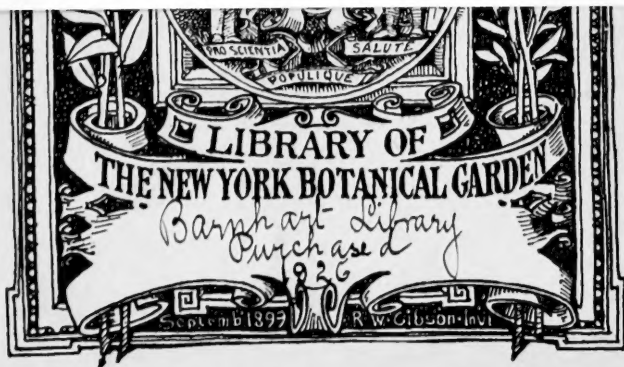
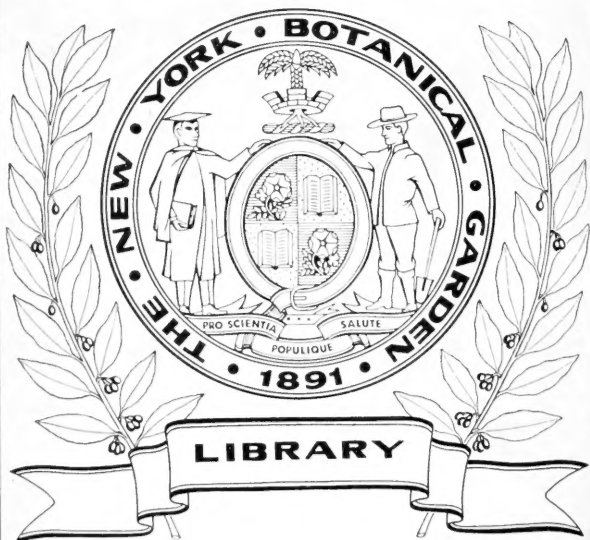


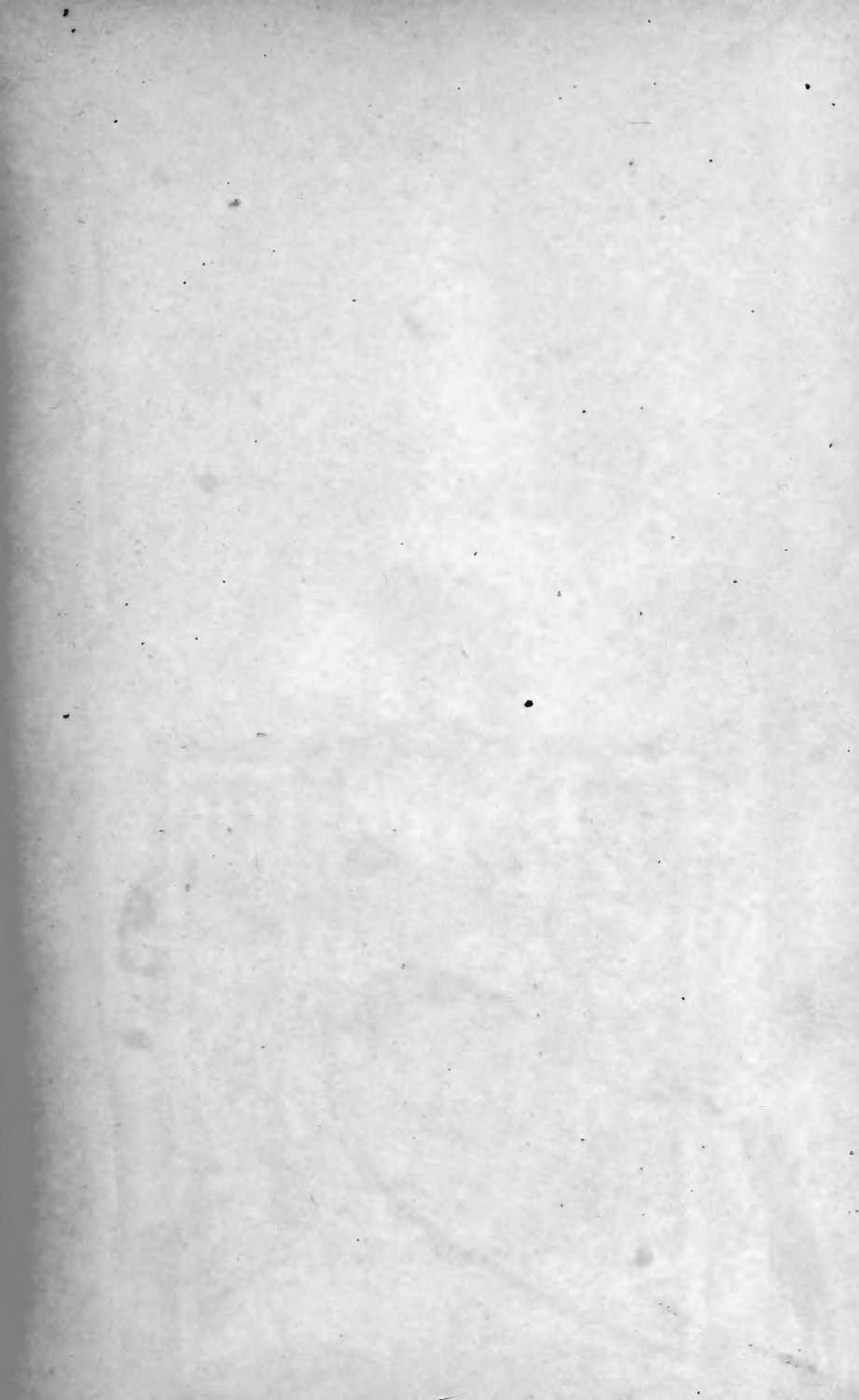
AN
ILLUSTRATED GUIDE
TO
FLOWERING PLANTS
GEORGE T. STEVENS

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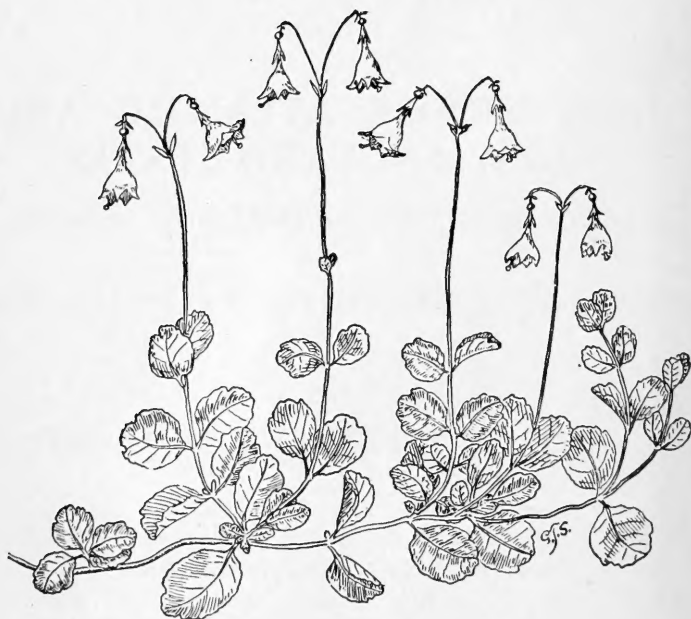




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AN ILLUSTRATED GUIDE TO THE
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LINNAEA BOREALIS

Natural Size

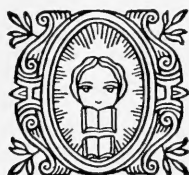
This interesting and almost universally distributed little plant was selected by the Dutch botanist Gronovius, with the concurrence of Linnaeus, to be named in honor of the great Carl von Linnaeus, father of modern botany and indeed of modern systematic natural history.

AN ILLUSTRATED GUIDE
TO THE
FLOWERING PLANTS
OF
THE MIDDLE ATLANTIC AND
NEW ENGLAND STATES
(EXCEPTING THE GRASSES AND SEDGES)

THE DESCRIPTIVE TEXT WRITTEN IN FAMILIAR LANGUAGE

BY
GEORGE T. STEVENS, M.D., Ph.D.

WITH MORE THAN 1800 ILLUSTRATIONS
FROM DRAWINGS BY THE AUTHOR



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Published, June, 1910

PREFACE

The purpose of this book is to furnish a practically complete handbook containing descriptions of the native flowering plants of the Northeastern United States, including not only the showy herbs but also the trees, shrubs and weeds growing native in that region and to adapt the work to the convenience and assistance of the very large and ever growing class of educated people who are interested in the study of this most attractive branch of natural history but who, by reason of unfamiliarity with the technical terms which have been in universal use for handbooks of botany, have absolutely no adequate aid in the prosecution of an agreeable and refining pursuit. While aiming to render the work available to the non-technical student, the arrangements and descriptions are intended to conform to the requirements of the technical botanist to the extent of furnishing a convenient handbook.

That there is a distinct and urgent demand for such a work is recognized not only by the cultured general public but also by professional botanists.

In reply to the question recently published in a botanical journal, "Why does not the subject of botany more often create a lasting interest?" a distinguished professor in one of our great universities replies: "All our botanical courses and our text books . . . are too technical . . . they are written by technical botanists who have forgotten that they were ever young themselves."

The classification adopted in this work is, in the main, that of Professor Adolph Engler in his *Syllabus der Pflanzenfamilien*, conceded to be the latest and highest authority on this subject, yet, in a few instances in the interest of a more simplified arrangement, I have followed the classification of Professor Eichler.

By introducing the modern Orders as well as the Families of plants I have hoped to familiarize the student with their natural relations, thus furnishing the observing beginner something of infinitely greater value than the empty knowledge of the names of a few plants. By thus giving a correct impression of the developmental or evolutionary relations between the different species, the beginner is soon prepared to recognize as an acquaintance and friend

PREFACE

the plant which he or she meets for the first time. Its specific, or, if the term may be used, its baptismal name may have to be sought in the genealogical record, the handbook, but the student already knows its family and its relations to the family by its general character.

In the preparation of the work I have made use of my very large private herbarium, a collection which has been the work of many years, but I have had constantly before me the works of the latest German, French and English authorities and I have as constantly consulted the American works of Professor Wood, Dr. Asa Gray and that by Messrs. Britton and Brown. Indeed, without the aid of this last named invaluable work the preparation of this book would have been difficult. For numerous data, including locality, season of blooming and other necessary knowledge, I am greatly indebted to this authority. In the final revision of the manuscript the New Gray Manual has been freely consulted.

The illustrations have been drawn by myself, mostly from the fresh living plants, but a small number of the drawings I have been obliged to make from the dried specimens in my herbarium. These drawings illustrate a very large proportion of our native plants, including nearly every species that the amateur is likely to meet.

The book includes two parts. The first part is an outline of structural botany intended to be sufficient to enable a beginner to use with advantage the second and main part.

The work has been the occupation of the hours of recreation from professional labor, a relaxation from the exacting demands of every-day routine of surgical practice and of the writing of professional books and papers, occupations which have filled the larger measure of the time at my disposal. It has, however, been an agreeable task to turn from the severe tension of professional pursuits to the refreshing attractions of this delightful branch of natural science.

I am indebted to Prof. Charles H. Peck, the New York State Botanist, for his kindness in carefully examining the manuscript before it was placed in the hands of the printer and to the publishers for the excellent manner in which the book has been brought out.

GEORGE T. STEVENS.

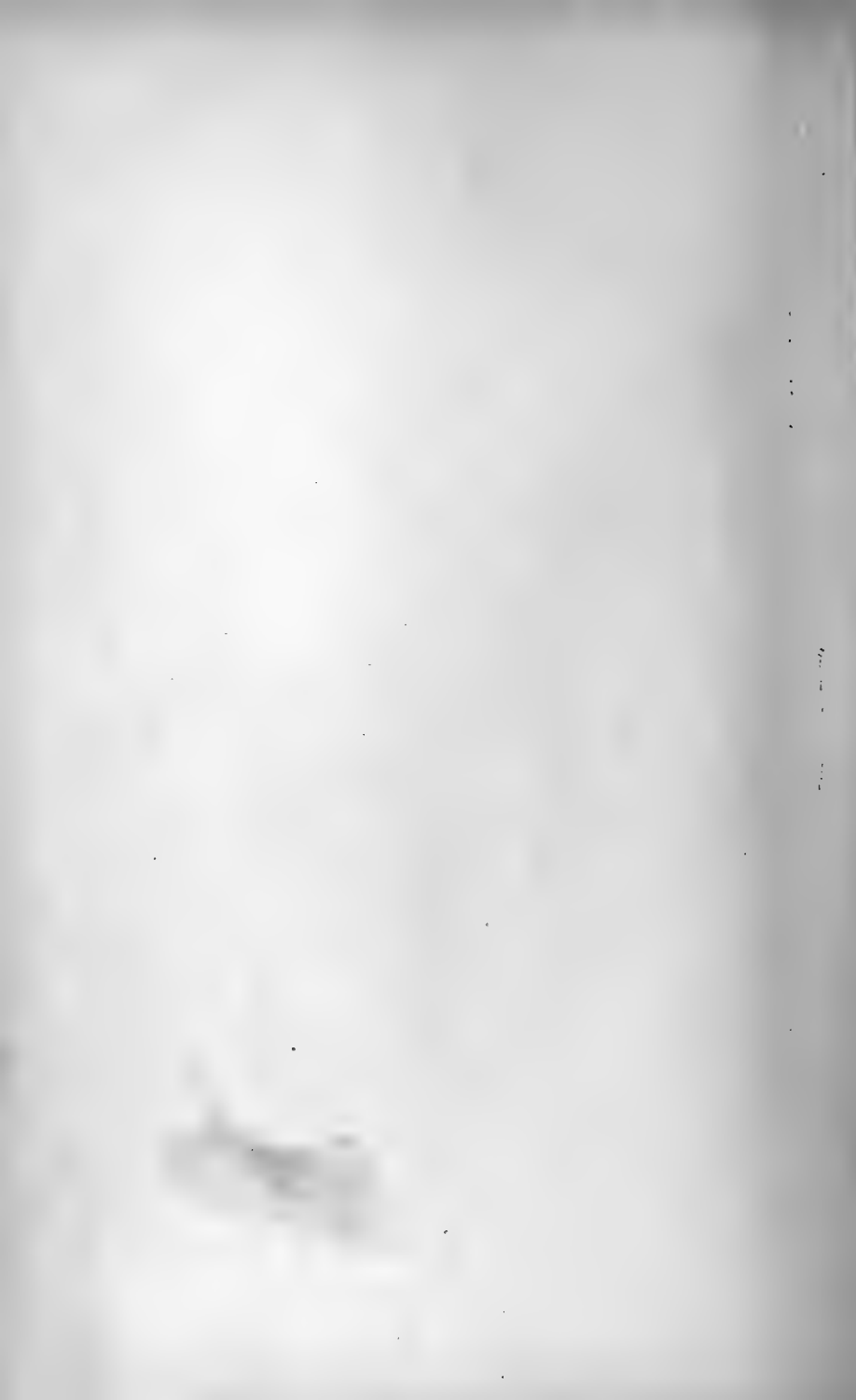
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1910.

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PART I

AN OUTLINE OF STRUCTURAL BOTANY



AN OUTLINE OF STRUCTURAL BOTANY

IF we consider the characters of a plant from the point of view of its internal and ultimate structure we are occupied with its *Internal Morphology*, an important and necessary study, which reveals a great variety of interesting facts all worthy of the attention of the student of nature.

So also if we examine the different phenomena which contribute to the development and growth of the plant, the branch of study known as *Vegetable Physiology*, we are engaged in inquiries relating to the actions and influences which contribute to the functions of growth and of reproduction and to the form of the plant in its various stages. In this branch of investigation we study the influence of light, of heat, of moisture and of many physical and chemical forces. This branch of botanical study is also most interesting and important, and both it and the study of internal morphology are essential to a well rounded knowledge of botany.

Necessary as are these branches of study to one who would acquire a full conception of the science of botany, a familiarity with them is not essential to the student who seeks principally to recognise the various plants which he may encounter in his excursions through fields and forests or along lakes or streams or who desires to form a collection of plants for study or amusement.

In the following pages it is the purpose to present only those facts respecting the *External Morphology* which will serve as aids to the student in determining the names and places in classification of the flowering plants which are found in the region selected.

While space does not admit here of a consideration of the two first mentioned branches of the study of botany and while it admits of only an outline of that branch necessary to aid in the determination of names and of classification of plants, the student should be impressed with the importance of a wider knowledge of the science of vegetable life than that which can be acquired by the superficial acquaintance of plants which one may encounter or collect.

Books treating of both internal and external structural botany and of vegetable physiology are to be found in which the science is treated, some from an elementary standpoint, others from a most technical point of view.

It is to such works that the student should resort according to the degree to which he would carry his study in order that his acquaintance with the vegetable world may become an intimate one of greatest interest.

ORGANS OF VEGETATION

The organs of vegetation consist of the *root*, the *stem* and the *leaves*, with those modifications of leaves consisting of the organs destined to reproduce the species, the spore in non-flowering plants and the flower and fruit of flowering plants.

THE ROOT

The root is that part of the plant usually growing downward, whose office it is, especially, to absorb from its surrounding medium, most commonly the soil, the moisture and some other materials

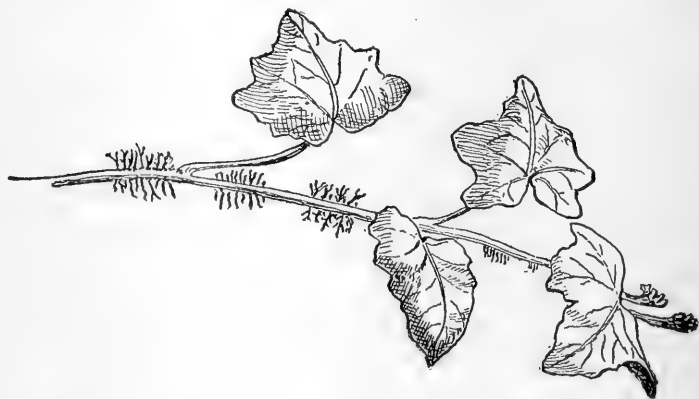


FIG. 1

from which the plant derives certain elements of its nourishment. The root also, in a great majority of cases, serves to fix the plant in a position favorable to its existence and growth. It differs from the stem in not bearing leaves.

Some plants, notably many species of the orchid group in tropical and semi-tropical climates and some trees, as for example the mangrove, are supplied with *aerial roots*. Some of these roots growing in the open air cling to the branches of trees, while other aerial roots hang as long, more or less fleshy, pendants or cords exposed to the winds. Other aerial roots, arising irregularly in the course of the stem, as for example, those from the stem of the ivy (Fig. 1), and which have for their purpose, in general, the support of weak climbing stems, are known as *adventitious roots*. Such roots grow-

ing at regular intervals, as at the leaf axils, are *lateral roots* (Fig. 2).



FIG. 2

Still other plants have roots swimming free in water on the surface of which the body of the plant floats.

Many plants of the non-flowering class are devoid of roots, but with rare exceptions, as, for example, the floating grains constituting the plants of *Wolffia*, flowering plants are provided with roots, terrestrial, aerial or aquatic.



FIG. 3—Fibrous roots of grass.

Although the roots of a plant have their origin in the radicle of the embryo they may exist in large numbers having the appearance of arising from as many distinct origins, but at the very base of the stem. Thus, among the plants of the great grass family, a group of roots seems to spring from the same level and to proceed downward with few or no branches. In

fact these numerous roots have sprung from the radicle all at nearly the same level and have so far monopolized its structure that they practically, though not theoretically, arise from the base of the stem. Roots of this kind, arising in numbers from apparently the same level are known as *compound or fibrous roots*, a form common among plants with parallel-veined leaves—(monocotyledonous plants) (Fig. 3). In case of plants with net-veined leaves—dicotyledonous plants)—the axis usually extends downward as a *tap root*.

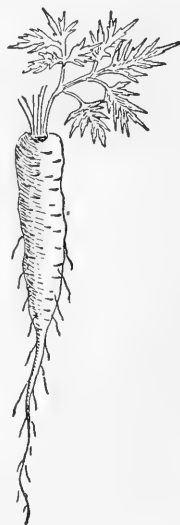


FIG. 4

This tap root may continue as the principal axis, taking often the form which we see in the beet or carrot (Fig. 4), in which case it is said to be a fleshy root, or it may maintain a more slender form. In many cases roots become reservoirs of nutrient materials, in which cases they are thickened and fleshy, as in the case of the sweet potato, the peony and others (Fig. 5). These are *tuberous roots*, which differ from the tubers like the common potato in that this last uniformly bears buds or eyes, and is therefore a part of a modified stem. In the majority of plants whose leaves are net-veined, branches diverge from the tap root which may equal or exceed it in size and importance and the root then divides like the branches of a tree, in which case it is said to be *ramose*. This is the form assumed by most shrubs and trees and by a great number of herbs.



FIG. 5—Tuberous root of Apios.



FIG. 6—Two plants of Lemna about three times enlarged. At the foot of the pendulous portion the root is seen the Cap, which is more noticeable in this little plant than in most others.



FIG. 7—Young Morning Glory. Between the two cotyledons or "seed leaves" is seen the expanding plumule. Along the course of the branching roots the "pilose portion" is shown.

If we examine a young root more in detail we find that at its very extremity it is terminated by a little *cap*. This cap may be seen without the aid of a glass in the little thread hanging from the body of the duckmeat, *Lemna* (Fig. 6), which floats at the surface of the water. The cap varies in length and in comparative thickness, but is always present and is the advancing organ in the process of growth. Above the cap, with some exceptions, appears a more or less extended ring of fine hairs, the *pilose portion* of the root (Fig. 7). It is by way of these hairs and not by way of the cap that such nutritive material as is taken from the soil, the water or the air, through the root is introduced into the circulation of the plant. As the root extends in length these hairs disappear above and new ones appear, maintaining the ring in about a constant distance from the terminal cap.

Above the ring of hairs the root assumes a smooth appearance. In the case of the roots of net-veined leaved plants the young rootlet appears to enter the root by an opening, as there is

seen at the point of union a ring raised more or less above the surface of the root at that point.

The part just below the stem is known as the *caudex* (a Fig. 7).

UNDERGROUND STEMS (ROOTSTOCKS, CORMS, BULBS, TUBERS)

There are certain modifications of the stem which by reason of their position, mostly under the soil, the absence of green coloring matter and by their appearance, are, by those who have not considered their nature sufficiently, regarded as roots.

Although these forms are technically modified stems and not roots, we may consider them in this place as, to some extent, intermediate forms.

If we were to draw from the soft soil a stalk of the common quack grass we would observe at its foot a white cylindrical extension of the size of the stalk and that at intervals there spring fascicles of roots and also, if we have not broken the cylinder, that it is



FIG. 8

FIG. 8—Rootstock of Solomon's Seal, showing the "seals" from which arise the branches or aerial stems and the scars marking the point of growth of last year's aerial stems.



FIG. 9

FIG. 9—Corm of Jack-in-the-Pulpit.

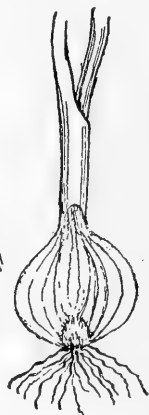


FIG. 10

FIG. 10—Bulb of Wild Onion.

terminated, not by the cap which terminates a root, but by a bud, in which it resembles a stem. Its course is horizontal beneath the soil and it may at intervals send up several stalks. This white cylinder is simply a subterranean stem modified by its position for the performance of its office. It is technically a *rhizome*, but in familiar language a *rootstock*. Such rootstocks are found in case of the iris, Solomon's Seal (Fig. 8), wild azalea and a great many other plants,

Another form of modified stem is the *corm* (Fig. 9). It is a solid, rounded mass at the foot of the stem, often flattened, as it is in case of the Jack-in-the-pulpit. It resembles a bulb in form, but differs from it in structure.

The *bulb*, which occupies a position at the foot of the stem similar to that of the corm, consists of a compact mass of scales from the midst of which proceeds a stem (Fig. 10). Both the corm and the bulb give out roots from their base.

A *tuber* is an expansion of an underground stem in which is stored nutrient material which may be, after the dying down of the aerial part of the plant, supplied to the young buds which have been formed on the surface of the tuber. The common white potatoe is the best example of such a tuber, its *eyes* being in fact so many buds which sprout in the spring and are fed by the starchy material of the tuber.

Other forms of modified stems, runners, stolons and suckers are less underground forms than those above described and will be mentioned in connection with the stem.

THE STEM

As the root is usually the descending axis of the plant, so the stem is ordinarily the ascending axis, though, as we have seen above, the modified stem, the *rootstock*, the *tuberous root*, etc., are buried beneath the soil.

With exceptions of a few minute species all flowering plants are furnished with a stem, although in the case of those improperly said to be stemless—*acaulescent*—the stem is extremely short, consisting only of a narrow ring above the caudex of the root.

Thus the stem may vary in extent from the simple ring above the root to the height of a giant sequoia.

The young stems of most plants bear, at more or less irregular intervals, leaves and buds. If we examine the young twig of a birch we notice that the distance between the leaves diminishes toward the outer extremity until at the end we find a terminal bud which is, in fact, a collection of rudimentary leaves often covered by scales, themselves modified leaves, at the point at which the future growth is to take place. At the axil of each leaf and just above we notice a small top-shaped body, a *lateral bud*. It is destined to put forth as a branch at a future time. The future branches, of which these lateral buds are the promise, will them-

selves bear leaves and other buds. When a bud is formed not terminal nor at a leaf axil it is an *extra axillary bud*, or if in irregular order or at intermediate points, it is an *adventive bud*.

The leaves usually arise from the stem in a certain fixed order, depending upon the species of plant, or the order of arrangement governed by a general law. In case of the presence of adventive buds or branches the orderly disposition of the leaves may be materially disturbed.

The points, or more exactly, the transverse planes, marking the insertion of the leaves are called *nodes*. These nodes are very clearly shown in the stems of grasses. The space comprised between two successive nodes is an *internode* (Fig. 11).

Upon the relative positions of axillary and terminal buds depend the divisions of the stem. A true bifurcation or forking from exactly opposite buds is rare, especially in case of the higher plants, but a *false* bifurcation from buds situated in close proximity is much more common.

Naturally the character of the divisions or bifurcations will determine the general form or port of the plant. If the terminal bud continues to hold a considerable lead, the lateral buds sending out branches in their order the plant will assume a comparatively regular spire-top form such as we observe in case of the fir tree. But if a bud close to the terminal bud sends out a branch about equalling the latter and if the process is repeated indefinitely we have a widely branching stem, the rounded or flat top, such as is shown by the apple tree.

The stem may be cylindric, as it is in many grasses, triangular as in some sedges, fluted, quadrangular or flattened.

From the stem may arise imperfectly developed branches, woody and sharp, which are *spines* or *thorns*, these differ from the more superficial *prickles*, such as are found on the stem of the rose and many other plants, and which arise entirely from the bark. The stem is also modified to form *tendrils*, as we find them on the vine of the grape, though some tendrils are modified leaf-forms, as we find them in many species of the pea family, as well as in some other plants.



FIG. 11 — Diagram indicating the relative distances between the buds—1, 2, 3, internodes.

The stems of flowering plants may be divided into two classes upon which divisions are in large measure founded the two great groups of plants known as *Endogenous* and *Exogenous* plants.

In the first of these groups, *endogens*, including the grasses, palms, liliaceous and many other plants, the accretion of growth is from within the stem. This latter does not become thicker as it extends in height. This statement will not appear correct when one remembers that the stalk of Indian corn is nearly or quite an inch in diameter at maturity, while in its early stage it has only a fraction of that diameter. This is not because the diameter of the first sprout has materially increased, but that successive joints or nodes have arisen from the root, each of greater diameter than the one preceding it. This form of growth may be observed in the grasses, rushes and all of the plants known as *monocotyledonous* plants. On the other hand, in another great group of plants, the *exogens*, the growth of the stem is from within outward. The stem of the ordinary tree of temperate climates increases in diameter in proportion to its growth, the accretion being made externally. This is true of most of the species of herbs growing in the same climate. In the stem of the endogen there is no distinction of bark, wood and pith, but in the stem of the exogen this distinction is clear, at least in the very young plant. The distinction of the bark from the wood is evident throughout the growth of the plant.

Upon the character and size of the stem depend the division of plants into herbs, shrubs and trees.

Plants, the stems of which do not become woody and which die down to the ground at the close of the season, or after flowering, are known as *herbs*, while those the stems of which become woody or which are persistent from year to year, are, if of small size when of mature growth, *shrubs*, but if the plant reaches or exceeds about twenty feet when fully grown it is a tree.

While in the greatest number of species of plants the stem rises from the ground, standing erect or nearly so by its own strength, *upright stems*, there are others which have too little strength thus to rise independently. Their length is usually out of proportion to their diameter to enable them to stand upright without assistance. Some



FIG. 12

of these are *procumbent* stems which creep along the ground like the weak stem of the common blue veronica (Fig. 12), its head

ascending at length, neither quite erect nor prostrate like its proximate part; or like the strawberry (Fig. 13), which sends out long slender, almost horizontal stems, known as runners, each of which at length puts forth a cluster of leaves and a fasciculus of roots which find their way beneath the soil and then push out another or several runners from this new station. Runners less slender, such as those



FIG. 13



FIG. 14

from the common antennaria, are called *stolons* (Fig. 14). A somewhat different form of prostrate stem is that of the creeping loosestrife (*Lysimachia*), which lies flat upon the ground and throws out its fascicles of rootlets at the leaf-nodes (Fig. 15).

Some of the stems of many shrubs and even of some trees droop, touching the soil at length and, taking root, give rise to new plants in this manner. The drooping stems of the black raspberry are examples of this form of stem among shrubs, those of the banyan among trees.

But these weak stems do not in all cases run along the ground nor droop to take root like those just mentioned. Some of these weak stems are held in more



FIG. 15

or less upright positions by means of tendrils, which may proceed directly from the stem as modified branches, as in case of the grape vine, or which are modified leaf stalks, as we find them in case of the clematis, the pea, etc., or the stem may be held by pricklers, as in case of galiums. Still other weak stems wind about more erect plants or other bodies, of which the hop, the bindweed, the convolulus and many trailing vines are examples (Fig. 16).

THE LEAF

In general the leaf is the digestive organ of the higher plants, for the principal food of plants is carbonic acid which, within the leaf, is converted into starch with elements which are supplied from the roots. That it contributes to the beauty and interest of the plant is an obvious fact. Of its color and of its physiology we need not here speak, but of the forms which the leaf assumes and of the arrangement of the leaves it is necessary to take note, since on these forms and on these arrangements we must base many of the comparisons between different groups of plants.



FIG. 16

In most of the orders of plants usually known as the lower orders leaves are not found, and even in a few of the plants which come under our observation as flowering plants, the leaves may be only rudimentary, yet we may regard the leaf as an essential organ of the class of plants which is to be described in this work.

We may take the leaf of the buttercup as a study of the leaf structure (Fig. 17).

We find then, first, the broad expanse, the *blade*; second, the slender, yet thicker, somewhat cylindric organ, the *petiole*, or leaf-stalk, and third, and finally, the base of the petiole, which, in case of the buttercup, nearly or quite surrounds the stem to which it is closely attached.

These three parts constitute the typical leaf, but not all leaves are typical. In the case of many leaves, for example, the broadened base of the leaf stem is wanting and the petiole is attached to the stem by a narrow base, which may or may not be somewhat more expanded than the column of the petiole. Again, the petiole may be almost completely absent and the leaf blade is apparently attached directly to the stem without the intervention of the petiole. The leaf is then said to be *sessile*, as flowers are said to be sessile when there is no pedicle or flower stem.



FIG. 17—Leaf of *Ranunculus acris*—a, the blade; b, the petiole or leaf-stalk; c, the base.

So the leaf may consist of the blade and the base without the petiole, as we see it in the long and narrow blade of grass with its base clasping the stem without an intermediate part representing a petiole.

Beyond these three very general forms there are various other modifications such as the formation of a hollow tube by the petiole, as in the *Sarracenia*, or of the simple awl-like or needle-like forms of the pine leaves or the thread-like leaves of many aquatic plants, and in some plants the form and general structure of the leaf is modified according to the medium in which it exists. Thus some species of *Sagittaria* have thread-like leaves which are entirely submersed, living wholly below the surface of the water ; broad, rounded blades floating upon the surface of water and sharply angled arrow-like leaves which rise above the water's surface. Many instances of this *polymorphism* might be mentioned, the modifications being due primarily to the adaptation of the leaf to divers circumstances.

A great, and in classification, a very important, division in the general structure of leaves is that which distinguishes the so-called parallel-veined leaves from the net-veined leaves.

With the former, the parallel-veined leaf, is commonly associated the seed of a single cotyledon or lobe ; while with the net-veined leaf is usually associated the two-lobed or dicotyledoned seed and upon these characters are founded the first great division in the class of flowering plants, the *monocotyledonous* and the *dicotyledonous angiosperms*, that is, the one-lobed and the two-lobed sub-groups of the class of plants having the ovules within an enclosing ovary.

These striking characteristics in the construction of the leaves permit us, in a great majority of cases, to judge without further consideration whether a given plant belongs to one or the other of these two great groups.

Exceptions, as to most rules, occur here, for there are plants with net-veined leaves belonging to the great group of monocotyledons, for example ; the trilliums, which are members of the lily family, have net veins. Then also a few plants belonging to the group of dicotyledons have apparently parallel veins.

Notwithstanding the few exceptions it becomes easy after a little observation to determine with which of the great sub-classes we have to do.

Returning to our buttercup leaf, we find that not only do the veins of the blade diverge and cross among themselves, but that the blade is deeply cut into several segments or lobes and that starting from the point of attachment of the petiole there radiate,

fan-like, as many strong ribs or veins as there are lobes to the leaf, and that these radiating veins send out a network of smaller veins.



FIG. 18 — Pinnately veined leaf of Elm.

If we compare this with the leaf of the elm (Fig. 18), we see that in the latter a strong rib or vein runs from end to end through the center of the leaf, while other smaller veins diverge on either side and at fairly regular distances, like the barbs of a feather. Because, in case of the ranunculus leaf and others constructed on a similar plan, the veins radiate something like the fingers of the hand when spread out, such leaves are said to be *palmately* veined, while in the case of the elm leaf and others constructed on the feather plan they are said to be *pinnately* veined or feather veined.

If we compare our ranunculus leaf and the elm leaf with a leaf from the common plantain which grows so freely about country dooryards and in waste places we observe that in case of the elm and the buttercup the borders are not continuous, one being broken by very deep interruptions, the other only by the depth of the sharp teeth. On the other hand, the borders of the plantain leaf are continuous. Such a border is said to be *entire*, while the others are interrupted. It is somewhat rare to find blades of the palmate or feather-veined leaves with entire borders, though the entire border is characteristic of the parallel-veined leaf.

As it is well known, the leaf blade assumes many forms, most of which have a resemblance to familiar objects, for example: to the outline of an egg; of an arrow-head; of a spatula, etc., and diagrams representing several of these forms are given in the plate opposite the table which is to follow.

Compound Leaves

The leaf, as we have thus far examined it, has only the three elements which were at first mentioned, namely, the blade, the petiole and the base. Such a leaf is known as a *simple* leaf. But we often find leaves which are apparently more complex; for example, the leaf of the horse-chestnut is composed of five separate blades radiating from a stout common leaf-stalk or petiole. This

petiole is not a branch or twig of the tree from which five leaves might arise, for when the leaf is ripe in autumn this common petiole looses its hold upon the stem and it and its five blades fall to the ground together. The petiole and the five blades then constitute a single leaf and the five blades are not five leaves, but so many *leaflets* of a *compound leaf*. Another example of compound leaf is found in that of the locust tree, where the petiole proceeds as a main stem, on each side of which is a series of oval or rounded leaflets, the petiole terminating as the midvein of an odd leaflet. These rounded blades are no more separate leaves than are the radiating blades of the horse-chestnut, but are elements of the compound leaf. In the case of the radiating leaflets the arrangement is known as a *palmately* compound leaf ; while in the case where the secondary petioles branch from the main leaf-stalk like the barbs of a feather it is a *pinnately* compound leaf. Hence it will be seen that similar terms are used both for the simple and compound leaf and this is a fact which the amateur should not fail to comprehend, that while the terms of science may not be familiar the true scientist employs the least number of new terms that it is possible to use in the necessary description and classification of his object.

We find many other examples of compound leaves, as in the clover with its three leaflets, most of the potentillas with their palmate five leaflets and many species of the pea family, with their pinnate double rows of leaflets.

STIPULES

At the base of the leaf-stalk or of the blade of many leaves are found leaf-like appendages having often the color and general character of a leaf but differing usually in form and size from the leaf itself. Such appendages are found at the foot of the petiole of a rose leaf, where, starting from the very base of the petiole it extends along its column as a sort of fringed collar.

The stipules constitute a very important feature of the leaf from the point of view of the determination of different species, for a great many leaves are without stipules, while some have very conspicuous ones. About the bud of the magnolia two large brown stipules form a thick protecting cover, which falls as the leaf ex-

pands. About the stem of the polygons the stipules take the form of tall collars while in the pea family the stipules in some species exceed the leaf in size and among the pondweeds it is often a long grass-like appendage.

Referring to the diagrams on the succeeding page, we find a number of forms which, while each may not precisely represent all the leaves which are classed as belonging to that particular



FIG. 19—Stipules of Rose leaf.



FIG. 20—Stipules of Clover.



FIG. 21—Stipules of *Viola arenaria*.

form, are all sufficiently typical to indicate the class of the leaf-blade which might be under observation, provided the leaf under consideration is not compound.

We may conveniently arrange them in the following table:

TABLE OF SIMPLE FEATHER VEINED LEAF-FORMS

I

A *single principal vein traverses the main axis of the leaf.*

The tissues intervening between the veinlets fully or mainly developed *Feather Veined Forms. Pinnate-Veined*

The middle veinlet exceeds the others in length, the veinlets above and below becoming gradually shorter.

The breadth of the widest part is:

About equal to the length of the leaf (Fig. 1) . . . *Orbicular*

About $\frac{2}{3}$ to $\frac{3}{4}$ the length (Fig. 2) *Oval*

About $\frac{1}{2}$ the length (Fig. 3) *Elliptic*

About $\frac{1}{4}$ to $\frac{1}{3}$ the length (Fig. 4) *Oblong*

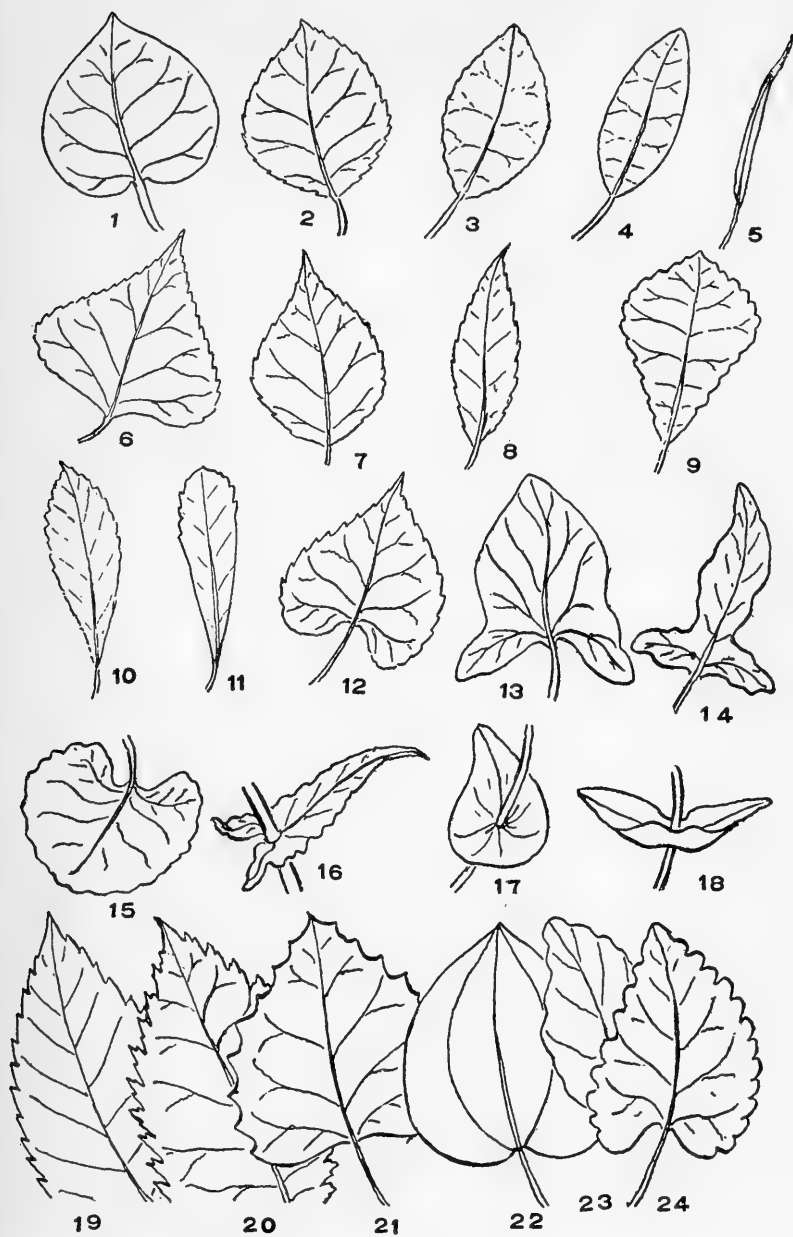
The veinlets of the lower third exceed the other side veinlets, which become gradually shorter above and below.

The breadth of the widest part is:

Nearly or quite equal to the length (Fig. 6) . . . *Deltoid*

About $\frac{2}{3}$ the length, *egg-shaped* (Fig. 7) *Ovate*

About $\frac{1}{3}$ the length or less, *lance-shaped* (Fig. 8) . . . *Lanceolate*



The side veinlets all very short (Fig. 5) *Linear*

The veinlets of the upper third exceed the others, which become gradually shorter above and below.

The widest part is:

About $\frac{1}{2}$ the length, *pear-shaped*; *inversely egg-shaped*

(Fig. 9) *Obovate*

About $\frac{1}{3}$ the length, *inversely lance-shaped* (Fig. 10)

. *Oblanceolate*

About $\frac{1}{4}$ that of the length or less *spatula-formed*

(Fig. 11) *Spatulate*

The lower veinlets protrude notably outward beyond the general outline or conspicuously backward.

The apex sharp, the two sides of the base rounded. *Heart-shaped* (Fig. 12) *Cordate*

The apex sharp, the general shape triangular, the two posterior triangular lobes pointing backward, not outward.

Arrow-head-shaped (Fig. 13) *Sagittate*

General form triangular, but the lower part of the leaf suddenly widening into two lateral triangular lobes. *Halberd-shaped* (Fig. 14) *Hastate*

The leaf blade of various forms, the posterior lobes protruding backward and inward. *Ear-shaped* (Fig. 16)

. *Auricular*

The posterior veinlets directed outward, backward and then inward, the leaf blade enclosing the stem (Fig. 17) *Perfoliate*

The veinlets of each of two opposite leaves projecting backward, the two leaf blades uniting around the stem (Fig.

18) *Connate*

The middle veinlet shorter than the width of the leaf blade, the base heart-shaped. *Kidney-formed* (Fig. 15) . *Reniform*

II

There is a single principal vein, but the intervening tissue between the veinlets may be so irregularly developed as to give to the blade the appearance of having been deeply cut into lobes and sinuses. Such forms are known as *pinnated leaves*.

1. The tissue sharply cut between the veinlets about $\frac{1}{2}$ way to the midvein. *Feather-cleft* *Pinnatifid*

A pinnatifid leaf with rounded lobes and sinuses like that of the White Oak (Fig. 29) *Sinuate*

With its lobes or segments pointing backward (Fig. 31) *Runcinate*

The terminal segment large, broad and rounded. *Lyre-shaped* (Fig. 30) *Lyrate*

2. The tissues between the veinlets cut out nearly to the midvein, the leaf is said to be (Fig. 32) *Pinnately Parted*

III

Three or more principal veins radiate from the leaf stem and traverse the leaf blade *Palmate veined*

1. The general outline of the leaf nearly or quite complete.
 General form rounded, broader than long, the posterior parts
 extending into two rounded lobes, *Kidney-formed* (Fig. 15)
 *Reniform*
 Several principal veins radiating in all directions, the leaf
 stem inserted in the midst of the blade. *Shield-shaped*
 (Fig. 25) *Peltate*
2. General outline cut into deep divisions by deficiency of tissue
 between the principal veins, forming separate leaflets (Fig.
 35) *Palmate-leaved*
 Principal veins 3 (Fig. 33) *Trilobate*
 Principal veins 5 (Fig. 34) *Five-lobed*

In these pinnately cleft leaves the intervening tissue is somewhat or largely wanting but in certain leaves this absence of intervening tissue is carried to the extent that the segments or lobes appear like quite perfect and independent leaves. An important difference will however be observed between such a group of apparently perfect leaves and a really perfect leaf.

If we separate by force a perfect leaf at the base of the leaf-stalk from the branch, it falls as a single blade as it does also in autumn by ripening. But if we separate the base of the leaf-stalk of one of these groups the whole group falls as did in the other case the single leaf blade.

These groups of leaflets, all attached to a common leaf-stalk or petiole are known as *Compound Leaves* and a few forms are shown by the following table.

- If the number of leaflets is reduced to two the leaf is . . . *Binate*
 If there are three leaflets arranged in a *palmate* form the leaf is
 said to be *ternate* (Fig. 33) *Trifoliate*
 If there are more than three leaflets, all arising at the end of the
 leaf stem, as in that of the Horse Chestnut, it is *Hand-shaped*
 (Fig. 34) *Palmately Compound*
 But if the leaflets are arranged along each side of a common leaf-
 stalk or petiole the leaf is (Fig. 35) . . . *Pinnately Compound*
 If the number of leaflets is exactly the same on each side of the
 leaf stem and there is not an odd one at the end, the leaf is
 *Even Pinnate*
 But if there is an odd leaf at the end it is . . . *Odd Pinnate*

In the description of plants the point or apex of the leaf often forms an important feature for differentiation.

When the point ends with an acute angle long drawn out, it is

(Fig. 36) *Acuminate*

If the angle is sharp but not long and tapering it is (Fig. 37) *Acute*

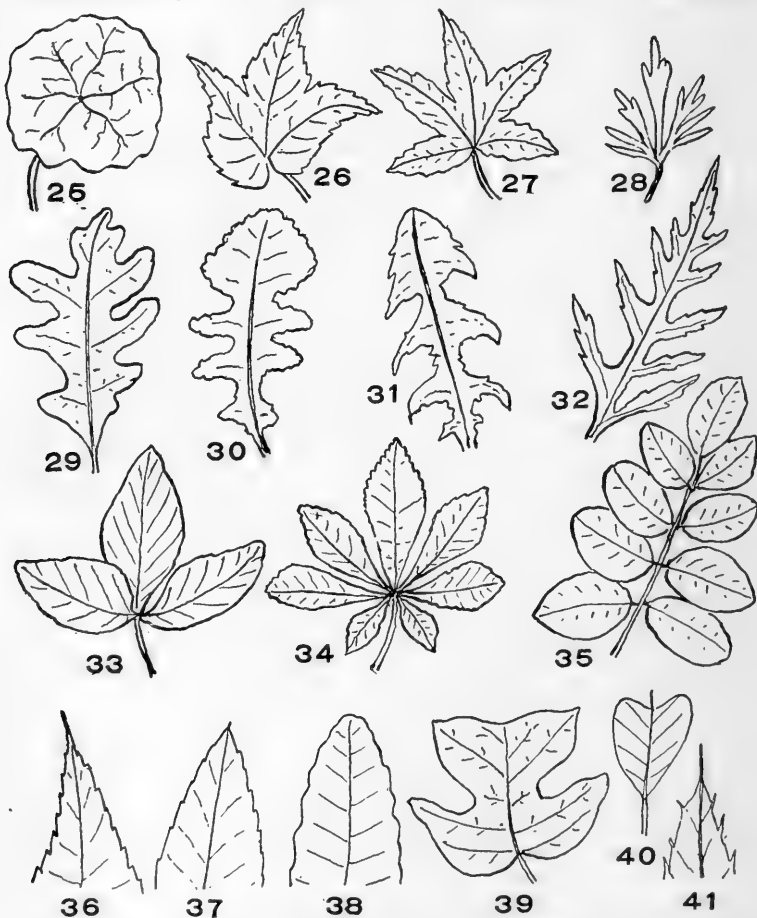
But if the point is rounded it is (Fig. 38) *Obtuse*

If terminated by a nearly straight edge, as though cut off, it is

(Fig. 39) *Truncate*

A leaf notched at the apex is (Fig. 40) *Emarginate*

If terminated by a hard bristly point it is (Fig. 41) . *Mucronate*



The leaf margins are also important in differentiation. The margin is said to be:

When it is divided into sharp teeth like those of a saw (Fig. 19)

. *Serrate*

When these teeth are also serrate the margin is (Fig. 20)

. *Doubly Serrate*
If the margin is formed of teeth with concave outlines as at Fig.

21, it is *Dentate*

When the margin is complete as at Fig. 22, it is *Entire*

When the border is formed of rounded teeth with convex outline
it is (Fig. 24) *Crenate*

The diminutive terms *denticulate* and *crenulate* are used in place
of *dentate* and *crenate* when the teeth are very small.

ARRANGEMENT OF LEAVES.

The disposition of the leaves upon the stem constitutes that part of botanical science technically known as *Phyllotaxy*, but to the non-technical it is the Arrangement of Leaves.

Every part of botanical science is of great interest to one who intelligently investigates it and this science of *Phyllotaxy* is one which richly repays the investigator. But in this place we can only refer to the conspicuous facts of three forms of arrangement. They are:

1st. *Alternate*, when the leaves are inserted singly at each node of the stem. In each case the insertion may appear to be first on one side of the stem and next on the exact opposite side. More frequently they appear to be inserted in a spiral line and this, as a matter of fact, is the real insertion, even when the leaves appear first on one then on the opposite side.

2d. They are said to be *opposite* when they are inserted in *pairs*, one exactly opposite the other on the stem.

3d. They are in whorls or *verticils*, whorled or *verticillate*, when three or more are inserted at the same node, forming a whorl about the stem.

Upon some stems leaves which are in fact alternate are so closely disposed that it is difficult to see their alternate arrangement. In such case the leaves are said to be *scattered*.

THE FLOWER

To the ordinary observer a flower is that gracefully formed group of colored petals and stamens surrounded at its base by a rosette of green bracts, which by its vivid hues, attractive shape and pleasant perfume seems to constitute the crowning glory of a plant.

A more exact and perhaps a more useful conception of a flower is that which defines it as an organ essential to the inception and the perfection of the seed and therefore to the perpetuation of the plant species.

In this sense the flower may not consist of gracefully formed

and brightly colored parts. It may indeed consist of a single stamen lodged against the stem in the axil of a leaf or of a pistil unprotected by any envelope. In such a case the grace and brilliancy of the flower as it is usually thought of, is absent but at least one of the two essential elements necessary to the perpetuation of the species is present and in the view of the botanist this constitutes a flower.

A flower, then, consists of a more or less complicated apparatus essential to the inception and perfection of the seed.

Two elements are absolutely essential to this process of reproduction of what are known as the higher plants, flowering plants. One is found in the pistil, at the base of which, or constituting the whole of which, is the ovary in which is found the ovule or ovules or, eventually, the developed seed.

The other element is seen in the stamen which furnishes the pollen which must be applied to the pistil in order to fertilize it and without which the ovules can not develop into seeds.

The transference of this pollen from the stamen to the pistil may be affected by the wind, by water, by insects or by other agencies.

Either of these elements, as we have seen, may be found alone, unaccompanied by the other element or by the conspicuous parts usually regarded as the flower. The flexible "pussy" of a willow consists of a great number of single flowers, each consisting of a pair of stamens at the base of which there is a single colorless



FIG. 22



FIG. 23



FIG. 24



FIG. 25

bract, or if the catkin is made up of pistillate flowers each flower consists of a single pistil with its bract (Figs. 22 and 23). But individuals of either kind, pistils or stamens, may unite in a group of considerable numbers or again, pistils and stamens may grow together in the same group (Fig. 24). There may be a single stamen and a single pistil or a single pistil with several stamens or there may be several of each in association within the same flower.

Examples in which many staminate flowers are found in one group and many pistillate flowers in another are found in the

willows and poplars. If the "pussies" of the willows are examined with a little care it will be seen that the soft gray fur of a catkin from one tree covers only staminate flowers while the less smooth catkin from another tree covers exclusively pistillate flowers.

An excellent example of a plant having both staminate and pistillate flowers, each in separate groups is found in the common Maize or Indian Corn.¹ In this case the tall "tassel" terminates the stalk and spreads into many almost horizontal branches each bearing a great number of staminate flowers. Below, at the side of the stalk, is a husky envelope from which protrudes a bundle of long slender filaments constituting the "silk." Each of these green filaments is the extended portion of a pistillate flower, or more exactly, of two such flowers for in this case two pistils unite as one. When these silky filaments have arrived at the proper stage for fertilization or pollination the wind wafts some of the pollen grains from the tassel of the plant or from a neighboring plant which falls upon the silky filaments and thus each fiber becomes pollinated and the conditions of growth of the individual seeds are supplied when each filament has been subjected to the action of the pollen.

Examples of extremely simple flowers in which both stamens and pistils are found in the same group,² are found in some of the aquatic plants such as the *Zanichella* (Fig. 26) of the fresh ponds where one or two pistils are situated at the axil of a leaf between two stamens. This simple arrangement constitutes the entire flower and indeed all the elements necessary to the development of the seed.

When the flower is thus destitute of any floral envelope, naked,³ it is usually the case that the pollination is effected by the agency of the wind or by water.

In the more conspicuous flowers that which gives them their character as blooms, the ornamental part, is the *perianth*.

¹ Linnaeus called plants having groups of staminate flowers only on one plant and pistillate flowers only on another of the same species *Dioecious* (living in two houses), but when such separate groups are found on the same plant he called the plant *Monoeceous* (one house). Jussieu, a later botanist, called plants having stamens in one flower and pistils in another *Diclinous* and those having the stamens and pistils grouped in the same flower *Monoclinous*.

When *diclinous* and *monoclinous* flowers are found on the same plant the plant is said to be *Polygamous*. Flowers having both stamens and pistils are *Hermaphrodite*.

² Such flowers are, in the technical sense *perfect*, because they contain both the elements for the perfection of the seed. They are not, however, *complete*, because they do not have the appendages of the higher orders of flowers, the calyx and corolla.

³ Flowers without a calyx or a corolla are *apetalous* or, more technically *achlamydeous*, words which in the technical works on systematic botany are important and not unfrequently used.

When this is complete it consists of two circles of organs (Fig. 28). The outer one which is generally, though not always, green called the calyx, is almost always divided, either partly or completely, into several parts known as *sepals*. These green sepals are well seen in the case of the rose where each becomes more or less sub-divided and thus more ornamental. The inner circle of the perianth is known as the *corolla* and when this consists of several divisions the parts are called petals.

In many flowers the petals remain distinct from each other⁴ while in other cases the petals are united showing but a single expansion since all the members are blended at their edges as we see the union in the harebell or in the convolvulus.

The petals of a flower are in most cases symmetrical as are other

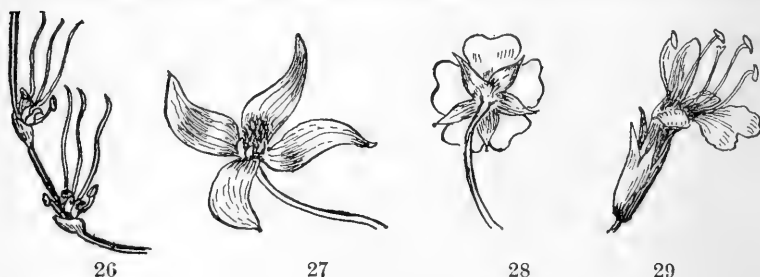


FIG. 26—Part of a stem of *Zanichella*. The naked flowers are seen at the leaf axils.

FIG. 27—An incomplete flower, *Clematis*. The petals are nearly suppressed while the sepals are large and colored.

FIG. 28—A complete flower, *Buttercup*, with calyx, corolla, stamens and pistils.

FIG. 29—An irregular flower (*Salvia*).

parts of the same flower. For example, the petals of the buttercup or of the apple blossom are all alike, one as long and as broad as the other and the sepals of the calyx are, in these blooms, similarly symmetrical (Fig. 28). Such flowers are called *regular*.⁵

But the parts of the flowers are not always thus symmetrical, for example, the petals of the sweet pea flower differ among themselves in size and shape, so also the parts of the larkspur and of the cypripedium flowers are not all alike. Such flowers are *irregular* (Fig. 29.)

Flowers may be *perfect* in the sense that they include both the stamens and the pistils yet they may not be *complete* in the sense

⁴Flowers, the corolla of which is composed of separate and distinct petals, are known as *polypetalous* or better, as *choripetalous* flowers, while flowers, the corollas each of which consists of a single member, made by the union of several petals, are *monopetalous* or more correctly *gamopetalous*.

⁵When the petals are thus symmetrical the flower is technically *homochlamedous* or, in familiar language, *regular*. When the parts are unsymmetrical the flower is *heterochlamedous*, or, *irregular*.

that they do not have the envelopes which we have called the perianth, the calyx and the corolla, the organs which, as has been remarked above, are, by the casual observer regarded as the flower. But when all these parts are present, calyx, corolla, stamens and pistils we have not only a perfect but a *complete* flower.

The calyx or outer circle of the perianth has ordinarily the color of leaves and appears as a little star-shaped circlet or cup-like receptacle at the base of the flower or extending upon the corolla enfolding it to a greater or less extent. (Fig 28.)

In some cases, however, the calyx is not green like the leaves but takes on the vivid colors which we are accustomed to find associated with the petals. In some instances the calyx may resemble the existing petals with which such sepals are generally alternate as in the case of the lily where the sepals are petaloid, alternate with the real petals and resembling them in size, form and color, the three sepals and the three petals uniting in an apparent bell-shaped corolla.

But the calyx may so far usurp the place of the corolla as to



30. Polypetalous flower of Chickweed, with 5 sepals, 5 petals and 10 stamens.
 31. Apetalous flower of *Thalictrum*, with 5 sepals, no petals and many stamens.
 32. Choripetalous flower of *Ranunculus*.
 33. Gamopetalous flower of *Convolvulus*.

entirely supplant it and assume the color, the delicacy of texture and the brilliancy of hue of the suppressed corolla. In the flower of the clematis (Fig 27) we have an instance of this usurpation in which the petals are so nearly suppressed that they appear only as rudimentary bodies while the sepals spread out as a broad white or purple crown. The shining yellow cup of the swamp marigold or american cowslip is another familiar instance for the usurpation of the function of the corolla by the calyx. The calyx is not supplanted by the corolla and when there is but a single envelope in the perianth we know that it is the calyx. In the flower of the columbine we have ten members of the perianth all colored. The five petals resemble little cornucopias while the five sepals have more nearly the ordinary form of petals.

The calyx, like the corolla, may be unsymmetrical and like the petals of the corolla the sepals may be concrescently united into a single tube. (Fig. 29.)

These external organs, corolla and calyx, are largely protective to the essential organs but they have, especially the corolla has, an important function aside from the protective one, that of attracting insects or birds and it is this function which undoubtedly lends to the flower its charm of form, hue and perfume.

When the several petals of a flower are distinct, one from the other to the base as we see them in the buttercup (Fig. 28) the corolla is said to be *dialypetalous*, i. e., separate petaled and the sepals being thus distinct the calyx is *dialysepalous*; or the corolla is said to be *polypetalous*, i. e. many petaled, and the calyx *polysepalous*. This arrangement of distinct petals is by no means constant and we see the parts of the corolla more or less united, from those corollas in which there is a faint union at the base to those in which, like the blue bell, the petals are all united to form a single envelope. The corolla of which the petals are thus joined, is said to be *gamopetalous* or *monopetalous*. (Fig. 33). In the great family of composite flowers, asters, thistles, etc., the heads are made up of from few to many of these *gamopetalous* flowers crowded into colonies, the whole having the appearance of a single flower.

The great majority of showy flowers are *entomophilous*, that is, they are attractive to insects. The primary source of this attraction is a series of small sacs or glands secreting a sweet liquid or semi-liquid substance called *nectar*. These nectar sacs may be situated at the base of the pistil, at that of the stamen, in the inner extremity of the pistils or even at the base of the sepals. In the violet it is hidden at the end of the spur. Nectaries are indeed sometimes situated outside the flowers but they are always enticements to the insects which are induced to visit the flower. (Fig. 34.)

It is from the nectar that the perfume of the flower largely proceeds and it is this nectar in which certain insects as well as humming birds delight as an article of food.

It is not always enough that the flower exhales a perfume which is pleasant and enticing to the insect, the wind or other agencies might prevent the perfume reaching the sensitive organs of smell but there is added a display which is attractive to the sight. Hence the fine colors and even probably the varied and beautiful forms of the corolla are provided as additional attractions to these winged visitors.

The instrumentality of these visitors in the fertilization of the flower will be seen as we proceed.

The various elements of the flower are arranged with a certain degree of uniformity even in the most irregular forms.

Selecting a well known "regular" flower as an illustration of the typical arrangement we may examine the blossom of the common buttercup when the petals are fully expanded.

In the very center are several greenish bodies, arranged about the receptacle, which represent the pistils. They are attached to this *receptacle* which is the summit of the axis of the little stem of the flower, the *peduncle*. (Fig. 32).

When there is but a single pistil in a typically regular flower it springs from the very central point of this axis which is often concave at the summit as we see it at Fig. 35. About this little group of carpels of the buttercup, stand, at regular intervals a row of stamens and beyond this another and still another row. These rows appear to be perfect but if we were to shave them all off at a level just above their origin at the receptacle and should examine this surface by the aid of a magnifying glass of moderate power we would find that there is in fact only a single row of

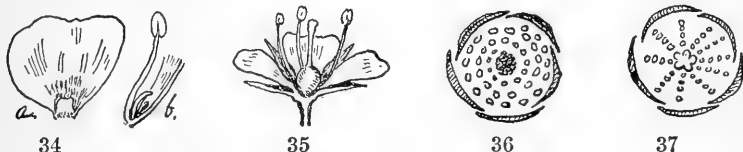


FIG. 34—Nectary at base of a Buttercup petal—a, view in front; b, longitudinal section.

FIG. 35—A typically regular flower.

FIG. 36—Diagram of arrangement of stamens in Ranunculus.

FIG. 37—Diagram of arrangement of stamens in Columbine.

stamens arranged in a spiral and that this spiral line goes around the carpels three times as we see it in the diagram, Fig. 36, where the shaded curved lines represent the insertion of the petals and the small points that of the stamens.

This arrangement is not universal nor even always found in the flowers of plants belonging to the same family as the buttercups. For example, the stamens of the columbine, which is a member of the great Ranunculus family, to which the buttercups belong, are arranged in about ten rows radiating from the central group of carpels. (Fig. 37). In flowers of other families there may be a single row of five, six, or more or less stamens or in still others, especially in flowers which are "irregular" the stamens may all be moved to one side or, as in orchids, consolidated and attached, to the pistil.

Returning to our buttercup flower, beyond the spiral row of stamens we find the five petals, their inner borders being attached to the receptacle in a row just outside the ranks of the stamens.

At the base of each of the petals is a little sac, the nectary, which

is more distinctly shown in the buttercup petal than it is in many flowers. (Fig. 34.)

These five petals appear at first to be arranged in a circular line, each occupying an equal space in the circle, but if we shave the flower as before and examine with care we find that they overlap one another in a broken spiral as seen in the diagram, Fig. 36.

As in the case of the arrangement of the stamens, this disposition of the petals may not hold for other flowers although it is typical of many. In the flowers of the lily, for example, three petals occupy each a portion of a circle while the three other petaloid members of the bell, in fact sepals, occupy a circle beyond these.

As also in case of stamens, in "irregular" flowers the petals may assume positions not at all typical. Thus, in the flower of the sweet pea three of the petals are situated much to one side, while a fourth, which is in fact a union of two, occupies much of the other side.

Leaving the petals and examining our buttercup flower further we find inserted into the base of the receptacle, in a ring outside the petals, the five green sepals. (Figs. 28, 32.) These are arranged about the base of the receptacle in much the same order as the petals, one overlapping the other to a certain extent, but alternating with the petals.

Thus we have the four elements of the complete flower arranged in four series from within outward in the order, the pistil, the stamens, the petals and the sepals; the petals forming the corolla, the sepals the calyx.

But while these four sets of organs are generally in this order they are not always thus disposed, for in certain cases the stamens are inserted, not in a circular group next to the pistil but upon the base of the petals and again, they may find this insertion upon the calyx. So also the calyx and corolla may seem to arise, not from below the base of the pistil but from above the rounded base.

Such peculiarities are important as characteristics in the classification and description of the flower and should be carefully observed.

When the whorls of stamens and petals are arranged below the pistil and free from it they are technically said to be *hypogynous*. (Fig. 38), and as this term is much used in botanical works it is a good one to remember as is also the term *epigynous* (Fig. 40) which is applied when the calyx, corolla and stamens seem to grow at the summit of the rounded base of the pistil, the ovary, as is the case with the rose where the ovary forms a gracefully oval base

to the remainder of the flower. When the petals and the stamens are united with the calyx at its base, appearing to rise from it, whether the calyx adheres or not to the ovary the flower is said to be *perigynous* (Fig. 39.)

These few technical words are introduced here because they occur so frequently in botanical literature and the characters are so important from the point of view of describing the flower that the student of plants even if he proposes to interest himself only as an amateur should carry these terms in his mind.

Before leaving the description of the flower we must not fail to call attention to some characteristics of the inner whorls, the pistils and the stamens. On a knowledge of these characteristics much depends in the identification of a plant by means of its flower.

THE PISTIL.

The pistil or pistils occupy, as we have seen, the central portion of the typical flower. (Fig. 42.) At the basal part of each pistil is the distended portion containing the ovules, destined to become the seeds, and this distended portion is known as the *ovary*. This



FIG. 38—Diagram of a flower in which the corolla and stamens are *hypogynous*, i. e., situated below the ovary.

FIG. 39—Diagram of a flower in which, although the corolla is inserted below the ovary, the stamens are inserted on the corolla, *above* the ovary. The stamens are *perigynous*.

FIG. 40—Corolla and stamens inserted above the ovary, *epigynous*.

ovary may consist of a single enclosure or *carpel* or it may be partitioned into several compartments or cells.

The ovules are found in these compartments or cells as they are called but the part of the cell to which they may be attached differs in different plants. Thus, in our buttercup the single ovule is attached to the side of the single cell of the carpel. (Fig. 41.) In other flowers a column rises through the center of the ovary and about this the ovules are arranged. In still others, the ovules are attached to the partitions which divide the ovary into compartments and in still other cases they are attached to the ridges which represent unfinished partitions. The adjoining figures illustrate some of the methods of arrangement of the ovules and the character of the cells or *locules* of the ovaries. (Figs. 43, 44.)

The parts of the flower are regarded as modified leaf-forms and the ovary is not an exception. If we suppose a leaf folded once with its borders united we have a conception of an ovary of a single carpel, from the united borders of which may arise a single ovule or several ovules. If two or more such folded leaves are combined to form an ovary we have an ovary of several carpels which may be permanently separated by the infoldings of the elemental leaves which will form so many partitions or, should these infoldings not extend to the center or should, in the course of the process of formation, some part of the infolding borders fail of development the partition will be only partially or not at all formed and the compound carpel may show only some partial indications of partitions and when although the original borders may have united, parts of the folds are wanting there may remain

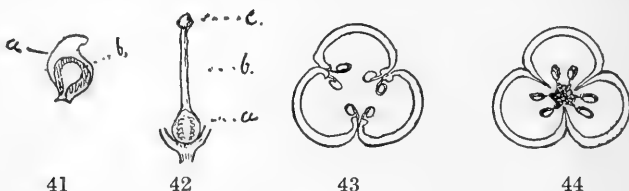


FIG. 41—Carpel of Buttercup—*a*, shell of carpel; *b*, seed.

FIG. 42—A pistil—*a*, ovary; *b*, style; *c*, stigma.

FIG. 43—Diagram of attachments of ovules to placentas on the wall of the ovary. These placentas are known as *parietal placentas*.

FIG. 44—Attachments of the ovule around a central column. The points of attachments are *central placentas*.

a central column in the cavity of the ovary with only the peripheral indications of the typical structure.

Rising from the rounded ovary is found, in a majority of the more typical flowers, a column which, in botany, is known as the *style*. There may be a single style which may arise from an ovary of a single locule or from one in which several locules are united or there may arise several styles from a number of carpels. The style differs in length and in comparative thickness in different flowers as in the case of the long and slender style of the tiger lily and in the short and thick one of the buttercup. Although, in its typical form it is a rounded and regular column it assumes other forms as in the orchid in which it is flattened and bears the stamen on its side or as we have seen it in the silk of the Indian corn where it is a long drawn out filament. Many other flowers may be found which afford an interesting study of this organ for each form of the pistil as a whole is designed so as best to promote the function of the organ, which is an adjunct to the process of

perfection of the seed. In some cases the style appears to be wanting as in the case of the poppy in the flower of which the broad capital, the stigma, of which we are presently to speak, rests directly upon the globe-shaped ovary.

Culminating the style as its terminal is a glandular, somewhat spongy appurtenance known as the *stigma* and which is destined to receive the pollen grains which must fertilize the ovules. This stigma is porous and the style is not as it appears from a superficial glance a solid column, but it encloses a canal or several canals leading to the ovary and through the pores of this stigma and through these canals of the style the pollen grains or the extensions of these grains find their way to the ovules. The stigma to a single style may be divided into several parts, for the style may branch at its summit into two or more divisions and on each of these divisions is found a stigma.

THE STAMENS.

The stamens, forming a ring outside the pistil and in some measure protective of it are designed as the source of supply of pollen grains. Like the pistil the stamens may assume various



FIG. 45—A few forms of stamens—*a*, Anther; *b*, Filament.

forms but the typical stamen arises as a *filament* terminated by an organ which appears to be differentiated from itself and to be attached to it, sometimes firmly and sometimes very slightly at the end of the filament. This is the *anther* of which more will be said as we proceed.

These stamen filaments are more or less numerous in different flowers but in one great class of flowering plants, the class in which the leaves are parallel veined or nearly so, (the lily family, the rushes, etc.) they are usually three in number or in multiples of three. In another great class which includes many of those plants with net veined leaves, the stamens are generally five or multiples of five, less frequently four. If we strip the petals from a flower of cranesbill geranium, so common in our woods in early spring, we shall find ten stamens alternately in two rows the filaments of

the inner row being much longer than those of the outer row. In other flowers the stamens may number twenty or more.¹ Even when found in these large numbers the arrangement in rows can generally be made out and the multiples of five are also generally to be observed. (Fig. 45.)

Notable exceptions to the general arrangement occur some of which will be mentioned when the architecture of the flower is considered.

The terminal body attached to the stamen is the *anther*. If we examine one of the anthers which dangle from the long stamens of the tiger lily we shall see that it is an elongated elliptic body along which, from end to end, extends a groove on the side opposite the attachment of the stamen. This groove is so deeply cut in some anthers that it almost or completely divides the anther into two which are connected by a narrow band of connective tissue. Again, each of the two divisions has a lesser groove, generally, as in the case of our lily, running longitudinally, and again, the two main divisions of the anther may be divided by a deep transverse groove, making four lobes of a single anther, each with its lesser longitudinal or transverse groove. In instances far less common the anther may be divided into sinuous lobes or into lobes which are transverse to the axis of the filament or it may take other forms which are quite atypical. Whatever form is found in the anther of an individual plant, as for example, that of our lily, it is the common form for that species and no important modification of form is found in the anthers of flowers from the same species of plants.

The anther is the pollen carrier and the secondary grooves form, when the pollen is mature, the openings through which the pollen grains escape. For as the grains enlarge the anther bursts open at these secondary grooves and the pollen lies exposed in such a way that the wind, the foot or the head of an insect or some other instrumentality may reach it and carry it to a neighboring pistil.

In the case of our lily the anther is seen to swing lightly from the slender point of the somewhat strong filament but if we look at a stamen of a water lily we see the anther attached by its back along the course of the flattened filament and again in some flowers the anther is fixed solidly as a capital at the summit of the filament.

THE POLLEN.

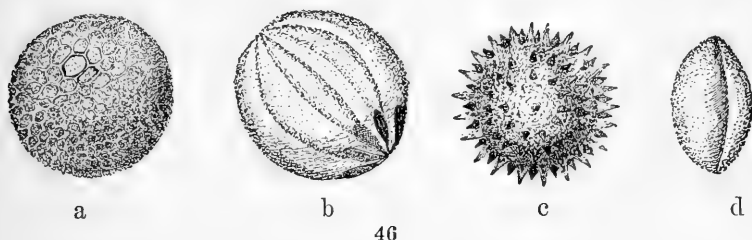
We may now examine the pollen which is the essential product

¹ Collectively the stamens are called the *androecium*, as collectively the carpels and pistils are called the *gynoecium*.

of the anther and the substance without the application of which to the pistil the ovules do not become seeds.

The yellow dust constituting the pollen when viewed by the unaided eye appears like other dust with no especial individuality of form. But if we place some grains of it under the lenses of a moderately magnifying microscope we see at once that each grain is a beautiful organized structure, though there are comparative grades of beauty in the grains of pollen from different flowers and it is interesting to note that the forms of greatest beauty are not always from the most attractive flowers. (Fig. 46.)

Generally rounded but sometimes spindle-shaped or cubical its surface may be elegantly faceted, delicately lined, covered with small points or smooth and glistening. Usually the grains are dry with little inclination to cohere to each other but in exceptional cases they are more or less glued together in little masses such as are found in the flowers of the milkweed and orchids so that when any part of the pollen is removed from its bed the whole mass



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FIG. 46—Some forms of Pollen Grains.—*a*. Phlox; *b*. Monarda; *c*. Marigold; *d*. Lily—all magnified about 500 times.

clings to the object which removes it. The grains may also be comparatively heavy or comparatively light. In some of the pines, for example, the pollen grains are supplied with little air vesicles which serve as balloons and enable the grains to float at long distances in the air.

