COMMELY-
NACEÆ.

Herbs, with chiefly fibrous *roots*, jointed and leafy *stems*, and perfect or somewhat polygamous often irregular *flowers*; *perianth* of three herbaceous or colored persistent sepals, and three fugacious petals; *stamens* 6, hypogynous, perfect, or a part of them sterile; *anthers* 2-celled, often of two forms; *styles* single; *stigma* entire; *ovary* free from the perianth, 2-3-celled, with 1-several orthotropous ovules in each cell; *capsule* loculicidally 2-3-valved, 1-several-seeded; *embryo* pulley-shaped, placed in a cavity of the albumen opposite the hilum.—*Plants* somewhat succulent; stems often branching; *sheaths* of the leaves entire or open.

COMMELYNA, Dill. DAY-FLOWER.

Flowers irregular; *sepals* mostly colored; *petals* fugacious, two of them kidney-shaped and long-clawed, the other smaller; *stamens* unequal, three of them fertile, the others with 4-lobed sterile *anthers*; *filaments* beardless; *capsule* 1-3-celled, the cells 1-2-seeded, or one of them frequently empty. *Stems* branching; *leaves* flat, oblong, or lanceolate, on sheathing petioles, the floral ones cordate and spathe-like, folded, and inclosing the few-flowered peduncle; flowers blue.

C. COMMUNIS, L.? *Stem* smooth, filiform, and creeping; *leaves* (short 1'-2' long), ovate-lanceolate, obtuse; *sheaths* fringed at the throat; *spathes* nearly crescent-shaped, obtuse at the base, lateral and terminal; *peduncles* by pairs, one of them bearing 3-4 small fertile flowers, which are included in the spathe, the other long-exserted, filiform, 1-flowered; *odd petal* lanceolate, sessile; *seeds* reticulate. Low grounds. July-September. Stem 1° - 2° long. Annual.

C. VIRGINICA, L. Pubescent; *stem* erect; *sheaths* hairy; *leaves* (4'-6' long) oblong-lanceolate, acuminate, thin, rough above; *spathe* (when opened) round ovate, contracted at the base; *sterile peduncle* included; *petals* large, the odd one lanceolate; *capsule* 2-3-seeded. (C. erecta, Ell.) Varies (C. angustifolia, Michx.) with the stems smooth, ascending; *leaves* narrowly lanceolate, rather rigid, and, like the sheath, nearly smooth; *flowers* smaller; *seeds* pulverulent. Light or sandy soil. May-September. Stem 1°-2° high. The *spathes* contain a viscid secretion until the seeds mature. Perennial.

C. ANGUSTIFOLIA. *Stem* erect, slender; *leaves* lance-linear, acute, rough, the *sheaths* fringed with brown hair; *spathes* crowded, short-stalked, conspicuously arcuate (hawk-bill-shaped), narrowed at the base; *sterile peduncle* included; *petals* nearly equal, the odd one smaller; *seeds* transversely oblong. Perennial. Red River.—Marcy.

TRADESCANTIA, L. SPIDERWORT.

Flowers regular; *sepals* herbaceous; *petals* similar, ovate, fugacious; *stamens* all fertile, the filaments hairy; *anthers* kidney-shaped; *ovary* 3-celled, with two ovules in each cell; *capsule* 2-3-celled, the cells 1-2-seeded.—Perennial *herbs* with narrow keeled *leaves*, both the floral ones and those of the stem; *flowers* in umbel-like clusters, axillary and terminal, expanding in the morning; *fruiting pedicels* recurved.

T. VIRGINICA, L. Smooth, or villous with glandless hairs; *leaves* linear, broadest at the base, mostly purple-veined; clusters axillary and terminal, sessile, many-flowered; *flowers* closely packed in 2 rows in the bud, each with an ovate scarious bract at the base; *petals* blue, like the style and densely bearded filaments, twice as long as the lanceolate-ovate sepals. Dry sandy soil. March-May. *Stems* ½°-2° high; *flowers* 1' in diameter.

T. PILOSA, Lehm. *Stem* often branched, and, like the sheaths, villous or nearly smooth; *leaves* oblong, narrowed at the base, pubescent on both sides; *clusters* axillary and terminal, sessile, dense, many-flowered; the *pedicels* and oblong *sepals* villous with glandular hairs; *seeds* transversely oblong, pitted on the back; *petals* blue. Light soil. May-July. Stem 1°-1½° high; leaves 1'-1½' wide; *flowers* ¾' in diameter.

T. ROSEA, Vent. *Stem* simple, slender, smooth; *leaves* linear-lanceolate, fringed on the margins; clusters solitary or by pairs, on long (3'-6') terminal peduncles, few-flowered; *petals* bright rose-color, three times as long as the ovate-lanceolate sepals. Light fertile soil. June-August. Stem 6'-8' high; *flowers* ½' in diameter.

148. MAYACA FAMILY. Order, MAYACACEÆ.

Creeping moss-like marsh *herbs*, with very numerous narrow and pellucid *leaves*, and solitary axillary *flowers*. Represented only by

MAYACA, Aublet.

Flowers regular, perfect; *sepals* 3, lanceolate, herbaceous, persistent; *petals* 3, obovate, deciduous or withering-persistent; *stamens* 3, free, inserted on the base of the sepals, persistent; *anthers* erect, spoon-shaped, imperfectly 2-celled, emarginate at the apex, introrse; *ovary* 1-celled; *ovules* few, orthotropous, fixed to three parietal placentæ; *style* single, terminal, persistent; *stigma* minutely 3-lobed; *capsule* rugose, 3-valved, the valves bearing the placentæ in the middle; *seeds* globose, furrowed and pitted, pointed at the apex; *embryo* minute at the apex of the albumen. *Stems* branching, tender; *leaves* alternate, linear, emarginate; *flowers* white or purple.

149. YELLOW-EYED GRASS FAMILY. *Order,*

XYRIDACEÆ.

Perennial *stemless marsh herbs*, with fibrous *roots*, sword-shaped equitant *leaves*, and perfect irregular fugacious *flowers*, collected in a dense imbricate-bracted spike; *sepals* 3; the two lateral ones glumaceous, keeled, persistent, the inner one hyaline, infolding, in the bud, the petals and caducous stamens; *petals* 3, rounded, distinct, or united by their long claws; *stamens* 3, and inserted on the summit of the claws of the petals, or 6, and the alternate ones sterile, hypogynous, and commonly bearded with jointed hairs; *anthers* erect, 2-celled, extrorse; *ovary* free, 1-3-celled; *style* single, 3-parted; *capsule* 3-valved, many-seeded; *seeds* minute, orthotropous; *embryo* minute, at the apex of the albumen. *Scape* commonly twisted or spiral, 2-edged near the summit, with a spathe-like sheath at the base; *spikes* mostly solitary.

XYRIS, L. YELLOW-EYED GRASS.

Petals distinct; *stamens* 6, the alternate ones hypogynous, sterile, commonly bearded at the summit, and slightly cohering with the claws of the contiguous petals; *stigmas* entire; *capsule* 1-celled, 3-valved, the valves bearing the placentæ in the middle; *seeds* very numerous, finely ribbed; *spikes* ovoid or oblong; *bracts* coriaceous or somewhat crustaceous, rounded, closely imbricated, convex and discolored on the back, the lower ones empty; *keel* of the lateral sepals mostly winged and variously lacerated; *flowers* yellow.

Sheath of the scape longer than the leaves. Biennials?

X. BREVIFOLIA, Michx. *Scape* nearly terete, smooth; *leaves* narrowly linear, smooth on the edges; *spike* globose, light brown, few-flowered; *bracts* soon lacerated at the

apex; lateral *sepals* lanceolate, rigid, crenulate on the wingless keel; *petals* obovate, rounded; *sterile filaments* sparingly bearded. Low sandy pine-barrens. April and May. Plant light brown; scape 6'-12' high, clustered. leaves 1'-3' long; spike 2"-3" long; petals 2' long.

150. PIPEWORT FAMILY. *Order, ERIOCAULONACEÆ.*

Perennial chiefly *stemless marsh herbs*, with narrow tufted *leaves*, and minute monœcious or diœcious *flowers*, collected in a dense hairy chaffy-bracted head.—STAMINATE FLOWERS: *sepals* 2-3; *corolla* tubular, bilabiate or 3-toothed, or sometimes wanting; *stamens* 2-6; *anthers* introrse.—PISTILLATE FLOWERS: *sepals* and *petals* 2-3; *ovary* 2-3-celled, with a single orthotropous ovule in each cell; *style* 2-3-parted; *capsule* loculicidally 2-3-valved, 1-3-seeded; *embryo* minute at the apex of the albumen.—Leaves concave and partly clasping at the base; *scape* furrowed and commonly twisted, with a spathe-like sheath at the base; exterior *scales* broader, empty, and involucrate; flowers fringed with white club-shaped hairs; corolla white.

SYNOPSIS.

<i>Stamens</i> 4.	<i>Anthers</i> 2-celled.	<i>Style</i> 2-parted.	<i>Corolla</i> 2-lipped.....	ERIOCAULON.
— 3.	— 2-celled.	— 3-parted, the lobes entire.....		PÆPALANTHUS.
— 3.	— 1-celled.	— 2-3-parted, the lobes entire, or 2-cleft.		LACHNOCAULON.

ERIOCAULON, L. PIPEWORT.

Flowers monœcious, each in the axil of a scale-like bract; *sepals* 2-3; *corolla* of the staminate flowers tubular, 2-lipped or 3-lobed, of the pistillate flowers 2-3-petalous; *stamens* 4 or 6; *anthers* 2-celled; *style* 2-3-parted; *stigmas* 2-3; *capsule* 2-3-celled, 1-3-seeded; *scapes* single or numerous, mostly from a short and villous rootstock; *lobes* of the corolla furnished with a blackish gland on the inner face,

commonly bearded with club-shaped hairs. The following species are all tetrandrous, with a 2-parted style and a 3-celled capsule.

E. DECANGULARE, L. *Leaves* mostly rigid, varying from lanceolate to linear-subulate, concave, obtuse; *scapes* commonly several from a thick and creeping rootstock, stout, smooth, 10–12-furrowed; *head* (2"–7" in diameter) compact, hemispherical, at length globose; *scales of the involucre* numerous, small, oblong, acutish, closely imbricated, straw-colored, or light chestnut, passing into the linear-spatulate acuminate bearded bracts, which are longer than the flower. (*E. gnaphalodes*, Ell., not of Michx.) Boggy places. July–September. Scares 2°–3° high; leaves 4'–12' long, 2"–6" wide.

E. GNAPHALODES, Michx. *Leaves* lanceolate-subulate, flat, very acute, rigid, or the immersed ones thin and pellucid; *scapes* few or single, slender, 9–11-furrowed; *head* hemispherical (4"–8" wide); *scales of the involucre* few, oblong or roundish, very obtuse, turning lead-color; *bracts* shorter than the flower, spatulate, their broad and bearded summit obtuse or more or less mucronate-pointed, turning blackish. (*E. compressum*, Lam.) Swamps and shallow ponds. April–June. Scares 1½°–2° high; leaves 2'–6' long, concave at the base.

PÆPALANTHUS, Martius.

Flowers monœcious.—STAMINATE FLOWERS: *sepals* 3; *corolla* tubular, 3-toothed; *stamens* 3; *anthers* 2-celled.—PISTILLATE FLOWERS: *sepals* and *petals* 3; *style* 3-parted, the divisions entire; *stigmas* 3; *capsule* 3-celled.—Habit of the preceding.

P. FLAVIDULUS, Kunth. *Leaves* short (1'–2' long), subulate, smooth, or sparingly pubescent; *scapes* numerous, filiform, 5-furrowed, and like the sheaths hairy; *heads* hemispherical, yellowish-white; *scales of the involucre* ob-

long, acute, smooth and shining; *flowers* slender, pediceled; *sepals* linear, acute; *corolla* of the *staminate* flowers funnel-shaped, of the *pistillate* flowers composed of 3 slender petals, cohering above the ovary; *stamens* and *styles* exserted. (*Eriocaulon flavidulum*, Michx.) Low sandy pine-barrens. April and May. Scapes 6'-12' high.

LACHNOCAULON, Kunth.

Flowers monœcious.—STAMINATE FLOWERS: *sepals* 3, equal; *corolla* none; *stamens* 3, with the filaments united below into a club-shaped tube; *anthers* 1-celled.—PISTILLATE FLOWERS: *sepals* 3, equal; *corolla* none, or reduced to tufted hairs; *style* club-shaped, 2-3-parted, the divisions entire or 2-cleft; *stigmas* 2-6; *capsule* 2-3-celled. Habit of the two preceding. *Bracts* and *sepals* blackish, fringed with club-shaped hairs.

L. MICHAUXII, Kunth. *Leaves* linear (1'-2' long), hairy, becoming smoothish; *scapes* slender, hairy, 4-furrowed (1° high); *heads* globose; *bracts* and *sepals* spatulate, obtuse, fringed with white hairs; divisions of the *style* 3, each 2-cleft. (*Eriocaulon villosum*, Michx.) Low grassy pine-barrens. May and June, growing in tufts. Heads 2" wide.

151. SEDGE FAMILY. Order, CYPERACEÆ.

Slender herbs, with simple solid mostly 3-angled stems (*culms*), and grass-like *leaves*, with closed sheaths; *flowers* spiked, each in the axil of a single (rarely 2-4) scale-like bract (*scale*); *perianth* composed of hypogynous scales or bristles, or none; *ovary* 1-celled, with a single erect anatropous ovule, forming in fruit a lenticular or 3-angled achenium (*nut*), which is often crowned with the persistent jointed base of the style (*tubercle*); *stamens* 1-12; *anthers* erect; *style* 2-3-cleft or parted; *embryo* minute at the base of the albumen.

SYNOPSIS.

TRIBE I. **Cypereæ.** *Flowers perfect. Spikelets 1-many-flowered. Scales one to each flower, imbricated in 2 rows. Perianth bristly, or none.*

* *Perianth none; nut beakless.*

Spikelets few-many-flowered. Inflorescence terminal.....CYPERUS.

——— *1-flowered. Inflorescence terminal, capitate.....KYLLINGIA.*

** *Perianth bristly; nut beaked.*

Spikes lateral and terminal. Spikelets many-flowered.....DULICHUM.

TRIBE II. **Lipocarpheæ.** *Flowers perfect. Spikes many-flowered. Scales 2-4 to each flower, the exterior ones imbricated in many rows. Perianth none.*

Inner scale 1. Involucre mostly 1-leaved, erect.....HEMICARPHA.

Inner scales 2. Leaves of the involucre 2 or more, spreading.....LIPOCARPHA.

TRIBE III. **Scirpeæ.** *Flowers perfect. Spikes commonly many-flowered. Scales one to each flower, imbricated in several (rarely 2) rows, all fruitful, or the lowest empty. Perianth bristly, hairy, or wanting.*

* *Perianth of 3 bristles, alternating with 3 stalked scales.*

Nut pointed. Scales of the clustered axillary and terminal spikes awned..FUIRENA.

** *Perianth bristly, occasionally wanting.*

Nut tubercled. Culms leafless, sheathed at the base, bearing one terminal spike.

.....ELEOCHARIS.

Tubercle none. Culms mostly leafy at the base or throughout. Spikes commonly few or many. Perianth of 3-6 bristles.....SCIRPUS.

Perianth of numerous long and woolly hairs.....ERIOPHORUM.

*** *Perianth none; style tumid at the base.*

† *Scales imbricated in several rows; spikes terete.*

Styles deciduous. Stigmas 2. Nut lenticular or globose.....FIMBRISTYLIS.

——— 3. — 3-angled.....TRICHELOSTYLIS.

——— *persistent at the base. Stigmas 3. Nut 3-angled... ISOLEPIS.*

†† *Scales imbricated in 2 rows; spike compressed.*

Style 3-cleft, jointed to the 3-angled nut.....ABILGAARDIA.

TRIBE IV. **Rhynchosporeæ.** *Flowers* perfect or polygamous. *Spikelets* commonly few-flowered. *Scales* one to each flower, imbricated in few-several rows, the lower ones empty, the upper mostly sterile. *Perianth* bristly, or none.

* *Perianth* bristly (occasionally wanting in *Rhynchospora*).

Style 2-cleft, dilated and persistent at the base. *Nut* lenticular or globose.

RHYNCHOSPORA.

Style entire or minutely 2-cleft, the lower persistent at the base. *Nut* flat.

CERATOSCHÆNUS.

** *Perianth* none.

Spikes few-flowered, only the uppermost flower perfect. *Nut* globose.....CLADIUM.

TRIBE V. **Sclerieæ.** *Flowers* monœcious. *Sterile spike* many-flowered. *Scales* one to each flower, imbricated in furrows. *Fertile spike* 1-flowered, with two or more scales. *Perianth* none.

Style 3-cleft, deciduous. *Nut* bony, globose or 3-angled.....SCLERIA.

TRIBE VI. **Cariceæ.** *Flowers* monœcious, very rarely diœcious; sterile and fertile flowers on the same spike, or on separate spikes. *Scales* one to each flower, imbricated in few-many rows. *Nut* inclosed in a sac. *Perianth* none.

Bristles within the sac none. *Spikes* axillary and terminal.. ..CAREX.

CYPERUS, L.

Spikelets 2-many-flowered, commonly flat or compressed; *scales* imbricated in two opposite rows, often decurrent on the jointed rachis, deciduous; *perianth* none; *stamens* 1-3; *style* 2-3-cleft, deciduous; *nut* lenticular or 3-angled; *culms* 3-angled (rarely terete), jointless, leafy or occasionally sheathed at the base; *spikelets* numerous (rarely 1-2), disposed in single or umbellate heads or spikes, and surrounded with a leafy involucre; *rays* sheathed.