When the pollen grain is brought into immediate relation with the stigma it begins to grow into an elongated fibril which penetrates the spongy substance of the stigma and finds its way down the channeled pistil till it comes in contact with the ovules which at once take on a new form of life and develop into perfect seeds. Naturally the amount of pollen produced by individual plants will depend largely upon the probable waste that must occur in the process of transmission to the stigmas of other flowers than the one which bears the pollen. Hence we find a greater abundance of pollen produced by wind fertilized plants than by those in which the process of fertilization is carried on by the aid of insects. In

some of these wind fertilized plants the amount of pollen is almost incredible. The cone bearing plants, pines, spruces, etc., must produce such an infinite number of these floating bodies as to insure the falling of great numbers upon distantly removed cones in such a way that they must remain attached to the stigmas.

ARCHITECTURE OF THE FLOWER.

Notwithstanding the great variety of forms of flowers a close comparison indicates that, in the main, flowers are constituted on a few general and pretty uniform plans and that the variations of form depend, not so much on the adoption of new plans as on the modification of the few general plans.

We have examined the various elements of a flower, pistil, stamens, corolla and calyx and we have found that the first two of this group of organs are essential while the others are protective or useful as auxiliaries.

Botanists have adopted certain diagrammatic figures to express in graphic form the relations of these floral organs in the architectural structure of the flower. For example: if we would express the number and relative position of the members of a flower of the Iris family, a diagram something after the manner of that at Fig. 47 would be employed. At the center is found the three-rayed figure enclosed by a thin line. The three rays are lobed at their extremities. This central figure represents the column to which are attached the two rows of ovules in each of the three cells of the ovary. The ovary with its closed cells is represented by the heavy line just beyond the center. Beyond the line representing the ovary is seen a dotted line with three small crosses. The dotted line indicates the circle in which three stamens would be found were they developed, but since they are undeveloped the crosses indicate the points at which they would have been found had they been developed.

Beyond this is another dotted line in which are three scalloped figures and these figures represent the actual, fully developed, three stamens of the iris. Beyond the circle for the stamens we find a circle represented by three heavy lines and another circle of three parts not shaded. It is customary to represent the inner of these two circles by solid lines, the other by shaded lines. They represent, the inner circle, the petals, the outer, the sepals. In this case both circles represent colored organs. Below this circular part of the diagram is seen another heavy curved line which represents a bract at the base of the flower and, as the flower of iris is not always terminal we see at the upper side of the diagram the line representing another bract and a small circle, which represents the stem.

In expressing the arrangement of a flower with five sepals, five petals, five stamens and a pistil with a five-celled ovary the diagram Fig. 48 would be used.

In each of these cases the diagram is drawn without reference to

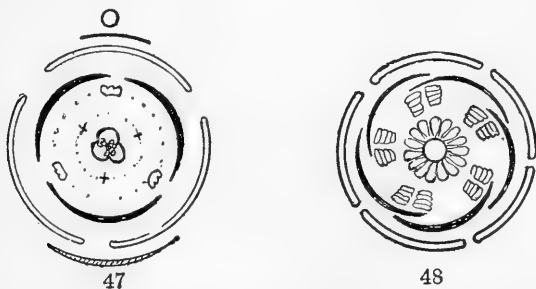
the level of the origin of these members and, as will be seen, in each case the members are not only regularly but typically disposed since we have, in the case of the Iris, three members of each of the four whorls, while at the inner whorl, the fifth, the ovules are shown as two for each cell of the ovary or, for each border of the folded leaf of which the cell is supposed to be formed. In the other case the members are five in each of the whorls and, like the first, the members of one whorl alternate with those of the adjoining one and are symmetrically placed.

But while the general plan may remain, many modifications of it may occur, for example: the five members in the whorl of stamens may be doubled or multiplied several times. On the other hand, some one or more of the members of one or more of these whorls may be suppressed or, as frequently, it is merged with a neighboring member.

Thus, in the case of the lily, there are two rows of stamens of three each, while as we see in our diagram of the iris there is but one row of developed stamens while another row, indicated by the crosses, remains undeveloped. Also a single member of one or of several of the whorls may be suppressed as it happens in the great mustard family where we have four sepals, four petals, four long and two short stamens and one pistil composed of two united carpels.

Besides the multiplying of the whorls in some cases and the suppression of the whole or a part in other cases we find frequent instances in which the members of some or of several of the whorls have been moved toward one side of the peduncle and as a result we have a one-sided flower as in case of the pea.

This, like other parts of the delightful study of botany would be



an interesting topic to pursue much more in detail were the space available.

ARRANGEMENT OF FLOWERS.

The arrangement of flowers on the flower stem constitutes one of the means of identifying the different species of the plant.

When the single flower finds itself the sole occupant of an isolated portion of the stem it is said to be *solitary* as it is in case of the violet or the tulip but very frequently the flowers are disposed

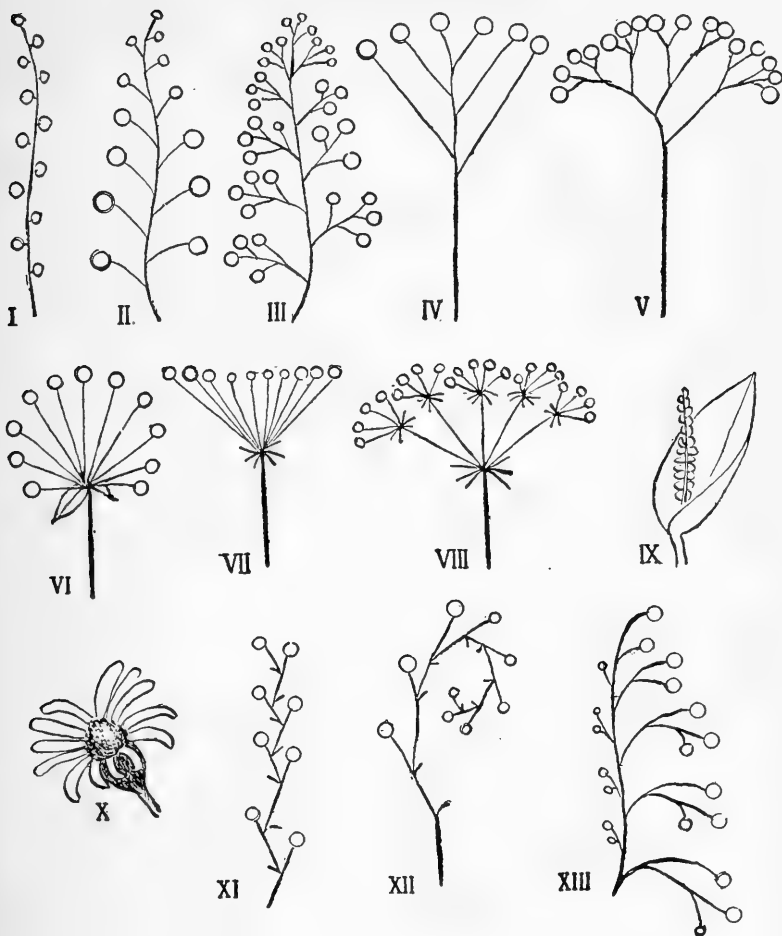
in groups which may be simple or quite complicated. We speak of such a group as the *inflorescence*.

In the inflorescence of many plants there are found members which do not answer exactly to leaves and are not properly a part of the flower, they are *bracts*, often found at the base of the immediate flower stem or at the base of the flower itself. We have an example of the first in the fringy collar below the radiating pedicles in the flower cluster of the wild carrot and of the other in the green organs below the head of the china aster. These bracts sometimes take unusual forms, as that at the base of the small cluster of flowers of the linden, and from which the cluster appears to grow. These bracts often fill an important part in the arrangement of clusters of flowers though many clusters are without bracts.

Coming to the most common arrangement of flower clusters we may conveniently arrange them in the form of a table:

- | | |
|---|-------------------------------------|
| I. Flowers arranged along the plant stem without flower stems or with very short ones | <i>A Spike</i> |
| II. Arranged along the plant stem on short flower stems, but which are gradually somewhat longer toward the base | <i>A Raceme</i> |
| III. A similar arrangement, but each flower stem branching into two or more | <i>A Compound Raceme or Panicle</i> |
| IV. Flowers on flower stems branching from nearly the same point and reaching about the same level | <i>A Simple Corymb</i> |
| V. Flowers borne on branched divisions of a corymb | <i>A Compound Corymb</i> |
| VI. and VII. Flowers on somewhat long flower stems all from the same point and radiating like the rods of an umbrella to a common level or rounded (Figs. VI and VII) | <i>An Umbel</i> |
| VIII. The flower stems of an umbel branched to form secondary umbels | <i>A Compound Umbel</i> |
| IX. A spike more or less surrounded on at least one side by a spathe | <i>A Spadix</i> |
| X. The flowers arranged more or less compactly on a receptacle and surrounded by bracts | <i>A Head</i> |
| XI. Inflorescence on a succession of new axes, the primary, secondary, etc., axes each terminated by a flower | <i>A Cyme</i> |
| XII. A cyme in which the inflorescence coils upon itself | <i>A Scorpid Cyme</i> |
| XIII. Arrangement similar to a panicle, but the branches one-sided | <i>A Secund Panicle</i> |

ARRANGEMENT OF FLOWERS



THE FRUIT.

As the ovules, under the fertilizing influence of the pollen advance toward maturity, they and the immediate envelopes which enclose them become modified and are known as the *fruit*.

While in fact the maturing seed with its immediate protecting membranes is the fruit, popularly the fleshy or pulpy modification of some accessory part is regarded as the fruit. Thus, in the strawberry the little hard shining bodies are the real fruit while

the delicious pulpy substance which gives value for us to the berry is a modification of the floral receptacle, and the rich substance of the apple is another example of the excessive growth of the receptacle on which the seeds first rested and then were enveloped by it.

The forms which the fruit may take during the process of ripening are important elements in the determination of the species of plants and are often employed in the differential descriptions.

The following table will serve to show some, but not all, of the principal forms of fruit.

1. Simple Fruits

This division includes fruits which have a dry envelope in contrast with the fleshy fruits.

- a. Fruits in which the carpels at maturity are burst by the internal pressure of the seed, but which have no regular *seam* which opens when the seed is ripe.

Pericarp (surrounding of the seeds) not a winged fruit.

Fruit of a single cell and enclosing a single seed. Example: buttercup, anemone, fruit of composite flowers (Fig. 49 and 50) *An Achene*

Fruit in which 2, 3, or 4 *achenes* are united into one is known respectively as, *Diachene*, *Triachene*, etc.

Pericarp developed at the borders into a broad, spreading wing or wings. Example: maple, ash, etc. (Fig. 51) . . . *A Samara*

- b. Fruits in which the carpels, at maturity open at a regular seam or, technically, a *dehiscence*.

Fruits which consist of a single carpel or of several carpels not joined together, the *dehiscence* of which is in the direction of the axis of the carpel.

Opening by a *single* seam. Example: columbine, larkspur (Fig. 52 and 53) *A Follicle*

Opening by two seams. Example: the pea (Fig. 54) *A Pod or Legume*

Fruit a compound ovary more or less hard and woody and which opens at the side or top (Fig. 55 and 56) . . . *A Capsule or Casket*

An ovary of two elongated carpels which are joined, side by side, and which open from bottom to top leaving a partition between the two *valves* (Fig. 57) *A Silicle*

A *silicle* is a short silique. These forms are characteristic of the family of crucifers.

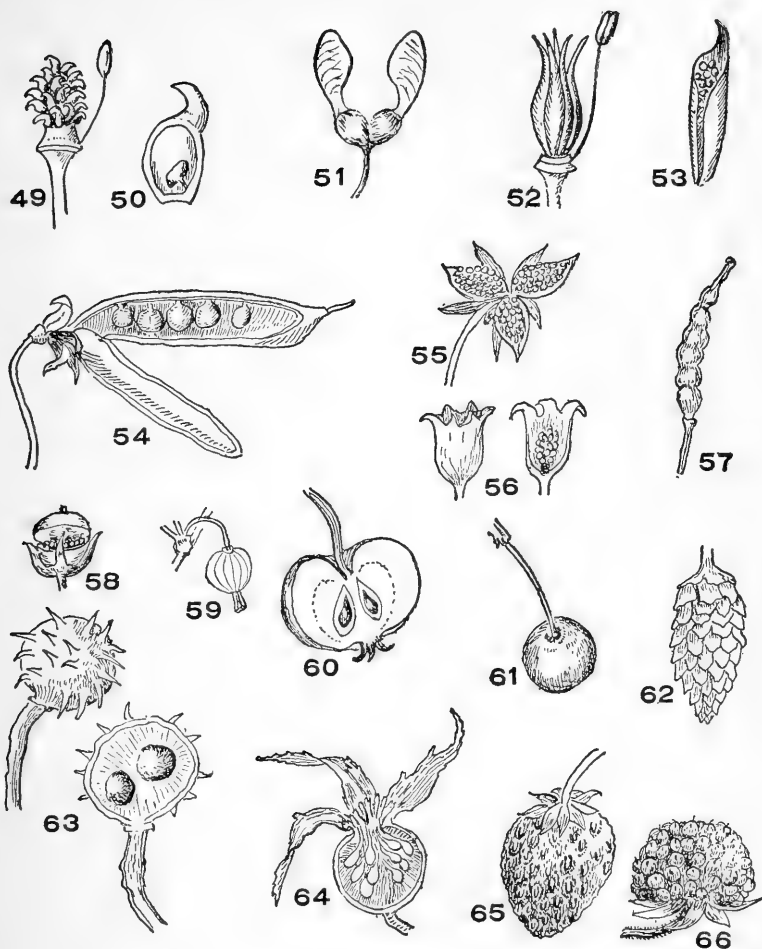
An ovary of one or more carpels opening transversely, a capsule like a little cup with a lid (Fig. 58) . . . *A Pyxis or Box*

2. Fleshy Fruits

Fruit in which the seed is *immediately* surrounded by a strong membranous or woody wall.

- a. The seeds each (usually 5) surrounded by a tough membranous or cartilaginous wall. Example: apple, pear, etc. (Fig. 60) *A Pome*

FRUIT FORMS



FIGURES

49. Cluster of achenes of buttercup.
50. A single achene from the group.
51. Samara of maple.
52. Follicles of columbine.
53. A single follicle half open.
54. Pod of pea.
55. Capsule of violet, open.
56. Capsule of *silene* showing the complete capsule and a section.
57. Silique of mustard.

58. Pyxis of "four o'clock."
59. Berry of gooseberry.
60. Pome.
61. Drupe.
62. Cone.
63. Husk of horse chestnut, showing two nuts.
64. Hip of rose.
65. Compound fruit of strawberry.
66. Compound fruit of raspberry.

- b. A small fruit with a membranous covering which includes a soft pulp in which lie the seeds. Example: currant, gooseberry, blueberry (Fig. 59) *A Berry*
The orange and lemon would come under this group.
- c. A compound ovary of carpels with a strong, rather thick envelope containing a pulp in which are distributed the seeds. Example: melon, cucumber *A Gourd or Pepo*
- d. A fruit in which the seed is protected by a hard, woody wall, a nut, or stone.
The stone covered by a fleshy succulent layer. Example: cherry, plum (Fig. 61) *A Drupe*
The stone not covered by a fleshy layer. Example: oak, chestnut (Fig. 63) *A Nut*

3. *Aggregated Fruits*

- Many small seed bodies included on the surface of a pulpy or dry convex receptacle *Multiple Fruits*
The receptacle pulpy. Example: strawberry (Figs. 65, 66).
The receptacle dry. Example: potentillas, roses (Fig. 64).

4. *Compound Fruits*

Include the cones of the Pine family, Fig. 62, and some other forms not common with us.

THE SEED.

The ovule, when it has been fertilized through the influence of the pollen, takes on a new form of growth in which there is the beginning of the prospective plant, the *embryo*.

In the ovules of plants belonging to the great division to which the grasses, sedges, palms and lilies belong—the monocotyledons—the embryo is formed at the base of a single lobe or *cotyledon* of the developing seed (Fig. 70), while in the grand division to which most of the plants with net-veined leaves belong—the dicotyledons—the embryo is formed between two lobes or cotyledons (Fig. 67).

The presence then of one or of two cotyledons or lobes in the seeds, constitutes the distinguishing feature characterizing the two great types of plants whose seeds are enclosed in an ovary. In the group of cone-bearing trees, pines, spruces and the like, the cotyledons are not uniform in number, there being from three to several cotyledons in the single seed. Fig. 71 shows a young pine with the expanding cotyledons, numbering eleven, in a verticel. At the summit, still holding the cotyledonous leaves together at their extremities is seen the tegument of the seed, not yet cast off. As the plantlet pushes upward a new whorl of leaves will appear and later other whorls.

Even in the class of monocotyledonous and dicotyledonous plants there are occasional exceptions in the numbers of cotyledons, for the seeds of the pond-weeds, for example, among the first great

class may have more than one cotyledon, while exceptions, like the seed of the African Kola tree, in which there may be from one to several cotyledons, occasionally occur in the other class.

These cotyledons with the enveloping tegument and the embryo comprise the essential elements of the seed.

Commencing our examination with the tegument we find that not only does it invest the seed, but that while apparently a single organ it consists, in fact, of several layers of each to which names are given.¹

To the outer membrane or layer which is commonly smooth, as we see it on the grain of corn or wheat, may occur various modifications which are devices for the dissemination or protection of the seeds. These modifications may be in the form of appendages such as hairs, hooks, bristles or wings.

The ovule is held in relation to the ovary by a little connective organ, the *funiculus*, and the point at which this little bond of union is attached to the ovule or seed is marked, when the latter separates from the ovary, by a spot known as the *chalaza*.

The essential part of the seed is, of course, the embryo, which is, in fact, the rudimentary young plant, and it is to this that all other parts of the seed are subsidiary. Thus, the cotyledons store up nutriment which will be required by the embryo during the early stages of its development until it can draw its nourishment from the soil or other environment.

The embryo consists of a radicle which is destined to form the root and of a *plumule*, the rudiment of the stem and leaves (Fig. 67). The cotyledons occupy, as a rule, much the largest portion of the seed and form, in dicotyledonous plants, the first pair of leaves which are often thick and fleshy (Figs. 67 and 68), while the single cotyledon of the grain of corn forms, in germination (Fig. 70) a storage body which does not rise above the surface of the soil and does not assume a green color, as do the cotyledons of the bean, the maple or the oak.

While the nutrient material is often stored in the cotyledons, a reservoir of nutritious matter is sometimes found in an independent body known as the *albumen*, which varies in its nature and position.



FIG. 67 — Cotyledons of common bean, showing embryo between.

¹ The outer layer of the integument is the *testa*, the second is the *mesosperm* and the third the *endosperm*.

The embryo, which lies at the base of the single cotyledon of the grain of wheat and almost straight between the lobes of the bean may curve around the albumen mass in the seeds of certain plants and from the fact of the encircling of the albumen by the embryo of such plants, as for example, the Corn Cockle, and many other plants of the pink family, this feature is an important element in the classification of the plants. In still other seeds the albuminous mass completely encloses the embryo.

It is unnecessary here to discuss the processes attending the



FIG. 68



FIG. 69



FIG. 70



FIG. 71

germination of the seed beyond mentioning some of the more obvious phenomena. Under the influence of the air, of moisture and of a certain degree of heat the parts enclosed within the membranous or woody coverings swell and break through the outer wall by separating its parts at certain seams or joints, or tearing it in an irregular manner. Thus the young plant commences an independent existence.

The plumule of a seed which has been buried in the soil pushes toward the light and air while the radicle penetrates even deeper into the soil. At this stage the cotyledon may, as it usually does in case of plants of the dicotyledonous class, cling one to one side of the little stem, the other to the other side and as the stem pushes upward they appear above ground as the two first leaves as we see them in the fleshy seed leaves of the bean (Fig. 67). As the expansion of the plumule proceeds the characteristic leaves of the plant appear as we see them in the young maple shown at Fig. 68. At Fig. 69 we see a young oak, one of the cotyledons of which has not yet thrown off the shell of the acorn.

The single cotyledon of the monocotyledonous class does not usually rise above the soil as do those of the other great class, but remains hidden where the moisture of the soil can aid it in its nourishment of the new plant. At Fig. 70 is shown the young plant of maize, the shell and cotyledon remaining near the branching and descending radicle.

In the seed of the pines there are several cotyledons, and they rise in a little spindle-shaped structure formed of a number of symmetrically curved ribs, lifting the shell of the seed at their summit like a little cap, as we see it at Fig. 71. At length the cap is thrown off and from the midst of the group of cotyledon rays arises whorl after whorl of needle-like leaves.

THE NAMES OF PLANTS

To the amateur the names of plants are a source of difficulty and often of perplexity. The common name of an individual plant usually differs not only in words, but in meaning, so far as it has a meaning, in different languages. Even in the same language there are often many names for the same plant in different localities and the same name is often applied to plants widely different in character and appearance.

Hence, for an English-speaking person to know the common names of the plants growing in his or her vicinity might be of little advantage, since in another locality these common names might be differently applied or other names might be used for the same species.

This unfortunate state of confusion existed when Linnaeus, the great systematizer, not only of botany, but of other branches of natural science, adopted a system of giving to each plant two names which, in some sense, compare with the names which we apply among ourselves; for example, we say, James Monroe; Monroe referring to a group of persons and James to an individual.

In plant naming we use the two names much in the same way; thus, we say: *Viola tricolor*: *Viola* being the name of a group which is called a *Genus*, while the qualifying or specific name *tricolor* refers to the three colors found in the flower of this species and is its *specific* name.

A rule which is now almost universally accepted requires that the *Genus* or the *Species* shall bear the name given it by the person first describing the *Genus* or *Species*. Thus, although many species of violets were known before Linnaeus, he first applied the name in

the system now current; hence *Viola* remains in all countries the name of a group of plants having many common characteristics, while the specific name *tricolor*, also given by the same great botanist, remains the name for this particular species.

In writing this name botanists are accustomed to follow it by the name or the initial letter of the authority giving the name; thus, *Viola tricolor*, L. But another species of *Viola* described and named by the botanist De Candolle is *Viola arenaria*, DC.

A plant which has been assigned to a Genus, not the one to which it was originally assigned, retains the specific name given by the first authority whose name follows in brackets and the name of the later authority follows this: thus, *Ranunculus Cymbalaria*, Pursh, is now *Oxygraphis Cymbalaria* (Pursh), Prantl.

It must be acknowledged, even by those who do not like to charge their memories with unfamiliar names, that this general system is most important and even necessary, yet it is unfortunate that so many men of learning have, in the naming of the plants which they have described, forgotten that simplicity and euphony should characterize the nomenclature of objects of interest.

It is an interesting and most fortunate fact that the great Linnaeus, who introduced and established the double-name system and who gave their names to a vast number of plants, was a true lover of them and made it a rule to employ the simplest terms that he could find for his *specific* names; the terms which he used as *generic* names were, in a great number of cases, those which had already been employed for one or other plant of the group before he introduced his nomenclature, so that he was not always responsible for these generic names, but even here, when he was at liberty to choose, he selected the most euphonic or the most familiar name. Thus the generic name *Viola* was not originally used by Linnaeus, but was selected by him from several applied to the same group; then, to specify a particular form of *Viola* he gave the specific name *tricolor*, an easy name to remember and one in euphony with the generic term. Through all the vast lists of these specific names given by this great man the character of simplicity will be observed and it will be noticed also that these simple terms are repeated over and over. This systematic effort at simplicity, it is unfortunately necessary to add, has not always been imitated by botanists of lesser fame.

CLASSIFICATION OF PLANTS

When we observe a considerable number of plants we may find among them striking differences in manner of growth, in comparative size and in the form of leaves and flowers as well as in other details. But on further observation we may find in this diversified collection a number of groups, the individuals of which can only, with difficulty, be distinguished from each other, or which are quite indistinguishable from a slight examination. Observing still further we may see that some of these groups, the individuals of which are alike, strongly resemble some other groups, while the individuals of one group differ in some important respects from individuals of the other groups. We may carry these comparisons to several degrees of approximate resemblance and we may find that of the diversified collection, which at first seemed to possess no organization, we may separate the individuals into several more or less approximately related groups.

Taking those first, the individuals of which resemble each other more than they resemble any others in the collection, we would have the first of our series of groups. Selecting next from these first groups the groups which most strongly resemble each other, that is, which have the greatest number of common characteristics, we would have a second grouping which, with perhaps many common features, would still include some differences. Still carefully observing we might still arrange this secondary group into a more general assemblage.

This is what has been done in the classification of plants. In respect to the first group, the group in which the individuals so strongly resemble each other that, given the name of one individual we call all the others by the same name, it has been found that from the seed of one of these individuals we may obtain a plant just like the parent plant and like the other individuals of the original group.

Such a group of individuals, from the seeds of which may be produced succeeding generations of similar plants, is known as a *Species*.

We need not then further define a *Species* than by saying that it is a group of individuals resembling each other more than they resemble individuals of any other group and that from the seed or from cuttings may be produced other generations similar to the first.

Our second grouping would include plants which, although hav-

ing characteristics common to all, would have less resemblances among the individuals than we find in the Species and if the seed of one member of the group were planted it would not produce a plant which would resemble all the members, but only members exactly like that which produced the seed.

This secondary grouping is known as a *Genus* (meaning *race*, *stock*). It is the second step in our classification and the second easiest, for there are usually found between the species of a genus very obvious connecting features.

But on much closer scrutiny we may collect these *Genera* into other groups with evident general resemblances shown either in general appearance or by the comparative study of one or more classes of organs. It is, in fact, by this latter method principally that this third grouping is determined and the groups are called *Families*.

Even these Families may be united into larger groups and we have *Orders*, and the collection of Orders leads us to *Classes*, and these Classes finally form *Divisions*.

Thus, the mushrooms, which are without flowers and without seeds, belong to one Division, while the violet, with its flower and its seed, belongs to another Division; and of the flowering and seeded plants we have the large group of plants with parallel veined leaves whose ovules have a single lobe, belonging to one Class, while the plants with net-veined leaves and two-lobed ovules belong to another Class.

We may then arrange our groups of plants, from the most general to the most specific groups, as follows:

Divisions. Classes. Orders. Families. Genera. Species.

It is found convenient in some cases to subdivide some of these groups, when the subdivisions are known as Sub-Classes, Sub-Families, etc., or, in the case of Species, as Varieties.

In treatises and text-books during most of the nineteenth century it was the custom to arrange the sequence of Families according to a prevailing view of the perfection of the development of the plants from highest to lowest; commencing with what were regarded as the most fully developed, the plants of the *Ranunculus Family*, and proceeding towards those less completely organized.

This system of arrangement has, within the past few years, given way to the much more natural and more reasonable arrangement of finding the sequence of the Families in the gradual evolution of the organs of the plants. This system has not simply reversed the order of arrangement with which many of us have become fa-

miliar; investigation has changed the comparative rank of many Families so that the newer arrangement differs not only in the reversal of the sequences, but in a more or less general rearrangement.

Again, the text-books universally known in this country during the last half century and more, those of Gray and Wood, like others less generally used, employed the term *Order* for the grouping next higher than that of the *Genus*. The term *Family* is now used where Gray and Wood and their contemporaries used the term *Order* and this latter term is employed for a group of *Families*.

Thus we have, in the main, returned to the method of classification of Antoine Laurent de Jussieu which was published in 1789, but with modifications such as more recent investigations have suggested.

The arrangement most generally accepted at present is that of Dr. Adolph Engler,¹ which system, with few modifications, has been followed in this work.

The system is based upon the principle of development from the more simple to the more complex. Yet it is not always practicable to follow in a direct line such an evolutionary principle, since evolution has progressed along different lines. Hence, one line is followed to its highest point of development. For example, along the line of monocotyledonous plants the Orchid Family represents the highest degree of development. It is more highly specialized than many plants of the Class of Dicotyledons, yet because, on the whole, this latter Class contains the most complex organizations, the whole of the Class takes rank above the whole of the Class of Monocotyledons, including the Orchids.

This system of arrangement reveals the beauty of the principle of development in the Plant Kingdom and by the gradual modifications which contribute to the characters of the successive Families the student is presented with a panorama of the history of the plant world which not only charms by the beauty of its symmetry, but enables him with much greater facility to comprehend and remember the relationship of the groups which he studies than was possible by the former system.

SOME OF THE CHARACTERS OF PLANTS USED AS THE BASES OF CLASSIFICATION

Evidently in order to form a practical system of classification of

¹ Dr. Engler is Professor of Botany and Director of the Botanical Gardens and Museums of Berlin.

plants certain characters must be chosen which are common to one group and which are absent from another.

Thus we may commence with the individuals which are most alike and proceed toward those which have the least number of common characteristics or we may commence with those having but few characters in common and proceed to those in which most of the characters are common.

The system which we may adopt may be an artificial one, such, for example, as the distinction between trees and herbs, water plants and land plants and other such characters. The beautiful system of Linnaeus which served so long as an almost indispensable aid in the study of plants was an artificial one based, for flowering plants, in great part, upon the number and relations of the stamens and pistils. Even now this system is perhaps the most convenient for the determination of the species.

It has, however, in later times, given way to the system known as the *natural method* which has infinitely greater scientific value. It is in fact based, so far as our knowledge extends, upon the theory of genealogical descent, determined by the analogy of characters. To this we have referred in the preceding section.

It would be impracticable in this place to indicate every element in such a great system, but for our present purpose we may consider the first great division in the plant kingdom as that which places all plants propagated by seeds in one class and those which are perpetuated without seeds in another.

The plants included in this work belong to a single *Grand Division* of the Vegetable Kingdom. They are *Embryo-bearing Plants* (technically) *Embryophyta*.

This Grand Division is also called the Division of *Flower-Bearing Plants*. It is characterized by the fact that the succeeding generations are developed from true seeds which contain in themselves an embryo stem which terminates at one extremity in what is known as the *plumule*, the embryonic first leaf or leaves, and at the other extremity as the *radicle* or embryonic rootlet.

The seed containing the embryo is always developed while connected with the parent plant.

Ferns, true mosses, mushrooms and other non-flowering plants are propagated by a different form of generation. The non-flowering species of higher development are propagated by spores which differ from seeds in being less specialized and apparently less elevated in the scale of development. In the lowest orders propagation is by simple division of the cell constituting the plant or by the formation within the parent cell of a group of similar cells

which are set free by the bursting of the wall of the parent cell. This separating the seed-bearing from the non-seed bearing plants constitutes a natural and to a great extent a definite division.

Taking now the plants which are developed from seeds we find certain very general features which are characteristic of large groups. Thus, in a great class of seed-bearing plants the seeds are borne within a closed cavity; for example, the seeds of the pea-vine are enclosed within the pod, those of the rose within the rounded red fruit and those of the portulaca in a round capsule. On the other hand, if we examine one of the "cones" from a pine tree we find, on separating the more or less woody scales of which it is composed, the seeds lying between these scales not enclosed in a protecting chamber. This character prevails with all the species of pines, spruces and the like and seems to be an extremely old form of seed growth, for it is frequently found among the fossils of the carboniferous age.

This contrast between plants bearing seeds in an enclosed chamber and those plants bearing seeds not enclosed has been taken by botanists as the first line of division, and we have the *First Division* of embryo-bearing plants consisting of those with the seeds not enclosed, naked seeded, and a *Second Division*, including all those whose seeds are enclosed within a chamber and these two great divisions include all the embryo-bearing plants. Hence we have reached the first step in Classification.

Although the Gymnosperms are divided into a number of groups all of the species in our northeastern States belong to a single class, the *Coniferae*.

A difference in the construction of the seeds leads to two great *classes* among the Angiosperms or plants whose seeds are protected within an ovary.

If a grain of wheat, or a seed from some other grassy plant, and a garden bean or pea are placed in water for a few hours the outer covering or integument can then be easily removed, when it will be seen that the two kinds of seeds act quite differently, that in case of the bean or pea the seed easily divides into two principal lobes between which lies a small leaf-like object, the embryo, while in the case of the wheat kernel no such division occurs, but the embryo lies curled at the base of the single lobe. The two larger parts in the case of the bean and the one principal mass in the case of the wheat are the lobes, or technically the *cotyledons*, which are masses of nutriment stored up for the support of the embryo until it can draw its own subsistence from the soil.

The single lobe, with the embryo attached, the single cotyledon

of the wheat seed represents for the whole class to which the grains, grasses, lilies, etc., belong, as the two lobes or cotyledons of the bean represent the structure of the seeds of the other class.

Upon these facts then we may commence the formation of a table of classification as follows.

FIRST GRAND DIVISION.—CRYPTOGAMS

This is not the more technical division for, in more recent times that division of the vegetable kingdom which has been long distinguished by this term has been divided into several groups, which include the Green Algae, Diatoms, Stoneworts, Fungi, Mosses, Fern-like plants and others. Since none of these classes are included in this work it is unnecessary to specify these divisions. The character which divides all these so-called *lower* forms of vegetation from those with which we shall be occupied is the absence of flowers and of seeds. They were called in the Linnean system of classification *Cryptogams* (*cryptos*, hidden), because the manner of fertilization was not understood.

SECOND GRAND DIVISION.—PHANEROGAMIA OR EMBRYOPHYTA

This great division includes all plants having stamens and pistils and bearing seeds. The term Phanerogamia (*phaneros*, visible), refers to the manifest organs of reproduction, the pistils and stamens, while the term Embryophyta signifies an *embryo bearer*. The division is divided into two subdivisions.

FIRST SUBDIVISION.—GYMNOSPERMS

Characterized by the naked ovules (*gymnos*, naked), that is, ovules not enclosed in an ovary.

SECOND SUBDIVISION.—ANGIOSPERMS

The subdivision characterized by the fact that the ovules are protected within an ovary.

The subdivision ANGIOSPERMS is divided into two great classes.

CLASS I.—MONOCOTYLEDONS

Plants whose seeds have but a single lobe.

CLASS II.—DICOTYLEDONS

Plants whose seeds have two (rarely more) lobes.

These classes are again divided as we have seen in the preceding section into orders, these orders into families and these families into genera and then species.

In the extended table at page 57 will be found characters generally sufficient to lead us to the Order in which we may find a given plant growing native in our region.

COLLECTING, DRYING AND MOUNTING OF PLANTS

Many intelligent people believe that they have a genuine love for plants, yet they take a seeming pride in the fact that they know little or nothing of their natural relations or even their names, with few exceptions.

It is impossible to have any true appreciation of any class of objects or beings of which we have only the most superficial knowledge.

The pleasure experienced by one who has gained some acquaintance with a group of plants when such an one encounters a member of the group, which he or she has not met before, and the enjoyment of one who is prepared to make comparisons between the different species which may be encountered in a morning's walk, quite surpasses the indifferent satisfaction of one who is pleased only by the color and form of a flower, while the body of the plant is almost or completely disregarded.

Fortunately something beyond a vague undefined enjoyment of plants is now desired by a much larger class of people than was formerly interested in them.

If the technical names of the common plants met with in our excursions through the fields and groves are learned, one soon becomes interested in finding that these names express relations between individuals of different aspect, which would otherwise be unsuspected. A knowledge of the common names is quite insufficient to enable the casual observer to detect these relations. An illustration of this statement might be found in the case of two species of *Cornus* common in our region. The excursionist meets with a little plant two to four inches high with a white flower succeeded by a bunch of red berries. He knows the plant as the "Bunch berry." Extending the walk, a tree twenty or thirty feet high is met with; it is adorned with hundreds of large white flowers with green centers. The tree is the dogwood. In these names there are no suggestions of any relation between the little dwarf plant and the flower-bedecked tree. Should the excursionist, however, learn that the name of each is *Cornus*, he would be interested to search for the resemblance and he would soon find that the "flower" in each case is a group of flowers arranged in very similar fashion, and that there is in fact a striking resemblance between the little herb and the spreading tree.

Such relations and resemblances are to be observed on every

hand and mainly by the use of technical names are these resemblances and relations suggested.

The corollary of this is that in order to enjoy the plants and flowers which we meet we should possess a knowledge of botany at least to the extent of recognizing common plants by their technical names.

To one who would like to have a knowledge of the plants of his or her immediate locality an herbarium is important, not to say essential. One cannot always find a growing specimen which has already been identified with which to compare a newly found specimen. The exercise which will soonest fix the name, character and relations of a plant in mind is the act of preparing it for and preserving it in an herbarium.

An herbarium is a collection of dried plants arranged according to a system of classification.

When the beginner thinks of the great number of plants which would constitute a complete herbarium he is in danger of discouragement, but it is to be remembered that no herbarium is complete, even the greatest. A collection of the plants of a certain locality, a county, a town or even a lesser area is valuable according to its completeness for the given region and the amateur who will make a thorough collection of the plants growing in his town or even in his school district will be a contributor not only to his own enjoyment and to his own intellectual culture, but to science as well.

Hence the collection should begin in the best way, and the best way is, after all, the easiest way.

First, the botanist or the amateur plant-lover should be provided with a receptacle for the specimens to be taken home from his or her excursions. The most convenient receptacle is a tin box made for the purpose and sold by dealers and known as a vasculum or botanist's box. In absence of the conventional botanist's box any closed tin box may serve, such, for example, as those in which certain biscuits are sold at the grocers. Cardboard boxes are scarcely a protection and they absorb the moisture from the plant as blotting paper absorbs ink. People who send flowers by mail in cardboard boxes usually waste the stamps they use, while the friend to whom the flowers are consigned receives a crushed box with wilted flowers. A tin box with a fairly close cover will preserve plants quite fresh during several days, often more than a week.

Plants for preservation or for study should be placed at once in the closed box in order to preserve their freshness. A few specimens of a single species are better than many. Small plants should be taken with the roots. Larger plants should always show characteristic leaves and portions of stem. The beginner should

always commence with a collection of the commonest plants. If one waits for rare or beautiful specimens the collection will grow slowly and will be imperfect and unsatisfactory.

The specimens which are to be preserved must go into the press. The form and materials for a press should next be considered. The purpose is to dry the specimens in the best manner, and in the least practical time.

A press may be made of two thin boards, a few newspapers and a pair of straps with buckles. Dealers supply much better presses at a low cost, which are made of thin slats fastened to cross-bars, the two sides enclosing the drying papers, straps with buckles being used to produce the pressure which should be sufficient to flatten the specimens, but not enough to crush them. Such presses permit of more rapid drying than those made of boards. A temporary press may be made of a number of layers of newspapers laid upon the floor or a table over which a board is laid upon which is placed a weight. Drying papers are sold by dealers, but by far the most convenient papers are ordinary newspapers, not calendered. While for some purposes they are not equal to prepared dryers they are always at hand. Many persons press small plants between the leaves of illustrated magazines. As these magazines are made up largely of highly calendered paper absorption is prevented and the specimens turn black or the leaves drop off. Experience will soon help the beginner to know about how much paper should lie between the different specimens, but one rule might be stated. If a very considerable number of plants is to go into the press more layers should lie between the different specimens than would be required for a few.

The plant to be preserved should, after being identified, be laid carefully between the drying papers in such a way as to show the leaves, stem, root, when practical, the flowers and fruit, if the fruit and flower are both on the same plant at the same time. If not there should finally be a specimen each for flower and for fruit. As the specimen is placed between the sheets *there should always be placed with it* a slip of paper with the name of the plant, the date when collected, the locality and, generally, the kind of soil in which it grew. This slip should be carefully preserved in connection with the specimen until the latter is finally mounted on the herbarium sheet when the record should be transferred to it also.

Ranunculus acris. L.

Englewood, N. J.,

May 15, 1909.

Found in moist meadows, or dryer soil.

Placing the press in the open air in the sunlight will hasten the drying, or at the seaside or in damp weather the press may be placed near a stove. When the specimen is dried it is ready for the herbarium. The mounting papers should if possible be of the standard size, $10\frac{1}{2} \times 16\frac{1}{2}$ inches. If it is inconvenient to have such papers the specimens may be kept in folders of fragments of newspapers or sheets of thin wrapping paper or they may be transferred temporarily to sheets of paper of any size by using fasteners which will permit of the final removal of the specimen to standard size paper, care being always taken that the record follows it.

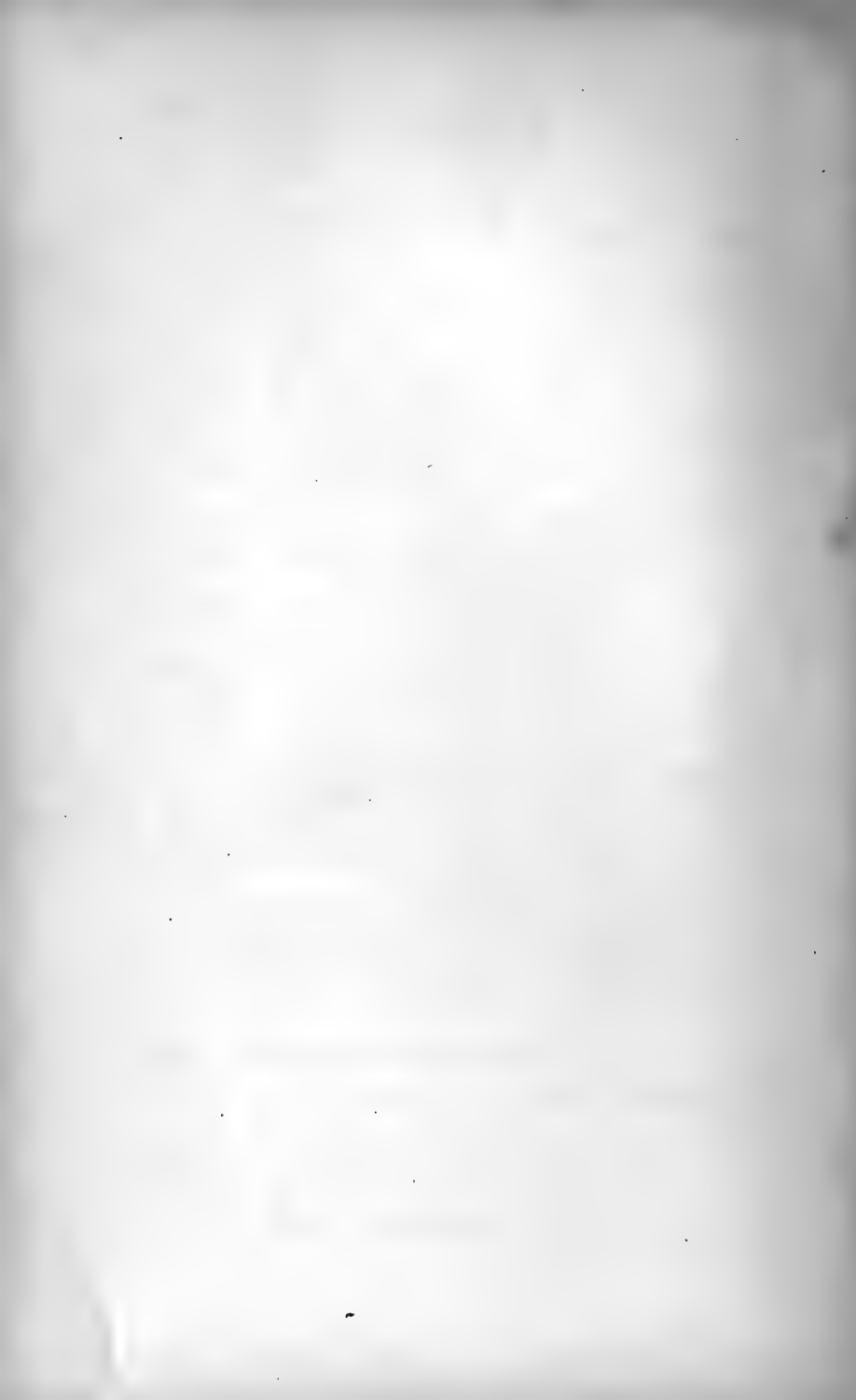
When a considerable number of specimens have been properly dried and mounted they should be placed in folders of manilla paper, each folder to receive the plants of a genus, the name of the genus to appear on the lower left hand corner. Should a genus contain many species and these perhaps some varieties, thinner folders may be used within the genus holders to separate the species, especially when it is desirable to preserve several specimens of the same species to illustrate the growth of the plant under different circumstances of soil or climate. It is a mistake to mount the specimens in a book.

Finally, should the collection become large the genus folders should be arranged in a cabinet according to their families.

It is better to keep specimens gathered in widely different localities, for example, those collected in the Northern States and those from the Southern States in separate collections unless the collection has become so important that it fully represents this broad extent of country.

PART II

SPECIAL FLORA OF THE MIDDLE
ATLANTIC AND NEW ENGLAND
STATES



FLORA

GROUPING OF FLOWERING PLANTS

Among the plants familiar to us are found some which do not produce seeds, that is, seeds in the sense that the grains of wheat or of mustard are seeds, each containing the embryo of a future plant. Such plants as ferns, mosses, mushrooms and a great number of less conspicuous forms do not produce seeds of this kind, and, therefore, since a flower is a collection of organs essential to the evolution of the seed, these plants which are not reproduced from seeds have no occasion for flowers and consequently do not produce them.

Plants producing neither flowers nor seeds constitute a great group by themselves, while those commonly known as "the higher plants" constitute another well defined group.

This latter group, characterized by the production of flowers and seeds is known as the Grand Division of Flowering Plants. Technically the Grand Division is known as *Embryophyta*,¹ the word meaning *Embryo-plants* or *Phanerogamia*, meaning plants having manifest flowers.

In the introductory part of this work more detailed information regarding the principles of grouping in this Grand Division will be found. This should be carefully studied.

The following table includes the Sub-divisions, Classes and Orders of this primary plant series so far as the orders are represented by native plants in our area.

The word Order as employed in the table and throughout this work is applied to a larger group than that to which it was applied in text-books a few years ago. The groups then known as orders are now known as *families* and an *order*, as the term is now used, may include several families.

THE GRAND DIVISION OF FLOWERING PLANTS

(EMBRYOPHATA, PHANEROGAMIA)

Plants which produce seeds. They are provided with fully developed or with rudimentary stamens and pistils which are the essential elements of flowers. They are grouped into two Sub-divisions

¹ This grand or primary division is also known as *Phanerogamia*, meaning visible flowers, while the primary series, not endowed with such flowers is known as *Cryptogamia*, or hidden flowers.

SUB-DIVISION I—GYMNOSPERMAE¹—NAKED-SEEDED PLANTS

(Page 81)

Plants whose seeds are not enclosed in protective seed vessels. There are several Classes of Gymnosperms, only one of which is represented in our region, though the Ginko tree, which is somewhat extensively planted as an ornamental tree, is a member of one of these classes, not, however, growing as a native tree with us. Our native plants with this peculiarity of naked seeds are all included in a single group.

CLASS—CONIFERAE—CONE-BEARING PLANTS

(Page 81)

The plants of this class are included in the Pine and Yew families. They are trees or shrubs with needle-shaped or scale-like leaves and are mostly evergreen. The seeds are borne on the face of a scale, a number of scales forming a *cone*.

A vast majority of our flowering plants, however, have their seeds concealed in some form of closed envelope as is the case with the pea in its pod, the small seeds of the larkspur in their dry follicle or the seeds of the apple, enclosed by the tough parchment-like walls which are themselves surrounded by the pulp, those of the squash covered in by the pulp and the tough thick shell. Plants whose seeds are thus enclosed constitute the second great Sub-division.

SUB-DIVISION II—ANGIOSPERMAE²—PLANTS WITH ENCLOSED SEEDS

(Page 89)

Plants whose ovules or seeds are enclosed in a protective seed vessel, the ovary.

This second Sub-division is divided into two classes, each characterized by the manner of growth of the stem and by the number of lobes constituting the seeds.

Below are seen three figures representing the naked seeds of the Pine family and three examples of enclosed seeds.



FIG. 1.

1. A scale from the cone of a pine with two winged seeds lying upon its surface.
2. A cone of hemlock.
3. A single scale from a hemlock cone with its two winged seeds. The protection for the ovules thus lying upon the surface of a scale is from an overlying scale, the ovule resting between the two.
4. A pod of wild mustard, the three lower seeds are exposed by cutting parts of the pod.
5. Three follicles of monkshood, the seeds of one follicle exposed.
6. Section of an apple, showing the membranous core, which constitutes the immediate envelope for the seeds.

¹ Gymnos, naked; sperma, seed.² Aggeion, a vessel.

CLASS I—MONOCOTYLEDONS—PLANTS WITH SINGLE LOBED OVULES

The seeds have a single lobe or *cotyledon* constituting a rudimentary leaf. The leaves of plants of this class are, in general, parallel-veined, and in the stem there is no distinction of pith, wood and bark. The flower of most of the land plants of this class and of the more highly developed of its aquatics, has its parts in 3's (petals 3 or 6, sepals 3 and stamens 3 or 6). In the submersed aquatics and in some other water plants of the class, also in some of the grass-like plants, the parts of the flower are in 2's or 4's or very rarely in 5's.

ORDERS OF MONOCOTYLEDONOUS PLANTS IN OUR AREA

ORDER I—PANDANALES—CAT-TAIL ORDER

(Page 90)

Herbs growing in marshes or other wet places. The flowers are arranged on the fleshy terminal of the stem in the form known as a *spadix*, but without the leaf-like sheath characteristic of the Arum family. The envelope about the floral elements (perianth) is composed of bristles or chaffy scales and the flowers bearing stamens and those bearing pistils are in different groups, one above the other. The flowers are arranged in long cylindric groups or in rounded heads.



7. Pistillate flower of Cat-tail. 8. Cat-tail. 9. Bur-reed. 10. Pistillate flower of Bur-reed.

ORDER II—HELOBIAE¹—WATER OR MARSH PLANTS

(Page 93)

Plants wholly or partly submersed in water or partly floating. In some families the perianth (flower envelope) is wanting or incomplete, while in others it is present and conspicuous. The perianth has never more than 4 segments in a single series and it is only in the very inconspicuous flowers that there are so many. The more conspicuous flowers have a calyx of 3 sepals and a corolla of the same number of petals. The stamens number from 1 to many.



11 and 12 Pondweeds. 13. Ruppia. 14. Arrowgrass. 15. Duckweed. 16. Arrow-head.

ORDER III—GLUMIFLORAE—GLUMACEOUS PLANTS

(Page 109)

Flowers bearing glumes of dry husks, which take the place of the

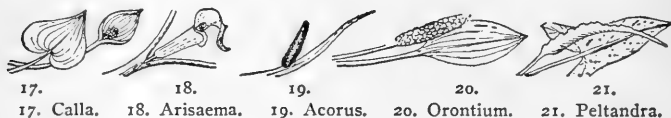
¹ *Helos*, marsh; *bios*, life.

petals of other flowers. The class includes grasses and sedges. These are not included in this work.

ORDER IV—SPATHIFLORAE—SPADIX-FLOWERED PLANTS

(Page 109)

Flowers are borne on a fleshy, club-like receptacle (a spadix), which is usually surrounded by a broad leaf-like sheath, sometimes highly colored (A spathe).



17. Calla. 18. Arisaema. 19. Acorus. 20. Orontium. 21. Peltandra.

ORDER V—FARINOSAE—PLANTS WITH MEALY SEEDS

(Page 112)

Flowers regular or nearly so (except in Commelina), the several carpels united into a single ovary. The flower parts are mostly in 3's or 6's. Ovary situated above the corolla and calyx. Differs structurally from the following order in that the embryo is placed at the end of the seed opposite the point of attachment of the seed to the ovary.



22. Xyris. 23. Pipewort. 24. Day-flower. 25. Spiderwort.

ORDER VI—LILIFLORAE—PLANTS WITH LILIACEOUS FLOWERS

(Page 117)

Flowers generally conspicuous and symmetrical. The flower parts always in 3's; petals 6, stamens 6 or 3, pistil 1 with a 3-celled ovary.



26. Lily. 27. Onion. 28. Veratrum. 29. Bellwort. 30. Hyacinth. 31. False Lily-of-the-Valley. 32. Trillium. 33. Smilax.

ORDER VII—ORCHIDACEAE—PLANTS WITH ORCHIDACEOUS FLOWERS

(Page 146)

Leaves with parallel veins or veins spreading in elliptical lines. Flowers usually unsymmetrical, stamens growing in union with the pistil within the flower envelope.



34. Cypripedium. 35. Orchis spectabilis. 36. Orchis orbicularis. 37. White bog orchis. 38. Fringed orchis. 39. Pogonia. 40. Calypso.

CLASS II—DICOTYLEDONS—PLANTS WITH TWIN-LOBED OVULES
(Page 164)

The seeds have 2 lobes or cotyledons. The leaves are, almost always, net-veined, and the distinction of pith, wood and bark is evident. The flower parts or members are very rarely in 3's, but usually in 5's or less frequently in 4's.

SUB-CLASSES, GROUPS AND ORDERS OF DICOTYLEDONOUS PLANTS IN OUR AREA

SUB-CLASS I—CHORIPETALAE
(Page 166)

Petals separate (examples: Buttercup, Pink, Violet). This natural Sub-Class is here divided into two more or less natural groups, for notwithstanding the sub-class is composed of plants, the flowers of which are assumed technically to have divided petals there is, in fact, a great group in which the petals are undeveloped or in which the floral envelope is of a very rudimentary character. We shall then assume the groups:

1. Flowers without petals 1st. Group, APETALAE
2. Flowers with several petals or colored sepals. 2d. Group,
 POLYPETALAE

GROUP I.—ORDERS OF APETALOUS CHORIPETALAE

ORDER I—JULIFLORALES—CATKIN-BEARING TREES AND HERBS
(Page 166)

Flowers grouped in large numbers in catkin-like inflorescence or in fascicles. Flowers without corolla and often without calyx. Trees, shrubs and herbs.



40. Staminate catkin of Willow. 41. Single flower. 42. Pistillate catkin of Willow. 43. Staminate catkin of Poplar. 44. Pistillate catkin of Poplar. 45. Pistillate catkin of Hornbeam. 46. Single pistillate flower. 47. Staminate cluster of Elm. 48. Winged seed of Elm. 49. Catkin of Nettle. 50. Catkin of Hop.

ORDER II—SANTALES—THE MISTLETOE ORDER
(Page 196)

Plants, (ours) all parasites; calyx present, sometimes colored, corolla absent, flowers not in catkins. Ovary 1-celled, below the sepals.

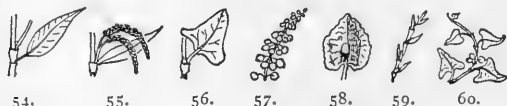


51. Mistletoe. 52. Flower of Wild Günger. 53. Flower of Dutchman's Pipe.

ORDER III—POLYGONALES—THE BUCKWHEAT ORDER

(Page 200)

Our species, herbs, mostly in wet places. Flowers in general, regular, the parts mostly in 3s. Ovary 1-celled, 1-seeded, the seed arising from the base of the ovary. Leaves alternate, subtended by a collaret or sheathing stipule, technically an *ocrea*.



54. Single joint and leaf of Polygonum. 55. Catkin of Polygonum. 56. Leaf of Buckwheat. 57. Spike of flowers of Dock. 58. Winged seed of Dock. 59. Spray of Door Weed. 60. Spray of Bind Weed.

ORDER IV—CHENOPODIINEAE—PIG WEED ORDER

(Page 210)

Our species always herbs, mostly weeds in cultivated grounds. (The beet and spinach are valuable cultivated species.) Flowers always with the members equal, but these are generally very small and inconspicuous, rarely colored and the corolla is nearly always absent. Ovary 1-celled, 1-seeded. Leaves *without stipules or collaret*.



64. Summit of Pig Weed. 65. Transverse section of seed of Pig Weed. 66. Flower of same. 67. Summit of Orache. 68. Seed of Orache. 69. Summit of Slender Glasswort. 70. Spray of Dondia. 71. Section of seed of same. 72. Flower of Poke Weed. 73. Flower of Pink. 74. Flower of Carpet Weed. 75. Flower of Lychnis.

ORDER V—PHYTOLACCINEAE—POKE ROOT ORDER

(Page 221)

A single, rather coarse plant, in our area, with flowers in a long nearly cylindric cluster. Individual flowers regular, stamens as many or more than the parts of the calyx. Corolla wanting, the calyx white or colored.

GROUP II—ORDERS OF POLYPETALOUS CHORIPETALAE

In this group the flowers have, as a rule, both calyx and corolla fully developed, the corolla consisting of several petals distinct and separate from each other. Examples: Buttercup, Wild Rose, Poppy. In a few species in the Order Caryophyllineae, a few in the Order Ranales, and a very few in other Orders the petals are undeveloped.

ORDER I—PORTULACINEAE—ORDER OF PURSLANES

(Page 223)

Flowers with calyx and corolla, the former of 2 (or more) sepals, the latter of 4 or 5 (or more) petals. Stamens as many as the petals and opposite to them or sometimes more or less. Ovary of 1 cell with many ovules arising from the base. Fruit a capsule, opening as a lid

at the top or by 3 teeth at top. Floral receptacle *concave* and the ovary above the petals and stamens.

ORDER II—CARYOPHYLLINEAE—PINK ORDER

(Page 224)

Flowers generally with both calyx and corolla, the latter of several distinct petals, mostly 5. In *Paronichia* and in certain species of some other genera the corolla is undeveloped or only rudimentary. Ovary of 1 cell, above the stamens and corolla, many seeded, the ovules arising from the central column. Leaves always opposite and without teeth or lobes and without stipules.

ORDER III—RANALES—ORDER OF POLYCARPES

(Page 240)

Flowers with several petals or in a few exceptional cases without apparent petals, regular or irregular. Stamens usually numerous more than the petals. Stamens and petals *below the ovary*, which consists of 1 or more, frequently several, seed vessels (carpels) which, in general, are free from each other (example, those of the Buttercup). The parts of the flower are usually inserted in a spiral line. The Order includes Families differing widely in appearance, but which are united by these general characteristics.



76. Flower of Water Lily. 77. Spray of Hornwort. 78. Section of flower of *Ranunculus*. 79. Flower of *Columbine*. 80. Flower of *Larkspur*. 81. Flower cluster of *Barberry*. 82. Flower of *Mandrake*. 83. *Menispermum*. 84. Leaf and fruit of *Sassafras*. 85. Flower of *Tulip Tree*.

ORDER IV—RHOEADALES—THE POPPY ORDER

(Page 268)

Flowers with double perianth, the petals usually 4, the sepals 2 or 4, sometimes 8. The parts of the perianth are always independent. The receptacle is, with few exceptions, convex; stamens 4 or more. Seed caskets (carpels) 2 or more, which ordinarily grow together, forming a single ovary as in the Poppy.



86. "Head" of Poppy. 87. Fruit of *Celandine*. 88. Flower of *Biscutella*. 89. Flower of *Cardamine*. 90. Stamens and pistil of *Cardamine*. 91. Pod (silicle), of *Shepherd's Purse*. 92. Pod (silicle), of *Penny Cress*. 94. Flower of *Cleome*. 95. Flower of *Mignonette*.

ORDER V—SARRACENIALES—ORDER OF THE PITCHER PLANTS

(Page 291)

Seed caskets (carpels) 2 or more united into one. Ovaries above the stamens, corolla usually of 5 petals. Leaves all at the base. In *Sar-*

racenia the leaf stalk is transformed into a hollow tube. Insectivorous plants growing in swamps, secreting a viscid substance which aids in the capture of insects.



98. Flower of Pitcher Plant. 99. Leaf of Drosera.

ORDER VI—ROSALES—ORDER OF THE ROSE ALLIANCE
(Page 292)

Seed caskets (carpels) of variable number, free from each other or growing together. Petals and sepals usually 5. Stamens more numerous or of the same number. Flowers symmetrical or not. Receptacle concave. Leaves simple or compound. The stamens are usually inserted on the calyx a short distance from the ovary or at the top of the ovary.



100. Schematic section of Rose hip. 101. Fruit of Gooseberry. 102. Fruit of Cherry. 103. Section of Apple. 104. Fruit of Strawberry. 105. Fruit of Blackberry. 106. Flower of Wild Vetch. 107. Flower of Clover. 108. Pod of Wild Vetch. 109. Flower of Sensitive Pea.

ORDER VII—GERANIALES—ORDER OF THE GERANIUMS
(Page 364)

Ovary superior to and free from the calyx. Stamens few, as many as the sepals and opposite them or fewer when the corolla is irregular. The ovules are pendulous, the *raphe* or ridge toward the axis of the ovary.



110. Fruit of Geranium. 111. The same after the bursting of the ovary. 112. Section of flower of Oxalis. 113. Flower of Flax. 114. Fruit of Flax. 115. Cluster of fruit of Prickly Ash. 116. Cluster of flowers of Polygala. 117. Flower of Polygala. 118. Flower of Acylopha. 119. Flower of Euphorbia. 120. Summit of Calitriche.

ORDER VIII—SAPINDALES—ORDER OF THE MAPLES
(Page 380)

The characteristics which differentiate this order from the preceding is the fact that the ovules are pendulous *with the ridge or raphe* turned *away from* the axis of the ovary.



121. Spray of Empetrum. 122. Cluster of flowers of Sumac. 123. Berries of Holly. 124. Flowers of Euonymus. 125. Leaf of Staphylea. 126. Fruit (key) of Maple. 127. Flower of Jewel Weed. 128. Flowers of Buckthorn. 129. Grapes.

ORDER IX—RHAMNALES—ORDER OF THE BUCKTHORN

(Page 394)

Shrubs, trees or vines. Ovary superior and free from the calyx. Stamens as many as the divisions of the calyx and *alternate* with them. When petals are present the stamens are opposite to them. Ovules not pedulous.

ORDER X—MALVALES—ORDER OF THE MALLOWS

(Page 396)

Trees, shrubs or herbs with distinct petals and, usually, numerous stamens. Carpels united into a compound ovary, which is free from the calyx and above it. Sepals, in the bud, meeting but not overlapping. Ovule bearing surface forming a central column within the capsule.



130. 131. 132.

130. Leaf and fruit of Linden. 131. Flower of Mallow. 132. Fruit of Mallow.

ORDER XI—PARIETALES—ORDER OF THE VIOLETS

(Page 400)

Herbs, rarely trees or shrubs, ours all small herbs. Sepals overlapping each other in bud or are longitudinally rolled. Ovules generally attached to the *sides* of the capsule or rarely to central axis.



133. 134. 135. 136. 137. 138.

133. Flower of Hypericum. 134. Spray of Water-wort. 135. Flower of Pin-weed. 136. Fruit of Pin-weed. 137. Flower of Violet. 138. Flower of Yellow Passion Flower.

ORDER XII—OPUNTIALES—ORDER OF THE CACTI

(Page 417)

Fleshy and generally, spiny plants. Ovary inferior to the calyx and attached to it. Sepals and petals numerous, indefinite in number.

ORDER XIII—THYMELEALES—ORDER OF THE MOOSE WOOD

(Page 417)

In our area, all shrubs, not fleshy or spiny. Calyx extending upwards upon the ovary and *attached to it*. In our species petals are wanting. Ovary of a single cell with a single ovule.

ORDER XIV—MYRTALES—ORDER OF THE MYRTLES

(Page 418)

Calyx attached to the ovary or the latter is free. Ovules are numerous. Petals present except in one family of aquatic plants.



139. Buffalo Berry. 140. Lythrum. 141. Flower of Rhexia. 142. Flower of Ludwigia. 143. Flower of Epilobium. 144. Flower of Evening Primrose. 145. Flower of Enchanters Nightshade. 146. Spray of Myriophyllum.

ORDER XV—UMBELLALES—ORDER OF THE CARROT

(Page 434)

Herbs, shrubs or trees. Flowers in umbels or umbel-like heads. Ovary surrounded by the calyx, each cell of the ovary containing a single ovule. Stamens equal in number with the petals and alternate with them.



147. Umbel of Aralia. 148. Umbel of Wild Carrot. 149. Umbel of Bupleurum. 150. Hydrocotyle. 151. Umbel of Cornus.

(For Key to the Orders of Sub-Class II—*Sympetalous* or *Monopetalous Exogens*—See Page 456.)

AN ARTIFICIAL KEY TO THE FAMILIES OF PLANTS INCLUDED IN THIS WORK

(Numerals in parentheses refer to corresponding numbers of the small cuts.)

- 1. Ovules lying naked, usually between the scales of a cone or a berry-like body or on a fleshy disk. (1, 2, 3) CLASS CONIFERAE. 2
- 1. Ovules developed in a closed cavity (an ovary). (4, 5) CLASS ANGIOSPERMAE 3
- 2. Seeds (ovules) in a cone-like (1) body or in a 3-seeded berry PINACEAE. Pg. 82
- 2. Seeds (ovules) on a fleshy disk. (3) TAXACEAE. Pg. 82



- 3. Leaves mostly parallel-veined; flower parts usually in 3's; stem without pith. (6, 7) 4
- 3. Leaves net-veined; flower parts mostly in 5's or 4's, not in 3's; stems with pith, at least when young. (8, 9, 10) 25



CLASS I MONOCOTYLEDONS

- 4. Plants not aquatic 13

Aquatic Plants

- 4. Aquatic plants, floating or submersed 5
- 4. Aquatic plants, not floating nor wholly submersed 8

- 5. Small green disks floating on the surface of water, usually with thread-like roots extending downward in the water LEMNACEAE. Pg. 93
- 5. Plants with true leaves and stem 6
- 6. Flowers without white or colored perianth, arranged along a fleshy, club-like receptacle or in few flowered umbels. (11, 12) NAIADACEAE. Pg. 94
- 6. Flowers with white or colored perianth 7



- 7. Perianth adherent to the surface of the ovary. (15, 16) VALLISNERIACEAE. Pg. 108
- 7. Perianth not adherent to the ovary, flowers subtended by a small leaf-like sheath, one or few in heads
 *Heteranthera* in PONTEDERIACEAE. Pg. 116
- 8. Perianth of bristles, hairs or scales 9
- 8. Flowers with minute perianth or none 11
- 8. Perianth of well-developed and conspicuous parts 12
- 9. Perianth of bristles or hairs, flowers in compact cylinders. (17) TYPHACEAE. Pg. 90
- 9. Perianth of scales 10
- 10. Perianth of one or more very small scales, flowers in dense heads. (18) SPARGANIACEAE. Pg. 92
- 10. Perianth of 6 husk-like scales, green or brown, rush-like plants. (22) JUNCACEAE. Pg. 118



- 11. Flowers without perianth, on a fleshy spike (spadix), usually surrounded by or subtended by a leaf-like bract. (21) ARACEAE. Pg. 109
- 11. Plants with rush-like cylindric leaves and flower stems. Flowers in slender spikes, perianth herbaceous. (19) TRIGLOCHINEAE. Pg. 102

11. Plants with basal leaves, often wholly submersed. Flowers in dense round heads. (14) . . . ERIOCAULACEAE. Pg. 113



21.



22.

12. Flowers white; petals 3; sepals 3; flowers usually in successive whorls on the stem. (13) . . . ALISMACEAE. Pg. 103
 12. Flowers blue, in a thick spike which is subtended by a leaf-like sheath. (23) . . . PONTEDERACEAE. Pg. 116
 12. Flowers yellow, in elongated heads. (26) . . . XYRIDACEAE. Pg. 112

Terrestrial Plants

13. Flowers without perianth, on an elongated fleshy receptacle subtended by a leaf-like sheath. (27) . . . ARACEAE. Pg. 109
 13. Flowers with perianth of dry scales; grass-like plants. (21) . . . ORDER GLUMALES
 (The Glumales are not included in this work.)
 13. Perianth not of scales . . . 14



23.



24.



25.



26.

14. Flowers regular or irregular, blue, the flower or cluster subtended by a leaf-like sheath. (24, 25) COMMELINACEAE. Pg. 114
 14. Flowers or clusters not subtended by a leaf-like sheath . . . 15
 15. Stamens and pistils free from each other . . . 16
 15. Stamens and pistils united. (28, 29) . . . ORCHIDACEAE. Pg. 146
 16. Herbs . . . 17
 16. Woody vines. (30) . . . SMILACEAE. Pg. 140
 17. Stamens 6, petals 6 . . . 19
 17. Stamens 3 . . . 18



27.



28.



29.



30.



31.

18. Perianth of unequal parts. (31) . . . IRIDACEAE. Pg. 142
 18. Perianth of equal parts. (33) . . . HAEMODORACEAE. Pg. 141

19. Veinlets of leaves in form of a net-work. (32)
 *Trillium*, in CONVALLARIACEAE. Pg. 138
19. Veinlets not in form of a net-work 20
20. Flowers in umbels, leaves and stem arising from a bulb . . 21
20. Flowers not in umbels 22



32.



33.



34.



35.

21. Perianth adherent to the ovary AMARILLIDACEAE. Pg. 141
21. Perianth not adherent to the ovary. (34) ALLIACEAE. Pg. 130
22. Climbing vines. (35) DIOSCORIACEAE. Pg. 142
22. Plants not vines 23
23. Styles 3, distinct. (36) MELANTHACEAE. Pg. 125
23. Style 1 24
24. Fruit a fleshy berry. (37) CONVALLARIACEAE. Pg. 134
24. Fruit a capsule splitting lengthwise. (38) LILIACEAE. Pg. 124



36.



37.



38.

CLASS II

DICOTYLEDONS, OR EXOGENS

a. FLOWERS WITHOUT PETALS, 25

- b. FLOWERS WITH SEVERAL PETALS, 54. c. FLOWERS WITH UNITED PETALS, 119

25. Trees, shrubs or undershrubs 26
25. Herbs 39

Trees, shrubs and undershrubs

26. Flowers in catkins or catkin-like heads. (39, 40) 27
26. Flowers not in catkins nor catkin-like heads 33
27. Leaves compound, feather-formed (pinnate). (41)
 JUGLANDACEAE. Pg. 178
27. Leaves simple. (42) 28
28. Parasitic shrubs, on other trees; fruit a berry
 LORANTHACEAE. Pg. 198
28. Trees and shrubs, not parasitic 29

29. Sap milky MORACEAE. Pg. 194
 29. Sap not milky 30
 30. Calyx not present. (43) 31
 30. Calyx present. (44) 32
 31. Ovary of 1 cell, with 1 seed. (45) . . . MYRICACEAE. Pg. 177
 31. Ovary folliculate, many seeded. (46) . . SALICACEAE. Pg. 167
 32. Both pistillate and staminate flowers in catkins
 BETULACEAE. Pg. 180
 32. Pistillate flowers subtended by an involucre, which becomes
 a bur or a cup at maturity FAGACEAE. Pg. 185



39.



40.



41.



42.



43.



44.



45.



46.

33. Fruit a key (Samara) 34
 33. Fruit a rounded bur-like head
 *Liquidamber* in HAMAMELIDACEAE. Pg. 306
 33. Fruit a drupe or berry 36
 33. Fruit a single seeded achene with a plumose tail
 *Clematis* in RANUNCULACEAE. Pg. 248
 34. Fruit a double key. (47) ACERACEAE. Pg. 389
 34. Fruit a single key. (48) 35
 35. Leaves simple ULMACEAE. Pg. 191
 35. Leaves of several leaflets . . . *Fraxinus* in OLEACEAE. Pg. 485
 36. Leaves alternate 37
 36. Leaves opposite . . . *Shepherdia* in ELAEAGANACEAE. Pg. 418
 37. Calyx 4- or 5-parted THYMELEACEAE. Pg. 417
 37. Calyx 6-parted 38
 38. Stamens 4 or 5 SANTALACEAE. Pg. 198
 38. Stamens 9 LAUBACEAE. Pg. 268

Flowers without Petals, Herbs

39. Leaves alternate or all from the root 40
 39. Leaves opposite 47
 40. Plant entirely aquatic, leaves dissected, the segments thread-
 like 41
 40. Plants terrestrial, leaves not dissected, not thread-like . . . 42
 41. Leaves alternate PODOSTEMACEAE. Pg. 295
 41. Leaves in whorls CERATOPHYLLACEAE. Pg. 243
 42. Stipules present, sheathing the stem above the joints.
 (49) POLYGONACEAE. Pg. 200
 42. Stipules absent 43

43. Flowers white or pink, in long slender catkin-like spikes or spikes with small flowers 44
43. Flowers never white, mostly in rounded masses or clusters or in spikes 45
43. Flowers neither in close masses nor in spikes 46
44. Fruit, 4 fleshy carpels SAURURACEAE. Pg. 166
44. Fruit a dark purple berry PHYTOLACCACEAE. Pg. 221
45. Calyx green or colored, minute CHENOPODEACEAE. Pg. 211
45. Calyx of dry scales or husks, and surrounded by dry, often colored bracts AMARANTHACEAE. Pg. 218
46. Calyx attached to the whole extent of the ovary. (50) ARISTOLOCHIACEAE. Pg. 199
46. Calyx not attached to the ovary 47
47. Fruit a 3-lobed capsule. (51) EUPHORBACEAE. Pg. 374
47. Fruit an indefinite number of 1-celled carpels. Some species of RANUNCULACEAE. Pg. 246
48. Plants entirely aquatic 49
48. Plants terrestrial 50
49. Leaves opposite CALLITRICHACEAE. Pg. 379
49. Leaves in whorls HALORAGIDACEAE. Pg. 431



50. Leaves with stipules. (52) 51
50. Leaves without stipules 52
51. Twining vine or a plant with leaves of 5 leaflets from a common point of insertion PART OF URTICACEAE Pg. 194
51. Plants not twining and leaves not divided into leaflets URTICACEAE. Pg. 194
52. Fruit a 3-celled capsule 53
52. Fruit usually a 1-celled capsule. Species in CARYOPHYLLACEAE. Pg. 225
53. Capsule pendulous. (51) EUPHORBACEAE. Pg. 374
53. Capsule not pendulous AIZOACEAE. Pg. 221

b. FLOWERS WITH SEVERAL PETALS. POLYPETALAE

54. Trees, shrubs, woody vines 55 and 60
54. Herbs 82

a. Woody Vines

55. Fruit a number of single-seeded achenes, each with a plumose tail; sepals 4, resembling petals. (53) *Clematis* in RANUNCULACEAE. Pg. 248
55. Fruit a berry 56
56. Leaves of 3 leaflets *Rhus radicans* in ANICARDIACEAE. Pg. 384
56. Leaves never of 3 leaflets 57
57. Stamens 4 or 5 58
57. Stamens 12 or more. (54) MENISPERMACEAE. Pg. 266
58. Throat of calyx crowned with a double or' triple fringe. (55) PASSIFLORACEAE. Pg. 416
58. Throat of calyx not fringed 59
59. Stamens alternate with the petals. *Celastrus* in CELASTRACEAE. Pg. 388
59. Stamens opposite to the petals VITACEAE. Pg. 395

b. Trees and shrubs

60. Leaves opposite 61
60. Leaves alternate 64
- Leaves opposite*
61. Fruit a capsule 62
61. Fruit a berry 63
61. Fruit a disk-shaped fleshy pod CELASTRACEAE. Pg. 386
61. Fruit of 3 inflated carpels STAPHYLEACEAE. Pg. 388
61. Fruit a double key (samara). (47) ACERACEAE. Pg. 389
62. Fruit a membranous 2-celled capsule. *Hydrangea* in SAXIFRAGACEAE. Pg. 302
62. Fruit a globose leathery nut-like capsule. (56) HIPPOCASTANACEAE. Pg. 390
63. Flowers in elongated clusters BERBERIDACEAE. Pg. 264
63. Flowers in umbel-like clusters. (57) CORNACEAE. Pg. 450



53.



54.



55.



56.



57.

Leaves alternate

64. Leaves compound 65
64. Leaves simple 70
65. Juice milky ANACARDIACEAE. Pg. 382
65. Juice not milky 66
66. Leaves compound, fruit a Key (48) or stems armed with large prickles (not thorns) RUTACEAE. Pg. 370
66. Fruit not a Key and stems not armed with prickles on the bark 67

67. Flowers irregular 68
 67. Flowers regular 69
68. Flowers yellow CAESALPINACEAE. Pg. 336
 68. Flowers white *Robinia* in PAPILIONACEAE. Pg. 348
69. Fruit a twisted key SIMARUBACEAE. Pg. 371
 69. Fruit not a key ROSACEAE. Pg. 306
70. Flowers irregular CAESALPINACEAE. Pg. 336
 70. Flowers regular 71
71. Leaves with mostly permanent stipules 72
 71. Leaves without stipules or with small ones which fall early 73
72. Fruit a pendulous head of several nutlets. (59)
 PLATANACEAE. Pg. 306
 72. Fruit not a pendulous head of nutlets ROSACEAE. Pg. 306
73. Stamens few 74
 73. Stamens usually more than 12 77
74. Stamens 2 to 4, calyx segments 3. (60) EMPETRACEAE. Pg. 381
 74. Stamens 4 or 5, calyx segments more than 3 75
75. Stamens alternate with the petals 76
 75. Stamens opposite to the petals RHAMNACEAE. Pg. 394
76. Fruit a 1-celled globular berry GROSSULARIACEAE. Pg. 303
 76. Fruit a fleshy pod, splitting in the meridians.
 CELASTRACEAE. Pg. 386
76. Fruit a berry-like drupe with several hard nutlets.
 ILICACEAE. Pg. 384
76. Fruit a woody 2-beaked capsule HAMAMELIDACEAE. Pg. 304
77. Stamens united in 5 sets, flowers from a broad spatula-
 formed bract TILIACEAE. Pg. 398
 77. Stamens distinct 78
78. Stamens arising below the base of the ovary 79
 78. Stamens arising at or above the base of the ovary 80
79. Fruit of many carpels borne on an elongated receptacle.
 (61) MAGNOLIACEAE. Pg. 244
 79. Fruit a large fleshy pod. (62) ANONACEAE. Pg. 244



58.



59.



60.



61.



62.

80. Pistil 1, fruit fleshy, enclosing a single hard bony nut, a
stone. (63) DRUPACEAE. Pg. 332
80. Pistils several 81
81. Fruit of several carpels not pulpy ROSACEAE. Pg. 306
81. Fruit a fleshy pulp enclosing leathery carpels. (64)
. POMACEAE. Pg. 328
82. Leaves alternate or at the base 83
82. Leaves opposite 105

Leaves alternate or basal

83. Flowers regular 84
83. Flowers irregular 114
84. Stamens not more than 12 85
84. Stamens numerous 98
85. Climbing or trailing vines MENISPERMACEAE. Pg. 266
85. Not vines 86
86. Sap milky. (51) EUPHORBIACEAE. Pg. 374
86. Sap watery 87
87. Petals 3. (65) LIMNANTHACEAE. Pg. 382
87. Petals 4, rarely 2 88
87. Petals more than 4 90
88. Plant aquatic. (66) TRAPACEAE. Pg. 431
88. Plants not aquatic 89



63.



64.



65.



66.



67.

89. Stamens 6 of equal lengths. (67) CAPPARADACEAE. Pg. 288
89. Stamens 6 of unequal lengths. (68) CRUCIFERAE. Pg. 272
89. Stamens 2, 4 or 8 ONAGRACEAE. Pg. 422
90. Flowers in umbels 91
90. Flowers not in umbels 92
91. Styles 5, fruit a berry. (70) ARALIACEAE. Pg. 434
91. Styles 2, fruit 2 dry carpels. (69) UMBELLIFERAE. Pg. 436
92. Stamens arising below the ovary and free from it (hypogynous). (71) 93
92. Stamens arising from the ovary, either near its base or from its summit. (72) 94

93. Stamens 6 BERBERIDACEAE. Pg. 264
 93. Stamens 5 LINACEAE. Pg. 368
 93. Stamens 10 or 12 95
 94. The long capsule splitting from below into 5 carpels, when
 ripe. (72) GERANIACEAE. Pg. 364
 94. Capsule oval, round or columnar, not splitting from below,
 (73) OXALIDACEAE. Pg. 366



68.



69.



70.



71.



72.



73.

95. Calyx adherent to the ovary. *Lythrum* of LYTHRACEAE. Pg. 421
 95. Calyx free from the ovary 96
 96. Leaves all from the root. (74) DROSERACEAE. Pg. 291
 96. Leaves mostly from the stem 97
 97. Fleshy herbs CRASSULACEAE. Pg. 296
 97. Herbs not fleshy SAXIFRAGACEAE. Pg. 297

Leaves alternate
Stamens numerous

98. Leaves floating on water, shield-shaped. (75)
 NYMPHAEACEAE. Pg. 242
 98. Leaves not shield-shaped nor floating 99
 99. Stems of jointed fleshy masses without leaves.
 CACTACEAE. Pg. 417
 99. Stems not fleshy, leaves present 100
 100. Plants with milky sap (Part of) PAPAVERACEAE. Pg. 269
 100. Plants with watery sap 101
 101. Leaves hollow, pitcher-form. (76) SARRACENIACEAE. Pg. 291
 101. Leaves not hollow or pitcher-formed 102
 102. Stamens united at base forming a central column around the
 pistil. (77) MALVACEAE. Pg. 398
 102. Stamens free, attached to the ovary. (78) ROSACEAE. Pg. 306
 102. Stamens free, arising below the ovary 103



74.



75.



76.



77.



78.

103. Carpels numerous RANUNCULACEAE. Pg. 246
 103. Carpel 1 CISTACEAE. Pg. 406

Leaves opposite

104. Flowers regular 105
 104. Flowers irregular 114

105. Aquatic weeds, usually fully submersed HALORAGIDACEAE. Pg. 431
 105. Plants terrestrial or at least not fully submersed . . . 106



79.



80.



81.



82.



83.

106. Stem and leaves usually fleshy PORTULACACEAE. Pg. 223
 106. Stem and leaves not fleshy 107

107. Calyx adherent to the ovary 108
 107. Calyx free from the ovary 109

108. Leaves distinctly 3-nerved MELASTOMACEAE. Pg. 422
 108. Leaves not 3-nerved ONAGRACEAE. Pg. 422

109. Stamens and pistils not in the same flower. Plants often
 with milky juice EUPHORBIACEAE. Pg. 374
 109. Stamens and pistils in the same flower 110

110. Fruit a 5-celled berry-like drupe ARALIACEAE. Pg. 434
 110. Fruit not berry-like 111

111. Stems swelling at the nodes. (81) : CARYOPHYLLACEAE. Pg. 225
 111. Stems not swelling at nodes 112

112. Stamens numerous. (82) HYPERICACEAE. Pg. 402
 112. Stamens not more than 12 113

113. Leaves lobed GERANIACEAE. Pg. 364
 113. Leaves entire LYTHRACEAE. Pg. 420



84.



85.



86.



87.



88.



89.

*Flowers with several petals**Irregular*

114. Trees HIPPOCASTANACEAE. Pg. 390
 114. Herbs 115
 115. Stamens 20 or more RANUNCULACEAE. Pg. 246
 115. Stamens not more than 12 116
 116. Calyx of 2 sepals PAPAVERACEAE. Pg. 269
 116. Calyx of 3 sepals BALSAMINACEAE. Pg. 392
 116. Calyx of more than 3 divisions 117
 117. Fruit a pod (legume, example, Pea)
 CAESALPINACEAE. Pg. 336, or PAPILIONACEAE. Pg. 339
 117. Fruit a capsule 118
 118. Capsule splitting into 3 equal parts. (83) . . . VIOLACEAE. Pg. 409
 118. Capsule splitting at the margin POLYGALACEAE. Pg. 371
 118. Capsule opening at the top RESEDACEAE. Pg. 290

GAMOPETALAE

a. Flowers with the petals partly or wholly united.

119. Herbs 127
 119. Trees or shrubs 120
 120. Leaves alternate 121
 120. Leaves opposite 125
 121. Lofty tree, stamens more than 10 EBENACEAE. Pg. 482
 121. Shrubs, stamens 10 or less than 10 122
 122. Petals united only at the base (84). Fruit a capsule
 CLETHRACEAE. Pg. 458
 122. Petals distinctly united, fruit a capsule, drupe or berry . . . 123
 123. Calyx below the ovary. (85) 124
 123. Calyx attached to the ovary, its divisions above it. (86)
 VACCINIACEAE. Pg. 470
 124. Small, moss-like plants DIAPENSIACEAE. Pg. 476
 124. Shrubs ERICACEAE. Pg. 462
 125. Calyx above the ovary CAPRIFOLIACEAE. Pg. 590
 125. Calyx below the ovary 126
 126. Stamens 2 or 4 *Paulownia* in SCROFULARIACEAE. Pg. 556
 126. Stamens 5 BIGONIACEAE. Pg. 576
 127. Climbing vines with long and juicy stems furnished with
 tendrils CUCURBITACEAE. Pg. 604
 127. Climbing vines, or more or less erect herbs, with juicy
 stems, not furnished with tendrils 128
 127. Creeping vine with twin flowers CAPRIFOLIACEAE. Pg. 590
 127. More or less erect herbs 129
 128. Plants with leaves and bell-shaped flowers.
 CONVULVACEAE. Pg. 500

128. Plants without leaves, parasitic vines with small star-like flowers in dense clusters. (87) . . . CUSCUTACEAE. Pg. 503
129. Herbs with milky juice 130
129. Herbs with watery juice 131
130. Styles united, pollen grains not in waxy masses, ovary superior to the calyx APOCYNACEAE. Pg. 493
130. Styles not united, pollen in waxy masses, ovary superior to the calyx. (88) ASCLEPIADACEAE. Pg. 494
130. Style 1, ovary inferior to the calyx. (89) CAMPANULACEAE. Pg. 605
131. Ovary superior to the calyx 132
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134. Corolla irregular. (92) OROBANCHACEAE. Pg. 574
135. Stamens free from the corolla 136
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136. Style 1, fruit a capsule. (93) PRIMULACEAE. Pg. 477
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138. Ovary 2, distinct 139
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91.



92.



93.



94.

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 153. Flowers not all rays 154



95.



96.



97.



98.



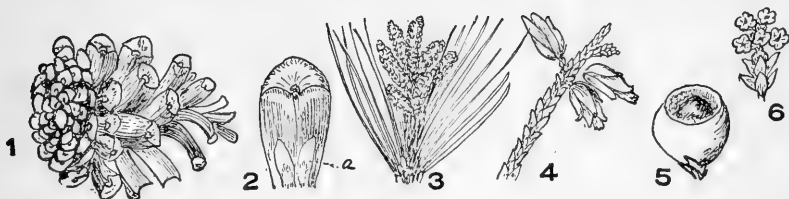
99.



100.

154. Stamens distinct 155
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155. Stamens 2 to 4 DIPSACACEAE. Pg. 602
 155. Stamens 5. (99) AMBROSIIACEAE. Pg. 628

SUB-DIVISION I—EMBRYO BEARING PLANTS



EXAMPLES OF FLOWERS OF GYMNASPERMS

1. A Cone of *Pinus rigida* with the scales separated to permit the escape of the seeds. 2, a single scale from the cone showing at *a* the thin covers of the seeds, the location of which is shown at the base. 3, staminate flowers of a pine. 4, a spray of White Cedar with the small modified cones. 5, a berry of the pistillate flower of Dwarf Yew which is, in fact, a modified cone. 6, the staminate flower of Yew.

GYMNOSPERMAE. Naked Seeded Plants.

A principal characteristic is the absence of an ovary or seed casket. The embryo is developed from a thin flat scale which is protected by the woody scales lying on each side of it (1), or within a fleshy fruit resembling a berry (5), but which is in fact a modification of one or more of the scales at the apex of a scaly cone while some of the lower scales may still be seen encircling the base of the drupe. In the first form the group of woody or leathery scales arranged spirally around a long axis forms the cone familiar as the fruit of the family of pines. In the second the berry-like fruit is that characteristic of the yew and the juniper. In either case, whether the fertile flowers are in the form of a cone or of a drupe, the pollen flowers are scaly cones or catkins (3).

The pollen and the ovules are not borne upon the same flowers. In our species the pollen bearing and the ovule bearing cones are found on the same plant (*monoecious*).

Of this sub-division there is, in our region, but one class.

Class—CONIFERAE. Cone Bearing Trees or Shrubs

All the cone bearers are trees or shrubs and with a single ex-

ception (the larch) they are evergreens. The leaves are either needle-formed or are flattened, scale-like, which overlap each other like little tiles (imbricate). The pollen flowers and the fertile flowers are in separate groups. There is no floral envelope and the scale which bears the ovule, like that on which the pollen lies, is naked. There is neither style nor stigma.

The class of cone bearers is, so far as we know, one of the oldest of all the classes of true seed bearing plants. Fossil remains of such trees are found in very ancient geological formations.

In the class of cone bearers there are two families.

Fruit a red berry **TAXACEAE**

Fruit a cone of woody or leathery scales or a brown or
blue berry **PINACEAE**

FAMILY I.— **TAXACEAE**. THE YEW FAMILY

The red, one seeded berry-like fruit (Fig. 5, page 81) is conspicuous among the dark green, flat, needle-shaped leaves which are about an inch in length and arranged in opposite rows, one on each side of the stem. The pollen bearing cones are very small and inconspicuous (Fig. 6, page 81), with numerous (6 to 8) pollen sacs, while the disk-formed or hemispherical fruit is conspicuous and attractive. The juice is not resinous.

TAXUS, L.

Characters of the Family.

T. baccata, (L.) AMERICAN YEW. (*T. canadensis*, Willd.) A low, spreading shrub with evergreen prickly leaves, which are dark shining green. Berries bright red. In rich shady places.

FAMILY II.— **PINACEAE**. THE PINE FAMILY

Trees and shrubs with resinous juice. The cones bearing pollen and the seed-bearing cones are on the same tree. Those with pollen consist of an elongated floral axis bearing stamens arranged spirally. The fruit bearers are the ordinary cones, more conspicuous and permanent. At the base of each scale of the fruit cone are two or more ovules.

The leaves are,

- 1st. Needle-shaped (pine, spruces, balsams and junipers).
- 2d. Flat, scale-like leaves overlapping each other (white and red cedars).

Fruit berry-like,

Berry brown or blue **Juniperus**

Fruit a cone composed of leathery or woody scales.

Leaves in small bundles or fasciculi.

Falling in autumn **Larix**

Evergreen **Pinus**

Leaves inserted singly on the stem.

Needle-shaped leaves spreading in all directions.

Leaves prismatic, more or less 4-sided **Picea**

Leaves flattened, not prismatic **Abies**

Needle-shaped leaves spreading on opposite sides **Tsuga**

Leaves flattened and overlapping each other, not needle-shaped.

Two rows of leaves keeled, stem appearing flattened **Thuja**

Four rows of leaves keeled, stem rounded **Chamaecyparis**

The family is divided into two tribes, *Cupressineae* and *Abietineae*.

TRIBE I.—CUPRESSINEAE. THE CYPRESS TRIBE

The leaves are opposite or in whorls, not in bundles, and the scales of the cones are few compared with those in the next tribe.

I. JUNIPERUS, L.

Leaves awl-shaped, in our species arranged in whorls of about three leaves each, or scale-like and overlapping. Fruit a false berry containing 1 to 3 hard seeds. Berry embraced below by a few scales. Pollen bearing cones small, oval or globular, in the axils of the leaves near the extremity of the stem and usually on a different plant from the fruit bearer.

1. **J. communis**, L. (Fig. 8, pl. 1). COMMON JUNIPER. A small tree or shrub, aromatic, leaves needle-shaped, prickly, 1/2 to 2/3 in. long. Berries turning from greenish the first year to dark brown or bluish-brown the second year. On dry hillsides southeast portion of our region and southward. Not common in our area.

2. **J. nana**, Willd. LOW JUNIPER. (*J. communis*, var. *depressa*, Pursh.) A low shrub spreading in a broad circular patch, sometimes 8 or 10 ft. in diameter and about 2 ft. high. Leaves and fruit resemble those of the erect species, No. 1. Barren hillsides. Common.

3. **J. virginiana**, L. (Fig. 7, p. 1.) RED CEDAR. A tree, generally, in our region less than 40 ft. high. Leaves somewhat flattened, short,

overlapping, in four ranks. Ends of the leaves sometimes spiny. Berries round or oval, light blue or greenish-blue. Dry hillsides. Common.

4. **J. sabina**, L. SHRUBBY RED CEDAR. (*J. sabina*, var. *procumbens*, Pursh.) A low trailing shrub, often resembling a vine. Similar to red cedar in leaves and fruit. In northern sections of our region, mostly on sea coast.

2. THUJA, L.

Cones leathery or woody with but few (6 to 8) scales, ovoid, green or reddish-brown attached to extremities of the twigs. Leaves in four ranks clasping and overlapping each other, the lateral leaf keeled, giving the leaf-enveloped stem a broad flattened appearance.

T. occidentalis, L. (Fig. 5, pl. 1.) WHITE CEDAR. ARBOR VITAE. A tree often of large dimensions, branching extensively. Growing mostly in swamps. All parts aromatic.

3. CHAMAECYPARIS, Spach.

Trees similar to *Thuja*, with very small leaves in 4 ranks, forming a rounded leaf-encircled stem. Cones globose, with small knobs on the surface of the scales.

C. thyoides, (L.) BSP. (Fig. 4, pl. 1.) SOUTHERN WHITE CEDAR. A tree, cone-like in form, generally in swamps. Young leaves bluish-green. Cones about $\frac{1}{4}$ in. diameter, bluish, knobby. Swamps, principally in southern part of our area.

TRIBE II.—ABIETINEAE. THE PINE TRIBE

Trees and shrubs with resinous juice. The leaves, all prismatic and needle-shaped, are arranged in spirals around the stem. This arrangement holds whether the leaves are grouped in bundles or are inserted separately. In the first instance the groups are arranged spirally, in the second the individual leaves are so arranged.

1. LARIX, Adams

Tall tree with spreading branches. Leaves in fascicles of 20 or more, without sheath but growing directly from a knobby, woody support (suppressed branch); leaves deciduous.

L. laricina, (Du Roi) Koch. (Fig. 6, pl. 1.) LARCH. TAMARACK. Tree attaining a height of over 50 ft. It is our only species of the pine family with deciduous leaves. These grow in thick, diverging clusters, which in the spring are of a light and brilliant green color, $\frac{3}{4}$ in. to 1 in. long. Each leaf of the fascicle starts in the axil of a minute scale. The brown cones are borne at the base of young branches. In swamps. Leaves appear in May.

L. decidua, (Mill), the European species, with longer leaves, often cultivated in our region.

2. PINUS, L.

The young branches have short scaly leaves, in the axils of which spring



PLATE 1

1. *Picea mariana*. 2. *Tsuga canadensis*. 3. *Abies balsamea*. 4. *Chamaecyparis thyoides*. 5. *Thuja occidentalis*. 6. *Larix laricina*. 7. *Juniperus virginiana*. 8. *J. communis*.

the fascicles (bundles) of the more ordinary needle-formed leaves. These last spring from short, woody pedicels (short branchlets) and each group is surrounded at the base by a fibrous sheath. The scale leaves fall as the others attain their growth. The bundles contain each from 2 to 5 leaves, the number depending on the species. Both pollen flowers and ovules in cones, the first smaller than the others and situated more terminally.

The pines are mostly large trees with branches in whorls at regular intervals. The number of leaves in the bundles aids us in determining the species.

Leaves in fascicles of 2's.

Leaves 4 to 6 in. long *P. resinosa*

Leaves 2 to 2½ in. long *P. virginiana*

Leaves about 1 in. long, stout and thick *P. divaricata*

Leaves in fascicles of 2's or 3's.

Leaves 2½ to 4 in. long, stout and rigid *P. pungens*

Leaves 3 to 5 in. long, slender and flexible.

Cones pyramidal or conic *P. echinata*

Cones globose or short oval *P. rigida*

Leaves 6 to 8 in. long *P. Taeda*

Leaves in fascicles of 5's *P. strobus*

1. *P. resinosa*, Ait. (Fig. 2, pl. 2.) CANADIAN PINE. RED PINE. A very large tree. Cones oval with a rounded base, 1½ to 2 in. long, near the ends of the branches. Bark reddish, flaky. Common in the northern half of our area.

2. *P. virginiana*, Mill. (Fig. 3, pl. 2.) JERSEY PINE. SCRUB PINE. (*P. inops*, Ait.) Usually a small tree (20 to 30 ft. high), ungraceful in form, bark rough. Pollen cones 1/3 in. long, terminal; ovule cones at base of young branches, oval, 1 to 2 in. long, curved, scales with slender prickles. Rare north of Long Island. (Wadhams, N. Y., also Jay, N. Y.—G. T. S.)

3. *P. divaricata*, (Ait.) Gord. (Fig. 4, pl. 2.) LABRADOR PINE. SCRUB PINE. GRAY PINE. (*P. Banksiana*, Lamb.) Sometimes a very tall tree, sometimes a tree of medium height, but often short and scrubby. Bark rough. Leaves may vary from ¾ to 2 in. long, curved, diverged, with sharp points. Sheaths of fascicles quite short. Cones, long oval, the scales with minute prickles. Sandy soil, forming extensive forests, northern N. Y. and W. New England.

4. *P. pungens*, Michx. TABLE MOUNTAIN PINE. Large tree. Leaves mostly in 2's, sheath of leaves 5/12 to 8/12 in. long. Cones oval, scales with awl-like spines at extremities which curve downward. Mountains in southern part of our area and further south.

5. *P. echinata*, Mill. YELLOW PINE. Very large forest tree. Cones pyramidal, about 2 in. long, extremities of scales of cone with small, straight spines, which do not curve downward. Southern part of our area and southward.

6. *P. rigida*, Mill. (Fig. 5, pl. 2.) PITCH PINE. A forest tree 50 to 80 ft. high. Leaves stout and stiff. Cones ovoid to globular, 1 to 2 in. long. Scales wedge-shaped, each with a recurved spine. Common, especially in what are known as "Pine Barrens."

7. *P. Taeda*, L. OLD FIELD PINE. Large forest tree in the southern states, only rarely in the southern section of our region. Pollen cones



PLATE 2

1. *Pinus strobus*. 2. *P. resinosa*. 3. *P. virginiana*. 4. *P. divaricata*.
5. *P. rigida*.

terminal, long, almost cylindric. Fertile cones 6 to 10 in. long, 2 in. thick. Scales large with a ridge running transversely, a recurved point at its center.

8. *P. strobus*, L. (Fig. 1, pl. 2.) WHITE PINE. One of the largest of the pines. Formerly very common throughout our region. Young trees still quite common. Leaves more slender than either of the foregoing species, light green, 3 to 5 in. long. Cones cylindric, 3 to 5 in. long, without prickles on the scales.

9. *P. sylvestris*, L. SCOTCH PINE. Cultivated species, at some points naturalized in our region. Leaves in 2's.

3. *PICEA*, Link.

Trees with rough bark, leaves all needle-formed, $\frac{1}{3}$ to $\frac{2}{3}$ in. long, not included in a sheath but each leaf is separately inserted. The spiral manner of insertion of the leaves gives the appearance of a cylindric brush to the leafy branch, the 4-angled leaves spreading in all directions. They are borne upon small woody projections which, when the leaves are fallen, give to the branch a rasp-like surface. The cones are oval or cylindric with thin scales, which have none of the ridges or points seen upon the scales of pines. Tree cone-shaped, with spiry summit.

1. *P. canadensis*, (Mill.) BSP. WHITE SPRUCE. Cones nodding, cylindric, about 2 in. long, with short foot-stalks. Edges of scales not notched or toothed. Twigs not downy, whitish-green. N. Y. and northward.

2. *P. rubra*, Link. RED SPRUCE. Cones long oval becoming somewhat acute at apex. Scales only slightly toothed and with striations on the surface. Leaves very acute, light green, twigs sparingly downy. In our area generally.

3. *P. mariana*, (Mill.) BSP. (Fig. 1, pl. 1.) BLACK SPRUCE. Cones oval or almost spherical, blunt at apex, without foot-stalk, 1 to 2 in. long. *Edges of the scales jagged.* Twigs downy, brown.

Var. *P. mariana brevifolia*, Peck, is a slender tree which on high mountains is reduced to a small shrub with leaves $\frac{1}{4}$ to $\frac{1}{2}$ in. long. Scales with irregularly notched tips. Swamps and bogs in the northern part of our area.

4. *TSUGA*, Carr.

Trees with slender, very flexible branches with flat leaves, $\frac{1}{2}$ in. long, which although actually arranged spirally appear as though in two ranks one on each side of the stem. Staminate cones about $\frac{1}{5}$ in. long, in the axils of the leaves. Ovule bearing cones terminal, $\frac{1}{2}$ in. long. Throughout our area.

T. canadensis, (L.) Carr. (Fig. 2, pl. 1.) HEMLOCK. A large forest tree, with flat leaves and reddish-brown cones about $\frac{1}{2}$ in. long. Throughout our area.

5. *ABIES*, Juss.

Trees with smooth bark on which are found "balsam blisters." These trees assume a beautiful pyramidal form and are the most ornamental of the coniferae of our region. The leaves are flat, scattered, longer than those of the spruces and of a rich, dark green color. Fertile cones cylindric.

1. *A. balsamea*, (L.) Mill. (Fig. 3, pl. 1.) SINGLE BALSAM FIR.

Leaves spreading, but appearing nearly as though in 2 rows on opposite sides of the stem. Dark green above, light bluish-green below. Throughout our area.

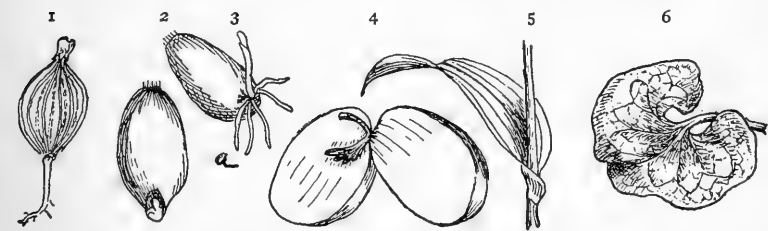
SUB-DIVISION II—ANGIOSPERMAE

The ovules in this great division are concealed in a cavity known as the ovary. (Fig. 1, below.)

The flower consists essentially of a pistil, at the base of which is the ovary containing the ovules and one or two or more stamens bearing anthers on which are developed the pollen grains destined to fertilize the ovules. The pistil and stamens may occupy different flowers. Flower receptacles bearing these two essential elements separately may grow upon the same plant, in which case they are said to be *monoecious*, or the pistillate flowers may occupy one plant the staminate another, in which case they are said to be *dioecious*.

When the pistils and stamens are found on the same receptacle the flower is said to be a perfect flower and this is the form prevailing in the great majority of plants of this great division.

Plants of this sub-division are divided into two classes.



1, showing the numerous cotyledons of pine. 2, a grain of wheat showing the position of the embryo at the base. 3, a grain showing the development of the two cotyledons of a garden bean with the embryo between them. 4, the two cotyledons of a garden bean with the embryo between them. 5, a leaf of grass, showing the parallel veins of the monocotyledons. 6, a leaf of Asarum, showing the net veins of the dicotyledons.

Class I.—MONOCOTYLEDONOUS PLANTS

Plants with Single-Lobed Ovules

The embryo has a single seed lobe (cotyledon) (Figs. 2 and 3, above). Leaves generally parallel-veined (or nerved) (Fig. 5), enfolding one another at the base (sheathing). Rarely the leaves are net-veined.

Flower, as a rule, 3 parted in its various divisions, thus, the perianth consists of 3 + 3 parts, all of which may have the appearance of petals, but which structurally may be regarded as being 3 petals and 3 sepals. There are two rows of stamens, one row of which may not be fully developed. Although there is usually but one pistil, it divides at the base into an ovary of 3 divisions. *Most of the plants of the first two orders vary in several respects from the prevailing type.*

Order I.—PANDANALES. Naked Flowering Plants

Flowers without a proper floral envelope. Stamens and pistils in different groups. These groups consist either in dense cylindric spikes or in ball-shaped masses. Instead of a floral envelope each staminate and each pistillate flower composing the dense mass of a spike is surrounded by a few hairs (in *Typhaceae*) or by small scales (in *Sparganiaceae*). They are all marsh plants with creeping root-stalks and grow in clusters.

Flowers arranged in dense cylindric masses . . . **TYPHACEAE**

Flowers arranged in rounded heads . . . **SPARGANIACEAE**

FAMILY I.—TYPHACEAE. CAT TAIL FAMILY

Tall marsh plants with very long linear leaves and tall flower stalks bearing at the summit two cylindric flower masses, the more slender cylinder containing the staminate flowers above, the thicker and more conspicuous, the pistillate flowers, below.

TYPHA, L.

Cylinder of pistillate flowers 5 to 8 in. long, that of the staminate about the same length. Flowers immensely numerous. The bristles, which alone represent the floral envelope, enclose, in staminate flowers, groups of 2 to 7 stamens each. One (rarely more) pistil may also be enclosed by a single set of bristles.

1. *T. latifolia*, L. (Fig. 2, pl. 3.) **BROAD-LEAVED CAT TAIL.** The slender straight stems are from 5 to 8 ft. high, leaves as high or higher. The flower cylinders become dark velvety brown. The staminate cylinder *extends down to and is in contact with* the other, but the division may be distinctly seen. Marshes throughout the country.

2. *T. angustifolia*, L. (Fig. 1, pl. 3.) **NARROW-LEAVED CAT TAIL.**



PLATE 3

1. *Typha angustifolia*. 2. *T. latifolia*. 3. *Sparganium eurycarpum*. 4. *S. simplex*. 5. *S. minimum*. 6. *Heteranthera dubia*. 7. *H. reniformis*.

Stem more slender than the last and generally higher. The cylinder of staminate flowers *does not extend down to the other* cylinder, but there is between the two a space of naked stem, of from 1 to 3 inches. Situations similar to No. 1.

FAMILY II.—SPARGANIACEAE. BUR-REED FAMILY

Marsh plants with long linear leaves and tall flower stem usually branching near the summit and bearing several globe-formed heads, the heads nearest the summit being much smaller than those below. The upper are the staminate flowers, the others the pistillate. Immediately below each of the larger balls a long slender leafy bract starts, which is related to the spathe of the arum family. Each ball of pistillate flowers represents a collection of many seed-carpels.

SPARGANIUM, (Tourn.) L.

Has the characters described above.

1. *S. eurycarpum*, Engelm. (Fig. 3, pl. 3.) BROAD FRUITED BUR-REED. Stem 3 to 8 ft. high; 2 to 4 pistillate heads on each stem, each usually on a short flower stalk; 5 or more smaller staminate heads above the pistillate. The extremity of the pistil *divides in two parts* (stigmas).

2. *S. androcladum*, Engelm. BRANCHING BUR-REED. Pistillate heads 3 to 7, plant more branching than No. 1, and smaller, 1 to 2 ft. high. Pistil extremity (stigma) *single*.

3. *S. americanum*, Nutt. AMERICAN BUR-REED. Resembles No. 2, but is not branching. The lower flower heads on short stems. Low grounds. Summer.

4. *S. simplex*, Hudson. (Fig. 4, pl. 3.) SIMPLE STEMMED BUR-REED. Stem 2 to 24 in. high, *not branching*. Pistillate and staminate heads on a straight stem. Generally erect. Lower flower heads without stems.

5. *S. minimum*, Fries. (Fig. 5, pl. 3.) SMALL BUR-REED. A slender floating species. From a few in. to 2 ft. high, with pelucid floating leaves. Generally, one staminate and about two pistillate heads.

6. *S. lucidum*, Fernald & Eames. Plant 30 to 36 in. high, the leaves much overtopping the inflorescence. Pistillate flower heads only at the axils and on short stems. Fruit lustrous. Muddy shores, Mass. and south.

7. *S. angustifolium*, Michx. Slender, 12 to 36 in. high, growing in ponds and slow streams. Leaves very long and narrow. Heads of pistillate flowers somewhat above the axils and lower ones on short stems. New England and west.

8. *S. fluctuans*, (Morong.) Robinson. Plant 15 to 40 in. high. Leaves narrow and long. Flower heads on branches, each of 2 or 3 branches bearing 3 to 5 heads. Margins of cool lakes, usually at a depth of 20 or 30 inches.

Order II.—HELOBIAE. Water Plants

While all the plants of this order are fluvial the order does not by any means include all aquatic plants.

The flowers may be destitute of floral envelopes or may have very imperfect perianths, or have perfectly developed and showy flowers, as in the *Sagittaria*. The stamens vary from one to many, the pistils also are indefinite in number.

The characteristics of plants included in this order are therefore so varied that they must be found in the characteristics of the different families.

SYNOPSIS OF THE FAMILIES OF THE ORDER HELOBIAE

Small rounded green bodies floating on the surface of pools

. **LEMNACEAE**

Plants submersed or floating with very inconspicuous greenish flowers. Submersed plants with upper leaves sometimes floating, lower leaves alternate. Flowers situated on a fleshy cylinder, in a small axillary group or on a grooved receptacle, perianth wanting or consisting of 4 fleshy segments. Leaves sheathing at base. Flowers in axils of leaves, pollen flowers with double perianth

. **NAIADACEAE**

Plants with roots in water, but with aerial stems and more or less conspicuous flowers. Perianth segments 6; stamens 6. Marsh plants with half-rounded, deeply-grooved leaves with membraneous sheaths at the base, not entirely submersed, flowers in long spikes terminally on tall flower stems

TRIGLOCHINEAE

Marsh herbs commonly not wholly submersed, but usually growing in water, with sheathing leaves, with flowers on a tall aerial spike and with the perianth (calyx and corolla) in 3's

ALISMACEAE

Submersed herbs with flowers arising from a spadix (a fleshy cylinder), but not surrounded by or resting upon a spathe (a leaf-like envelope)

VALLISNERIACEAE

FAMILY I.—LEMNACEAE. DUCKWEED FAMILY.

Minute swimming plants, small green scales floating on the surface of still pools. The vegetative apparatus is reduced to a small

disk less specialized than a leaf (a thallus). The rootlet is a floating thread extending from the under side of the green disk downward about an inch. From one side of the disk grows the minute flower, or, technically, flowers, for the minute group consists of two stamens and a pistil which, although in close relation are not considered as in the same receptacle. These are surrounded by a green envelope which is regarded as a spathe, hence these plants have been classified as closely related to the Arums.

In the genus *Wolffia*, minute floating bodies, there is no root-like appendage.

1. LEMNA, L.

Characters included above, with the root-like appendages.

1. *L. trisulca*, L. (Fig. 3, pl. 6.) IVY-LEAVED DUCKWEED. Fronds in form of a snow shoe, often more than $\frac{1}{2}$ in. long. Ponds, ditches, etc.

2. *L. perpusilla*, Torr. MINUTE DUCKWEED. Scale or frond about $\frac{1}{10}$ in. long, pear-shaped, with 3 nerves on the surface, purplish beneath. Ponds, lakes, etc.

3. *L. minor*, L. (Fig. 4, pl. 6.) LESSER DUCKWEED. Nearly round, more or less 3-nerved, about $\frac{1}{2}$ in. diameter, several sticking together. Common in stagnant pools.

4. *L. cyclostasa*, (Ell.) Chev. VALDIVIA DUCKWEED. Oval with one extremity pointed, $\frac{1}{12}$ in. diameter. No nerves on surface.

5. *L. polyrrhiza*, L. (Fig. 2, pl. 6.) GREATER DUCKWEED. Disk rounded or oblong, 7 to 12 nerved. Rootlets in a cluster of 5 to 11. (This plant is assigned to a genus *Spirodella*, *S. polyrrhiza*, by Schleiden.)

2. WOLFFIA, Horkel.

In our region, minute flowering plants, the smallest of flowering plants, small grains which can only be distinguished from the lower, non-flowering plants, by the aid of a strong magnifying glass. There is no root-like thread, the plant is not flattened like *Lemna*, but more or less globular.

1. *W. columbiana*, Karst. (Fig. 11, pl. 6.) Plant nearly spherical, about $\frac{1}{50}$ in. diameter. Not dotted. Floating near the surface of stagnant waters.

2. *W. punctata*, Griseb. (*W. brasiliensis*, Englm.) Plant oblong, about $\frac{1}{50}$ in. long, with brown dots above and below. Floating in similar situations to No. 1.

FAMILY II.—NAIADACEAE. PONDWEED FAMILY

Plants of fresh or salt water, entirely immersed except that the flowers may appear above water, and the upper leaves may float. Upper leaves usually in pairs, the lower generally alternate, and in 2 rows. Flowers usually small, inconspicuous, in lengthened

groups, the corolla absent or of various forms. The stamens consist of the anthers only, being without filaments or with only the rudiments of filaments. The stamens and pistil may occupy the same flower or separate flowers.

Flowers on fleshy spikes. Perianth, when present, 4-parted.

Found in fresh water **Potamogeton**

Flowers without perianth, on a long-grooved receptacle which is nearly hidden by the grass-like leaf. Marine plant

. **Zostera**

Flowers few, without perianth, fruit arranged in a false umbel surmounting a tall spiral fruit stalk **Ruppia**

Flowers naked, pear-shaped, green, in small radiating groups in the axils of the leaves **Zannichellia**

Margins of leaves spiny-toothed. Pistillate and staminate flowers on different plants. Pistil solitary, naked . **Naias**

1. POTAMOGETON, L.

Aquatic plants mostly in shallow pools or streams of fresh water, with inconspicuous, greenish or sometimes dull reddish masses of flowers arranged on a fleshy pediceled spike, perianth 4-parted, stamens 4; ovaries 4; leaves all submersed or, the uppermost spreading into a long narrow or a rounded oval expanse, floating on the surface of the water. Lower leaves alternate, upper generally opposite. Lower leaves quite thin, membranous; the floating leaves leathery and firm in structure. Stipules thin and generally resembling the membranous leaves, they are, in some species, several inches in length.

GROUP 1: *Upper leaves floating on the surface of the water and differing from the submersed leaves in form and texture.*

This group is again divided into two sections.

SEC. 1. *Floating leaves more or less heart-shaped at base, sometimes but slightly so.*

1. **P. natans**, L. (Fig. 1, pl. 4.) COMMON PONDWEED. Stem 2 to 4 ft. long; floating leaves 2 to 4 in. long, half as wide, on long leaf stems which are as thick as the main stem. Leaves elliptic or ovate, obtuse, tipped with an abrupt point at outer extremity. The nutlet has a deep impression down the middle. Leaf wings (stipules) very long (4 to 6 in.); spike of flowers 1 to 2 in. long, dull green, protruding above the surface of the water. Common in still ponds and borders of lakes and streams.

2. **P. Oakesianus**, Robbins. (Fig. 1, pl. 5.) OAKES'S PONDWEED. Stems more slender than those of No. 1. Leaf stems *thicker than the main stem*. No groove on the side of the nutlet. Leaves elliptic, very

slightly heart-shaped at base, about $\frac{1}{2}$ as large as those of *P. natans*. Still waters, most of our area.

3. *P. pulcher*, Tuckerm. SPOTTED PONDWEED. Floating leaves large, 3 to 5 in. long, 1 to 3 in. wide, oval, generally heart-shaped at base. Leaf stalks rather short. Flower stalk longer and spotted. Submersed leaves of two kinds, the upper lance, almost ribbon-shaped, 3 to 8 in. long, thin, pelucid, the lower broader, thicker and on a leaf stalk. Fruit 3 ridged. Lakes and ponds, north to south in our area.

SEC. 2. *Floating leaves not heart-shaped.*

A. *Submersed leaves expanded to somewhat broad leaf blades.*

4. *P. amplifolius*, Tuckerm. (Fig. 2, pl. 4.) LARGE-LEAVED PONDWEED. Floating leaves (not always present) oval or broadly elliptic, rounded at base 2 to 4 in. long. Submersed leaves broader and longer (4 to 8 in. long), with short leaf stalks. Stipules very long, grass-like. Lakes, especially in northern half of our area.

5. *P. alpinus*, Balbis. (Fig. 5, pl. 4.) NORTHERN PONDWEED. Floating leaves 2 to 5 in. long, often absent, lance-shaped, with apex broadest narrowing to a very short leaf-stalk. Submersed leaves much the same form, but with almost no leaf-stalks. Stipules broad, obtuse at free extremity. Flower stem 2 to 8 in. long, spike of flowers 1 to $1\frac{1}{2}$ in. long. Fruit reddish. Ponds and borders of streams, our area.

Var. *Faxonii*, Morong. FAXON'S PONDWEED. Floating leaves rather shorter and broader than No. 6, and with very blunt points. Submersed leaves broader and with leaf-stalk $\frac{1}{2}$ to 1 in. long. Creeks entering Lake Champlain from the east.

6. *P. lonchites*, Tuckerm. LONG-LEAVED PONDWEED. (*P. americanus*, C. & S.) Floating leaves thin, opposite, elliptic, blunt or somewhat acute at apex, 2 to 6 in. long with long leaf stalks. Submersed leaves long, ribbon-like, wavy, acute at each end with leaf stalk 1 to 4 in. long. Stipules acute, 1 to 4 in. long. Fruit with 3 distinct ridges on the back. Ponds and streams.

B. *Submersed leaves narrowed to grass-like blades, not thread-like.*

7. *P. heterophyllus*, Schreb. VARIOUS-LEAVED PONDWEED. Stems very long and slender. Floating leaves 1 to 2 in. long, broad, elliptic, sometimes approaching to heart-shaped at base, pointed at apex. Leaf stalks 1 to 4 in. long. Submersed leaves narrow lance-shaped or linear, acute at both ends, rather stiff, no leaf stalk. Stipules long, broad at base, obtuse at outer extremity. A very variable species as the name indicates. Common.

8. *P. spathulaeformis*, Morong. SPATULATE-LEAVED PONDWEED. Floating leaves broadly elliptic or ovate, with the external extremity broadest, apex sharp pointed. Submersed leaves lance-shaped broader at outer extremity and tapering to a short leaf stalk, stipules obtuse. Mystic Pond, Medford Pond, Mass. (said to be hybrid of *P. heterophyllus* and *P. Zizii*).

9. *P. Nuttallii*, Cham. & Sch. (Fig. 3, pl. 4.) NUTTALL'S PONDWEED. (*P. epiphydrus*, Raf.) Floating leaves oblong, 1 to 4 in. long, tapering



PLATE 4

1. *Potamogeton natans*. 2. *P. amplifolius*. 3. *P. Nuttallii*. 4. *P. lucens*.
5. *P. alpinus*. 6. *P. perfoliatus*

toward the base and blending into the short leaf stem. Lower floating leaves gradually modified until they pass to the form of the submersed leaves. Submersed leaves pear-shaped or elliptic and generally with nerves diverging from the base. Ponds and streams, through our area.

C. Upper leaves elliptic, lower leaves thread-like.

10. *P. hybridus*, Michx. RAFINESQUE'S PONDWEED. (*P. diversifolius*, Raf.) Floating leaves elliptic, sometimes narrowed to lance-shaped, about 1 in. long, $\frac{1}{2}$ as wide. Submersed leaves 3 or 4 in. long, thread-like, stipules obtuse, less than $\frac{1}{4}$ as long as submersed leaves. Spikes of flowers at surface of water, $\frac{1}{2}$ in. long, those in the axils of submersed leaves with about 4 flowers on a flower stalk $\frac{1}{4}$ in. long, differing in this respect from No. 9. Still waters, throughout our area.

11. *P. dimorphus*, Raf. (Fig. 8, pl. 5.) SPIRAL PONDWEED. (*P. spirillus*, Tuckerm.) Stem 6 in. to 2 ft. long. Floating leaves $2/3$ to 1 in. long, $\frac{1}{2}$ as wide. Leaf stalk about as long as leaf. Near the floating leaves are the cylindric flower spikes on stems $\frac{1}{2}$ to 1 in. long, while in the axils of the submersed leaves the small rounded flower masses are *without* flower stalks. Ponds and ditches, our area.

12. *P. Vaseyi*, Robbins. VASEY'S PONDWEED. Floating leaves 1 to 4 pairs, opposite, on fruit-bearing stems, $\frac{1}{4}$ to $\frac{1}{2}$ in. long, more than $\frac{1}{2}$ as wide, stipules long and narrow. Flower spikes *only on the stem of floating leaves*. Eastern Mass. and westward.

D. Floating leaves both elliptic and very narrow grass-like.

13. *P. lateralis*, Morong. OPPOSITE-LEAVED PONDWEED. Stem thread-like, branching, the branches with floating leaves have no flower spikes. Floating leaves elliptic, obtuse, $1/3$ in. long, $\frac{1}{2}$ as wide as linear. Submersed branches with very narrow linear leaves bearing flower groups on flower stalks 1 to 2 in. long, flower spike with about 4 flowers. Lakes and streams, Eastern Mass. and westward.

GROUP 2. *Leaves all submersed or exceptionally a few floating.*

A. Leaves broad, rounded or heart-shaped at base, clasping the stem.

14. *P. perfoliatus*, L. (Fig. 6, pl. 4.) CLASPING-LEAVED PONDWEED. Leaves broadly oval or rounded, nearly or quite as broad as long, cordate and clasping the stem, upper leaves opposite, lower alternate. Ponds and streams, our area.

Var. *P. lanceolatus*, with longer lance-shaped leaves. Lake Champlain and northward.

15. *P. Richardsonii*, (Benn.) Rybd. Leaves long, lance-shaped, base heart-shaped and clasping the stem, wavy, pale bright green. Quiet waters, New England and N. Y.

B. Leaves broad lance-shaped not clasping at base.

16. *P. bupleuroides*, Fernald. Leaves nearly orbicular to lance-shaped, obtuse at apex, flat not crisped. Stipules inconspicuous, not usually developed. Fruit rounded, somewhat 3-keeled. Brackish waters.

17. *P. angustifolius*, Berchtold & Prest. Resembles *P. lucens*, but is smaller and whereas all the leaves of *P. lucens* are submersed the upper leaves of this form are sometimes floating on the surface. The fruit of this species is 3-keeled while that of *P. lucens* is roundish and scarcely keeled. Lakes, Vt., Conn., and N. Y.

18. *P. lucens*, L. (Fig. 4, pl. 4.) SHINING PONDWEED. Leaves 3 to 4 in. long, 1 in. broad, lance-shaped or the uppermost oval, often shining. Leaf stalks short, flower stalk often 4 to 6 in. long. Through our area.

Var. *P. lucens connecticutensis*, Robbins; leaves crisped, not shining. Conn. and N. Y., rare.

19. *P. Zizii*, Roth. ZIZ'S PONDWEED. Smaller than *P. lucens*, but much like it. Branched at base. Floating leaves elliptic, 2 to 4 in. long with long leaf-stalks. Submersed leaves long, lance-shaped, wavy, the surface shining, on long leaf-stalks. *Flowers on stems thicker than the general stem.* Flower spikes 1 to 2 in. long. Lakes and streams throughout our region.

20. *P. praelongus*, Wulf. WHITE-STEMMED PONDWEED. Very long stem, leaves broader at base and half clasping the stem. Stems white. Some leaves 12 to 14 in. long.

21. *P. mysticus*, Morong. MYSTIC PONDWEED. Plant slender, upper leaves lance-ovate, opposite, 1 to $1\frac{1}{2}$ in. long, $\frac{1}{12}$ to $\frac{1}{4}$ in. wide. Lower leaves alternate, longer than the upper. No leaf stalks. Stipules generally small. Spikes with 4 to 6 flowers. Ponds in Mass.

22. *P. crispus*, L. (Fig. 4, pl. 5.) CURLED-LEAVED PONDWEED. Leaves oblong, rounded at summit, wavy, half clasping at base, 2 to 4 in. long, $\frac{1}{3}$ as wide. Spikes with few more or less scattered flowers. Fresh or sometimes brackish water, Mass. and southward.

C. Leaves very narrow, grass-like or thread-like.

23. *P. obtusifolius*, Mertens & Koch. BLUNT-LEAVED PONDWEED. Leaves very narrow grass-like, 3-veined, 2 to 3 in. long, $\frac{1}{20}$ to $\frac{3}{20}$ in. wide, very obtuse at extremity. Stipules rather long and also very obtuse. Spike 5 to 8 flowered. Fruit not keeled. Our region, in still waters.

24. *P. zosteræfolius*, Schum. (Fig. 9, pl. 5.) EEL GRASS PONDWEED. Leaves similar to No. 23, but often much longer and less obtuse at extremity. Indefinitely veined. Fruit keeled. Stipules falling early. Still or running waters, N. J. and northward.

25. *P. Hillii*, Morong. HILL'S PONDWEED. Leaves narrow grass-like 1 to 3 in. long, pointed at free extremity. Ponds, Eastern N. Y., westward.

26. *P. foliosus*, Raf. LEAFY PONDWEED. Stem thread-like; leaves very narrow 1 to 2 in. long, sharp pointed; stipules obtuse; fruit distinctly keeled. Ponds and streams, our region.

27. *P. Friesii*, Rubrecht. FRIES'S PONDWEED. Stems 2 to 4 ft. long. Plant resembles No. 23 but stipules are acute. Still waters, N. Y. and westward.

28. *P. rutilus*, Wolfg. SLENDER PONDWEED. Stems almost thread-like, 1 to 2 ft. long; leaves about 1 in. long, very slender grass-like and *narrowing all the way to a sharp point*. Most northern parts of our area.

29. *P. interruptus*, Kitaibel. INTERRUPTED PONDWEED. Leaves grassy, in clusters sheathed by the stipules. Flowers on interrupted spikes.

30. *P. Robbinsii*, Oakes. ROBBIN'S PONDWEED. Stems rigid, much branching; leaves rigid, in 2 opposite rows closely investing the stem, 3 to 5 in. long, acute at outer extremity; stipules sheathing the stem, but at length free, very acute. Flowers very few in interrupted spikes. Lakes and ponds, N. J. and northward.

D. Leaves all thread-like.

31. *P. pectinatus*, L. (Fig. 2, pl. 5.) FENNEL-LEAVED PONDWEED. Spikes on long flower stalks with interrupted rounded spikes of flowers. Stem much branching. Stipules in contact with leaves half the length of the former. Some obscure raised lines on the back of the seed. Fresh or salt waters, our area.

32. *P. filiformis*, Pers. (Fig. 7, pl. 5.) FILIFORM PONDWEED. Stems thread-like, 3 to 20 ft. long; leaves 2 to 12 in. long. Differing from No. 31 by absence of the lines on back of seed. Ponds, western N. Y.

33. *P. gemmiparus*, Morong. CAPILLARY PONDWEED. The stipules are lance-shaped, acute at outer, broad at inner extremity. Ponds, eastern Mass. and R. I.

34. *P. pusillus*, L. SMALL PONDWEED. Resembles Nos. 31 and 32 but flower groups are small rounded masses, each spike containing from 3 to 8 flowers in a nearly globular mass. Ponds, lakes and streams, our area.

35. *P. strictifolius*. Leaves much more rigid than those of *P. pusillus*, the edges turned back. In other respects strongly resembles *P. pusillus*.

36. *P. confervoides*, Reichb. ALGA-LIKE PONDWEED. Stems very slender, thread-like, 6 to 18 in. high. Leaves thread-like or flat bristle-formed, about 1 in. long, the point very fine, 1-nerved or nerveless. Stipules nearly or quite $\frac{1}{4}$ in. long, blunt. Flower stem long and erect. Flowers in short spikes or heads, about $\frac{1}{4}$ in. long. In cold mountain ponds throughout most of our region.

2. ZANNICHELLIA, Mitchell

Submersed water plant with creeping roots, slender stems and thread-like leaves each broadened to a sheathing base. In the axils of the leaves spring the naked flowers which consist each of a single stamen and a group of 4 or less or more pistils, which expand toward the base into oval-shaped ovaries. Fruit directly on the receptacle or on a very short pedicel.

Z. palustris, L. (Fig. 3, pl. 5.) ZANNICHELLIA. Stems thread-like; leaves 1 to 3 in. long. Fruits 2 to 5 in a cluster. Fresh water, pools and ditches throughout our area.

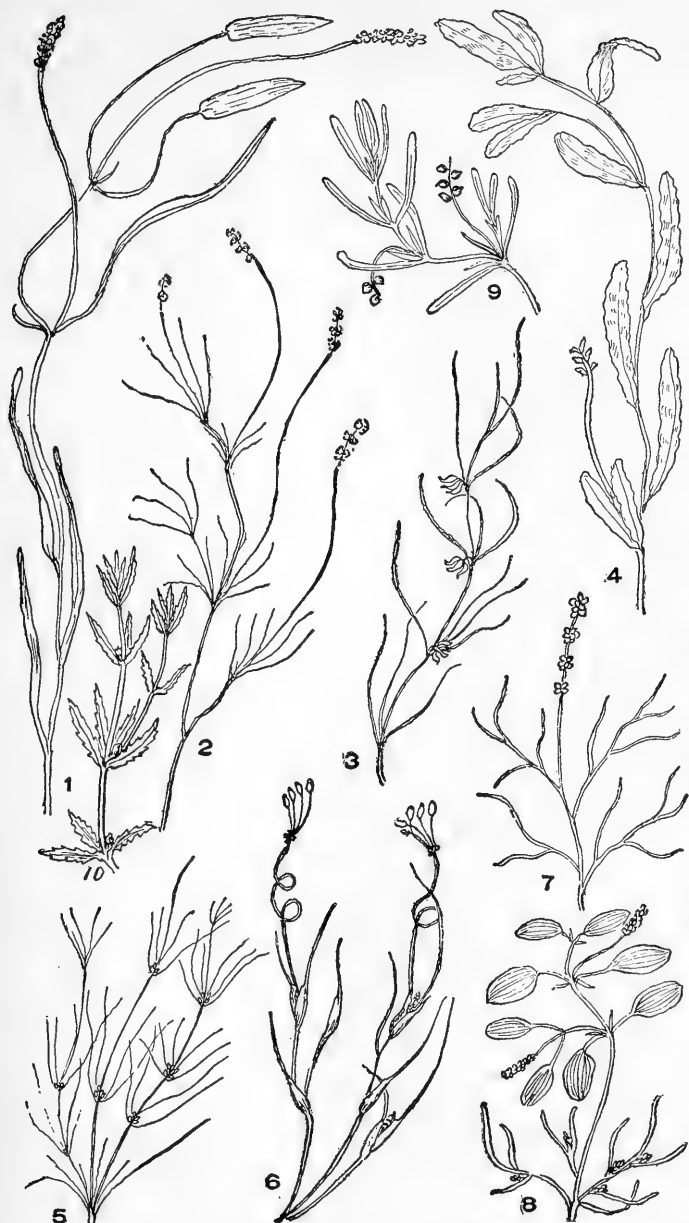


PLATE 5

1. *Potamogeton Oakesianus*. 2. *P. pectinatus*. 3. *Zannichellia palustris*. 4. *Potamogeton crispus*. 5. *Naias gracillima*. 6. *Ruppia maritima*. 7. *Potamogeton filiformis*. 8. *P. dimorphus*. 9. *P. zosteraefolius*. 10. *Naias marina*.

3. ZOSTERA, L.

Submersed water plant in salt water. Stems creeping; leaves narrow linear, often 2 to 3 ft. long. The flowers are naked, arranged in 2 rows of about 10 to 20 in each row, on a long receptacle, which arises at the axil of the sheathing leaf, and which is nearly enclosed by it. Each flower consists of an anther or of a pistil. These alternate in the 2 rows, each being sessile.

Z. marina, L. (Fig. 9, pl. 6.) EEL GRASS. Leaves 1 to 6 ft. long, less than $\frac{1}{4}$ in. wide, 3 to 7 nerved. Flower mass 1 to $2\frac{1}{2}$ in. long. Along the Atlantic coast.

4. RUPPIA, L.

Submersed plants in salt water with creeping roots and thread-like, much branching stems. Leaves alternate, thread-like, their bases expanding to a membranous sheath. From the axil of this sheath arises the flower stalk which, at first, is partly enclosed by the membranous sheath, but as the fruit matures the flower stalk becomes a long thread-like spirally-wound peduncle bearing an umbel-like cluster of hard seeds. The flower consists of 2 anthers attached directly to the receptacle, each so nearly divided in halves that they appear like 4 anthers. These enclose several (generally 4) pistils, which are also sessile.

R. maritima, L. (Fig. 6, pl. 5.) DITCH GRASS. MARITIME RUPPIA. Stem 2 to 3 ft. long; leaves 1 to 3 in. long; the slender spiral fruit stalk about 1 ft. long. The only species within our limits. Common along the Atlantic coast.

5. NAIAS, L.

Slender branching submersed plants with leaves generally in whorls (3 to 5). Margins of the leaves toothed. Pistillate and staminate flowers on different receptacles, sometimes on different plants. Staminate flower with a cylindric calyx, entire or with 4 diverging points. The inner perianth is pelucid, adhering to the single stamen. Capsule 1-seeded.

1. *N. marina*, L. (Fig. 10, pl. 5.) LARGE NAIAS. Stem stout, with whorls of about 3 leaves, which are about 1 in. long by $\frac{1}{12}$ broad, deeply toothed on the margin with spiny teeth. Several such teeth on the back of the central nerve. Lakes, marshes and salt springs, western N. Y. and westward.

2. *N. flexilis*, Willd. (Fig. 6, pl. 6.) SLENDER NAIAS. Leaves in pairs, narrower than No. 1, acute at outer extremity somewhat sheathing at base. Few teeth on margin. Lakes, ponds and streams, all of our area.

3. *N. gracillima*, Morong. (Fig. 5, pl. 5.) THREAD-LIKE NAIAS. Stem thread-like, branching. Leaves thread-like but minutely notched on margins, in 2's or in verticles of 3 to 5. Ponds, pools. Local in Mass., N. Y., N. J., and southward.

FAMILY III.—TRIGLOCHINEAE. ARROW GRASS FAMILY

Plants growing in marshes. Leaves half cylindric, stem naked, with broad membranous sheath at base. Flowers small, green or

yellowish-green, with 4 to 6 segments to the perianth, on a tall, slender, round scape, arranged in spindle-shaped cluster (raceme). Stamens 6 or 4. Carpels 6 or 3.

1. TRIGLOCHIN, L.

Characters as above.

1. *T. palustris*, L. MARSH-ARROW GRASS. Leaves linear, 5 to 12 in. long, tapering to sharp point. The naked flower scape 8 to 20 in. high. Flowers erect on the scape, nearly $\frac{1}{4}$ in. long and $\frac{1}{16}$ in. wide. Segments of perianth 6. Anthers 6. Fruit of 3 carpels joined, linear club-shaped. In marshes. New York and northward.

2. *T. maritima*, L. (Fig. 5, pl. 6.) SEASIDE ARROW GRASS. A large species $\frac{1}{2}$ to 2 ft. high. Flower stem much longer than leaves. Raceme often 15 in. or more in length. Fruit ovate or ovoid, of 6 united carpels. Salt marshes and lake shores. New Jersey and northward.

2. SCHEUCHZERIA, L.

Marsh plant with leafy stem. Leaves half round below, grass like above, with broad membraneous sheath at base. Flower stem with long leafy bracts, each flower growing from the axil of a bract. Flowers greenish, perianth of 6 segments. Stamens 6, ovaries 3, radiating.

S. palustris, L. (Fig. 8, pl. 6.) SCHEUCHZERIA. A rush-like plant 8 in. to 1 ft. high. Leaves 4 to 6 in. long. The sheath of the basal leaves is often 4 in. long. Bays throughout our area.

FAMILY IV.—ALISMACEAE. WATER PLANTAIN FAMILY

Marsh or aquatic plants with showy flowers borne in whorls on scape-like stems, which arise at the root, with sheathing leaves, also arising from the root, and with flowers with stamens and pistils on the same flower or on different flowers on the same stem. Petals 3, white, sepals 3, green. Stamens 6 or more. Ovaries numerous. The leaves are found on long leaf-stalks and are strongly marked by the nerves which arise and terminate at the ends of the leaf. The blade of the leaf is in some species reduced to a grass-like or strap-shaped extension of the leaf-stalk.

1. ALISMA, L.

Flowers numerous, small, white or rosy, in elongated clusters consisting of several whorls, arranged on the scape which arises from the root. Flowers with both stamens and pistils. Leaves all from the root.

1. *A. Plantago-aquatica*, L. (Fig. 5, pl. 7.) WATER PLANTAIN. Leaves all at the base, spreading, broad egg-shaped with 5 to 7 nearly parallel or elliptically arranged nerves. Leaf stalk longer than the leaf. Flowers on a stem 6 to 30 in. tall, arranged in a loose pyramidal cluster composed of numerous smaller fan-shaped clusters of whorls, each made up of 3 to 10 flowers on slender individual flower stalks an inch or more in length. Swampy places or shallow water. Common, June-October.

2. **A. tenellum**, Mart. DWARF WATER PLANTAIN. (*Helianthium tenellum*, Britton. *Echinodorus tennellus*, Buchenau.) Leaves lance-shaped, on long leaf-stalks all basal. Flower stem naked, bearing at summit a spreading whorl or umbel of 2 to 8 white flowers on unequal flower stalks. Muddy places. Mass. southward and westward. April-August.

3. **A. Geyeri**, Torr. Leaves linear-lance-shaped to elliptic, overtopping the shorter flower scapes. Whorls of flowers several, the cluster more diffuse than that of No. 1. Individual flower stems thick, strongly divergent in fruit. Petals rose color at the margins with a yellow spot at base. Locally, N. Y. and westward.

2. LOPHOTOCARPUS, Durand

Aquatic herbs with leaves and flowers resembling sagittaria and hardly distinguished from it. In this genus the flowers are all perfect, *i. e.*, stamens and pistils are on the same receptacle. In sagittaria the stamens and pistils are in different flowers.

1. **L. calycinus**, J. G. Smith. LOPHOTOCARPUS. Leaves lance-arrow or halberd-shaped. Flower stem decumbent. Plants with habits and appearance of sagittaria. Swamps and muddy bottoms, our area. July-September.

2. **L. spongiosus**, (Engelm.) J. G. Smith. SPONGY SAGITTARIA. Submersed aquatic with thick spongy stem-like leaves which are 4 to 12 in. high, sometimes expanding to an arrow-shaped leaf-blade, 2 to 4 in. long, with or without diverging acute lobes half as long as the leaf-stalks, at length decumbent. New Brunswick south to Virginia. July-August.

3. **L. spathulatus**, J. G. Smith. SPATULA-LEAVED SAGITTARIA. Small aquatic with stem-like leaves, without leaf-blades. These bladeless leaves 1 to 2½ in. high. Flower stem usually shorter than the leaves, 1 or 2 flowered. Stamens 6 to 9. On sandy beaches within influence of the tide. Newburyport, Mass.

3. SAGITTARIA, L.

Water plants growing in muddy borders of ponds and streams. Leaves and flowers aerial. Leaves all at base, varying from the extreme arrow-head form to long lance-shape or even to long leaf stalks without blade. Flowers on a spike in whorls of 3's, each whorl subtended by a whorl of 3 bracts; upper flower whorls consisting of staminate, the lower of pistillate flowers. Corolla of 3 broad white petals, calyx of 3 green sepals. Carpels on a convex receptacle. The beak at the extremity of the carpel forms an important feature for identification of some variable species.

Leaves arrow-shaped (sagittate), with the posterior lobes at least ¼ as long as the blade.

Bracts below the pistillate (lower) flowers as long as the individual flower stems.

Beak at extremity of fruit more than ¼ the length of the fruit itself *S. longirostra*

Beak less than ¼ length of fruit *S. arifolia*

Bracts below pistillate flowers shorter than the flower stems.

Leaves broad *S. latifolia*

Leaves very narrow, not always arrow-shaped *S. Engelmannia*

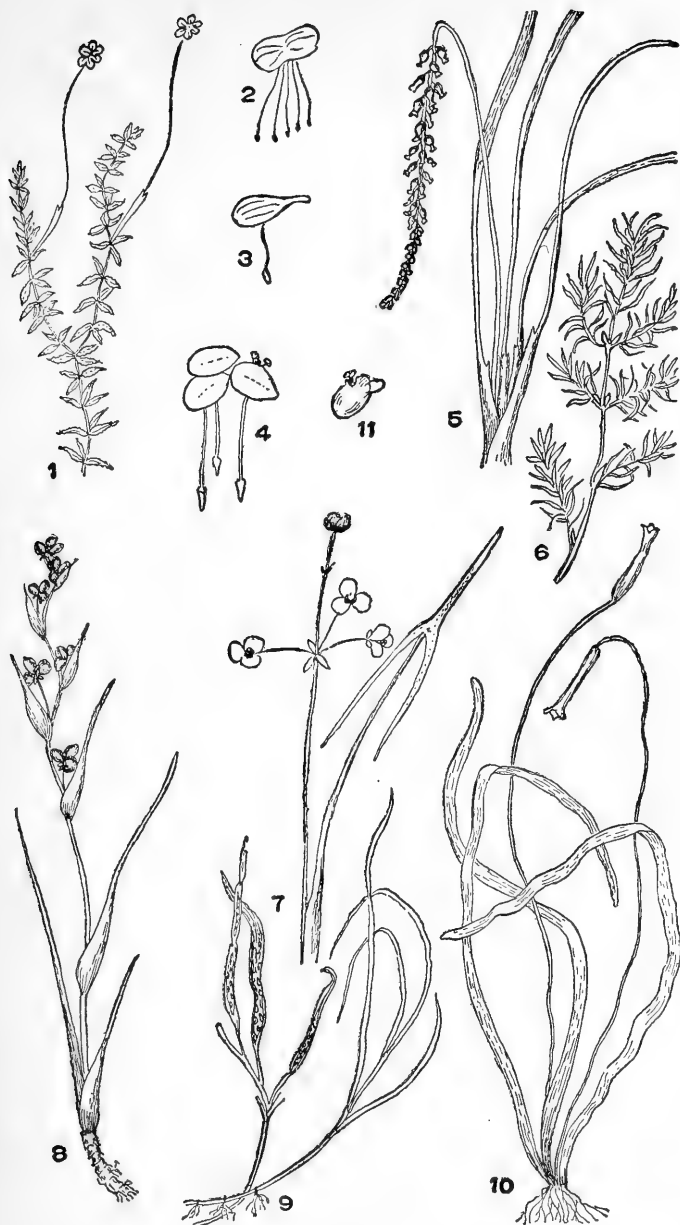


PLATE 6

1. *Elodea canadensis*. 2. *Lemna polyrhiza*. 3. *L. trisulca*. 4. *L. minor*.
 5. *Triglochin maritima*. 6. *Najas flexilis*. 7. *Sagittaria Engelmannia*.
 8. *Scheuchzeria palustris*. 9. *Zostera marina*. 10. *Vallisneria spiralis*.
 11. *Wolffia columbiana*.

Leaves not generally arrow-shaped.

Flowers with very short or with no individual flower stems . . . *S. heterophylla*

Flowers with rather long flower stems.

Leaves reduced to short rounded stems generally without leaf-blade *S. teres*

Leaves more or less grass-like.

Leaves lance-shaped *S. graminea*

Leaves linear.

Flowers white *S. subulata*

Petals with a rose-colored spot at base *S. Eatonii*

1. *S. longirostra*, (Micheli.) J. G. Smith. (Fig. 1, pl. 7.) LONG-BEAKED ARROW-HEAD. Plant 1 to 3 ft. tall. Leaves on leaf stalks longer than themselves, often broad, spreading at base to 2 receding lobes, acute at apex and at the ends of the lobes. Flower scape at base 6-angled, longer than leaves, very erect; at upper $\frac{1}{3}$ about 2 whorls of pistillate and 2 to 4 whorls of staminate flowers, each subtended by 3 bracts, longer than the flower pedicel. The white petals greater in breadth than length. Fruit with a stout beak, nearly erect. This is a common species in this country and it is also native in Europe. Its leaves are extremely variable in form and hence the species is known also as *S. variabilis*. The drawing, Fig. 1, pl. 7, shows the very narrow form of the leaf, the blade is, however, sometimes several inches across. Margins of lakes and ponds and in swamps. July-September.

2. *S. arifolia*, Nutt. (Fig. 2, pl. 7.) ARUM-LEAVED SAGITTARIA. Leaf wings about $\frac{1}{4}$ the length of blade. Flowers arranged as in No. 1. Leaf stalks bend outward. Fruit with a very small beak less than $\frac{1}{10}$ length of fruit. Situations similar to No. 1. August-September.

3. *S. Engelmannia*, J. G. Smith. (Fig. 7, pl. 6.) ENGELMANN'S ARROW-HEAD. Stem quite slender, leaves very narrow, basal lobes being linear, about $\frac{1}{2}$ as long as the blade. The bracts below the pistillate flowers about $\frac{1}{3}$ the length of the flower pedicels. The fruit (achene) is terminated by a beak, nearly $\frac{1}{2}$ its own length, which points directly upward. Situations similar to No. 1. August-September.

4. *S. latifolia*, Willd. (Fig. 3, pl. 7.) BROAD-LEAVED ARROW-HEAD. Variable in size and form. Flower scape from 6 in. to 2 ft. tall. Leaves often very broad, but also sometimes quite narrow. Lobes $\frac{1}{4}$ to $\frac{1}{3}$ as long as blade. The beak at the summit of the fruit points obliquely or almost horizontally.

5. *S. heterophylla*, Pursh. (Fig. 4, pl. 7.) SESSILE-FRUITED ARROW-HEAD. (*S. rigida*, Pursh.) Plant from $\frac{1}{2}$ to 2 ft. high. Leaves variable, from broad linear, almost grass-like, to lance-shaped or elliptic or ovate, about as high as flower stalk. Pistillate (lower) flowers with very short pedicel (sessile), staminate flowers above, on long pedicels. Fruit with an upright beak $\frac{1}{4}$ length of the fruit itself.

6. *S. graminea*, Michx. GRASS-LEAVED SAGITTARIA. Leaves linear, lance-shaped or elliptic. The pistillate flowers on pedicels as long as or longer than those of the upper staminate flowers. Ponds, our area.

7. *S. Eatonii*, J. E. Smith. EATON'S SAGITTARIA. Aquatic with mostly bladeless leaves or rarely with these leaf-stems expanding to a linear lance-shaped blade. Flower stem 4 to 8 in. high, weak, bearing 1, 2 or rarely 3 whorls of flowers. Lowest whorl with 2 fertile and 1 staminate flower. Pedicels of fertile flowers about $\frac{1}{2}$ in. long. In new edition of



PLATE 7

1. *Sagittaria longirostra*. 2. *S. arifolia*. 3. *S. latifolia*. 4. *S. heterophylla*. 5. *Alisma Plantago-aquatica*. 6. Enlarged flower of *A. Plantago-aquatica*.

Gray regarded as a form of *S. graminca*. On sandy shores between high and low tide, Newburyport, Mass.

8. *S. teres*, S. Watts. **SLENDER SAGITTARIA**. Leaves reduced to short rounded leaf stalks without blades or bracts. Flower stalk slender $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high; few flowered. Ponds, Mass. and southward.

9. *S. subulata*, (L.) Buchenare. **SUBULATE SAGITTARIA**. Leaves simply leaf stalks or with narrow lanceolate blades. Flower stalk very slender $\frac{1}{6}$ to $\frac{1}{2}$ ft. high. Bracts below flower whorls united to their extremities or nearly so. Conn., southward.

FAMILY V.—VALLISNERIACEAE. TAPE-GRASS FAMILY

Submersed aquatic herbs, with regular flowers which terminate a long thread-like peduncle, which arises from a spathe or involucre. Flowers tubular, 3- or 6-parted at summit. Pistillate and staminate flowers on the same or on different plants. Stamens 3 to 12, separate or in union. Fruit ripening under water.

1. VALLISNERIA, L.

Submersed. Leaves long, grass-like with 5 parallel nerves including the marginal. Pistillate flowers white, with 3 lobes, on a long thread-like pedicel starting near the root and extending to the surface of the water when expanded. After fertilization the long pedicel becomes spiral and draws the flower below the surface. Fruit much elongated. Staminate flowers on short scape on a conic receptacle.

V. spiralis, L. (Fig. 10, pl. 6.) **LAKE GRASS**. **EEL GRASS**. In still waters throughout our region.

2. ELODEA, Michx. (*Philotria*, Raf.)

Submersed plant with many whorls of 3 or 4 short awl-shaped or elliptic leaves. Much branching. Flowers white, 6-parted at summit, on a long white thread-like pedicel (6 to 12 in.), which arises from a tubular "spathe" but little thicker than itself and which generally terminates a branch. The tiny white flower floats on the surface of the water, the remainder of the plant submersed. Staminate flowers without the long pedicel, breaking off and rising to surface of water to shed the pollen.

E. canadensis, Michx. (Fig. 1, pl. 6.) **DITCH MOSS**. In quiet ponds and lakes, throughout our area. May-Aug.

3. LIMNOBIUM, Richard. (*Hydrocharis*, Bosc.)

Water herbs spreading by stolons with broad egg-shaped or heart-shaped leaves which arise in fascicled groups at the stolon nodes. Flowers white on flower stalks *shorter than the leaves*. Pistillate and staminate flowers on same plant. Perianth 6 parted, segments unequal. Staminate flowers in a spathe, 2 to 4. Fruit berry-like.

L. Spongia, (Bosc.) Richard. **FROG-BIT**. Leaves round or somewhat egg-shaped, 1 to 2 in. long, nearly or quite as wide, 5 to 7 nerved. Flowers and leaves arising from the nodes of the runners. In shallow still water, our area. July-Aug.

Order III.—GLUMIFLORAE. Glumaceous Flowered Plants

The order *Glumiflorae* includes the great families of grasses and sedges. The inflorescence is characterized by the dry, scale-like bracts, which are known as *glumes*. These glumaceous plants number, in our region, more than 400 species. Though of much interest as including some of the most valuable plants, the study of them is, to some extent, a speciality. Owing to the great number of the species and with the view of limiting the extent of this work, these families are omitted.

Order IV.—SPATHIFLORAE. Order of the Arums

The order includes, in our region, only one family, *Araceae*.