§ 1. PYCREUS. *Style 2-cleft; nut lenticular; spikes more or less umbelled. Annuals; spikelets linear or linear-oblong, flat, many- (10-40) -flowered; rachis narrowly margined; scales compressed-keeled, 5-nerved.*

* *Spikelets clustered on the common rachis.*

C. FLAVESCENS, L. *Umbel sessile or of 2-4 rays, shorter than the spikelets; spikelets 3-several in a cluster, oblong-linear, acute, spreading, 20-30-flowered; scales yellowish brown, ovate, obtuse, appressed; rachis margined; stamens 3; nut orbicular, black, smooth and shining; culms clustered, 4'-10' high; leaves and 3-leaved involucre narrowly linear. (C. fasciculatus, Ell.?)*

C. DIANDRUS, Torr. *Umbel of 2-5 short and unequal rays, the longer ones longer than the spikelets; spikelets lanceolate-oblong, acute, brownish or dark brown, spreading; scales ovate, obtuse, appressed, green on the keel; rachis margined; stamens 2; nut oblong-obovate, roughish, dull gray. Wet places. August. Culms 4'-10' high; involucre 3-leaved. This and the preceding are probably only diandrous forms of C. flavescens.*

** *Spikelets scattered on the common rachis (spiked.)*

C. FLAVICOMUS, Michx. *Umbel compound, many-rayed; spikelets very numerous, crowded, linear, acute, 12-30-flowered; scales loosely imbricated, yellowish, round-obovate, emarginate, with broad and scarious margins, at length spreading; rachis broadly margined; stamens 3; nut obovate, black, smooth and shining, barely shorter than the scale; culms thick, obtuse angled; 1°-3° high; leaves broadly linear, glaucous beneath, as long as the culm. Low grounds and ditches. May-September. Involucre 3-5-leaved; spikelets 6"-9" long.*

C. MICRODONTUS, Torr. *Umbel of 4-8 rays, simple or somewhat compound; spikelets numerous, crowded, linear, acute, 15-25-flowered, pale brown; scales thin, ovate, acute, closely imbricated; rachis slightly margined; stamens 2; nut linear-oblong or somewhat club-shaped, short-*

pointed, grayish and minutely pitted; *culms* filiform, 3-angled, 6'-12' high; *leaves* and elongated *involucre* very narrow. Margins of ponds and streams, Red River. July-September. *Rays* 1'-2' long; *spikelets* 4''-7'' long.—*Marcy*.

§ 2. *CYPERUS* proper. *Style* 3-cleft; *nut* 3-angled; *joints of the rachis* winged by the adnate decurrent scales, rarely wingless.

SPICATI. *Umbel* simple or compound; *spikelets* few-many-flowered, distinct, spreading, forming loose or compact spikes at the summit of the rays; *scales* rigid, 7-11-nerved; *joints of the rachis* commonly conspicuously winged; *stamens* 3.

* *Spikelets* approximate or crowded on all sides of the common rachis, forming oblong or cylindrical spikes.

C. STRIGOSUS, L. *Umbel* large, 4-8-rayed, simple or compound, much shorter than the involucre; *involucels* bristly, shorter than the dense oblong spikes; *spikelets* yellowish, linear, acute, compressed, 6-10-flowered; *scales* somewhat scattered on the very slender rachis, oblong-lanceolate, acute, closely appressed, much longer than the linear-oblong acute minutely dotted dull *nut*; *culms* (1° - 3° high) tumid at the base, as long as the broadly linear leaves. Swamps and damp soil. July-September. *Rays* 4'-6' long; *spikelets* $\frac{1}{2}$ '- $\frac{3}{4}$ ' long; *sheath* of the rays bristle-pointed. Wichita Mountains.

C. SCHWEINITZII, Torr. *Culm* 8'-12' high, triquetrous, rough on the angles; *leaves* shorter than the stem, about a line wide; *umbel* simple, erect, 4-6-rayed; *rays* elongated, unequal; *sheaths* truncate, entire; *involucre* 3-5-leaved, longer than the leaves, scabrous on the margin; *spikelets* 6-7, alternate, approximate, in cylindric clusters, 6-8-flowered, with a small, setaceous bract at the base of each; *scales* membranaceous on the margin; *stamens* 3; *style* 3-cleft, scarcely longer than the smooth *achenia*. Northern Texas.

C. MICHAUXIANUS, Schultes. *Umbel* compound, 4-6-rayed; *rays* short with the sheaths pointed; *spikes* loose, mostly shorter than the leafy involucels; *spikelets* spread-

ing or reflexed, linear-subulate, terete, 10-12-flowered; *scales* scattered on the short-jointed broadly-winged rachis, oblong, obtuse, faintly-nerved, appressed; *nut* oblong, compressed-3-angled; *culms* slender, obtuse-angled; *involucre* 4-6-leaved. (*C. speciosus*, Vahl.?) Swamps and ditches. August and September. Culm 2° - 3° high; *spikelets* 6"-8" long, flexuous in fruit. Annual.

GLOMERATI. *Umbel* simple or compound; *spikelets* many-flowered, compressed, numerous in cluster, forming more or less dense heads at the summit of the common and partial rays; *rachis* wingless; *stamens* solitary.

* *Umbel* compound; *spikelets* ovate or oblong, flat; *scales* 3-nerved, concave on the back, acute; *nut* minute, lanceolate or oblong.

C. VEGETUS, Willd. *Umbel* often decompound, many-rayed, widely spreading; *involucre* 4-leaved, many times longer than the umbel; *spikelets* short ($1\frac{1}{2}$ "-2" long), ovate, 10-15-flowered, very numerous in the heads; *scales* lanceolate, incurved, spreading at the apex; *nut* minute, linear-lanceolate, slender-pointed; *culms* slender (2° - 3° high), obtuse-angled or nearly terete; *leaves* narrow, rigid, rough on the margins near the summit. Low pine-barrens and margins of ponds. September. Culms tumid at the base; *leaves* of the involucre horizontal; *heads* light brown. Perennial.

C. DRUMMONDII, Torr. *Umbel* compound, of 4-6 primary rays, and as many smaller ones, shorter than the 4-leaved involucre; *spikelets* (10-20 in a cluster) oblong or oblong-linear, 40-50-flowered; *scales* yellowish, ovate, straight, free at the apex; *nut* oblong, pointed, abruptly contracted at the base, minutely wrinkled; *culms* (6'-15' high) obtuse-angled, very rough, longer than the narrow leaves. Sandy swamps. September. Annual.

CAPITATI. *Umbel* simple or sessile; *spikelets* inserted on all sides of the common rachis, forming clusters or heads; *joints* of the rachis mostly winged; *scales* rigid, 5-11-nerved; *stamens* 3.

* *Spikelets* few in loose clusters.

C. FILIFORMIS, Swartz. *Clusters* sessile; *spikelets* 6-12,

erect, terete, subulate, 6-12-flowered; *scales* scattered, appressed, oblong, mucronate, finely-nerved; *rachis* very slender, flexuous; *nut* oblong, acute; *culms* tufted, filiform, acute-angled, longer than the bristle-like leaves; *involucre* 2-leaved, the lower one elongated and erect. *Culms* 4'-10' high, tumid at the base; spikelets 4"-6" long. Perennial.

** *Spikelets numerous in compact globular or oblong heads.*

† *Perennials; culms tumid or tuberous at the base.*

C. RETROFRACTUS, Torr. *Umbel* of about 8 slender (2'-6' long) rays, longer than the involucre; *heads* obovate; *spikelets* subulate, reflexed, terete; *scales* 4-5, the two lower ones ovate and empty, the upper lanceolate, acute; *nut* linear-oblong; *culm* tall (2°-4°), downy and roughish, like the broadly linear leaves. (*Mariscus retrofractus*, Vahl.) Barren sandy soil. July-September. *Leaves* much shorter than the culm.

KYLLINGIA, L.

Spikelets compressed, mostly 1-flowered; *scales* commonly 4, imbricated in two rows, the two lower ones small and empty, the third perfect, the fourth imperfect; *perianth* none; *stamens* 1-3; *style* elongated, 2-cleft; *nut* lenticular; *culms* jointless, 3-angled, leafy at the base; *involucre* 3-5-leaved; *spikelets* collected in single or clustered sessile heads. *Plants* odorous.

K. PUMILA, Michx. *Heads* (green) mostly 3, globose or ovate; *spikelets* 1-flowered, ovate-lanceolate, acute at each end; *scales* 3, the lowest minute, the middle one ovate, compressed, mucronate, mostly serrulate on the keel, inclosing the upper one; *nut* obovate; *stamens* 2; *culms* weak, acute-angled; *leaves* and 3-4-leaved *involucre* linear. Wet places. July-September. *Culms* tufted, 4'-10' high. Annuals.

K. MONOCEPHALA, L. "*Heads* single, globose, compact; *spikelets* 1-flowered, monandrous, ovate, acuminate, the 2 superior scales striate, nearly smooth on the sides, serrulate-ciliate on the keel, the 2 inferior minute; *nut* somewhat orbicular; *involucre* 3-leaved, one of the leaves erect, the others horizontal." (Torr.)—*Rhizoma* creeping; *culms* 1° high; head greenish, generally inclined; *leaves* abruptly pointed. Low moist lands.

DULICHIMUM, Richard.

Spikelets linear, compressed, many-flowered; *scales* imbricated in 2 rows, decurrent on the joints of the rachis; *perianth* composed of 6–9 downwardly hispid rigid bristles; *stamens* 3; *style* 2-cleft; *nut* lanceolate, compressed, long-beaked. Perennial. *Culms* terete, jointed, leafy; *leaves* numerous, 3-ranked, linear or lanceolate, short and spreading; *spikes* numerous, solitary in the upper axils, simple or the lower compound; *spikelets* 8–14, 2-ranked, spreading, 6–10-flowered; *scales* lanceolate, many-nerved, closely imbricated; *bristles* nearly twice as long as the compressed or concave *nut*.

D. SPATHACEUM, Richard. Ponds and ditches. August–September. *Culms* 1°–2° high; *leaves* 1'–3' long; *spikelets* 6"–12" long; *peduncles* of the lower spikes longer than the sheaths.

LIPOCARPHA, R. Br.

Spikes many-flowered, terete; *scales* spatulate, imbricated in many rows, deciduous, the lowest empty; *interior scales* 2, parallel to the exterior ones, membranaceous, inclosing the flower and nut; *stamens* 1–2; *style* 2–3-cleft; *nut* compressed, 3-angled; *culms* jointless, leafy at the base; *spikes* in a terminal cluster; *involucre* leafy.

L. MACULATA, Torr. Annual; *culms* clustered, terete; *leaves* much shorter than the culm, linear, concave, smooth;

involucre 2-6-leaved, spreading or recurved; *spikes* small, ovate, 3-9 in a cluster; *scales* spotted; *scales* of the perianth very thin, the nerves at length free and bristle-like below; *nut* oblong, contracted into a short neck. (*Kyllingia maculata*, Michx.) Springy or miry places. July-September. Culms 4'-8' high; spikes 1"-2" long, green.

FUIRENA, Rottb.

Spikes many-flowered; *scales* imbricated in many rows, awned at the apex; *perianth* consisting of three petal-like stalked scales alternating with as many bristles; *stamens* 3; *style* 3-cleft; *nut* 3-angled, raised on a stalk, and pointed with the persistent base of the style; *culms* terete, jointed; spikes single or clustered, lateral and terminal; scales hairy.

F. SCIRPOIDEA, Vahl. *Rhizoma* thick and creeping; *culms* slender; *leaves* reduced to pointed sheaths, smooth; *spikes* 1-3, terminal, ovate, supported by a small bract-like involucre; *scales* obovate, 9-nerved, pointed with a short erect awn; *stalks* of the oval barely pointed petal-like scales longer than the hispid bristles. Wet sandy places, near the coast. May-September. Culms 1° high.

F. SQUARROSA, Michx. *Culms* clustered, smooth, or pubescent near the summit; *leaves* flat, linear or linear-lanceolate, the margins, like the lower sheaths, hairy; *spikes* oblong, in lateral and terminal clusters; *scales* oblong-obovate, with the long pale awn recurved; petal-like *scales* ovate, acute; *bristles* as long as the stalk of the obovate nut.—Var., HISPIDA. (F. hispida, Ell.) *Leaves*, *sheaths*, and upper portion of the *culm* bristly-hairy; petal-like scales acuminate; bristles nearly as long as the nut. Swamps. July-September. Culms $\frac{1}{2}$ °-2° high; leaves 2'-5' long. The terminal cluster occasionally compound. Perennial.

ELEOCHARIS, R. Br. SPIKE-RUSH.

Spikes many- (rarely 2-4) -flowered; *scales* imbricated on all sides of the rachis, or somewhat 2-ranked, the lowest usually empty, bract-like, and persistent; *perianth* of 3-8 bearded bristles, occasionally wanting; *stamens* 1-3; *style* 2-3-cleft; *nut* compressed, biconvex, or 3-angled, crowned with the persistent jointed base of the style (tubercled). Commonly perennials, with creeping rootstocks. *Culms* jointless, leafless, sheathed at the base, bearing at the apex a single spike.

§ 1. ELEOCHARIS proper. *Spikes* many-flowered; *scales* imbricated in several rows.

* *Spikes* cylindrical, scarcely thicker than the soft cellular culms; *nut* biconvex, pitted or wrinkled in longitudinal lines.

† *Scales* rounded, thick and faintly nerved; *style* 3 cleft; *bristles* 6, sparingly bearded or smoothish, as long as the nut. (*Limnochloa*, Nees.)

E. EQUISETOIDES, Torr. *Culms* stout, terete, knotted by cross partitions, roughish; *scales* pale, round-ovate, obtuse or the upper acute, scarious on the margins; *bristles* hispid; *nut* pale brown, obscurely wrinkled, shining, crowned with a sessile conical-beaked acute tubercle. (*Scirpus equisetoides*, Ell.) Ponds. July-September. *Culms* 1°-2° high, 3" in diameter; *sheaths* brown; *spikes* 1' long. Perennial.

E. QUADRANGULATA, R. Br. *Culms* unequally 4-sided, with the angles acute; *scales* pale, roundish, very obtuse, scarious on the margins; *bristles* slender, bearded, unequal; *nut* broadly obovate, finely pitted, dull white; *tubercle* ovate or conical, free around the base, much shorter than the nut. (*Scirpus quadrangulatus*, Michx.) Ponds and ditches. July-September. *Culm* 2°-3° high, 1"-2" in diameter; *sheaths* purplish; *spikes* 1' long. Perennial.

** *Spikes* thicker than the culm; *style* 3-cleft; *nut* 3-angled.

† *Bristles* 6, as long as the nut and tubercle; *nut* longitudinally furrowed and pitted.

E. TUBERCULOSA, R. Br. *Culms* somewhat compressed, tough and wiry; *spikes* pale, ovate or oblong, acute;

scales oblong, rigid, 1-nerved; *nut* obovate, as large as the ovate compressed 3-angled tubercle; *bristles* rigid, hispid. —Varies with larger spikes and pubescent bristles. (*Scirpus tuberculosus*, Michx.) Wet places, chiefly along the coast. March–September. Culms 6'–12' high; spikes 3"–4" long (6"–8" in the var.). Nut shining. Perennial.

E. SIMPLEX, Torr. *Culms* unequally 3-sided, acute-angled; *spikes* short, ovate, acute; *scales* ovate-oblong, whitish, with brownish sides; *nut* obovate, flat on the inner face, twice as long as the conical-beaked compressed acute tubercle; *bristles* rigid. (*E. tortilis*, Schult.; *Scirpus simplex*, Ell.) Miry places along streams. May–September. Culms 1°–1½° high, very slender, twisted when dry; spikes 2"–3" long, angular, few-flowered. Perennial.

E. MICROFORMIS, Buckley. *Culms* erect, setaceous, cespitose, 1–2 inches high, smooth; *spikes* ovate, obtuse or subacute, 10–12-scaled; *scales* ovate, acute or subobtuse, reddish brown; *keel* green; *achenia* smooth, shining, pyriform, setæ 6, equal to the seed in length. Mature achenia black and shining, crowned with a broad white tubercle, with a short point in the centre. Northern Texas. June.

†† *Culms terete or compressed, more or less spongy.*

E. OBTUSA, Schultes. *Culms* tufted, terete, thick and spongy; *spikes* ovate or oblong, obtuse, many-flowered; *scales* thin, oblong, obtuse, commonly brown on the sides, green on the keel, with broad and white margins; *style* 2–3-cleft; *nut* (light brown) obovate, lenticular, smooth and shining, scarcely wider than the short compressed acute tubercle; *bristles* 6, rigid, twice the length of the nut. (*Scirpus capitatus*, Ell.) Muddy margins of ponds and streams. Common. June–September. Culms 6'–18' high; spikes 2"–4" long.

§ 2. *CHEETOCYPERUS*. *Spikes few-flowered, compressed; scales membranaceous, imbricated in 2-3 rows; style 3-cleft; culms capillary.*

E. ACICULARIS, R. Br. *Culms* (2'-12' high) angled; *spikes* ovate, 5-6-flowered, acute; *scales* oblong, with reddish sides; *nut* oblong, white, nearly terete, longitudinally ribbed and pitted, pointed with the conical or depressed tubercle; *bristles* 3-4, shorter than the nut, sometimes wanting. (*Scirpus trichodes*, Muhl.) Margins of ponds. June-September.

E. PYGMAEA, Torr. *Culms* short (1'-2' high), grooved on one side; *spikes* ovate, 3-6-flowered; *scales* whitish, ovate; *nut* ovate, pale, prominently 3-angled, smooth and shining, narrowed above into the minute tubercle; *bristles* 6, longer than the nut, sometimes wanting. (*Scirpus capillaceus*, Ell.) Muddy or sandy banks near the coast. April-July. *Rhizoma* very slender, bearing minute tuberlike buds; *spikes* 1"-2" long.

SCIRPUS, L. BULRUSH.

Spikes terete, single, or oftener in clusters or umbels, which are subtended by a 1-many-leaved involucre; *scales* imbricated in several rows; *nut* obtuse, or pointed by the persistent jointless base of the style; *tubercle* none; *culms* jointed and leafy, or leafy or sheathed only at the base. Otherwise like *Eleocharis*. Perennial.

§ *Culms jointless; leaves or sheaths radical.*

* *Spike solitary, terminal.*

S. CÆSPITOSUS, L. *Culms* tufted (6'-10' high), terete, wiry; *sheaths* numerous, rigid, imbricated, the uppermost ending in a short leaf; *spike* 3-8-flowered; *involucre* 2-leaved, as long as the spike, pointed; *nut* oblong, compressed-3-angled, abruptly pointed, half as long as the smooth capillary bristles. Mountains. July. *Rhizoma* thick and creeping; *spike* 1"-2" long.