FAMILY I.—ARACEAE. ARUM FAMILY

Herbs bearing a fleshy spike which supports a large number of flowers, which are destitute of a perianth (a spadix). The spadix is enclosed by a sheath-like organ, the spathe. In *Acorus* the sheath appears like a continuation of the grass-like stem and does not wholly enclose the spadix. When the flowers are perfect, that is, when stamen and pistil are included in the same flower, the fleshy spike is surrounded by flowers which are alike on all parts of the receptacle. When some of the flowers are staminate and others are pistillate the former are on the upper part of the spadix, the latter below. The stamens are without filaments or with very short ones, and the styles are wanting to the pistils or are very short.

Leaves divided into 3 or more segments	Arisaema
Leaves arrow-head shaped	Peltandra
Leaves egg-shaped, heart-shaped at base.	
Spathe (flower envelope) white	Calla
Spathe brown to yellow	Symplocarpus
Leaves elliptic	Orontium
Leaves long, grass-like	Acorus

1. ARISAEMA, Martius. (Arum, L.)

Stem arising from an acrid, flattened, fleshy, bulb-like mass, a *corm*. Flower and leaf stems from the same base. Spadix consists of a column,

the upper part of which bears staminate flowers, the lower, pistillate. The column is enclosed by a sheath, generally striped in green and dark purple (the spathe). Fruit a fleshy oval berry, red when ripe. A number of such berries surround the fleshy, club-like mass.

1. **A. triphyllum**, Torr. (Fig. 1, pl. 8.) JACK-IN-THE-PULPIT. (*Arum triphyllum*, L.) One or two leaf stems, each bearing 3 leaflets, the stem and leaf $\frac{3}{4}$ to 3 ft. high. Flower stem shorter than stems bearing leaves. The green- or purple-striped sheath curves over the spadix. Found commonly in moist woods. April-June.

Var. *A. pusillum*, Peck. SMALL JACK-IN-THE-PULPIT. Similar to No. 1, but smaller and more slender, 14 in. high or less, spathe striped below; hood deep brown or nearly black. Open soggy bogs, New York. May-July.

Var. *A. Stewardsonii*, Britton. FLUTED SPATHED INDIAN TURNIP. Similar to No. 1, but spathe is distinctly fluted and leaves are shining on both sides. Spathe about as long as the stem from which it springs. Wet woods, growing among sphagnum, Penn. to Vermont. July.

2. **A. Dracontium**, (L.) Schott. (Fig. 7, pl. 8.) GREEN DRAGON. Leaf stem bears 5 to 17 leaflets, the stem and leaflets much exceeding the flower scape in height, the leaflets 3 to 10 in. long. Sheath greenish or whitish, not curving over the spadix, which tapers to a long, slender appendix. Moist shady places, our area. May-June.

2. PELTANDRA, Raf.

Large, undivided, arrow-shaped, shining, green leaves on long sheathing stalks, native of bogs. Flower column (spadix) slender and tapering, closely enveloped by the long green sheath (spathe). As the fruit is perfected the long flower stems bend toward the ground in goose neck fashion and the extremity of the sheath as well as the column fall off.

P. virginica, (L.) Kunth. (Fig. 1, pl. 9.) GREEN ARROW ARUM. In swamps and bogs throughout our region.

3. CALLA, L.

Low herb with heart-shaped or rounded leaves, in swamps or in borders of sluggish streams. Flower column much shorter than the sheath, which is white within and greenish on the outside. Leaf stem 2 to 6 in. long, leaf blades 2 to 6 in. long and nearly as wide. Berries in a cylindric group around the fleshy *spadix*, each involucre conic, red, few seeded.

C. palustris, L. (Fig. 6, pl. 8.) WATER ARUM. Resembles the cultivated calla, but is more or less creeping, and the central column is much thicker and longer in proportion to the white sheath. Bogs throughout our area.

4. SYMPLOCARPUS, Salisb. (*Spathyema*, Raf.)

Leaves large, heart-shaped or nearly oval. Whole plant foetid. Flower column oval, surrounded by a purplish-brown sheath, 3 to 6 in. high and $\frac{1}{2}$ as wide.

S. foetidus, (L.) Nutt. (Fig. 4, pl. 9.) SKUNK CABBAGE. The unattractive flower appears very early in the spring (Feb. to April), preceding the large leaves, these become from 1 to 3 ft. long and $\frac{1}{2}$ as wide. In swamps and wet soil, our area. Feb.-April.



PLATE 8

1. *Arisaema triphyllum*. 1a. Corm of *A. triphyllum*. 2. *Commelina communis*. 3. *C. virginica*. 4. *C. hirtella* (leaf and sheath). 5. *Tradescantia virginiana*. 6. *Calla palustris*. 7. *Arisaema Dracontium*.

5. ORONTIUM, L.

Water plant with elliptic leaves. Flower column (spadix) tall, cylindric. The sheath (spathe) at first covers the column, then recedes, and in many cases falls.

O. aquaticum, L. (Fig. 2, pl. 9.) **GOLDEN CLUB**. Leaves often floating in water, 3 to 12 in. long, $\frac{1}{2}$ as wide; entire, with veins nearly parallel. Swamps and ponds, southeast part of our area and southward. April-May.

6. ACORUS, L.

Long, aromatic, creeping rootstalks and grass- or flag-like leaves; growing in wet places. Flower column appearing to start from the side of a bayonet-like leaf.

A. Calamus, L. (Fig. 3, pl. 9.) **SWEET FLAG**. **CALAMUS ROOT**. Leaves 2 to 6 ft. high, 1 in. or less broad. Flower stem triangular or somewhat rounded. Swamps and along streams, common. May-July.

Order V.—FARINOSAE. Order of the Spiderworts

A small order including herbaceous plants, mostly aquatic, but including the family *Commelinaceae*, the plants of which are found in rich moist soil. Flowers with 3 or 6 stamens and 1 to 3 ovaries. Petals 3 or rarely 2; sepals 3. Flowers, except *Commelinaceae*, are nearly or quite regular; the petals and sepals are below the ovary. Flowers generally not individually conspicuous, but in some families forming heads or spikes, which are quite showy.

The order is specially characterized by the technical fact that the embryo arises at the end of the ovule opposite to the point of attachment of the ovule to the ovary.

Flowers yellow, in chaffy heads **XYRIDACEAE**

Flowers white or dull lead color in globose heads

. **ERIOCAULACEAE**

Flowers blue.

Plants not aquatic **COMMELINACEAE**

Aquatic plants **PONTEDERIACEAE**

FAMILY I.—XYRIDACEAE. YELLOW-EYED GRASS FAMILY

Marsh plants with grass-like tufted leaves and with twisted, angular flower stalks, bearing chaffy terminal heads with yellow

flowers. Petals 5; sepals 3; fertile stamens 3 inserted on the corolla (3 aborted stamens), capsule many-seeded.

XYRIS, L.

Characters, those of the Family.

Scape with a conspicuous bulb at base *X. arenicola*
 Scape not arising from a conspicuous bulb.

Heads nearly globose.

The two side sepals without wings *X. flexuosa*

The two side sepals winged.

Scape decidedly flattened *X. caroliniana*

Scape not distinctly flattened *X. montana*

Heads cylindric or oblong.

Keel of lateral sepals fringed *X. fimbriata*

Keel of lateral sepals not fringed *X. Smalliana*

1. *X. flexuosa*, Muhl. (Fig. 8, pl. 9.) SLENDER YELLOW-EYED GRASS. Heads globose, $\frac{1}{4}$ in. high; leaves narrowly linear. The 2 side sepals *without wings*. The flower scape only slightly or not at all twisted, 4 to 18 in. high, expanding to a bulb at base. Expanded flower about $\frac{1}{4}$ in. diameter. Swamps and wet places. July-Sept.

2. *X. montana*, H. Ries. NORTHERN YELLOW-EYED GRASS. Two side sepals *with wings*, flower scape only slightly twisted, not bulbous at base, heads oblong. Smaller than No. 1, but much resembling it. White Mountains. In cold bogs. July-Aug.

3. *X. fimbriata*, Ell. (Fig. 6, pl. 9.) FRINGED YELLOW-EYED GRASS. Scape stout, 2 to 4 ft. high, angled, heads cylindric, $\frac{1}{2}$ to 1 in. long. Lateral sepals narrow and *twice as long* as the subtending chaffy bract and distinctly fringed. Wet pine barrens, New Jersey.

4. *X. caroliniana*, Walt. CAROLINA YELLOW-EYED GRASS. Scape decidedly flattened, 6 in. to 2 ft. high. Lateral sepals winged, obscurely fringed above, these lateral sepals shorter than the chaffy bract, subtending them. Swamps mostly near the coast.

5. *X. arenicola*, Small. (Fig. 7, pl. 9.) TWISTED YELLOW-EYED GRASS. (*X. torta*, Kunth.) Scape much twisted, arising from a bulbous base. Leaves also spiral twisted. Heads narrow oblong. Lateral sepals exceeding the bract and slightly fringed. Dry pine barrens, New Jersey. May-Aug.

6. *X. Smalliana*, Nash. CONGDON'S YELLOW-EYED GRASS. (*X. Congdoni*, Small.) Larger than *X. caroliniana*, the stem 16 to 22 in. high. Leaves about $\frac{3}{8}$ in. broad at base, the longer ones as long as the flower stem. Bracts forming the head numerous with irregularly notched borders. Lateral sepals $\frac{1}{2}$ in. long. Low grounds, Mass. to New Jersey. Aug.-Sept.

FAMILY II.—ERIOCAULACEAE. PIPEWORT FAMILY

Plants growing in bogs and in water. Leaves tufted, grass-like, springing directly from the root. Flower stem longer than the leaves, sometimes very long, angular and twisted. Flowers in rounded heads, each individual flower subtended by a thin dry bract. Pistillate and staminate flowers in the same head or occa-

sionally all the staminate flowers on one plant, the pistillate on another. Stamens equal in number or twice the number of the sepals.

1. ERIOCAULON, L.

Leaves short, grass-like. Flower stem with a sheathing bract at the base. Flowers in white or dull lead-colored rounded heads. Flowers bearing stamens nearly tubular, of 2 segments at the summit, united below. Stamens 4 to 6. The staminate flowers generally exterior to the pistillate. Calyx of 2 or 3 scaly sepals. Corolla tubular, spreading above and divided at summit into 2 or 3 segments. Stamens twice as many as the segments. Bracts bearded.

1. *E. articulatum*, (Huds.) Morong. (Fig. 9, pl. 9.) SEVEN-ANGLED PIPEWORT. (*E. septangulare*, With.). Leaves as long as the sheaths of the flower scapes. Flower scapes twisted, 7-angled. When growing in water the heads reach the surface, hence the scape may be 2 to 10 ft. long; when on the muddy bank 1 or more inches high. Our area.

2. *E. Parkeri*, Robinson. PARKER'S PIPEWORT. Growing in tufts, smooth, flower stem $2\frac{1}{2}$ to 5 in. high. Leaves linear-lanceolate, about $\frac{1}{4}$ in. wide, $1\frac{1}{2}$ to $2\frac{1}{2}$ in. long. Differs from No. 1 in that the head of the latter is said to be "ellipsoid," while this species has heads said to be "campanulate" in fruit and the flowers of the present species are erect while the outer ones of No. 1 are spreading. In tidal mud, near Camden, New Jersey. Sept.-Oct.

3. *E. compressum*, Lam. FLATTENED PIPEWORT. Leaf blades sharp-pointed, *shorter than the sheaths of the flower stem*, the latter slender and flattened, 10- to 12-angled, $\frac{1}{2}$ to 3 ft. long. Shallow water, south New Jersey and southward.

4. *E. decangulare*, L. (Fig. 5, pl. 9.) TEN-ANGLED PIPEWORT. Leaf blades blunt-pointed, *much longer than the sheath of the flower scape*, rather broad, grass-like, 6 to 20 in. long, often $\frac{1}{2}$ in. wide. Flower stem 1 to 3 ft. tall. Swamps, south New Jersey and southward.

FAMILY III.—COMMELINACEAE. SPIDERWORT FAMILY

Generally somewhat succulent plants, annual or perennial by their roots. Leaves alternate, always sheathing the stem at the base. Flowers blue, generally several, subtended by a leaf-like spathe (*Commelina*) or leafy bracts (*Tradescantia*). Sepals 3; petals 3, unequal; stamens 6.

1. COMMELINA, L.

Weak, semi-prostrate, juicy herbs, with base of leaves encircling the stem. Flowers $\frac{1}{2}$ in. broad, enclosed below by a heart-shaped folded leaf or spathe. Sepals or petals unequal. Of the 6 stamens 3 are usually sterile and smaller than the others. Flowers all summer.

1. *C. communis*, L. (Fig. 2, pl. 8.) CREEPING DAY FLOWER. (*C. nudiflora*, L.?). Leaves and stem light green, semi-prostrate, often rooting

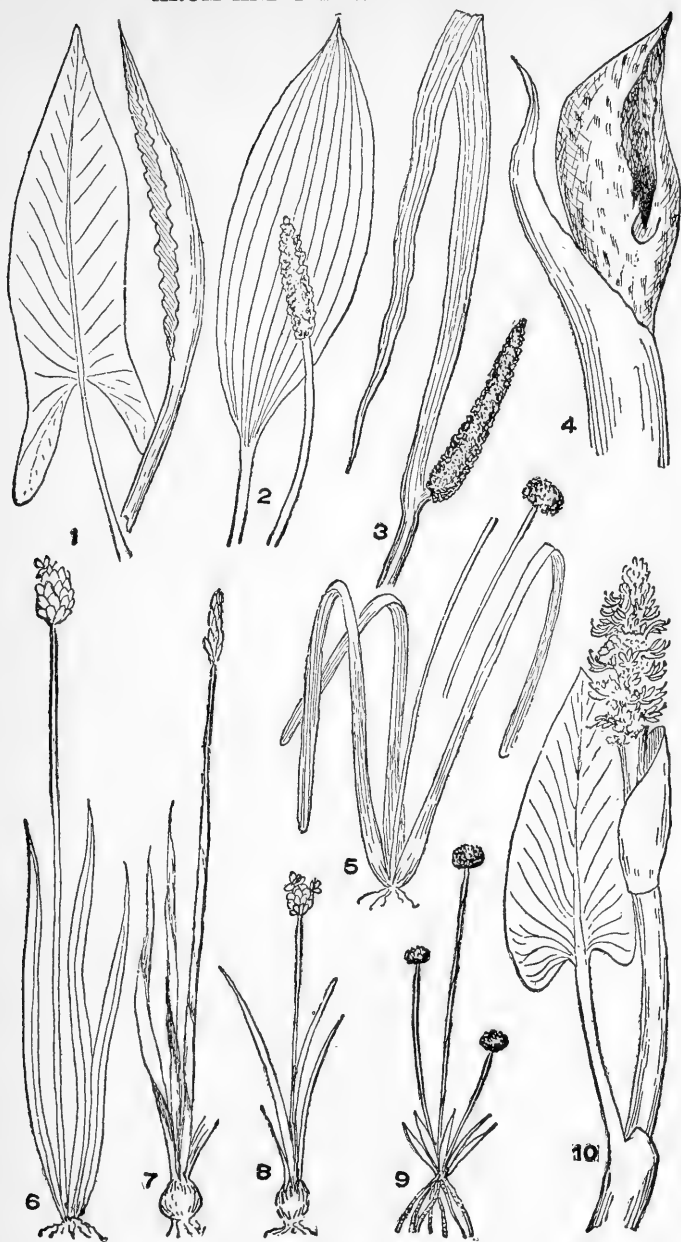


PLATE 9

1. *Peltandra virginica*. 2. *Orontium aquaticum*. 3. *Acorus Calamus*.
 4. *Symplocarpus foetidus*. 5. *Eriocaulon decangulare*. 6. *Xyris fimbriata*.
 7. *X. arenicola*. 8. *X. flexuosa*. 9. *Eriocaulon articulatum*. 10. *Pontederia*

at the nodes. Leaves lance-shaped or oval lance-shaped, $\frac{1}{2}$ to $\frac{3}{4}$ in. wide, their sheathing bases *not* fringed with hairs or very slightly ciliate, and of the color of the leaf or with whitish veins; *the margins of the spathe not united*. In moist places, southern part of our area.

2. *C. hirtella*, Vahl. (Fig. 4, pl. 8.) BEARDED DAY FLOWER. Similar to No. 1, leaves broader and *sheaths bearded on the edges with a fringe of rather stiff hairs*. Penna. and southward.

3. *C. virginica*, L. (Fig. 3, pl. 8.) VIRGINIA DAY FLOWER. A larger species, $1\frac{1}{2}$ to 3 ft. high and with flowers 1 in. broad. N. Y. and southward.

2. TRADESCANTIA, L.

Branching herbs with long, narrow leaves, almost grass-like, and regular flowers. Petals blue, 3 in number; sepals 3, stamens 6, all alike. The loose cluster of a few flowers is subtended by long leafy bracts.

1. *T. virginiana*, L. (Fig. 5, pl. 8.) SPIDERWORT. Stem and leaves smooth, light green, stem $\frac{1}{2}$ to 3 ft. tall. Leaves linear, channeled. Woods and thickets. Conn., and southward.

2. *T. pilosa*, Lehm. ZIGZAG SPIDERWORT. Resembles No. 1, but the whole plant is more or less hairy. Stem zigzag. Southern Penna. and southward. June-Aug.

FAMILY IV.—PONTEDERIACEAE. PICKEREL-WEED FAMILY

Aquatic plants, herbs with flower-stem bearing clusters of blue irregular flowers subtended by a leaf-like spathe. Leaves broad or linear. Flowers of 6 unequal petals, with 3 or 6 stamens inserted in the tube of the corolla. Pistil 1, the head being 3-lobed.

Many flowers forming a nearly cylindric spike . . . *Pontederia*

A few flowers in a loose cluster subtended by a spathe *Heteranthera*

1. PONTEDERIA, L.

Perianth tubular with 2 lips of 3 divisions each, the lower lip more spreading than the upper. Leaves thick, heart-shaped. Flower stalk stout.

P. cordata, L. (Fig. 10, pl. 9.) PICKEREL WEED. Leaves heart-arrow-shaped. Flower spike densely flowered, forming a cylindric spike from 1 to 3 in. long. Found in shallow borders of ponds and streams where the thick creeping rootstalks form a net-work in the muddy bottom. July-Aug.

2. HETERANTHERA, R. & P.

Perianth spreading with 6 nearly equal segments. Flower clusters with few flowers, subtended by a spathe. Stamens 3, inserted in the throat of the perianth. Creeping and floating herbs with various forms of leaves.

1. *H. reniformis*, R. & P. (Fig. 7, pl. 3.) MUD PLANTAIN. Leaves kidney-formed. Flowers 2 to 5 in a cluster, *white or pale blue*. Mud in shallow borders of ponds and streams. Conn., westward.

2. *H. dubia*, (Jacq.) MacM. (Fig. 6, pl. 3.) WATER STAR GRASS. Leaves grass-like. One flower only arising from the spathe, yellow. In still water or in the muddy borders of streams. In our whole region.

Order VI.—LILIIFLORAE. Order of Lily-like Flowers

Perianth (except in *Iris* and *Trillium*) of 6 similar parts, usually all colored. In *Juncaceae* the parts are dry, greenish or brown, scales or glumes, and in *Muscari*, *Alettris* and a few others the divisions are more or less united. The divisions are arranged in an outer and an inner row, the outer in fact representing the calyx. In *Trillium* the segments of the outer row are green sepals. The divisions are, however, in other genera generally structurally similar and all have the appearance of petals. The *anthers face toward the inside of the flower*.

In the *Iris* and *Bloodwort* families 3 stamens are suppressed and in the *Iris* itself 3 petals are less in size than the other 3, while the 3 styles are so expanded and colored as to resemble petals. There are, therefore, with the exceptions mentioned, 6 petals, and in all our species, 6 stamens and 1 or 3 pistils, the latter surmounting an ovary divided into 3 cells, the ovary being situated above the stamens and perianth in some families and below in others. In general the leaves are long and narrow with parallel veins. In most of the berry-bearing species the leaves are broadened and in the plants with twining or woody stems the leaves are decidedly broad, often oval or even round. This fact holds also with *Trillium*.

The order is an extensive one, including Rushes, the onion-like Alliums, the Hyacinths, Smilax and other tribes besides the true Lilies.

1. Flowers with dry, chaffy perianth (glumes) similar to that of the grasses, sedges, etc., but with the general structure of *Liliiflorae* RUSH FAMILY JUNCACEAE

2. Flowers not with chaffy perianth, perianth colored.

Flowers with 6 stamens.

Ovary situated above the perianth.

Fruit a capsule.

Capsule splitting at the partitions.

. BUNCH FLOWER FAMILY **MELANTHACEAE**

Capsule splitting between the partitions.

Flowers in loose clusters or solitary.

. LILY FAMILY **LILLIACEAE**Flowers in rounded umbels. Tribe **ALLIOIDEAE**

Fruit a fleshy berry.

Vines climbing by tendril.

. SMILAX FAMILY **SMILACEAE**Erect herbs with perfect flowers **CONVALLARIACEAE***Ovary situated below the perianth.*Erect herbs. AMARYLLIS FAMILY **AMARYLLIDACEAE**Herbaceous vine . YAM FAMILY **DIOSCOREACEAE**

Flowers with 3 stamens.

Ovary situated wholly or partly below the perianth.

Stamens opposite the inner corolla segments.

. . . BLOODWORT FAMILY **HAEMODORACEAE**

Stamens opposite the outer segments of the corolla.

. IRIS FAMILY **IRIDACEAE**FAMILY I.—**JUNCACEAE**. THE RUSH FAMILY

Grass-like herbs with small dry, greenish flowers much resembling the grasses, but having the divisions of the lily order. The perianth is of 6 parts, glume-like, in 2 series, all equal and regular. Stamens 6 (rarely 3); style 1; ovary 1-celled or 3-celled. Inflorescence in spreading or elongated clusters, often one-sided.

Capsule many-seeded **Juncus**Capsule 3-seeded **Luzula**1. **JUNCUS**, L.

Plants principally inhabiting swamps or wet ground. Leaves grass-like. Stamens 6 or 3. Capsule 1- or 3-celled. Seeds many. Flowers usually on a long, cylindric scape, which to most people is mistaken for the leaf. This long scape forms the *rush* that is used for various purposes.

A. Clusters of flowers apparently growing from the side of the scape.

1. **J. effusus**, L. (Fig. 1, pl. 10.) COMMON RUSH. Scape straight, $\frac{1}{2}$ to 4 ft. high, growing in dense tufts. The cluster of green flowers grows apparently on one side of the scape, which extends above it from 2 to several inches. The cluster is twice compound, the flowers separate, not in heads, the cluster subtended by several bracts. A long leaf-like bract sheaths the scape at base. The segments of the perianth are green, lance-shaped, acute. Common in swamps and other wet places.

2. **J. filiformis**, L. (Fig. 8, pl. 10.) THREAD RUSH. Scape straight, weak, very slender. The cluster of flowers is nearly simple, not twice compound as in No. 1. The petals are shorter than the sepals, while in No. 1 they are longer.

3. **J. setaceus**, Rostk. AWL-LEAVED RUSH. Scape $1\frac{1}{2}$ to 3 ft. high, plant in dense tufts. The bract or leaf sheathing the scape at base is extended into a cylindric stem like the scape. Cluster of flowers compound, with conspicuous bracts at the base of the secondary groups. Sepals longer than petals and both narrow lance-shaped and acute at apex. The apparent prolongation of the stem is really the involucreal leaf to the flower cluster. Marshes along the sea coast, Delaware, southward.

4. **J. Smithii**, Coville. PENNSYLVANIA RUSH. (*J. gymnocarpus*, Englm.) Stem 1 to $2\frac{1}{2}$ ft. high; basal leaves reduced to clasping sheaths. The loose cluster of flowers about an inch high, diffuse, the leaf below the cluster 4 to 10 in. long. Parts of the perianth reaching only to the middle of the capsule. The capsule broadly oval with a sharp point or spine at the apex, brown and glistening. Swamps, mountains of Schuylkill and Lebanon Counties, Penna.

5. **J. balticus**, Willd. BALTIC RUSH. Scape 1 to 3 ft. high, the plants arising in dense rows from a stout rootstock. Flower cluster brown, 1 to $1\frac{1}{2}$ in. high, the parts of the perianth lance-shaped, acute, nearly equal. Sandy shores, most of our region.

6. **J. trifidus**, L. (Fig. 7, pl. 10.) HIGHLAND RUSH. A small rush, densely tufted; scape 4 to 12 in. high. Basal leaves sheathing the scape, scarcely diverging as leaf blades. At from 1 to 3 in. below the small head of flowers a single-stem leaf arises, which is from 3 to 5 in. long; very narrow. Cluster of 1 to 3 flowers in the axil of a bract resembling the leaf-stem, but rarely more than 2 in. long. Flowers dark brown. Stamens 6. On the high mountains of the Adirondack and White Mountain ranges.

7. **J. Roemerianus**, Scheele. RÖEMER'S RUSH. A large rush, growing in salt marshes; scape stout, rigid, $1\frac{1}{2}$ to 4 ft. high, arising singly from a horizontal rootstock. Basal leaves short, sheathing, or nearly as long as the stem. Cluster of flowers diffuse, 2 to 6 in. high, with flowers in heads of 5 to 8, dark brown. Stamens and pistils not always all on same plant. Seeds without tails. Sepals sharp-pointed, the petals shorter. Salt marshes, New Jersey and southward.

8. **J. maritimus**, Lam. (Fig. 5, pl. 10.) SEA RUSH. Resembles No. 6. Flower green, not dark brown as it is in that species and seeds are tailed. Salt marshes at Coney Island, N. Y.

*B. Clusters of flowers terminal on the scape.**Flowers separate, not in heads.*

9. **J. bufonius**, L. (Fig. 6, pl. 10.) TOAD RUSH. *Stem branching, tufted, 3 to 8 in. high. Leaves from root and stem, the latter 1 to 2 in. long. Flowers terminal in forked clusters. Final clusters of 2 or 3 flowers. Parts of the perianth lance-shaped, sharp, the petals much longer than the sepals, not equal among themselves. Common.*

10. **J. tenuis**, Willd. (Fig. 10, pl. 10.) SLENDER RUSH. *Stems not branched; wiry, 8 to 30 in. high. Leaves flat, thread-like, $\frac{1}{2}$ the height of stem. Flowers in a diffuse fan-shaped cluster, not in heads, subtended by a bract much longer than the cluster. Parts of the perianth green, spreading; pod globular. Common.*

11. **J. secundus**, Beaur. SECOND RUSH. *Growing in tufts. Stem 6 to 16 in. high. Flowers in a one-sided cluster. Capsule oblong, 3-sided, equaled by the perianth. Leaf at base of cluster about as long as the cluster. Dry soil.*

12. **J. Dudleyi**, Weigand. DUDLEY'S RUSH. *Stems 12 to 40 in. high. Leaves basal, about one-half the length of the scape, narrowly linear, flat. Inflorescence 1 to 2 in. high, the subtending leaf or bract exceeding it in length. Cluster few flowered. Capsule ovoid, shorter than the perianth. Me., Washington, Conn.*

13. **J. dichotomus**, Ell. FORKED RUSH. *Stems not branched, wiry, 1 to 3 ft. high. Leaves thread-like, round, channeled on one side, extending from long sheaths. Flowers in a forked cluster, each flower separate. Pod round, as long as the sepals. This and the preceding species closely resembling each other. Common in dry soil.*

14. **J. Gerardi**, Lois. (Fig. 2, pl. 10.) BLACK GRASS. *Stems 8 to 30 in. high, from creeping rootstocks. Basal leaves sheathing then spreading, flat, narrow; stem leaves thread-like. Flowers in a forked cluster, not in heads, each subordinate cluster subtended by a long bract. Pod as long as the sepals, black; parts of the perianth obtuse. Style conspicuous, 3-branched at summit. Mostly in salt marshes.*

15. **J. Greenei**, Oakes & Tuckerm. GREENE'S RUSH. *Scapes wiry, 8 to 30 in. high. Leaves slender, round, grooved. Cluster forked; flowers separate; bract at base of cluster very slender and several times longer than the cluster. Flowers straw colored. Sepals shorter than the pod, egg-shaped. Stamens 6. Near the sea coast, Maine, southward.*

16. **J. Vaseyi**, Engelm. (Fig. 3, pl. 10.) VASEY'S RUSH. *Resembles No. 12, but sepals are as long as the pod and the bract is usually not much longer than the flower cluster. Dry soil, throughout our area.*

*C. Clusters of flowers terminal.**Flowers in heads. Seeds tailed.*

17. **J. asper**, Engelm. NEW JERSEY RUSH. (*J. Cacsariensis*, Coville.) *Stems rigid, 20 to 40 in. high, stout. Leaves of the stem long, rounded, roughened. Cluster 1 to 4 in. high, subordinate clusters (heads), 2- to 3-flowered; parts of the perianth lance-shaped, sharp pointed, not as long as the 3-sided lance-shaped capsule, which at length becomes*



PLATE 10

1. *Juncus effusus*. 2. *J. Gerardi*. 3. *J. Vaseyi*. 4. *J. canadensis*. 5. *J. maritimus*. 6. *J. bufonius*. 7. *J. trifidus*. 8. *J. filiformis*. 9. *J. nodosus*. 10. *J. tenuis*. 11. *Luzula spicata*. 12. *L. confusa*. 13. *L. pilosa*. 14. *L. campestris*.

black. Seeds tailed at both ends. Sandy swamps. Southern part of our area. (New Jersey).

18. *J. canadensis*, Gay. (Fig. 4, pl. 10.) CANADA RUSH. Stems 1 to 4 ft. high, stout, with 2 to 4 stem leaves, which are erect and smooth. Flower cluster in whorls, the heads containing from 3 to 40 flowers. Parts of the perianth lance-shaped, acute, the inner row longer than the outer. Stamens 3. Capsule 3-sided, lance-shaped, longer than the perianth. Seeds tailed at each end. Common; quite variable.

19. *J. marginatus*, Rostk. GRASS-LEAVED RUSH. Growing in tufts. Scape 6 to 30 in. tall, 2- to 4-leaved. Flowers in several nearly spherical heads on branching stems or one above another. Stamens 3; capsule ovoid, as long as the perianth. Grassy places.

20. *J. stygius*, L. MOOR RUSH. Not tufted. Stems 3 to 12 in. high; 1 to 3 leaves below. Flowers in 1 to 4 heads, each of 1 to 4 flowers. The bract subtending the cluster or clusters, usually exceeding the clusters in length. Capsule spindle-shaped, sharp-pointed, rather longer than the perianth. Maine, northern New York.

Seeds acute, not tailed.

21. *J. pelocarpus*, Meyer. BROWNISH-FRUITED RUSH. (*J. subtilis*, Meyer.) Stems slender, 3 to 20 in. high, with 1 to 5 leaves, which are slender and rounded. Flower cluster of whorls of branches bearing very small heads, 1 to 3 flowers, which are reddish. Pod oblong, pointed, longer than the perianth. Bract subtending the cluster shorter than the cluster. Northern part of our area to southern New Jersey.

22. *J. articulatus*, L. JOINTED RUSH. Stems 8 to 20 in. high, with 1 or 2 leaves, which are rounded and slender. Cluster of several whorls of branches, the branches carrying 1 or more heads each. Heads of 6 to 12 flowers. Perianth brown, its parts oblong. Pod deep brown exceeding the perianth. Seeds not tailed. Bract of base of cluster shorter than cluster. Throughout our area.

23. *J. militaris*, Begel. BAYONET RUSH. Stems stout, 2 to 4 ft. high, each bearing a single leaf or less frequently 2 rounded leaves, one of which may be 2 to 3½ ft. high, overtopping the flower cluster. At base are dense fascicles of thread-like leaves from the nodes of the root-stock. Cluster branching, with many heads, each containing from 5 to 12 or more brown flowers. Parts of the perianth acute, as long as the cone-shaped capsule. In bogs and streams, northern New York.

24. *J. nodosus*, L. (Fig. 9, pl. 10.) KNOTTED RUSH. Stem slender, ½ to 2 ft. high, with 2 or 3 stem leaves, the upper (the bract) overtopping the cluster. Cluster of few or many heads; the heads nearly spherical of 8 to 20 flowers. Capsule conical, very slender-pointed, the parts of the involucre also narrow and slender-pointed, 1/2 or 2/3 as long as the capsule. Wet sands.

25. *J. Richardsonianus*, Schult. RICHARDSON'S RUSH. In loose tufts. Stems 6 to 20 in. high, 1- to 2-leaved. Clusters of rounded heads 2½ to 8 in. high, branching, the branches somewhat parallel or spreading. Leaf below the cluster about ½ as long as the cluster. Heads 3- to 12-flowered. Capsule ovoid-oblong, slightly exceeding the perianth, straw-colored or brown. Throughout our area.

26. **J. Torreyi**, Coville. TORRY'S RUSH. Stems 8 to 40 in. high, not in tufts. Stem leaves 1 to 4. Heads round, $\frac{1}{2}$ to $\frac{3}{4}$ in. diameter, 1 to 20 in a cluster. Stamens 6. Capsule 3-sided with a long beak, exceeding the perianth. Western New York, extending westward.

27. **J. acuminatus**, Michx. SHARP-FRUITED RUSH. Stem 1 to 3 ft. high, with 2 or 3 stem leaves, the lower 4 to 8 in. long. Cluster long, with remote whorls of flower stems; heads 3 to 15 flowered. Stamens 3. Parts of the perianth narrow, awl-shaped, very sharp pointed, about as long as the brown capsule. Throughout our area.

28. **J. scirpoides**, Lam. SCIRPUS-LIKE RUSH. Stem 1 to 3 ft. high, slender, rigid, with about 2 rounded stem leaves. Cluster of 2 to 30 spherical pale green heads, the cluster sometimes 6 in. long. Parts of the perianth narrow awl-shaped to bristle-like, nearly as long as the conical capsule. Wet sandy soil, New York, southward.

LUZULA, DC. (Juncoides, Adams)

Perennial plants with some of the characteristics of the Rushes, but with flat, grass-like leaves which are soft and often hairy, and with flowers in umbels, spikes or diffuse clusters. Flowers, each subtended by a bract. Capsule of 1 cell with 3 seeds; stamens 6. Plants usually found in dry grounds.

1. **L. pilosa**, Coville. (Fig. 13, pl. 10.) HAIRY WOOD RUSH. (*L. saltuensis*, Fernald.) Stem erect, 2- to 4-leaved, 6 to 12 in. high. Leaf blades grass-like, hairy; stem leaves shorter than those from the base. Flowers in an umbel subtended by a bract $\frac{1}{2}$ to 1 in. high, the thread-like flower stems bearing each a single flower or rarely 2. Parts of the perianth 6, triangular, narrowed at apex, longer than the toothed bractlets, brown, with a translucent margin. Capsule longer than the perianth segments, pyramidal, surmounted by the 3-parted pistil. Found in a considerable part of our area.

2. **L. parviflora**, (Ehrh.) Coville. SMALL-FLOWERED WOOD RUSH. Stem 10 to 30 in. high, with 2 to 5 grass-like leaves, which are smooth. Flowers small, in a cluster composed of 2 or more whorls of flower stems, each of which may be terminated by a sort of umbel, the cluster 1 to 4 in. high, bracted at the base of each whorl and at the branchings. Flowers borne singly on the thread-like branches of the cluster. Parts of the perianth 6, narrowed at the apex, scarcely as long as the egg-shaped capsule. Maine, New Hampshire, New York and westward.

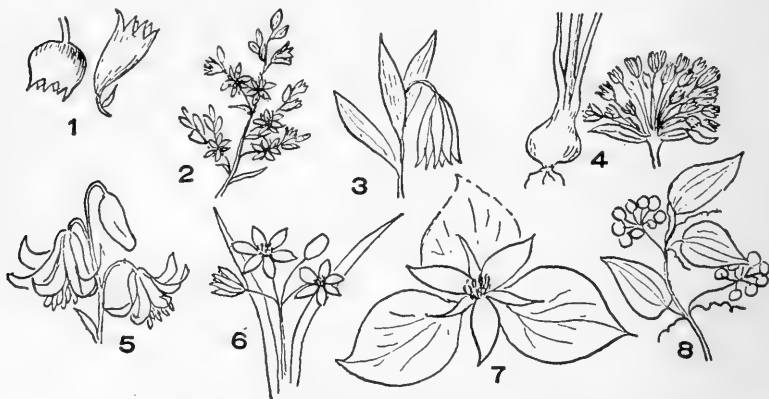
3. **L. spicata**, (L.) Kuntze. (Fig. 11, pl. 10.) SPIKED WOOD RUSH. Stem 4 to 16 in. high, with 1 to 3 leaves; basal leaves forming a grassy tuft. Flowers brown in a narrow interrupted spike, more or less nodding. Parts of the perianth bristle-pointed; capsule egg-shaped, about as long as the parts of the perianth. Found generally on the high mountains of our area.

4. **L. confusa**, Lindb. (Fig. 12, pl. 10.) NORTHERN WOOD RUSH. (*L. hyperborca*, (R. Br.) Sheldon.) Plants 4 to 8 in. high. Leaves in a small cluster at base and 1 or 2 on the stem. Flowers in an oblong cluster or two clusters, dense, $\frac{1}{2}$ in. or less in length. Parts of the perianth brown. Higher mountains of our area.

5. *L. campestris*, (L.) DC. (Fig. 14, pl. 10.) COMMON WOOD RUSH. Stem 4 to 20 in. high, rising from a grassy tuft of leaves and bearing 1 or 2 stem leaves. Flowers in a terminal umbel, straw colored, the parts of the perianth bristle-pointed, longer than the rounded capsule. Common in dry woodlands.

FAMILY II.—LILIACEAE. LILY FAMILY

In our region, herbaceous plants or woody vines with flowers in clusters of various forms. Flowers regular, with 6 segments of the perianth, exceptionally united at base, in 2 rows, an outer and an inner, the outer series in fact representing the calyx. Stamens 6, the anthers mostly with their *face inward*. Fruit of 3 carpels; style with an entire summit or divided into 3 lobes. Capsule usually splitting at the partitions.



A. Herbs not having twining or woody stems Fruit not a round berry.

Ovary with few exceptions, situated above the perianth.

Flowers with 6 symmetrical petals, all uniformly colored and not united.

Flowers solitary or in loose clusters, *pistil not divided in 3 parts* LILY TRIBE. (5) **Lilioideae**

Flowers few or solitary in more or less dense clusters. *Styles divided into 3 spreading lobes.*

Flowers solitary. Genus *UVULARIA* (3).

. . . BUNCH FLOWER TRIBE. (2) **Melanthioideae**

Flowers in a rounded umbel. Style not divided. Stem springing from a bulb. ONION TRIBE. (4) **Allioideae**

Flowers with 6 petals *all united* at the base, forming a 6-toothed bell or tube. HYACINTH TRIBE. (1) **Hyacinthineae**

Ovary situated below the perianth.

Erect herbs. . CONVALLARIA TRIBE. (7) **Convallariineae**

B. Plants with twining stems.

Stems woody SMILAX TRIBE. (8) **Smilacoideae**

TRIBE I.—**MELANTHIOIDEAE**. BUNCH FLOWER TRIBE

Herbs springing from a rootstock or less frequently from a bulb. Leaves all from the root or arising from the stem. Perianth of 6 equal parts, separate or slightly connected at the base. Flowers generally in lengthened clusters (spikes, racemes, panicles, I, II, III, p. 36, Part I), in *Uvularia* solitary. Ovary superior to the stamens and perianth and free from both. Stamens 6, inserted, not directly on the receptacle, but at the base of the segments of the perianth. Styles 3, sometimes quite short, the 3 divisions of the ovary closely connected, but not completely united as they are in the Lily and other flowers of the Lily family. The divisions are, however, always free at the summit. Fruit a 3-parted capsule, splitting longitudinally through the partitions.

Flowers in more or less elongated clusters.

Flowers purple **Helonias**

Flowers greenish or white.

Leaves narrow, grass-like.

Flowers each with an involucre of 3 bracts . . . **Tofieldia**

Flowers without an involucre.

Segments of the perianth with 2 glands or protuberances
at base.

Segments without a claw **Zygadenus**

Segments with a claw **Melanthium**

Segments of corolla without glands.

All the flowers with stamens and pistils.

Flower stems quite leafy . . . **Xerophyllum**

Flower stems with a few short leaves.

Basal leaves not over 1/10 in. broad

. **Narthecium**

Basal leaves 1/6 in. to more than 1 in.

broad **Amianthium**

Some of the flowers with only one set of the above

organs **Stenanthium**

Leaves broad.

Leaves oval or egg-shaped **Veratrum**

Leaves broader at outer extremity than inner (spatula-
formed). Flowers mostly either staminate only or

pistillate only **Chamaelirium**

Flowers solitary, yellow **Uvularia**

1. TOFIELDIA, Huds. (Tofield, an English botanist)

Perennial plants with narrow flower clusters, each terminal to a long and slender flower-stem (spike, raceme, I, II, p. 36, Part I). Leaves narrow, grass-like and mostly at the base. Flowers with both stamens and pistils, white or green, spreading, each subtended by a small, scale-like 3-parted involucre. At base of each flower stem is a small, green, leaf-like bract below the calyx. Segments of the perianth without claws. Stamens bearing anthers which look inward. Capsule 3-angular and separable into 3 parts, each part with many seeds.

1. *T. glutinosa*, (Michx.) Pers. GLUTINOUS TOFIELDIA. Stem 6 to 20 in. high, covered with soft, viscid hairs. The flower pedicels very glutinous and clustered in 3's. Seed with a long tail at each end. Capsule oblong.

2. *T. racemosa*, (Walt.) BSP. (Fig. 5, pl. 11.) VISCID TOFIELDIA. Stems very viscid, downy, somewhat taller than No. 1. Flowers clustered in 3's. Seed with a short tail at each end, in an oval capsule. Swamps, southern New Jersey and southward.

2. NARTHECIUM, (Moehring), Juss. (Abama, Adams)

Perennial herbs with the general appearance of *Tofieldia*. Flowers small, greenish-yellow. Segments of perianth 6, linear-lance-shaped. No involucre at base of flower as there is in *Tofieldia*. Seeds appendaged at end. Capsule oblong-cylindric. Stalk less viscid than that of *Tofieldia*. Stamens covered with white hairs.

N. americanum, Ker. AMERICAN BOG ASPHODEL. Stem 8 to 20 in. tall, not hairy, wiry. Basal leaves 3 to 8 in. long. Flower cluster 1 to 2 in. long. Rare, swamps in southern New Jersey.

3. HELONIAS, L.

Perennial herbs in bogs. Leaves evergreen, broadly spatula-formed or inversely lance-shaped, all from the base. Stem surmounted by a somewhat narrow bunch (raceme) of purple flowers. Perianth of 6 parts. Seed with a white tail at each end. Capsule broadly egg-shaped.

H. bullata, L. (Fig. 2, pl. 11.) SWAMP PINK. Stem 1 to 2 ft. high, with few or no bracts. Southern New York, New Jersey and Penna. Rare.

4. XEROPHYLLUM, Michx.

Tall perennial herbs with woody rootstock, very slender linear leaves and with very numerous showy white flowers in a slender cluster (II, p. 36, Part I). Petals *without glands* at base, widely spreading; sepals white resembling petals, oval. Stamen filaments dilated at middle. Capsule oval, or nearly globular, 3-grooved. The summits of the 3 styles turn outward. Each of the 3 lobes of the capsule with 2 seeds.

X. asphodeloides, (L.) Nutt. TURKEY-BEARD. Stem 2½ to 5 ft. high, many leaves below with few above. Leaves from the base 1 ft. or more in length and 1/12 of an inch broad. In pine barrens of New Jersey and southward. May-July.



PLATE 11

1. *Veratrum viride*. 2. *Helonias bullata*. 3. *Amianthium muscaetoxicum*.
4. *Chamaelirium luteum*. 5. *Tofieldia racemosa*. 6. *Melanthium virginicum*.

5. CHAMAEELIRIUM, Willd.

Herb, from thick tubrous rootstock. Stem tall and smooth. Staminate and pistillate flowers growing on different plants, each class of flowers in a linear cluster (spike I, p. 36), the petals spatula-formed, white, with a single central nerve. Leaves at the base, spatula-formed (Fig. 11, p. 17, Part I), those of the stem few and lance-shaped. Seeds winged at each end. The plants with pistillate flowers are usually taller than those with staminate flowers.

1. *C. luteum*, (L.) A. Gray. (Fig. 4, pl. 11.) BLAZING STAR. Plant $1\frac{1}{2}$ to 2 ft. high, leafy; basal leaves 2 to 8 in. long, spatula-formed. Low grounds, New England and south.

2. *C. obovale*, Small. Similar to No. 1, but the capsule of No. 1 is oblong on a slender pedicel, that of *C. obovale* is obversely egg-shaped, on a stout pedicel. Mass., northward. Spring.

6. AMIANTHIUM, Gray (Chrosperma, Raf.)

Tall smooth herb, starting from a bulb, with many long, linear, blunt pointed leaves from the base and only a few short leaves on the flower stem. Flowers all with stamens and pistils, white, in slender elongated clusters (II, p. 36, Part I). Petals without claws or glands, oval, obtuse and spreading. Ovary 3-lobed, ovoid.

A. muscaetoxicum, (Walt.) Gray. (Fig. 3, pl. 11.) FLY-POISON. Stem $1\frac{1}{2}$ to 4 ft. high. Cluster of flowers dense; seeds fleshy, red. Leaves keeled, grass-like, about $\frac{1}{2}$ in. broad. In southern part of our region.

7. STENANTHIUM, (Gray) Kunth.

Plants resembling *Amianthium*, the terminal cluster of greenish-white flowers less compact and broader below (panicle). Segments of the perianth narrow and long. Leaves grass-like, keeled. Some of the flowers are perfect, bearing both stamens and pistils, others only one set of these organs.

S. robustum, S. Wats. STOUT STENANTHIUM. (*S. gramineum*, (Ker.) Kunth.). Stem leafy, 3 to 5 ft. high. Leaves 1 ft. long or more, the upper reduced to bracts. Flower cluster pyramidal, compound (panicle). Moist soil, southern Penna. July-Sept.

8. ZYGADENUS, Michx.

Smooth perennial herbs, in our species from a bulb, with nearly naked stems and grass-like leaves. Petals each with 1 or 2 glands at base. Seeds angled. Flowers greenish-white, in a loose spike or raceme (I, II, p. 36, Part I) from 6 to 12 in. long. Flowers generally bearing both stamens and pistils, greenish, yellowish or white. Capsule 3 lobed, 3-celled.

1. *Z. chloranthus*, Richards. GLAUCUS ZYGADENUS. (*Z. elegans*, Pursh.?). Plant covered with a whitened bloom. Bulb about 1 in. long, about $\frac{1}{2}$ in. broad; leaves grass-like. Gland at base of petals distinctly heart-shaped. The flower cluster only moderately spreading (II, p. 36).

2. *Z. leimanthoides*, A. Gray. PINE-BARREN ZYGADENUS. Flower

cluster quite spreading (III, p. 36, Part I). The gland at base of petals only a yellow spot. Flowers about $\frac{1}{2}$ in. broad. Swamps, wet soil.

9. MELANTHIUM, L.

Perennial herbs, tall, leafy, with greenish flowers in a long loose terminal pyramidal cluster (panicle, III, p. 24, Part I). Leaves broad-linear. Flowers simply staminate or simply pistillate on the same plant or both classes of organs in the same flower, greenish-white or cream color. Perianth of 6 spreading, oblong or somewhat heart-shaped segments raised on slender claws with or without 2 glands at base. Capsule conical; seeds flat, broadly winged.

1. *M. virginicum*, L. (Fig. 6, pl. 11.) BUNCH-FLOWER. Stems 2 to 5 ft. high. Leaves somewhat broadly linear-lanceolate. Cluster pyramidal. *Petals oblong, the outline not indented.* June-Aug.

2. *M. latifolium*, Desr. CRISPED BUNCH-FLOWER. Leaves broader toward the outer extremity. *Petals nearly rounded and with undulating outline.* June-Aug.

10. VERATRUM, (Tourn.) L.

Perennial herb with tall leafy stem springing from a thickened root-stock (poisonous). Leaves alternate, mostly broad oval, passing to lance-shaped, marked by strong parallel veins and longitudinal foldings. Flowers in a loose pyramidal cluster (panicle) at the summit of the stem. These are mostly perfect or some may be staminate only and others pistillate only. Stamens not arising from the segments of the perianth, but from the receptacle, nearly erect at first, then spreading.

V. viride, Ait. (Fig. 1, pl. 11.) AMERICAN WHITE HELLEBORE. INDIAN POKE. Stem from 2 to 8 ft. high; flowers yellowish-green in the axils of bracts, forming a large pyramidal cluster. Wet places throughout our region. May-July.

11. UVULARIA, L.

Perennial erect herbs from rootstocks. Stems smooth, forking, leafy above with clasping scales below. Flowers large, drooping, solitary at the extremities of branches or rarely 2 at end of the same branch. Perianth narrow bell-shaped, 1 to $1\frac{1}{2}$ in. long. Stamen filaments thread-like, the anthers quite long. Ovary 3 angled, ovoid.

Leaves completely surrounding the stem.

Leaves downy beneath *U. grandiflora*

Leaves smooth beneath *U. perfoliata*

Leaves not completely surrounding the stem *U. sessilifolia*

1. *U. perfoliata*, L. (Fig. 5, pl. 12.) PERFOLIATE BELLWORT. Stem and leaves smooth, light green. Stem forked above the middle, 6 to 18 in. high, often with a few leaves below the fork. Leaves penetrated by the stem. Flowers pale yellow, an inch or more long, drooping. Ovary with 3 somewhat obtuse angles. Moist woods. May-June.

2. *U. grandiflora*, J. E. Smith. LARGE-FLOWERED BELLWORT. Stem penetrating the leaves which are *downy beneath* and oval or egg-shaped. Flowers larger than in the preceding species. Growing in similar situations. April-June.

3. *U. sessilifolia*, L. (Fig. 6, pl. 12.) **SESSILE-LEAVED BELLWORT.** (*Oakesia sessilifolia*, Wats.) Leaves narrowly oval or lance-shaped, not penetrated by the stem but half clasping it, 1 to 3 in. long. Flowers greenish-yellow. Ovary with 3 winged angles. Moist woods. May-June.

TRIBE II.—**ALLIOIDEAE.** ONION TRIBE

Only a single species, *Allium*, native in our territory.

ALLIUM, L.

Herbs with a characteristic garlicky odor with leaves and flower stem springing from a bulb. Leaves mostly narrow and flat or hollow cylindric tubes. Less frequently broader lance-shaped. Flowers terminal on an erect, generally cylindric, scape, in a rounded umbel which sometimes contains also small bulblets. Perianth of 6 segments, all colored. Seeds angular, black.

Leaves broad, lanceolate *A. tricoccum*
Leaves linear, flat.

Heads containing both flowers and bulblets *A. canadense*

Heads with flowers only, heads nodding, stamens nearly twice the

length of perianth *A. cernuum*

Leaves hollow tubes.

Stamens, at least the inner 3, with a prolonged tooth or spine

at each side extending above the anther *A. vineale*

Stamens simple, not furnished with spines *A. Schoenoprasum*

1. *A. tricoccum*, Ait. **WILD LEEK.** Leaves 6 to 12 in. long, disappearing before the flowers are developed. Flower stalk $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high. The two bracts subtending the umbel as long or longer than the pedicels of the flowers; falling early. Flowers white, filaments of the stamens flattened, as long as the petals. June-July.

2. *A. Schoenoprasum*, L. **CHIVES.** Leaves as long as the flower stem, permanent. Bracts of the umbel broad, often partly enclosing the umbel after the opening of the flowers. Flowers forming a dense head, rose-colored, the flower longer than the pedicel. Stamens shorter than the petals. Moist soil, often cultivated. June-Aug.

3. *A. cernuum*, Roth. **NODDING WHITE ONION.** Stem 4-angled, 1 to 2 ft. high, leaves about as long, flat. Bracts below the umbel small and falling early. Flower umbel nodding. Rather dry localities, New York and westward. July-Aug.

4. *A. vineale*, L. **WILD GARLIC.** Stem 1 to 3 ft. high, leaves few and shorter than the stem, cylindric, hollow. Umbel containing flowers or bulblets or both. Fields, Connecticut and westward. June-July.

5. *A. canadense*, L. **MEADOW GARLIC.** Stem 1 to 2 ft. high; leaves linear, flat, shorter than flower stem; umbel bracts conspicuous, white, acute at apex. Flowers pink or white, often replaced by bulblets. Moist fields, throughout our area. May-June.

TRIBE III.—**LILIOIDEAE.** TRUE LILY TRIBE

Flowers of the typical construction of the order; 6 petals, 6 stamens, 1 pistil, ovary of 3 cells, above the stamens and free from them; stamens



PLATE 12

1. *Maianthemum canadense*. 2. *Smilacina racemosa*. 3. *Polygonatum biflorum*. 4. *P. commutatum*. 5. *Uvularia perfoliata*. 6. *U. sessilifolia*.

having anthers which face toward the inside of the flower. Stem springing from a bulb or rootstock bearing one or several flowers in a loose group.

Leaves numerous on the stem	<i>Lilium</i>
Leaves 2 at lower part of stem	<i>Erythronium</i>
Leaves all from the bulb	<i>Ornithogalum</i>

1. LILIUM, L.

Tall herbs with leafy stems, bearing at or toward the summit one or several large showy bell-shaped flowers of 6 colored, petaloid, segments. Stamens generally shorter than the long, graceful style. Seed capsule sub-triangular.

1. *L. philadelphicum*, L. (Fig. 2, pl. 13.) RED OR WOOD LILY. Stem very erect, 1 to 3 ft. tall, with one or more large deep orange flowers at the summit, erect or nearly so. Leaves lance-shaped, 1 to 4 in. long, in whorls, 3 to 8 leaves in each whorl. Petals with dark purple dots, spreading above. A plant of much elegance in dry woods and thickets. June-July.

2. *L. canadense*, L. (Fig. 3, pl. 13.) WILD YELLOW LILY. Leaves in whorls; stem much taller than No. 1. (2 to 5 ft.), and bearing a pyramidal cluster of yellow or orange bell-shaped drooping flowers, the petals of which are turned back or spread outward. Leaves lance-shaped with the veins beneath covered with hairs. Edges of leaves also roughened. In moist meadows. Throughout our range. June-July.

3. *L. superbum*, L. (Fig. 1, pl. 13.) TURK'S CAP LILY. Stem 3 to 8 ft. high. Leaves in whorls or the upper alternate, the edges and under veins of the leaves smooth. Flowers orange or orange-yellow, purple-spotted, notably darker in color than No. 2. Wet meadows and marshes, throughout our region.

4. *L. tigrinum*, Andr. TIGER LILY. Stem tall, dark purple with dark bulblets in the axils of the alternate leaves. Flowers similar but larger than those of No. 3. An elegant lily, escaped from cultivation.

2. ERYTHRONIUM, L.

Low herbaceous plants arising from a dilated root base resembling a bulb in form. Leaves 2, opposite, at the lower half of the stem, broad lance-form. Flower solitary, nodding, bell-shaped. Perianth of 6 segments; stamens 6; ovary 3 celled.

1. *E. americanum*, Ker. (Fig. 4, pl. 13.) YELLOW ADDER'S TONGUE. Stem 6 to 12 in. high. Leaves 3 to 8 in. long, $\frac{1}{4}$ to 1 in. wide, dark green, usually mottled with brown. Flowers yellow. In wet shady places. Common. March-May.

2. *E. albidum*, Nutt. WHITE ADDER'S TONGUE. Similar to No. 1, with white or purple flowers. In similar situations. March-May.

3. ORNITHOGALUM, L.

Low herbs arising from bulbs. Leaves all from the bulb; flower stem



PLATE 13

1. *Lilium superbum*. 2. *L. philadelphicum*. 3. *L. canadense*. 4. *Erythronium americanum*. 5. *Muscari racemosum*. 6. *Ornithogalum umbellatum*.

leafless, smooth, bearing a loose broad cluster of white flowers. (VII, p. 36, Part I.)

O. umbellatum, L. (Fig. 6, pl. 13.) STAR OF BETHLEHEM. Segments of perianth green beneath, spreading, opening in sunshine. Naturalized. In fields and meadows. May-June.

TRIBE IV.—HYACINTHINEAE. THE HYACINTH TRIBE

Bulbous or fibrous rooted herbs. Flowers with 6 stamens, a single style and a 3-celled ovary. *Perianth segments united to form a globose or tubular bell.*

Flowers globose or not spreading at the outer borders . . . **Muscari**
 Flowers tubular, spreading at their outer borders : . . **Aletris**

1. MUSCARI, Mill.

Leaves fleshy, arising from the bulb. Flower stem bearing a grape-like cluster of globose or oblong flowers.

1. **M. botryoides**, (L.) Mill. GRAPE HYACINTH. Flower stem 4 to 10 in. high, about equalling the leaves. Flowers dark blue or purple, globose.

2. **M. racemosum**, (L.) Mill. (Fig. 5, pl. 13.) STARCH GRAPE HYACINTH. Flowers ovate or oblong. Contracted at outer border. Escaped from gardens.

2. ALETRIS, L.

Herbs with slender flower stem and spreading rosette of yellowish-green leaves at base. Flowers tubular, spreading at the outer extremity, each with 6 lobes; arranged in a slender spike, 1 to 3 ft. high, the 6 stamens inserted on the segments of the united perianth, the tall style somewhat deeply divided, outer surface of perianth roughened. Ovary 3 celled rounded or ovoid.

1. **A. farinosa**, L. (Fig. 5, pl. 16.) STAR GRASS. COLIC ROOT. Flowers white, spike of flowers 3 to 12 in. long, each flower subtended by a bract longer than the flower pedicel. May-July.

2. **A. aurea**, Walt. YELLOW COLIC ROOT. Similar to No. 1 but with yellow flowers. In the southern part of our region. July-Aug.

TRIBE V.—CONVALLARIINAE. LILY OF THE VALLEY TRIBE

Perennial plants, herbs and woody vines arising from rootstocks, leaves all from the root or from the stem. Fruit, except in *Trillium*, a rounded fleshy berry. Leaves broad with parallel veins. In *Trillium* and *Asparagus* the arrangement of the veins is exceptional, being net-veined in the former and the leaf scale-like or needle-shaped in the latter. Perianth of 6 segments (*Maianthemum* 4 segments) usually free, but in a few species united, forming a tubular flower. Flowers in lengthened clusters, in pairs

or single. Ovaries, except in *Maianthemum*, 3-celled above the perianth and free from it.

Herbs without Woody Stems

Leaves small, needle-formed **Asparagus**

Leaves broad, *but parallel veined*.

Perianth segments 4, stamens 4 **Maianthemum**

Perianth of 6 segments free, stamens 6.

Flowers in an umbel.

Leaves from the root **Clintonia**

Leaves in a whorl of more than 3 about the stem . **Medeola**

Flowers in a lengthened cluster (raceme) . . . **Smilacina**

Flowers in pairs.

Flower pair terminal **Disporum**

Flowers along the course of the stem (or sometimes single).

Flower segments free **Streptopus**

Flower segments united, tubular . . . **Polygonatum**

Leaves broad, *veins not parallel*.

Perianth of 3 colored and 3 green segments . . . **Trillium**

1. ASPARAGUS, L.

Rootstock perennial, stem slender, branching with many short needle-like leaves (or branchlets) arising in groups. The earlier leaves are scale-like with broad insertions and it is in the axils of these scale-like leaves that the needle formed leaves arise. Flowers numerous along the branches of the stem, bell-shaped, segments deeply divided but joined at the base. Berry red when ripe.

A. officinalis, L. Escaped from gardens, naturalized in places in our region.

2. CLINTONIA, Raf.

Herbs, growing in shade with spreading roots, few leaves, all from the root and a slender scape or flower stem bearing an umbel-like cluster of bell-shaped flowers. Ovary 2-celled.

1. **C. borealis**, (Ait.) Raf. (Fig. 5, pl. 14.) **YELLOW CLINTONIA**. Flower stem covered with fine soft hairs, 6 to 15 in. high. Flowers, 3 to 5 in the umbel, yellow. Common.

2. **C. umbellulata**, (Michx.) Torr. **WHITE CLINTONIA**. Stem more hairy and leaves broader. Flowers 12 to 30 in the umbel, white. Rich woods; New York and southward.

3. SMILACINA, Desf. (Vagnera, Adams)

Slender horizontal rootstocks. Leafy stems with loose many flowered

clusters at the summit. Leaves alternate. Flowers white or greenish-white.

1. *S. racemosa*, (L.) Desf. (Fig. 2, pl. 12.) FALSE SPIKENARD. Flower cluster branching (panicle); leaves oval, strongly veined. Berry red, dotted. Common. May-July.

2. *S. stellata*, (L.) Desf. STAR-FLOWERED SOLOMON'S SEAL. Stem 10 to 18 in. high; flower cluster not branching (raceme). Leaves numerous, oval lance-shaped. Berry red. Moist soil. Common. May-June.

3. *S. trifolia*, (L.) Desf. THREE-LEAVED SOLOMON'S SEAL. Stem 2 to 15 in. high. Flower cluster simple, not branching. Leaves 3, oval lance-shaped. Bogs, in most of our region. May-June.

4. MAIANTHEMUM, Wiggers (Unifolium, Greene)

Small plants springing from slender rootstocks with shining alternate leaves (1, 2 or 3). Flowers in an oval terminal cluster, white, succeeded by berries which, when ripe, are pale red. Petals only 4; ovary of 2 cells; pistil about as long as the ovary.

M. canadense, Desf. (Fig. 1, pl. 12.) TWO-LEAVED SOLOMON'S SEAL. WILD LILY OF THE VALLEY. A very frequent little plant in borders of woods, often forming extensive beds. Stem 1 to 6 in. high, angular. Leaves heart-shaped, $1\frac{1}{2}$ to 2 in. long, half as wide, generally blunt at outer extremity. Flower cluster of 20 or more small white flowers.

5. DISPORUM, Salisb.

Herbs resembling *Uvularia* but with hairy stem and leaves and with flowers erect in pairs. Leaves ovate, with long tapering points, without leaf stems, rarely clasping; segments of perianth 6, slender; stamens 6, below the ovary and free from it. Flowers greenish-yellow or white. Berry ovoid.

D. lanuginosum, (Michx.) Nichols. HAIRY DISPORUM. Plant $1\frac{1}{2}$ to 2 ft. high, with an abundance of soft hairs. Flowers bell-shaped, nearly erect. In shady places, western New York and westward.

6. STREPTOPUS, Michx.

Herbs arising from rootstocks. Branching, with alternate leaves which clasp the stem. Flowers solitary or in pairs, from the leaf axils, bell-shaped, with 6 slender segments. Stamens 6, opposite the petals and below the ovary. Pistil 1, slender. Berry roundish.

1. *S. amplexifolius*, (L.) DC. CLASPING-LEAVED TWISTED STALK. Flowers greenish, drooping. Borders of leaves smooth, pale green on the under side, darker above. Leaves 2 to 3 in. long, $\frac{1}{2}$ as wide. Plant 1 to 2 ft. high. In moist woods throughout our region. May-June.

2. *S. roseus*, Michx. (Fig. 3, pl. 14.) ROSE TWIST FOOT. Margins of leaves roughened and hairy. Leaves equally green on both sides. Plant about the size of No. 1. Common. May-June.

7. POLYGONATUM, Adams

Perianth segments united into a bell-shaped tube, 6 parted at the border.



PLATE 14

1. *Trillium grandiflorum*. 2. *T. erectum*. 3. *Streptopus roseus*. 4. *Medeola virginiana*. 5. *Clintonia borealis*.

Herbs arising from a horizontal rootstock. Stems not branching, slender. Leaves without leaf stalks, alternate, ovate or lance-shaped, with slender points. Flowers in pairs, or 3 or 4 from a common stalk, the common flower stalks arising at the axils of the leaves. Berry dark blue.

1. **P. biflorum**, (Walt.) Ell. (Fig. 3, pl. 12.) HAIRY SOLOMON'S SEAL. *Plant hairy*, $\frac{1}{2}$ to 3 ft. high. Common. In woods and shady places. April-July.

2. **P. commutatum**, (R. & S.) Dietr. (Fig. 4, pl. 12.) SMOOTH SOLOMON'S SEAL. *Plant entirely smooth*, 1 to 8 ft. high. In moist woods, New Hampshire, Rhode Island and southward. May-July.

8. MEDEOLA, L.

Slender, erect herb arising from a tubrous root, without branches, stem surrounded, at about the middle, by a whorl of about 6 or more leaves and terminated above by another whorl of 3 to 5 leaves which are surrounded by several greenish-yellow flowers. Perianth of 6 re-curving segments; stamens 6, slender and conspicuous; styles 3, dark red, much longer than the segments of the perianth and spreading. Berry globose.

M. virginiana, L. (Fig. 4, pl. 14.) INDIAN CUCUMBER ROOT. Plant from 1 to 2½ ft. high. The 3 or 4 flowers may rise above the upper whorl or droop between its leaves. Moist rich woods. Common. May-June.

9. TRILLIUM, L.

Herbs arising from tubrous roots or short rootstocks, with simple stems surmounted by a whorl of 3 broad leaves and a single flower. Flower of 6 segments, 3 green, 3 colored. Stamens 6; ovary 3-angled and 3-celled.

Leaves on leaf-stalks.

Plant 2 to 6 in. high *T. nivale*

Plant 8 to 24 in. high *T. undulatum*

Leaves without leaf stalks or with very short ones.

Petals broadest at outer extremity *T. grandiflorum*

Petals broadest at inner extremity.

Pedicel of flower not more than 1½ in. long *T. cernuum*

Pedicel of flower more than 1½ in. long *T. erectum*

1. **T. grandiflorum**, (Michx.) Salisb. (Fig. 1, pl. 14.) LARGE-FLOWERED WAKE-ROBIN. Petals broadest at outer extremity, white or light rose with greenish veins, and much longer than the green sepals. Flower nearly erect, larger and less spreading than the other species. Stem 8 to 18 in. high. Somewhat common. In moist woods or lowlands. May-June.

2. **T. erectum**, L. (Fig. 2, pl. 14.) ILL-SCENTED WAKE-ROBIN. Petals broadest at inner extremity, and scarcely exceeding the green sepals in length or even shorter, an inch long and twice as wide as the sepals, spreading to a wheel-formed flower. Flower nodding on a nearly erect peduncle, dark purple. Stem a foot or more high. Common in moist woods. April-June.

3. **T. cernuum**, L. NODDING WAKE-ROBIN. Leaves more rounded than either of the other species. Petals white, rather longer than the green sepals, lance-shaped. Flowers spreading with petals rolled back. Stem 10 to 15 in. high.



ERRATA

Page 138, 15th line

For *surrounded* read *surmounted*.

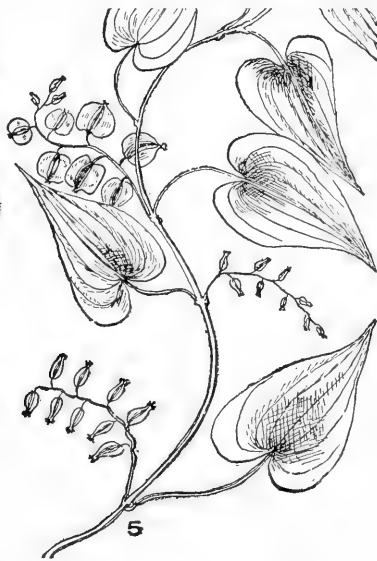


PLATE 15

1. *Smilax glauca*. 2. *S. rotundifolia*. 3. *S. tannifolia*. 4. *S. Walteri*. 5. *Dioscorea villosa*.

Herbs arising from a horizontal rootstock. Stems not branching, slender. Leaves without leaf stalks, alternate, ovate or lance-shaped, with slender points. Flowers in pairs, or 3 or 4 from a common stalk, the common flower stalks arising at the axils of the leaves. Berry dark blue.

1. **P. biflorum**, (Walt.) Ell. (Fig. 3, pl. 12.) **HAIRY SOLOMON'S SEAL**. *Plant hairy*, $\frac{1}{2}$ to 3 ft. high. Common. In woods and shady places. April-July.

2. **P. commutatum**, (R. & S.) Dietr. (Fig. 4, pl. 12.) **SMOOTH SOLOMON'S SEAL**. *Plant entirely smooth*, 1 to 8 ft. high. In moist woods, New Hampshire, Rhode Island and southward. May-July.

TRILLIUM

Stem

9. TRILLIUM

Herbs arising from tubrous roots or short rootstocks, with simple stem surmounted by a whorl of 3 broad leaves and a single flower. Flower of 6 segments, 3 green, 3 colored. Stamens 6; ovary 3-angled and 3-celled.

Leaves on leaf-stalks.

Plant 2 to 6 in. high *T. nivale*

Plant 8 to 24 in. high *T. undulatum*

Leaves without leaf stalks or with very short ones.

Petals broadest at outer extremity *T. grandiflorum*

Petals broadest at inner extremity.

Pedicle of flower not more than $1\frac{1}{4}$ in. long *T. cernuum*

Pedicle of flower more than $1\frac{1}{4}$ in. long *T. erectum*

1. **T. grandiflorum**, (Michx.) Salisb. (Fig. 1, pl. 14.) **LARGE-FLOWERED WAKE-ROBIN**. Petals broadest at outer extremity, white or light rose with greenish veins, and much longer than the green sepals. Flower nearly erect, larger and less spreading than the other species. Stem 8 to 18 in. high. Somewhat common. In moist woods or lowlands. May-June.

2. **T. erectum**, L. (Fig. 2, pl. 14.) **ILL-SCENTED WAKE-ROBIN**. Petals broadest at inner extremity, and scarcely exceeding the green sepals in length or even shorter, an inch long and twice as wide as the sepals, spreading to a wheel-formed flower. Flower nodding on a nearly erect peduncle, dark purple. Stem a foot or more high. Common in moist woods. April-June.

3. **T. cernuum**, L. **NODDING WAKE-ROBIN**. Leaves more rounded than either of the other species. Petals white, rather longer than the green sepals, lance-shaped. Flowers spreading with petals rolled back. Stem 10 to 15 in. high.



PLATE 15

1. *Smilax glauca*. 2. *S. rotundifolia*. 3. *S. tamnifolia*. 4. *S. Walteri*. 5. *Dioscorea villosa*.

4. *T. undulatum*, Willd. PAINTED WAKE-ROBIN. Leaves with leaf stalks and with long narrow points. Petals lance-shaped or lance ovate, nearly equal at the extremities, edges wavy, longer than the green sepals. Flowers on nearly erect flower stems (pedicels) white, beautifully marked with pink veins which distinctly color the throat. Stem 8 to 12 in. high. Common in woods. April-June.

5. *T. nivale*, Beck. EARLY WAKE-ROBIN. Plant 2 to 6 in. high. Leaves on leaf-stalks, the blade 1 to 2 in. long, broadly oval. Flower on a flower stem 1 in. long, bent or curved beneath the leaves. Petals white, oblong or oval. Woods, Penna. and southward. March-May.

TRIBE VI.—SMILACOIDEAE. SMILAX TRIBE

Woody or, in Nos. 1 and 2, herbaceous vines, climbing by tendrils, arising from large tubrous rootstocks. Pistillate and staminate flowers on different plants, in rounded umbels, generally on long pedicels. Segments of the perianth 6, small, white; stamens inserted at the base of the perianth segments. Berry globular, 3-celled, with 1 or 2 seeds in each cell.

One family, SMILACEAE, and only one genus.

SMILAX, L.

Which has the characters named above.

Herbaceous, annual plants	<i>S. herbacea</i> and <i>S. tamnifolia</i>
Woody perennial vines.	
Stems all armed with prickles	<i>S. glauca</i> , <i>S. rotundifolia</i> and <i>S. hispida</i>
Smaller stems without prickles.	
Leaves shield-shaped	<i>S. bona-nox</i>
Leaves lance-shaped	<i>S. laurifolia</i>
Leaves oval-heart-shaped	<i>S. Walteri</i>
Leaves egg-shaped	<i>S. pseudo-china</i>

Herbaceous Annual Plants

1. *S. herbacea*, L. CARRION FLOWER. Stem round or slightly angled, very smooth, green, bushy, with slender branches. *Leaves oblong-egg-shaped, 7-nerved.* Flower stems longer than leaf stems. Woods and thickets of our area. April-June.

2. *S. tamnifolia*, Michx. (Fig. 3, pl. 15.) HALBERD-LEAVED SMILAX. Climbing or erect, smooth light green. *Leaves heart-shield-shaped, 5-nerved.* Flower stems much longer than leaf stems. Southern New Jersey and Penna., and southward. May-July.

Stems woody, perennial

Stems armed with many prickles.

3. *S. glauca*, Walt. (Fig. 1, pl. 15.) GLAUCUS-LEAVED GREENBRIAR. Stem round or the smaller branches slightly 4-angled. Leaves broadly ovate or rarely heart-shaped at base, thick, 3-nerved. Leaf stems bearing tendrils. *Flower stems considerably longer than leaf stems.* Dry soil, eastern Mass. and southward. May-June,

4. **S. rotundifolia**, L. (Fig. 2, pl. 15.) COMMON GREENBRIAR. Stem stout, round. Leaves round-egg-shaped, often broader than long. Points of leaves sharp, borders smooth, 5-nerved. *Flower stems not longer than leaf stems.* Woods and thickets of our area. April-June.

5. **S. bona-nox**, L. BRISTLY GREENBRIAR. Stem round or slightly angular, branchlets angular, with many prickles. Leaves deltoid-heart-shaped, 5-nerved, often with prickles along the leaf borders. Flower-stem longer than leaf-stem. Southern two-thirds of our area and southward. April-July.

6. **S. hispida**, Muhl. HISPID GREENBRIAR. Stem climbing, covered below by a dense growth of soft bristly prickles, main stem round, the branches somewhat angular. Leaf stems about $\frac{1}{2}$ in. long; leaves thin, egg-shaped, sharply pointed at apex, obtuse or somewhat heart-shaped at base, 7-veined. Stem of flower-cluster from 2 to 5 in. long. Berries bluish-black. Moist thickets, rare. Conn. southward. May-July.

§ Stems without prickles or with prickles only on main stems.

7. **S. laurifolia**, L. LAUREL-LEAVED GREENBRIAR. Stem round, high climbing, prickles only on main stems or rarely on small branchlets. Leaves narrow lance-shaped, broader at outer third than at inner third. Leaves generally 3-nerved, leaf stems very short. Flower stems $\frac{1}{4}$ to 1 in. long. In southern part of our region. March-Sept.

8. **S. Walteri**, Pursh. (Fig. 4, pl. 15.) WALTER'S GREENBRIAR. Stem angled. Leaves egg-shaped, heart-shaped, obtuse at apex, 3-nerved. New Jersey and southward. March-Aug.