** *Spikes 2-many, apparently lateral; the 1-leaved involucre erect and continuous with the culm.*

† *Spikes in sessile clusters.*

S. PUNGENS, Vahl. *Culms* stout, acutely 3-angled, two of the sides concave, leafy at the base; *leaves* channeled, sharply keeled; *involucre* slender (3'-4' long); *spikes* 3-6, light brown, oblong; *scales* membranaceous, oval, 2-cleft, mucronate-awned, slightly ciliate; *anthers* slender-pointed; *style* 2-cleft; *nut* round-obovate, plano-convex or lenticular, as long as the 3-5 hispid bristles. (S. Americanus, Pers.) Sandy marshes along the coast. June-September. Culm 2°-3° high; leaves 2-3, mostly shorter than the culm; spikes 4"-6" long.

S. OLNEYI, Gray. *Culms* stout, with three-winged angles, and three deeply channeled sides, leafless, or the sheaths ending in short pointed leaves; *involucre* short (1½'-1' long) rigid; *spikes* 7-13, short, ovate, dark brown; *scales* smooth, orbicular, 2-cleft, mucronate; *anthers* obtuse; *style* 2-cleft; *nut* round-obovate, plano-convex, as long as the 6 hispid bristles. Brackish marshes. June-September. Culms 2°-4° high; leaves 2'-4' long; spikes 2'' long.

§ *Culms jointed, leafy throughout; umbel terminal; involucre 2-several-leaved, spreading.*

* *Bristles hispid downward.*

S. POLYPHYLLUS, Vahl. *Culm* obtuse-angled, smooth; *leaves* long, rough on the margins; *umbel* decom-pound, spreading; *spikes* small, 3-8 in a cluster, ovate, yellowish-brown; *scales* ovate, mucronate, keeled; *bristles* 6, slender, hispid near the summit, mostly tortuous, 2-3 times as long as the pale compressed-3-angled pointed nut. (S. exaltatus, Pursh.) Shady swamps. July. Culm 2°-5° high; spikes 1" long.

ERIOPHORUM, L. COTTON GRASS.

Spikes many-flowered; *scales* imbricated in many rows; *perianth* composed of numerous (rarely 6) smooth and flat

hairs, much longer than the scale, and forming a woolly or silky tuft; *stamens* commonly 3; *style* 3-cleft, deciduous; *nut* 3-angled or lenticular. Perennials, with leafy *culms*, in our species, and clustered or umbelled spikes.

E. VIRGINICUM, L. *Culm* nearly terete, rigid; *leaves* narrowly linear, elongated; *spikes* densely clustered, nearly sessile, erect; *involucre* 2-3-leaved; *wool* reddish, thrice the length of the brownish scales; *nut* compressed-3-angled, acute. Bogs and swamps. June-August. *Culm* 2°-3° high; leaves 10'-18' long.

FIMBRISTYLIS, Vahl.

Spikes many-flowered; *scales* imbricated in several rows; *perianth* none; *stamens* 1-3; *style* 2-cleft, commonly flat and fringed on the margins, tumid at the base, deciduous; *nut* lenticular. *Culms* jointless, leafy at the base; *involucre* 1-several-leaved; *spikes* terminal, umbellate or clustered.

* *Spikes* umbelled.

F. SPADICEA, Vahl. Perennial; *culms* clustered, nearly terete, rigid (2°-3° high); *leaves* long, linear or filiform, concave, rough on the margins; *umbel* simple or compound, erect; *involucre* 2-3-leaved; *spikes* ovate or oblong, dark brown; *scales* smooth, rigid, rounded; *nut* obovate, acute, slightly furrowed and pitted. (*Scirpus castaneus*, Michx.; *S. ferrugineus*, Ell.) Salt marshes. August-October.

TRICHELOSTYLIS, Lestib.

Spikes terete, many-flowered; *scales* imbricated in few (4-8) rows; *perianth* none; *style* 3-cleft, tumid at the base, deciduous; *nut* 3-angled. *Culms* jointless, leafy at the base; *spikes* umbelled.

T. AUTUMNALIS. *Culms* slender, flat, 2-edged, 6'-12' high, tufted; *involucre* 2-leaved, mostly shorter than the

simple compound or decompound umbel; *spikes* linear-lanceolate; *scales* ovate-lanceolate, mucronate, imbricated in 4 rows; *stamens* 2; *nut* white, obovate, obtuse, often warty. (*Scirpus autumnalis*, L.) Low grounds. Very common. July–October. Annual.

ISOLEPIS, R. Br.

Spikes few–many-flowered; *scales* imbricated in few–several rows; *perianth* none; *style* 3-cleft, the tumid base persistent at the apex of the 3-angled nut. All annuals (in our species), with filiform or bristle-form *culms* and *leaves*; *spikes* umbelled or clustered; *leaves* radical.

* *Spikes* umbelled. (*Scales* pubescent.)

I. CAPILLARIS, R. and S. *Culm* (4'–6' high) smooth, furrowed, and, like the rough-edged leaves, bristle-like; *spikes* 3–4, in a single umbel, oblong, 6–8-flowered; *scales* oblong, obtuse, strongly keeled, brown on the sides, imbricated in 4 rows; *nut* obovate, obtuse, nearly equal-sided, transversely wrinkled; *stamens* 2. (*Scirpus capillaris*, L.) Moist sandy places. June–September. *Sheaths* of the leaves bearded at the throat; *involucre* 2–3-leaved, scarcely longer than the umbel.

I. COARCTATA, Torr. *Culms* (1° high) terete, filiform; *leaves* bristle-form, smooth, with the sheaths bearded; *umbel* compound, contracted; *spikes* (3" long) linear-oblong, 10–15-flowered; *scales* ovate, acutish, imbricated in 4 rows; *nut* flat on the inner face, obtuse-angled in front, obscurely dotted. (*Scirpus coarctatus*, Ell.) Dry sandy soil, near the coast. September and October. *Rays* of the umbel $\frac{1}{2}'$ long.

RHYNCHOSPORA, Vahl. BEAK-RUSH.

Spikes 1–several-flowered; *scales* imbricated in few rows, the lowest empty, the upper usually bearing imperfect

flowers; *perianth* of 3-6 (rarely 12-20) hispid or plumose bristles, occasionally wanting; *stamens* mostly 3; *style* 2-cleft; *nut* lenticular or globose, crowned with the dilated and persistent base long as the nut.—Var., *GLOBULARIS*. Smaller (6'-15' high); *corymbs* reduced to few globose-ovate dark-brown clustered spikes; *nuts* smaller, and deeper furrowed. Low ground. June and July.

R. PUNCTATA, Ell. *Culms* (1° - 2° high) slender, 3-angled; *leaves* short, linear-lanceolate; *corymbs* 3-4, cluster-like, the lateral ones simple, distant, and long-peduncled; *spikes* ovate; *nut* obovate, compressed, with transverse pitted furrows, rather shorter than the 6 slightly hispid bristles; *tubercle* conical, compressed, shorter than the nut. May and June.

* *Nut smooth and even; bristles hispid upward.*

R. CILIATA, Vahl. *Culms* blunt-angled (1° - 2° high); *leaves* short, glaucous, linear-lanceolate, obtuse, fringed on the margins; *corymbs* mostly solitary, capitate; *spikes* light brown, ovate; *nut* oval, lenticular, minutely roughened; *tubercle* flat, conical; *bristles* 6, $\frac{1}{3}$ the length of the nut; *stamens* 3. Wet pine-barrens. June-August. Leaves 2'-4' long; lateral corymb (when present) remote.

** *Nut smooth and even; bristles hispid downward.*

R. ALBA, Vahl. *Culms* (1° - 2° high) slender, 3-angled above; *leaves* narrowly linear or setaceous; *corymbs* mostly 2, capitate, white, turning brownish, the lower one long-peduncled; *spikes* ovate-lanceolate, 1-flowered; *nut* obovate, lenticular, twice as long as the compressed subulate tubercle; *bristles* 10-20, rigid, as long as the nut and tubercle, ciliate at the base. Wet springy places. August and September.

CERATOSCHÆNUS, Nees. HORNED RUSH.

Spikes few-flowered; *scales* loosely imbricated, the lower ones empty, the upper with staminate or abortive flowers;

perianth of 4-6 bristles, which are dilated and connate at the base; *stamens* 3; *style* elongated, entire or slightly 2-cleft at the apex; *nut* compressed, crowned with the persistent and hispid lower half of the style. Perennials. *Culms* jointed, leafy; *spikes* scattered in an open corymb, or clustered in a globose head.

C. CORNICULATUS, Nees. *Culms* stout (3° - 4° high), 3-angled; *leaves* flat, scabrous on the edges (6"-10" wide); *corymbs* 3-5, erect, compound; *spikes* brown, ovate-lanceolate; *style* very long, the lower and persistent portion upwardly scabrous; *nut* narrowly obovate, smooth, the sides concave and minutely dotted; *bristles* 5-6, rigid, smoothish, half as long as the nut; *tubercle* subulate, 3-4 times the length of the nut. (Rhynchospora longirostris, Ell.) Ponds and ditches. *July-September. Leaves 1° - 2° long; nut and tubercle nearly 1' long.

CLADIUM, Browne.

Spikes ovate, 1-2-flowered; *scales* loosely imbricated, the lower ones empty; *perianth* none; *stamens* 2; *style* 2-3-cleft, the divisions often 2-3-cleft, deciduous; *nut* globose-ovate, the pericarp thickened and corky near the apex; *tubercle* none. *Culms* tall; spikes disposed in axillary and terminal cyme-like panicles.

C. EFFUSUM, Torr. (Saw-grass.) *Culms* (4° - 8° high) nearly terete; *leaves* linear, elongated, saw-edged; *panicles* numerous, diffuse; *spikes* small, 3-4 in a cluster, deep brown; *scales* about 6, the uppermost bearing a perfect flower, the next below staminiferous, the others empty; *nut* ovate, pointed, wrinkled. (Schœnus effusus, Swartz.) Fresh or brackish marshes along the coast. July and August.

SCLERIA, L. NUT-RUSH.

Flowers monœcious; *sterile* spike few-many-flowered; *scales* loosely imbricated in 2-3 rows; *fertile flowers* soli-

tary, separate or at the base of the sterile spike; *stamens* 1-3; *style* 3-cleft; *nut* globose or ovate, stony or bony.—Chiefly perennials, with creeping *rootstocks*, and triangular leafy *culms*; *spikes* clustered, lateral and terminal.

§ *SCLERIA* proper. *Nut supported by an annular or 3-6-lobed disk.*

* *Nuts reticulated; disk of 3 flattened lobes; stamens 2.*

S. LAXA, Torr. *Culms* weak, rough on the angles; *leaves* linear, obtuse; *spikes* separate, the axillary ones on a long and drooping peduncle; *nut* globose, wrinkled and somewhat hairy, obscurely pitted; *lobes* of the disk appressed to the nut. (*S. reticularis*, Ell.) Damp pine-barrens. August–October. *Culms* 1° – $1\frac{1}{2}^{\circ}$ long; *nut* $1\frac{1}{2}''$ – $2''$ in diameter.

** *Nut warty; disk bearing 3-6 globular lobes; stamens 3.*

S. ELLIOTTII. *Culms* stout ($\frac{1}{2}^{\circ}$ – 1° high), densely rough-fringed on the angles throughout; *leaves* 3-4, broadly linear ($2''$ – $3''$ wide), closely fringed on the margins and midrib beneath; *sheaths* pubescent; *clusters* 2, the lateral one remote, on a short erect peduncle; *sterile* spike small, few-flowered; *nut* globose, deeply wrinkled or pitted, and with slender warty projections at the base; *lobes* of the disk 3, globose, 2-lobed. (*S. hirtella*, Ell., Michx. ? not of Swartz.) Low pine-barrens.

§ *HYPOPORUM*. *Disk none; nut concave and often pitted at the sides of the triangular base.*

* *Clusters of spikes (small) numerous, scattered near the summit of the culm, forming an interrupted compound spike; bracts mostly short.*

S. FILIFORMIS, Swartz. Glaucous; *culms* slender ($1\frac{1}{2}^{\circ}$ – 2° high), smooth; *leaves* narrowly linear, rough on the margins and keel, ciliate at the throat; *clusters* 3-4, erect, few-flowered, the lowest remote, leafy-bracted; *scales* lanceolate, rough-pointed; *stamens* 3; *nut* obovate, obscurely 3-angled, smooth and glassy, concave at the base, not pitted. October.

S. MICHAUXII. *Culms* (6'-12' high) smooth; *leaves* linear, and, like the sheaths, hairy; *clusters* 4-6, nodding; *scales* bristle-awned; *nut* globose-3-angled, very minute, pointed, smooth, not pitted at the base. (S. interrupta, Michx., not of Richard.) Low pine-barrens. July and August.

CAREX, L. SEDGE.

Flowers monœcious, rarely diœcious, spiked; *sterile* and *fertile flowers* in the same spike (*androgynous*), or in separate spikes; *scales* imbricated in few-many rows; *stamens* 2-3; *style* 2-3-cleft, exserted from a sac (*perigynium*) which incloses the ovary and the lenticular biconvex or 3-angled nut.—Perennials, with grass-like *leaves*; *spikes* from the axils of scale-like or leaf-like bracts, simple or compound.

§ VIGNEA. *Stigmas* two; *nut* lenticular, or more or less compressed.

* *Spikes* with the upper flowers sterile, the lower fertile.

† *Spikes* indefinite, disposed in a close panicle.

‡ *Perigynia* short-stalked, truncate at the base.

C. CRUS-CORVI, Shuttleworth. *Panicle* very large, the lower branches long and distinct, the upper short and crowded; *perigynia* plano-convex, ovate, strongly nerved, dilated at the base, tapering into a long and slender rough-edged deeply 2-cleft beak, thrice the length of the ovate-mucronate scale. River swamps. May. *Culms* thick and spongy, sharp-angled, and, like the broad ($\frac{1}{2}$ '- $\frac{3}{4}$ ' wide) leaves, glaucous; *panicle* 4'-9' long, oblong or spike-like; *perigynia* widely spreading, brown at maturity.

C. MUHLENBERGII, Schk. *Spikes* 5-8, ovoid, approximate, or crowded in an oblong head; *perigynia* round-ovate, plano-convex, strongly nerved, with a short and broad rough-edged 2-cleft beak, barely longer than the ovate short-pointed scale. Dry sterile soil. *Culms* 12'-18'

high, rigid, rough above, twice as long as the narrow leaves; *head* or spike 1' long; *bracts* bristle-form, longer than the spikes. Cache Creek.—*Marcy*.

****** *Spikes with the lower flowers sterile, the upper fertile.*

C. STELLULATA, Good. *Spikes* 3-5, obovoid, distinct, the uppermost club-shaped at the base; *perigynia* ovate, rounded at the base, tapering into a short and rough 2-cleft beak, finely nerved, spreading and finally recurved, rather longer than the ovate pointed scale. (C. scirpoides, Schk.) Shady river-swamps. *Culms* 6'-12' high, weak; *leaves* narrow and tender; spikes small.

Var., STERILIS. *Sterile and fertile spikes* on separate culms, or some of them either sterile or fertile on the same culm, otherwise like the preceding, and growing in similar places. (C. sterilis, Willd.)

Var., CONFERTA. *Culms* taller (2° high) and stouter; *spikes* larger and more crowded; *perigynia* round-ovate, twice as long as the broadly ovate barely pointed scale. Pine-barren swamps.

C. STRAMINEA, Schk. *Spikes* 3-6, distinct, ovoid; *perigynia* ovate or round-ovate, broadly winged, abruptly narrowed into a short 2-cleft beak, somewhat tawny and spreading at maturity, longer than the ovate-lanceolate scale.

Var., FESTUCACEA. *Spikes* 6-8, pale, obovoid or somewhat club-shaped, scattered; *perigynia* ovate, less broadly margined, tapering into a more slender beak, erect and pale green at maturity. (C. festucacea, Schk.; C. fœnea, Torr., etc., a form with more rigid culms, and more crowded and glaucous spikes.) Swamps, very common. *Culms* 1°-2° high; *leaves* narrowly linear, shorter than the culm. Trinity River.

§ CAREX proper. *Stigmas* 3; *nut* 3-angled; *spikes* 2 or more.

* *Spikes* monœcious; *terminal spikes* sterile below, fertile above; *the others* chiefly fertile.

† *Perigynia* leafless.

‡† *Spikes* remote, linear or cylindrical, rather loosely flowered, on long and mostly drooping peduncles; *bracts* long and leaf-like; *perigynia* smooth, somewhat inflated, few and faintly nerved.

C. OXYLEPIS, Torr. and Hook. *Spikes* 4-5, linear, all on long bristle-like partly included nodding peduncles, distant; *perigynia* oblong, acute-angled, emarginate at the pointed apex, longer than the lanceolate rough-pointed white scale. Low ground. *Culms* slender, $1\frac{1}{2}^{\circ}$ - 2° high, the lower part, like the leaves and sheaths, pubescent.

C. GRACILLIMA, Schw. *Spikes* 3-5, distant, linear, on slender and nodding peduncles; *perigynia* oblong, obtuse, entire and oblique at the orifice, about twice as long as the oblong obtuse short-awned scale. Wet lands. *Culm* 1° - 2° high; *spikes* $1'$ - $1\frac{1}{2}'$ long, thicker than those of the preceding; *sheaths* smooth.

Spikes cylindrical or oblong, densely many-flowered; *perigynia* ovate or roundish.

C. CHEROKEENSIS, Schk. *Sterile spikes* 2-4, slender; *fertile spikes* 5-15, often 2-3 from the same sheath, oblong or cylindrical, sterile at the summit, all on long and nodding peduncles; *perigynia* whitish, oblong, compressed-3-angled, short-beaked, with the orifice membranaceous and obliquely 2-cleft, longer than the oblong acute scale; *stigmas* elongated.—*Plant* whitish; *culms* 1° - 2° high, smooth, like the linear leaves.

153. GRASS FAMILY. Order, GRAMINEÆ.

Chiefly *herbs*; *stem (culm)* mostly hollow and with closed joints; *leaves* alternate, 2-ranked, narrow and entire; *sheaths* open or split on one side, and usually prolonged into a membranaceous or fringed appendage (*ligula*) at the base of the blade; *flowers* in spiked or paniced

spikelets, consisting of 2-ranked imbricated bracts or scales, of which the exterior or lower ones, subtending one or more flowers, are called *glumes*, and the two inner ones, inclosing the 1-celled 1-ovuled ovary, and 1-11 (commonly 3) hypogynous stamens, are called *paleæ*; *perianth* none, or composed of 1-3 minute hypogynous scales (*squamulæ*); *anthers* versatile, 2-celled; *styles* 2-3, with hairy or plumose stigmas; *fruit* a caryopsis (*grain*); *embryo* placed on the outside and near the base of mealy albumen; *root* fibrous.

SYNOPSIS.

TRIBE I. **Oryzææ.** *Spikelets* 1-flowered, mostly imperfect. *Glumes* none. *Paleæ* 2. *Stamens* 1-11.

Flowers perfect, compressed-panicle. *Paleæ* unequal, ciliate.....LEERSIA.

—— monœcious; the pistillate and staminate ones in the same panicle..ZIZANIA.

—————; ————— in separate spikes.

HYDROCHLOA.

—— diœcious, in terminal spikes.....MONANTHOCLOE.

TRIBE II. **Agrostideæ.** *Spikelets* 1-flowered, or with the pedicel of a second flower above. *Glumes* 2. *Paleæ* mostly 2, the lower one often awned. *Stamens* 1-3. *Spikelets* in open or closely spiked panicles.

* *Glumes* united at the base, strongly compressed-keeled.

Lower palea awned on the back, the upper wanting. *Flowers* spiked..ALOPECURUS.

** *Glumes* distinct, concave or keeled; *paleæ* membranaceous; *grain* free; *spikelets* in open or contracted panicles.

Flowers awnless. *Seed* loose in the globose or obovoid pericarp.....SPOROBOLUS.

Paleæ shorter than the nearly equal *glumes*, the lower awned on the back, the upper sometimes wanting.....AGROSTIS.

Lower glume smaller than the upper one. *Paleæ* bearded at the base, the lower one mucronate or awn-pointed. *Stamens* 3.....MUHLENBERGIA.

*** *Paleæ* raised on a hairy stalk; the lower one awned, indurated, and involute, closely investing the grain.

Lower palea with a single contorted awn jointed with its apex. *Panicle* short.

STIPA.

—— triple-awned. *Panicle* elongated.....ARISTIDA.

TRIBE III. **Chlorideæ.** *Spikelets* 2-several-flowered in 1-sided spikes. *Rachis* jointed. *Upper* flowers imperfect. *Glumes* and *paleæ* 2. *Spikes* racemed or digitate, rarely single.

* *Spikelets* 2-3-flowered, only the lowest flower perfect.

Spikelets linear, scattered. *Lower palea* and rudiment awned. *Spikes* racemed.

GYMNOPOGON.

— roundish, crowded. — mucronate. *Spikes* digitate. EUSTACHYS.

Lower palea awnless. *Culms* creeping. *Spikes* digitate. CYNODON.

** *Spikelets* mostly several-flowered the lower flowers perfect.

Spikes digitate. *Upper glumes* awned. *Paleæ* pointed. DACTYLOCTENIUM.

— *Glumes* and *paleæ* awnless. ELEUSINE.

— racemed, long and slender. *Glumes* awnless. LEPTOCHLOA.

TRIBE IV. **Festucaceæ.** *Spikelets* panicled, few-many-flowered, the upper flowers imperfect. *Glumes* 2. *Paleæ* 2, membranaceous or rarely indurated, awnless, or the lower one with a straight awn at or near the apex. *Stamens* 1-3.

* *Grain* smooth, free from the *paleæ*; lower flowers perfect.

† *Lower palea* 3-5-toothed or awned.

Spikelets 5-7-flowered. *Lower palea* slightly 2-cleft, the 3 hairy nerves percurrent.

TRICUSPIS.

†† *Lower palea* entire, awnless or awn-pointed.

‡ *Glumes* unlike, the lower one linear, the upper obovate.

Spikelets 1-5-flowered. *Culms* slender, tufted. EATONIA.

‡‡ *Glumes* alike; lower *palea* rounded on the back, not keeled.

Spikelets 3-5-flowered. *Lower palea* many-nerved. MELICA.

Spikelets 5-many-flowered. *Lower palea* strongly 7-nerved. GLYCERIA.

Spikelets loosely many-flowered. *Culms* woody. ARUNDINARIA.

Spikelets diæctious. *Lower palea* rigid. BRIZOPYRUM.

‡‡‡ *Glumes* alike; lower *palea* keeled.

Paleæ falling away together, the lower one 5-nerved, and with cobwebby hairs at the base. *Spikelets* 3-6-flowered. POA.

Lower palea falling before the upper one, 3-nerved, not hairy. ERAGROSTIS.

— awn-pointed. *Panicle* contracted, composed of 1-sided clusters.

DACTYLIS.

** Grain adherent to the upper palea, downy at the apex.

Lower palea entire, acute or awn-pointed.....FESTUCA.
 ——— *2-cleft, awned between the teeth*.....BROMUS.

*** Grain free, smooth; lowest flowers of the spikelets imperfect.

Spikelets broad and flat, many-flowered. Palea coriaceous.....UNIOLA.

TRIBE V. **Hordeaceæ.** *Spikelets 2-several-flowered, sessile, on opposite sides of the jointed rachis, spiked. Glumes 1-2, rarely wanting. Palea 2.*

Spikelets 2-4 at each joint of the rachis. Glumes 2, placed side by side before the spikelets.....ELYMUS.

——— *2-3 at each joint of the rachis. Glumes none*.....GYMNOSTICHUM.

TRIBE VI. **Avenaceæ.** *Spikelets panicle, 2-several-flowered, the terminal flowers mostly imperfect. Rachis or base of the flowers often bearded. Lower palea with a twisted, bent, or straight awn on the back, or below the apex.*

Spikelets 2-several-flowered. Lower palea thin, compressed-keeled, bearing a bent awn below the 2 cleft apex.....TRisetum.

——— *2-flowered, the lower flower staminate, and bearing a long bent awn below the middle*.....ARRHENATHERUM.

TRIBE VII. **Phalarideæ.** *Spikelets in spike-like panicles, 3-flowered, the upper or middle flower perfect, the two lateral ones imperfect or mere rudiments. Glumes 2. Palea 2, indurated in fruit.*

Lateral flowers rudimentary. Perfect flowers triandrous.....PHALARIS.

TRIBE VIII. **Paniceæ.** *Spikelets 2-flowered. Glumes 2, or the lower wanting. Lower flower imperfect, either staminate or neutral, with the lower palea membranaceous and similar to the upper glume, the upper one mostly wanting. Palea of the perfect flower coriaceous. Grain mostly grooved or flattened on the outside. Flowers in spikes or panicles.*

* Lower glume and upper palea of the sterile flower wanting (the spikelet appearing like a single flower, with 2 glumes and 2 palea).

Spikelets alike, plano-convex, in 1-sided spikes.....PASPALUM.

**** Glumes 2, the lower one often minute, rarely wanting.**

- Spikelets single, without a bristly or spiny involucre*.....PANICUM.
 ——— *single, or few in a cluster, inclosed in an indurated and spiny involucre; spikelets spiked*.....CENCHRUS.
Spikes and spikelets as in Rottbœllia, but the flowers as in Panicum..STENOTAPHRUM.

TRIBE IX. Rottbœlliaceæ. *Spikelets 1-2-flowered, by pairs, imbedded in an excavation of the^a thick and jointed rachis, one stalked and imperfect, the other sessile and perfect; or the upper spikelets all staminate and the lower pistillate. Lower glume coriaceous or cartilaginous. Paleæ awnless.*

- Spikelets 2 on each joint, one stalked and sterile, the other sessile and perfect.*
 ROTTBÆLLIA.
 ——— *2 on each joint, the one at the top of the joint sterile, the other at the base globose and fertile*.....MANISURIUS.
Upper spikelets by pairs, all staminate; the lower ones single, and pistillate.
 TRIPSACUM.

TRIBE X. Andropogoneæ. *Spikelets 2-3 on each joint of the slender hairy or plumose rachis. Glumes more rigid than the thin-awned paleæ.*

- Spikelets 2 on each joint of the plumose or hairy rachis, one sessile and perfect, the other stalked and imperfect or rudimentary*.....ANDROPOGON.
 ——— *2 on each joint of the rachis, both fertile and surrounded by a hairy involucre*.....ERIANTHUS.
 ——— *panicled, 2-3 together, the latter ones rudimentary*.....SORGHUM.

LEERSIA, Swartz. FALSE RICE.

Perennial aquatic or marsh grasses, with the leaves and sheaths roughened with minute recurved points, the 1-flowered (whitish) spikelets crowded in 1-sided panicled racemes; pedicels jointed; glumes none; paleæ 2, chartaceous, strongly compressed, fringed on the keel, the lower one much wider; stamens 1-6; stigmas 2; grain compressed.

L. ORYZOIDES, Swartz. *Panicle large, diffuse; spikelets oblong, flat, loosely imbricated; stamens 3. Ditches and swamps. July and August. Culm 3°-4° long, commonly*

prostrate at the base; *leaves* spreading; base of the panicle mostly inclosed in the sheath of the subtending leaf; *spikelets* strongly fringed, about 3" long.

L. VIRGINICA, Willd. *Panicle* nearly simple, the lower branches spreading; *spikelets* small, concave, sparingly fringed, closely imbricated; *stamens* 1-2. (L. imbricata, Lam.?) Swamps and margins of streams. July and August. More slender than the last, and with spikelets half as large.

ZIZANIA, Gron. WILD RICE.

Rank water-grasses, with broad flat *leaves*, and large diffuse *panicles* of monœcious 1-flowered *spikelets*, on club-shaped jointed *pedicels*; *glumes* none, or reduced to a cup-shaped ring at the base of the spikelet; *paleæ* 2, membranaceous, the lower one rough-awned in the pistillate spikelet; *stamens* 6; *stigmas* elongated, brush-shaped; *grain* cylindrical, free.

Z. AQUATICA, L. *Lower portion* of the *panicle* staminate and widely spreading, the *upper* pistillate and erect, with straight branches; *awn* straight, elongated; *styles* 2; *grain* linear. Deep marshes and ponds. July. Culms 4°-8° high; *leaves* rough beneath; *panicle* 1°-2° long.

ALOPECURUS, L. FOXTAIL GRASS.

Flat-leaved grasses, with the 1-flowered *spikelets* closely crowded in a simple spike-like cylindrical panicle; *glumes* 2, compressed, boat-shaped, sharply keeled, united below, awnless; *lower paleæ* compressed, awned on the back below the middle, the *upper* wanting; *stamens* 3; *styles* 2, rarely united below; *grain* free, smooth and lenticular.

A. GENICULATUS, L. Low; *culms* ascending, bent at the lower joints; *awn* longer than the obtuse hairy glume. Wet cultivated grounds. April. Culms 6'-12' high;

leaves 2'-4' long, with the sheaths shorter than the joints; *spikes* 1'-1½' long.

SPOROBOLUS, Brown. DROP-SEED GRASS.

Tough wiry and tufted or creeping *perennial grasses*, with narrow *leaves*, and 1-flowered awnless *spikelets*, disposed in open, or crowded in spiked panicles; *glumes* 2, membranaceous, unequal, the lower one shorter; *paleæ* 2, mostly longer than the glumes, and of the same texture; *stamens* 3; *styles* 2; *grain* oval or globose, loose in the thin membranaceous pericarp, deciduous; *panicles* exserted.

* *Panicles open.*

S. JUNCEUS, Kunth. (*Wire Grass*.) *Panicle* narrow, the short and spreading branches whorled; *spikelets* on one side of the branches, short-stalked; *glumes* smooth, the upper one acute, 2-3 times longer than the lower, and about equal to the obtuse paleæ; *culms* (1°-2° high) erect; *leaves* chiefly radical, filiform and elongated, involute, those of the culm short and remote. (*Agrostis juncea*, Michx.) Dry pine-barrens, common. April and May, and often in October.

** *Panicles spiked.*

S. VIRGINICUS, Kunth. *Culms* creeping, short-jointed, the short and mostly clustered branches erect; *leaves* 2-ranked, soon convolute, short and rigid; *panicle* small, lanceolate; *glumes* nearly equal, acute, rather longer than the paleæ. (*Agrostis Virginica*, L.) Saline marshes and banks along the coast. July and August. *Flowering stems* 6'-12' high; *leaves* 2'-4' long; *panicle* 1'-2' long, pale or purple.

AGROSTIS, L. BENT GRASS.

Tufted usually tender grasses, with flat and narrow *leaves*; the small 1-flowered *spikelets* racemose on the hair-like clustered branches of the open panicle, on thickened

pedicels; *glumes* 2, nearly equal, longer than the *paleæ*; *paleæ* 2, the lower one commonly awned on the back, 3-5-nerved, the upper 2-nerved, occasionally minute or wanting; *stamens* 1-3; *styles* or *stigmas* 2; *grain* free.

§ 1. *TRICHODIUM*. *Upper palea minute or wanting, the lower awnless, shorter than the unequal acute rough-keeled glumes.*

A. SCABRA, Willd. *Culms* slender, erect; *leaves* short; *branches* of the panicle long, hair-like, hispid, bearing the purple spikelets near their summits. (*T. laxiflorum*, Ell.) Sterile soil. June and July. *Panicle* usually as long as the culm. Annuals.

§ 2. *AGROSTIS* proper. *Upper palea manifest, the lower commonly awned on the back.*

A. RUPESTRIS, All. *Culms* slender, erect; *panicle* small, oblong, with erect smooth branches; *glumes* lanceolate, nearly equal, rough-keeled; *lower palea* one-third shorter than the *glumes*, short-awned below the middle, the *upper* one minute. July. *Culms* 1° high.

POLYPOGON, Desf. BEARD GRASS.

Flat-leaved chiefly annual grasses, with the 1-flowered *spikelets* stalked, and crowded in close clusters into a terminal spiked panicle; *glumes* 2, equal, awned, and much longer than the *paleæ*, of which the lower one is truncated and toothed at the apex, and often short-awned; *stamens* 3; *stigmas* 2; *grain* elliptical, free.

P. MARITIMUS, Willd. *Culms* simple (6'-8' high); *glumes* pubescent, hispid on the keel, one-third as long as the slender awns; *lower palea* 4-toothed, unawned. (*Phleum pratense*, Ell., Herb.) Sea-shore.

MUHLENBERGIA, Schreb. DROP-SEED GRASS.

Spikelets 1-flowered; *glumes* persistent, pointed or awned, equal, or the lower one smaller; *paleæ* 2, sessile in the

glumes, commonly hairy at the base, deciduous with the inclosed grain, the lower one 3-nerved and mucronate or awned at the apex; *stamens* 3.

MUHLENBERGIA proper. *Spikelets commonly much crowded, in lateral and terminal panicles, short-stalked; culms branching; leaves flat.*

M. WILLDENOVII, Trin. *Culms* sparingly branched, erect; *panicles* linear; *spikelets* scattered; *paleæ* twice as long as the nearly equal short-pointed glumes, the lower one with an awn 3-4 times as long as the spikelet. (*Agrostis tenuiflora*, Willd.) Dry rocky soil. July and August. Culms 3° high.

M. DIFFUSA, Schreb. *Culms* diffusely branched, low; *panicles* long and slender; *glumes* very small, the upper one truncated; *awn* of the *palea* twice as long as the spikelet. Shaded waste places. August and September. Culms 1°-1½° high.

STIPA, L. FEATHER GRASS.

Perennial grasses, with convolute leaves, and loose *panicles* of 1-flowered spikelets, with very long awns; *glumes* 2, membranaceous, nearly equal, awnless and persistent; *paleæ* coriaceous, involute, raised on an obconical bearded stalk, the lower one with a twisted or contorted awn jointed with its apex; *stamens* 3; *grain* terete, inclosed in the *paleæ*.

S. AVENACEA, L. *Culms* (1°-2° high) clustered; *leaves* narrowly linear, rough, the lowest elongated; *awn* pubescent, bent in the middle, many times longer than the dark-brown *palea*. Dry soil. April.

ARISTIDA, L. WIRE GRASS.

Dry and harsh *perennial grasses*, growing in barren soil, with narrow leaves, racemose or *spiked-panicked* 1-flowered *spikelets* nearly as in *Stipa*, but the *lower palea* ending in a triple awn, which is continuous with its apex; *upper palea* minute; *grain* linear.

* *Glumes unequal, the upper one shorter.*

A. PURPURASCENS, Poir. *Culms* ($1\frac{1}{2}^{\circ}$ – 2° high) slender, sparingly branched; *sheaths* smooth; *glumes* sometimes nearly equal, purple; *lower palea* (3" long) $\frac{1}{2}$ – $\frac{1}{3}$ as long as the nearly equal awns. Dry soil. August. *Panicle* slender, 1° long, with the branches appressed.

** *Glumes equal, or the upper one longer.*

A. GRACILIS, Ell. *Culms* much branched at the base, very slender; *leaves* flat; *panicle* very narrow, with distant appressed branches; *middle awn* rather longer than the rough and spotted lower palea, the *lateral ones* much shorter; *glumes* nearly equal. Dry gravelly soil. August. *Culms* (with the panicle) 6'–12' high; *spikelets* purple.

A. SPICIFORMIS, Ell. *Culms* simple, rigid, erect (1° – $1\frac{1}{2}^{\circ}$ high); *leaves* rigid, erect, convolute, smooth; *panicle* spiked; *glumes* much shorter than the long (1') very slender paleæ, the upper one twice as long as the lower; *awns* nearly equal, widely spreading, the middle one as long as the paleæ. Low pine-barrens. August and September. *Panicles* 2'–4' long, at length twisted.

A. TUBERCULOSA, Nutt. *Culms* rigid, branching (1° – $1\frac{1}{2}^{\circ}$ high); *leaves* flat; *glumes* nearly equal, longer than the paleæ, bristle-awned; *awns* (2' long) equal, jointed with the paleæ, twisted below, then widely spreading, several times longer than the paleæ. Dry ridges. September. *Panicle* simple.

GYMNOPOGON, Beauv. •

Low perennial grasses, with short and crowded distichous spreading *leaves*; *spikelets* appressed, scattered on the straight and at length reflexed branches of the simple panicle, consisting of one perfect flower, and the awn-like pedicel of a second flower above; *glumes* 2, subulate, hispid-serrulate; *paleæ* 2, shorter than the glumes, the lower one awned under the apex; *stamens* 3.