9. **S. pseudo-china**, L. LONG-STALKED GREENBRIAR. Rootstock tuberos. Stem climbing, without prickles or with few. Leaves egg-shaped, somewhat heart-shaped at base, 5-veined; leaf stem flattened. Flower stem nearly as long as the leaves. Berries black. Rare. Dry or sandy soil. New Jersey and southward. March-Aug.

FAMILY III.—HAEMODORACEAE. BLOODWORT FAMILY

General characteristics of the Lily family, but with only 3 stamens, which are opposite the 3 inner segments of the perianth. Perianth situated partly or wholly *above* the ovary which is 3 celled. Perennial herb with erect stems and narrow, grass-like leaves.

1. LACHNANTHES, Ell. (*Gyrotheca*, Salisb.)

A stout herb with fibrous, perennial roots $1\frac{1}{2}$ to 2 ft. high, woolly or hairy above. Flowers in a head or loose rounded cluster, yellow. Calyx segments long, narrow and pointed, as long as the yellowish petals.

L. tinctoria, (Walt.) Ell. RED ROOT. Flowers 15 to 20 in a terminal umbel-like cluster, covered with woolly hairs. Found in swamps and wet places, Mass. and southward. July-Sept.

FAMILY IV.—AMARYLLIDACEAE. AMARYLLIS FAMILY

Perennial herbs with grass-like leaves. Flowers showy in um-

bel-like clusters, yellow or white. Perianth segments 6, adherent to the ovary. Stamens, in our species, 6. Ovary 3-celled, each cell with many seeds.

1. HYPOXIS, L.

Low herbs arising from short rootstocks not unlike bulbs. Leaves all from the rootstock, grass-like. Flowers star-shaped, green on the outside, yellow within, the few-flowered cluster terminal to a naked scape. Below the flower cluster are 2 lance-shaped bracts.

1. *H. hirsuta*, (L.) Coville. (Fig. 4, pl. 16.) STAR GRASS. Leaves all from the root. Flower stem generally not as long as the grass-like leaves. Whole plant hairy. Flowers 2 to 6 in the group. Stem 3 to 10 in. high. Dry woods throughout our region. May-Oct.

2. LOPHIOLA, Ker.

Erect herb arising from a slender rootstock. Leaves grass-like, mostly from the root but found sparingly on the flower stem. The spreading cluster is compound, a dozen to 20 flowers in the group, the flower branchlets being subtended by 2 lance-shaped bracts. Capsule ovoid.

1. *L. americana*, (Pursh.) A. Wood. LOPHIOLA. GOLDEN CREST FLOWER. Perianth segments woolly. Stem 1 to 2 ft. high, when young covered with whitish woolly hairs. Root leaves smooth, narrow and long, those from the stem shorter. Flowers yellow within and woolly, greenish on the outside. Bogs, New Jersey and southward. June-Aug.

FAMILY V.—DIOSCOREACEAE. YAM FAMILY

Twining shrubs with alternate heart-shaped leaves. Staminate and pistillate flowers on different plants or the two kinds on the same plant. Perianth of 6 segments, adherent to the ovary. In the staminate flowers the stamens are inserted into the base of the perianth segments. Both kinds of flowers in long slender clusters. Leaves at lower part of stem in whorls of 4s; above, alternate, each with about 9 conspicuous nerves. Styles 3, ovary 3-celled, winged.

1. DIOSCOREA, L.

A twining vine in woods and thickets, mostly clinging to trees. Leaves egg-shaped, with slender pointed outer extremities, on long slender leaf stalk.

D. villosa, L. (Fig. 5, pl. 15.) WILD YAM-ROOT. Mostly in the southern part of our region. June-July.

FAMILY VI.—IRIDACEAE. IRIS FAMILY

Perennial herbs, in wet or moist grounds. Leaves linear, erect, in two ranks. Perianth of 6 segments, in *Gemmingia* and *Sisyrinchium* alike, in *Iris* the 3 inner segments smaller than the

others. Flowers subtended by conspicuous leaf-like bracts. Stamens 3, opposite the outer segments of the perianth.

Segments of perianth in two unequal series **Iris**

Segments of perianth equal.

Flowers orange **Gemmingia**

Flowers blue **Sisyrinchium**

1. IRIS, L.

Three inner segments of the perianth curved outward, narrower than the others. Outer segments more erect but curved inward. The 3 divisions of the style are flattened and colored, resembling petals, the stigmas being on the under (outer) side of the generally 2 lipped style.

Stem 1 to 2 in. high *I. verna*

Stems about 6 in. high *I. lacustris*

Stems from 1 to 2 ft. high.

Flowers yellow *I. pseudacorus*

Flowers blue.

Leaves sword-shaped *I. versicolor*

Leaves narrow, grass-like.

Flower pedicel shorter than the bracts subtending it . *I. Hookeri*

Flower pedicel much longer than the bracts, plant 1
ft. or more high *I. prismatica*

1. **I. versicolor**, L. (Fig. 3, pl. 16.) LARGER BLUE FLAG. Stems 1 to 3 ft. high. Leaves shorter than the stem, $\frac{1}{2}$ to 1 in. wide. Bract longer than the flower stem. Flowers blue, with yellow, green and white. The common blue flag along borders of springs and in moist places. May-July.

2. **I. pseudacorus**, L. YELLOW FLAG. Leaves sword-like. Stems 1½ to 3 ft. high. The only native or naturalized species with yellow flowers. Not common. Marshy places. Introduced from Europe. May-July.

3. **I. Hookeri**, Penny. HOOKER'S BLUE FLAG. (*I. setosa*, Pall.). Leaves grass-like, mostly from the base. Seed capsules nearly egg-shaped with 3 obtuse lobes. The bracts below the flowers are as long or longer than the pedicel of the flower. Stem 10 to 20 in. high. Banks of streams, throughout our area. May-July.

4. **I. verna**, L. DWARF IRIS. Stem 1 to 3 in. high, usually 1-flowered. Leaves narrowly linear. Flowers violet-blue or rarely white. Shaded hillsides, S. Penna. and southward. April-May.

5. **I. prismatica**, Pursh. SLENDER BLUE FLAG. Leaves grass-like; plant slender. Flowers solitary or two together, the flower on a long delicate flower pedicel. Capsule acute at each end. Mostly along the eastern coast. May-July.

6. **I. lacustris**, Nutt. DWARF LAKE IRIS. One of the smallest of the genus native in our region. Stem about 5 or 6 in. high. Flowers 1 to 1½ in. long. Leaves as long or longer than the flower stem. A local species on the shores of Lake Huron and Lake Superior. May.

2. GEMMINGIA, Fabricius

An introduced erect herb, perennial, with leaves resembling the Iris

and with a broad loose terminal cluster of flowers with equal spreading, orange, purple-mottled, flowers, the petals and sepals nearly or quite equal. Stamens 6, inserted at the base of the perianth segments.

1. *G. chinensis*, (L.) Kuntze. BLACKBERRY LILY. Stem 1 to 5 ft. tall. Fruit many knob-like protrusions, resembling in form and appearance a blackberry. In southern part of our region. June-July.

3. SISYRINCHIUM, L.

Herbs arising from rootstocks. The three branches of the style thread-like. Leaves grass-like. Segments of perianth 6, equal, the petals widest at outer extremity; stamens 6. From the midvein of each petal extends a delicate spine-like projection. Flowers wheel-formed. Below the little umbel of flowers are two leaf-like bracts which form a sort of spathe. From this spathe arise by delicate pedicels the two, three, or more star-like flowers.

Bracts below the flowers very unequal.

The long bract generally bright purple *S. mucronatum*
The long bract not purple *S. angustifolium*

Bracts below the flowers nearly or quite equal.

Leaves from 1/10 to 1/5 in. wide.

Stem wings notched *S. intermedium*

Stem wings not notched *S. graminoides*

Leaves from 1/40 to 1/20 in. wide *S. atlanticum*

1. *S. graminoides*, Lamark. STOUT BLUE-EYED GRASS. A common species in damp grassy soil. Flower stem somewhat flattened, *branching, one branch shorter than the other*. Leaves broad grass-like. Plant 8 to 20 in. high.

2. *S. atlanticum*, Bicknell. (Fig. 2, pl. 16.) EASTERN BLUE-EYED GRASS. Less common than No. 1. Stem and leaves very narrow, whole plant slender. Stem branching, 8 to 24 in. high. Generally growing in tufts. Umbel often many flowered. In moist fields throughout our region, but mostly in the Eastern part. May-June.

3. *S. angustifolium*, Mill. (Fig. 1, pl. 16.) POINTED BLUE-EYED GRASS. Stem flat, two edged. Leaves about 1/12 in. wide and from 3 to 16 in. high. Umbel few flowered, subtended by a long bract which extends considerably above the flowers and a second very inconspicuous bract. In moist meadows. Common. June-Aug.

4. *S. mucronatum*, Michx. MICHAUX'S BLUE-EYED GRASS. Growing more in tufts than the last; stem and leaves much more delicate and slender, from thread-like to 1/15 in. wide. Stems with very narrow wings on margins. Leaves often as long as flower stems. The outer long bract at the base of the umbel 1/2 to 2 1/2 in. long, often bright purple; the inner bract about 1 in. or less in length. Flowers deep violet-blue. Meadows and fields, New Jersey and westward. May-June.

5. *S. intermedium*, Bicknell. INTERMEDIATE BLUE-EYED GRASS. Growing in tufts, stems 4 to 16 in. high, slender, simple or branched above into two long flower stems. Leaves nearly 1/8 in. wide. Stem very flat, the wings very finely notched. Flower stem usually shorter than the leaf situated just below the branching (2 to 3 1/2 in. long). Outer bract below the little umbel of flowers tapering to a very slender point, 1 to 2 1/2 in. long, usually purple. Flowers 2 to 6, pale blue. Southern New Jersey and southward. May-June.



PLATE 16

1. *Sisyrinchium angustifolium*. 2. *S. atlanticum*. 3. *Iris versicolor*.
4. *Hypoxis hirsuta*. 5. *Aletris farinosa*.

Order VII.—ORCHIDACEAE. Orchidaceous Plants

Of this order there is, in our region, only one family.

ORCHIDACEAE. ORCHID FAMILY

Among the Monocotyledonous plants the orchid family is peculiar in being that in which the flowers are always irregular. The perianth is of two rows of flower leaves, an outer, the calyx, of 3 segments which are alike or very nearly so and an inner, the corolla, also of 3 generally very unequal parts. The two side segments are nearly alike, but the middle or upper one is unlike the others and generally forms a lip, simple or fringed, or a boat-like pouch, and is often extended into a long spur. This upper segment, by the twisting of the ovary or of the flower pedicel may become the lower one. This upper lip differs from the other segments, not only in form and size but it is often strikingly in contrast in its color. Of the stamens, only one is, as a rule, developed, but in *Cypripedium* two are fertile. The stamen or the two stamens grow in union with the pistil, forming what is known as the column. This arrangement brings the pollen bearing anther directly over or behind the stigma. The ovary is, contrary to the general rule with monocotyledonous plants, entirely inferior to all the parts of the flower, is elongated and in nearly all cases twisted, the torsion in general being 180° , while in some foreign species the rotation is fully 360° .

In *Cypripedium* the bending of the flower stalk serves the same purpose as does the torsion of the ovary in other genera. The one-celled ovary is divided by three deep partitions to which are attached the very numerous small seeds. Orchidaceous plants are all perennial, the bulb for the succeeding year forming at the side of the bulb of the current year. Leaves generally from the stem and alternate but sometimes all from the root or opposite on the stem or even in whorls on the stem, they are parallel nerved. Flowers in a slender spike or loose broadened cluster or, less frequently, solitary.

There are over 5000 known species of orchidaceous plants, the great majority of which are found in tropical climates, the most of these latter being air plants, finding their homes on the branches of trees and deriving their nourishment largely through the long trailing aerial roots. In our region all the species are plants having their roots in the soil or in wet mosses.

Flowers with two fertile anthers resting each on a lateral projection from the common column, the odd, center stamen (which answers to the fertile stamen of other orchids) spread into a petal-like expansion **Cypripedium**

Lip extended into a spur.

Flower with one fertile stamen. Pollen in masses drawn out and forming a little stalk (caudicle) which is connected with a glutinous adhesive substance known as a "gland."

The glands enclosed in a hood or pouch which opens at the mouth of the spur **Orchis**

Glands not enclosed in a pouch . . . **Habenaria**

Pollen masses waxy, terminal to the column. Slender herb arising from a solid bulb. Spur slender, 2 or 3 times as long as the flower. Flowers greenish in a loose lengthened cluster **Tipularia**

Lip not extended into a spur.

Pollen masses not drawn out to form the little stalk, grains more or less powdery, but cohering in 4 or 5 delicate masses and attached to the summit of the anther.

Leaves 2, opposite. The pair of green leaves near middle of stem. Lip of flower split . . **Listera**

The pair of shining leaves near the base of the stem. Sepals and petals linear . **Liparis**

Leaves along the stem, mostly below. Flowers in twisted spikes **Spiranthes**

Leaves in rosette at base of stem, often blotched with white, not reticulated; lip entire, roundish **Epipactis**

Stem very leafy, flowers in a long slender cluster, anther hooded **Serapias**

Leaves mostly reduced to sheaths; flower solitary, purple **Arethusa**

Leaves broad grass-like; flowers several in a loose cluster, pink purple. Lip crested with long yellow hairs **Calopogon**

Flowers few or solitary. Leaves few, alternate or in a whorl. Anther attached to the back of the column **Pogonia**

Leaf single.

Oval, with a single flower having a double,
bearded lip **Calypso**

Leaf broadly oval clasping the stem with sev-
eral scales below. Flowers greenish **Microstylis**

Grass-like, with a long cluster of yellow-brown
flowers **Aplectrum**

Plants without leaves or with inconspicuous ones.

Flowers dull, roots coralloid . . . **Corallorrhiza**

I. CYPRIPEDIUM, L.

Plants with terminal nodding flowers. Two stamens fertile. Stigma in 3 lobes. Lip developed into a large inflated pouch or sac. Leaves from the stem or from the root, large, many nerved.

Stem not leafy, leaves directly from root *C. acaule*
Stem leafy.

Flowers yellow.

Lip 1 to 2 in. long *C. hirsutum*

Lip $\frac{1}{2}$ to 1 in. long *C. parviflorum*

Flowers purple.

Petals as long or longer than the lip *C. arietinum*

Petals shorter than the lip.

Stem 1 to 2 ft. high *C. spectabile*

Stem 6 to 12 in. high *C. candidum*

1. **C. arietinum**, R. Br. (Fig. 4, pl. 17.) RAM'S HEAD. Stems 8 to 12 in. high, often in clusters. Leaves broad elliptic, petals linear, greenish-brown; lip red with white veins, somewhat downy, the apex prolonged into a spur. Lateral sepals not united. In damp woods, most of our region. May-Aug.

2. **C. acaule**, Ait. (Fig. 2, pl. 17.) MOCCASSIN FLOWER. Flower scape 10 to 14 in. high. Leaves from the base of stem, opposite, broad elliptic, strongly nerved. Flower 2 in. long. Petals not as long as the pouch-like lip. Lateral sepals more or less united. An exquisite flower. In damp woods. May-June.

3. **C. spectabile**, Salisb. (Fig. 3, pl. 17.) SHOWY LADY'S SLIPPER. (*C. reginae*, Walt.). Stem leafy, 2 ft. high; leaves broad lance-ovate, strongly veined. Sepals broad, blunt at end, not as long as the lip. Lip purplish white with many red veins. The most showy of our Cypripediums. In wet meadows and swamps. June-Sept.

4. **C. candidum**, Willd. SMALL WHITE LADY'S SLIPPER. Stem with 3 or 4 broad lance-shaped leaves, 6 to 12 in. high. Sepals and petals longer than the lip. Lip white with purple veins within. Flower rather less than an inch long. Woods and swamps. May-July.

5. **C. hirsutum**, Mill. (Fig. 1, pl. 17.) LARGE YELLOW LADY'S SLIPPER. Stem leafy, 1 to 2 ft. high, hairy; leaves oval or broad lance-shaped. Flowers large, lip 1 to 2 in. long, greenish-yellow with purple stripes. Sepals long, twisted, narrow lance-shaped. Woods and thickets throughout our region. May-July.

6. **C. parviflorum**, Salisb. SMALL LADY'S SLIPPER. Stems very leafy, about as tall as No. 5, flower smaller; lip $\frac{1}{2}$ to $1\frac{1}{4}$ in. long, bright yellow



PLATE 17

1. *Cypripedium hirsutum*. 2. *C. acaule*. 3. *C. spectabile*. 4. *C. arietinum*.
 5. *Aplectrum spicatum*.

with purple spots within. Sepals long *egg-shaped to lance-egg-shaped*. Woods and thickets. May-July.

2. ORCHIS, L.

Perennial, from fleshy roots. Leaves, in our species, 1 or 2 from base of stem. Flower stem leafless with a narrow spike of exquisite purple flowers. Lip spurred. Pollen in two masses, related to each other by the slender elastic threads.

1. *O. spectabilis*, L. (Fig. 1, pl. 18.) SHOWY ORCHIS. (*Galeorchis spectabilis*, (L.) Rydb.). Stem 4 to 12 in. high, but rarely more than 6 in., 4-angled with 1 or 2 lance-shaped bracts. Leaves 2, opposite, rarely more, broad oval, spreading, about as long as flower stem. Flowers 3 to 6, showy, rose-white or somewhat violet, lip not lobed. Throughout our region in rich, generally piny, woods. April-June.

2. *O. rotundifolia*, Banks. (Fig. 2, pl. 18.) SMALL ROUND-LEAVED ORCHID. Stem more slender than No. 1, about as high. *Leaf single*, from base of stem, broadly oval or nearly orbicular. Flower stem with few flowers. Lip white or light purple with purple spots, three lobes, the end one notched. In damp woods mostly in northern part of our area. July-August.

3. HABENARIA, Willd.

Plants differing from the orchids only in some, to the amateur, rather obscure features. Mostly with leafy stems. Flowers in long narrow clusters (spikes) or in loose clusters (racemes). Lip entire, 3 lobed or fimbriated. *The two glands to which are attached the delicate threads (or caudicles) connected with the pollen masses are not enclosed in a pouch but lie quite naked.* The petals are usually smaller than the sepals. Color of flowers, purple, white, green or yellow.

Flowers Greenish-yellow

One leaf at base of stem	<i>H. obtusata</i>
Two leaves at base of stem.	
Flower stem with one or more leaf-like bracts	<i>H. orbiculata</i>
Flower scape without bracts	<i>H. Hookeri</i>
Stem leafy, bracts about as long as the flowers.	
Lip not divided in 3 lobes, border entire.	
Upper sepal finely notched	<i>H. hyperborca</i>
Lip with a tooth at each side of the base	<i>H. flava</i>
Stem leafy, bracts much longer than the flowers	<i>H. bracteata</i>
Stem with one leaf at base	<i>H. clavellata</i>

Flowers Yellow or Orange

Lip not fringed	<i>H. integra</i>
Lip fringed.	
Spur longer than the ovary	<i>H. ciliaris</i>
Spur shorter than ovary.	
Lip in 3 divisions	<i>H. lacera</i>
Lip not 3 parted	<i>H. cristata</i>

Flowers White

Lip not fringed.	
Not very fragrant	<i>H. dilatata</i>
Lip fringed.	
Very fragrant	<i>H. fragrans</i>
3-parted	<i>H. leucophacea</i>
Not 3-parted	<i>H. blephariglottis</i>

Flowers Purple

Segments of the lip deeply fringed.	
Lip $\frac{1}{2}$ to 1 in. broad	<i>H. fimbriata</i>
Lip $\frac{1}{2}$ to $\frac{1}{4}$ in. broad	<i>H. psychodes</i>
Segments of lip <i>toothed</i> , not fringed	<i>H. peramoena</i>



PLATE 18

1. *Orchis spectabilis*. 2. *O. rotundifolia*. 3. *Habenaria orbiculata*. 4. *H. bracteata*. 5. *H. dilatata*.

1. *H. orbiculata*, (Pursh.) Torr. (Fig. 3, pl. 18.) LARGE ROUND-LEAVED ORCHIS. Stem slender 1 to 2 ft. high, bearing a long loose cluster of green flowers and *one or more leafy bracts*. Leaves large, shining, 3 to 6 in. long and nearly round, lying flat on the ground. Spur longer than the long twisted ovary. In rich damp woods throughout our area. July-Aug.

2. *H. Hookeri*, Torr. HOOKER'S ORCHIS. Scape only about half as high as No. 1 and leaves also smaller and less spreading. Flowers yellowish-green, spur 1 in. long. In most respects strongly resembling No. 1, but the *green bracts on the stem are wanting*. In situations similar to No. 1. June-Sept.

3. *H. obtusata*, (Pursh.) Richards. (Fig. 4, pl. 19.) SMALL NORTHERN BOG ORCHIS. Stem 4 to 10 in. high, slender, 4-angled. The single leaf arising from base of stem ovate, widest toward apex. Lip narrow lance-shaped and as long as the spur. Bogs, generally distributed in our area. July-Sept.

4. *H. hyperborea*, (L.) R. Br. TALL LEAFY GREEN ORCHIS. (*Limnorchis media*, Rydb.). Stem 1 to 3 ft. high, *leafy*. Lance-shaped or broad lance-shaped 2 to 12 in. long. Spike of numerous flowers very narrow; *flowers greenish-yellow*, the bracts, one subtending each flower, are longer than the flower. Spur as long as the slightly indented lip. Swamps and damp woods. May-Aug.

5. *H. dilatata*, (Pursh.) Gray. (Fig. 5, pl. 18.) TALL WHITE BOG ORCHIS. Slender stem 8 in. to 2 ft. high. Leaves lance-shaped to grass-like. Spike of flowers narrow, long. Bracts below the flowers about as long as or shorter than the *white flowers*. Lip linear and ending in an obtuse point. Swamps and wet woods. June-Sept.

6. *H. fragrans*, A. Gray. FRAGRANT ORCHIS (*Limnorchis fragrans*, Rydb.). Resembles No. 5. Lip narrowly linear, dilated at the base, shorter than the spur. Flowers small, white, very fragrant. Bogs, Willoughby mountains, Vermont. July.

7. *H. integra*, (Nutt.) Spreng. SMALL SOUTHERN ORCHIS. Stem 1 to 2 ft. high; leaves lanceolate to grass-like, about 3; spike of flowers short (1 to 3 in.), with numerous *orange-yellow flowers*. Lip ovate, longer than the sepals, spur longer than the sepals. Wet places, New Jersey and southward. July.

8. *H. bracteata*, (Willd.) R. Br. (Fig. 4, pl. 18.) LONG-BRACTED ORCHIS. Stem $\frac{1}{2}$ to 2 ft. high. Leaves oblong, obtuse at apex or somewhat sharp pointed. Lip somewhat 3-toothed at outer end. Bracts below the flowers lance-shaped and three times as long as the *greenish flowers*. Petals very narrow, twice as long as the white spur. Woods and meadows. May-Sept.

9. *H. clavellata*, (Michx.) Spreng. (Fig. 7, pl. 19.) SMALL GREEN WOOD ORCHIS. Stem $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high, with only a single leaf, which is near the base, and with several leaf-like bracts along the stem above. The larger single leaf, widest toward the apex, 2 to 6 in. long. Bracts below the flowers not so long as the ovary. Flower spike $\frac{1}{2}$ to 2 in. long, with numerous small *greenish flowers*. Moist woods. July-Aug.

10. *H. flava*, (L.) A. Gray. (Fig. 5, pl. 19.) SMALL PALE GREEN ORCHIS. Stem 1 to 2 ft. high. Leaves oblong to lance-shaped, sharp

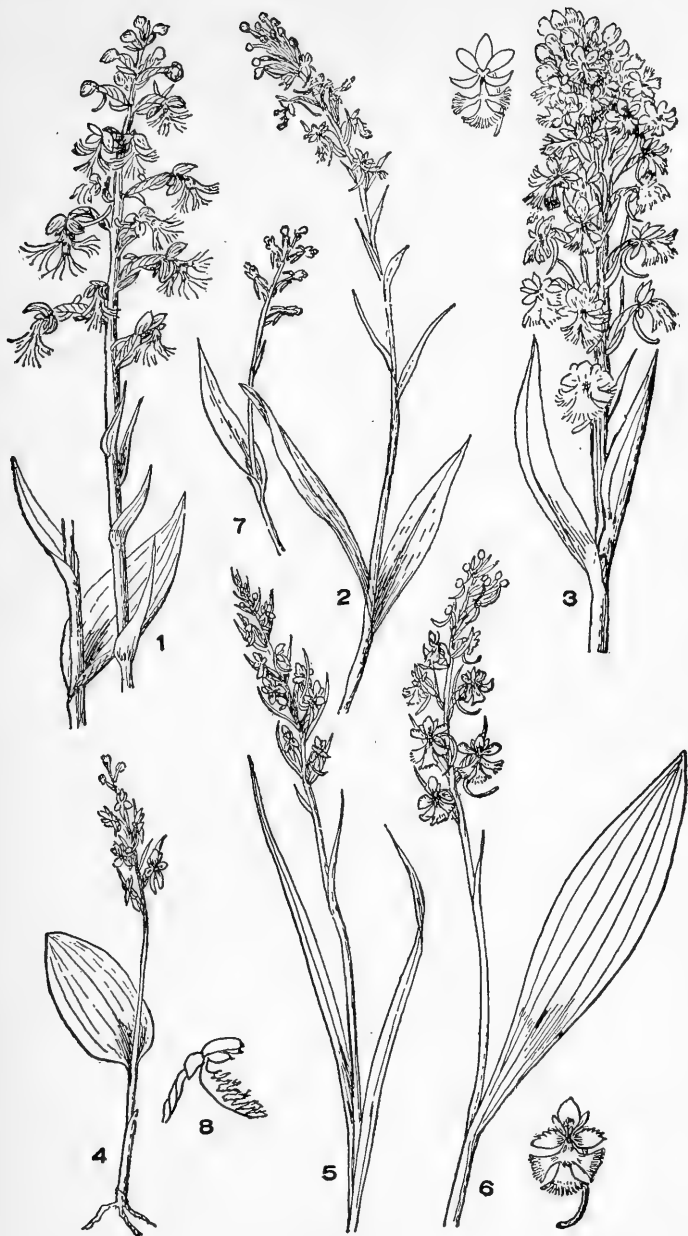


PLATE 19

1. *Habenaria lacera*. 2. *H. cristata*. 3. *H. fimbriata*. 4. *H. obtusuta*.
5. *H. flava*. 6. *H. psycodes*. 7. *H. bracteata*. 8. *H. ciliaris*.

pointed or obtuse at outer extremity. Bracts below the flowers longer than the *yellowish-brown flowers*, the lips of which are 3-toothed, rather longer than the petals and with a tubercle at the base. Moist soil. June-July.

11. *H. cristata*, (Michx.) R. Br. (Fig. 2, pl. 19.) CRESTED YELLOW ORCHIS. Stem 1 to 2 ft. high, slender; leaves lance-shaped to grass-like. Flowers in a somewhat dense spike 2 to 4 in. long. Lip rather longer than the roundish sepals. Spur $\frac{1}{2}$ as long as the ovary. *Flowers orange*. Swamps, New Jersey and south.

12. *H. ciliaris*, (L.) R. Br. (Fig. 8, pl. 19.) YELLOW FRINGED ORCHIS. Stem about 2 ft. high. Leaves lance-shaped, pointed at extremity. Flower spike with *many yellow flowers*. Sepals rounded, $\frac{1}{3}$ to $\frac{1}{2}$ in. long, petals not as long, toothed. Lip not lobed, oblong, the border profusely fringed. Spur very slender, more than an inch long. Wet meadows. July-Aug.

13. *H. blephariglottis*, (Willd.) Torr. WHITE FRINGED ORCHIS. Stem 1 to 2 ft. high. Leaves lance-shaped. Spikes with many *white flowers*. Lip long and narrow with copious, sometimes sparse, fringe. Spur 1 in. long. Swamps. July-Aug.

14. *H. lacera*, (Michx.) R. Br. (Fig. 1, pl. 19.) RAGGED ORCHIS. Slender stem 1 to 2 ft. high. Leaves lance-shaped to linear about 6 in. long, upper smaller. Flower spike with many *greenish-yellow flowers*. Petals obtuse. *Spur about as long as the lip*. Lip divided into 3 segments, each fringed at the end by long thread-like segments. Wet meadows and woods. June-July.

15. *H. leucophaea*, (Nutt.) A. Gray. WHITE PRAIRIE ORCHIS. Stout angled stem 1 to 2½ ft. high. Leaves lance-shaped, tapering and sharp pointed. Flower parts much like No. 13 but *spur twice as long as the lip* and flowers white. Moist fields. June-July.

16. *H. fimbriata*, A. Gray. (Fig. 3, pl. 19.) LARGE PURPLE FRINGED ORCHIS. FIMBRIATED ORCHIS. (*H. grandiflora*, Torr.). Stem 15 in. to 3 ft. tall, angled. Leaves oval, broad lance-shaped or narrow, 2 to 6 in. long; extremely obtuse. Segments of lip fan-shaped, broader than in Nos. 13 and 14. Ends bordered with thread-like fringes; the petals pointed, notched. *Spur as long as or slightly longer than the ovary*, curved. Cluster of *lilac flowers* 3 to 15 in. long, forming an extremely showy and beautiful florescence. Moist and shady places. June-Aug.

17. *H. psycodes*, (L.) A. Gray. (Fig. 6, pl. 19.) SMALLER PURPLE FRINGED ORCHIS. Stem more slender than No. 15, *not angled*, 1 to 3 ft. high. Leaves lance-shaped to oval, with sharp points. Spike 2 to 6 in. long with *many lilac flowers*. Lip fringed as in No. 15, but fringe is noticeably shorter and side segments less broad. Petals erect with delicately fringed border. Spur $1\frac{1}{2}$ times as long as the ovary. Wet meadows. July-Aug.

18. *H. peramoena*, A. Gray. FRINGELESS PURPLE ORCHIS. Stem 1 to 2½ ft. high, leafy. Leaves lance-shaped to linear, the longer ones 4 to 8 in. in length. Spike of flowers 3 to 7 in. long, of numerous *violet-purple showy flowers*. Lip segments with very short fringe, or row of fine teeth, middle lobe notched in center. Spur longer than ovary. Moist meadows. July-Aug.

4. POGONIA, Juss.

Flowers solitary or few, always conspicuous compared to the delicate plant. The segments of the flower distinctly separate. Lip without spur, fringed along the border or deeply notched at outer extremity. Column bearing the stigma and anthers erect and prolonged.

1. *P. ophioglossoides*, (L.) Ker. (Fig. 4, pl. 20.) ROSE POGONIA. Stem delicate, 8 to 15 in. high, with single leaf or rarely 2 or 3 broad lance-shaped leaves, a leaf-like bract also at base of flower. Where single, the leaf is near the middle of the stem, $\frac{1}{2}$ to 3 in. long, without leaf-stalk. A leaf sometimes also arises by a long leaf-stalk from the base of the stem. Petals and sepals leaning to side, elliptic or oval, $\frac{1}{2}$ to $\frac{2}{3}$ in. long, *beautifully shaded light purple*. The lip has a conspicuous fringe about the border, and on the inner surface a crest or beard, it is longer than the petals. One of the prettiest of the orchis family in our region. In wet meadows and swamps. June-July.

2. *P. trianthophora*, BSP. NODDING POGONIA. (*Triphora trianthophora*, (Sw.) Rydb.). Stem 3 to 8 in. high. Leaves, broad ovate, $\frac{1}{4}$ to $\frac{3}{4}$ in. long without leaf-stalks, 3 to 8 and alternate. Flowers 1 to 5 or more on rather long flower stems. Lip not quite as long as the petals and sepals, broad and somewhat irregularly notched. Petals elliptic. Flowers, 1 in. long, purple, drooping when expanded. In rich woods. Aug.-Sept.

3. *P. divaricata*, (L.) R. Br. (Fig. 3, pl. 20.) SPREADING POGONIA. Stem 1 to 2 ft. high, with one leaf near the middle and a leaf-like bract just below the single flower. Leaf without leaf-stalk, clasping the stem, 2 to 4 in. long and $\frac{1}{4}$ to $\frac{1}{2}$ in. wide, blunt at outer end. Petals and sepals long lance-shaped, the former 1 in. the latter $1\frac{1}{4}$ in. long. Lip broad with a prolonged middle or two short lateral lobes. Flowers rather dark purple. In swamps. Southern part of our region. Southern New Jersey, southward. July.

4. *P. verticillata*, (Willd.) Nutt. WHORLED POGONIA. (*Isotria verticillata*, (Willd.) Raf.). Stem about 1 ft. high. Leaves 5 in a whorl at summit of stem, broad oval. Single greenish-yellow flower, on a slender flower stem, nodding. Sepals very narrow and *more than twice the length of the petals*, which are about $\frac{3}{4}$ in. long. The sepals are dark purple, the petals yellowish. Lip with a 3-lobed extremity and a crest of hairs in the inner side. Moist woods. May-June.

5. *P. affinis*, Austin. SMALLER WHORLED POGONIA. (*Isotria verticillata*, (Willd.) Raf.). Stem about 10 in. high; leaves in a whorl at summit, resembling No. 4. Flowers greenish-yellow. *Sepals only about equal in length with the petals*. Moist woods, rare. Connecticut, southern New York and New Jersey. June.

5. ARETHUSA, L.

Of the two known species ours is an exquisite low herb found usually in bogs. The sheathed stem arises from a small bulb and is terminated by a single or rarely by two, large, richly colored, rose-purple flowers. The solitary leaf is at first concealed by a sheath of the stem but at the time of the opening of the flower it expands and protrudes. Sepals

and petals are nearly equal, adhering below, in the form of a hood above. The broad lip curves upward, outward and downward, broadest at the summit, crested with hairs down the face. The column is adherent to the lip and becomes petal-like and expanded at the apex. The anther is terminal and lid-shaped. Capsule ellipsoid, erect, angular.

A. bulbosa, L. (Fig. 2, pl. 20.) ARETHUSA. Plant 5 to 10 in. high; flower solitary or rarely 2 flowers from the same scape. In bogs throughout our region. May-June.

6. SERAPIAS, L. (Epipactis, R. Br.)

Tall herbs with leafy stems. Leaves alternate, clasping the stem. Flowers in a long narrow cluster (raceme), with bracts below the individual flowers. Lip with a sac at the base, without a spur, free, broad, the upper portion petal-like. Segments of the perianth all separate.

E. viridiflora, Reichb. HELLEBORINE. Stem 1 to 2 ft. high, with soft hairs above. Leaves egg-shaped, clasping the stem, 1 to 3 in. long. Flowers greenish to purple. Petals narrow, lance-shaped. Lip lobed, wavy. Introduced from Europe. July.

7. SPIRANTHES, Richard (Gyrostachys, Pers.)

Herbs with slender stems, the flower spike spiral. Leaves few, mostly at the base, generally narrow lance-shaped. The small white flowers are arranged in from 1 to 3 rows which wind, more or less, about the stem. Lip without a spur, broad compared with the other floral segments which are quite narrow, the border wavy. The 3 upper segments of the corolla are often united.

Flowers in 3 ranks which are only slightly twisted.

The 3 upper segments converge and overlie each other forming a sort

of hood; spike dense *S. Romanzoffiana*

The segments separate, they do not form a hood.

Leaves lance-shaped *S. plantaginea*

Leaves linear *S. cernua*

Flowers in a single rank, the spike much twisted, not dense.

Stem leafy, leaves grass-like *S. praecox*

Stem not leafy, the basal leaves withering before flowering time.

Root a single spindle-shaped tuber *S. simplex*

Stem not leafy, 2 basal leaves more prominent than those of *S. simplex*. Root of several tubers *S. gracilis*

1. **S. Romanzoffiana**, Cham. HOODED LADY'S TRESSES. Stem 6 to 15 in. high, leafy below, above, leaves reduced to bracts, the larger leaves below ranging from rather broad lanceolate to narrow linear, 3 to 8 in. long. Spike of flowers 1 to 4 in. long with bracts at the base of and shorter than the flowers. The three upper segments converge and overlie each other, to a greater or less extent, forming a sort of hood. Moist cold soil in all our area. July-Aug.

2. **S. plantaginea**, Raf. WIDE-LEAVED LADY'S TRESSES. (*S. lucida*, Ames.) Stem 4 to 9 or more in. high, smooth and naked except at lower part. Leaves oblong or lance-shaped 1 to 5 in. long, $\frac{1}{4}$ to $\frac{3}{4}$ in. wide, all close to the base and all distinctly 3-nerved. Spike 1 to 3 in. long, narrow. The outer flower segments do not unite with the upper inner segments and are narrow lance-shaped. The upper segment of the outer row somewhat united with the two upper petals. Face of lip pale yellow. Moist soil, common. June-Aug.



PLATE 20

1. *Spiranthes gracilis*. 2. *Arethusa bulbosa*. 3. *Pogonia divaricata*.
 4. *P. ophioglossoides*. 5. *Spiranthes cernua*. 6. *Calopogon pulchellus*. 7. *Epi-
 pactis pubescens*.

3. *S. cernua*, (L.) Richard. (Fig. 5, pl. 20.) NODDING LADY'S TRESSES. Stem leafy at base, bracted above, 6 to 20 in. high. Leaves 3 to 14 in. long, narrow lance-shaped, *not distinctly 3-nerved*. Spike of flowers 2 to 10 in. long. Flowers sometimes hairy, nodding. Lateral sepals not turned up or connected with the upper petals. Moist soil, common. June-Aug.

4. *S. praecox*, (Walt.) Wats. and Coulter. GRASS-LEAVED LADY'S TRESSES. Stem 10 to 30 in. high, hairy above. *Leaves long, grass-like growing from the base and upward*. Flowers in a linear spike, somewhat densely crowded. Lip smooth beneath. Moist soil, New Jersey and southward. June-Aug.

5. *S. vernalis*, Engelm. and Gray. EARLY LADY'S TRESSES. Similar to No. 4 but lip *downy* beneath. Mass., southward.

6. *S. gracilis*, (Bigel.) Beck. (Fig. 1, pl. 20.) SLENDER LADY'S TRESSES. Stem extremely slender, 5 to 25 in. high. Leaves, oblong or ovate, the outer and broadest, all in a cluster on the ground, mostly disappearing at flowering time. A few very narrow, acute bracts on the stem. Spike of flowers, about 1 to 3 in. long, slender, the flowers run nearly in a straight row a part of the length of the spike, then twist to another side of the stem, running again in a nearly straight line, then again shifting. Woods and shady places. Common. July-Sept.

7. *S. simplex*, A. Gray. LITTLE LADY'S TRESSES. A smaller species, stem 5 to 9 in. high. Leaves all at the base, ovate or oblong, disappearing at flowering time; very delicate bracts (2 - 3) along the stem. Flowers small and nearly in a straight row on one side of the very delicate stem. Dry soil, Mass., southward. Aug-Sept.

8. *LISTERA*, R. Br.

Small herbs growing in wet places; a pair of opposite leaves near the middle of the stem. Sepals and petals spreading or turned backward. Lip 2-lobed, drooping and longer than the other segments. Flowers small in a slender spike, greenish or purplish.

Leaves oval, base of lip with a triangular tooth at each side at the base
L. convallarioides
 Leaves heart-shaped at base. Lip twice as long as the petals, linear, not
 toothed at base. *L. cordata*
 Leaves oval. Lip not linear but about $\frac{1}{3}$ as broad as long, with basal ear-
 like lobes. *L. auriculata*
 Leaves kidney-formed; lip broadly 2-lobed at apex. *L. Smallii*
 Leaves oval; lip 4 to 8 times as long as petals, split. *L. australis*

1. *L. convallarioides*, (Sw.) Torr. BROAD-LIPPED TWAYBLADE. Stem 4 to 10 in. high, with delicate hairs on the upper half. Leaves oval or nearly round. *Lip twice as long as the petals, broad generally, with a tooth at each side of the base, and at the apex 2 lobes separated by a broad notch*. Flowers white. Damp woods. June-Aug.

2. *L. cordata*, (L.) R. Br. (Fig. 1, pl. 21.) HEART-LEAVED TWAYBLADE. Plant much resembling No. 1, but leaves heart-shaped at base, and flowers purplish or purple-brown. June-Aug.

3. *L. australis*, Lindl. (Fig. 2, pl. 21.) SOUTHERN TWAYBLADE. Size and general aspect of No. 1. Leaves ovate; lip 3 times as long as the petals and *deeply cleft*. Flowers white. Swamps. New York, New Jersey and southward. June-Aug.

4. **L. Smallii**, Weigand. **SMALL'S TWAYBLADE**. Stem slender, 6 to 8 in. high; leaves at or below the middle of the stem, egg-shaped to kidney-formed, abruptly pointed. The elongated cluster of flowers loose. Sepals and petals lance-shaped, longer than the ovary. Lip large, $\frac{1}{2}$ in. long, wedge-shaped, 2-lobed at the apex and with prominent lateral teeth at the base. Damp woods, mountains of Penna. and southward. June-Aug.

5. **L. auriculata**, Weigand. **AURICLED TWAYBLADE**. Slender, 4 to 7 in. high. Leaves large $1\frac{1}{2}$ to 2 in. long, oval or elliptic egg-shaped, borne above the middle of the stem. Cluster many flowered. Lip 2-cleft, $\frac{1}{4}$ to $\frac{1}{3}$ as broad as long, slightly hairy. Cedar swamps, New Hampshire and Maine. July.

9. **EPIPACTIS**, (Haller) Boehm. (**Peranium**, Salisb., **Goodyera**, R. Br.)

Low herbs with leaves clustered at base of stem and with pointed bracts on the stem. Flowers in narrow spike. Upper sepal and two petals united in sort of hood. Lateral sepals free.

Flowers on one side of the spike	<i>E. repens</i>
Flowers in a spiral spike	<i>E. tessellata</i>
Flowers all around the stem.	
Lip nearly round	<i>E. pubescens</i>
Lip long and grooved	<i>E. Menziesii</i>

1. **E. repens**, (L.) Crantz. **LESSER RATTLESNAKE PLANTAIN**. Stem 6 to 12 in. high. Leaves in a cluster at base, ovate, the upper surface beautifully marked with white reticulations, on dark back ground, reticulations do not follow the main nerves which are nearly parallel. Flowers small, greenish-white. June-July.

Var. *P. repens ophioides*, Fernald, the leaf blotches are whiter than in *E. repens*. This form represents the species in our area. Woods.

2. **E. pubescens**, (Willd.) Eaton. (Fig. 7, pl. 20.) **DOWNY RATTLESNAKE PLANTAIN**. Stem 6 to 20 in. high, densely covered with delicate hairs. Leaves oval *with leaf-stalks* which are nearly or quite wanting in No. 1. Reticulations similar to No. 1. *The lip which is nearly round is strongly saccate*. Dry woods. Common. July-Aug.

3. **E. Menziesii**, (Lindl.) Morong. **MENZIES RATTLESNAKE PLANTAIN**. (*E. decipiens*, (Hook.) Ames.) Stem 9 to 12 in. high. Leaves much like No. 2. *Lip long, trough-like*, narrowed toward the outer extremity but spreading at the apex. Dry woods, northern part of our area.

4. **E. tessellata**, (Lodd.) Eaton. **CHECKERED RATTLESNAKE PLANTAIN**. Leaves dark green with pale blotches or no blotches. Spike of flowers $2\frac{1}{2}$ to 3 in. long, *spiral*. Flowers greenish-white; lip forming a sac. Woods, Mass. and northward. July-Aug.

10. **MICROSTYLIS**, (Nutt.) Eaton. (**Achroanthes**, Raf.)

Low herbs arising from solid bulbs with somewhat the general aspect of *Listera* but with a single broad elliptic leaf below the middle of the stem. Flowers white or greenish-white in a narrow spike. Lip broad, about as long as the petals.

1. **M. monophyllos**, (L.) Lindl. (Fig. 4, pl. 21.) **WHITE ADDER'S MOUTH**. Stem slender, 4 to 6 in. high. The single leaf sheathing the stem. The *very slender spike of small white flowers about $\frac{1}{2}$ the length of the stem. The flower stalk shorter than the flower*, each with a small bract. Lip heart-shaped with the apex contracted to a narrow point. In woods and wet places, throughout our area. July.

2. **M. unifolia**, (Michx.) BSP. (Fig. 7, pl. 21.) **GREEN ADDER'S MOUTH**. Stem 6 to 10 in. high, it and the leaves much like No. 1. *Spike of flowers short*, not $\frac{1}{3}$ the length of the stem and much broader than that of No. 1. The flower pedicel longer than the flower. Lip broad, almost fan-shaped, 3-lobed at apex. Cold wet ground, not frequent. July.

II. LIPARIS, Rich. (*Leptorchis*, Thouars)

Low herbs arising from solid bulbs with naked stem and two broad leaves at base. Flowers in rather broad spikes. Sepals and petals narrow and nearly equal; lip broad, often with 2 tubercles near the base.

1. **L. liliifolia**, (L.) Richard. (Fig. 8, pl. 21.) **LARGE TWAYBLADE**. Stem 4 to 10 in. high; leaves broad elliptic or oval. Spike of 5 to 15 showy flowers, the linear petals and sepals white or greenish-white, the lip purple-brown. *Flower stalk nearly an inch long*. Lip broad oval, as long as the petals. Woods and thickets. May-July.

2. **L. Loeselii**, (L.) Richard. (Fig. 9, pl. 21.) **FEN ORCHIS**. Stem 2 to 8 in. high; leaves oval. Spike few flowered (3-6). Petals and sepals linear, unequal; lip wedge-shaped, often in 3 lobes at apex, the middle lobe longest. Sepals and petals greenish-white, lip yellowish-green. Wet places. June.

12. CALYPSO, Salisb.

A small herb arising from a solid bulb, with stem 3 to 6 in. high and with a single leaf at the base of the stem and a single flower at its summit. Stem with 2 or more sheathing bracts. The sepals and petals nearly equal, the lip large and inflated.

C. bulbosa, (L.) Oakes. (Fig. 3, pl. 21.) **CALYPSO**. Flower showy; leaf nearly round but somewhat pointed at apex. Flower purple, pink and yellow, somewhat resembling the flower of *Cypripedium*. Rare in our region, but found occasionally in woods. May-June.

13. CORALLORRHIZA, R. Br.

Plants mostly without green coloring. Stem and scales brown or purplish. Flowers in loose terminal spike. Lip 1 to 3 ridged, projecting backward as a spur which grows fast to the ovary or which is entirely suppressed. Petals and sepals nearly equal. Roots of coralloid branching masses.

Small spur or little sac or depression of lip at summit of ovary.

Lip egg-shaped with 2 conspicuous lateral teeth near the base *C. trifida*
Lip inversely egg-shaped, wavy or with minute teeth at the borders.

Lip broadly egg-shaped, white with crimson spots . . . *C. odorhiza*
Lip in general outline egg-shaped, with a conspicuous rounded lobe

at each side near the base . . . *C. maculata*

No spur or sac to the lip.

Lip egg-shaped, with wavy border . . . *C. striata*



PLATE 21

1. *Listera cordata*. 2. *L. australis*. 3. *Calypso bulbosa*. 4. *Microstylis monophyllos*. 5. *Corallorrhiza odontorhiza*. 6. *C. trifida*. 7. *Microstylis unifolia*. 8. *Liparis liliifolia*. 9. *L. Loeselii*.

1. *C. trifida*, Chatelain. (Fig. 6, pl. 21.) **EARLY CORAL ROOT.** Stem brown, 4 to 12 in. high. Flower scape 1 to 3 in. with few (5 to 10) dull purple flowers which are *drooping*. Petals and sepals nearly equal; *lip shorter than the petals*, with a tooth on each side near the base and a double notch at the apex, no spur except a small protuberance. Flower stalk very short or absent. Damp woods. Rare. June.

2. *C. odontorhiza*, (Willd.) Nutt. (Fig. 5, pl. 21.) **SMALL-FLOWERED CORAL-ROOT.** Stem 9 to 14 in. high, purplish. Flower scape with 6 to 20 purplish drooping flowers, quite small, on flower stalks about $\frac{1}{4}$ as long as the flowers. Sepals and petals nearly equal, $\frac{1}{4}$ in. long, marked with purplish lines. Lip broadly oval, *as long as the petals*, *wavy but not notched at the apex*. Ovary oval, *drooping*. Spur absent or represented by a small sac connected with the ovary. Woods. July-September.

3. *C. Wisteriana*. Conrad. **WISTER'S CORAL-ROOT.** Stem 8 to 16 in. high, not as slender as No. 2. Flower spike with 6 to 18 *drooping* flowers, *each about $\frac{1}{2}$ in. long* with slender flower stalks $\frac{1}{6}$ as long as the flowers. Petals and sepals about equal. Lip longer than petals, broadly oval with very slight indentation at apex and with purplish dots on the upper surface. Woods. Feby.-May.

4. *C. maculata*, Raf. **LARGE CORAL-ROOT.** (*C. multiflora*, Butt.). Stem 8 to 20 in. high; flower spike 2 to 8 in. long with from 10 to 30 *nearly erect* brownish-purple flowers. Petals and sepals unequal. Lip much shorter than the lateral sepals, broad, almost quadri-lateral with 3 distinct lobes. *Spur present* but adherent to the ovary. Woods. July-September.

5. *C. striata*, Lindl. **STRIPED CORAL-ROOT.** Stems 6 to 20 in. high; flower spike 2 to 6 in. long. Flowers larger than either of the preceding species, purple. Petals, sepals and lip about the same length. *Spur none*. Lip oval *without lobes or notches*, narrowed at the base.

14. TIPULARIA, Nutt.

Herb, arising from a large solid bulb, with a single broad leaf on a slender stalk which arises, in autumn, directly from the bulb. Leaf purplish beneath; the flower scape, arising also from the bulb, appears in the following summer, bearing a number of small greenish flowers. Sepals and petals nearly alike, but the latter narrow; lip slightly longer and with 3 lobes. Spur about 3 times as long as the flower and very slender.

T. discolor, (Pursh.) Nutt. **CRANE-FLY ORCHIS.** (*T. unifolia*, (Muhl.) BSP. Flower stem 15 to 20 in. high. Flower spike 5 to 10 in. long. Flowers green, tinged with purple. In woods. July-Aug.

15. CALOPOGON, R. Br. (*Limodorum*, L.)

Herb arising from a bulb with a long grass-like leaf and a naked flower scape on which are from 3 to 15 showy flowers. The ovary (which is in these orchidaceous plants the flower stalk), *does not twist* and the lip is therefore on the upper or inner side of the flower. It is conspicuously bearded on its upper side.

C. pulchellus, (Sw.) R. Br. (Fig. 6, pl. 20.) GRASS PINK. CALOPOGON. (*Limodorum tuberosum*, (?)). Flower scape 12 to 20 in. high, leaf 8 to 12 in. long, $\frac{1}{4}$ to $\frac{3}{4}$ in. wide. Flowers exquisite pink-purple, 1 in. broad, a small bract below each flower. Petals and sepals nearly alike, lip broad at apex, 2-lobed. The column (combined anther and stigma) is about as long as the lip. Face of the lip light with yellow or rose-colored hairs. In mossy bogs throughout our area. June-July.

16. APLECTRUM, Nutt.

Herb arising from a solid bulb-like corm, which is filled with a glutinous substance. In the autumn it sends up a large oval leaf and in the following spring or summer a scape which bears a number of dingy dull yellowish-brown flowers, sprinkled with purple, each about an inch broad.

A. spicatum, BSP. (Fig. 5, pl. 17.) ADAM AND EVE. PUTTY ROOT. (*A. hyemale*, (Muhl.) Torr.). Stem 12 in. or more high. Flowers in a loose spike. Petals longer than the lip which is somewhat 3-lobed. Rich mould in woods. May-June.

GROUPS AND ORDERS OF THE SUB-CLASS CHORIPETALS, OF THE CLASS DICOTY- LEDONS, DIVISION OF ANGIOSPERMS.

Class II.—DICOTYLEDONS

Embryo with two lobes (see page 50). Leaves generally net-veined. In a few cases, by abortion of a cotyledon, there is an apparent condition of monocotyledonism. In a number of instances also the leaves are constructed nearly on the parallel-veined plan.

Dicotyledons are divided into two great sub-classes. In the flowers of the first sub-class the petals are separate as in the case of the buttercups, violets, pinks, etc., while in the flowers of the second sub-class the petals are so united that, in general, they appear as a single envelope as in the case of the hare bells, the mints, the huckleberry tribe and others.

Curiously, a large group in which no petals are to be seen, belongs to the first sub-class, since it is assumed that although the petals are little or not at all apparent they are technically present but suppressed.

The first sub-class, CHORIPETALAE,* then, is composed of two groups, in a certain sense artificial, but convenient for our purpose:

Plants whose flowers have no apparent petals and, generally, only very rudimentary envelopes. 1st Group.

. **APETALAE**

Plants whose flowers have, generally, several petals or colored sepals which are distinctly petaloid. 2d

Group **POLYPETALAE**

In the second sub-class GAMOPETALAE, the petals are united, but in a few exceptional cases nearly or quite separated.

* Gr. *Choris*, asunder: petalon, a petal.

ORDERS OF THE GROUP APETALAE

1. Flowers in catkins or in various groups resembling catkins.
 Flowers without corolla and usually without calyx
 ORDER I. **JULIFLORES**

 Herb with nodding spike resembling a catkin
 SUB-ORDER **Piperales**

 Flowers in true aments or catkins, calyx none
 SUB-ORDER **Amentaceae**

 Flowers in catkins, a calyx usually present
 SUB-ORDER **Fagales**

 Flowers in groups of various forms, each flower bearing
 stamens alone or pistils alone, leaves without
 stipules SUB-ORDER **Urticales**
2. Flowers not in catkins, calyx present, plants all parasites ORDER II. **SANTALALES**
3. Flowers not in catkins, calyx present, ovules arranged
 around a central column of the single celled ovary.
 (Only a small part of this Order is apetalous.)
 ORDER III. **CENTROSPERMAE**

(For the continuation of the Synopsis of the Orders of *Choripetalae* see the beginning of the Group *Polypetalae*.)

While the apetalous Orders and Sub-Orders are usually regarded as an artificial group, it is doubtless true that they differ materially from the typical Choripetalae and that the herbs and trees belonging to this group are more primitive in respect to the flower than those belonging to groups with more specialized flowers. The flowers of this group are not only of very simple structure but in most cases the stamens are borne on one tree or plant while the pistils are borne on another.

Sub-Class I. CHORIPETALAE

Plants With Free Petals or With no Apparent Petals

Group I. APETALAE. Flowers without petals

Flowers without a corolla, often with no floral envelope, or with a very simple one. The group includes all the plants of the Order *Juliflorae*, the Order *Hysterophytes* and all but two Families in the Order *Centrospermae*. The special characters are shown in the descriptions of the Orders and Families.

Order I.—JULIFLORALES. Catkin-Bearing Trees and Herbs

Flowers individually quite inconspicuous, wanting the corolla and most frequently the calyx except in a rudimentary form. Flowers grouped in large numbers in catkin-like inflorescence or in fascicles. Stamens opposite to the divisions of the calyx, when a calyx is present.

The Order Juliflorales is divided into three Sub-Orders:

- 1st. Sub-Order, of which we have but a single species **Piperales**
- 2d. Sub-Order, the true catkin bearers, all trees and shrubs **Amentaceans**
- 3d. Sub-Order, the nettle group, all herbs except *Ulmus* **Urticaceans**

SUB-ORDER I.—PIPERALES. PIPERALES

Our only species an herb with long nodding spikes of flowers which bear both stamens and pistils, differing in this from catkins. The flowers have neither calyx nor corolla. Fruit a berry.

FAMILY I.—SAURURACEAE. LIZARD TAIL FAMILY

The characters of the family are included in the description of those of the Genus *Saururus*.

SAURURUS. L.

Flowers without a perianth or with a very rudimentary one. Stamens and pistils in the same flower; stamens 6 or 8 or less, long and white, giving to the spindle-shaped cluster of flowers the appearance of a fully developed spike of pure white flowers. Pistil of 2 or more ovary cells at base.

S. cernuus, L. (Fig. 1, pl. 22.) **LIZARD'S TAIL.** Herb, 2 to 3 ft. high, branching. Leaves egg-shaped, heart-shaped at base, with 5 to 9 distinct, nearly parallel veins; 2 to 6 in. long, 2 to 3½ in. wide, tapering at apex to a slender point. Spike of white flowers dense, 5 or 6 in. long, on a common flower-stem considerably longer. Swamps and wet borders of ponds or streams, southern half of our area and in central and western New York. June-Aug.

SUB-ORDER II.—AMENTACEAE. AMENT OR CATKIN BEARERS *

Stamens and pistils in different flower groups. Trees and shrubs. Inflorescence of staminate flowers always in catkins; pistillate flowers generally catkin-like. Flowers without a perianth or with a very rudimentary one. Leaves always well developed and always alternate.

Trees with compound leaves **Juglandaceae**

Trees with simple leaves.

Pistillate and staminate clusters on different trees **Salicaceae**

Pistillate and staminate clusters on the same tree.

Ovary 1-celled, 1-ovuled and 1-seeded in fruit **Myricaceae**

FAMILY I.—SALICACEAE. WILLOW FAMILY

Flowers all in catkins. Catkins with pistillate flowers not on the same tree with those with staminate flowers. A single flower consists of a cluster of stamens or cluster of pistils in the axil of a bract which is entire, tooth-like, or slit into strips. No perianth except a paddle-like projection in case of the willows and a somewhat cup-shaped disk at the base in poplars. Stamens, in willows 2 to 5, in poplars numerous. Some willows have permanent stipules to the leaves, others and the poplars have stipules which fall before the leaf acquires its growth. Fruit a pod (usually several attached to the axis of the catkin) with numerous seeds each furnished with a silky down.

* A catkin or ament consists of a group of apetalous flowers, each flower springing from the axil of a scale and all arranged spirally on an undividing stem or axis. The flowers of an individual group or catkin consist, generally, exclusively either of staminate or of pistillate flowers. The axis or stem of the catkin is not, for the staminate group, a complete continuation of the branch from which it grows, but is attached in the manner of a leaf and falls when its purpose is served. The staminate catkins are usually flexible, drooping dangles, while the pistillate aments are frequently erect.

Bracts at base of flowers not slit or divided **Salix**
 Bracts at base of flowers divided **Populus**

1. **SALIX**, (Tourn.) L.

Trees or shrubs, mostly along streams. Long slender flexible branches with, in most species, long narrow sharp pointed leaves, sharply toothed, or nearly entire. The aments—"pussys"—appear in early spring before the leaves.

1. *Catkins on short leafy branches; leaves all lance-shaped*

Stamens more than 2 in each axil

Trees from 15 to 50 or more ft. high.

Leaves very finely and closely notched around the entire border.

Leaves linear lance-shaped	<i>S. Wheeleri</i>
Leaves narrow lance-shaped	<i>S. nigra</i>
Leaves broad lance-shaped	<i>S. amygdaloides</i>
Leaves ovate-lance-shaped	<i>S. lucida</i>
Leaves elliptic lance-shaped	<i>S. serissima</i>

Stamens 2 only in each axil

Tall tree with reddish-green twigs *S. fragilis*

Tall tree with yellow twigs *S. alba*

Tall tree with very long slender green twigs *S. babylonica*

Leaves with distinct teeth (1/20 to 1/10 in. apart). Branching shrub, 2 to 10 ft. high.

Leaves narrow lance-shaped *S. longifolia*

Leaves broad lance-shaped or oblong *S. glaucophylla*

2. *Catkins lateral on the branches or at the terminals*

Stamens 2 in each axil

Small trees or shrubs 6 to 18 ft. high.

Leaves narrow lance-shaped, broadest near the apex *S. purpurea*

Leaves elliptic or lance-ovate.

Hairy above *S. Bebbiana*

Smooth green above, nearly white beneath, teeth minute or none *S. discolor*

Leaves oblong, firm, borders distinctly toothed, young branches densely hairy.

Bracts not as long as the individual flower pedicels *S. eriocephala*

Leaves as above, young branches not hairy, bracts as above *S. prinoides*

Bracts longer than the flower pedicels *S. squamata*

Leaves rather broad lance-shaped *S. sericea*

Shrubs 2 to 10 ft. high.

Leaves lance-shaped, scarcely notched.

Twigs not very hairy.

Leaves grayish, hairy beneath *S. humilis*

Leaves silvery with silky hairs beneath *S. viminalis*

Twigs very hairy, leaves oval *S. adenophylla*

Leaves narrow egg-shaped *S. coactilis*

Leaves heart-shaped at base *S. cordata*

Leaves elliptic or broad lance-shaped, tapering at base *S. phylicifolia*

Leaves ovate or oval, rounded at base *S. balsamifera*

Shrub 2 to 5 ft. high.

Leaves narrow lance-shaped or elliptic, white beneath *S. candida*

Shrubs 6 in. to 2 ft. high.

Leaves lance-shaped *S. tristis*

Leaves narrow elliptic, broadest toward the apex *S. argyrocarpa*

Leaves elliptic, tapering equally at both ends *S. myrtilloides*

Shrubs less than 1 ft. high.

Leaves pear-shaped, broadest toward apex *S. Uvu-ursi*

Leaves orbicular *S. herbacea*

1. **S. nigra**, Marsh. (Fig. 1, pl. 23.) **BLACK WILLOW**. Usually a small tree, 15 to 30 ft. high, but rarely reaching a much greater height. Leaves narrow lance-shaped, tapering sharply at both ends. Branches pale yellow; leaves deep green above, somewhat lighter below; leaf-



PLATE 22

1. *Saururus cernuus*. 2. *Salix lucida*. 3. *S. cordata*. 4. *S. Bebbiana*. 5. *S. Uva-ursi* 6. *herbacea*.

stalk rather short; stipules small and falling early; capsule ovoid, rather longer than its pedicel. Stamens 3 to 7. Along the banks of streams and lakes. Common.

2. *S. amygdaloides*, Anders. (Fig. 1, pl. 23a.) PEACH-LEAVED WILLOW. Tree, usually small but sometimes attaining a height of 70 ft. Leaves broad lance-shaped, tapering to a long delicate point at apex and to a more blunt point at base, pale beneath, dark green above, on a long leaf-stalk. Stipules very small and falling early. Capsule egg-shaped. Central and western New York, on banks of lakes and streams.

3. *S. lucida*, Muhl. (Fig. 2, pl. 22.) SHINING WILLOW. Shrub, 5 to 15 ft. high, rarely higher, with green or yellowish-brown, shining twigs. Leaves smooth and glossy on both sides, egg-shaped to lance-shaped; stipules small, oblong. Basal third of leaf an in. wide, tapering to a long slender point at apex, while at the base the taper is more abrupt. Stamens about 5. Along banks of streams. Common.

4. *S. serissima*, (Bailey). Fernald. (Fig. 2, pl. 23a.) LATE FRUITING WILLOW. Shrub, 13 ft., or less, high, with smooth shining brown twigs. Leaves elliptic-lance-shaped or lance-shaped, $\frac{1}{2}$ to 4 in. long, $\frac{1}{2}$ to $1\frac{1}{2}$ in. wide, finely toothed, tapering to a slender point. Leaf-stalks $\frac{1}{2}$ in. long, or less. Catkins borne at ends of short, leafy branches, the catkin stem and scales densely white silky. Staminate catkins nearly an in. long, loosely flowered. Bogs and wet meadows, Mass., New Jersey and New York. May-June.

5. *S. Wheeleri*, (Bowlee.) Rydb. WHEELER'S WILLOW. A low shrub with silky twigs and linear lance-shaped leaves 3 in. long or more, $\frac{1}{4}$ in. wide, densely white silky on both sides. Catkins borne at ends of short leafy branches. Sandy beaches, New York and northward. June-July.

Stamens 2 only, catkins on short branches (Figs. 1 and 2, pl. 23)

6. *S. fragilis*, L. (Fig. 3, pl. 23a.) CRACK WILLOW. BRITTLE WILLOW. Tree, 60 to 80 ft. high; twigs reddish green. Leaves lance-shaped, broad at basal third, green and shining, tapering to a long slender point at apex. Serrations fine. Capsule conic on a short pedicel. Escaped from cultivation, mostly in the southern section of our region.

7. *S. alba*, L. (Fig. 2, pl. 23.) WHITE WILLOW. Large tree with yellow twigs and very narrow lance-shaped, finely toothed leaves which taper to a slender point at both ends, green above or ashy gray, paler or silky white beneath. Stipules, when present, ovate lance-shaped. Capsule somewhat conic without a pedicel. Branches not drooping. Moist soil, frequent along borders of streams, common.

8. *S. babylonica*, L. WEeping WILLOW. A very large tree with long drooping and flexible green twigs. An ornamental tree well known and of well marked characteristics.

Stamens 2 in each axil; borders of leaves remotely notched

9. *S. longifolia*, Muhl. (Fig. 3, pl. 23.) RIVER-BANK WILLOW. (*S. fluriatilis*, Nutt.). Shrub, 2 to 10 ft. high, trunks growing in clumps. Leaves very narrow, $2\frac{1}{2}$ to 4 in. long, with remote teeth. Leaf-stalks very short. River banks, common.

10. *S. glaucophylla*, Bebb. (Fig. 4, pl. 23a.) BROAD-LEAVED WIL-



PLATE 23

1. *Salix nigra*. 2. *S. alba*. 3. *S. longifolia*. 4. *S. sericea*.

low. Shrub about as high as the last. Leaves dark green, shining above, whitish below, *broad* lance-shaped, $2\frac{1}{2}$ in. long, toothed; stipules ear-shaped, rather large, persistent. Catkins leafy at base. Dry soil, Maine and northward.

11. *S. purpurea*, L. (Fig. 5, pl. 23a.) PURPLE WILLOW. A small tree, escaped from cultivation and seen only rarely as a naturalized species. Twigs flexible, long, purple. Leaves lance-shaped but broadest toward the apex. The stamens may be 2 in each axil or their different filaments may be so united as to form a single stamen. The capsules in the pistillate flowers are sessile, *i. e.*, they have no pedicel or an extremely short one.

12. *S. Bebbiana*, Sarg. (Fig. 4, pl. 22.) BEBB'S WILLOW. (*S. rostrata*, Richards.) Small tree or shrub, 8 to 15 ft. Twigs covered with soft down. Leaves egg-shaped, or generally broadest toward the apex (pear-shaped), 2 to 3 in. long, dull green above, blue or white below; borders scarcely notched but uneven, upper surface rather deeply and irregularly reticulated between the principal veins. Pistillate flowers, the pedicel of the capsule as long as the capsule itself. Moist or dry soil, common.

13. *S. discolor*, Muhl. (Fig. 6, pl. 23a.) GLAUCUS WILLOW. PUSSY WILLOW. Generally a shrub, but sometimes a small tree. Twigs dark reddish purple with silky hairs. Leaves broad lance-shaped or oblong, often broadest toward the apex, 3 to 5 in. long; notches remote; bright green above, smooth and nearly white beneath. Catkins appear much earlier than the leaves. The pedicel of the capsule of pistillate flower about $\frac{1}{4}$ to $\frac{1}{3}$ as long as the capsule and style together. Capsule downy. Borders of streams, common.

14. *S. eriocephala*, Michx. PUSSY WILLOW. Leaves firm, oblong, the borders distinctly toothed; young branches densely hairy. Catkins short and dense. Wet places, New England to Penna. and westward.

15. *S. prinoides*, Pursh. CHESTNUT OAK WILLOW. Resembles the last but young branches are not hairy and catkins are long and loose. New York to Virginia.

16. *S. squamata*, Rydb. LONG-BRACTED WILLOW. Resembles *S. eriocephala* but young branches are less hairy, bracts at base of individual flowers are longer than the flower pedicel. New Jersey and Pennsylvania.

17. *S. sericea*, Marsh. (Fig. 4, pl. 23.) SILKY WILLOW. Shrub, rarely 10 ft. high, but sometimes about 12 ft. Twigs slender, with fine silky hairs. Leaves 2 to 4 in. long, narrow lance-shaped, tapering at both ends but somewhat broader toward the base than toward the apex. Notches fine and even. Pedicel of capsule less than $\frac{1}{4}$ as long as capsule and style. Capsule downy. Wet places, borders of streams.

18. *S. humilis*, Marsh. (Fig. 7, pl. 23a.) PRAIRIE WILLOW. Shrub 3 to 8 ft. high, with rather broad lance-shaped leaves, the lower even egg-shaped, in general broadest toward the apex, 2 to 4 in. long; borders only slightly toothed, upper surface dull green, lower gray with hairs. Pedicel of capsule about $\frac{1}{2}$ as long as capsule and style. Dry soil.

19. *S. viminalis*, L. (Fig. 8, pl. 23a.) OSIER WILLOW. Shrub, often cultivated in rows in low grounds for basket work. Introduced and only

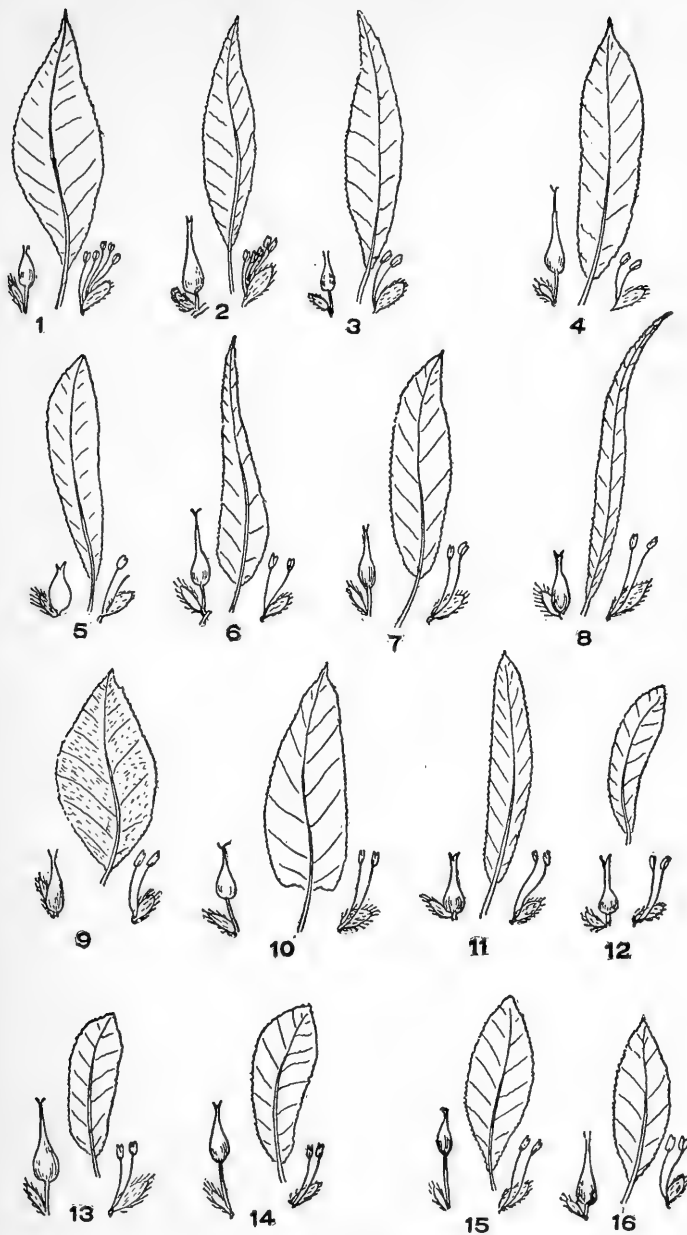


PLATE 23a

1. *Salix amygdaloides*. 2. *S. serissima*. 3. *S. fragilis*. 4. *S. glaucophylla*.
 5. *S. purpurea*. 6. *S. discolor*. 7. *S. humilis*. 8. *S. viminalis*. 9. *S. adeno-*
phylla. 10. *S. balsamifera*. 11. *S. candida*. 12. *S. tristis*. 13. *S. myrti-*
loides. 14. *S. argyrocarpa*. 15. *S. coactilis*. 16. *S. phyllicifolia*.

rarely escaped. Twigs very slender, green, flexible. Leaves linear lance-shaped, tapering about equally toward both ends; 3 to 6 in. long; borders scarcely toothed or notched, smooth, dark green above, silver white and silky beneath. Pedicel of capsule wanting or very short.

20. *S. adenophylla*, Hook. (Fig. 9, pl. 23a.) FURRY WILLOW. Shrub 3 to 9 ft. high, with broadly lance-shaped or egg-shaped leaves. The twigs, leaves and stipules clothed, even when the leaves are fully grown, with a dense covering of long silky hairs. Leaves 1 to 2 in. long, sharply pointed at apex, rounded at base, with close and fine serrations at the borders. Stipules heart-shaped at base, conspicuous. Catkins long, densely flowered. Lake and river shores, throughout our region.

21. *S. cordata*, Muhl. (Fig. 3, pl. 22.) HEART-LEAVED WILLOW. Shrub 5 ft. or more high, rarely 10 or 12 ft. high. Leaves broad lance-shaped, often heart-shaped at base, $1\frac{1}{2}$ to 3 in. long, sparingly or not at all notched, both upper and lower surface nearly green. Pedicel of capsule less than $\frac{1}{4}$ the length of capsule and style. In wet soil, common.

22. *S. phylicifolia*, L. (Fig. 16, pl. 23a.) TEA-LEAVED WILLOW. Shrub, 1 to 10 ft. high; leaves broad lance-shaped or elliptic, tapering nearly alike at both ends; smooth both sides, the lower lighter in color than the upper, $1\frac{1}{2}$ to 3 in. long. Pedicel of capsule very short. Moist ravines toward the summit of the White Mountains.

23. *S. balsamifera*, Barratt. (Fig. 10, pl. 23a.) BALSAM WILLOW. Shrub with egg-shaped leaves rounded or somewhat heart-shaped at base, 2 to 3 in. long. Pedicel of capsule about as long as capsule and style. Swamps in the northern section of our region.

24. *S. candida*, Fluegge. (Fig. 11, pl. 23a.) HOARY WILLOW. Small shrub, 2 to 5 ft. high. Young twigs white, hairy, later becoming red or purple. Leaves with smooth borders or sparingly toothed, narrow or elliptic-lance-shaped, persistently white and silky beneath, green and somewhat silky above, 2 to 4 in. long. Pedicel of capsule very short. In swamps, most of our area.

25. *S. tristis*, Ait. (Fig. 12, pl. 23a.) SAGE WILLOW. Shrub 1 to 2 ft. high. Twigs hairy. Leaves lance-shaped, broadest toward apex; borders smooth, white silky beneath, light green above, 1 to 2 in. long. Catkins with few flowers. Pedicel of capsule about $\frac{1}{3}$ the length of capsule and style. Dry soil, our area.