G. RACEMOSUS, Beauv. *Culms* (1° high) rigid; *leaves* lanceolate ($1\frac{1}{2}$ '-2' long); *branches of the panicle* bearing the linear spikelets from the base to the summit; *awn* 2-3 times the length of the *paleæ* and the pedicel of the sterile flower. (*Andropogon ambiguus*, Michx.) Var. *FILIFORMIS* has narrower *leaves*, the *spikelets* borne above the middle of the branches, and the *awns* and sterile *pedicel* shorter than the *paleæ*. Dry sandy soil. September and October.

EUSTACHYS, Desv.

Chiefly *tropical grasses*, with compressed *culms* and *sheaths*, distichous flat or folded obtuse *leaves*, and digitate rarely single *spikes*; *spikelets* 2-3-flowered, imbricated or crowded in 2 rows on one side of the triangular rachis; the *lowest flower* perfect and sessile, the *upper ones* staminate or neutral, and stalked; *glumes* 2, membranaceous, persistent, the upper (exterior) one short-awned; *paleæ* coriaceous, the lower one boat-shaped, mucronate-awned under the apex, the upper (mostly wanting in the sterile flowers) unawned; *stamens* 3; *grain* free.

E. PETRÆA, Desv. *Culms* (1° - 2° high) clustered, erect; *leaves* glaucous; *spikes* 3-5; *spikelets* 2-flowered; *glumes* hispid, the upper oblong, deeply emarginate; *lower palea* dark brown, hairy on the keel and margins, bearded at the base; *sterile flower* neutral, club-shaped, awnless. Damp soil along the coast. May-August. Leaves 3'-5' long; spikes erect; spikelets roundish. Perennial.

CYNODON, Richard. BERMUDA GRASS.

Diffusely *creeping grasses*, with short and erect flowering *stems*, and flat *leaves*; *spikes* digitate, 1-sided; *spikelets* crowded, awnless, 2-flowered, the *lower flower* perfect, the *upper* an awn-like pedicel; *glumes* 2, membranaceous, nearly equal; *paleæ* 2, membranaceous, the lower one larger and keeled; *stamens* 3; *grain* free.

C. DACTYLON, Pers. *Spikes* 3-5, filiform, purple; *glumes* rough-keeled; *paleæ* longer than the glumes, the lower one boat-shaped, and hairy on the keel; *anthers* and *stigmas* purple. (*Digitaria Dactylon*, Ell.) Waste places. *Culms* perennial; *leaves* 2'-4' long; *spikes* 1'-2' long, filiform.

DACTYLOCTENIUM, Willd. CROWFOOT GRASS.

Annual creeping or spreading branching grasses, with flat *leaves* and digitate rarely single *spikes*; *spikelets* 2-several-flowered, crowded on one side of the flattened rachis; the *uppermost flower* imperfect; *glumes* 2, compressed-keeled, membranaceous, the upper (exterior) awn-pointed; *paleæ* 2, boat-shaped, pointed; *stamens* 3; *stigmas* plumose, with branching hairs; *grain* roundish, rugose, free.

D. ÆGYPTIACUM, Willd. *Culms* ascending from a creeping base; *leaves* fringed; *spikes* commonly 4, awn-pointed; *spikelets* 3-flowered. (*Eleusine? cruciata*, Ell.) Cultivated ground, common. *Culms* numerous, 1° high; *spikes* 1'-2' long.

ELEUSINE, Gært.

Characters chiefly of *Dactyloctenium*, but the narrower *glumes* and *paleæ* obtuse and awnless; *stigmas* plumose, with simple hairs; *spikelets* closely imbricated. Low annuals.

E. INDICA, Gært. Cultivated ground, very common. *Culms* (6'-18' high) flattened; *leaves* flat; *spikes* 2-several, the lower ones sometimes scattered (2'-4' long); *spikelets* 6-flowered.

LEPTOCHLOA, Beauv.

Flat-leaved grasses, with the numerous *spikes* disposed in a terminal *raceme*; *spikelets* sessile, loose on one side of the elongated filiform rachis, 3-many-flowered; *glumes* 2,

membranaceous, unequal, keeled; *paleæ* 2, membranaceous, the lower one longer than the upper, 3-nerved, awned or unawned; *stamens* 3; *grain* oblong, free.

LEPTOCHLOA proper. Lower *palea* unawned.

L. MUCRONATA, Kunth. Culms 2°-3° high; sheaths of the broad (4"-6" wide) rough *leaves* hairy; *spikes* numerous, in an elongated raceme, 2'-4' long, spreading; *spikelets* minute, 3-4-flowered; *glumes* mucronate, longer or shorter than the flowers; lower *palea* smooth, emarginate. (Eleusine mucronata, Michx.) Cultivated fields. August-September.

TRICUSPIS, Beauv.

Perennial grasses, with tall, erect, simple culms, from a thick and scaly rootstock, elongated rigid leaves, and ovate or lanceolate 5-7-flowered stalked spikelets, disposed in a simple or compound open panicle; glumes 2, smooth, emarginate, shorter than the crowded flowers; paleæ 2, 2-cleft, the lower one shortly 3-awned by the percurrent hairy nerves, bearded at the base; stamens 3; grain obovate-oblong, free.

T. SESSLERIOIDES, Torr. Panicle ample and diffuse, or contracted and erect, bearded in the axils; spikelets terete, lanceolate, mostly purple; lower palea with two awn-like teeth similar to the three short awns. (Poa quinquifida, Pursh.) Dry soil. August and September. Culms 3°-5° high; sheaths often hairy.

EATONIA, Raf.

Slender erect and tufted grasses, with narrow leaves, and small smooth (not hairy) spikelets of pale flowers in a racemose or spicate panicle; spikelets awnless, 2-5-flowered, the uppermost flower usually an awn-like pedicel; glumes membranaceous, shorter than the flowers, the lower one

linear and 1-nerved, the *upper* obovate, 3-nerved; *paleæ* unequal, the lower one obtuse; *stamens* 3; *grain* linear-oblong.

E. PENNSYLVANICA, Gray. *Panicle* slender, loose, the 2-3-flowered *spikelets* scattered on the slender branches; *glumes* slightly roughened on the back, the upper one obovate, obtuse, or abruptly short-pointed; *lower palea* obtuse; *leaves* flat, with the sheaths smooth, rough, or soft-downy. (Aira mollis, Ell.) Upper districts. April. *Culms* 1°-2°. Perennial.

MELICA, L.

Perennial grasses, with *flat leaves*, and 3-5-flowered *spikelets* of large flowers in a *simple panicle*; *flowers* awnless, the upper ones imperfect; *glumes* membranaceous, unequal, convex, obtuse, scarious on the margins, many-nerved; *paleæ* similar to the glumes, the upper one smaller, concave on the back; *stamens* 3; *grain* free.

M. MUTICA, Walt. *Culms* 1°-2° high; *leaves* and *sheaths* smooth or rough-pubescent; *panicle* loose, of few nodding racemose spikelets; *upper flowers* imperfect, truncate-obovate; *palea* roughish. (M. glabra, Michx.) Dry open woods. April. Witchita River.

GLYCERIA, Brown.

Smooth perennial marsh or water grasses, with *flat leaves*, nearly *entire sheaths*, and terete or tumid *many-flowered spikelets* disposed in a *simple or compound panicle*; *rachis* jointed; *glumes* membranaceous, obtuse, persistent; *paleæ* nearly equal, somewhat chartaceous, obtuse, early falling away with the separating joints of the rachis, the *lower* one naked, convex, 7-nerved; *stamens* 2-3; *grain* free, oblong.

G. NERVATA, Trin. *Culms* erect; *panicle* diffuse, the capillary branches at length drooping; *spikelets* purplish,

very numerous, ovate-oblong, 5-6-flowered, nearly terete; *lower palea* oblong, obtuse, 7-nerved. (*Poa parviflora*, Pursh.) Wet swamps. July. Culms 2° - 3° high; spikelets 2'' long.

G. PALLIDA, Trin. Culms erect or ascending; *panicle* narrow, nearly simple, with the capillary branches erect; *spikelets* pale, oblong-linear, 5-9-flowered, nearly terete; *lower palea* oblong, minutely 5-toothed, 7-nerved. Shallow water. July. Culms 1° - 3° long; spikelets $\frac{1}{2}$ ' long.

ARUNDINARIA, Michx. CANE OR REED.

Tall woody grasses, with clustered spreading branches, broad and flat persistent leaves, and racemose or panicked many-flowered spikelets; glumes unequal, concave, membranaceous, awn-pointed; *paleæ* rather loosely imbricated on the bearded and jointed rachis, nearly equal, the lowest one ovate-lanceolate, concave, many-nerved, awn-pointed, the upper strongly 2-keeled; *stamens* 3; *stigmas* 3; grain oblong, free.

A. GIGANTEA. (Cane.) Culms arborescent, 10° - 20° high, rigid, simple the first year, branching the second, afterward at indefinite periods fruiting, and soon after decaying; leaves lanceolate (1'-2' wide), acuminate, smoothish; panicles lateral, composed of few simple racemes; spikelets purple, erect; lower palea lanceolate-ovate, pubescent, fringed (8'' long), awn-pointed. (*Arundinaria macrosperma*, Michx.) Banks of the rivers. February.

A. TECTA, Muhl. (Reed.) Culms slender, 2° - 10° high, branching; leaves linear-lanceolate, acuminate, roughish, the sheaths bearded at the throat; spikelets solitary, or in a simple raceme at the summit of the branches, or frequently on leafless radical culms; lower palea (6'' long) ovate-lanceolate, smooth, fringed on the margins, awn-pointed. (*Arundo tecta*, Walt.) Swamps. February and March.

BRIZOPYRUM, Link.

A low and rigid perennial diœcious grass, growing in saline marshes, with linear-subulate involute distichous leaves, and many-flowered compressed spikelets, crowded in a nearly simple spike; glumes and paleæ smooth, somewhat coriaceous, obtuse, compressed, not keeled, the lower ones several-nerved; stamens 3; stigmas 2; grain oblong, free.

B. SPICATUM, Hook. *Rootstocks long and creeping; culms 1° high; leaves spreading, rigid; 2'-4' long, smooth, like the imbricated sheaths; spikelets oblong, 7-15-flowered. (Uniola spicata, Ell.) Low sandy shores and marshes. August and September.*

POA, L. MEADOW GRASS.

Grasses with tufted culms, smooth flat and tender leaves, and compressed few-flowered spikelets in loose or contracted panicles; glumes unequal, shorter than the flowers; lower palea nearly membranaceous, keeled, scarious on the margins, awnless, 5-nerved, the three more prominent nerves mostly hairy or woolly below; upper palea 2-toothed, falling at maturity with the lower one; stamens 2-3; stigmas plumose; grain free.

* *Branches of the panicle single, or by pairs.*

P. ANNUA, L. *Annual; culms tender, spreading, 6'-10' high; leaves linear, 3'-6' long, 1½" wide; panicle ovate, the smooth branches at length reflexed; spikelets ovate, about 5-flowered; glumes obtuse or emarginate, half as long as the sparsely hairy obtuse flowers. February and March.*

P. COMPRESSA, L. *Culms ascending from a creeping base, geniculate, and, like the sheaths, compressed; panicle contracted, 1-sided, the short erect branches 2-4 in a clus-*

ter; *spikelets* 4-8-flowered; *lower palea* rather obtuse, hairy below, faintly nerved. With the preceding. May. Culms 1° high; *leaves* bluish green.

ERAGROSTIS, Beauv.

Spikelets few-many-flowered, compressed; *lower palea* 3-nerved, not hairy nor woolly, the *upper* one remaining after the rest of the flower has fallen. Otherwise as in *Poa*. Culms often branched; *leaves* and *sheaths* smooth or hairy.

* *Culms prostrate and creeping, diffusely branched.*

E. REPTANS, Nees. Culms filiform, the flowering branches erect (4'-6' high), *leaves* short (1'-2' long), linear; *sheaths* downy at the base; *panicle* small (2'-3' long), ovate or oblong, often contracted; *spikelets* linear, 10-30-flowered, nearly sessile, imperfectly diœcious; *paleæ* acute. (*Poa reptans*, Michx.) Low sandy places. August and September. Plant pale green. Annual.

** *Culms branching, erect or ascending; annuals.*

E. MEGASTACHYA, Link. Culms prostrate and geniculate at the base, ascending; *leaves* linear; *sheaths* smooth; *panicle* oblong or pyramidal, contracted or spreading; *spikelets* oblong or at length linear (3"-5" long), 10-30-flowered, often lead-color; *lower palea* ovate, obtuse. (*Briza Eragrostis*, E.) July and August.

E. CILIARIS, Link. Culms slender, prostrate or ascending, geniculate; *leaves* (2'-3' long) linear, smooth; *sheaths* smooth, bearded at the throat; *panicle* spiked, cylindrical, the minute ($\frac{1}{2}$ " long) *ovate spikelets* densely crowded on the short appressed branches, 5-7-flowered; *lower palea* obtuse, mucronate, rough or ciliate on the back; the *upper* one fringed on the margins with long bristly hairs.—Varies with the culms nearly erect, open lanceolate or ob-

long panicle, distinct pale *spikelets*, and *flowers* more scattered on the smooth rachis. Culms 6'-12' long; spikelets purple.

E. PURSHII, Schrad. Culms slender, ascending, geniculate near the base, 6'-12' long; leaves narrowly linear, with the sheaths bearded at the throat; panicle 3'-6' long, the lowest of the widely spreading branches whorled; spikelets linear, 5-10-flowered, purple or pale, the lateral ones appressed, and mostly longer than their pedicels; lower palea ovate, 3-nerved. (Poa pectinata, and P. tenella, of authors. June-September.

DACTYLIS, L. ORCHARD GRASS.

Perennial grasses, with simple culms, keeled leaves, and 2-7-flowered spikelets crowded in a 1-sided glomerate panicle; glumes and lower palea herbaceous, keeled, awn-pointed, rough-ciliate on the keel, the latter 5-nerved; stamens 3; grain free.

D. GLOMERATA, L. May and June. Culms 2°-3° high; leaves and sheaths scabrous; spikelets in close clusters at the end of the short branches, 2-4-flowered; glumes and flowers lanceolate.

FESTUCA, L. FESCUE GRASS.

Grasses with flat or setaceous leaves, and paniced 3-many-flowered mostly awned spikelets; rachis jointed as in Glyceria; glumes unequal, mostly keeled; paleæ nearly coriaceous, the lower one naked, rounded on the back, 3-5-nerved, acute or bristle-awned, the upper commonly adhering at maturity to the inclosed grain; stamens 1-3.

* Flowers awned; panicle contracted; annuals.

F. MYURUS, L. Culms erect, very slender, concealed in the sheaths of the bristle-like leaves; panicle elongated, linear, 1-sided, partly included in the sheath of the uppermost

leaf, the scattered branches appressed; *spikelets* compressed, 6-flowered; *awn* 3-4 times the length of the subulate sparsely hairy *palea*; *stamens* 1. Dry sandy soil. March and April. Culms 6'-12' high; panicle pale, 4'-6' long.

F. TENELLA, Willd. Culms (2'-12' high) erect or ascending; *leaves* narrowly linear or filiform; *panicle* long-peduncled, simple, spiked, or the branches slightly spreading, mostly purple; *spikelets* crowded, compressed, oblong, 8-12-flowered; *awn* not longer than the subulate hispid *palea*. Dry sandy soil. February-April. Wichita Mountains.

F. DURIUSCULA, L. Culms erect, 1° - $1\frac{1}{2}^{\circ}$ high; *leaves* filiform; *panicle* simple, 1-sided, mostly bending, spreading; *spikelets* oblong, about 6-flowered; *awn* shorter than the smooth lanceolate *palea*. April-May.

** Flowers awnless; panicle spreading; perennials.

F. NUTANS, Willd. Culms 2° - 4° high, and, like the broadly linear leaves, rough, or the latter hairy; *panicle* 1-sided, simple, erect or bending, the branches mostly by pairs, remote, bearing few ovate 5-6-flowered spikelets near their summits, at length reflexed; *glumes* rough on the back, acute; *lower palea* ovate, barely pointed. Rich woods and banks. August. Head-waters of Trinity River.

BROMUS, L. BROME GRASS.

Grasses with flat leaves, and long-stalked spikelets in loose panicles; spikelets large, 3-many-flowered; glumes membranaceous, unequal, commonly keeled; lower palea usually awned under the apex, convex on the back, about 7-nerved at the base; stamens 3; grain flattened and grooved on the inner face, and adherent to the upper palea.

B. CILIATUS, L.; var., PURGANS, Gray. Perennial; *panicle* diffuse, the slender drooping branches mostly by pairs;

spikelets lanceolate after flowering, 10–12-flowered; *lower glume* 1-nerved, the upper 3-nerved; *lower palea* convex on the back, 7-nerved, hairy, about as long as the awn; *culms* 2°–4° high; *leaves* and *sheaths* smooth or downy. River-banks and rich soil. June.

B. SECALINUS, L. (*Cheat* or *Chess*.) Annual; *panicle* spreading, with clustered, at length drooping branches; *spikelets* ($\frac{1}{2}$ –1' long) 8–10-flowered, oblong-ovate; *lower glume* 5-nerved, the upper 7-nerved; *paleæ* smooth, the lower one convex, 7-nerved, awnless or short-awned; *culms* 1°–2° high; *leaves* and *sheaths* smooth or downy.

UNIOLA, L.

Tough perennial grasses, with erect culms, from creeping rootstocks, and mostly broad, flat, many-flowered spikelets, in erect or drooping panicles, with one or more of the lower flowers glume-like and neutral, and the upper imperfect; glumes lanceolate, compressed-keeled; lower palea rather rigid, strongly compressed-keeled, nerved, awnless, much larger than the 2-keeled upper one; grain free; stamens 1–3.

* *Spikelets long-pedicelcd, drooping; flowers appressed.*

U. LATIFOLIA, Michx. *Culms* 2°–3° high; *leaves* flat, lanceolate ($\frac{1}{2}$ –1' wide); *panicle* loose, drooping; *spikelets* green, oblong, acute, 10–15-flowered; *lower palea* one-third longer than the upper, fringed on the keel, acutish; *stamens* 1. Banks of rivers. July and August. *Spikelets* 12"–15" long.

ELYMUS, L. LYME GRASS.

Coarse flat-leaved perennial grasses, with rigid erect culms, bearing a single spike of 2–7-flowered spikelets, arranged 2–4 in a cluster at each joint of the zigzag rachis; glumes 2, placed side by side before the spikelets, coriaceous, un-

equal-sided, mostly awned; *paleæ* of the same texture as the glumes, the lower convex on the back, tapering into a rigid awn, the upper inclosing the linear hairy-tipped grain; *stamens* 3; *stigmas* 2.

E. VIRGINICUS, L. *Spike* dense, erect (3' long), the base usually included in the dilated sheath of the uppermost leaf; *spikelets* 2-3 in a cluster, 2-3-flowered, smoothish, *short-awned*; *glumes* lanceolate, strongly nerved. River-banks. July and August. *Culms* 2°-3° high; *leaves* rough; *sheaths* smooth.

E. CANADENSIS, L. *Culm* erect, 3°-5° high; *leaves* lance-linear, flat, smooth, dark green, or often glaucous; *spike* rather loose and spreading, 4'-8' long, generally nodding; *rachis* hairy; *spikelets* more or less hairy, in twos and threes, 3-6-flowered; *awns* of the flowers usually curved, longer (7"-17") than those of the glumes.—A tall grass, looking like rye, with long recurved, waving *spikes*. Red River.

HORDEUM. BARLEY.

Spikelets 3 at each joint of the rachis, 1-flowered, the lateral ones sometimes abortive; *glumes* 2, subulate, nearly equal, awned; *paleæ* 2, lower lance-ovate, long-awned, upper obtusely acuminate; *caryopsis* adhering to the *paleæ*.

H. JUBATUM, L. (*Squirrel-tail Grass*.) *Culm* slender, round, smooth, simple, about 2° high; *leaves* broad-linear, 4'-6' long, rough-edged, otherwise smooth, as well as the sheaths; *spikes* 2'-3' long; *spikelets* with the lateral flowers neuter; *glumes* and *paleæ* produced into fine, smooth awns, 6 times as long (2') as the flowers; *abortive flowers* on short pedicels. Marshy places. Northern Texas. June.

H. PUSILLUM, Nutt. *Culm* 4'-6', decumbent or geniculate at the base; *leaves* about 1½' long, rather obtuse, glaucous, striate; *upper sheath* turned, embracing the spike;

spike linear, about $1\frac{1}{2}'$ long; *glumes* by threes, collateral, imbricated, lateral; *abortive flowers* awnless; *awn* of the central sessile perfect flower as long as those of the involucre, twice the length ($7''$) of the pales; *glumes* all awned, the inner setaceous from the base. Northern Texas.

GYMNOSTICHUM, Schreb.

Spikelets 2-3 on each joint of the rachis, raised on a short and thick stalk; *glumes* none, or a single awn-like rudiment. Otherwise as in *Elymus*.

G. HYSTRIX, Schreb. *Spike* erect, 3'-6' long, lax-flowered; *spikelets* yellowish, 3-4-flowered, smooth or rough-hairy, long-awned; *leaves* and *sheaths* smoothish. (*Elymus* *Hystrix*, L.) July. *Culms* 2° - 3° high; *rachis* 2-edged.

TRisetum, Pers.

Spikelets 2-several-flowered; *lower palea* compressed-keeled, usually bearing a bent awn below the 2-cleft or 2-pointed apex; *spikelets* in open or spiked panicles.

T. PALUSTRE, Torr. Smooth; *culms* weak (1° - $1\frac{1}{2}^{\circ}$ long); *leaves* flat, linear; *panicle* long and narrow, loose; *spikelets* 2-3-flowered; the *lower flower* awnless, the *upper* with a spreading awn and an awn-like rudiment at the base, or rarely both flowers awnless. (*Aira pallens*, Muhl.; *A. triflora*, Ell.?) Swamps. March and April. *Panicle* pale, 4'-8' long.

ARRHENATHERUM, Beauv.

Tall grasses, with *flat leaves*, and *spreading panicles* with *clustered* or *whorled branches*; *spikelets* 2-flowered, with the awn-like rudiment of a third flower, the *lower one* staminate, the *upper* perfect; *glumes* membranaceous, concave, the upper one as long as the flowers; *paleæ* herbaceous, the lower one of the perfect flowers slightly awned

near the apex, that of the staminate flower bearing a long bent awn below the middle; *stamens* 3.

A. AVENACEUM, Beauv. *Culms* smooth, 2°-3° high; *leaves* broadly linear; *panicle* narrow, whitish, 8'-10' long; *glumes* scarious. May. Perennial.

PHALARIS, L.

Spikelets crowded in a densely spiked panicle, 3-flowered; the two lower flowers reduced to hairy scales; the upper perfect, consisting of 2 boat-shaped awnless, at length coriaceous paleæ, the lower one longer and inclosing the upper, and two nearly equal broadly keeled glumes which are longer than the flower; *stamens* 3; *styles* elongated; *grain* inclosed in the paleæ.

P. INTERMEDIA, Bosc. *Culms* ascending, slender, 6'-12' high; *leaves* short, with the uppermost sheath inflated; *spike* ($\frac{1}{2}$ '-1' long) oval, compact; *glumes* lanceolate, slender-pointed, broadly keeled, twice as long as the hairy ovate flower. (P. Americana, Ell.; P. microstachya, DC.) Sandy places along the coast. April and May. Leaves broadly linear, 1'-2' long, somewhat glaucous; spike white or purplish. Annual.

Var., ANGUSTA. (P. angusta, Nees.) *Culm* stout (2°-3° high; *spike* cylindrical (2'-4' long), somewhat interrupted at the base; *glumes* short-pointed, rather narrowly keeled, $\frac{1}{3}$ longer than the ovate hairy flower. *Leaves* not glaucous, 4'-10' long. Annual.

PASPALUM, L.

Spikelets spiked or somewhat racemed, apparently 1-flowered, awnless, borne in 1-4 rows on one side of the flattened or triangular jointless rachis; *glumes* 2, membranaceous, nearly equal; *paleæ* 2, ovate or roundish, coriaceous, the lower one larger, concave, and partly inclosing the flattened

upper one; *stamens* 3; *grain* included in the indurated paleæ. Such is the apparent structure of the spikelet, but theoretically it is 2-flowered, as in *Panicum*, with the lower glume and upper palea of the lower flower undeveloped.

* *Spikes racemed; spikelets partly inclosed by the recurved margins of the broadly-winged membranaceous rachis.*

P. WALTERI, Schultes. Smooth; *spikes* 3-7, the lowest ones included in the sheath of the uppermost leaf; *spikelets* in two rows, ovate, smooth; *glumes* obtuse, 5-nerved. (P. vaginatum, Ell.) July and August. *Culms* decumbent, creeping, 1°-3° long; *leaves* linear, short.

** *Spikes mostly by pairs, divaricate; spikelets ovate-lanceolate, acute, 2-rowed on the slender wingless rachis; glumes smooth, longer than the paleæ.*

P. VAGINATUM, Swartz. *Peduncles* single, terminal, *spikes* (rarely 3 or 4) short (1'-1½' long), erect or horizontal; *glumes* rugose, 5-nerved, rather longer than the acute flower; *culms* diffusely creeping, short-jointed, the flowering branches (4'-10' long) erect; *leaves* (1'-3' long) subulate-convolute, their dilated imbricated sheaths persistent. (P. furcatum, Fluegge.) Saline swamps. August and September. *Culms* 2°-4° long; *sheaths* compressed, bearded at the throat. Perennial.

*** *Spikes solitary, or few and racemose; spikelets ovate or roundish, in 2-4 rows; rachis mostly flattened and flexuous; glumes and paleæ nearly equal.*

P. LÆVE, Michx. *Spikes* 3-5, long (3'-4') and slender; *spikelets* single, in 2 rows, orbicular, wider than the flexuous rachis; *glumes* smooth and even, 5-nerved; *culms* simple, erect (3°-4° high); *leaves* (deep green) and *sheaths* smooth, or the latter hairy. Dry woods. July and August. *Spikelets* 1½" long, larger and thicker than the last. Perennial.

P. UNDULATUM, Poir. *Spikes* 2-12, spreading (2'-3' long); *spikelets* small (1" long), oval or roundish, crowded in 3-4 rows under the broad and flat rachis; *glumes* smooth,

5-nerved; *paleæ* of the neutral flower often rugose; *culms* erect or ascending, mostly branching; *leaves* deep green, broadly linear, flat, mostly fringed on the margins or near the base, and, like the smooth or hairy sheaths, often purple. (*P. purpurascens*, Ell.; *P. plicatulum*, Michx.; *P. confertum*, Leconte; *P. Boscianum*, Fluegge.) September. Culms $\frac{1}{2}$ °-3° high. Annual.

PANICUM, L. PANIC GRASS.

Inflorescence spiked, racemose or paniced; *spikelets* 2-flowered, naked (no involucre); *glumes* 2, herbaceous, the upper one usually as long as the flowers, the lower smaller, often minute, or occasionally wanting; *lower flower* staminate or neutral, of 1-2 *paleæ*; the *upper palea*, when present, small and hyaline, the lower herbaceous and resembling the upper glume; *upper flower* perfect, coriaceous, awnless, inclosing the free grain; *stamens* 3.

§ 1. DIGITARIA. *Inflorescence* spiked; *spikelets* 2-3 together, imbricated on one side of a filiform rachis; *lower flower* of one *palea*, and neutral; *glumes* shorter than the flowers; *annuals*.

P. SANGUINALE, L. (*Crab Grass*.) *Culms* ascending from a diffusely creeping base; *leaves* thin, spreading, the lower part, like the sheaths, hairy; *spikes* 5-10, spreading; *spikelets* oblong, pointed; *glumes* hairy on the margins, the upper half as long as the flowers, the lower minute, or in var. *VILLOSUM* (*Digitaria villosa*, Ell., a smaller and more hairy form) wanting. May-October.

P. FILIFORME, L. *Culms* erect, sparingly branched (2°-3° high); *leaves* linear, erect, and, like the sheaths, hairy; *spikes* 2-5, alternate, erect, filiform; *spikelets* oblong, acute, scattered; *upper glume* half as long as the acute blackish *palea*, the lower wanting. Dry sandy soil, common. August and September.

§ 2. *PANICUM* proper. *Glumes* 2, *unequal*, *awnless*; *spikelets* in *panicles* or *racemes*.

* *Spikelets* crowded in *simple* or *panicled racemes*.

† *Sterile flowers* of *two paleæ*, *staminate* or *neutral*.

P. CURTISII. *Panicle* slender, spike-like (6'–8' long), the appressed lower branches remote; *spikelets* ovate-lanceolate; *glumes* slightly keeled, the *upper* 5-nerved, twice as long as the *lower* one, and rather shorter than the acutish flower; *sterile flower* 3-androus; *culms* and smooth linear-lanceolate *leaves* rigid; *sheaths* smooth or hairy. Ponds and swamps. Culms 3°–4° high, often rooting at the lower joints.

** *Spikelets* mostly in *pairs*, on short appressed *pedicels* scattered on the *ultimate branches* of the usually ample open *panicle*.

† *Sterile flower* of *one palea*, *neutral*.

P. PROLIFERUM, Lam. Smooth; *culms* thick and succulent, ascending, branched, genticulate; *panicles* lateral and terminal, diffuse; *spikelets* lanceolate-ovate, acute, somewhat crowded on the straight branches; *upper glume* 7-nerved, 3–4 times as long as the lower; *perfect flower* pointed. (P. geniculatum, Muhl.) Wet places near the coast. September. Culms 1°–3° long. Annual.

P. DIVERGENS, Muhl. *Culms* slender, fragile, sparingly branched; *leaves* subulate, rough on the upper surface and margins; the smooth *sheaths* longer than the joints; *panicle* diffuse, bearded at the axils; *spikelets* small, spindle-shaped, solitary at the summit of very long (2'–4') and rough peduncles; *lower glume* minute; *perfect flower* lanceolate-oblong, acute, nearly as long as the upper glume and neutral palea. (P. autumnale, Bosc.) Dry sandy soil. August. Culms 1° high; leaves 2'–4' long. Perennial.

P. PAUCIFLORUM, Ell. *Panicle* expanding, few-flowered; *flowers* very large; *leaves* narrow-lanceolate, ciliate at the base; *sheaths* hairy. May. *Culm* 12'–18' high, roughish and branching at the joints; *leaves* 3'–4' long, 3''–4'' wide, smooth above; *spikelets* oval, the lower glume very small.

P. TEXANUM, Buckley. *Culms* erect or subdecumbent, smooth; *sheaths* shorter than the internodes, subpubescent and hairy at their mouths; upper portion of the internodes and joints pubescent; *leaves* 6-10 inches long and 8-10 lines broad, long acuminate, under surface subpubescent; *panicle* compressed, 5-8 lines long and 5-7 lines broad; *rays* alternate, erect; *lower glume* ovate-acute, $\frac{1}{2}$ shorter than the floret, 5-nerved; *upper one* 7-nerved, acute, hyaline, between the nerves subpubescent, longer than and covering the floret. Several stems grow from the same root. *Stems* sparingly branched; *seeds* numerous and aggregated. Austin, Texas, where it is cut for hay, of which horses and cattle are very fond. It grows thick in cultivated fields, and yields from 1-2 tons of hay per acre. It is a very valuable grass for the South.

CENCHRUS, L. COCKSPUR.

Prostrate or creeping grasses, with the spikelets of *Panicum* proper, but inclosed, 1-several together, in spiny or bristly, at length indurated and deciduous involucre, the latter burr-like, and arranged in a terminal spike; *stamens* 3; *styles* united below.

C. ECHINATUS, L. *Spikes* cylindrical, composed of 20 or more globular involucre (3'-4' long); *involucre* downy, spiny above, and with a row of rigid barbed bristles above the base, 3-5-flowered; *culms* ascending. Fields and waste grounds. July-September. *Culms* 1°-2° long; *involucre* purplish. Annual.

C. TRIBULOIDES, L. *Involucres* whitish, 10-15 in a spike, wedge-shaped at the base, armed above with stout compressed broadly subulate erect or spreading spines; bristles none; *spikelets* mostly by pairs. Sands along the coast. July-October. *Culms* prostrate, 1°-2° long; *leaves* linear; *spikes* 1'-2' long. Annual.

STENOTAPHRUM, Trin.

A creeping and branching grass, with the awnless spikelets sunk in excavations of the continuous flattened rachis; spikelets by pairs, one pediceled and imperfect, the other sessile, and with the structure of Panicum.

S. AMERICANUM, Schrank. (Rottbœllia dimidiata, Ell.) Damp sandy places along the coast. June–September. Smooth throughout. Culms flattened, creeping, the branches nearly opposite; *flowering* culms erect, 6'–12' high; *leaves* 2'–6' long, linear, obtuse, flat or folded, contracted at the base; *spikes* lateral and terminal, peduncled, 2'–5' long; *sterile spikelet* neutral or rudimentary; *fertile spikelet* sessile, the upper glume 7-nerved, 3 times the length of the lower one; *palea* of the sterile flower coriaceous, like those of the perfect one. Perennial.

ROTTBÆLLIA, Brown.

Erect perennial mostly tall grasses, with flat or channelled leaves and spiked inflorescence; spikes nearly terete, jointed; spikelets awnless, borne by pairs at the base of each joint, one imperfect, on a coriaceous and closely appressed pedicel, the other sessile, imbedded in an excavation of the joint, 2-flowered; glumes 2, the exterior one flat, coriaceous, with a hinge-like depression at the base, the interior boat-shaped, membranaceous; paleæ hyaline, 1–2 in the staminate or neutral lower flower, and 2 in the upper and perfect flower; stamens 3; styles 2; grain compressed, free; spikes solitary on lateral and terminal peduncles or branches.

R. RUGOSA, Nutt. Culms compressed; peduncles or branches clustered, short, included in the sheaths of the elongated upper leaves; spikes spreading, slightly compressed; sessile spikelet shorter than the joint; lower

glume lanceolate, transversely rugose; *sterile flower* neutral. Pine-barren swamps and ponds. September. Culms 2°-4° high; spikes green, 1½'-2' long, 1" in diameter.

MANISURIS, L.

Annual grasses, with branching culms, flat leaves, and spiked inflorescence; *spikes* lateral and terminal, clustered, jointed, the short peduncles inclosed in spathe-like sheaths; *spikelets* 1-flowered, placed one at each end of the joints of the spike, the *upper* neutral, compressed, of two nearly equal hispid membranaceous glumes, the lower perfect, globose; *glumes* coriaceous, concave, the lower reticulated, the upper smooth; *paleæ* 2, hyaline; *stamens* 3; *grain* included.

M. GRANULARIS, Swartz. *Leaves* linear-lanceolate, and, like the sheaths, hairy; *spikes* 6"-10" long; *spikelets* minute, turning black. Fields and pastures. August and September. Culms 1°-2° high.

TRIPSACUM, L. GAMA GRASS.

A tall perennial grass, with solid culms, broad and flat leaves, and spiked inflorescence; *spikelets* awnless, monœcious, in jointed spikes, the upper ones staminate, the lower fertile, 2-flowered; *staminate flowers* by pairs on each short triangular joint of the slender rachis, 3-androus; *glumes* 2, coriaceous; *paleæ* hyaline; *pistillate* spikelets single, imbedded in a deep excavation of the thick and polished joints; the *outer* glume cartilaginous, concave, the *inner* membranaceous, boat-shaped; *lower* flower neutral, the *upper* pistillate, both with hyaline paleæ; *anthers* opening by terminal pores; *stigmas* elongated; *grain* free.

T. DACTYLOIDES, L. Rich soil. August and September. Culms erect, from tufted creeping rootstocks, 3°-5° high;

leaves 1' wide; *spikes* 4'-8' long, on long lateral and terminal peduncles, 2-4 in a cluster or sometimes solitary. (*L. monostachyum*, Willd.)

ANDROPOGON, L. BROOM GRASS.

Coarse perennial grasses, with branching erect *culms*, long and harsh *leaves*, and spiked inflorescence; *spikes* lateral and terminal, jointed; *spikelets* by pairs on each joint of the slender commonly hairy or plumose rachis, one of them pedicelled and staminate, neutral, or rudimentary, the other sessile, 2-flowered, the *lower flower* consisting of one palea, and neutral; the *upper* of 2 paleæ, mostly perfect, shorter than the herbaceous or chartaceous glumes, the lower one mostly awned at the apex; *stamens* 1-3; *grain* free.