26. *S. coactilis*, Fernald. (Fig. 15, pl. 23a.) Large shrub with coarse branchlets, the younger downy. Leaves oblong or narrow egg-shaped, remotely toothed, with lustrous reddish-white down at first, later velvety. Stipules half-egg-shaped, persistent. Banks of Penobscot river, Maine.

27. *S. argyrocarpa*, Anders. (Fig. 14, pl. 23a.) SILVER WILLOW. Diffuse shrub, $\frac{1}{2}$ to 2 ft. high. Twigs shining. Leaves 1 to 2 in. long, oblong and widest toward the apex, white silky beneath, bright green above. Catkins few flowered. Pedicel as long as the silvery capsule and the style. On the White Mountains.

28. *S. myrtilloides*, L. (Fig. 13, pl. 23a.) BOG WILLOW. Shrub 1 to 3 ft. high. Twigs brown. Leaves elliptic or egg-shaped, 1 to 2 in. long, tapering nearly equally toward each end. Apex obtuse or somewhat

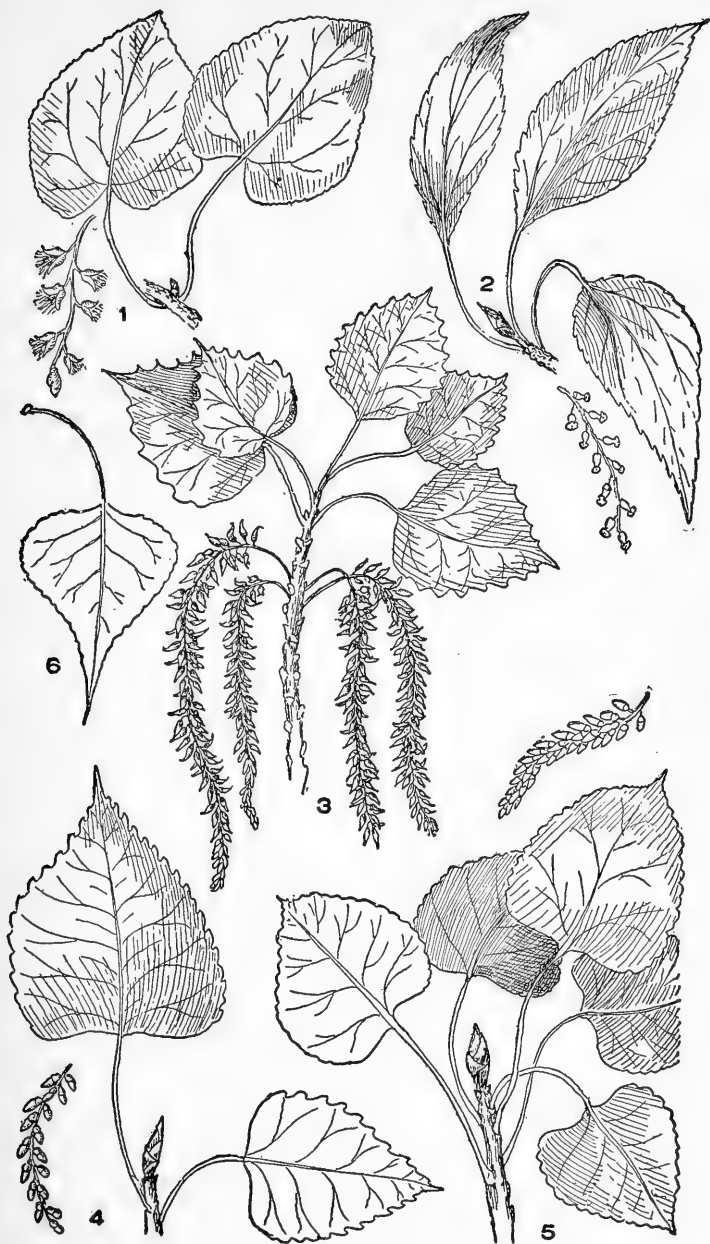


PLATE 24

1. *Populus heterophylla*. 2. *P. balsamifera*. 3. *P. alba*. 4. *P. grandidentata*. 5. *P. tremuloides*. 6. *P. deltoides*.

pointed, border without notches or teeth, bright green above, pale beneath. Pedicel of capsule more than $\frac{1}{2}$ as long as capsule and style. Bogs, throughout our area.

29. *S. herbacea*, L. (Fig. 6, pl. 22.) DWARF WILLOW. Prostrate matted shrub with rounded leaves and catkins with few flowers. Height from 1 to 6 in. On the summits of the White Mountains.

One stamen only in the axil of the bract or rarely two

30. *S. Uva-ursi*, Pursh. (Fig. 5, pl. 22.) BEARBERRY WILLOW. A prostrate herb-like shrub, generally less than 6 in. high, with crooked stems and egg-shaped or elliptic leaves, which are generally less than $\frac{1}{2}$ in. long and $\frac{1}{2}$ or $\frac{1}{3}$ as wide, broadest toward apex, slightly toothed. Catkins on lateral leafy bases, the pistillate becoming quite long. On the summits of the White Mountains and Adirondacks.

2. POPULUS, L.

Pistillate and staminate catkins on different trees. Each staminate group containing from 8 to 30 stamens. *Bract at base of stamens slit.* Buds without hairs, scaly, resinous. Leaves on long slender leaf-stalks, broad, heart-shaped or oval. Catkins long and drooping. Large trees with soft wood.

Leaves permanently covered beneath by a dense, white, silky coat . . . *P. alba*
Leaves usually only when young covered beneath by a dense silky coat . . . *P. heterophylla*

Leaves never covered by dense white coat.

Leaves narrowly egg-shaped, with rounded leaf-stalks . . . *P. balsamifera*

Leaves broadly egg-shaped, with leaf-stalks flattened laterally.

Borders coarsely and deeply toothed . . . *P. grandidentata*

Borders finely toothed, leaves short-pointed at the apex . . . *P. tremuloides*

Leaves with long and slender points.

Bases often rounded in . . . *P. nigra*

Bases generally rounded out . . . *P. deltoides*

1. *P. alba*, L. (Fig. 3, pl. 24.) WHITE POPLAR. SILVER-LEAF POPLAR. Large tree. Leaves somewhat obliquely 4-sided (rhombic) with deep sinuous cuttings. Under surface of leaves permanently covered by a dense, white, silky coat. March-May.

2. *P. heterophylla*, L. (Fig. 1, pl. 24.) SWAMP OR DOWNY POPLAR. Large tree. Leaves egg-shaped with, usually, a somewhat heart-shaped base. When young the leaves are covered beneath by a white silky coat which usually disappears as the leaf matures. In moist places mostly in the southern half of our area. April-May.

3. *P. balsamifera*, L. (Fig. 2, pl. 24.) BALSAM POPLAR. Large tree. Buds large and varnished, shining, resinous. Leaves broadly egg-shaped, finely notched at borders, smooth, shining above and beneath. Leaf-stalks round.

Var. *P. balsamifera candicans*, Gray, is the Balm of Gilead tree common in cultivation. *P. balsamifera* is found throughout our area. April.

4. *P. grandidentata*, Michx. (Fig. 4, pl. 24.) LARGE TOOTHED ASPEN. Leaves rounded-egg-shaped, sharply tapering at apex, with very conspicuous, irregular teeth. Bark rather smooth, greenish. Leaves at extremities of branches only. Rich woods throughout our region. April.

5. *P. tremuloides*, Michx. (Fig. 5, pl. 24.) AMERICAN ASPEN. WHITE POPLAR. Leaves rounded, heart-shaped at base, sharply tapering

at apex. Teeth not large. Leaf-stalks longer than the leaves and flattened laterally. A slender tree, very common throughout our area. March-May.

6. *P. nigra*, L. BLACK POPLAR. Leaves almost triangular (deltoid), tapering to a slender point at the apex. When young the leaves are somewhat silky. Base of leaf bluntly rounded, sometimes rounded in. A large tree, naturalized, found in the Hudson and Delaware Valleys. April-May.

7. *P. deltoides*, Marsh. (Fig. 6, pl. 24.) COTTONWOOD. Leaves broadly triangular (deltoid), abruptly pointed at apex, generally rounded out at the base. Leaf-stalk about as long as the leaf-blade. Along streams, throughout our region. March-May.

P. pyramidalis, Rosier. LOMBARDY POPLAR, with its broad, deltoid leaves and erect branches, is found wild occasionally.

FAMILY II.—MYRICACEAE. BAYBERRY FAMILY

Shrubs with alternate leaves which are aromatic. Catkins, small and erect, both pistillate and staminate flowers found on the same plant or one form only on a single plant. In the aments a single flower only is found at the axil of a bract. Staminate flower consists, usually, of 4 to 6 stamens, the filaments somewhat united. Each pistillate flower subtended by 2 to several bractlets. Ovary 1-celled; fruit a small berry-like nut.

I. MYRICA, L.

Shrubs with pear-shaped leaves, broadest at the apex, or with linear lance-shaped leaves. After the fall of the catkins the branches of some species bear an abundance of whitish, waxy, berry-like nuts.

1. *M. Gale*, L. (Fig. 7, pl. 25.) SWEET GALE. Leaves pear-shaped, about 4 times as long as broad. Toward the apex the leaves are notched while the basal half of the border is generally smooth. Common at the borders of streams, ponds and swamps. April-May.

2. *M. carolinensis*, Mill. (Fig. 8, pl. 25.) WAXBERRY. Shrub, rather larger than the preceding (2 to 8 ft. high). Leaves similar to No. 1, but without teeth at the borders. Berries very numerous, light grayish-white, waxy to the touch. In early times in this country these berries furnished an important supply of wax to the settlers. In sandy soil, moist or dry. April-May.

3. *M. asplenifolia*, L. (Fig. 5, pl. 25.) SWEET FERN. (*Comptonia perigrina*, Coulter.) Shrub, 1 to 2 ft. high, very leafy, the leaves and stems decidedly aromatic. Leaves linear-lance-shaped, the borders cut into a number of shallow lobes giving the leaves a fern-like appearance. Stipules half heart-shaped. The pistillate aments at the leaf axils have a bur-like appearance, the staminate aments dangle from the ends of the branches. Dry hillsides and sterile soil, frequent in our region.

FAMILY III.—JUGLANDACEAE. WALNUT FAMILY

Trees, the leaves of which are alternate and each consisting of several leaflets (compound leaves). Stipules none. Flowers in simple catkins or, in case of the pistillate flowers, solitary or in a group of several at the end of a shoot of the season. Perianth formed on the typical plan of 4 lobes for the pistillate flowers and 3 to 6 for the staminate ones.

Fruit a hard nut, rounded or egg-shaped, the woody husk or case enclosing a hard nut within which is the oily *meat* or seed.

Staminate catkins single	Juglans
Staminate catkins in 3s	Carya

1. JUGLANS, L.

Compound, pinnate, leaves, the leaflets arranged opposite along the main leaf stalk, except the terminal leaflet which is alone. Staminate flowers in long drooping cylindric catkins, *which hang singly*. Fertile flowers in small cluster or solitary.

1. **J. cinerea**, L. (Fig. 3, pl. 25.) BUTTERNUT. Leaflets 7 to 16 pairs with an odd one, narrow egg-shaped or oblong lance-shaped; pointed at apex, notched borders, rounded at base; smooth above, soft hairy beneath. Fruit a long egg-shaped nut, the woody case being roughened by irregular deep ridges, the kernel double and irregular. Nut occurs singly or in groups of 2 to 4. A broad tree well known for its oily nuts. Bark light gray, not rough. April-May.

2. **J. nigra**, L. (Fig. 1, pl. 25.) BLACK WALNUT. Leaflets 7 to 11 pairs and an odd one, resembling those of former species but more tapering at apex and somewhat heart-shaped at base. Smooth above, somewhat downy beneath. Fruit spherical, outer husk roughly dotted, woody shell corrugated. Bark brown, rough. A large tree. April-May.

2. CARYA, Nutt. (*Hicoria*, Raf.)

Trees, often very large (80 to 120 ft. high), with pinnately compound leaves, resembling the former genus. The staminate *catkins which, in Juglans are single, are in Carya in clusters of 3's*. Fruit spherical to oblong, consisting of a woody husk, a hard shell within this and an irregular kernel or seed within the shell of the nut. The number of leaflets varies in different species, being few in Nos. 5 and 6, and numerous (7 to 13) in the other species.

1. **C. cordiformis**, (Wang.) K. Koch. BITTER NUT. SWAMP HICKORY. Leaflets 7 to 9, 3 to 6 in. long. Fruit sub-globose, *husk narrowly 6 ridged*, splitting tardily into 4 valves. *Nut not angled*, white, 1 in. long. Kernel bitter. Moist woods, swamps, throughout our region.

2. **C. ovata**, Mill. (Fig. 4, pl. 25.) SHAG-BARK HICKORY. Bark shaggy. Leaflets 5, rarely 7, oblong, 4 to 6 in. long. Fruit sub-globose 1½ to 2½ in. long. Husk splitting early into 4 valves; nut white, *angular*, pointed. Kernel sweet. New England and westward.

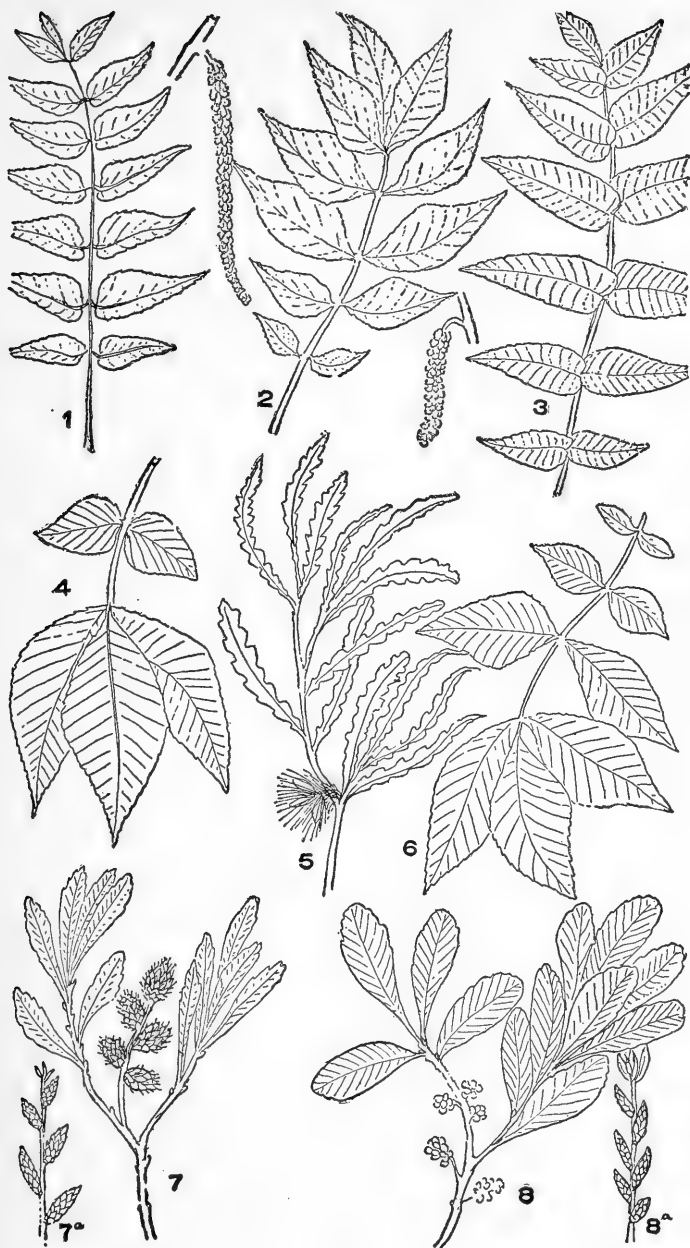


PLATE 25

1. *Juglans nigra*. 2. *Carya alba*. 3. *Juglans cinerea*. 4. *Carya ovata*. 5. *Myrica asplenifolia*. 6. *Carya laciniosa*. 7. *Myrica Gale*, with pistillate catkins. 7a. Staminate catkins. 8. *M. carolinensis*. 8a.

3. *C. laciniosa*, Michx. (Fig. 6, pl. 25.) BIG SHAG-BARK. KING NUT. Bark less shaggy. Leaflets, 7 to 9 (rarely 5), 8 in. long by 5 in. wide. Fruit 2 to 3 in. long, oblong, splitting early. Nut angular, large ($1\frac{1}{4}$ to 2 in. long), pointed at both ends, yellowish-white. Kernel sweet. Central New York, Penna., and southward.

4. *C. alba*, L. (Fig. 2, pl. 25.) WHITE HEART HICKORY. MOCKER NUT. Bark not shaggy but rough. Leaflets 7 to 9, persistently covered with soft hairs. Fruit globose $1\frac{1}{2}$ to $3\frac{1}{2}$ in. long, husk very thick and hard. Nut globose, not compressed at sides, 4 ridged, angled, pointed at summit. Kernel sweet. East Mass., northward and westward.

5. *C. microcarpa*, Nutt. SMALL-FRUITED HICKORY. Bark close but rough. Leaflets 5 to 7, oblong, $3\frac{1}{2}$ to 5 in. long, not hairy. Fruit small (less than 1 in. long), globose, husk thin, splitting imperfectly toward the base. Nut globose, small, slightly compressed, not angular. Kernel sweet. East Mass., and southward.

6. *C. glabra*, Mill. PIG NUT. BROWN HICKORY. Bark close, not shaggy. Leaflets 5 to 7, oblong, widest at apex. Fruit top-shaped, the apex pointed. Nut brown, sharp pointed, thick shelled. Kernel bitter. Throughout our area.

SUB-ORDER III.—FAGALES. THE BEECH TRIBE

Trees or shrubs with simple alternate leaves, the borders of which are generally notched or lobed, with leaf stems. Flowers of two forms almost always on the same tree. The staminate flowers always in catkins, in *Castanea* and the oaks they are arranged in interrupted clusters on the catkin. In *Fagus* they are in a single cluster. The stamens are arranged in groups of 1 to 20 in the axil of a bract or attached to the receptacle. The pistillate flowers in catkins in *Betulaceae*, in small groups in *Fagaceae*. Fruit a nut.

Pistillate flowers in a short more or less erect catkin or when

not in a catkin the involucre at the base of the group without spines, consisting of leaf-like, generally divided,

bracts **Betulaceae**

Pistillate flowers never in catkins, the pistillate involucre

forming a small cup containing one or more flowers

. **Fagaceae**

FAMILY I.—BETULACEAE. THE BIRCH FAMILY

The birches and alders have the pistillate flowers in short erect catkins. In *Carpinus* and *Ostrya* they are arranged in a leafy



PLATE 26

1. *Carpinus caroliniana*. 1a. Single bract with nut at base. 2. *Ostrya virginiana*. 3. *Castanea dentata*. 4. *Corylus rostrata*. 5. Nut of *C. americana*. 6. *Fagus americana*. 6a. Cluster of staminate flowers.

hop-like group of bracts, while in *Corylus* the bracts form a much divided fringe-like collar which encloses the oval nut.

Pistillate flowers not in catkins.

Bract of the involucre halberd-shaped **Carpinus**

Bract of the involucre pointed, oval **Ostrya**

Bracts of the involucre much incised **Corylus**

Pistillate flowers in catkins.

Scales of pistillate flowers falling early . . . **Betula**

Scales persistent **Alnus**

1. CARPINUS, L.

Small tree with smooth gray bark and very compact wood. Stems furrowed. Staminate catkins long, drooping and scaly. Pistillate, two flowers to each leaf-like bract, the latter in a spiral around a prolonged stem. Nut small ovoid.

C. caroliniana, Walt. (Fig. 1, pl. 26.) AMERICAN HORNBEAM. BLUE BEECH. A small tree, generally growing under the protecting cover of larger trees. Leaves long ovate with sharp notches, the teeth extending to the spine. Terminal spine very acute. In shady and damp places, throughout our area. April-May.

2. OSTRYA, Scop.

Small tree, in general resembling the hornbeam. The leaves are less prolonged and the cluster of fertile flowers and fruit resembles an elongated hop flower.

O. virginiana, (Mills.) Willd. (Fig. 2, pl. 26.) HOP HORNBEAM. IRONWOOD. Staminate flowers scaly, the scales extending to the branch. Nut oblong ovoid, small. In dryer places than *Carpinus*.

3. CORYLUS, L.

Shrubs with broad leaves, staminate flowers in a scaly catkin, scales reaching the branch, expanding before the leaves. Pistillate flowers in small groups also appearing before the leaves. The involucre surrounding the seed becomes a strong rough envelope to the seed or nut.

1. **C. americana**, Walt. (Fig. 5, pl. 26.) HAZEL NUT. Leaves broad, rounded, with rather fine serrations. The involucre large and spreading with deeply lacinated borders. Throughout our area.

2. **C. rostrata**, Ait. (Fig. 4, pl. 26.) BEAKED HAZEL NUT. Leaves less round than the previous species, extremity narrowly pointed, serrations coarse. The involucre of the nut contracts to a long narrow neck and is covered with hairs. Throughout our area.

4. BETULA, L.

Trees and shrubs, outer bark generally in layers of horizontal fibers. Bark and young twigs aromatic. Both kinds of flowers expand before the leaves. Staminate catkins drooping, each scale covering 3 flowers.



PLATE 27

1. *Betula lenta*. 2. *B. populifolia*. 3. *B. nigra*. 4. *B. glandulosa*. 5. *Alnus crispa*. 6. *A. rugosa*.

Pistillate catkins erect or spreading, scales each covering 3 flowers in the axis.

Trees.

Bark white or yellowish-white.

Leaves deltoid.

Green

B. *populifolia*

B. *coerulea*

Leaves egg-shaped B. *papyrifera*

Bark brown or greenish-brown.

Pistillate catkin with a stem B. *nigra*

Pistillate catkin stemless or nearly so.

Bark dark brown B. *lenta*

Bark yellowish or greenish-brown.

Twigs not silky B. *lutea*

Twigs quite silky P. *alleghaniensis*

Shrubs.

Young branchlets dotted with wart-like glands B. *glandulosa*

Young branchlets not glandular B. *pumila*

1. **B. populifolia**, Marsh. (Fig. 2, pl. 27.) AMERICAN WHITE BIRCH. Tree, from 15 to 30 ft. high. Bark smooth and white. Twigs brown. Leaves triangular with the free point very slender. Smooth and shining both sides, tremulous. Mostly in damp places but grows in dry soil, most of our area.

2. **B. coerulea**, Blanchard. BLUE BIRCH. Larger than No. 1. Foliage bluish-green; young shoots warty. Leaves egg-shaped to deltoid on long leaf-stalks, irregularly and sharply toothed; base of leaf nearly straight across, apex tapering to a long narrow point, both surfaces smooth. Woods, Vermont. May.

3. **B. papyrifera**, Marsh. PAPER or CANOE BIRCH. Tree, 50 to 65 ft. high; bark white, splitting into layers. Leaves egg-shaped to heart-shaped, free point less tapering than in No. 1, pale above, somewhat dotted below, double serrations with petiole about $\frac{1}{3}$ length of leaf. Rich woods and wet places, throughout our range.

4. **B. nigra**, L. (Fig. 3, pl. 27.) RIVER BIRCH. RED BIRCH. Tree, 50 to 75 ft. high; bark greenish-brown, peeling in very thin layers. Leaves rhombic ovate, tapering at each end, serrations irregular, the larger serrations including several of the smaller, smooth and deep green above, light below. Banks of streams and lakes, east Mass., southward.

5. **B. lenta**, L. (Fig. 1, pl. 27.) CHERRY BIRCH. SWEET BIRCH. BLACK BIRCH. Tree 50 to 70 ft. high; bark dark brown, not separating into layers like No. 3. Twigs very aromatic. Leaves egg-shaped, sometimes heart-shaped; doubly serrate, serrations generally regular, bright green above, veins beneath dull green. Rich woods, our range.

6. **B. lutea**, Michx. YELLOW BIRCH. GRAY BIRCH. Tallest of the birches. Bark yellowish or gray; not always separable into layers; twigs less aromatic than No. 4; leaves ovate or long-ovate, generally with tapering points, dull green above, downy on the veins beneath. Rich moist woods, our range.

7. **B. alleghaniensis**, Britton. SOUTHERN YELLOW BIRCH. Resembles *B. lutea*. Young twigs downy with long hairs. Leaves egg-shaped, tapering, 5 in. long, coarsely and sharply toothed, heart-shaped at base or rounded, dark green above, yellow-green and more or less downy beneath, especially on the veins. Leaf-stalks downy $\frac{1}{2}$ in. long. Stamen bearing catkins about $2\frac{1}{2}$ in. long. Mass., northward.

8. *B. pumila*, L. LOW BIRCH. Shrub, 2 to 15 ft. high. Young twigs and leaves quite downy; leaves pear-shaped, or round, serrations coarse, single and regular. In bogs.

9. *B. glandulosa*, Michx. (Fig. 4, pl. 27.) DWARF BIRCH. A prostrate or erect shrubby plant, 1 to 2 ft. high. On elevations of White Mountains, 4 to 6 inches. Leaves orbicular or somewhat egg-shaped. Smooth and dark green both sides. Branchlets dotted with glands. Found on high mountains in New York, Maine, New Hampshire, etc.

5. ALNUS, Gaertn.

Small trees or shrubs. Like the birches, the catkins of the staminate flowers are long and pendulous, while those of the pistillate flowers are erect, both kinds expand before or with the leaves. The bark is dark brown, in old trees grayish. Leaves alternate, egg-shaped, toothed, dark green.

Flowers appearing *with* the leaves.

Twigs not downy *A. crispa*

Twigs downy.

Leaves blunt at both ends *A. mollis*

Flowers appearing *before* the leaves.

Leaves broadest at base *A. incana*

Leaves broadest at outer-half *A. rugosa*

Leaves acute at both ends *A. Noveboracensis*

1. *A. crispa*, Pursh. (Fig. 5, pl. 27.) GREEN OR MOUNTAIN ALDER. (*A. Alnobetula*, Koch?). Low shrub, 2 to 8 ft. high. Leaves oval or egg-shaped, when young more or less downy, teeth small and regular, in single series, when older the upper surface dark green and lower light green with pubescence on veins. Leaves and catkins expand together. On high mountains and along cold streams. New York and New England and southward.

2. *A. mollis*, Fernald. HAIRY GREEN ALDER. More downy than No. 1, the under surface of leaves often densely hairy. Otherwise in general similar to No. 1. New York, westward and northward. May-June.

3. *A. incana*, Willd. SPECKLED OR HOARY ALDER. Shrub, or small tree, 8 to 25 ft. high. Leaves more broadly oval than No. 1, dentation generally double, dark green above, whitish beneath. Borders of streams and swamps.

4. *A. rugosa*, Koch. (Fig. 6, pl. 27.) SMOOTH ALDER. (*A. serulata*, Willd.). Shrub or tree reaching height of 30 ft. or more. Leaves tapering at base, broad at upper third and rounded at apex, serrations double, deep green above and below. Forms thick masses of growth along streams or in wet soil.

5. *A. Noveboracensis*, Britton. NEW YORK ALDER. Shrub or small tree. Young twigs and leaf-stalks densely downy. Leaves oblong to pear-shaped, acute at both ends, $4\frac{1}{2}$ in. long or less, sharply and irregularly toothed, densely downy on the veins beneath. Woods and thickets near the coast, southeastern New York.

FAMILY II.—FAGACEAE. THE BEECH FAMILY

Trees and shrubs with alternate leaves and with small flowers,

the staminate on drooping catkins or in heads, the pistillate enclosed in a little leafy perianth which finally becomes the bur in *Fagus* and *Castanea* and the cup in *Quercus*. Fruit, one or more nuts, each enclosed in a woody shell.

Fruit surrounded by a prickly bur.

Nuts triangular **Fagus**

Nuts rounded **Castanea**

Fruit subtended by a woody cup **Quercus**

1. FAGUS, L.

Trees with smooth light gray bark, widely branching. Leaves alternate. Staminate flowers on a slender peduncle, only the terminal flower being developed. Pistillate flowers, two together, surrounded by an involucre which, at maturity is composed of 4 valves, which open to permit the falling of the fruit.

F. americana, Sweet. (Fig. 6, pl. 26.) AMERICAN BEECH. (*F. grandifolia*, Ehrh.). A handsome forest tree with rounded aborescence, leaves long egg-shaped with conspicuous and regular serrations. The bur contains two 3-angled nuts which are pleasant to the taste. Throughout our area. April-May.

2. CASTANEA, Hill

Tall, profusely branching tree, with long egg-shaped leaves with coarse serrations. Staminate flowers in pendulous interrupted catkins. Pistillate flowers 3 to 5 together in a little cup which becomes at maturity the prickly bur.

1. *C. dentata*, (Marsh.) Borkh. (Fig. 3, pl. 26.) AMERICAN CHESTNUT. A forest tree, sometimes 100 ft. high. Leaves 5 to 12 in. long. Nuts 1 or more in each bur. In most of our region. June-July.

2. *C. pumila*, (L.) Mill. CHINQUAPIN. A tree usually not as large as No. 1, and sometimes a shrub. Leaves 3 to 6 in. long, sharply toothed, the teeth narrow, almost spiny. The staminate catkin is continuous, not interrupted at lower part as is the case with that of *C. dentata*. Bur smaller than that of No. 1. New Jersey, Penna., and south. June.

3. QUERCUS, L.

Trees and shrubs with leaves deeply lobed or entire. The flowers appear before the leaves, the staminate in drooping catkins with interrupted groups of stamens, each group containing from 5 to 9 members (Fig. 8, pl. 28). Pistillate flowers solitary, each surrounded by an oblong involucre or calyx. The inner bracts of the involucre unite to form a cup in which is developed the oval-shaped nut or acorn.

Trees

Leaves not lobed or conspicuously toothed.

Hairy gray beneath *Q. imbricaria*

Not hairy gray beneath *Q. phellos*

Leaves not lobed, but with deep serrations.

Leaves lance-shaped, about 4 times as long as broad . . . *Q. Muhlenbergii*



PLATE 28

1. *Quercus palustris*. 2. *Q. macrocarpa*. 3. *Q. ilicifolia*. 4. *Q. alba*.
 5. *Q. rubra*. 6. *Q. stellata*. 7. Catkin of *Quercus*. 8. Stamens. 9. A pistillate flower,

- Leaves egg-shaped or pear-shaped.
 Cup deep *Q. prinus*
 Cup shallow *Q. Michauxii*
 Leaves pear-shaped, cup shallow *Q. Alexandrii*
 Leaves all deeply lobed.
 Leaves tipped, each with a conspicuous bristle.
 Dull green above, pale beneath *Q. rubra*
 Shining above, green beneath.
 Cup covering $\frac{1}{2}$ the nut *Q. palustris*
 Cup covering $\frac{1}{2}$ the nut *Q. coccinea*
 Cup covering more than $\frac{1}{2}$ the nut.
 Inner bark orange *Q. velutina*
 Inner bark gray or reddish *Q. borealis*
 Leaves green above, gray beneath, lobes lance-shaped *Q. falcata*
 Leaves green above, gray beneath, lobes triangular *Q. ilicifolia*
 Leaves green above, brown beneath *Q. marylandica*
 Leaves not tipped with bristles.
 Deep green beneath *Q. alba*
 Dark brown beneath *Q. stellata*
 White and silky beneath.
 Acorn nearly covered by cup *Q. lyrata*
 Acorn $\frac{2}{3}$ covered, border of cup fringed *Q. macrocarpa*
 Acorn $\frac{1}{2}$ covered by cup, leaves not usually deeply lobed *Q. bicolor*

Shrub

- Leaves oval, coarsely toothed *Q. prinoides*

1. *Q. rubra*, L. (Fig. 5, pl. 28.) RED OAK. Tall forest tree. Leaves in general outline oval but cut into lobes by deep rounded sinuses, the lobes triangular. Main lobes number about 5. Cup, saucer-shaped, arising from a short stalk, covering about $\frac{1}{3}$ of the acorn. Bark dark gray. Common.

Var. *borealis*, Michx. GRAY OAK. Large tree with leaves similar to those of *Q. rubra*. Cup hemispheric, on a short stem covering $\frac{1}{2}$ the nut, its bracts triangular. Leaves deeply 7 to 13 lobed, lustrous deep green above, dull, paler beneath. Penna., New York and northward.

2. *Q. palustris*, Muench. (Fig. 1, pl. 28.) SWAMP OAK. PIN OAK. Tall forest tree, growing mostly in moist or wet places. Cup shallow saucer-shaped, covering about $\frac{1}{2}$ or less of the mature acorn. Leaves in general outline broadest at outer third, with very deep sinuses which are quite broad, main lobes about 5, each terminated by several sharp points. Bark dark gray. Low grounds, Mass., southward.

3. *Q. coccinea*, Muench. (Fig. 1, pl. 29.) SCARLET OAK. Tall tree, cup top-shaped and covering more than $\frac{1}{2}$ the somewhat elongated acorn. Leaves in outline oval. Sinuses very deep and more angular than in the preceding species; lobes sharply angled, about as many as in No. 1 and No. 2. Bark gray, inner bark reddish. Dry soil in our area.

4. *Q. velutina*, Lam. (Fig. 6, pl. 29.) BLACK OAK. QUERCITRON. Tall forest tree, cup less top-shaped than No. 3 and covering only $\frac{1}{2}$ the mature acorn. Leaves with rounded sinuses, lobes about 7 often extending to the middle. Bark dark gray, inner bark reddish or orange.

5. *Q. falcata*, Michx. (Fig. 2, pl. 29.) SPANISH OAK. (*Q. digitata*, (Marsh.) Sudw.). Tall tree. Leaves with sharp lobes and angular sinuses. Lobes about 7 but often reduced to 4 or 3; dark green and smooth above, silky gray beneath. Acorn globular, cup nearly half surrounding it. Bark dark brown. New Jersey and southward. Rare in our region.

6. *Q. ilicifolia*, Wang. (Fig. 3, pl. 28.) BEAR OR SCRUB OAK. (*Q. nana*, Sarg.). Shrub or small tree, often growing in dense thickets.

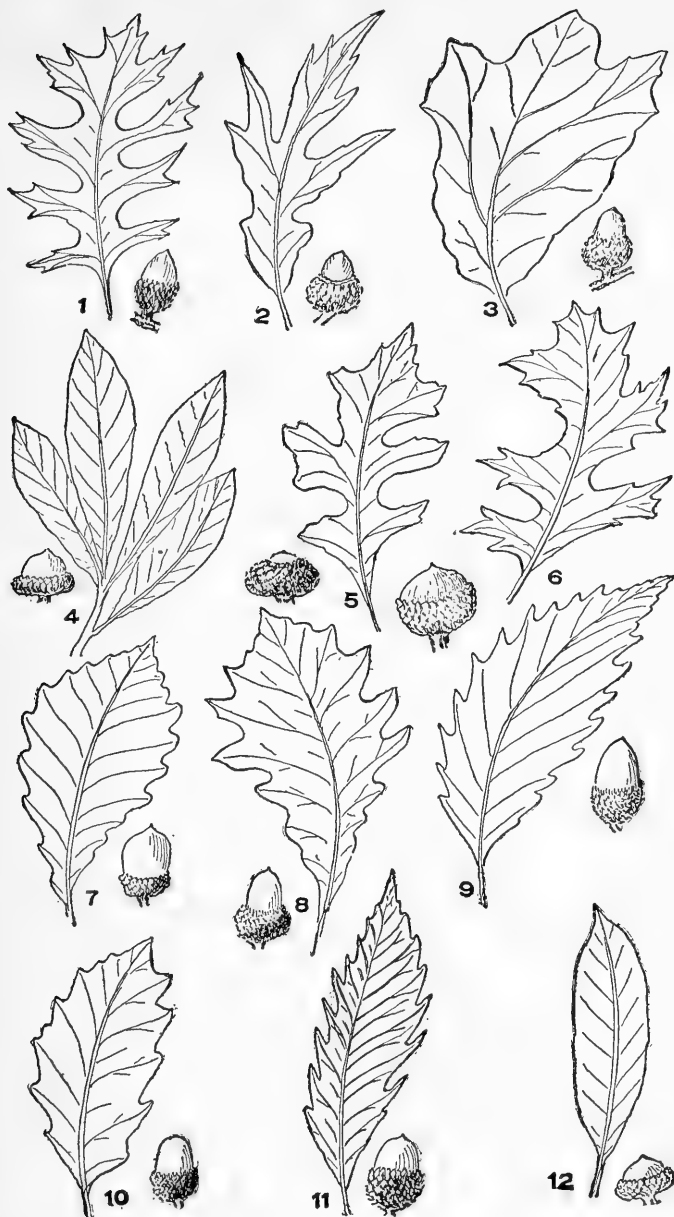


PLATE 29

1. *Quercus coccinea*. 2. *Q. falcata*. 3. *Q. marylandica*. 4. *Q. phellos*. 5. *Q. lyrata*. 6. *Q. velutina*. 7. *Q. prinus*. 8. *Q. bicolor*. 9. *Q. Michauxii*. 10. *Q. prinoides*. 11. *Q. Muhlenbergii*. 12. *Q. imbricaria*.

Leaves about 5 lobed, sometimes less, often more. Lobes sharp, sinuses angular, but variable; when mature, dark green above, with silvery silkiness beneath. Bark dark brown, scaly. Maine and westward.

7. *Q. marylandica*, Muench. (Fig. 3, pl. 29.) BLACK JACK. BAREN OAK. Moderately tall or small tree. Leaves much broadest at the free extremity; lobes rounded shallow and generally 3, confined to the free extremity. Cup covering $\frac{1}{3}$ the acorn. Branches irregular; bark almost black, scaly. Long Island and westward.

8. *Q. phellos*, L. (Fig. 4, pl. 29.) WILLOW OAK. One of two oaks native in our region whose leaves are neither lobed or serrated. A moderately high tree with long narrow leaves with smooth edges; the basal extremity acute and the free extremity generally so. Surface of leaves above deep shining green, below lighter. Acorns quite small. Long Island and southward.

9. *Q. imbricaria*, Michx. (Fig. 12, pl. 29.) SHINGLE OAK. A tall tree with lance-shaped leaves with smooth margins and bristle points. The under surface of the leaves *gray with silky hairs which are permanent*. Central Penna., and southward.

10. *Q. alba*, L. (Fig. 4, pl. 28.) WHITE OAK. One of the largest of the oaks. Leaves deeply cut into narrow but rounded lobes without spines or bristles, the sinuses generally very deep; lobes about 6, dark green above, rather lighter below. Cup shallow covering about $\frac{1}{5}$ the acorn. Bark light gray with shallow fissures. Throughout our area.

11. *Q. stellata*, Wang. (Fig. 6, pl. 28.) POST OR IRON OAK. (*Q. minor*, Sarg.). Sometimes a shrub, sometimes a moderately tall tree. Leaves deeply divided by rounded sinuses, the lobes, about 5, about as broad as, or even broader at the outer extremities, than at the inner; bristles absent. Dark shining green above, silky brown beneath. Cup covering about $\frac{1}{2}$ the acorn. Mass., southern New York, westward and southward.

12. *Q. lyrata*, Walt. (Fig. 5, pl. 29.) SWAMP OAK. OVERCUP OAK. POST OAK. Tall tree. Leaves with about 5 lobes, the deep and broad sinuses near the center giving the leaf a peculiar construction there which is characteristic. Surface of leaves bright green above, densely silky and white below. Cup covering $\frac{2}{3}$ of the nut which is broad and flat. New Jersey and southward.

13. *Q. macrocarpa*, Michx. (Fig. 2, pl. 28.) MOSSY CUP OAK. BUR OAK. Tall tree. Leaves with about 7 rounded lobes with generally shallow sinuses, deep green above, silky gray beneath. Cup with coarse scales and with a distinct fringe at its border composed of the bristly tips of the upper layer. Bark gray, in flakes or scales. Throughout most of our area.

14. *Q. bicolor*, Willd. (Fig. 8, pl. 29.) SWAMP WHITE OAK. (*Q. platanooides*, Sudw.) Large tree. Leaves, in general form, ovate with free extremity broadest. Lobes rounded, about 7 in number, the sinuses generally quite shallow, the stem end decidedly tapering. Bright yellowish-green above, pale green to white, silky beneath. Bark gray, flaky. Acorn narrow, cup covering the lower half. Generally in our area.

15. *Q. Muhlenbergii*, Englm. (Fig. 11, pl. 29.) CHESTNUT OR YEL-

LOW OAK. (*Q. acuminata*, Sarg.). Tree resembling the chestnut in size and appearance of trunk. Leaves not lobed but with very coarse serrations, lance-shaped or broad lance-shaped. Most of our region.

16. *Q. Alexanderi*, Britton. ALEXANDER'S OAK. Similar to the last; leaves pear-shaped. Cup cup-shaped, short stalked or not stalked. Vermont and westward.

17. *Q. prinus*, L. (Fig. 7, pl. 29.) ROCK CHESTNUT OAK. CHINQUAPIN. Large tree with ovate leaves broadest at outer third. Serrations coarse. Bark dark brown in broad ridges. Maine.

18. *Q. prinoides*, Willd. (Fig. 10, pl. 29.) SCRUB CHESTNUT OAK. Shrub, from 2 to 12 ft. high; leaves resembling those of No. 14 but smaller (about 2½ to 5 in. long, 2 to 3 wide), silky gray beneath. Maine and southward.

19. *Q. Michauxii*, Nutt. (Fig. 9, pl. 29.) BASKET OAK. Leaves oval with regular dentations, usually more or less silky beneath; acorn with a shallow cup, bordered by a stiff fringe, the acorn twice as high as the cup. Only in the most southern part of our area. (Del.).

SUB-ORDER IV.—URTICALES. THE NETTLE ALLIANCE

This section contains plants of widely different general aspect, some being among the highest of our trees, some shrubs, the great majority herbs with inconspicuous greenish flowers. The leaves in all cases have stipules (appendages at the base of the leaf stalk) but in all the trees and shrubs these appendages fall away with the early development of the leaves. In the herbaceous plants they are permanent. The flowers, like those of other plants of the great order of *Juliflores* are without petals, are small, greenish or yellow-green, with various forms of clusters. Ovary formed of 1 or 2 carpels, one of which is usually sterile, with the calyx-like envelope below.

Trees with watery sap	ULMACEAE
Trees with milky sap	MORACEAE
Herbs	URTICACEAE

FAMILY I.—ULMACEAE. ELM FAMILY

The family of Elms contains some of our loftiest and most beautiful trees. The species of the family are characterized by the inconspicuous flowers, the two forms of which may be upon the same tree or some of the flowers may contain both stamens and pistils. They occur along the course of the twig, not at its extremity, forming little tufts (Fig. 5, pl. 30), or the pistillate (especially in *Celtis*) may be solitary. Stamens as many as the lobes

of the envelope. Ovary 1-celled, above the envelope. Fruit a dry nut-like winged body.

Flowers opening before the appearance of leaves . . . **Ulmus**

Flowers opening after the appearance of the leaves . **Celtis**

1. ULMUS, L.

Leaves alternate, with oval, sharply notched leaves, which are unequal on the two sides of the midvein. Staminate flowers in tufts of reddish-brown, small, bell-shaped (Fig. 5, pl. 30). Seeds in *samaras* or dry, flat, ovoid, winged encasements which float in the wind or drop at the foot of the tree (Fig. 4, pl. 30).

Flowers without pedicels (sessile on the stem) *U. fulva*
Flowers on pedicels.

Bark of twigs smooth *U. americana*
Bark of twigs with corky wings or ridges *U. racemosa*

1. **U. fulva**, Michx. SLIPPERY ELM. RED ELM. A tree 45 to 60 ft. high; leaves oval or ovate, one side much shorter than the other, serrations double, the apex slender tapering, upper surface *very rough* with short papillæ, under surface downy, length 5 to 7 in. by 2 to 3 in. broad. The roughness of the leaves of this elm is felt whether the hand passes from stem to point or in the opposite direction. *Those of No. 2 feel rough only in passing the hand from apex to stem.* New England and westward.

2. **U. americana**, L. (Figs. 4 and 5, pl. 30.) AMERICAN ELM. WHITE ELM. The more common species. Leaves similar to No. 1 but on the whole smaller, rough only one way. Common.

3. **U. racemosa**, Thomas. CORK ELM. ROCK ELM. Leaves similar to those of Nos. 1 and 2 but the serrations are finer and the base of the leaf is more rounded. Corky ridges often appear on twigs which are more than a year old. New England and westward.

2. CELTIS, L.

While the leaves of the elms have a single main vein extending through the center from which feather veins run from each side with much regularity, in *Celtis* the leaves have 3 main veins with lesser veins coursing in various directions. Flowers greenish, the staminate in clusters of several flowers, the pistillate solitary or 2 or 3 together. Calyx of 4 to 6 segments. Fruit a globular berry.

1. **C. occidentalis**, L. (Fig. 6, pl. 30.) AMERICAN NETTLE TREE. HACKBERRY. Tree resembling an elm with sweet fruit. Leaves egg-shaped with reticulate veinings from 3 main veins; serrations single, coarse. Staminate flowers numerous on drooping pedicels; pistillate usually solitary. Some of the flowers have both stamens and pistils.

Var. *C. occidentalis crassifolia*, Lam. HACKBERRY. Tree or shrub with downy twigs and egg-shaped leaves which are rough above. Otherwise much like *C. occidentalis*. New York and southward.



PLATE 30

1. *Phoradendron flavescens*. 2. *Aristolochia Serpentaria*. 3. *Asarum canadense*. 4. *Ulmus americana*. 5. Staminate flowers of *U. americana*. 6. *Celtis occidentalis*. 7. *Morus alba*.

FAMILY II.—**MORACEAE**. MULBERRY FAMILY

Trees and shrubs with alternate, dentate leaves which are often lobed. Stamens and pistils in different flowers, both kinds on the same tree or on different trees. Stamen bearing flowers on a long, pendulous spike arising from the leaf axils, each flower 4-parted with 4 stamens. Pistillate flowers also in pendulous clusters, the ovary becoming succulent and sweet, the aggregation constituting the berry. Juice milky.

1. **MORUS**, L.

The Genus has the characters of the family.

1. **M. rubra**, L. RED MULBERRY. Leaves broad, egg-shaped, somewhat heart-shaped at base, rough above, silky beneath, with a principal nerve and about 4 secondary nerves with lesser nerves forming reticulations. Fruit an elongated dark purple sweet pleasant berry.

2. **M. alba**, L. (Fig. 7, pl. 30.) WHITE MULBERRY. Leaves similar to No. 1, but smaller and more heart-shaped at base, often lobed, smooth and shining. Fruit drooping, white or pinkish. (Escaped from cultivation. It is the tree the leaves of which are used for feeding silk worms).

2. **BROUSSONETIA**, L'Her.

Tree or shrub with milky juice. Leaves alternate, broad, with conspicuous serrations and generally with deep sinuses dividing the leaf into 3 irregular lobes. Sometimes the sinus is only on one side, in other cases it is absent. Fruit globular.

B. papyrifera, (L.) Vent. PAPER MULBERRY. Leaves rough above, silky beneath, irregularly lobed or without lobes. Fruit red globular berries. Escaped from cultivation.

FAMILY III.—**URTICACEAE**. NETTLE FAMILY

Herbs with permanent stipules and with the stamens and pistils in different flowers, on different plants or on the same plant. Leaves opposite or alternate, flowers green; the staminate with as many stamens as the lobes of the calyx and *vis-a-vis* to them, in loose clusters, inflorescence about a single axis, or more closely crowded in a catkin-like spike or into an erect fillet. Pistillate flowers with a single ovary, in catkins, with leafy bracts or in spikes without bracts.

Twining vine	Humulus
Leaves with radiant lobes	Cannabis
Leaves simple, undivided but toothed.	

Herbs with stinging hairs.

Leaves opposite *Urtica*

Leaves alternate *Laportea*

Herbs without stinging hairs.

Leaves opposite.

Pistillate calyx 3 parted *Pilea*

Pistillate calyx 2 to 4 parted *Boehmeria*

Leaves alternate *Parietaria*

1. URTICA, L.

Herbs, 1 to 6 ft. tall, with opposite simple leaves, stem and leaves covered with stinging hairs. Flowers minute, green, in long hanging clusters at the axils of the leaves. Staminate flowers (sometimes on same plant with the pistillate and sometimes on same group) with 4 stamens and a 4 parted calyx. The calyx of the pistillate flower also 4 parted but 2 parts are larger than the other pair. Nos. 1 and 2, perennial; No. 3, annual.

1. *U. dioica*, L. (Fig. 6, pl. 31.) STINGING NETTLE. GREAT NETTLE. Leaves ovate with rounded or heart-shaped base, 5 to 7 veined, 1 to 3 in. wide, tapering at apex, serrations very deep, very bristly with stinging hairs. Not as common as No. 2. Found in waste places and roadsides.

2. *U. gracilis*, Ait. (Fig. 4, pl. 31.) SLENDER NETTLE. Leaves slender-ovate to lanceolate. Stinging hairs less profuse than No. 1. Apex tapering, base rounded, rarely heart-shaped, 3 to 6 in. long, 1 to 1½ in. wide. Plant 2 to 6 ft. high. Common.

3. *U. urens*, L. (Fig. 8, pl. 31.) SMALL NETTLE. Leaves elliptic or egg-shaped, very coarsely and deeply serrate, mostly 3 nerved. Stinging hairs more sparingly provided than in No. 1 or No. 2. Two flower clusters in each leaf axil. Plant from 8 in. to 18 in. high. In waste places.

4. *U. Lyallii*, Wats. LYALL'S NETTLE. Similar to *U. gracilis*, but the leaves broader, the surface somewhat bristly, sometimes quite downy, usually heart-shaped at base. Teeth fewer and coarser than in *U. gracilis*. Waste places, New Foundland south to Conn., and western New York.

2. LAPORTEA, Gaud. (*Urticastrum*, Fabr.)

Perennial plants with stinging hairs. Flowers small, green, in loose branching and spreading clusters. Staminate flowers, sepals 5; stamens 5. Pistillate flowers, calyx 4-parted, the inner pair of segments larger than the others, surrounding an ovary.

L. canadensis, (L.) Gaud. (Fig. 9, pl. 31.) WOOD NETTLE. (*Urticastrum divaricatum*, Kuntze.) Leaves, usually very large (3 to 7 in. long, 2 to 5 in. broad), thin, ovate, with spreading feather veins; serrations sharp and conspicuous. Flowers in large loose clusters larger than the leaf stems. Found in rich woods of our area.

3. PILEA, Lindley (*Adicea*, Raf.)

Herbs *without* stings, with opposite leaves. Flowers of both kinds on

a single plant or the two kinds on different plants. Stamens 3 or 4; calyx 3- or 4-parted; pistillate calyx 3-parted. Leaves ovate, pointed at each end, 3 nerved.

P. pumila, (L.) Gray. (Fig. 7, pl. 31.) **CLEARWEED. RICHWEED.** Succulent, half transparent stems 3 in. to 2 ft. high. Leaves egg-shaped, coarsely and deeply toothed, pointed at base or apex. Flower clusters, two in axil of a leaf, much shorter than leaf stalk. Moist places; frequent.

4. **BOEHMERIA**, Jacq.

Flowers of both kinds or only of one kind on a single plant, collected in spikes of globular clusters, or, the lower spikes non-continuous. Leaves opposite, 3 nerved. Staminate flowers, stamens 4. Calyx generally 4-parted; calyx of pistillate flowers tubular or 4-toothed.

B. cylindrica, (L.) Sw. (Fig. 10, pl. 31.) **WILD FALSE NETTLE.** A coarse weed in low places, 2 to 3 ft. high. Leaves ovate, opposite on long leaf stalks, coarsely dentate. Flower spikes from leaf axils, the upper spikes leafy at top. Moist places; frequent.

5. **PARIETARIA**, L.

Herbs with alternate 3-nerved leaves, with dense axillary clusters of greenish flowers. Staminate and pistillate in the same groups, surrounded by leafy bracts; stamens 4; calyx of both kinds of flowers 4-parted.

P. pennsylvanica, Muhl. (Fig. 5, pl. 31.) **PENNSYLVANIA PARIETARIA.** Stem weak, delicate, leaves broadly lanceolate, 3-nerved, without indentations, tapering at each end, apex rather blunt; flowers in a rounded group. In dry shady places.

6. **HUMULUS**, L.

A twining vine, often 25 ft. or more in length. Leaves opposite, 3 or more lobed, rough; staminate flowers in loose branching clusters, yellowish-green; pistillate flowers in catkin-like, rounded or elongated clusters of yellowish-green bracts inclosing each a single ovary.

H. Lupulus, L. (Fig. 1, pl. 31.) **Hop.** Extensively cultivated, but found wild in thickets and along streams.

7. **CANNABIS**, Tourn.

Erect herb with opposite leaves divided in long finger-like lobes. Stipules persistent; clusters of greenish flowers axillary; the staminate in loose branching clusters, the pistillate in spikes; pistillate flowers, each surrounded by a leafy bract.

C. sativa, L. (Figs. 2 and 3, pl. 31.) **HEMP.** Very erect herb, 3 to 6 ft. tall, branching; the leaves consisting of from 5 to 7 long leaflets joined at the base. In waste places, and cultivated for its fibers.

Order II.—**SANTALES**

This small order, containing two families, each with very few species, includes plants which are parasitic or half parasitic. Beyond this there are few common characteristics between the two



PLATE 31

1. *Humulus Lupulus*. 2. *Cannabis sativa*. 3. Pistillate flowers of *C. sativa*. 4. *Urtica gracilis*. 5. *Parietaria pennsylvanica*. 6. *Urtica dioica*. 7. *Pilea pumila*. 8. *Urtica urens*. 9. *Laportea canadensis*. 10. *Boehmeria cylindrica*.

families. The flowers in all have a simple and single perianth which closely surrounds the ovary and on which are borne the stamens.

In the Family *Loranthaceae* all the species are parasitic.

In the Family *Aristolochiaceae* the species are of plants which find their home at the roots of decaying trees and are in some measure parasitic.

Parasites on trees; fruit a berry. FAMILY I. **LORANTHACEAE**

Plants not parasitic. FAMILY II. **SANTALACEAE**

Parasites on roots or shrubs; fruit a nut.

. FAMILY III. **ARISTOLOCHIACEAE**

FAMILY I.—**LORANTHACEAE**. MISTLETOE FAMILY

Plants growing on trees as parasites, nourishing themselves through roots which penetrate the bark of the supporting tree. They have opposite leaves but these in *Arceuthobium* are reduced to thickened scales. Flowers at the end of the branches or in the leaf axils, generally in clusters. They have no colored perianth. Fruit a berry with a single seed.

Leaves foliaceous **Phoradendron**

Leaves scale-like **Arceuthobium**

1. **ARCEUTHOBIUM**, Bieb. (Razoumofskya, Hoffm.)

Small plants, parasitic on the conifers, branches 4 angled, opposite leaves scale-like. Berry globose, fleshy, on a short stem.

A. pusillum, Peck. SMALL MISTLETOE. Plant from $\frac{1}{2}$ to 1 in. long, greenish-brown, leaf scales rounded; staminate and pistillate flowers on different plants which may grow from the same tree or from different trees. On twigs of spruce trees. Adirondack region, White Mountain and Pocono regions.

2. **PHORADENDRON**, Nutt.

Leaves leathery, flowers in jointed clusters, staminate and pistillate on different plants. Berry pulpy. Yellowish-green plants growing on other trees.

P. flavescens, (Pursh.) Nutt. (Fig. 1, pl. 30.) AMERICAN MISTLETOE. Irregularly branching; leaves oblong, thick and leathery. Berries in clusters. New Jersey, southward and westward.

FAMILY II.—**SANTALACEAE**. SANDALWOOD FAMILY

Herbs and shrubs with alternate leaves (opposite in some foreign species) which have entire borders and are without stipules. Flowers in clusters or solitary, terminal or from the leaf axils, each flower with stamens and pistils, or flowers with one of these

elements only, both kinds of flowers on the same plant or on different plants, mostly greenish. Calyx adherent to the base of the ovary, 3 to 6 lobed; petals none. Stamens as many as the lobes of the calyx. Fruit a drupe or nut; seed one.

COMANDRA, Nutt.

Characters as above.

1. *C. livida*, Richards. NORTHERN COMANDRA. Stem slender, simple, 4 to 12 in. high. Leaves oval, rounded at apex, tapering at base. Flowers in small clusters at the leaf axils, from a slender common flower stem about 1 in. long, 1 to 5 flowers in the group. Drupe globose. Vermont and northward. June-July.

2. *C. umbellata*, Nutt. BASTARD TOAD-FLAX. Stem 6 to 18 in. high, leafy, branched. Leaves oblong or broad lance-shaped, pale green, acute or nearly acute at each end, without leaf-stalks. Flowers in umbel-like clusters, a number of these small clusters arising from as many leaf axils. Calyx greenish-white. Through the extent of our area. April-July.

FAMILY III.—ARISTOLOCHIACEAE. BIRTHWORT FAMILY

Low herbs, twining vines and, beyond our area, sometimes shrubs, with leaves from the root or alternate on a stem. Stipules absent; flowers from the axils of the leaves, usually solitary but exceptionally in clusters, greenish or purplish. Petals none, the calyx tube adhering to the ovary and dividing above the latter into 3 more or less spreading lobes. In some species beyond our limits the lobes are 6 or irregular. Stamens 6 or 12 inserted on the short and fleshy style.

Low herbs, not vines, leaves from the root . . . *Asarum*

Twining vines or nearly erect herbs, with irregular flowers; leaves from the stem *Aristolochia*

I. ASARUM, L.

Herbs with, generally, two broad heart-shaped leaves starting from the root and borne on long leaf-stalks, between which springs the single flower. Root branching, aromatic. Calyx bell-shaped, adherent to the ovary, dividing into 3 lobes. Stamens 12, also adherent to the ovary.

1. *A. canadense*, L. (Fig. 3, pl. 30.) WILD GINGER. Leaves broad kidney-shaped at base, with fine silky or downy pubescence. Between the two long leaf-stalks arises the slender flower stalk, bearing the brownish-purple, bell-shaped flower, the 3 divisions of the calyx extending into long slender, tapering points. Generally at the base of trees where some, at least, of the wood is decaying. April-May.

Var. *reflexum*, (Bicknell.) Robinson. SHORT LOBED WILD GINGER.

Flowers smaller than the typical form and lobes of the calyx early reflexed. Conn., and southward. April-May.

2. ARISTOLOCHIA, L.

Erect herb or twining vines with alternate leaves on leaf-stalks, egg-shaped, base heart-shaped, apex tapering. Flowers irregular. Stamens 6, style 3 to 6 parted.

1. *A. Serpentaria*, L. (Fig. 2, pl. 30.) VIRGINIA SNAKE ROOT. Leaves egg-shaped or broad lanceolate with heart-shaped base, $1\frac{1}{2}$ to 5 in. long, alternate. Flowers from a pedicel arising from the root and which bears scaly bracts. The calyx tube elongated and curved like an S, the mouth broadly open. Rare in our region. June-July.

2. *A. Clematitis*, L. BIRTHWORT. European species, escaped from cultivation, naturalized near Flushing, Troy, and Utica, N. Y., with straight calyx tube and clustered flowers.

3. *A. macrophylla*, Lam. DUTCHMAN'S PIPE. A twining vine mostly cultivated. Leaves broad, kidney-shaped, densely downy. Flower in the form of a pipe. Rich woods, southern Penna.

Order III.—POLYGONALES. Order of the Sorrelworts

Flowers without corollas, the perianth consisting of a regular envelope which is not adherent to the ovary. Stamens generally equal in number to the divisions of the green or colored calyx, rarely double the number or less or more. Ovary one, surmounted by a pistil which divides into 2 or 3 stigmas. Fruit a dry 3-angled seed or a compressed one with wings. Stamens and pistils in the same flowers or in different flowers. Only one family.

FAMILY. POLYGONACEAE. BUCKWHEAT FAMILY

Herbaceous plants erect or twining, with alternate leaves. Calyx green, colored or white, divided in 3 to 6 parts; seed carpels 2 or 3. In our species the joints at the leaf-stalks are always surrounded by a long sheathing collaret extending on the stem above the insertion of the leaf stalk. There is no true stipule. These collarets are known as *ocreae*. Flowers in elongated terminal clusters or more compressed clusters in the leaf axils.

Calyx in 4 parts, stamens 6 *Oxyria*

Calyx in 6 parts *Rumex*

Calyx in 4 or 5 parts; stamens 5 to 9.

Pedicels of flowers solitary and closely jointed *Polygonella*

Pedicels several in a group.

Fruit ordinarily enveloped by the perianth *Polygonum*

Fruit larger than the perianth . . . *Fagopyrum*

I. RUMEX, L.

Erect herbs, annual or perennial. Stems branching, grooved; leaves in some of the species mostly grouped about the root, in others alternate along the stem. Calyx of 6 sepals, the 3 inner ones conspicuously larger than the others in fruit; stamens 6, opposite the sepals; pistil divided into 3 parts with tufted or stellate summits (stigmas). Flowers in great numbers disposed along the stems in groups, these groups branching, simple or in whorls. The fertile and sterile flowers are found on different plants or in separate groups on the same plant or mingled in the same groups.

Leaves arrow-head- or halberd-shaped; stems and leaves sour to the taste, low herbs.

Sepals of the fruit-hull not longer than the fruit.

Exterior sepals below the fruit, erect *R. Acetosella*

Exterior sepals below the fruit, turned down *R. Acetosa*

Sepals of the fruit-hull several times longer than the fruit *R. hastatulus*

Leaves not arrow-head- or halberd-shaped.

Leaves not heart-shaped at base.

Margins of leaves not wavy.

Fruit-hull wings diamond-shaped *R. salicifolius*

Fruit-hull wings club-shaped *R. verticillatus*

Fruit-hull wings heart-shaped *R. altissimus*

Margins of leaves wavy.

Seed wings scarcely toothed *R. Patientia*

Seed wings toothed *R. britannica*

Leaves heart-shaped at base.

Flowers in a dense almost uninterrupted spike . . . *R. persicarioides*

Flowers in loose interrupted spikes.

Seed wings heart-shaped, not toothed. Leaf borders wavy.

. *R. crispus*

Seed wings spatula-formed *R. sanguineus*

Seed wings arrow-head-shaped with long spines *R. obtusifolius*

§ Leaves mostly clustered about base, halberd-shaped; leaves and stem acid

1. *R. Acetosella*, L. (Fig. 3, pl. 32.) FIELD SORREL. SHEEP SORREL. Leaves narrow, the base lobes spreading, 1 to 4 in. long, usually broader at or above the middle than elsewhere except the lobes. Upper leaves lance-shaped, not lobed. Flowers crowded in erect, somewhat branching clusters. Fruit longer than the greenish perianth. Common in dry fields.

2. *R. hastatulus*, Muhl. ENGELMANN'S SORREL. Base lobes of leaves usually less conspicuous than in No. 1, but sometimes more, leaves 1 to 5 in. long; stem leaves linear; collaret silvery; perianth greenish, as long or longer than the fruit. Sea coasts, southern section of our region. March to August.

3. *R. Acetosa*, L. (Fig. 11, pl. 32.) SORREL. SOUR DOCK. Lobes extending backward almost parallel with the leaf stalk; lower leaves with long leaf-stalks, upper with none. Flower clusters more crowded than in No. 1, or No. 2. Exterior sepals turned backward. Introduced.

§§ Leaves neither halberd-shaped nor heart-shaped at base. Borders not wavy

4. *R. salicifolius*, Weinm. (Fig. 5, pl. 32.) PALE DOCK. WILLOW-LEAVED DOCK. (*R. americanus*, Meisn.) Plant erect or spreading, 1 to 3 ft. high. Leaves narrow lance-shaped, acute at each end; panicle of flowers interrupted, at least at lower part, clusters dense, of pale green

flowers. Fruit, smooth, shining, dark red, winged or triangular, not heart-shaped. Swamps. In bloom from May to September.

5. *R. verticillatus*, L. (Fig. 10, pl. 32.) SWAMP DOCK. Leaves oblong, lance-shaped, acute at each end, 2 to 12 in. long. Flower cluster a tall spike, densely crowded with whorls of green flowers, 10 to 30 flowers each; and leafless. Leaves with long stalks; wings of fruit, diamond-shaped. Plant 2 to 5 ft. high. In swamps. May to July.

6. *R. altissimus*, Wood. (Fig. 8, pl. 32.) TALL DOCK. PEACH-LEAVED DOCK. Leaves narrow elliptic, acute each end, 2 to 10 in. long. Flower panicles leafless with interrupted dense clusters of light green flowers. Wings of fruit triangular, cordate at base. Plants 3 to 4 ft. high. Swamps and moist places. April-June.

‡ *Leaves as in §§, but with wavy borders*

7. *R. Patientia*, L. (Figs. 1 and 6, pl. 32.) PATIENCE DOCK. Lower leaves broad lance-shaped, 4 to 16 in. long, borders wavy; flower panicle of dense whorls of green flowers. Seed wings broad, nearly orbicular or kidney-shaped, cordate, obscurely toothed at margin. Plant 3 to 5 ft. tall.

8. *R. britannica*, L. (Fig. 13, pl. 32.) GREAT WATER DOCK. Leaves broad lance-shaped, 1 to 2 ft. long, somewhat wavy margined. Flower panicle nearly leafless. Fruit wings broadly triangular, cordate, the margins distinctly toothed. Swamps and wet places. July-August.

‡‡ *Leaves cordate at base. Flower panicles more or less interrupted*

9. *R. crispus*, L. (Fig. 9, pl. 32.) CURLED DOCK. YELLOW DOCK. Leaves lance-shaped, 6 to 12 in. long, margins strongly wavy. Flowers in long wand-like panicles, leafless above; seed wings heart-shaped. Plant 3 to 4 ft. high. Fields and waste cultivated grounds.

10. *R. sanguineus*, L. (Fig. 4, 12, pl. 32.) BLOODY DOCK. RED-VEINED DOCK. Leaves lance-shaped or oblong, often fiddle-shaped; 1 to 5 in. long; panicle of flowers leafless; whorls at some distance from each other. Seed wings club-shaped. Plant 1 to 3 ft. high. Waste cultivated grounds. May to August.

11. *R. obtusifolius*, L. (Figs. 2 and 7, pl. 32.) FIDDLE DOCK. Stem somewhat rough. Leaves broad ovate, heart-shaped at base, blunt at apex, 6 to 14 in. long, wavy margined. Whorls, few flowered and distant, seed wings halberd-shaped with conspicuous spines or awl-shaped teeth. Plant 1 to 3 ft. high. In waste places. June to August.

‡‡ *Flowers in a dense uninterrupted panicle*

12. *R. persicarioides*, L. (Fig. 14, pl. 32.) GOLDEN DOCK. Leaves narrow lance-shaped, blunt or even slightly cordate at base, more or less wavy. Plant erect or prostrate, 1 to 3 ft. high. Flowers in a dense uninterrupted spike. Seed wings with 4 or 5 long spine-like bristles. Sandy shores. July to Oct.

2. FAGOPYRUM, Tourn.

Annual herb, widely cultivated, most of the plants found wild are from seeds escaped from cultivated fields. Leaves alternate, deltoid or halberd-shaped. *Collaret* (ocrea) *cylindric*. The 5 divisions of the calyx



PLATE 32

1. *Rumex Patientia*. 2. *R. obtusifolius*. 3. *R. Acetosella*. 4. *R. sanguineus*. 5. *R. salicifolius*. 6. Fruit of *R. Patientia*. 7. Fruit of *R. obtusifolius*. 8. Fruit of *R. altissimus*. 9. Fruit of *R. crispus*. 10. Fruit of *R. verticillatus*. 11. Fruit of *R. Acetosa*. 12. Fruit of *R. sanguineus*. 13. Fruit of *R. britannica*. 14. Fruit of *R. persicarioides*.

white or greenish-white or rosy, resembling petals, stamens 8; ovary 1 celled, with a 3-parted style and a stellate stigma.

1. *F. esculentum*, Moench. BUCKWHEAT. (*F. Fagopyrum*, Karst.) Flowers in dense clusters, terminal to the branches of the loose inflorescence. Seed much longer than the perianth, its borders not winged.

2. *F. tartaricum*, (L.) Gaertn. TARTARY BUCKWHEAT. Leaves similar to No. 1, but broader and more arrow-shaped. Flowers smaller. Seed winged, the borders of the wings wavy or lobed.

3. POLYGONUM, L.

This family includes several somewhat distinct groups of plants, all of which are, in our region, herbs, erect, prostrate or twining. The flowers generally include both stamens and pistils and the corolla is wanting. The divisions of the calyx, generally 5, which are nearly equal, are often colored or white, producing the apparent effect of a corolla. Stamens vary from 5 to 8. Fruit a dry hard grain, enclosed in some species by the calyx as a seed hull, while in other cases it projects above the hull, the seed being partly uncovered. The ocrea or collaret at the nodes mentioned as characteristic of the Order Polygonales, is in this genus peculiarly conspicuous.

1ST. GROUP.—THE PERSICARIAE

Erect or prostrate herbs, not twining. Flowers in terminal, elongated clusters.

1. Flowers surrounding the axis stem in dense, crowded clusters

Flower clusters single.

Plant found on mountain summits *P. viviparum*

Flower clusters generally one, sometimes two. Aquatic plants.

Plants smooth. Leaves elliptic *P. amphibium*

Leaves egg-shaped, but with long tapering apex *P. Muhlenbergii*

Plant distinctly hairy, generally aquatic *P. Hartwrightii*

Flower clusters several.

Herbs, generally less than 3 ft. high.

Clusters drooping *P. lapathifolium*

Clusters erect.

Plant hairy *P. Carey*

Plant not hairy.

Collaret conspicuously fringed *P. persicaria*

Collaret not fringed *P. pennsylvanicum*

Herb 3 to 8 feet high *P. orientale*

2. Flowers arranged on the long axis stem in loose interrupted series

THE WATER PEPPERS

Collaret long, hairy and fringed with long bristles. Leaves lance-shaped

. *P. hydropiperoides*

Collaret long, not hairy, fringed with short bristles.

Stamens 4 to 6 *P. Hydropiper*

Stamens 8 *P. acre*

Collaret hairy and fringed, leaves broad egg-shaped.

Apex of leaves tapering *P. virginianum*

Apex of leaves blunt *P. littorale*

2D. GROUP

Prostrate, or, less frequently, erect herbs with flowers all in the axils of the leaves.

THE KNOTGRASSES

Stem leafy to the end; plant prostrate.

Leaves as long as, or usually longer than, the internodes.

Leaves rolled at the margins *P. maritimum*

Leaves not rolled at margins *P. aviculare*

Internodes as long as or longer than the leaves *P. Rayi*

Plant erect, leaves broad *P. exsertum*

Leaves at extremity of stem much reduced and transformed to bracts.

Stem round. Plant yellowish-green *P. ramosissimum*

Stem angular.

Flower and fruit directed upward *P. tenue*

Flower and fruit directed downward *P. Douglasii*

3D. GROUP

Herbs climbing by twining stems or by recurved prickles.

Twining stems, unarmed by prickles.

Seed hull not winged at the angles, or obscurely winged.

Collaret not bristly *P. convolvulus*

Collaret bristly *P. cilinode*

Seed hull conspicuously winged at the angles.

Leaves ovate, cordate at base *P. scandens*

Leaves narrow, arrow-head shaped *P. sagittatum*

Leaves triangular, slightly cordate at base *P. dumetorum*

Leaves egg-shaped, stem prickly *P. arifolium*

A. Erect or prostrate herbs. Flowers in elongated terminal clusters

1. *P. pennsylvanicum*, L. (Fig. 5, pl. 33.) PENNSYLVANIAN PERSICARIA. Plant less erect and less high than No. 5, the clusters of flowers erect or nearly so, bright rose color, spikes often blunt at summit. Leaves long lance-shaped. Moist soil. July-Sept.

2. *P. viviparum*, L. (Fig. 6, pl. 33.) ALPINE BISTORT. A small plant found on the heights of mountains in New England. Slender, 4 to 8 in. high; collaret conspicuous; flowers crowded, flesh colored, sometimes replaced by small red bulblets (hence the name, *viviparum*). Lowest leaves oblong with more or less heart-shaped base and blunt apex; upper leaves narrow, lance-shaped.

3. *P. amphibium*, L. (Fig. 7, pl. 33.) WATER PERSICARIA. Aquatic; leaves broad, elliptic, thick, rather blunt at each end; generally floating; roots springing from the nodes. Flowers bright pink or rose color. Ponds and lakes, northern New Jersey and northward.

4. *P. Hartwrightii*, Gray. HARTWRIGHT'S PERSICARIA. (New Edition, Gray, var. of *P. amphibium*.) Much like No. 2, but is rough with hairs, at least on the collaret. Grows in mud or floats on water. Swamps and wet places, generally distributed.

5. *P. Muhlenbergii*, (Meisn.) Wats. SWAMP PERSICARIA. (*P. emersum*, (Michx.) Britton.) Plant 1 to 3 ft. high; leaves long, egg-shaped, the apex prolonged and tapering. Swamps and wet places, generally distributed.

6. *P. lapathifolium*, L. (Fig. 3, pl. 33.) DOCK-LEAVED PERSICARIA. PALE PERSICARIA. Plant larger than most of those of the genus and more ornamental, from 1 to 4 ft. high, often in dense masses. Leaves lance-shaped, acute at each end, the apex long and tapering. Clusters of flowers dense, gracefully drooping, white or rose color. Wet places. New England and westward.

Var. *incarnatum*, Watson, the leaves longer and broader and the spikes long, drooping, linear, several in a cluster. Still another variety, *incanum*, found in the northern and western sections of our region, is a much smaller plant with smaller leaves and which are covered with a white silkiness beneath, tapering at each end and especially at apex. Ditches and way-side places. Very common.

7. *P. persicaria*, L. LADY'S THUMB. Plant 6 to 20 in. high; leaves narrow lance-shaped, tapering at each end; the collaret fringed with short bristles. Group of flowers oval or oblong. Leaves conspicuously

marked with dark spots, often a rather large spot, triangular or other formed, near the central part. Waste places. Common.

8. *P. Careyi*, Olney. CAREY'S PERSICARIA. Plant hairy; clusters of flowers long and curved, less dense than the preceding species. Leaves narrow lance-shaped, tapering at both ends. Shady swamps, mostly in eastern part of our area.

9. *P. orientale*, L. PRINCE'S FEATHER. Plant 3 to 8 ft. tall, often grown in gardens but to some extent naturalized in waste places. Leaves 3 to 12 in. long, broad egg-shaped with tapering apex. Clusters of flowers dense, large, bright rose color.

10. *P. hydropiperoides*, Michx. WILD WATER PEPPER. Plant 1 to 3 ft. high, much branching; leaves narrowly lance-shaped to linear; collarets conspicuously long and hairy with long bristly borders. Flowers arranged on long slender stems in loose series, nearly white. Swamps and wet places. Common.