ANDROPOGON proper. *Upper flower perfect.*

* *Peduncle solitary, bearing a single spike.*

A. NUTTALLII. *Culms* (3°-4° high) straight, smooth, like the long linear *leaves*; *spikes* rigid, long-peduncled, the rachis and pedicel of the sterile flower fringed with closely appressed white hairs; *spikelets* awnless; *glumes* hispid above; *sterile flower* of 2 paleæ, 3-androus. (*Rottbœllia ciliata*, Nutt.) Low pine-barrens. September. *Spikes* 3'-6' long.

A. OLIGOSTACHYUS. *Culms* rigid, erect; *leaves* linear, smooth, glaucous; *spikes* 3-4, on short mostly included peduncles, hoary with short spreading hairs; *lower glume* pubescent, $\frac{1}{2}$ - $\frac{1}{3}$ as long as the contorted awn; *sterile flower* neutral, short-awned. Dry sand-ridges. August and September. *Culm* 2°-3° high; *spikes* 2'-3' long.

** *Peduncles clustered, each bearing a single spike.*

A. SCOPARIUS, Michx. *Leaves* smooth or rough-hairy; *spikes* numerous, on exserted peduncles, the slender flexuous rachis, and pedicel of the awned or awnless staminate

or neutral sterile flower fringed with spreading hairs; *perfect flower* half as long as the awn, the glumes often roughened with elevated points. Dry sterile soil. August and September. *Culms* 2° – 3° high; spikes 1'–2' long.

*** *Peduncles or branches mostly clustered, bearing 2-4 rigid (green) digitate spikes; rachis and pedicel of the triandrous awnless sterile flower fringed with scattered hairs, and short-bearded at the base.*

A. FURCATUS, Muhl. *Culm* stout, rigid, 3° – 5° high; *leaves* rough, fringed at the base; *peduncles* or branches commonly several at each upper joint; *spikelets* appressed; *glumes* hispid on the nerves, half as long as the bent awn. Open woods. September. *Spikes* compressed, 2'–3' long.

**** *Peduncles or branches 1-several from each upper joint, often included in the dilated sheaths; spikelets slender, hoary with long silky spreading hairs; sterile flower reduced to an awn-like glume at the apex of the very slender pedicel, or obsolete; stamen 1.*

A. TETRASTACHYUS, Ell. *Culms* 3° – 4° high; *leaves* and sheaths very hairy; *branches* short, the lower ones by pairs, the upper single; *spikes* 4; *glumes* bristly-serrulate, one-fourth as long as the straight awn; *pedicel* of the awn-like sterile flower barely exceeding the fertile flower.—Var., DISTACHYUS. *Leaves* and *sheaths* less hairy or smoothish; *spikes* by pairs, more rigid, on long-exserted branches; *pedicel* of the sterile flower much longer than the smoother glumes. Low pine-barrens. September.

A. MACROURUS, Michx. *Spikes* by pairs, exceedingly numerous, crowded in a large and close panicle; *awns* 3–4 times the length of the glumes; *sterile flower* an awn-like glume.—Varies, with the whole plant glaucous and more slender, branches and spikes more scattered. Low barren soils. September. *Culms* 2° – 5° high.

ERIANTHUS, Michx.

Tall reed-like grass, with long and flat leaves, and panicle inflorescence; spikelets by pairs on the slender

branches, alike, one pediceled, the other sessile, both with a hairy involucre at the base; *lower flower* of one palea, neutral; the upper of two paleæ, perfect, shorter than the membranaceous nearly equal glumes, the lower one awned; *stamens* 2-3.

E. ALOPECUROIDES, Ell. *Culms* 4°-10° high; *sheaths* of the broad (6"-12") very rough leaves woolly above, rough below; *panicle* (1°-2° long) woolly, expanding, pyramidal; *hairs* of the involucre copious, twice as long as the sparsely hairy glumes; *awn* straight.

SORGHUM, Pers.

Spikelets 2-3 together on the slender branches of the loose panicle, the *lateral* ones sterile or a mere pedicel, the *middle* or *terminal* one fertile; *glumes* coriaceous or indurated, closely bearded, sometimes awnless. Otherwise like *Andropogon*.

S. AVENACEUM. *Panicle* erect; *glumes* yellowish, lanceolate, the lower one hairy; *one palea* to each flower, linear, ciliate; *awn* rough, slender, twice as long as the glumes; *sterile flowers* reduced to one or two slender hairy pedicels. (*Andropogon avenaceus*, Mich.; *A. ciliatus*, Ell.) Dry sandy soil. September. *Culms* (2°-4° high) and *leaves* smooth; *panicle* oblong, 6'-12' long. Perennial.

S. NUTANS, Gray. *Panicle* long and narrow, nodding; *glumes* dark brown, the upper sparingly, the lower densely hairy; *paleæ* of the upper flower 2, unequal; *awn* 4 times the length of the glumes, bent in the middle, rough above, twisted and hairy below; *sterile spikelets* mostly rudiments. (*A. nutans*, L.) Dry barren soil. September. *Culms* 2°-4° high; *panicle* 1°-2° long. Perennial.

MONANTHOCHLOË, Engelm.

A low maritime branching grass, with very short rigid crowded leaves, and diœcious flowers in solitary terminal

sessile spikes; *glumes* none; *spikes* short, 3-5-flowered, the lowest flower, or the two lower ones, neutral, of 1-2 paleæ, the uppermost abortive, the intermediate ones, composed of two paleæ, triandrous in the staminate, digynous in the pistillate spike; *paleæ* convolute, scarious and obtuse at the apex, the lower one rigid, ovate-lanceolate, 9-12-nerved above, the upper rather longer, 2-keeled or 2-winged on the back; *squamulæ* none; *anthers* longer than the short filaments, 2-lobed at each end; *ovary* lanceolate-linear, 3-angled; *styles* 2; *stigmas* elongated, plumose with simple hairs; *grain* 3-angled, free.

M. LITTORALIS, Engelm. Low sandy shores. *Culms* much branched, 5'-8' high, smooth and somewhat woody, erect, or at length prostrate and rooting; *leaves* 3" long, very rigid, obtuse, many-nerved, rough on the margins, mostly crowded at the summit of the short branches, and inclosing the short (3"-4") sessile spikes; *flowers* pediceled.

SERIES II.

CRYPTOGAMOUS OR FLOWERLESS PLANTS.

VEGETABLES destitute of proper flowers, and producing, in the place of seeds, minute homogeneous bodies (spores) containing no embryo.

Class III.—Acrogens.

Plants with a distinct stem, growing from the apex only, containing woody fiber and vessels.

154. HORSETAIL FAMILY. *Order*, Equisetaceæ.

EQUISETUM, L. SCOURING RUSH.

Character same as that of the order. *Plants* leafless, simple stem or with whorled branches; *stems* striate-sulcate, jointed, fistular between and separable at the joints; *sheaths* dentate, crowning each internode; *fructification* terminal, spiked or cone-like, composed of 6-sided peltate scales arranged spirally, bearing beneath 4-7 spore-cases which open laterally; *spores* globular, furnished at the base with 4 club-shaped elaters (elastic filaments) involving them spirally, or open when discharged.

E. LÆVIGATUM. Tall, erect, simple or somewhat branched; *sheaths* elongated, appressed, green with black border, of about 22 leaves; *sheaths* of the branches about 8-leaved, with subulate persistent points; *stems* 15'-2° high.

E. LIMOSUM. *Stems* somewhat branched, erect, striate-sulcate; *branches* from the middle joints, simple, short, 5-sided, smooth; *spike* oblong-ovoid; *sheaths* appressed. Stem 2° high. Banks of Buffalo Bayou.

155. FERN FAMILY. *Order, FILICES.*

Stem a creeping horizontal rhizoma, sometimes erect and arborescent; *leaves* (fronds) variously divided, circinate vernation, and raised on a foot-stalk or stipe; *fructification* borne on the back or margin of the fronds; *spore-case* sometimes covered by a membrane, called the *indusium* or *involucre*, and containing numerous minute *spores* or seeds.

POLYPODIUM, L. POLYPODY.

Fruit-dots round, naked, mostly at the ends of the free or reticulated veins; *rootstocks* creeping; sterile and fertile *fronds* alike.

§ 1. POLYPODIUM proper. *Veins free.*

P. VULGARE, L. *Fronds* evergreen, smooth on both sides, oblong, simply and deeply pinnatifid; the *divisions* linear-oblong, obtuse, slightly-toothed; *fruit-dots* large. Mossy rocks, etc., in shady woods. Fronds 4'-10' high.

§ 2. MARGINARIA, Bory. *Veins obscure, sometimes reticulating near the margin; stipe and lower surface of the frond covered with chaffy scales.*

P. INCANUM, Swartz. *Fronds* evergreen, coriaceous, beneath thickly beset with peltate chaffy scales, smooth and green above, pinnately parted; the *divisions* oblong, obtuse, entire; *fruit-dots* near the margin. On trunks of trees. *Rootstock* chaffy, creeping; fronds 3'-8' high.

PTERIS, L.

Sporangia borne on a transverse marginal receptacle connecting the ends of the veins; *indusium* continuous, formed of the membranaceous margin of the frond, at first reflexed, at length pushed back and disclosing the ripened fructification; *fronds* 1-3-pinnate or decompound.

P. AQUILINA, L. (*Brake.*) *Fronds* large, glabrous or

somewhat hairy beneath, broadly triangular, tripinnate; *pinnules* oblong or linear, entire or hastate or pinnately parted; *ultimate segments* obtuse, oblong or linear, the terminal ones often elongated, the margin reflexed or revolute; *veins* simple or forked; *indusium* narrow, ciliated. Common everywhere. *Stipe* stout, 6'-2° high; frond 1°-2° long.

Var. CAUDATA (*P. caudata*, L.), with very *narrow segments*, the terminal ones elongated, and both surfaces of the frond glabrous or even glaucous, occurs along the Gulf coast.

PELLÆA, Link.

Fruit-dots oblong or linear at the ends of the veins, confluent in a broad marginal line of fructification; *indusium* as in *Pteris*; *veins* free, forked or pinnate; *fronds* mostly 1-3-pinnate, smooth, mostly coriaceous.

P. ATROPURPUREA, Link. *Fronds* tufted, coriaceous, ovate-lanceolate, pinnate or below bipinnate; *pinnæ* opposite, rather distant, the lower ones stalked; *pinnules* sessile, oblong or linear-oblong, truncate or subcordate at the base, obtuse or rarely somewhat mucronate; *indusium* formed of the reflexed and little-changed margin, at length pushed back and showing a broad marginal band of ripened sporangia. (*Pteris atropurpurea*, L.; *Allosorus*, Kunze, Gray.) Mostly on lime-rock. Frond 2'-12' high; *stipe* and *rachis* black and shining, smooth or somewhat rusty-pubescent.

CHEILANTHES, Swartz.

Fruit-dots at the thickened ends of the veins, distinct or at length confluent, covered by the continuous or interrupted reflexed margin of the lobes; *veins* free; *fronds* 1-3-pinnate; *pinnules* with a midrib, often hairy or woolly.

C. VESTITA, Swartz. *Fronds* broadly lanceolate, like the

stalks hirsute with rusty hairs, bipinnate; *pinnae* triangular-ovate; *pinnules* oblong, obtuse, more or less incised; the ends of the lobes reflexed to form separate herbaceous involucre. Fronds 4'-8' long, becoming smooth above.

ADIANTUM, L. MAIDENHAIR.

Indusium orbicular or transversely elongated, formed of a reflexed and altered portion of the margin of the frond, bearing the sporangia on its under side at the ends of the veins; *midrib* none or eccentric; *veins* forking, mostly free; *stipe* and *rachis* commonly black and shining.

A. CAPILLUS-VENERIS, L. *Frond* ovate-lanceolate, 2-3-pinnate; *pinnules* very delicate, oblique, broadly wedge-shaped or sometimes rhomboid, rather *long-stalked*, the upper margin deeply incised and fruit-bearing or sterile and dentate; *stipe* slender, ebeneous; *rachis* almost capillary, flexuous. Mostly pendent from limestone cliffs. Austin and west to the San Antonio. Fronds 1°-3° long. Found also in Buffalo Bayou.

ASPLENIUM, L.

Fruit-dots oblong or linear, oblique to the midrib, the *indusium* attached by one margin to the mostly free veins, rarely curved, or double and attached to both sides of the vein.

ASPLENIUM proper. *Indusia* straight, attached by their whole length to the upper side of the vein; rarely some of them double, and placed back to back.

* *Fronds* pinnatifid or simply pinnate.

A. EBENEUM, Aiton. *Stipe* and *rachis* purplish black and shining; *fronds* linear-lanceolate or spatulate, acuminate, pinnate; *pinnae* numerous, sessile, linear-oblong, auricled on one or both sides of the base, serrate or nearly entire, those below the middle of the frond gradually shorter

and deflexed; *fruit-dots* 10-13 on a pinna. Fronds 6'-18' high, 1'-3' wide; stipe very short.

** *Fronds 2-3-pinnate or pinnatifid.*

A. MONTANUM, Willd. *Fronds* small, ovate-lanceolate, pinnate; *pinnæ* few, petioled, ovate or triangular; the lower ones pinnatifid; the upper ones incised; divisions toothed or serrate; *fruit-dots* very short, the basal ones often with a double indusium. Mountains, North and West Texas. Fronds 2'-5' high, with a winged greenish rachis, and a stipe nearly as long as the frond.

WATER-FERNS. Order, HYDROPTERIDES.

Aquatic herbs, with the *sporangia* of two forms, borne at the base of the *leaves* and bursting irregularly.

ISOETES, L.

Plants composed of fibrous roots and filiform cellular leaves, without any apparent stem; sporangia sunk in an excavation of the dilated base of the *leaves*, plano-convex, membranaceous, filled with transverse threads and minute powdery spores; those of the central leaves filled with larger spores.

I. FLACCIDA, Shuttlw. Immersed; *leaves* very long ($1\frac{1}{2}^{\circ}$ - 2°), slender, flaccid, yellowish-green; *spores* very small, minutely pulverulent, not reticulated. In lakes and clear streams.

AZOLLA, L.

Minute floating plants, with pendent roots, pinnately branching stems, and thick imbricated cellular leaves; *sporangia* of two kinds, ovoid, sessile on the under side of the branches, and covered with a thin membrane; the smaller kind opening transversely, containing several angular grains, attached to a central column, the larger

bursting irregularly and containing *numerous globular stalked spores*.

A. CAROLINIANA, Willd. On still water, chiefly near the coast. *Plant* reddish, circular in outline, $\frac{1}{2}$ '-1' in diameter; *leaves* ovate, obtuse, rounded and roughened on the back.

GLOSSARY.

ABBREVIATIONS AND SIGNS.

Adans.,	Adanson.	Gr.,	Gray.
Ait.,	Aiton.	Hoff.,	Hoffman.
Arn.,	Arnot.	Hook.,	Hooker.
Aubl.,	Aublet.	Jacq.,	Jacquin.
Baldw.,	Baldwin.	Juss.,	Jussien.
Benth.,	Bentham.	L.,	Linnaeus.
Bigel.,	Bigelow.	Lam.,	Lamarck.
Boerh.,	Boerhaave.	L'Herit.,	L'Heritier.
Buckl.,	Buckley.	Lindl.,	Lindley.
Cass.,	Cassini.	Marsh.,	Marshall.
Catesb.,	Catesby.	Michx.,	Michaux.
Darl.,	Darlington.	Mill.,	Miller.
DC.,	De Candolle.	Neck.,	Necker.
Dill.,	Dillenius.	Nutt.,	Nuttall.
Ehrh.,	Ehrhart.	Torr.,	Torrey.
Ell.,	Elliot.	Tourn.,	Tournefort.
Endl.,	Endlicher.	Walt.,	Walter.
Engl.,	Engelmann.	Willd.,	Willdenow.

° Length in feet, as 3°, 4°.

' Length in inches, as 2', 3'.

" Length in lines (1-12th of an inch), as 2'', 4''.

- A, prefixed to a word, signifies without ;
as apetalous, without petals.
- Abbreviated ; shortened.
- Abortive ; not fully developed.
- Accrete ; grown together.
- Accumbent ; lying on something else.
- Achenium ; 28.
- Achlamydeous ; without floral envelopes.
- Acute ; pointed.
- Adherent ; growing fast to another body.
- Adnate ; growing fast to.
- Adventitious ; growing out of the usual position.
- Æstivation ; the mode in which the sepals or petals are applied to each other.
- Aggregate ; crowded together.
- Alternate ; scattered, one after another.
- Amentaceous ; bearing aments.
- Amplexicaul ; stem clasping.
- Anatropal ; 26.
- Androecium ; 1.
- Androgynous ; containing both staminate and pistillate flowers.
- Angiospermous ; seeds in a pod.
- Angustifolius ; narrow-leaved.
- Anomalous ; out of the regular order.
- Anterior ; that part of the axillary flower farthest removed from the main axil.
- Apiculate ; tipped with a short, abrupt point.
- Apocarpous ; 9.
- Appendage ; something added to a part.
- Appressed ; pressed to.
- Arborescent ; tree-like.
- Areolate ; having the surface divided into little spaces.

Aril; an extra covering over the seed, 35.

Aristate; with an awn or beard.

Armed; furnished with prickles, thorns, etc.

Articulated; jointed.

Ascending; 41.

Asperate; rough.

Assurgent; curved outward and upward.

Attenuated; narrow and sharp-pointed.

Auriculate; ear-bearing.

Awn; a rigid bristle.

Axillary; being in the axil.

Axil placenta; 13.

Axis; the central line of a body.

Baccate; berry-like.

Banner; same as vexillum.

Barb; stiff, hooked hair.

Basilar; belonging to the base.

Bearded; tufts of hair.

Bibracteolate; consisting of two bracts.

Bicolor; two colors.

Bicrenate; double crenate.

Bicuspidated; with two points or cusps.

Bidentate; two teeth.

Biennial; two years.

Bifid; two-cleft.

Bifoliate; two leaves.

Bifurcate; two-forked, or merely forked.

Biglandular; two glands.

Bilabiate; two-lipped.