11. *P. Hydropiper*, L. (Fig. 2, pl. 33.) WATER PEPPER. SMART WEED. Plant 1 to 2 ft. high, smooth. Leaves lance-shaped, sometimes linear, tapering at apex. Flowers arranged as in No. 10. Collarets not hairy and bordered by short bristles. Wet places. Generally distributed.

12. *P. acre*, HBK. (Fig. 4, pl. 33.) DOTTED WATER PEPPER. WATER SMART WEED. (*P. punctatum*, Ell.) Plant 2 to 5 ft. high, smooth. Leaves narrow lance-shaped, acute at each end. With conspicuous spots on the surface. Flowers greenish-white or tinged with pink. Collaret fringed. Wet places; common.

13. *P. virginianum*, L. (Fig. 1, pl. 33.) VIRGINIA KNOTWEED. Plant 3 to 4 ft. high, growing mostly in woods and shady places. Leaves broad egg-shaped with tapering apex, the upper often narrow, all on short leaf-stalks. Sheaths hairy, fringed. Flowers arranged on a long slender stem, sparse. Flower stem usually occupying $\frac{1}{2}$ the height of the plant or more. Rich soil; common.

14. *P. aviculare*, L. (Fig. 7, pl. 34.) DOOR WEED. KNOT-GRASS. Plant very common in neglected door yards, generally prostrate, bluish-green. Leaves oblong or lance-shaped, mostly acute at each end $\frac{1}{4}$ to $\frac{2}{3}$ in. long, with very short or no leaf-stalk; interval between the joints rather longer than the leaves. Flowers very small, green, with white borders. Yards and waste places; common.

15. *P. littorale*, Link. (Fig. 10, pl. 34.) SHORE KNOTWEED. Similar to No. 13, but leaves mostly blunt and somewhat broader. Common on shores and in waste places.

16. *P. maritimum*, L. SEASIDE KNOTWEED. Leaves fleshy, narrower and shorter than Nos. 13 and 14, the margins generally rolled; nodes at very short intervals; sheaths torn by the swelling of the joints. Sands along the seashore.

17. *P. Rayi*, Babingt. RAY'S KNOTWEED. Plant 3 to 24 in. long, prostrate, bluish-green; leaves longer and broader than either of the three preceding. Naturalized, found in waste places.

18. *P. Fowleri*, Robinson. FOWLER'S KNOTWEED. Differs from *P. Rayi* chiefly in the more obtuse leaves, the oblong calyx lobes and the



PLATE 33

1. *Polygonum virginianum*. 2. *P. Hydropiper*. 3. *P. lapathifolium*. 4. *P. acre*. 5. *P. pennsylvanicum*. 6. *P. viviparum*. 7. *P. amphibium*.

smaller more gradually narrowed fruit. Sandy shores, Maine and northward. Aug.-Sept.

19. *P. erectum*, L. (Fig. 5, pl. 34.) ERECT KNOTWEED. Plant $\frac{1}{2}$ to 2 ft. high. Leaves oval or oblong, apex acute or somewhat obtuse; joints large with 1 or 2 greenish flowers in the leaf axils. Mostly in rich soil.

20. *P. exsertum*, Small. (Fig. 4, pl. 34.) LONG FRUITED KNOTWEED. Plant about 2 ft. high, slender but erect; leaves similar to *P. aviculare*, etc. The sheaths at the nodes divided into long silvery points. The 3-angled seed projects much beyond the hull, hence the name. Brackish marshes, Maine to New York.

B. Leaves of extremity of stem reduced and transformed to bracts. Plants mostly erect

21. *P. ramosissimum*, Michx. BUSHY KNOTWEED. Plant erect, often 3 or 4 ft. high, yellowish-green. Leaves similar to preceding species, inter-nodes usually shorter than leaves. Collaret fringed in long coarse points which arise from lacerations. Saline soil, coast from Maine to New Jersey.

22. *P. tenue*, Michx. (Fig. 2, pl. 34.) SLENDER KNOTWEED. Stem slender, angled, $\frac{1}{2}$ to 1 ft. high, smooth; leaves linear, from $\frac{1}{4}$ to 1 in. long with a lateral impression or fold on either side of the mid-vein. Flowers green in axils of leaves, *pointing upward*. Dry soil; generally distributed.

23. *P. Douglasii*, Green. DOUGLAS'S KNOTWEED. Similar to No. 20, but leaves broader and without the folds. The flowers at the leaf axils *point downward*. Northern New York and Vermont.

C. Leaves arrow-shaped, egg-shaped or halberd-shaped. All heart-shaped at base. Plants climbers or trailers

24. *P. convolvulus*, L. (Fig. 8, pl. 34.) BLACK BINDWEED. Stem somewhat angular; leaves egg-shaped or arrow-head-shaped, upper ones lance-shaped, tapering at apex. The angles of the seed hull either without wings or very slightly winged. Flowers in pendulous spreading clusters at leaf axils, green. The plant trailing or twining. Common in waste grounds.

25. *P. cilinode*, Michx. (Fig. 12, pl. 34.) FRINGED BLACK BINDWEED. Leaves broad egg-shaped or spear head-shaped; collarets fringed with depressed bristles, not at border but near the base. Clusters of flowers on stems only slightly spreading or branching. Plant generally twining or trailing over stone fences, etc.

Var. *erectum*, Peck. Rocky places; generally distributed.

26. *P. scandens*, L. (Fig. 6, pl. 34.) CLIMBING FALSE BUCKWHEAT. Vine, sometimes 20 ft. high, smooth. Leaves egg-shaped, heart-shaped at base, sharp pointed. Seed hull conspicuously winged at the angles, the wings with entire borders. Fruiting calyx about $\frac{1}{2}$ in. long. Woods and thickets. Common. The form *P. dumetorum*, L., fruiting calyx about $\frac{1}{4}$ in. long, occasional in our region and very similar to *P. scandens*.

27. *P. dumetorum*, L. (Fig. 9, pl. 34.) CRESTED FALSE BUCKWHEAT. (*P. cristatum*, Engelm. and Gray.) Vine similar to No. 24,



PLATE 34

1. *Polygonella articulata*. 2. *Polygonum tenue*. 3. *P. arifolium*. 4. *P. exsertum*. 5. *P. erectum*. 6. *P. scandens*. 7. *P. aviculare*. 8. *P. convolvulus*. 9. *P. dumetorum*. 10. *P. littorale*. 11. *P. sagittatum*. 12. *P. cilinode*.

but leaves broad triangular with depression at base. Margin of wings of seed hull irregularly notched. Shady woods, New York and southward.

28. *P. sagittatum*, L. (Fig. 11, pl. 34.) ARROW-LEAVED TEAR THUMB. Stem slender, 4-angled, the plant reclining upon other plants and clinging to them by recurved prickles. Leaves narrow arrow-head-form, heart-shaped at base; *leaf-stalk short*. Wet or moist soil; common.

29. *P. arifolium*, L. (Fig. 3, pl. 34.) HALBERD-LEAVED TEAR THUMB. Stem 4-angled, armed with recurved prickles, climbing by these. Leaves broad egg-shaped with spreading wings at base, on long leaf-stalks. Flowers few in an elongated cluster. Moist soil. Common.

4. OXYRIA, Hill.

A few alpine species with round kidney-form leaves on long leaf-stalks mostly from the root. Flowers on a scape arising from the base, small, greenish, clustered in a rather loose narrow and elongated group (raceme). Calyx of 4 divisions; stamens 8; fruit a thin, flattened, lens-shaped body extending beyond the calyx and surrounded by a broad wing.

O. digyna, Hill. MOUNTAIN SORREL. High regions of the White Mountains and far north and west. July-Sept.

5. POLYGONELLA, Michx.

Herbs with branched conspicuously jointed stems and narrow leaves. Flowers on *jointed flower stems*. Calyx 5-parted, colored. The 3 inner segments investing the fruit and becoming larger than the others and often developing wings at the angles. Stamens 8; style 3-parted. Fruit a 3-angled dry nut similar to the fruit of *Polygonum*.

P. articulata, (L.) Meisn. (Fig. 1, pl. 34.) COAST JOINTWEED. Plant 4 to 15 in. high; stem wiry, slender, branching. Leaves linear. Flowers in slender diffuse clusters *on flower stalks closely jointed*. Flowers very small, rose color. Sandy coasts and inland sandy places.

Order IV.—CHENOPODIINEAE. The Order of the Pig-weeds

Herbaceous plants, some with fleshy stems and leaves. Leaves alternate (except in *Salicornia*, in our region), smooth or covered with hairs. The flowers are, in general, small, inconspicuous, green, crowded in glomerate masses or in spikes, but sometimes solitary and moderately conspicuous, while in one instance the glomerate masses are brightly colored. Among the *Amaranth*s some species have colored bracts. In some families the flowers are perfect, having the stamens and pistils in the same envelope; in other families the stamens and pistils occupy different flowers and sometimes different plants. The corolla is always wanting; calyx generally divided in 5 parts, but in *Salicornia* and some

species of *Amaranth*s, 2 or more. The stamens are ordinarily as many as the parts of the calyx and opposite to them. In general there are 2 carpels (divisions of the pistil). The fruit is a small, hard, dry seed (achene) which is persistently enveloped by the perianth. It becomes in many instances an important indicator of the genus by the form which the embryo takes in the seed. If cut longitudinally the embryo may be seen in the form of a horse-shoe or in that of a complete ring or as a spiral.

Flowers without membranous bracts . . . **CHENOPODIACEAE**

Flowers with dry membranous bracts . . . **AMARANTHACEAE**

FAMILY I.—**CHENOPODIACEAE**. GOOSEFOOT FAMILY

Flowers without bracts, minute, greenish. Stamens generally as many as the divisions of the calyx and inserted opposite to them or on their base. Calyx persistent and enclosing the fruit.

Flowers in glomerate masses.

Leaves net-veined, spreading.

Stamens and pistils in same flower.

Calyx 5-parted.

Flower groups axillary and terminal

. **Chenopodium**

Flower groups only axillary . . . **Roubieva**

Calyx in 3 parts **Blitum**

Stamens and pistils in different flowers . . . **Atriplex**

Leaves linear, plant not fleshy **Kochia**

Leaves aborted or fleshy and linear.

Flowers glomerate, fleshy herbs, leaves reduced to

scales **Salicornia**

Fleshy herbs, leaves linear, rounded . . . **Suaeda**

Flowers not in glomerate masses.

Fleshy herbs, leaves terminated by prickles **Salsola**

I. **CHENOPODIUM**, L.

Herbs with alternate leaves on long leaf stems with small green flowers arranged in glomerate masses, without bracts, the glomerules in the axils of the leaves, and mostly in terminal groups. Calyx generally 5-parted. Stamens 1 to 5.

(The leaves used here in differentiating the species are those which are most typical, those from about the middle of the plant and possibly the general appearance of a group and not of an individual leaf.)

Leaves white, mealy.

Rhomboid	<i>C. album</i>
Lance-egg-shaped, the borders toothed	<i>C. glaucum</i>
Egg-shaped, the borders entire	<i>C. vulvaria</i>
Lance-shaped	<i>C. leptophyllum</i>
Elliptic	<i>C. polyspermum</i>

Leaves green, not mealy.

Narrow, generally lance-shaped	<i>C. Boscianum</i>
Rhombic	<i>C. rubrum</i>
Feather-formed by deep sinuses	<i>C. Botrys</i>
Oblong or broad lance-shaped	<i>C. ambrosioides</i>
Egg-shaped	<i>C. anthelminticum</i>
Triangular or nearly so.	
Border not toothed or notched	<i>C. Bonus Henricus</i>
Border with 1 to 4 long teeth	<i>C. hybridum</i>
Border with a number of indentations or sharp serrations.	
Base of leaf convex, more or less rounded out	<i>C. murale</i>
Base of leaf concave, more or less depressed inward	<i>C. urbicum</i>

All annual except No. 10

1. *C. album*, L. (Fig. 3, pl. 35.) WHITE GOOSEFOOT. PIGWEED. Plant smooth; 1 to 10 ft. high. Whole plant more or less mealy-white. Leaves, rhomboid with sinuate dentations on the two sides; upper leaves narrow to lance-shaped. Stem with alternate green and white or purplish and green stripes. Flowers in compact glomerules which are arranged in loose, leafy, clusters axillary and terminal. Calyx, with keels at the angles, completely enveloping the fruit. Seeds shining black. Embryo completely annular. A common weed in cultivated and waste places.

2. *C. glaucum*, L. (Fig. 9, pl. 35.) OAK-LEAVED GOOSEFOOT. Plant smooth $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high, prostrate or erect. Plant white, mealy. Leaves oblong to lance-shaped with deep indentations; teeth rounded, about 4 on each side; green above, bluish-white beneath. Upper leaves narrow and entire. Seed globose, sharp edged, only partly enveloped by calyx, embryo annular. Like the former species a common weed.

3. *C. vulvaria*, L. STINKING GOOSEFOOT. Similar to No. 2, but leaves are egg-shaped and the margins are without lobes or teeth. In situations similar to the last.

4. *C. leptophyllum*, (Moq.) Nutt. (Fig. 5, pl. 35.) NARROW-LEAVED GOOSEFOOT. Plant densely mealy, erect, $\frac{1}{2}$ to 2 ft. high. Leaves narrow lance-shaped with entire borders, $\frac{1}{2}$ to 1 in. long. Glomerules closely packed about the stem. Sea shore, Connecticut to New Jersey. Shores of Lake Erie.

5. *C. polyspermum*, L. (Fig. 4, pl. 35.) MANY-SEEDED GOOSEFOOT. Plant smooth, low, spreading or sometimes erect. Leaves elliptic or egg-shaped, green, no mealiness. Clusters of flowers leafy; calyx partly exposing the fruit. Weed, not very common.

6. *C. Boscianum*, Moq. (Fig. 1, pl. 35.) Bosc's GOOSEFOOT. Plant slender, erect (about 2 ft. high), smooth, not mealy or only slightly so. Leaves mostly lance-shaped, tapering at each end, the borders not indented, green on both sides. Flowers in loose leafy clusters on slender branches. Calyx nearly covering seed. Woods and thickets, New York, New Jersey and south.

7. *C. urbicum*, L. UPRIGHT GOOSEFOOT. CITY GOOSEFOOT. Plant erect, 1 to 3 ft. high. Stem striated, green and white. Leaves triangular with irregular triangular teeth. Flower clusters leafless or nearly so, tall and spike-like, the flower groups crowded against the stem. Common.



PLATE 35

1. *Chenopodium Boscianum*. 2. *C. rubrum*. 3. *C. album*. 4. *C. polyspermum*. 5. *C. leptophyllum*. 6. *C. anthelminticum*. 7. *C. Bonus Henricus*. 8. *C. ambrosioides*. 9. *C. glaucum*. 10. *C. murale*. 11. *C. hybridum*.

8. *C. murale*, L. (Fig. 10, pl. 35.) NETTLE-LEAVED GOOSEFOOT. Plant with an offensive odor, leaves thin, shining green, rhombic to egg-shaped, apex acute, margins sharply and deeply toothed, clusters of flowers loose and spreading. Seeds not shining, acute at borders. Waste places; common.

9. *C. hybridum*, L. (Fig. 11, pl. 35.) MAPLE-LEAVED GOOSEFOOT. Plant bright green, 2 to 4 ft. high. Leaves triangular with long taper point and 1 to 3 triangular or lance points on margin of each side. Clusters of flowers leafless. Calyx leaving fruit exposed. Woods and thickets. Common.

10. *C. rubrum*, L. (Fig. 2, pl. 35.) RED GOOSEFOOT. Somewhat fleshy, 1 to 2½ ft. high, *stems becoming mostly red* or with red and green stripes. Leaves shining, green or red, rhombic, deeply and sharply toothed, base pointed, apex acute; upper leaves lance-shaped. Flower clusters scattered in axillary and terminal leafy spikes often the whole length of stem. Calyx lobes rather fleshy, and nearly or quite covering the seed. Saline soil; along the sea coasts.

11. *C. Bonus Henricus*, L. (Fig. 7, pl. 35.) GOOD KING HENRY. PERENNIAL GOOSEFOOT. Stem ridged 1 to 2½ ft. high. Leaves large, triangular, *margins entire*, green or slightly mealy. Flower groups rather dense, crowding closely around the stems, which are not freely branching, clusters leafless. Naturalized. Not very common. In waste places.

12. *C. Botrys*, L. FEATHER GERANIUM. JERUSALEM OAK. Plant ½ to 2 ft. high, with a strong odor; stem silky and glandular, somewhat hairy; leaves with long stems, oblong but cut by deep sinuses into a feather-formed leaf, the lobes rounded and toothed. Flowers in small groups loosely arranged in clusters only slightly leafy. Calyx partially enclosing fruit. Waste places throughout our area.

13. *C. ambrosioides*, L. (Fig. 8, pl. 35.) MEXICAN TEA. Plant 2 to 3 ft. high, strong scented, much branching. Leaves 1 to 3½ in. long, *with very short leaf-stalk*, ovate, margins sinuous. Glomerules, small axillary masses in long narrow very leafy clusters, these clusters descending far upon the stem. Calyx completely enclosing the fruit. In waste places.

14. *C. anthelminticum*, L. (Fig. 6, pl. 35.) WORMSEED. Plant resembling No. 12, but leaves strongly toothed and clusters of glomerules more elongated, less leafy. Upper leaves very narrow. Waste places. Naturalized from Europe.

2. ROUBIEVA, Moq.

A perennial plant of somewhat offensive odor, prostrate, much branched, with glomerules of very small flowers only in the leaf axils. Flowers with stamens only or pistils only or with both. Calyx 3- to 5-parted, enclosing the fruit; stamens 5, within the calyx.

R. multifida, (L.) Moq. (Fig. 2, pl. 36.) CUT-LEAVED GOOSEFOOT. Leaves small, lance-shaped, deeply cut at margins into linear or lance-shaped lobes, about 2 on each side, apex acute. Flowers 1 to 5 in a group, situated at the leaf axils. In waste places. Naturalized. June-Sept.



PLATE 36

1. *Blitum capitatum*. 2. *Roubieva multifida*. 3. *Atriplex arenaria*. 4. *A. rosea*. 5. *A. hastata*. 6. *A. patula*. 7. *Salicornia herbacea*. 8. *S. mucronata*. 9. *S. ambigua*. 10. *Suaeda maritima* 11. *S. americana*.

3. BLITUM, L.

Plant strongly resembling the *Chenopodiums* with flowers bearing stamens or pistils or both. Calyx *fleshy* and turning bright red at maturity giving to the rounded flower groups, which are arranged in long, erect, interrupted clusters, the appearance of bright berries attached to the stem. Stamens 1 to 5.

B. capitatum, L. (Fig. 1, pl. 36.) STRAWBERRY BLITE. Stem leafy below, but leafless above where the glomerules of flowers appear. Leaves triangular or spear-shaped, the base slightly concave, the other margins wavy indented. Leaf stems about as long as the leaves. Mostly in waste places. June-Aug.

4. ATRIPLEX, L.

Plants resembling the *Chenopodiums*. Flowers bearing stamens or pistils, mostly the two forms on different plants, but often on the same; rarely also flowers with both stamens and pistils. Calyx of staminate flowers 3- to 5-parted, the parts united at the base; that of pistillate flowers of 2 sepals which completely enclose the fruit, and which are more or less united and which are leafy bract-like. Embryo completely annular. Leaves alternate, rarely opposite.

Leaves long, narrow with plane margins or with one conspicuous tooth or more on each side *A. patula*
 Leaves triangular, the bases arching in *A. hastata*
 Leaves egg-shaped or triangular, bases arching out *A. rosea*
 Leaves oblong, margins plane *A. arenaria*

1. **A. patula**, L. (Fig. 6, pl. 36.) SPREADING ORACHE. Stems very much branched at base, the lowest branches spreading. Leaves alternate, narrow lance-shaped, with one or more conspicuous teeth on each margin or without teeth, the upper leaves linear. All the leaves tapering at the base, the upper nearly or quite without leaf-stalks, the lower with moderately long stalks. Flowers in glomerules along a branching stem. Waste places. July-Aug.

2. **A. hastata**, L. (Fig. 5, pl. 36.) HALBERD-LEAVED ORACHE. Stem erect, branching, rigid. Lower branches spreading. Leaves on slender stems, *opposite*, sometimes alternate, triangular with the bases arching in. The margins somewhat sinuous or toothed. Upper leaves narrow, margins entire. Calyx segments triangular, with or without teeth. Salt marshes and waste places. Aug.-Oct.

3. **A. rosea**, L. (Fig. 4, pl. 36.) RED ORACHE. Stem erect or prostrate, mealy. Leaves egg-shaped or rhomboid with the base arching outward, often turning red. Upper leaves narrow lance-shaped and generally toothed. Leaf margins sinuate or toothed. Calyx of fruiting flowers rhomboid with conspicuous teeth and with several tubercles on the sides. Glomerules arranged as in the preceding species. Waste places, sea coasts, occasionally inland.

4. **A. arenaria**, Nutt. (Fig. 3, pl. 36.) SEA-BEACH ATRIPLEX. Mealy, whitish, stem prostrate much branched; leaves oblong, margins without teeth. Fruiting flower, calyx triangular, toothed with tubercles on sides. Sandy sea beaches, Mass., southward.

5. KOCHIA, Roth.

Flowers with both stamens and pistils or with staminate and pistillate flowers separate but on the same plant. The herbaceous perianth cup-shaped, of 5 divisions. Stamens 5, pistils 2, which are united at the base. Fruit dry and hard, covered by the 5-parted calyx.

K. Scoparia, (L.) Roth. **KOCHIA**. An herbaceous or shrubby plant, stiff, erect, with linear leaves pointed at the end; branches long, flowers in the leaf axils. Introduced from Europe, where it is sometimes cultivated for making brushes, brooms, etc.

6. SALICORNIA, L.

Low fleshy plants growing in salt marshes; leafless or with the leaves reduced to small scales. Stem round; branches opposite. The stem articulated, the inconspicuous flowers partly buried in the nodes. Flowers mostly of 4 toothed, fleshy, sometimes winged divisions. Generally a single stamen, pistils 2. Fruit dry.

Annual

1. **S. herbacea**, L. (Fig. 7, pl. 36.) **SLENDER GLASSWORT**. (*S. europaea*, L.). Stems quite slender, the flower bearing spikes being at most only slightly more than one line in diameter, simple or freely branched. The scales very *inconspicuous and rounded at the ends*. Stamens of the middle flower protrude beyond the scale higher than do those of the two flowers at its sides. The plant remains green or turns red in autumn. Salt marshy places along the coast.

2. **S. mucronata**, Bigel. (Fig. 8, pl. 36.) **POINTED-SCALED GLASSWORT**. (*S. Bigelovii*, Torr.). Stems much stouter than those of No. 1. Scales *conspicuous* and pointed at the extremities. At maturity the whole plant turns red. Plant 3 to 15 in. high. Salt marshes.

Perennial

3. **S. ambigua**, Michx. (Fig. 9, pl. 36.) **WOODY GLASSWORT**. Plant arising from a woody rootstock; erect or reclining; scales pointed, short. Salt marshes along the sea coast.

7. SUAEDA, Forskal. (*Dondia*, Adams)

Flowers without footstalks, in the axils of the thick, almost rounded fleshy leaves, with both stamens and pistils. Perianth consisting of the fleshy calyx, which is in 5 divisions and which surrounds the fruit. Stamens 5, pistils 2 or 3. Plant of the sea-side.

1. **S. americana**, (Pers.) Fernald. (Fig. 11, pl. 36.) **TALL SEA-BLIGHT**. Plant 1 to 2 ft. high, erect or rarely prostrate, much branched or nearly simple; dark green without whitish bloom. Leaves of the stem linear, sharp pointed, $\frac{1}{2}$ to $1\frac{1}{2}$ in. long, somewhat 3-angled. Salt marshes, common.

2. **S. maritima**, (L.) Dumort. (Fig. 10, pl. 36.) **LOW SEA-BLIGHT**. Plant 5 to 12 in. high, light green and covered with whitish bloom. Leaves $\frac{1}{2}$ to 1 in. long, half round, not as sharp at extremity as those of No. 1. Salt marshes along the coast.

3. **S. Richii**, Fernald. RICH'S SUAEDA. Stems procumbent, forming mats. Leaves dark green, nearly cylindric, obtuse. Salt marshes and wet sand. Maine.

8. SALSOLA, L.

Herbs with branching stems and stiff awl-shaped prickly leaves in the axils of which the solitary flowers appear, directly on the main stems. Flowers with two fleshy bracts, calyx of 5 parts, stamens mostly 5, styles 2.

1. **S. Kali**, L. (Fig. 6, pl. 37.) SALTWORT. A coarse dull green, diffusely branching plant at the seaside. The branches more or less ascending or nearly prostrate. Leaves alternate, prickly; flowers solitary in axils of leaves, the divisions forming a violet colored rosette.

2. **S. Tragus**, L. (Fig. 5, pl. 37.) RUSSIAN THISTLE. Stem more slender than No. 1, leaves similar but less fleshy. Grows in cultivated fields. Introduced.

FAMILY II.—AMARANTHACEAE. AMARANTH FAMILY

Herbaceous plants, weeds, with simple leaves without stipules and with the greenish or white flowers generally in more or less densely crowded terminal heads or in lesser clusters in the axils of the leaves. Flowers with both stamens and pistils or with these organs in separate flowers in the same plant or with stamens on one plant and pistils on another. Petals absent; calyx dry herbaceous with 5 divisions, or absent. *Flowers partly or wholly surrounded by dry persistent bracts, commonly 3. These bracts in some cases brightly colored.*

Flowers with stamens and pistils, or, if these organs are in different flowers, both kinds on the same plant. Calyx of 5 divisions **Amaranthus**
Staminate and pistillate flowers not on the same plant; pistillate flowers without calyx **Acnida**

I. AMARANTHUS, L.

Coarse herbaceous weeds in waste grounds and gardens. Leaves simple, alternate, oval or rhomboid, indented. Stamens 5 or rarely less, either in the same flower with the pistils or in separate flowers generally on the same plant. Pistils 2 or 3. Flowers small, green or purplish, with three bracts.

Flowers in terminal spikes and axillary clusters.

Clusters in thick dense spikes *A. retroflexus*
Clusters in slender spikes.

Leaves pointed at apex.

Dry spines at base of leaves *A. spinosus*

Leaves without spines at base *A. hybridus*

Leaves rounded and dented at apex *A. lividus*

Leaves rounded, not dented at apex, flowers in interrupted spikes.

. *A. deflexus*



PLATE 37

1. *Amaranthus retroflexus*. 2. *Phytolacca decandra*. 3. *Mollugo verticillata*. 4. *Claytonia virginica*. 5. *Salsola Tragus*. 6. *S. Kali*. 7. *Acnida canabina*. 8. *Claytonia caroliniana*. 9. *Amaranthus graecizans*.

Flower clusters in the axils of leaves.

Leaves broadest at apex, with smooth margins, and a bristle point at apex.	
Stem prostrate	<i>A. blitoides</i>
Stem erect	<i>A. graecizans</i>
Leaves broadest at base.	
Borders indented	<i>A. crispus</i>
Borders smooth, indentation at apex	<i>A. pumilus</i>

1. *A. retroflexus*, L. (Fig. 1, pl. 37.) ROUGH PIGWEED. A common coarse weed in gardens with stout branching stem and long slender stalked leaves which are egg-shaped, rhombic or irregular, generally pointed at apex and less pointed at base. The leaf margins are smooth or undulate. Plant more or less covered by soft hairs. Flowers in compact spikes without leaves. Found mostly in cultivated grounds.

2. *A. hybridus*, L. SLENDER PIGWEED. Similar to No. 1, but more slender. The flower spikes are longer and less thick, leaves less rough and of a deeper, dull green, or dark purple. Found, like No. 1, in cultivated grounds.

3. *A. spinosus*, L. SPINY AMARANTH. Plant smooth. Leaves egg-shaped or ovate-rhombic on long slender leaf stalks. At the base of the leaf stalk and of the small branches start two narrow, dry spines. The upper clusters of flowers form cylindric spikes and are staminate, while the pistillate flowers are in globular clusters below. Flowers inconspicuous, yellowish-green. Waste grounds. Naturalized.

4. *A. blitoides*, S. Wats. PROSTRATE AMARANTH. Plant prostrate, smooth, pale green. Leaves broadly rounded at apex, narrow and pointed at base. Flowers in leafy clusters in the leaf axils. On railroad ballast in our area.

5. *A. graecizans*, L. (Fig. 9, pl. 37.) TUMBLE WEED. Smooth, pale green; stem $\frac{1}{2}$ to 2 ft. high, much branched and whitish. Leaves similar to No. 4, *i. e.*, obversely egg-shaped or spatulate, with a fine spine at the apex. Flowers surrounded by dry spiny bracts in small axillary groups. Common in waste grounds.

6. *A. lividus*, L. PURPLISH AMARANTH. Plant slender, 1 to 2 ft. high, with purplish and somewhat succulent stem. Leaves egg-shaped or rhomboid-ovate with apex obtuse and conspicuously indented. Terminal slender spikes of staminate, lower rounded clusters of pistillate flowers. Not very common. Eastern parts.

7. *A. deflexus*, L. LOW AMARANTH. Similar to No. 6, with leaves less obtuse and not indented at apex. Waste places, eastern parts of our area.

8. *A. crispus*, (L.) Braun. CRISP-LEAVED AMARANTH. Slender, prostrate, profusely branched, spreading as a mat $\frac{1}{2}$ to 2 ft. in diameter over the ground. Leaves oval or rhomboid with undulating borders. Clusters of flowers small in the leaf axils. Stems hairy. Albany, New York City and a few other localities.

9. *A. pumilus*, Raf. COAST AMARANTH. Low or prostrate, 3 to 8 in. high, with fleshy oval leaves or with leaves broader at apex. All distinctly indented at apex. On sea beaches, Rhode Island and southward.

2. ACNIDA, L.

Our species a tall succulent herb resembling the Amaranths. The

flowers, however, occur, the staminate on one and the pistillate on another plant. The pistillate flowers have no floral envelope except the dry bracts. Both forms are grouped in slender cylindric clusters similar to those of the *Amaranth*.

A. cannabina, L. (Fig. 7, pl. 37.) SALT MARSH WATER HEMP. Plant 2 to 6 ft. tall, in swampy places. Leaves, lance-shaped to linear with long not very sharp points at apex, narrowed at base. Leaf stalk rather shorter than leaf. Salt marshes, New Hampshire and southward.

Order V.—PHYTOLACCINEAE

Herbs with simple alternate, opposite or verticillate leaves. In our species all without stipules. Flowers regular in form, with both stamens and pistils. Number of stamens variable. Perianth of 5 parted calyx, the sepals white or slightly colored. Ovary of several cells composed of as many carpels, united to form a fleshy berry or a capsule which splits either longitudinally or transversely.

Fruit a fleshy berry **PHYTOLACCACEAE**

Fruit a capsule **AIZOACEAE**

FAMILY I.—PHYTOLACCACEAE. POKEWEED FAMILY

The general characters of the family are those of the order, with, in the family, a calyx which more or less resembles a corolla, with 5 to 15 stamens and with fruit composed of several carpels united.

PHYTOLACCA, (Tourn.) L.

The divisions of the white or pinkish calyx rounded and equal.

P. decandra, L. (Fig. 2, pl. 37.) POKEWEED. Plant 4 to 12 ft. high, stem succulent, branching, the flowers shallow bell-shaped. Flowers arranged along the flower stem as a raceme generally 4 to 6 in. long. Stamens 10, shorter than the rounded sepals. Ovary of 10 cells which form a ring constituting the fleshy berry which, when ripe, is dark purple in color. The root is an acrid poison. Rich soil throughout our region.

FAMILY II.—AIZOACEAE. CARPET WEED FAMILY

In our region two species only, these are prostrate, spreading herbs with opposite or verticillate leaves without stipules; flowers

small, calyx of 5 sepals, petals absent. Fruit a capsule opening by a circular transverse line or by lines up and down.

Capsule opening by a transverse line . . . **Sesuvium**

Capsule opening by a longitudinal line . . . **Mollugo**

1. SESUVIUM, L.

Prostrate fleshy herb at sea side with opposite spatula-shaped leaves, broadest at apex, which is rounded and sometimes slightly indented. Flowers without flower stems, springing at the leaf axils, small, pink or purple; stamens 5; capsule 3 to 5 celled with many seeds. The capsule opens by a circular line by which the cap separates from the cup-like seed basket.

S. maritimum, (Walt.) BSP. (Fig. 5, pl. 38.) SEA PURSLANE. Growing in sands by the sea shore. Long Island and southward.

2. MOLLUGO, L.

Herb, profusely branching with leaves inserted in whorls, of about 5 each, spatula-shaped, outer third broadest. Stipules absent. Flowers growing in circles at *the leaf whorls*, of 5 sepals, white, small. A prostrate weed in cultivated grounds and waste places.

M. verticillata, L. (Fig. 3, pl. 37.) CARPET WEED. INDIAN CHICK-WEED. Prostrate, branching profusely, forming a mat. Flower pedicels several at the axils of the leaves, each bearing a single white flower. Roadsides and cultivated grounds.

Group II. POLYPETALAE. Flowers with Distinct Petals

While, among modern botanists the division *Choripetalae* includes both plants whose flowers have calyx and corolla and plants whose flowers have no corolla, it is most convenient for the purposes of this work to follow the older practice of dividing the class into Apetalous and Polypetalous Exogens. In the preceding orders of Exogens or Dicotyledons the corolla has been absent or only in a rudimentary stage. In the remaining orders of *Choripetalae* the petals are evident and distinctly separate, with few exceptions.

Order I.—PORTULACINEAE

The general characters of the order are found in those of the single family.

FAMILY. PORTULACACEAE. THE PURSLANE FAMILY

This family is represented in our region by three genera, *Claytonia*, *Montia* and *Portulaca*. They are all small herbs with weak stems and more or less fleshy leaves which are always, in our native species, opposite. The flowers are provided with *both calyx and corolla*. The divisions of the former are but 2, of the latter 5, which are regular or very nearly so. Stamens 5, opposite the petals (*Claytonia*) or less in number (*Montia*) or variable in number (*Portulaca*). The fruit is a capsule, opening, in *Portulaca*, like a lid, in *Montia* and *Claytonia* splitting at the sides by 3 valves.

Stamens 3	Montia
Stamens 5	Claytonia
Stamens 8 to 15	Portulaca

I. MONTIA, L.

Small annual spreading plant with opposite fleshy leaves. Flowers small, funnel-shaped, white, of 5 petals and 2 sepals; flowers arranged in groups or singly. Stamens 3, style 3-parted, capsule 3-valved with 3 seeds.

M. fontana, L. (Fig. 2, pl. 38.) **WATER CHICKWEED. BLINKS. WATER BLINKS.** A densely tufted plant in springs and wet places.

Light green, spreading, prostrate or partly erect. Flowers mostly terminal.

2. CLAYTONIA, L.

Low weak stemmed plants with a pair of opposite leaves, exceptionally 2 or even 3 pairs. Sepals 2, petals 5, stamens 5, inserted at the base of the petals, the style 3 parted at apex, capsule 3 to 6 sided. The bell-shaped, pretty, purple veined flowers in a loose terminal cluster.

1. *C. virginica*, L. (Fig. 4, pl. 37.) SPRING BEAUTY. The weak stem springing from a tuberous root. Leaves linear lance-shaped (3 to 7 in. long). Grows in moist open woods. Common. April-May.

2. *C. caroliniana*, Michx. (Fig. 8, pl. 37.) CAROLINA SPRING BEAUTY. Springing from a tuberous root. Leaves broader than No. 1, ovate-lanceolate or oblong. Principally along the Alleghanies. April-May.

3. PORTULACA, L.

Prostrate spreading weed with opposite fleshy leaves, smooth, with terminal inconspicuous yellow flowers. Sepals 2, petals 5, stamens 7 to 15, petals generally 5 inserted on the calyx. Styles united below, divided above to 2 to 8. Seed box a capsule which often divides as a lid.

P. oleracea, L. PURSLANE. PURSLEY. Prostrate, freely branching. Leaves fleshy, broad-ovate, clustered at the end of the stems. Flowers without flower stems at the axils of the leaves. In cultivated grounds. A troublesome weed.

(The portulaca of the flower gardens is *P. grandiflora*, Hook. It is occasionally found escaped from cultivation.)

Order II.—CARYOPHYLLINEAE

Flowers all regularly symmetrical, with calyx and corolla except in *Paronychia*, *Anychia* and *Scleranthus*, in which genera the corolla is wanting, as it is also in a few species of other genera. Divisions of the calyx 4 or 5, the petals when present equal in number to the calyx divisions. Sepals free or growing together forming a calyx tube. Petals never growing together. Stamens twice as many as the sepals or less than that number. The stamen filaments sometimes united with each other, more frequently free. Ovary formed of 2 to 5 carpels, at maturity of a single cell. Styles 2 to 5. Seeds several or many, attached to a central column.

Herbs, annual or with perennial roots. Stems often swollen at the nodes, leaves opposite, without stipules or, in a few species, with membraneous stipulate appendages to the leaves.

FAMILY. CARYOPHYLLACEAE. THE PINK FAMILY

Sepals united to form a calyx tube . **TRIBE Silenoideae**

Sepals distinct or united only at the base

. **TRIBE Alsinoideae**

Tribe SILENOIDEAE

Calyx segments united, with ribs at the commissures. Stamens and petals situated, each in a circle below the ovary and free from it. Styles distinct from each other.

Calyx ribs between the united sepals at least twice as many as the teeth.

Styles 5, alternate with the calyx teeth **Agrostemma**

Styles 5, opposite the calyx teeth.

Capsule with a single cell extending to the base . . **Lychnis**

Styles 3 or rarely 4 **Silene**

Calyx ribs only 5.

Segments of calyx connected by a rather broad intermediary
membranous band **Gypsophila**

Segments of the calyx not united by membranous intermediary
band.

Petals with a lip-like appendage at the base of the spread-
ing blade **Saponaria**

Petals without appendage.

Leafy bracts enclosing the base of the calyx . **Dianthus**

1. AGROSTEMMA, L.

Herb with narrow, grass-like leaves which are without leaf-stems. Whole plant hairy. Flowers large, terminal, not grouped. Calyx divided above, the long narrow divisions or teeth exceeding the length of the rounded petals. The blades of the petals without appendages.

A. Githago, L. (Fig. 8, pl. 39.) **CORN COCKLE. CORN CAMPION.** Plant from 1 to 3 ft. high, quite erect, with few branches. Leaves quite narrow, slightly united at the base with those opposite. Whole plant hairy. Flowers red, from $1\frac{1}{2}$ to $2\frac{1}{2}$ in. broad. Found mostly in fields of grain or in waste places. Introduced from Europe. Not common.

2. SILENE, L.

Herbs with annual or perennial roots. Leaves opposite or crowded, generally long and narrow, with simple margins. Calyx tubular or much inflated; teeth 5 with twice as many nerves or ridges. Base of the flower without bracts. Petals 5, each with a lip-like appendage at the throat of the flower. Stamens 10. Styles 3 or rarely 4.

Leaves crowded on the stem in moss-like tufts, plant of high mountains *S. acaulis*
 Leaves in verticils, 4 leaves in a whorl *S. stellata*
 Leaves opposite, long and narrow.

Leaves mostly spatula-formed, at least the lower ones and rounded at the apex.

Calyx much inflated.

Flowers numerous *S. latifolia*

Flowers few *S. alba*

Calyx tubular, if inflated, only by the ripening of the pod. Stem-leaves viscidly hairy.

Petals crimson *S. virginica*

Petals pink *S. pennsylvanica*

Stem and leaves smooth or nearly so. Flowers in loose clusters . *S. nutans*
 Leaves narrow lance-shaped, pointed at apex.

Stem at the nodes glutinous.

Flowers in loose clusters *S. antirrhina*

Flowers in compact clusters *S. Armeria*

Stems and leaves viscid hairy.

Flowers in loose terminal clusters *S. noctiflora*

Flowers in spike-like clusters.

Flowers small, petals not deeply toothed . *S. angelica*

Flowers large, petals deeply toothed . . *S. dichotoma*

1. *S. acaulis*, L. (Fig. 8, pl. 38.) MOSS CAMPION. A dwarf species growing on the White Mountains. Leaves linear, densely crowded around the branching stems. Flowers without footstalks or with very short ones, solitary at the summit of the stem. Petals purple or whitish-purple. Flowers during the summer.

2. *S. stellata*, (L.) Ait. (Fig. 9, pl. 38.) STARRY CAMPION. Roots perennial. Stems 2 to 3 ft. high. Leaves in whorls of 4s, broader than in other species, with sharp points. Calyx bell-shaped; petals white, fringed at the borders. Flowers nearly an in. across, in loose clusters. Woods of our region. June-Aug.

3. *S. alba*, Muhl. (Fig. 1, pl. 39.) WESTERN WHITE CAMPION. Stem simple or somewhat branching, weak, smooth or nearly so. Leaves lance-shaped, 3 to 5 in. long, $\frac{1}{2}$ in. wide, tapering to a slender point. Flowers few or solitary, white, about $\frac{3}{4}$ in. broad. Calyx inflated, downy. Petals wedge-shaped. Moist places, Penna., and west. June-July.

4. *S. latifolia*, (Mill.) Britton and Rendle. (Fig. 3, pl. 38.) BLADDER CAMPION. (*S. vulgaris*, Gareke.) Stem and leaves smooth; joints somewhat swollen, especially the lower ones. Lower leaves somewhat spatula-formed, upper ones lance-shaped. Calyx nearly globular, much inflated, with strongly marked nerves. Petals deeply 2-cleft, the lip inconspicuous, white. Flowers all summer.

5. *S. nutans*, L. (Fig. 7, pl. 39.) NODDING CATCHFLY. Root perennial. Stem and leaves smooth or nearly so. Plant slender, erect, with loose clusters of flowers at the summit. Lower leaves sometimes broadest toward the apex, upper ones narrow, lance-shaped, with pointed ends. Flowers white or pink, $\frac{1}{2}$ to $\frac{2}{3}$ in. broad, the petals deeply 2-cleft. Not common. Sparingly naturalized from Europe. June-Sept.

6. *S. virginica*, L. FIRE PINK. CATCHFLY. Root perennial. Stem 12 to 20 in. high. Plant covered with viscid down. Lower leaves spatula-formed, broadly rounded at apex. Upper leaves broadly lance-shaped. Flowers few, loosely clustered, each flower on a foot-stalk about as long as the calyx. Calyx cylindric but with maturity of the capsule becoming broader at the top. Petals narrow, with two short teeth, color deep crimson. In southern part of our region. June-Aug.



PLATE 38

1. *Silene pennsylvanica*. 2. *Montia fontana*. 3. *Silene latifolia*. 4. *S. Armeria*. 5. *Sesuvium maritimum*. 6. *Lychnis alba*. 7. *Saponaria officinalis*. 8. *Silene acaulis*. 9. *S. stellata*.

7. *S. pennsylvanica*, Michx. (Fig. 1, pl. 38.) WILD PINK. (*S. caroliniana*, Walt.). Root perennial. Stem erect or prostrate, 4 to 16 in. high. Upper parts of the plant viscid, hairy, the lower less viscid or even without that character. Basal leaves narrow and rounded at apex. Stem leaves lance-shaped but not with very sharp points. Calyx tubular, swelling with the ripening of the seeds. Petals wedge-shaped, the outer border slightly notched. Flowers deep pink, conspicuous against the gravelly soil in the early spring. Rocky places, mostly in woods, southern half of our region. April-June.

8. *S. antirrhina*, L. (Fig. 3, pl. 39.) SLEEPY CATCHFLY. Root annual. Stem slender and erect, generally smooth, branching above, 8 to 30 in. high. Lower leaves broader than those above but lance-shaped and with sharp points. Flowers whitish pink, small, in a loose terminal cluster. Calyx ovoid, the small petals each with a single notch at the outer extremity. Fields and woods, most of our area. July-Sept.

9. *S. Armeria*, L. (Fig. 4, pl. 38.) SWEET WILLIAM. LOBEL'S CATCHFLY. Root perennial. Stems erect, smooth. Leaves somewhat egg-shaped, the lower with blunt, the upper with sharp points. Flowers in flat crowded, terminal cluster, purple or pink. Calyx tubular. Escaped from gardens. June-July.

10. *S. noctiflora*, L. (Fig. 2, pl. 39.) NIGHT-FLOWERING CATCHFLY. Root annual. Stem 1 to 3 ft. high, viscid, hairy. Lower leaves blunt, upper ones sharp pointed, all broadly lance-shaped or somewhat egg-shaped. Flowers few in a terminal cluster. Petals white or pinkish. Flowers open at dusk and remain open till morning. Waste places, introduced from Europe. July-Sept.

11. *S. angelica*, L. ENGLISH OR SMALL-FLOWERED CATCHFLY. (*S. gallica*, L.). Annual. Plant 1 to 2 ft. high, the stem rough with rather stiff hairs. Flowers small, white, with short foot-stalks, arranged along the upper part of the stem. Calyx cylindric, hairy. Waste places, introduced from Europe. April-July.

12. *S. dichotoma*, Ehrh. (Fig. 4, pl. 39.) FORKED CATCHFLY. Annual. Stem 1 to 2 ft. high, branching, hairy. Leaves lance-shaped or with the broadest part toward the apex, hairy. Petals white, each deeply divided, with only a partially developed lip. Calyx hairy with 5 ribs. Flowers arranged along the upper parts of the much forked stem, each flower with a very short foot-stalk. Fields and waste places, introduced from Europe. June-Sept.

3. LYCHNIS, L.

Plants resembling the *Silene*. Calyx egg-shaped, tubular or inflated, with commissural nerves. The flowers differ from those of *Silene* in that in *Lychnis* there are 5 styles while in *Silene* there are but 3 or rarely 4. The plants of this genus have, for the most part, perfect flowers, that is, they have both stamens and pistils, but occasionally the stamens and pistils occupy different flowers which are not upon the same plant, that is, they are *diocious*. All the species in our region have been introduced from Europe.



PLATE 39

1. *Silene alba*. 2. *S. noctiflora*. 3. *S. antirrhina*. 4. *S. dichotoma*. 5. *Lychnis dioica*. 6. *L. Flos-cuculi*. 7. *Silene nutans*. 8. *Agrostemma Githago*.

Flowers white	<i>L. alba</i>
Flowers red or purple, rarely white.	
Stems very viscid	<i>L. dioica</i>
Stems not viscid or only slightly so.	
Petals cut in two lobes	<i>L. chalcedonica</i>
Petals cut in four lobes	<i>L. Flos-cuculi</i>

1. *L. alba*, Mill. (Fig. 6, pl. 38.) WHITE CAMPION. EVENING LYCHNIS. Roots biennial. Stems 1 to 2 ft. high, hairy and viscid. Calyx broadly egg-shaped, hairy. Petals with two lobes and with a conspicuous lip appendage at the throat of the flower. Flowers white or with a tinge of pink, opening toward evening and remaining open until the following morning. Waste places; naturalized. Blooms through the summer.

2. *L. dioica*, L. (Fig. 5, pl. 39.) RED CAMPION. Root biennial, stem 1 to 2 ft. high; viscid, hairy. Lower leaves with long foot-stalks, upper without foot-stalks, broad lance-shaped or oval. Petals indented, forming two lobes. Flowers red or white. Calyx with erect narrow teeth. Capsule globose. In waste places, roadside, etc. Blooms during summer.

3. *L. chalcedonica*, L. SCARLET LYCHNIS. Root perennial. Stems with soft hairs, not viscid, 1 to 2½ ft. high, erect. Leaves egg-shaped. Petals 2 lobed. Flowers red, in hemispheric clusters. Escaped from gardens locally. July-Sept.

4. *L. Flos-cuculi*, L. (Fig. 6, pl. 39.) RAGGED ROBIN. CUCKOO FLOWER. Root perennial. Stems 1 to 2 ft. high, roughish above. Lower leaves with foot-stalks, points rounded, upper without foot-stalks, apex sharp pointed. Capsule teeth rolling outwards. Flowers rosy, blue or white. Escaped from gardens. June-Sept.

4. GYPSOPHILA, L.

Slender annual plant with profusely branching stems and small flowers. Leaves smooth, narrow. Flowers from the leaf axils. Calyx 5-toothed, bell-shaped. Stamens 10. Styles 2.

G. muralis, L. LOW GYPSOPHILA. Annual. Stems about 6 in. high, much branched, slender. Leaves small and very narrow. Flowers from the leaf axils on long delicate foot-stalks. Flowers purplish. Waste places. Introduced. June-Sept.

5. SAPONARIA, L.

Root perennial. Stem erect, with broad lance-shaped to oval leaves, with 3 conspicuous veins. Flowers rather large in a crowded, or loose conspicuous terminal cluster. Calyx ovoid or tubular with inconspicuous nerves, teeth 5.

1. *S. officinalis*, L. (Fig. 7, pl. 38.) BOUNCING BET. SOAPWORT. Plant growing in masses at roadsides and waste places. Flowers whitish-pink in dense terminal clusters, sometimes double.

2. *S. Vaccaria*, L. COW HERB. (*Vaccaria Vaccaria*, (L.) Britton.) Annual. Stem and leaves very smooth. Flowers in loose clusters, pale red, petals without the lip-like appendage at throat of flower. Waste places; from Europe. June-Aug.

6. DIANTHUS, L.

Perennial or annual herbs with narrow grass-like leaves and generally swollen joints. Calyx cylindric, at its base two leafy bracts sometimes nearly enclosing the calyx. Stamens 10; styles 2. Capsule cylindric opening at the summit dividing it into 4 or 5 teeth.

1. *D. Armeria*, L. DEPTFORD PINK. Annual. Flower cluster interspersed with long bract-like leaves which are as long as the calyx tube. Leaves hairy. Flowers small, dark rose colored. Introduced from Europe. July.

2. *D. prolifer*, L. PROLIFEROUS PINK. Annual. Slender stem and leaves. Flowers small. Calyx surrounded by bracts which are rather broad and less acutely pointed than those of No. 1. Not common.

3. *D. deltoides*, L. MAIDEN PINK. Lower leaves short and blunt at summit, upper ones narrow and acute, rough at the edges. Striae on the calyx extending its whole length. Flowers almost solitary, pink or whitish. In waste places. Blooms during the summer.

Dianthus barbatus, L. (Sweet William) with flowers in a somewhat crowded head is found occasionally growing wild, escaped from gardens.

Tribe ALSINOIDEAE

Divisions of the calyx not united at the base. Fruit capsules with as many or with twice as many teeth as there are styles.

Flowers with petals

Leaves without stipules or stipular appendages.

Petals bifid.

Plant smooth, without hairs, capsule ovoid or oblong *Stellaria*

Plant more or less hairy, capsule cylindric . . . *Cerastium*

Petals not bifid.

Petals and sepals 4, rarely 5. Styles as many as the sepals

and alternate with them *Sagina*

Petals 5, styles fewer than the sepals.

Plants not fleshy.

Stamens 10 *Arenaria*

Stamens 8 *Moehringia*

Plants fleshy *Ammodenia*

Leaves with stipules or membraneous appendages.

Leaves in whorls *Spergula*

Leaves in pairs *Spergularia*

Flowers without petals

Leaves with membraneous stipules.

Sepals with a terminal prickle *Paronychia*

Sepals without terminal prickles *Anychia*

Leaves without membraneous stipules.

Sepals united at base *Scleranthus*

1. STELLARIA, L. (Alsine, L.)

Perennials or annuals, generally tufted delicate herbs rarely more than a few inches in height, erect or recumbent. Flowers single or in a sort of irregular umbel; white; petals white, 4 or 5, deeply 2-notched, or cleft, sometimes wanting. Stamens 10 or less. Styles commonly 3. Capsule 1 celled, globose, dividing by twice as many valves as there are styles.

Styles 5 *S. aquatica*

Styles 3, rarely 4.

Leaves mostly with footstalks *S. media*

Leaves without footstalks or with very short ones at the base.

Leaves broad, breadth at least one-third the length.

Stems hairy, at least in lines.

Leaves generally more than $\frac{1}{2}$ in. long . . . *S. pubera*

Leaves generally less than $\frac{1}{2}$ in. long . . . *S. uliginosa*

Stems without hairs *S. humifusa*

Leaves narrow linear.

Flowers single or rarely several in a group . . . *S. longipes*

Flowers in loose terminal clusters.

Leaves acute at each end. Petals longer than sepals.

Flowers usually less than $\frac{1}{2}$ in. broad *S. longifolia*

Flowers usually more than $\frac{1}{2}$ in. broad *S. Holostea*

Leaves acute at each end. Petals shorter than the

sepals *S. borealis*

Leaves acute at apex, broad at base . . . *S. graminea*

1. *S. aquatica*, (L.) Scop. (Fig. 6, pl. 40.) WATER MOUSE-EAR CHICKWEED. Stems angular, diffuse, 1 to 2 ft. long, recumbent or erect. Leaves egg-shaped to slightly heart-shaped at base, acute at apex. Lower leaves an inch or more in length with short footstalks. Flowers in terminal loose clusters, sepals ovate, not as long as the petals. In wet places in our area. Blooms from May to August.

2. *S. humifusa*, Rottb. LOW CHICKWEED. Stems 2 or 3 in. long, without hairs, spreading, prostrate or partly erect. Leaves fleshy, egg-shaped or oblong, $\frac{1}{6}$ to $\frac{1}{4}$ in. long, rather obtuse or somewhat acute at apex. Petals equal to or longer than the sepals. Wet places, mostly salty marshes. Blooms all the summer.

3. *S. uliginosa*, Murr. BOG STARWORT. MARSH CHICKWEED. Stem weak, 6 to 16 in. long, nearly erect or decumbent, 4-angled; leaves oblong or nearly lance-shaped, the lower with short footstalks, the upper without. Flowers in groups of few flowers with short flower stems. In brooks and springs, common. In bloom all summer.

4. *S. media*, (L.) Cyrill. (Fig. 1, pl. 40.) COMMON CHICKWEED. Stems weak, partly or wholly erect or decumbent. Along the stem runs a line of hairs, otherwise stem smooth. Leaves broadly egg-shaped with footstalks as long or longer than the leaves below, shorter or none above. Flowers from the axils of the opposite leaves, small, white, on delicate



PLATE 40

1. *Stellaria media*. 2. *S. longifolia*. 3. *S. graminea*. 4. *S. longipes*. 5. *S. pubera*. 6. *S. aquatica*. 7. *Cerastium viscosum*. 8. *C. arvense*. 9. *C. nutans*. 10. *C. vulgatum*.

flower stems, or in terminal clusters; petals 2-parted; sepals acute and longer than petals. Plant 4 to 15 in. high. Waste and cultivated places. Common. Blooms all summer.

5. *S. pubera*, Michx. (Fig. 5, pl. 40.) GREAT CHICKWEED. Stems somewhat weak, erect or decumbent, with *two* lines of hairs. Leaves oblong, $\frac{1}{2}$ to $1\frac{1}{2}$ in. long, narrowed at each end, without footstalks except the lower ones. Flowers white, about $\frac{1}{2}$ in. broad, in terminal leafy groups. Flower stems more or less supplied with soft hairs. Petals 2 parted, longer than the sepals. Moist rocky places in southern part of our region. Blooms May and June.

6. *S. Holostea*, L. GREATER STITCHWORT. Erect; rootstock creeping. Stem 18 to 24 in. high. Leaves without leaf-stems, lance-shaped, tapering to a long slender tip. Flowers showy, $\frac{1}{2}$ to $\frac{2}{3}$ in. broad, in terminal, leafy, spreading (panicked) clusters. Flower pedicels rather slender. Sepals $\frac{1}{2}$ as long as the 2-cleft petals. Naturalized in a few localities; at Train's Meadow Road, Long Island and at Poland, Maine.

7. *S. longifolia*, Muhl. (Fig. 2, pl. 40.) LONG-LEAVED STITCHWORT. Stem weak, slender, the plant lying on or ascending by aid of grasses or other plants, 8 to 18 in. high, branching freely, angles rough; leaves linear, acute at each end, 1 to $2\frac{1}{2}$ in. long and about $\frac{1}{10}$ as wide. Flowers in a broadly spreading cluster on slender flower stems. Petals longer than the sepals. Common in damp meadows. May-June.

8. *S. graminea*, L. (Fig. 3, pl. 40.) LESSER STITCHWORT. LESSER STARWORT. Stem similar to last but somewhat stouter. *Leaves broader at base or just above it.* Flowers also similar to those of No. 7, but larger. May-July.

9. *S. longipes*, Goldie. (Fig. 4, pl. 40.) LONG-STALKED STITCHWORT. Stem very slender, smooth and shining. Leaves lance-shaped, narrow, broadest at or near the middle. Flowers few. Plant similar to Nos. 6 and 7. Moist places. Blooms all summer.

10. *S. borealis*, Bigel. NORTHERN STITCHWORT. Stem similar to Nos. 7 and 8. Leaves narrow lance-shape, broadest near the middle. Flowers few in loose terminal cluster. *Petals shorter than sepals.* In southern part of our region. Wet places. All summer.

2. CERASTIUM, L.

Generally hairy herbs with white flowers in regularly forking terminal groups. Petals all 2-cleft. Stamens nearly always 10. Styles 3 to 5 (generally 5). Seed capsule 1-celled, many seeded.

Flower stem (pedicel) not longer than the sepals	<i>C. viscosum</i>
Flower stem longer than the sepals.	
Leaves linear-oblong	<i>C. arvense</i>
Leaves oblong.	
Petals not longer than the sepals	<i>C. vulgatum</i>
Petals longer than the sepals.	
Leaves 1 to 2 in. long	<i>C. nutans</i>
Leaves $\frac{1}{2}$ to $\frac{3}{4}$ in. long	<i>C. alpinum</i>

1. *C. viscosum*, L. (Fig. 7, pl. 40.) MOUSE-EAR CHICKWEED. Stems nearly erect, clammy, 4 to 12 in. high. Leaves broad egg-shaped without leaf stems; apex rounded, base tapering, quite hairy. The sharp pointed hairy sepals longer than the petals or about the same length. *Flower*

stem not longer than the sepals. Flowers in terminal groups. In moist grassy places. Not common. May-June.

2. *C. vulgatum*, L. (Fig. 10, pl. 40.) LARGER MOUSE-EAR CHICKWEED. Stems clammy. Leaves oblong, tapering at each end, without leaf-stems, $\frac{1}{2}$ to 1 in. long, half as wide. Flowers in loose terminal groups, the pedicels longer than the sepals, mostly turning downward between flowering and fruiting. Petals equal to or longer than the sepals. Fields and woods, common. May-Sept.

3. *C. nutans*, Raf. (Fig. 9, pl. 40.) NODDING CHICKWEED. POWDER HORN. (*C. longipedunculatum*, Muhl.). Stems diffusely branched, clammy or nearly destitute of hairs; 6 to 24 in. long. Leaves 1 to 2 in. long, $\frac{1}{4}$ as wide; the middle and upper ones without leaf-stems, lower with short leaf-stems. Flowers in loose terminal clusters. Petals about twice the length of the sepals. Pods nodding and curved upward. Moist soil; much of our area. May-July.

4. *C. arvense*, L. (Fig. 8, pl. 40.) FIELD CHICKWEED. Growing in dense tufts, 4 to 10 in. high. Stems and leaves downy. Leaves linear lance-shape; on the flowering stems the pairs are distant. Petals more than twice the length of the calyx. Flowers terminal in groups of about 4. $\frac{1}{2}$ to $\frac{3}{4}$ in. broad. Dry rocky hills in all of our area. April-July.

Var. *oblongifolium*, Britt., (Fig. 13, pl. 41), Taller; leaves broader; pod about twice as long as the calyx. New York and southwest.

5. *C. alpinum*, L. ALPINE CHICKWEED. Flowering stems erect, 2 to 6 in. high, sterile stems prostrate. Leaves broad lance-shaped, rather obtuse at apex, $\frac{1}{2}$ to $\frac{3}{4}$ in. long and about $\frac{1}{2}$ as broad, hairy. Flowers terminal, about 2 to 4 in cluster. Petals twice as long as sepals. Scarcely found south of Canadian line.

3. SAGINA, L.

Small matted herbs with thread-like or awl-like leaves, without stipules and with small white or whitish flowers on very slender flower stems. Petals not divided as in the two preceding genera and sometimes absent. Petals and sepals equal in number when petals are present, sometimes varying in the same species, 4 or 5. Stamens as many as the sepals. Ovary with a single cell, many seeded. Styles as many as the sepals and opposite to them.

Parts of the flower in 4's.	
Plant depressed	<i>S. procumbens</i>
Plant erect	<i>S. apetala</i>
Parts of the flower in 5's.	
Petals longer than the sepals	<i>S. nodosa</i>
Petals shorter than the sepals	<i>S. decumbens</i>

1. *S. procumbens*, L. PROCUMBENT PEARLWORT. Growing in dense mats, stems 1 to 3 in. high, semi-erect or lying on the ground. Leaves thread-like, $1/12$ to $1/4$ in. long, the pairs joining at the stem. Flowers $1/12$ in. broad, terminal or from the axils of the leaves, on thread-like flower stems which are 6 to 8 times longer than the flower. Sepals generally longer than the petals. In moist places, in our area. May-Sept.

2. *S. apetala*, Ard. SMALL-FLOWERED PEARLWORT. Partly or wholly erect, 1 to 4 in. high, stem very delicate. Leaves $1/12$ to $\frac{1}{8}$ in. long, broadened at the stem and at the base sparingly hairy. Flowers on long

thread-like flower stems, without petals or with very minute ones. Sepals generally 4. Dry soil in Mass., westward. June.

3. *S. nodosa*, (L.) Fenzl. (Fig. 11, pl. 41.) KNOTTED PEARLWORT. Growing in tufts, partly or wholly erect, 2 to 6 in. high. Leaves in pairs or mostly, below, in 4's, thread-form. Flowers $\frac{1}{4}$ in. broad, the petals much longer than the calyx, 1 or 2 to each stem. Wet sandy places. Northern part of our area. June-Sept.

4. *S. decumbens*, (Ell.) T. and G. (Fig. 10, pl. 41.) DECUMBENT PEARLWORT. Tufted annual with stems decumbent or partly erect, 2 to 4 in. long. Leaves narrowly linear, sometimes bristle-tipped, about $\frac{1}{4}$ in. long. Flower stems thread-like $\frac{1}{4}$ to $1\frac{1}{4}$ in. long; flowers about $1/12$ in. broad. Sepals, petals and styles, each 5; stamens 5 or 10. Petals equal to or shorter than the sepals. Dry soil, eastern Mass., south and west.

4. ARENARIA, L.

Small tufted herbs, annual or perennial. Leaves opposite, without leaf stems and flowers in terminal groups. Flowers always white, petals rounded, not divided or notched at apex, or rarely with minute notch. Sepals 5, styles 3, stamens 10.

Leaves egg-shaped, the intervals about equal to or exceeding the length of the leaves *A. serpyllifolia*
Leaves awl-shaped.

Lower leaves sparingly overlapping *A. verna*

Lower leaves densely overlapping *A. caroliniana*

Lower leaves in distinct whorl-like bundles *A. stricta*

Intervals between all the leaf pairs exceeding the length of the leaves *A. groenlandica*

1. *A. serpyllifolia*, L. (Fig. 8, pl. 41.) THYME-LEAVED SANDWORT. Stems 2 to 6 in. high, somewhat hairy, diffusely branched. Leaves egg-shaped, without leaf-stems, $1/6$ to $1/4$ in. long, the intervals between the pairs about equal or sometimes exceeding the length of the leaves. Flowers in terminal loose clusters, small; sepals sharp pointed with 3 to 5 nerves. In waste sandy or rocky places. June-Aug.

2. *A. verna*, L. VERNAL SANDWORT. Stems 1 to 3 in. high, growing in dense tufts. Leaves narrow awl-shaped, overlapping below but not densely so. Flowers numerous in loose clusters. Sepals sharp pointed with 3 nerves. Petals somewhat exceeding the sepals in length. Smugler's Notch, Vermont and northward. June-Sept.

3. *A. caroliniana*, Walt. (Fig. 6, pl. 41.) PINEBARREN SANDWORT. Stems densely tufted, 4 to 6 in. high. Leaves of lower part of stem densely overlapping, the upper portion of the stem without leaves or with 1 or 2 pairs. Flower clusters terminal, about 3 or 4 to a stem, $1/2$ to $2/3$ in. across. Sepals blunt, without nerves. Petals narrow, 3 or 4 times as long as the sepals. In sand, in the southern part of our area. May-July.

4. *A. stricta*, Michx. (Fig. 4, pl. 41.) ROCK SANDWORT. Stems slender in dense tufts, 5 to 15 in. high. Leaves bristle-like with clusters of 6 to 8 extra leaves in the axils forming a whorl-like fascicle. Flower cluster diffuse, leafless except a few bracts at the divisions of the stems. Petals rounded at apex, twice as long as the narrow and acute sepals.

5. *A. groenlandica*, (Retz.) Spreng. (Fig. 3, pl. 41.) MOUNTAIN



PLATE 41

1. *Ammodenia peploides*. 2. *Spergularia marina*. 3. *Arenaria groenlandica*. 4. *A. stricta*. 5. *Scleranthus annuus*. 6. *Arenaria caroliniana*. 7. *Moehringia lateriflora*. 8. *Arenaria serpyllifolia*. 9. *Spergularia rubra*. 10. *Sagina decumbens*. 11. *S. nodosa*. 12. *Spergula arvensis*. 13. *Cerastium arvense* var. *oblongifolium*.

SANDWORT. MOUNTAIN STARWORT. Stems in dense tufts 3 to 6 in. high, each dividing into a few (about 3) branches above, each slender branch bearing a somewhat showy, white flower. The tuft presents a gay appearance. Leaves bristle-form, about $\frac{1}{3}$ the length of the node between the pairs. Flowers about $\frac{1}{2}$ in. in diameter on thread-like foot stalks. On high mountains, Adirondacks, Catskills and White Mountains. June-Sept.

5. MOEHRINGIA, L.

Our species low herbs, perennial, with oblong or oval leaves, with no leaf stalks or with a very short one, with small white flowers in a diffuse lateral or terminal cluster. Sepals and petals 4 or 5. Stamens 8 or 10. Capsule few-seeded, oblong or ellipsoid.

1. **M. lateriflora**, (L.) Fenzl. (Fig. 7, pl. 41.) **BLUNT-LEAVED SANDWORT.** Stems covered with a fine down, 4 to 12 in. high, erect or nearly so. Leaves oblong or oval $\frac{1}{2}$ to 1 in. long, blunt at each end. Clusters few flowered, lateral or terminal or flowers solitary, about $\frac{1}{4}$ in. broad, petals and sepals 4 or 5. Stamens 8 to 10. Petals and sepals rounded at apex. Capsule nearly twice as long as the calyx. Moist places, southern and central New York, New Jersey and southward. May-June.

2. **M. macrophylla**, Hook. With narrower leaves and with pointed sepals. N. Guildford and Durham, Conn., Vermont and northward.

6. AMMODENIA, J. G. Gmel.

Fleshy herbs at seaside. Leaves egg-shaped or oblong. Flowers small, in the axils of the leaves or at the division of the stem. Petals small, inconspicuous, 3 in number, rarely 4. Sepals equal in number to the petals. Stamens 8 to 10. Styles 3.

A. peploides, (L.) Rupr. (Fig. 1, pl. 41.) **SEA BEACH SANDWORT.** Stems tufted, 6 to 10 in. high, branching or simple. Leaves egg-shaped, the apex sometimes broadest, clasping the stem at base. Flowers about $\frac{1}{4}$ in. broad, in the leaf axils (usually only 1 flower to a pair of leaves), at the branching of the stem or terminal. Sands of the sea shore. June-July.

7. SPERGULA, L.

Branching herbs with bristle or awl-formed leaves *with stipules*. Flowers in diffuse clusters, white. Stamens 5 to 10; styles 5; sepals and petals 5.

S. arvensis, L. (Fig. 12, pl. 41.) **SPURRY. CORN SPURRY.** Stems 6 to 18 in. high, the whole plant hairy. Leaves with stipules, slender, cylindric, awl-shaped, clustered in fascicles about the stem (20 or more in a sort of whorl). Flowers white. $\frac{1}{4}$ in. or more in diameter, in diffuse clusters at summit of stem. Petals somewhat pointed at apex. Sepals about as long or slightly longer than the petals. Mostly a weed in fields and waste places. Common.

8 SPERGULARIA, J. & C. Presl. (Tissa, Adams, Buda, Adams)

Low herbs with bristle-like, mostly fleshy, leaves, opposite or in whorl-like bundles, stipules at base of leaves. Flowers singly in the axils of

the leaves or terminal, whitish or pink. Sepals 5; petals 5; stamens 2 to 10; styles 3 except No. 1. Found on or near the sea coast, in wet sand.

1. *S. rubra*, (L.) J. & C. Presl. (Fig. 9, pl. 41.) SANDY SPURRY. PURPLE SANDWORT. Growing in *dry soil*, in waste places as a low, slender, spreading weed, stems 2 to 6 in. long. Plant smooth or nearly so. Leaves flattened, *scarcely fleshy*. Flowers bright pink, small, the petals generally not exceeding the calyx.

2. *S. marina*, (L.) Griseb. (Fig. 2, pl. 41.) SALT-MARSH SAND SPURRY. Grows in brackish sands, salt marshes along the New England coast, spreading with numerous branches, stems 4 to 8 in. long; smooth or with fine hairs. Leaves not in fascicles, bristle-form, rounded, quite fleshy, with egg-shaped stipules at base. Flowers small, pink, the *flower stem about twice as long as the flower*. Salt marshes on the coast, also those at Salina, N. Y.

3. *S. canadensis*, (Pers.) Don. NORTHERN SAND SPURRY. Plant similar to No. 2, but with white flowers on flower stems three or four times as long as the flowers. Muddy shores, R. I., Mass., and northward.

9. PARONYCHIA, Adams

Tufted herbs, sometimes woody at base, with opposite leaves and membranous, dry, silvery, leaf appendages (stipules). Flowers clustered among dry membranous bracts, without petals. Calyx of 5 divisions, bristle-pointed. Stamens 5; style 2-cleft at summit.

P. argyrocoma, (Michx.) Nutt. (Fig. 7, pl. 43.) SILVER WHITLOW-WORT. Growing in tufts in rocky, generally high, situations (White Mts., etc.), stems 3 to 8 in. high, with silvery scale-like hairs. Flowers in very dense clusters surrounded by dry silvery bracts. Rocky places, Maine, White Mountain region and southward.

10. ANYCHIA, Michx.

Slender herbs not growing in tufts, with repeatedly forking stems and small inconspicuous greenish flowers without petals in the axils of the leaves. Leaves elliptic, smooth, opposite, with very small dry stipular appendages. Calyx of 5 divisions, greenish without bristle points; stamens 2 to 5; styles 2.

1. *A. polygonoides*, Raf. (Fig. 6, pl. 43.) FORKED CHICKWEED. (*A. dichotoma*, Mich.) Stem and leaves *downy, mostly prostrate or partly erect*, 3 to 10 in. long. Leaves very narrow, elliptic, rounded at apex, about 1/6 in. long, without foot-stalks. In dry thickets and open places, throughout our area.

2. *A. canadensis*, (L.) BSP. (Fig. 8, pl. 43.) SLENDER FORKED CHICKWEED. Resembling the last, but stem and leaves mostly without hairs; plant 6 to 12 in. high and *usually erect*. Leaves 1/4 to 2/3 in. long. Dry woods and open places.

11. SCLERANTHUS, L.

Low tufted herbs with forking stems. Leaves without stipulate appendages, narrow awl-shaped. Flowers green, without petals, at axils

of leaves and in diffuse terminal clusters. Calyx deeply 5-lobed. Stamens usually 5 opposite to and attached to the divisions of the calyx.

S. annuus, L. (Fig. 5, pl. 41.) KNAWEI. GERMAN KNOT GRASS. Stems 3 to 5 in. long, much branched, prostrate or partly erect, smooth or with very soft hairs. Leaves mostly curving backward. Calyx tube 10-angled. Fields and waste places. Common.

Order III.—RANALES. Order of the Buttercups. Polycarpes

The most characteristic feature of this large order, in which plants of widely different appearance and habits are united, is found in the *carpels* or fruits, each carpel being regarded as a sort of modified leaf folded so as to contain the ovules. By referring to the figures at the head of the Family Ranunculaceæ a general idea of these carpels may be obtained. They are most frequently independent, as in the buttercups, and in general they are quite numerous but, *e. g.*, in the barberry the number is reduced to one.

The insertion of the parts of the flower is for the most part spirally around the base of the carpels, but in some instances, as in the case of the common white water lily, the stamens and petals are inserted into the sides of the consolidated group of carpels which form a single globe-like fruit. In the greatest number of genera the flowers are regular, that is, parts of the same kind are alike as in the common buttercup, but in other genera the flowers are quite irregular (Larkspur, Aconite).

Aquatic Plants.

With broad heart-shaped or shield-shaped leaves and conspicuous flowers **NYMPHAEACEAE**

With whorls of dissected leaves and flowers without floral envelope **CERATOPHYLLACEAE**

Trees.

With large conspicuous flowers.

Leaf buds covered by membranous stipules
. **MAGNOLIACEAE**

Leaf buds naked, leaves without stipules **ANONACEAE**

Trees and shrubs with small, mostly inconspicuous flowers.