Biovulate; two ovules.

Biserrate; twice serrate.

Biternate; twice ternate.

Bivalved; two valves.

Brachiate; with opposite spreading branches.

Bryology; science of Mosses.

Bulbiferous; bearing bulbs.

Cæspitose; growing in tufts.

Calceolate; slipper-shaped.

Caliculate; accessories to the calyx.

Callons; thickened.

Calycifloræ; plants with the other parts of the flowers on the calyx.

Campylotropal; 27.

Canaliculate; channeled.

Canescent; grayish white.

Capitate; head-shaped.

Capreolate; bearing tendrils.

Carpels; 3.

Cartilaginous; stiff, strong.

Caruncle; appendage of the hilum.

Caryopsis; 30.

Candate; tailed.

Cauliscent; belonging to the stem.

Cauliculus; a small stem.

Centrifugal (growth of radicle); 43.

Centripetal (growth of radicle); 42.

Cernus; nodding.

Chalaza; 20.

Chartaceous; paper-like texture.

Chromogen; producing color.

Ciliate; fringed with hairs.

Cincrous; ash-gray.

Circinate; rolled inward at the apex.

Circumscissile; 33.

Cirrhose; tendril-like.

Clasping; inclosing by its base.

Clavate; club-shaped.

Clawed; raised on a claw.

Coarctate; contracted, drawn together.

Cocci; carpels of the fruit, when away from the axil.

Coccus; a berry (plural, cocci); 1-seeded carpels of separable fruits).

Cochleate; coiled like a short spiral shell.

Coherent; growing together.

Comose; hair-like.

Cone; scaly fruit of pine, etc.

Conenchyma; cone-like cells.

Confluent; running together.

Conjugate; joined by pairs.

Connivent; converging together.

Cordate; heart-shaped.

Coriaceous; leather-like.

Corneous; hard like horn.

Corniculate; bearing a horn or spur.

Corrugated; wrinkled.

Cortex; bark.

Cortical; belonging to the bark.

Costate; ribbed.

Crenate; having sharp notches on the edge.

Crenulate; slightly crenate.

Crested; bearing an elevated ridge.

Crown; an appendage to the corolla.

Crowned; bearing anything at the apex.

Crustaceous; hard, thin, and brittle.

Cucullate; rolled up into a hood shape.

Culm; hollow stems of grasses.

Cuneate; wedge-shaped.

Cupule; a little cup.

Cuspidate; sharp, stiff point.

Cyaneous; bluish.

Cyathiform; cup-shaped.

Cymbiform; boat-shaped.

Cymose; in a cyme.

Deca; ten.

Decandrous; ten stamens.

Deciduous; falling off at the end of the season.

Declinate; bent downward.

Decompounded; much divided.

Decumbent; prostrate, but ascending at the summit.

Decurrent; with the edges extending below the main point of attachment.

Decussate; pairs of leaves that cross each other at right angles.

Deflected; turned away.

Deflexed; bent downward.

Dehiscent; opening regularly.

Deliquescent; same as solvent.

Deltoid; triangular.

Dendroid; tree-like in form.

Denticulate; slightly toothed.

Denuded; naked.

Depauperate; less developed than usual.

Depressed; flattened horizontally.

Didynamous; having four stamens, two longer than the other two.

- Diffuse ; loosely spreading.
 Digitate ; with five or more leaflets.
 Dimorphous ; of two forms.
 Dissected ; divided into many lobes.
 Dissepiment ; 11.
 Distichous ; two-ranked, placed on opposite sides of the axis.
 Divaricate ; widely spreading.
 Dorsal ; 7.
 Downy ; with short hairs.
 Duramen ; hard wood.
- Eared ; auriculated.
 Echinate ; with rigid prickles.
 Effete ; sterile, exhausted.
 Elaters ; spiral elastic threads accompanying certain spores.
 Elongated ; lengthened.
 Emarginate ; notched at the apex.
 Emerged ; raised out of water.
 Endochrome ; the coloring-matter of plants.
 Endopleura ; inner covering or integument.
 Entire ; even-edged.
 Ephemeral ; lasting but a day.
 Epigynous ; upon the ovary.
 Epipetalous ; on the petals.
 Epiphytes ; air plants.
 Episperm ; the skin of the seed.
 Equilateral ; equal-sided.
 Equitant ; two leaves, with their bases clasped one within the other, and their sides facing, as in the Iris.
 Eroze ; margins scalloped irregularly.
 Exostome ; the opening of the outer coat of the seed.
 Exserted ; projecting beyond.
 Extipulate ; without stipules.
 Exsertse ; turned outward.
- Fæcula ; starch.
 Falcate ; scythe-shaped, curved.
 False dissepiment ; 12.
 Farinaceous ; flour-like in texture.
 Farinous ; mealy on the surface.
 Fascicled ; collected in a cluster.
 Fastigate ; rising to the same level.
 Favose ; honey-combed.
 Ferruginous ; iron-colored.
 Filamentose ; composed of, or bearing threads.
 Filiform ; thread-like.
 Pimbriate ; margin cut into a fringe.
 Fistular ; hollow like an onion leaf.
 Flagelliform ; fan-shaped.
 Flagelliform ; whip-shaped, long and supple.
 Flexuous ; bent outward and inward, zigzag.
 Floccose ; bearing tufts of deciduous hairs.
 Foliaceous ; leaf-like.
 Foliolate ; bearing leaflets.
 Frutex, or Frutescent ; woody, as Crape Myrtle, or Lilac.
 Fugaceous ; soon disappearing.
 Fulvous ; tawny.
 Funiculus ; a little rope.
- Furcate ; forked.
 Furfuraceous ; scurfy.
 Fuscons ; grayish or blackish brown.
 Fusiform ; spindle-shaped.
- Galca, Calcate ; resembling a shield.
 Gamopetalous ; petals united.
 Gamophyllous ; sepals united.
 Geminate ; by pairs.
 Gemmation ; state of budding.
 Geniculate ; bent, as the knee.
 Gibbous ; puffed out.
 Glabrous ; smooth.
 Gladiate ; sword-shaped.
 Glands ; small knobs or excrescences.
 Glauous ; covered with minute whitish powder.
 Glomerate ; collected into close heads.
 Glumaceous ; bearing glumes.
 Glumes ; scale-like bracts of Grasses and Sedges.
 Granular ; covered with grains.
 Gymnabase ; a process of the torus, on and around which the carpels are suspended.
 Gymnæcium ; 2.
 Gymnos (Greek prefix) ; naked.
 Gymnospermous ; naked seeds, 23.
 Gynophore ; a produced torus, bearing the ovary on its summit.
 Gyrous ; strongly bent to and fro.
- Habit ; the general appearance of a plant.
 Habitat ; native situation of a plant.
 Hairy ; furnished with hairs.
 Halved ; one half apparently deficient.
 Hastate or Halbert-shaped ; dilated at the base into two spreading lobes.
 Heart-shaped ; ovate, with a sinus at the base.
 Hermaphrodite ; stamens and pistils both present.
 Heterocephalous ; heads of two sorts in the same plant, some staminate and some pistillate flowers.
 Heterogamous ; flowers of two sorts in the same head.
 Hilum ; 22.
 Hirsute ; beset with coarse hairs.
 Hispid ; with rigid hairs.
 Hoary ; grayish white.
 Hyaline ; thin and nearly transparent.
 Hybrid ; a cross between two species.
 Hyperborean ; inhabiting northern regions.
 Hypocrateriform ; salver-form.
- Icosandrous ; more than ten stamens.
 Incised ; cut like a gash.
 Included ; inclosed within.
 Incrassate ; thickened.
 Incumbent ; leaning upon, 40.
 Induplicate ; folded inward.
 Indusium ; the shield of the torus of the fern.
 Inferior ovary ; 15.
 Inflated ; as if blown up.
 Infra-axillary ; below the axil.

Infundibuliform ; funnel-shaped.
 Inserted, or insertion ; referring to the point of junction.
 Integument ; a covering.
 Introrse ; turned inward.
 Inverted ; turned upside-down.
 Involute ; rolled inward.

Jagged ; irregularly notched.
 Joints ; rings at regular intervals along stems.
 Jugum, a pair ; bijugus, two pairs ; trijugus, three pairs.

Keel ; a sharp, longitudinal ridge on the back of an organ.
 Kidney - shaped ; wider than heart-shaped.
 Knot ; swelling joint.

Labellum ; the odd petal of the orchis.
 Labiate ; lip-shaped.
 Lacinate ; slashed with deep incisions.
 Lactescence ; milkiness.
 Lacunous ; with large depressions or pits.
 Lacustrine ; growing in lakes.
 Lamellate ; formed in thin plates.
 Lanceolate ; lance-shaped.
 Lanuginous ; woolly.
 Lenticulate ; shaped like a double convex lens.
 Ligulate ; strap-shaped.
 Linear ; long and narrow.
 Lobe ; one of the parts of a divided body.
 Loculicidal, 32.
 Locusta ; a spikelet of the Grasses.
 Loment ; a jointed legume.
 Lunate ; crescent-shaped.
 Lyrate pinnatifid ; with the upper lobes larger than the lower.

Macros (in Greek compounds) ; long or large.
 Maculate ; spotted.
 Marcescent ; withering.
 Marginal ; belonging to the border.
 Marginate ; having the border different.
 Medulla ; pith.
 Membranaceous ; thin and pellucid.
 Mericarp ; one of the carpels of a cremocarp of an Umbellifer.
 Micropyle, 19.
 Moniliform ; bearing short joints, like a string of beads.
 Monos (in Greek compounds) ; one only.
 Mucro ; a sharp, small, abrupt point.
 Mucronate ; tipped with a short, slender point.
 Multifid ; many cleft.
 Muricate ; beset with hard, wart-like points.
 Muriform ; like a wall of brickwork.
 Muscology ; a treatise on Mosses.
 Mucous ; pointless, not pointed.

Natant ; swimming under water.
 Naturalized ; growing spontaneously, but not native.

Navicular ; boat-shaped.
 Necklace-form ; same as moniliform.
 Nectary ; any honey-bearing part.
 Nervation ; arrangements of the nerves in the leaves.
 Neutral ; flowers without stamens and pistils.
 Nodding ; bent over.
 Node ; a joint of the stem.
 Nodose ; knotty.
 Normal ; ordinary structure.
 Nuciform ; nut-like.
 Nucleus ; kernel, 16.

Ob ; reversed.
 Obcompressed ; flattened back and front.
 Oblanceolate ; inversely heart-shaped.
 Oblique ; unequal-sided.
 Obovate ; egg-shaped, narrow end downward.
 Obsolete ; obscure, or wanting.
 Obtuse ; blunt.
 Ocreolencous ; cream-color, pale yellow.
 Octandrous ; having eight sides.
 Oligandria ; with few stamens.
 Oligos (in Greek composition) ; few.
 Olivaceous ; olive - green, brownish green.
 One-sided ; borne on one side of the axis.
 Opaque ; dull.
 Opposite ; placed directly against each other.
 Orbicular ; circular.
 Orthotropal ; 24.
 Oval ; longer than broad.
 Ovary ; 4.
 Ovate ; egg-shaped.
 Ovoid ; a solid with an oval outline.
 Ovule ; 5.

Palate ; prominence at the throat of some bilabiate flowers.
 Paleaceous ; chaffy, having pales.
 Palmate ; hand-shaped.
 Papillose ; studded with minute wart-like prominences.
 Pappus ; the limb of the calyx of a composite flower.
 Parietal ; the inner lining of the fruit ; on the wall.
 Parted ; deeply divided into parts.
 Partial ; pertaining to the parts of a compound organ.
 Pectinate ; finely pinnatifid, combed.
 Pedate ; shaped like a bird's foot.
 Pedicel ; raised on a pedicel.
 Peduncled ; raised on a peduncle.
 Peltate ; fixed to the stalk at a point within the margin ; shield-shaped.
 Peri (Greek) ; around.
 Peripheric ; 38.
 Perisperm ; same as albumen.
 Petaloid ; with the form or texture of petals.
 Phyllotaxy ; leaf-arrangements.
 Pileus ; cap of some Fungals.
 Pitted ; with depressions.
 Placenta ; 8.

- Pollinia; the pollen masses of Milk-weed.
 Posterior; next the axis.
 Precocious; flowering before the leaves.
 Primine; 18.
 Procumbent; resting on the ground.
 Produced; extending more than usual.
 Proliferous; where clusters of flowers arise from another cluster.
 Pruinous; powdered, as if frosted.
 Pseudo (in Greek composition); spurious.
 Puberulent; minutely downy.
 Pubescent; downy with short hairs.
 Pulverulent; covered with fine powder.
 Punctate; marked with minute dots.
 Pungent; sharp-pointed, piercing.
 Putamen; the bony nucleus of a drupe.
 Pyramidal; form of a cone or pyramid.
 Pyriform; pear-shaped.
 Pyxis; a pericarp with a lid.
 Quadri (in composition); four.
 Quadrifoliate; four-leaved.
 Quadrijugate; four pairs of leaflets.
 Quinate; growing in fives.
 Quincuncial; when the pieces are five in number, of which two are exterior.
 Quinque (in composition); five.
 Quintuple; fivefold.
 Race; a permanent variety.
 Rachis; axis of the inflorescence.
 Radiate; diverging from a common center.
 Radiant; outer flowers enlarged.
 Radical; near or belonging to the root.
 Ramial; of a branch.
 Raphe; 25.
 Recurved; bent (not rolled) backward.
 Reflexed; curved backward.
 Refracted; bent suddenly, as if broken.
 Regma; fruit, as of *Geranium*.
 Regular; of uniform shape and size.
 Reniform; kidney-shaped.
 Repand; wavy.
 Repent; creeping.
 Resuspinate; up-side-down.
 Retorse; backward, downward.
 Revolute; rolled backward.
 Rhombic; in the figure of a rhomb.
 Rostrate; beaked.
 Rosulate; (leaves) arranged around the base of the stem.
 Rotate; wheel-shaped.
 Rubicund; rosy-red.
 Rugous; wrinkled.
 Ruminated (albumen); full of chinks, as if composed of folds.
 Runcinate; hooded backward.
 Saccate; bag-like.
 Sagittate; arrow-shaped.
 Samara; 22.
 Scabrous; rough.
 Scleriform; ladder-shaped.
 Scales; reduced leaves, or any small and thin appendages.
 Scaly; beset with scales.
 Scarious; very thin and colorless.
 Scorbiculate; pitted with little depressions.
 Scurfy; covered with minute scales.
 Secund; one-sided.
 Secundine; 17.
 Serrate; with the margin cut like a saw.
 Serrulate; finely serrate.
 Sessile; not raised on a stalk.
 Sheath; the base of a leaf when wrapped round the stem.
 Semicordate; half of cordate.
 Semilunar; half-moon-shaped.
 Septicidal; 31.
 Sericeous; silky.
 Setous; bearing bristles.
 Sinuate; with the margins cut into rounded incisions which are separated by rounded lobes.
 Specific; pertaining to the species.
 Spiny; armed with spines.
 Spur; an appendage of the calyx or corolla.
 Squarrous; spreading widely, as the scales of the Composites.
 Stellate; radiating from a common center.
 Sterile; not fruitful.
 Stipe; the stalk of the ovary, etc.
 Strap-shaped; flat, narrow, and straight.
 Strict; erect and very straight.
 Strigous; with sharp, close, rigid hairs.
 Strophiolate; having an appendage about the hilum.
 Suberos; corky in texture.
 Subulate; awl-shaped.
 Succulent; very juicy and cellular.
 Suffrutescent; woody at the base only.
 Sulcate; furrowed.
 Superaxillary; situated above the axil.
 Superior ovary; 14.
 Supra-decompound; very much divided.
 Syconus (fruit); as the Fig.
 Syn (in Greek compounds); union.
 Syncarpous; 10.
 Tawny; fulvous, dull yellowish brown.
 Taxonomy; science of classification.
 Tegmen; the inner seed-coat.
 Terete; cylindrical.
 Terminal; situated at the end of the apex.
 Ternate; of three leaflets, three in a whorl.
 Tessellated; checkered, as a pavement.
 Testa; the outer seed-coat.
 Tetra (in Greek composition); four.
 Tetragonal; four corners.
 Tetragynous; four pistils.
 Tetramerous; in parts of four.
 Throat; the orifice of a tubular corolla.
 Tomentose; clothed with hair; velvety.
 Torose or Torulose; knotty, knobby.
 Torus; same as Receptacle.
 Tricoccous (fruit); with three one-seeded carpels.
 Trilid; split halfway into three parts.
 Trifoliate; with three leaflets.
 Trigynous; three-styled.

- Trilobed ; three lobes.
 Trimerous ; three-parted.
 Tripartite ; separable into three parts.
 Triquetrous ; three-angled.
 Triterminate ; thrice ternate.
 Tubercle ; a wart-like appendage.
 Tuberosus ; like a tuber.
 Tubular ; shaped like a tube.
 Tumid ; swelled, thickened.
 Turbinate ; a cone with point downward.
 Turion ; a young shoot.
 Twining ; rising by coiling around a support.
 Umbilicate ; with sharp depression at the end.
 Unarmed ; no stings, prickles, etc.
 Uncinate ; hooked at the end.
 Undulate ; wavy.
 Unguiculate ; clawed.
 Uni (in compounds) ; one.
 Unifoliate ; with one leaf.
 Uniform ; with one form.
 Unilateral ; one-sided.
 Unilocular ; one-celled.
 Univalved ; one valve.
 Urceolate ; urn-shaped.
 Utricular ; formed like a utricle.
 Valves ; the pieces of which a seed-ves-
 sel is composed.
 Varicose ; irregularly swollen.
 Ventral ; 6.
 Ventricous ; swelling out on one side.
 Verrucous ; covered with warts.
 Vertex ; the summit.
 Vespertine ; appearing in the evening.
 Villous ; clothed with long, weak hair.
 Viminous ; with long, flexible shoots.
 Virgate ; wand-like, long and slender.
 Vitta, Vittæ ; minute oil-tubes in the
 fruit-coat of the Umbelliferae.
 Viviparous ; seeds germinating on the
 plant.
 Volva ; membrane inclosing the young
 Fungus.
 Waxy ; like beeswax.
 Whorl ; a circle of similar organs.
 Winged ; furnished with wings.
 Woolly ; clothed with long hairs.

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