With thorny spines below leaf axils. Carpel one
. **BERBERIDACEAE**

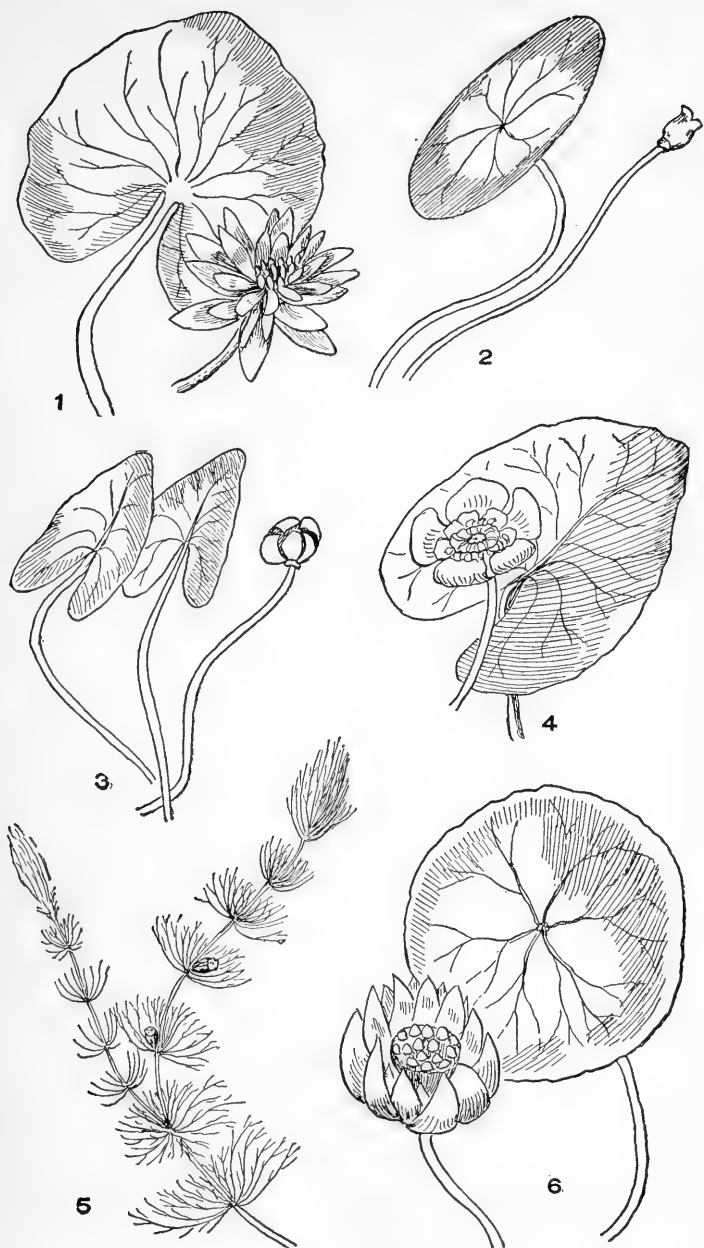


PLATE 42

1. *Castalia odorata*. 2. *Bransenia purpurea*. 3. *Nymphaea microphylla*. 4. *N. advena*. 5. *Ceratophyllum demersum*. 6. *Nelumbo lutea*.

Without thorny spines **LAURACEAE**
 Woody climber, leaves not compound . **MENISPERMACEAE**
 Woody climber, leaves compound. Clematis in *Ranunculaceae*.
 Herbs.

With several or many independent carpels, stamens
 mostly more than 12 **RANUNCULACEAE**

FAMILY I.—**NYMPHAEACEAE**. WATER LILY FAMILY

Aquatic herbs, the long creeping rootstocks of which are perennial. The shield-shaped or large heart-shaped leaves float on the surface of the water. Flowers solitary, regular, with both stamens and pistils. Divisions of the calyx and corolla in some species variable, passing from one form to the other. Stamens more than 10, also passing by slight gradings into petals.

Leaves all oval, shield form with footstalks near the center
 **Brasenia**

Leaves all heart-shaped, deeply cut at base.

Flowers yellow **Nymphaea**

Flowers white.

Fruit globose **Castalia**

Fruit an inverted cone **Nelumbo**

1. **BRASENIA**, Schreb.

Submersed stems often several feet long, branching. Leaves on long slender foot-stalks, oval, shield-form with the foot-stalks inserted near the center. Floating, borders undivided, 2 to 4 in. long.

B. purpurea, (Michx.) Casp. (Fig. 2, pl. 42.) **WATER SHIELD**. **WATER TARGET**. (*B. Schreberi*, Gmel. *B. peltata*, Pursh.) Flowers dull purple. The oval leaves floating in groups on the surface of ponds and streams. Blooms through the summer.

2. **NYMPHAEA**, L. (**Nuphar**, Sibthorn and Smith)

Submersed stems rather stout. Leaves with deep sinus at base. Flowers yellow, sepals 5, colored, petals small, in the cup of the colored calyx, graduating into the stamens. Sepals, petals and stamens surrounding the foot-stalk at base of the ovary. The compound carpels uniting into a single pistil.

1. **N. advena**, Soland. (Fig. 4, pl. 42.) **LARGE YELLOW POND LILY**. Leaves 5 to 12 in. long, 2/3 as wide. Flowers 1½ to 3½ in. diameter, deep yellow. Disk at summit of pistil 12 to 25 rayed, yellow or pale red. Common in still water. April-Sept.

2. **N. hybrida**, Peck. **RED DISKED POND LILY**. Similar to No. 1, but smaller and with the disk at summit of pistil bright red or crimson and

9 to 12 rayed. Intermediate between 1 and 3. Ponds, northern New York. May-Sept.

3. *N. microphylla*. Pers. (Fig. 3, pl. 42.) SMALL YELLOW POND LILY. (*N. Kalmiana*, Sims.) Leaves 2 to 4 in. long, $\frac{2}{3}$ as broad, some leaves submersed. Flowers smaller than No. 1 or 2. Sepals 5. Lakes and ponds in our area.

3. CASTALIA, Salisb.

Aquatic herbs with showy white flowers. Sepals 4. Petals many, graduating into stamens. Stamens many. Petals and stamens arising from surface of the rounded seed casket.

1. *C. odorata*, (Dryand.) Woodv. and Wood. (Fig. 1, pl. 42.) SWEET-SCENTED WHITE WATER LILY. (*Nymphaea odorata*, Ait.) Leaves orbicular with a deep narrow sinus, 4 to 12 in. in diameter. Flowers white or tinged with pink, perfume abundant but pleasing. Ponds and slow streams. June-Sept.

2. *C. tuberosa*, (Paine.) Greene. TUBEROUS WHITE WATER LILY. Similar to No. 1, but without or nearly without perfume. Lake Champlain and other northern lakes and ponds.

4. NELUMBO, (Tourn.) Adams

Resembling Castalia, but leaves with foot-stalks at or very near the center and with petals and stamens arising *below* the seed casket, which is in form of an inverted cone. The upper surface shows a number of pits in which the seed carpels are lodged.

1. *N. lutea*, (Willd.) Pers. (Fig. 6, pl. 42.) AMERICAN LOTUS. Leaves prominently ribbed. Plant and flower resembling Castalia, but the petals are less uniform and the knobbed upper surface of the seed casket is conspicuous in the midst of them. In Connecticut River and in lakes in southern New Jersey. Also in Sodus Bay, N. Y.

2. *N. nucifera*, Gaertn. INDIAN LOTUS. (*N. Nelumbo*, (L.) Karst.) Leaves rounded, standing above the surface of the water or floating, 2 to 3 ft. in diameter, the leaf-stalks 3 ft. or more in length. Flowers pink or white, 4 to 10 in. broad on flower stems 3 to 6 ft. high. Introduced into this country by Mr. Edmund D. Sturtevant. Now naturalized at Bordentown, N. J. Cultivated in many parks. July-Aug.

FAMILY II.—CERATOPHYLLACEAE. HORNWORT FAMILY

Submersed aquatics with finely dissected leaves in whorls. Staminate and pistillate flowers separate, on the same or on different plants. Staminate flowers with numerous stamens surrounded by an 8 to 12 parted colorless perianth, as is the pistil in the pistillate flower.

CERATOPHYLLUM, L.

Herbs growing under water in ponds and other quiet waters. Leaves very finely dissected.

C. demersum, L. (Fig. 5, pl. 42.) HORNWORT. Stems 2 to 8 ft.

long, depending on the depth of the water. Found commonly throughout our region in still waters.

FAMILY III.—**MAGNOLIACEAE.** MAGNOLIA FAMILY

Trees with alternate undivided leaves which in bud are covered by membranous stipules which may fall as the leaves spread. Flowers always large and showy on a convex or conical receptacle. Parts of the perianth not united and always regular. Stamens numerous, carpels (seed caskets) several and independent, arranged upon the elongated conical or cylindric receptacle.

1. **MAGNOLIA.** L.

Flowers large, *white*, or yellowish-green with 3 colored sepals and from 6 to 12 petals in 2 to 4 rows, smaller than the sepals. Fragrant. Seeds fleshy which hang to the elongated receptacle by slender threads which hold them in relation to the thin matrix till they are well ripened.

1. *M. virginiana*, L. (Fig. 1, pl. 43.) LAUREL MAGNOLIA. SWEET BAY. (*M. glauca*, L.). Tree 15 to 70 ft. high, rarely attaining the height of the latter figure in our region. Leaves thick, broad, oval, tapering at base, obtuse at apex or suddenly acute. Dark, shining green above, light green and slightly hairy beneath. Flowers globe-shaped. In swampy places, in the southern half of our region. May-June.

2. *M. acuminata*, L. (Fig. 5, pl. 43.) CUCUMBER TREE. A large tree (60 to 90 ft. high). Leaves *thin*, broadly rounded at base, acute at apex. Flowers smaller than No. 1, 2 in. high, bell-shaped, greenish-yellow. Cone of fruit a long cylinder from which the common name of the tree is derived. Southern New York, New Jersey and southward. Other species of *Magnolia* are found in our parks and private grounds which are native further south.

2. **LIRIODENDRON,** L.

Large forest tree with leaves in general form of a heptagon, 4 to 6 lobes. Flowers large, sepals 3, petals 6, the former turned backward, the latter erect, seeds suspended by filaments.

L. Tulipifera, L. (Fig. 2, pl. 43.) TULIP TREE. WHITE WOOD. Leaves heptagonal or nearly orbicular, the apex abruptly terminated with a notch at midvein. Flowers a delicate greenish-yellow, orange within. In woods and along fences.

FAMILY IV.—**ANONACEAE.** CUSTARD APPLE FAMILY

The characters are sufficiently indicated in those of the genus below.

ASIMINA, Adams

Small tree with alternate leaves which are long and broadest toward the apex (6 to 12 in. long by 2 or 3 in. broad). Flowers 1 to 2 in. across; sepals 3, as broad as long. Petals 6, arranged

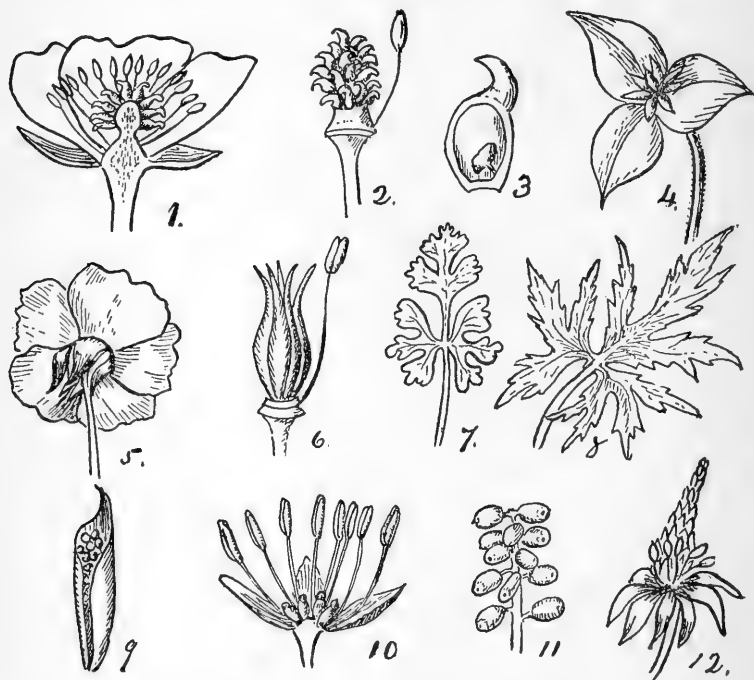


PLATE 43

1. *Magnolia virginiana*. 2. *Liriodendron Tulipifera*. 3. *Asimina triloba* (mature leaves). 4. *A. triloba* (young leaves and flower). 5. *Magnolia acuminata*. 6. *Anychia polygonoides*. 7. *Paronychia argyrocoma*. 8. *Anychia canadensis*.

in 2 series. Stamens from 3 to 15. Carpels also from a few to several. Only a single species in our region.

A. triloba, (L.) Dunal. (Figs. 3 and 4, pl. 43.) NORTH AMERICAN PAPAW. Tree found only in the southern part of our region. Flowers dull purple, petals 3 or 4 times as long as sepals.



1. Section of a flower of Buttercup showing the arrangement of calyx, petals, stamens and the numerous carpels (achenes), which are arranged about the receptacle. 2. The cluster of achenes on the receptacle with a single stamen, which is seen to arise from a ring at the foot of the receptacle. 3. A single achene cut lengthwise to show the single seed. 4. A group of achenes of *Hepatica* above the three bracts of the involucre. 5. Flower of *Ranunculus bulbosus*, showing the reflected sepals. 6. A group of follicles with a single stamen arising from the base of the receptacle. 7. Leaf of *Ranunculus bulbosus*. 8. Leaf of *R. acris*. 9. A follicle partly opened showing the double row of seeds. 10. Section of a flower of *Thalictrum* showing stamens, carpels and small sepals, much enlarged. 11. Cluster of berries of *Actea*. 12. Flower of *Myosurus*.

FAMILY V.—RANUNCULACEAE. THE CROWFOOT FAMILY

(Numerals in brackets refer to figures above.)

A large and important family with a great variety of forms. All of our species are herbs with the exception of those of *Clematis* and *Atragene*, which are climbing vines and *Xanthorrhiza*

which is a small shrub. Leaves alternate, except *Clematis* and *Atragene*, with the base of the foot-stalk broad and often clasping. In this family are found plants widely differing in appearance, but certain characteristics are common to all. The flowers in most of the species are regular, but in some they are quite irregular, as in the larkspur. So also the flowers of most species are complete in having sepals, petals, stamens and pistils, yet some, as for example, the clematis species, have large colored sepals while the petals are greatly reduced or are absent. In *Thalictrum* the flower is still further modified, for here not only is the corolla absent (10), but in some of the species the stamens are found in the flowers of one plant and the pistils in those of another. The seeds are contained in carpels which have the form of *achenes* in which there is but a single seed in the casket; of *follicles* when there are numerous seeds in the casket, while in a few instances the seeds are enclosed in a fleshy berry (11). Stamens numerous. Pistils numerous, few, or only one.

The *carpels* or seed caskets form a convenient means of dividing the genera into groups and they should be studied with care. Observe the difference between the entirely closed nut-like achene (3) and the generally longer seed casket, the follicle (6), with its line for splitting when the fruit is ripe (9).

FIRST GROUP

(References to figures in this Key are to those at the head of Family *Ranunculaceae*.)

Seeds in achenes (see Fig. 1).

Achenes with long plumose tails . . . **Clematis, Atragene**

Achenes grouped around a tall spike (Fig. 12) . . . **Myosurus**

Achenes in rounded or slightly elongated heads (Fig. 2).

Flowers with only one envelope, but with a short whorl of leaves resembling a calyx near the flower (Fig. 4). . . **Hepatica**

Whorl of stem leaves at some distance below the flower.

Flowers in an umbel **Anemonella**

Flowers not in an umbel **Anemone**

Leaves on flower stem not in a whorl.

Flowers numerous **Thalictrum**

One-flowered **Hydrastis**

Flowers with two envelopes, calyx and corolla.

Herbs, flowers yellow.

Head rounded or elongated, achenes (Fig. 2)	
smooth	Ranunculus
Heads elongated, achenes ridged . . .	Oxygraphis
Herbs, flowers white	Batrachium

SECOND GROUP

Seeds in a follicle

(Figs. 6 and 9)

Shrub	Xanthorrhiza
Herbs.	
Flowers yellow.	
Leaves undivided	Caltha
Leaves dissected	Trollius
Flowers red and yellow	Aquilegia
Flowers blue.	
Upper petal a long spur	Delphinium
Upper petal a hood	Aconitum
Flowers white.	
In a spike	Cimicifuga
Solitary.	
Flower stem naked	Coptis
Flower stem leafy	Isopyrum

THIRD GROUP

<i>Seeds in berries</i> (Fig. 11)	Actaea
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FIRST GROUP

(A.) *Carpels one seeded. Flowers with a single envelope, a calyx colored like a corolla*

1. CLEMATIS, L.

Climbing woody vines and erect herbs. Leaves of the twiners opposite on slender foot-stalks, simple or more frequently compound. Those of No. 3 without foot-stalks. Flower of 4 conspicuous colored sepals, the petals wanting. Achenes numerous, each with a long plumose tail.

Vines 10 to 20 ft. long.

Flowers white	<i>C. virginiana</i>
Flowers purple	<i>C. viorna</i>
Erect herbs with greenish flowers	<i>C. ochroleuca</i>

1. *C. virginiana*, L. (Fig. 1, pl. 46.) VIRGIN'S BOWER. A long vine, common, clinging by its leaf stalks to shrubs, trees and fences and bearing a profusion of white flower clusters, which are borne on long flower stalks springing from the axils of the opposite compound leaves. After the fall of the flowers the vine continues to be highly ornamental

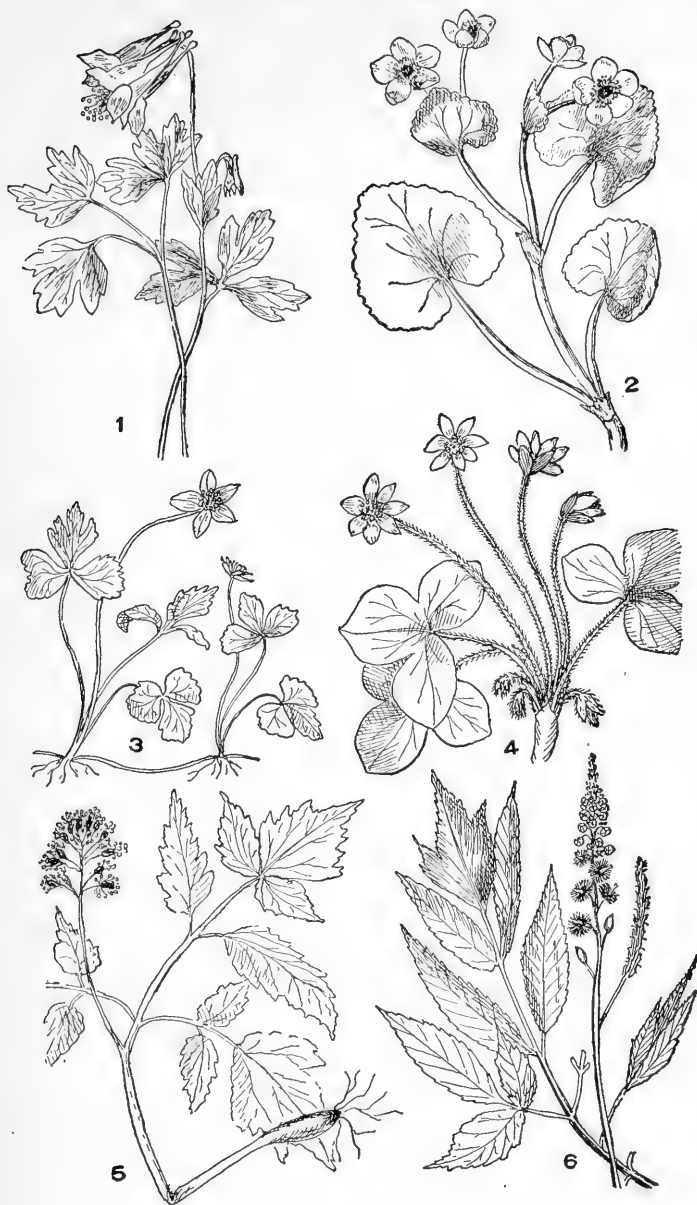


PLATE 44

1. *Aquilegia canadensis*. 2. *Caltha palustris*. 3. *Coptis trifolia*. 4. *Hepatica triloba*. 5. *Actaea rubra*. 6. *Cimicifuga racemosa*.

by virtue of the clusters of plumed seed caskets, which become nearly or quite as conspicuous as the clusters of white flowers. July-Sept.

2. *C. viorna*, L. LEATHER FLOWER. Flower purple, bell-shaped. Rare, if found at all, in our region.

3. *C. ochroleuca*, Ait. (Fig. 3, pl. 46.) ERECT SILKY CLEMATIS. Erect, 1 to 2 ft. high. Leaves not compound, broadly egg-shaped and without foot-stalks or with very short ones. Flower nodding, solitary, bell-shaped, about 1 in. long. Color, yellowish-brown. Fields and copses, in our region. May.

2. ATRAGENE, L.

Similar to Clematis, but differentiated by the presence of a few small petals. The sepals very large, forming a showy flower.

A. americana. Sims. (Fig. 4, pl. 46.) PURPLE VIRGIN'S BOWER. (*Clematis verticillaris*, DC.) A climbing vine, 10 to 20 ft high, clinging to shrubs and trees. Leaf stems forming a whorl about the main stem. Leaflets on foot-stalks nearly as long as themselves. Flowers solitary, 2 to 4 in. broad, of 4 large purple sepals on a long flower stem. One or more flower stems from the same axil. Rocky hills, not common. May-June.

3. HEPATICA, Hill

Leaves all from the base (radical) except the three small leaf-like organs which are situated just below the flower and resemble a calyx (Fig. 4, p. 396). The true leaves, which are somewhat triangular, or broadly heart-shaped are three-lobed and rather thick and form a brownish or dark green mat which spreads upon the surface of the ground or over the dead leaves of the woods in which the plant best thrives. Several hairy flower-stalks usually arise from the same root, each from 3 to 6 in. high, bearing a single blue, purple or whitish-purple flower just above the calyx-like involucre of three stem-leaves. The hepatica is one of the earliest and most attractive flowers of the spring.

1. *H. triloba*, Chaix. (Fig. 4, pl. 44.) ROUND-LEAVED HEPATICA. LIVERLEAF. LIVERWORT. With the lobes obtuse or rounded.

2. *H. acutiloba*, DC. SHARP-LOBED HEPATICA. With lobes much more acute than in *H. triloba*. In rich moist woods. April-May.

4. ANEMONE, L.

Herbs, erect, with leaves arising by a leaf-stalk directly from the base and with leaves also on a separate flower stem. Flowers with 5 to 9 petal-like sepals, white, brownish-white or reddish. Pistil column very short or its capital (stigma) in direct contact with the fruitlet. Pistils and stamens numerous. Fruit, dry one-seeded cells in a cluster. Below the flower, at some distance, is a whorl of 3 leaves, each leaf divided (except in *A. canadensis*), into 3 separate leaflets, each of these leaflets is deeply cut into 3 acute lobes. In *A. canadensis* the leaves are deeply divided but not into separate parts. In all our species, except *A. quinquefolia*, the flower stem divides at the main whorl of leaves into from 2 to 5 flower stalks, each bearing a single bud or flower and on some of these secondary stalks may occur also a secondary leaf whorl above which another division of the stem may appear.



PLATE 45

1. *Anemone quinquefolia*. 2. *A. canadensis*. 3. *A. virginiana*. 4. *A. multifida*. 4a. Head of fruit of *A. multifida*. 5. Leaf and head of fruit of *Anemone cylindrica*.

The floral envelope consists of 5 or more petal-like sepals, greenish or yellowish white, about $\frac{3}{4}$ in. across, on naked stalks, 3 to 10 in. long.

Pistils not more than 20.

Flowering stem bearing a single flower.

Leaves 5 parted *A. quinquefolia*

Leaves 3 parted *A. trifolia*

Flowering stem bearing more than one flower *A. canadensis*

Pistils generally more than 20 (30 to 50).

Flowers red *A. multifida*

Flowers white or greenish-white.

Head of fruit oblong *A. virginiana*

Head of fruit cylindric.

Leaves of involucre egg-shaped *A. cylindrica*

Leaves of involucre lance-shaped *A. riparia*

1. *A. quinquefolia*, L. (Fig. 1, pl. 45.) WIND FLOWER. (*A. nemorosa*, Michx.). Small, delicate plant with the leaf stems about as high as the leaves. Flowering stem 4 to 9 in. high. Leaves divided into 5 leaflets, the terminal one being on an independent foot-stalk, the two lateral ones on each side having a common foot-stalk. Borders of all the leaves deeply notched. The flowering stem bears a whorl of 3 leaves an inch or two below the solitary flower. The basal leaves appear later than the flower stem and leaves. Flower about 1 in. broad, white or, on the outside, somewhat purplish. In woods of our area. April-June.

2. *A. trifolia*, L. MOUNTAIN ANEMONE. Resembles No. 1, but is usually larger and stouter and the lower leaves are divided into 3 leaflets which are broad lance-shaped. Southern Penna., and southward. May.

3. *A. canadensis*, L. (Fig. 2, pl. 45.) CANADA ANEMONE. Plant 1 to 2 ft. high. Leaflets pale beneath, breadth of most of them greater two or more branches which bear each a leaf whorl about which there may spring one or more stems each bearing a flower. Leaves 3-parted by sinuses extending half way or more toward the base. Borders notched. Basal leaves on long foot-stalks. Pistils 12 to 20. Low grounds. Common. May-June.

4. *A. multifida*, Poir. (Fig. 4, pl. 45.) CUT-LEAVED ANEMONE. (*A. hudsoniana*, Richards.) Plant silky hairy. Flowering stem 6 to 18 in. high. Leaves from the base on long foot-stalks. Foot-stalks of the whorl leaves short. Leaves cut into many linear segments. Flower of 5 to 9 reddish or greenish-red sepals. In the northern part of our region; rare. June.

5. *A. virginiana*, L. (Fig. 3, pl. 45.) TALL ANEMONE. Flowering stem 2 to 3 ft. high. Whole plant hairy. Foot-stalks of the leaves of the whorl nearly as long as the leaves themselves. Leaves 3-lobed, the divisions of the whorl leaves less deep than those of the basal ones. Breadth greater than length. Sepals generally 5, white or greenish-white. The fruit head elongated but less cylindric than the next species. Shady places. Common. June-Aug.

6. *A. cylindrica*, A. Gray. (Fig. 5, pl. 45.) LONG-LEAVED ANEMONE. Flowering stem 1 to 2 ft. high. Whole plant covered with silky hairs. Leaves more deeply divided than in the last species. Flowers similar to the last. Fruit head cylindric, often an inch or more long. Open places, common. June-Aug.

7. *A. riparia*, Fernald. Resembles *A. cylindrica* but is less downy, with thinner leaves, those of the flower stem forming the involucre, lance-



PLATE 46

1. *Clematis virginiana*. 2. *Anemonella thalictroides*. 3. *Clematis ochroleuca*. 4. *Atragene americana*. 5. Head of fruit of *C. virginiana*. 6. *Myosurus minimus*.

shaped. Head of fruit sub-cylindric. Maine, Conn., and southward. June-Aug.

5. ANEMONELLA, Spach. (Syndesmon, Hoffmg.)

From a cluster of tubrous roots arises a stem 6 to 10 in. high surmounted by a whorl of leaves, above which arises a loose umbel of white flowers on long delicate foot-stalks. Later arise the stems of the basal leaves which are ternately compound, the common foot-stalks 1 or 2 in. long dividing into three branches, each bearing a rounded obtusely lobed leaflet.

A. thalictroides, (L.) Hoffmg. (Fig. 2, pl. 46.) RUE ANEMONE. Flowering stem 4 to 9 in. high, smooth. Sepals white, about 5 or 7. Flowers from 2 to 6 in the cluster. Common in open woods. Early spring.

6. THALICTRUM, L.

Rather tall herbs, flowering from April to June. Stems 1 to 7 ft. high. Leaves on the stem bearing the flowers and on one springing from the root and which is flowerless. Leaves of the flowering stem on a main leaf-stalk which divides into 3 branches, each branch again dividing into 3 parts from each of which spring 3 leaflets, each leaflet is also to some extent divided into 3 parts. The tall leaf-stalk which springs from the root has a less regularly divided leaf-stalk. Flowers in conspicuous white or greenish-yellow clusters. Individually the flowers are small (Fig. 10, page 396). Petals are absent and the small sepals 5, rarely 4, in number, are white with a tinge of green. Stamens and pistils may occupy the same flower or different flowers either on the same or different plants. The stamens of the staminate flowers form rather conspicuous little tassels of 20 or more stamens. The pistillate flowers are less conspicuous.

1. **T. dioicum**, L. (Fig. 2, pl. 47.) EARLY MEADOW-RUE. Smooth, 1 to 2 ft. high, somewhat hairy. At the first whorl of leaves sending than the length, often heart-shaped at base, 3 or rarely 4 leaflets in a group, each with 3 principal lobes with secondary sinuses or notches. Flowers, pistillate and staminate on different plants, the latter green or yellowish-green, dangling from the slender foot-stalks, the group forming pretty green tassels. A very early flower in rocky woods. Usually blooms in April.

2. **T. revolutum**, DC. (Fig. 3, pl. 47.) PURPLISH MEADOW-RUE. (*T. purpurascens*, Gray.) Stem 4 to 7 ft. high, purple, branching above. Stem leaves with short or no foot-stalks. Leaflets longer than broad, pear-shaped or nearly triangular, tapering at base and with about 2 deep notches at summit or none. Some of the leaflets narrow egg-shaped. *Flowers with both stamens and pistils.* Woods and copses, Mass., New Jersey, and southward. June-Aug.

3. **T. polygamum**, Muhl. (Fig. 1, pl. 47.) TALL MEADOW-RUE. Stem green, 3 to 11 ft. high. Growing in open swamps or wet places. Leaflets as broad as long with 3 lobes at summit, heart-shaped at base. Flowers with both pistils and stamens. Common. June-July.

7. HYDRASTIS, Ellis.

Erect herb with deeply cut, broad, kidney-shaped leaves and solitary

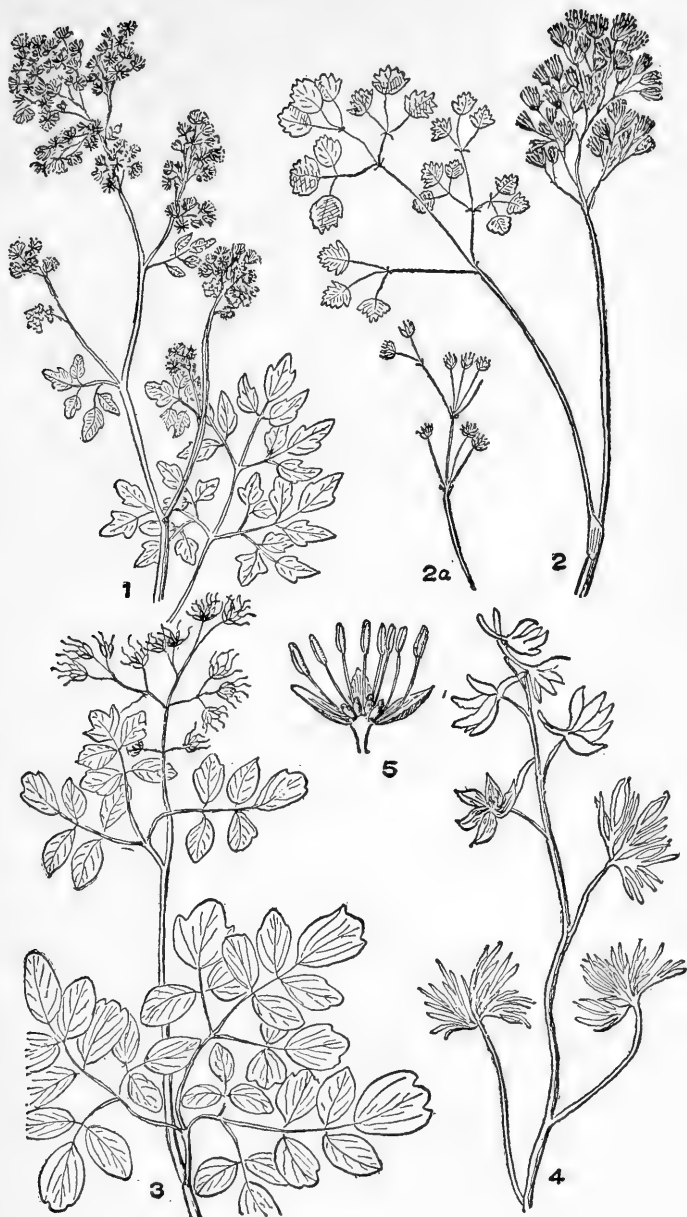


PLATE 47

1. *Thalictrum polygamum*. 2. *T. dioicum*. 2a. Pistillate flowers. 3. *T. revolutum*. 4. *Delphinium Consolida*. 5. Flower of *T. revolutum*, enlarged.

flower, with 3 sepals which fall as the flower expands. Petals none. Stamens numerous, carpels several, forming a rounded bunch.

H. canadensis, L. ORANGE ROOT. GOLDEN SEAL. Basal leaf on stalk separate from flower-bearing stem, 5 to 9 in. broad, heart-shaped at base, at periphery cut by 3 to 5 deep sinuses, the various segments with notched borders. Flowering stem with two smaller leaves similarly cut. Flower greenish-white, the whole plant covered with soft hairs. Woods, most of our area. April.

8. MYOSURUS, L.

A small plant found in moist places, its carpels arranged about a spindle-shaped receptacle. Sepals 5 (sometimes none), petals yellowish. Pistils many; stamens 5 to 25. Leaves linear.

M. minimus, L. (Fig. 6, pl. 46.) MOUSE TAIL. Plant 2 to 5 in. high, the elongated seed receptacle occupying nearly or quite $\frac{1}{2}$ the length. Doubtful if found in our area, but has been reported in extreme southern part.

B. Flowers with two envelopes, calyx and corolla

9. RANUNCULUS, L.

Herbs, most of which have the leaves much divided (Figs. 7 and 8, page 396). Flowers solitary or in loose clusters. Sepals 5, or rarely less, falling off as the seeds develop. Petals 5 or more or less, sometimes minute, flattened, with a small pit and a scale at the base (the former to contain nectar). Seed carpels numerous in a rounded or elongated group, *smooth*. Stem leaves alternate, the foot-stalks broad and clasping. *Flowers all yellow*, in our region.

Aquatic, with dissected leaves *R. delphinifolius*
Terrestrial (Nos. 2 and 3 in ditches and muddy places).

Fruit in cylindric heads.

Plant nearly or quite destitute of hairs *R. sceleratus*

Plant very hairy *R. pennsylvanicus*

Fruit in globose heads.

Plants creeping *R. reptans* and *R. repens*

Plants not creeping; erect or spreading.

Leaves grass-like

Leaves undivided, egg-shaped or lance-shaped *R. laxicaulis*

Lower leaves broadly rounded and heart-shaped, upper deeply

divided *R. micranthus*

Summit of fruit armed with a hooked style *R. alleghaniensis*

Lower leaves egg-shaped but somewhat deeply lobed, upper leaves

divided *R. abortivus*

Lower leaves elliptic *R. arvensis*

Leaves divided into 3 parts by deep sinuses, the leaflets not on

elongated foot-stalks.

Lobes without deep secondary sinuses *R. recurvatus*

Lobes cut by deep secondary sinuses.

Plant usually 2 to 3 ft. high *R. acris*

Plant usually 6 to 15 in. high *R. parvulus*

Leaves 3-divided, one or all of the divisions on elongated foot-

stalks and these divisions 2- or 3-divided by deep sinuses.

Sepals reflexed (Fig. 5, pl. 396).

The terminal leaf division only on a lengthened foot-stalk

. *R. bulbosus*

Sepals spreading.

Each of the leaf divisions on a lengthened foot-stalk

. *R. septentrionalis*

Leaflets with segments mostly rounded at apex

. *R. fascicularis*

Leaflets with segments mostly acute at apex *R. hispidus*



PLATE 48

1. *Ranunculus acris*. 2. *R. septentrionalis*. 3. *R. reptans*. 4. *R. abortivus*. 5. *R. sceleratus*.

Aquatic Plants

1. *R. delphinifolius*, Torr. YELLOW WATER CROWFOOT. Stem partly or entirely immersed. Leaves divided into many segments, the submersed ones mostly of thread-like segments, the floating ones somewhat broader and flattened, even rounded or kidney-shaped. Flowers yellow. In ponds throughout our area. May-July.

Terrestrial Plants growing in marshes, ditches and wet places

2. *R. pusillus*, Poir. LOW SPEARWORT. A low slender plant, 6 to 12 in. high. Lower leaves egg-shaped, mostly with very shallow dentations, on long foot-stalks. Upper leaves narrow lance-shape on short or no foot-stalks. Flowers small, yellow, usually with few petals or with 5. In marshes, southern New York, New Jersey and south. April-July.

3. *R. laxicaulis*, (T. and G.) Darby. (Fig. 2, pl. 50.) WATER PLANTAIN SPEARWORT. (*R. obtusiusculus*, Raf.). Plant ascending or nearly erect, smooth, 1 to 3 ft. high. Leaves grass-like, 3 to 6 in. long, about $\frac{1}{2}$ to $\frac{3}{4}$ in. wide, not toothed or with very shallow indentations; on broad foot-stalks which clasp the stem. Stems throwing out roots at joints. Flowers yellow, rather conspicuous. Marshes and ditches, our area. June-Aug.

Terrestrial Plants not peculiar to wet places. Heads of fruit cylindric

4. *R. sceleratus*, L. (Fig. 5, pl. 48.) CELERY-LEAVED CROWFOOT. Stem $\frac{1}{2}$ to 2 ft. high, smooth, sometimes quite thick. Lower leaves on long foot-stalks more or less triangular, the two deep sinuses extending $\frac{1}{2}$ way or more toward the base. Upper leaves without foot-stalks in 3 long narrow divisions. Flowers numerous, yellow, petals small, *calyx spreading*. Fruit cluster elongated, oblong or cylindric. Swamps and wet places. Common. April-Aug.

5. *R. pennsylvanicus*, L. f. (Fig. 4, pl. 49.) BRISTLY BUTTERCUP. Stem similar to No. 4, but *bristling with hairs*. Leaves 3-divided and on short foot-stalks. All the segments narrow. Flowers yellow, petals rather small, not exceeding the length of the *reflexed sepals*. June-Aug.

Heads of fruit globular. Lower leaves broadly rounded, heart-shaped

6. *R. abortivus*, L. (Fig. 4, pl. 48.) KIDNEY-LEAVED CROWFOOT. A smooth plant in borders of woods and in moist places, $\frac{1}{2}$ to 2 ft. high. Lower leaves rounded, undivided except by wavy undulations, heart-shaped at base, on long foot-stalks. Upper leaves without or with very short foot-stalks, divided into 3 narrow segments, each either notched or acute at apex. Flowers yellow, petals shorter than the divisions of the calyx. Woods and moist grounds. April-June.

7. *R. alleghaniensis*, Britton. Closely resembles *R. abortivus*, but stem has a whitish bloom and achenes have a recurved beak which is not found in *R. abortivus*. Situations same as *R. abortivus*.

8. *R. micranthus*, Nutt. ROCK CROWFOOT. Plant similar to the preceding, but covered with hairs and lower leaves with sinuses extend-

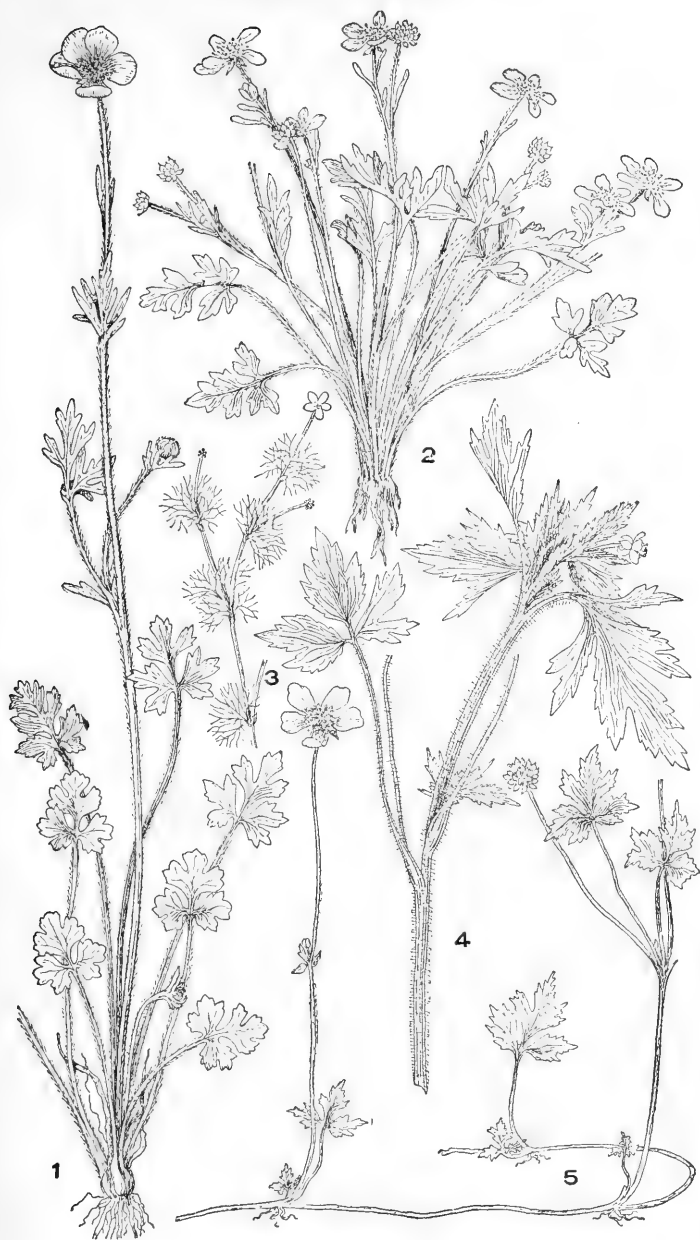


PLATE 49

1. *Ranunculus bulbosus*. 2. *R. fascicularis*. 3. *Batrachium divaricatum*.
4. *Ranunculus pennsylvanicus*. 5. *R. repens*.

ing half way to base. Rich woods, rocky places. Throughout our region. April-May.

9. *R. arvensis*, L. (Fig. 6, pl. 50.) CORN CROWFOOT. Plant without hairs or with few hairs; about 1 ft. high. Lower leaves on rather long foot-stalks elliptic or more rounded. Upper leaves cut into wedge-shaped or linear segments, these segments entire or notched at the edges. Leaves at middle of stem on foot-stalks, those above without foot-stalks. Flowers about $\frac{1}{2}$ in. broad; segments of calyx not reflexed. Fruit covered with prickles. Waste places, New Jersey and southward. Summer.

Lower leaves 3-parted nearly or quite to the base, divisions not on elongated foot-stalks

10. *R. recurvatus*, Poir. (Fig. 4, pl. 50.) HOOKED CROWFOOT. Stem $\frac{1}{2}$ to 2 ft. high, hairy. Leaves broadly kidney-shaped with two deep sinuses extending about half way to base. Lobes indented. Flowers not large. *Achenes with a strong hooked beak* (Fig. 3, page 396). Common. Mostly in woods.

11. *R. acris*, L. (Fig. 1, pl. 48.) TALL, OR MEADOW BUTTERCUP. Stem 2 to 3 ft. high, somewhat hairy. Leaves deeply cut into 3 lobes and these lobes again divided. Upper leaves, segments very narrow. Flowers rather large. Sepals spreading. This is the very common buttercup of meadows. Blooms all summer.

12. *R. parvulus*, L. (Fig. 5, pl. 50.) HAIRY BUTTERCUP. Stem 6 to 15 in. high. Whole plant hairy. Leaves 3-divided, the divisions more or less deeply cleft or lobed, the upper leaves linear or divided. Flowers about 1 in. broad; calyx reflexed. Head of fruit oblong. Waste places, New Jersey and southward. All summer.

One leaflet on each of the 3 divisions of the leaf with an elongated foot-stalk (Fig. 7, page 246). *Only the terminal leaflet on a foot-stalk*

13. *R. bulbosus*, L. (Fig. 1, pl. 49.) BULBOUS BUTTERCUP. Stem erect, with few branches, hairy, $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high. Leaves in 3 parts, the terminal part on a foot-stalk, the other divisions directly on the leaf stem. Each segment deeply indented. Flowers large, calyx reflected. Root bulbous. In grassy fields, mostly in eastern section of our area. May-June.

14. *R. fascicularis*, Muhl. (Fig. 2, pl. 49.) EARLY BUTTERCUP. TUFTED BUTTERCUP. Low, spreading. Stem and leaves hairy. Leaves similar to No. 13, but leaflets less deeply indented. *Calyx segments spreading*. Flowers rather large. In shady places and fields. New York, New England and southward. May-June.

Each of the three leaflets on a foot-stalk

15. *R. septentrionalis*, Poir. (Fig. 2, pl. 48.) MARSH BUTTERCUP. A branching plant, *smooth or slightly hairy*, 1 to 3 ft. high. Leaflets of 3 distinct leaflets, *each on a long foot-stalk* and each deeply cut into 3 segments. Moist, shady places.

16. *R. hispidus*, Michx. (Fig. 1, pl. 50.) HISPID BUTTERCUP. Densely hairy, $\frac{1}{2}$ to 2 ft. high, spreading. Leaflets, the terminal on a

long foot-stalk, the lateral ones on quite short ones, each leaflet divided into 2 or 3 segments by sinuses reaching $\frac{1}{3}$ the distance to the base. Upper leaves linear. Dry woods and thickets. March-May.

Creeping Plants

17. **R. repens**, L. (Fig. 5, pl. 49.) CREEPING BUTTERCUP. Plant nearly smooth, spreading by runners. Leaves of 3 leaflets, the terminal one on a foot-stalk.

18. **R. reptans**, L. (Fig. 3, pl. 48.) CREEPING SPEARWORT. A very small plant, creeping by runners, rooting at the nodes. Leaves grass-like, in a tuft, 1 to 2 in. high. Flowers solitary from the nodes. On sandy shores, somewhat rare but in most of our area. May-Sept.

10. **OXYGRAPHIS**, Bunge.

Small herb resembling *Ranunculus*, the *achene longitudinally striated*. Flowers small; leaves mostly from the root.

O. Cymbalaria, (Pursh.) Prantl. (Fig. 3, pl. 50.) SEASIDE CROWFOOT. (*Ranunculus Cymbalaria*, Pursh.). Low, about 2 to 6 ft. high. Spreading by runners. Leaves mostly directly from the root, broadly rounded, heart-shaped at base. Flowers small, singly or in clusters, on a nearly naked flower stem; fruit cluster elongated. On wet sandy shores. May-Aug.

11. **BATRACHIUM**, S. F. Gray

Aquatic herbs with leaves alternate and finely dissected. *Flowers white*. Achenes not ridged. Sepals and petals usually 5.

1. **B. divaricatum**, (Schränk.) Wimm. (Fig. 3, pl. 49.) STIFF WATER CROWFOOT. (*Ranunculus aquatilis*, Gray.) Leaves all under water, cut into thread-like divisions which, under water are spreading but which collapse on being drawn from the water. Leaves mostly without foot-stalks.

2. **B. tricophyllum**, (Chaix.) Bossch. WHITE WATER CROWFOOT. (*Ranunculus aquatilis*, L.). Similar to No. 1, but the dissected leaves, at least the lower ones, have rather long foot-stalks and the leaves are longer than those of No. 1.

3. **B. longirostris**, (Godr.) F. Schultz. LONG-BEAKED WHITE WATER CROWFOOT. Resembles No. 1, but the dissected leaves are on short leaf-stems. The fruit (achene) has at its apex a beak nearly $\frac{1}{16}$ in. long, that of *B. divaricatum* being minute. In ponds and streams, New England and westward. June-Aug.

SECOND GROUP

Seeds in a follicle (Fig. 9, page 396). Shrub

12. **XANTHORRHIZA**, L'Her.

Low shrub, with once or twice compound leaves each with about 5 leaflets. Terminal leaflet broad and deeply 3-lobed. Side leaflets nearly egg-shaped with lobed or nearly continuous border. Bark and long roots deep yellow. Flowers in long drooping clusters (racemes), pistillate and staminate on same stem. Petals small; color, brownish-purple. Stamens

5 to 10. Carpels, originally follicles with more than one seed. As the follicle matures one seed is suppressed.

X. apiifolia, L'Her. **SHRUB YELLOW ROOT**. Leaves clustered at the top of the stem. Stems in clusters 1 to 2 ft. high. Southern section of our region. April-May.

Herbs

Flowers yellow. Leaves undivided

13. **CALTHA**, L.

Herbs with large kidney-shaped or fan-shaped leaves with somewhat sinuate borders or with prominent teeth. Most of the leaves on foot-stalks from the root. Leaves of flower stems similar to the basal ones, the upper ones clasping the stem. Follicles numerous or few.

1. **C. palustris**, L. (Fig. 2, pl. 44.) **MARSH MARIGOLD**. Stem stout, hollow, more or less furrowed. Flowers without petals but with yellow sepals resembling petals. Leaves rounded, heart-shaped at base, margins with quite low teeth. Plant found in swampy meadows. Early May.

Var. **C. flabellifolia**, Pursh. **MOUNTAIN MARSH MARIGOLD**. Plant less stout; leaves fan-shaped with broad sinuses at base. Teeth at margin conspicuous. Pocono plateau, Pa., and northern New Jersey. June-July.

14. **TROLLIUS**, L.

Plant closely resembling *Ranunculus*, but usually stouter, 1 to 2 ft. high. Leaves divided by several sinuses extending to the stem or only part way to it. Flowers yellow, usually solitary with 5 sepals resembling petals. Carpels 5 or numerous. Stamens numerous.

T. laxus, Salisb. **AMERICAN GLOBE-FLOWER**. Slender, 1 to 2 ft. high. Upper leaf without a foot-stalk. Sepals yellowish or purplish, 5 to 6; petals minute. Follicles forming a head nearly or quite an inch in diameter, each follicle is tipped with a straight bristle $\frac{1}{4}$ the length of the follicle. Swamps. New Hampshire and New York. May-July.

15. **COPTIS**, Salisb.

Five or six sepals. Petals none or very small. Stamens 15 to 25. Seeds in follicles, of which there are from 3 to 10 in a stellate group. Small herbs with long creeping roots from which spring clusters of root leaves (2 to 4) each 3 parted, in the midst of which arises the delicate naked flower stem bearing a single flower.

C. trifolia, (L.) Salisb. (Fig. 3, pl. 44.) **GOLDTHREAD**. Three nearly equally divided kite-shaped leaflets, each slightly lobed at the summit and notched along the outer $\frac{2}{3}$ or $\frac{3}{4}$ of the border. Sepals white. A pretty star-shaped flower of early spring with shining leaves and golden colored thread-like running roots. In woods throughout our area. May.

16. **AQUILEGIA**, L.

Petals and sepals colored alike. Flower usually nodding so that the long tubular spurs of the petals point upward. The 5 ovate sepals form a 5-pointed star, between the division of which the petals ascend. Petals 5, of horn-of-plenty form, each attached to the receptacle by the short

lip of the opening. Pistils 5, developing 5 follicles (see Fig. 7, page 888). Leaf stem divided into 3 secondary stems, each bearing a 3-parted leaf with deeply lobed segments.

A. canadensis, L. (Fig. 1, pl. 44.) WILD COLUMBINE. Plant 1 to 2 ft. high, branching. Spur of the petals long, curving in at summit and tipped by a slight rounded extremity. Petals red outside, yellow inside. Sepals red. One of the most interesting of our native spring flowers. Rocky places in woods throughout our region. May.

The garden Columbine, with blue or purple flowers, *A. vulgaris*, L., is occasionally found in our area as an escape and to some extent naturalized.

17. ACONITUM, L.

Tall plants with large radiately lobed leaves and with a tall spike of irregular showy dark blue flowers. Sepals 5, the upper one hooded. Petals 2, under cover of the hooded sepal. Pistils 3 to 5. Stamens many.

1. **A. noveboracense**, Gray. NEW YORK MONKSHOOD. Plant 2 ft. high, flowers on a tall spike, the arched helmet conspicuously beaked. Leaves broad, deeply 5-parted with the segments deeply cut. Southern New York.

2. **A. uncinatum**, L. (Fig. 7, pl. 50.) WILD MONKSHOOD. Stem weak, sometimes climbing. Leaves 3 to 5 lobed, each lobe deeply cut. Cluster few flowered. Helmet conic, *slightly beaked*. Woods, southern Penna., and south. July-Sept.

18. DELPHINIUM, L.

Sepals 5, the upper long-spurred. Petals 4, blue, small, irregular, the two upper ones forming spurs which are enclosed in the long spur of the sepal. Carpels follicular, about 3. Showy plants with rounded deeply-divided leaves and tall clusters of blue flowers.

1. **D. exaltatum**, Ait. TALL LARKSPUR. (*D. urceolatum*, Jacq.). Two to five ft. high. Flowers dark blue on a tall spike, not large. Pistil 1; leaves 3-parted, the segments 2 or 3 cleft. In woods. Southern section of our region. July-Aug.

2. **D. tricornis**, Michx. DWARF LARKSPUR. Plant 1 to 3 ft. high. Leaves deeply 3- to 5-parted, each segment deeply cleft. Cluster of flowers loose, only 4 or 5 in. high. Pistil 1. Western Pennsylvania. April-June.

3. **D. Consolida**, L. (Fig. 4, pl. 47.) FIELD LARKSPUR. Plant 1 to 2½ ft. high. Leaves without leaf-stalks, finely dissected into linear segments. *Flower with 3 pistils*. Southern New Jersey and Penna. Naturalized in a few places. Summer.

4. **D. Ajacis**, L. Flowers more numerous than in No. 3. Pods downy, those of *D. Consolida* are without down. Naturalized in places.

19. CIMICIFUGA, L.

Leaf-stalks twice or thrice 3-parted. Flowers white in long slender wand-like clusters (racemes). Pistils 1 to 8. Stamens many, with white filaments. The 4 or 5 small petals, falling as the flower opens, leave the

cluster of white stamens as the conspicuous element of the flower. Fruit a dry pod-like follicle.

1. *C. racemosa*, (L.) Nutt. (Fig. 6, pl. 44.) BLACK COHOSH. BLACK SNAKEROOT. A tall handsome plant in rich woods, often 5 ft. high or more, with very long and slender forked spikes of flowers. Pistil 1, rarely 2 or 3. Clusters of feathery white stamens. Southern New England and southward. July.

2. *C. americana*, Michx. AMERICAN BUGBANE. Plant generally not so large as No. 1. Pistils 3 to 8, which develop into several more or less star-like groups of short inflated follicles. Southern Pennsylvania, Watkins, N. Y. Aug.-Sept.

20. ACTAEA, L.

Erect branching herbs with 3-parted leaf stalks, each division furnished with 3 to 5 leaflets. Upper leaves without leaf-stalks. Leaflets generally more or less 3-lobed and more or less deeply notched. Flowers in an ovate or oblong white cluster. Petals much shorter than the spreading cluster of numerous stamens. Plants of both species from 1 to 2 ft. high.

1. *A. rubra*, (Ait.) Willd. (Fig. 5, pl. 44.) RED BANEERRY. Flower cluster egg-shaped or almost rounded. Leaflets egg-shaped, deeply notched at borders. Berries red when ripe. Common. May.

2. *A. alba*, (L.) Mill. WHITE BANEERRY. Flower cluster more elongated, oblong. Leaves also longer and narrower and more deeply incised. Berries white. Rich woods. Common. May.

FAMILY VI.—BERBERIDACEAE. BARBERRY FAMILY

Shrubs and herbs. Leaves of the shrubs in rosette-like groups, those of the herbs solitary and springing directly from the root or from the flowering stem. Shrubs with stipulate leaves, herbs without stipules. Stamens equal in number to the petals or double the number. Pistil 1. Fruit a berry.

1. BERBERIS, L.

Shrub with spiny leaves and with grape-like pendant clusters of yellow flowers. Petals and sepals, each 6, exceptionally sepals exceed 6. Below the flower are found 2 or 3 bract-like bodies.

B. vulgaris, L. (Fig. 1, pl. 51.) BARBERRY. Shrub 6 to 8 ft. high. Leaves in close groups of about 3, in a rosette, not in a perfect whorl but condensed. Below each of the groups of leaves are 3-forked spines which are modified leaves. Leaves pear-shaped, sharply notched, the serrations each terminated by a soft bristle. Fruit, an elongated berry, red when ripe. Woods and thickets; naturalized. May-June.

2. CAULOPHYLLUM, Michx.

Herbs with thickened rootstock, the compound leaf arising from the flowering stem. Calyx of 6 sepals, below which are 3 or 4 small scale-like bracts. Stamens 6. Seeds in berries.



PLATE 50

1. *Ranunculus hispidus*. 2. *R. laxicaulis*. 3. *Oxygraphis Cymbalaria*. 4. *Ranunculus recurvatus*. 5. *R. parvulus*. 6. *R. arvensis*. 7. *Aconitum uncinatum*.

C. thalictroides, (L.) Michx. (Fig. 2, pl. 51.) **BLUE COHOSH.** Stem 1 to 3 ft. high, with 2 or more sheathing bracts at its origin. Stem otherwise simple, at length giving off a stem for the 3-divided compound leaf, each division of which has 5 leaflets. The flower branch has also a smaller compound leaf of similar composition. Flowers small, in one or two grape-like clusters, greenish-purple, succeeded by blue berries. Woods in our area, and southward. April-May.

3. JEFFERSONIA, Barton

Smooth herbs with leaf stems directly from root and with a solitary flower also from a slender basal stem. Sepals 4; petals 8; stamens 8. Sepals falling early. Seed casket (capsule), a pear-shaped pod opening by a sort of lid near the top, rather less than half the circumference serving as hinge. Capsule many seeded.

J. diphylla, (L.) Pers. **TWIN LEAF.** Plant when in flower 6 to 8 in. high, twice that in fruit. Leaves broad (bifid), each divided by a deep sinus at each end. These divide the leaf into two almost completely separated oval parts. Flowers about an inch broad, white. Woods, New York, westward and southward. April-May.

4. PODOPHYLLUM, L.

Erect herbs with poisonous rootstocks and with two or three large, deeply sinused leaves and from the flowering stem a solitary flower. Petals 6 to 9; sepals 3; stamens 12 to 18; pistil an oval-shaped ovary capped by a flat crown.

P. peltatum, L. (Fig. 5, pl. 51.) **MAY APPLE. WILD MANDRAKE.** Plant 12 to 20 in. high; leaves nearly a foot in diameter. The flower springs from between the stems of the large leaves. Flowering stems taller than those without flowers. Flower white, cup-shaped, about an inch in diameter on a stem rather longer than the diameter of the flower. Fruit an oval berry about as large as and resembling in shape an ordinary plum, yellow when ripe. Throughout our region. May.

FAMILY VII.—MENISPERMACEAE. MOONSEED FAMILY

Our only representative a woody climbing vine with alternate, lobed, leaves without stipules. Flowers in grape-like clusters, staminate and pistillate on different plants. Fruit a fleshy drupe with a stone-like seed.

MENISPERMUM, L.

Climber 6 to 12 ft. high. Leaves 4 to 8 in. wide, heart-shaped at base and with several sharp-pointed lobes, or none, at the circumference. Sepals 4 to 8, concealing the shorter petals. Stamens 12 to 24; pistils 2 to 4. Fruit rounded.

M. canadense, L. (Fig. 6, pl. 51.) **CANADA MOONSEED.** Climbing on trees or bushes in borders of woods and along streams. Lower leaves broadly oval, upper somewhat lobed or scalloped. New England, westward and southward. June-July.



PLATE 51

1. *Berberis vulgaris*. 2. *Caulophyllum thalictroides*. 3. *Sassafras variifolium*. 4. *Benzoin aestivale*. 5. *Podophyllum peltatum*. 6. *Menispermum canadense*.

FAMILY VIII.—**LAURACEAE.** LAUREL FAMILY

Trees rich in aromatic glands. Leaves alternate, without stipules. Flowers regular, small, in our only species the staminate and pistillate on different plants, or at least on different parts of the same plant, growing in a dense cluster surrounded by an involucre of bracts.

1. **SASSAFRAS, L.**

Leaves divided in about 3 unequal lobes or egg-shaped and undivided. Clusters of flowers at end of twigs. Perianth of 6 divisions. Stamens 9. The pistillate flowers have 6 to 9 sterile stamens.

S. variifolium, (Salisb.) Ktze. (Fig. 3, pl. 51.) **SASSAFRAS TREE.** (*S. Sassafras*, (L.) Karst.) Growing in woods, more especially in the southern half of our section. The tree is usually small but may attain to the height of 125 feet. April-May.

2. **BENZOIN, Fabric.**

Shrub with alternate pear-shaped leaves and yellow flowers, the staminate and pistillate forms on the same plant or on different plants. They are found in clusters with very short or no foot-stalks and are surrounded by an involucre of scale-like bracts. Flowers appearing before the leaves.

B. aestivale, (L.) Nees. (Fig. 4, pl. 51.) **SPICE BUSH.** (*B. Benzoïn*, (L.) Coulter.) Smooth shrub, 4 to 20 ft. high. Leaves mostly pear-shaped, but some egg-shaped. Flowers small, yellow, fragrant. In moist woods, northern part of our area and westward.

Order IV.—RHOEADALES. Order of the Poppies

Our species all herbaceous plants, leaves without stipules. The parts of the flower are, in general, arranged spirally; calyx, corolla and stamens are all arranged below the ovary and are free, that is, one group of these organs is not attached to another and the members of one of the groups are not connected among themselves. Exceptions are found in a partial concrecence of the parts of the calyx in a few species. The ovary consists of two or more carpels which, in the family *Papaveraceae*, are concrecent, with placental partitions between the cells. In the family *Cruciferae* the ovary divides into two valves, generally elongated, with a strong wall between the valves.

Plants with sticky, white or colored juice.

Sepals 2, falling with the development of the flower. Stamens

numerous **PAPAVERACEAE**

Plants with watery juice.

Sepals 4 or more, equal.

Flowers symmetrical.

Stamens 6, unequal, 4 long, 2 short **CRUCIFERAE**

Stamens 6 to many, equal . **CAPPARIDACEAE**

Flowers unsymmetrical.

Stamens 3 to many . . . **RESEDACEAE**

FAMILY I.—**PAPAVERACEAE**. THE POPPY FAMILY

Flowers regular; fruit a capsule consisting usually of several conerescant carpels separated by their partitions into cells or of an elongated pod. All the species have milky juice. Leaves alternate or directly from the root, deeply lobed or finely dissected. Sepals 2 (in *Argemone* 3), dropping as the flower expands. Petals 4 to 6, or more. Stamens generally numerous, below, and encircling the ovary.

I. **PAPAV**, L.

Smooth or hairy herbs with abundant milky sap. Leaves deeply cut or lobed. Sepals 2, falling as the flower expands. Petals 4 to 6. Capsule globe-formed with a broad flattened or convex cap-like cover, the stigma.

1. **P. Rhoeas**, L. FIELD OR CORN POPPY. Erect, 1 to 3 ft. high, hairy, lower leaves with leaf-stalks. Flowers scarlet. Capsule globose, smooth. Introduced. This is the field poppy which sprinkles the oat and wheat fields of England and the continent with bright scarlet blossoms.

2. **P. somniferum**, L. (Fig. 3, pl. 52.) GARDEN POPPY. Escaped from gardens; 1 to 3 ft. high. Flower bluish-white. Leaves clasping by a heart-shaped base. Rare except in gardens, but in a few localities apparently naturalized.

3. **P. Argemone**, L. (Fig. 2, pl. 52.) ROUGH-FRUITED POPPY. A slender plant occasionally found in waste grounds. Stem 1 to 2 ft. high, covered with soft hairs. Leaves rather finely cut into feather-formed segments, the lower on slender leaf-stalks, the upper without leaf-stalks. Flower red, usually with a dark center. A plant often seen in grain fields in Europe, only sparingly introduced here.

2. **ARGEMONE**, L.

Smooth plants; milk yellow. Sepals 3; petals 6. Leaves apiny toothed; flowers showy. Stamens numerous.

A. mexicana, L. (Fig. 1, pl. 52.) MEXICAN POPPY. Stem 1 to 2 ft. high. Leaves long with many deep sinuses and prickles resembling those of the thistle. In waste places. Introduced. June-Sept.

3. SANGUINARIA, L.

Herb with leaf-stalk arising directly from root and flower also on slender basal foot-stalk. Leaves light green, heart-shaped at base, rounded, with a number of shallow scallops.

S. canadensis, L. (Fig. 4, pl. 52.) BLOODROOT. Flower scape slender bearing a single white star-like flower. Root-stock bleeds a red juice when broken. Shady places, rich soil. April-May.

4. CHELIDONIUM, L.

Branching herbs preferring shady places, with reddish-yellow, sticky milk. Sepals 2; petals 4; stamens numerous. Capsule a lengthened silique or pod dividing to the base.

C. majus, L. (Fig. 5, pl. 52.) CELANDINE. Grows usually in masses in shady places. Leaves, in general outline oval but deeply lobed and divided in feather-formed leaflets. Flowers bright yellow $\frac{3}{4}$ in. across, in a loose umbel-like cluster surmounting the tall stalk. Seed pod an inch or more long. In cultivated grounds. Common. April-Sept.

SUB-FAMILY FUMARIACEAE

This sub-division of the family *Papaveraceae* is differentiated by the modification of the flowers, which, *in none of our species are regular*. The stamens are 4 to 6 and the single style at the top forms a 4-lobed stigma. Leaves alternate without stipules.

Flowers with a spur at base of each division.

Climbing vine *Adlumia*

Erect herbs, leaves all basal *Dicentra*

Flowers with only one division spurred.

Pod one seeded *Fumaria*

Pod several seeded *Corydalis*

1. DICENTRA, Bernh. (*Bicuculla*, Adams)

Erect herbs with finely dissected ternately compound leaves. Flower stem becoming taller than the leaves. Flower broadly heart-shaped with a spur on each side. Pods many seeded.

1. *D. Cucullaria*, (L.) Bernh. (Fig. 1, pl. 53.) DUTCHMAN'S BREECHES. Leaf and flower stems arising from somewhat angular tubers of reddish color, 5 to 10 in. high. Flowers as broad as long, white, the spurs spreading, inner petals minutely crested. An interesting plant with delicately colored, light green, finely divided leaves and a stem of nodding 2 spurred flowers. In rich woods, throughout our area. April-May.

2. *D. canadensis*, (Goldie.) Walp. (Fig. 3, pl. 53.) SQUIRREL CORN. Plant with much the same general appearance as No. 1. The spurs at base of flower are, however, much less spreading and more rounded; the inner petals, only slightly crested in No. 1, are in this



PLATE 52

1. *Argemone mexicana*. 2. *Papaver Argemone*. 3. *P. somniferum*. 4. *Sanguinaria canadensis*. 5. *Chelidonium majus*.

species conspicuously crested. Color, greenish-white tinged with purple. In rich woods. Common. May-June.

3. *D. eximia*, (Ker.) Torr. WILD BLEEDING HEART. Plant much larger than the two preceding, and leaves much less divided. 1 to 2 ft. high. Corolla oblong resembling that of No. 2, but larger and of a pink color, arranged in clusters more or less compound. Western New York. May-Aug.

2. ADLUMIA, Raf.

A delicate vine many feet in length climbing on shrubs, trees, etc. Sepals 2, quite small; petals 4, united into a rather long oval sac with resemblance to the flowers of *Dicentra*, but with short rounded spurs at base, which is somewhat heart-shaped, while the tips of the petals are only slightly spreading. Leaflets mostly in 3's. Pods few seeded.

A. fungosa, (Ait.) Greene. (Fig. 4, pl. 53.) MOUNTAIN FRINGE. The vine bears many clusters of pale pink flowers. Many of the leaf stalks are prolonged into winding tendrils. Native in rocky hills. Often cultivated. June-Aug.

3. CORYDALIS, Vent. (*Capnoides*, Adams)

Corolla spurred on one side only. Plants, in our region, erect with compound leaves found on the flower stem. Flowers in terminal clusters or in clusters springing from the stem opposite the nodes of the leaf stalks. Petals 4. Stamens 6. Seed pod linear.

1. *C. sempervirens*, (L.) Pers. (Fig. 5, pl. 53. PINK CORYDALIS. (*C. glauca*, Pursh.). Flowers with delicately alternating shades of red and yellow. Stem light green, 1 to 2 ft. high. Leaves of about 5 leaflets, each leaflet with 3 deep and 3 or more shallow sinuses. Rocky places. April-Sept.

2. *C. aurea*, Willd. (Fig. 6, pl. 53.) GOLDEN CORYDALIS. Very smooth, light bluish-green, 6 to 15 in. high. Leaves 3-compound. Flowers with one conspicuously long spur, bright golden-yellow. Woods. April-May.

3. *C. flavula*, (Raf.) DC. PALE CORYDALIS. Stem slender, smooth, pale green, 6 to 14 in. high. Leaves finely dissected. Flower yellow, *with a short spur*

4. FUMARIA, L.

Much branched herbs, with finely dissected leaves and many small flowers in long slender clusters. Calyx of 2 sepals, small scale-like. Petals 4, both pairs approaching, the inner pair coherent at apex, one of the outer pair spurred. Stamens 6, in 2 groups.

F. officinalis, L. (Fig. 2, pl. 53.) FUMITORY. Stem smooth, very leafy, 6 in. to 3 ft. long. Corolla flesh colored or crimson. Waste places, only occasionally; about dwellings. Introduced from Europe.

FAMILY II.—CRUCIFERAE. MUSTARD FAMILY

A large family of herbs with, generally, quite distinctive characters. While this is true it is not always easy for the amateur to distinguish the individual species.



PLATE 53

1. *Dicentra cucullaria*. 2. *Fumaria officinalis*. 3. *Dicentra canadensis*. 4. *Adlumia fungosa*. 5. *Corydalis sempervirens*. 6. *C. aurea*.

The corollas are all regular. All have 4 petals, equal and similar, forming a cruciform flower. The sepals are also 4, and equal. The stamens are 6 in number and, unlike the corolla, are unequal, 4 being longer than the remaining 2; in some species some of the stamens are suppressed. Pistil 1, of 2 united carpels. The fruit is almost always in a linear pod, a turn, or in short more or less triangular, orbicular or oblong pod, a turn.

FIRST GROUP

Fruit pod pear-shaped, triangular or oblong, *distinctly flattened contrary to the partition*. Flowers white.

Fruit-pod longer than broad.

Pod oval with a notch or with a slender style at the apex, or with both **Lepidium**

Pod pear-shaped or triangular; leaves clasping the stem by broad ear-like appendages.

Leaves feather-formed (pinnate), with deep sinuses **Capsella**

Leaves not feather-formed, sinuses shallow or none **Thlaspi**

Pod broader than long **Coronopus**

SECOND GROUP

Fruit oval or globular, not flattened or only slightly so.

Flowers white or purple.

Fleshy plant growing in sand at sea side **Cakile**

Aquatic plant with awl-shaped leaves, all basal . . . **Subularia**

Plants not fleshy and leaves not awl-shaped nor all basal.

Leaves mostly in a whorl about the base, plants generally less than a foot high **Draba**

Leaves not mostly in whorl at base, plants 1 ft. high or more **Berteroa**

Flowers yellow.

Leaves clasping stem by a broad base.

Pods marked by distinct reticulations **Neslia**

Pods not reticulated **Camelina**

Leaves not clasping stem by a broad base.

Leaves small, spatula-formed, pod without a conspicuous style **Alyssum**

Leaves pinnate (2 species) **Roripa**

THIRD GROUP

Fruit in linear pods (*siliques*, see page 38, Part I), generally in length more than 4 times the diameter of the flower. Exception, No. 18, about twice the length of the diameter of the flower.

Flowers yellow.

Pods not jointed nor markedly constricted between the seeds.

Leaves, at least the lower ones, feather-formed.

Pods not hairy.

Pods 4-angled **Barbarea**

Pods rounded, not 4-angled, term-

inated by a long beak . . . **Brassica**

Pods hairy **Sinapis**

ERRATA

Page 274, lines 6 and 7, should read:

The fruit is almost always a linear pod, a silique, or a short, more or less triangular, orbicular or oblong pod, a silicle.

Leaves broad, cordate or kidney-formed . . . **Alliaria**

Leaves feather-form (pinnate), lobed or ovate **Cardamine**

Leaves mostly in a whorl or rosette about the base, hairs when present not forked.

Seed pods quite short but generally with several seeds **Draba**

Seed pods linear, hairs simple **Arabis**

Seed pods linear, hairs forked

Petals white **Stenophragma**

Flowers purple **Hesperis**

The arrangement of these groups is based upon a few of the more general characteristics and does not follow the more technical grouping.

FIRST GROUP

Fruit-pod pear-shaped, triangular or oblong, distinctly flattened contrary to the partition.

Flowers white

1. LEPIDIUM, L.

Erect or diffused plants with pear-shaped, feather-formed or deeply lobed leaves. Pods rounded or pear-shaped, flattened, with two seeds, one in each valve of the pod or with only one seed. Stamens sometimes less than 6. Flowers small or petals sometimes wanting.

Stem leaves arrow-formed, clasping with ear-like appendages.

Pods with a somewhat conspicuous slender style *L. Draba*

Pods without the style *L. campestre*

Stem leaves, pear-shaped, on long leaf stalks *L. virginicum*

Pods distinctly pear-shaped *L. sativum*

Pods oval or orbicular.

With wings *L. apetalum*

Without wings *L. rudemale*

Stem leaves feather-formed (pinnatifid).

The corollas are all regular. All have 4 petals, equal and similar, forming a cruciform flower. The sepals are also 4, and equal. The stamens are 6 in number and, unlike the corolla, are unequal, the longest longer than the remaining 2; in some species some of the

Leaves feather-formed,

Leaves not feather-formed, sinuses shallow or none **Thlaspi**
 Pod broader than long **Coronopus**

SECOND GROUP

Fruit oval or globular, not flattened or only slightly so.

Flowers white or purple.

Fleshy plant growing in sand at sea side **Cakile**

Aquatic plant with awl-shaped leaves, all basal . . . **Subularia**

Plants not fleshy and leaves not awl-shaped nor all basal.

Leaves mostly in a whorl about the base, plants generally less than a foot high **Draba**

Leaves not mostly in whorl at base, plants 1 ft. high or more **Berteroa**

Flowers yellow.

Leaves clasping stem by a broad base.

Pods marked by distinct reticulations **Neslia**

Pods not reticulated **Camelina**

Leaves not clasping stem by a broad base.

Leaves small, spatula-formed, pod without a conspicuous style **Alyssum**

Leaves pinnate (2 species) **Roripa**

THIRD GROUP

Fruit in linear pods (*siliques*, see page 38, Part I), generally in length more than 4 times the diameter of the flower. Exception, No. 18, about twice the length of the diameter of the flower.

Flowers yellow.

Pods not jointed nor markedly constricted between the seeds.

Leaves, at least the lower ones, feather-formed.

Pods not hairy.

Pods 4-angled **Barbarea**

Pods rounded, not 4-angled, term-

inated by a long beak . . . **Brassica**

Pods hairy **Sinapis**

Leaves lance-shaped, not lobed **Erysimum**

Flowers, yellow white or purple.

Seeds in single row in each valve.

Pods not constricted between the seeds . . . **Sisymbrium**

Pods constricted between the seeds **Raphanus**

Seeds in two rows in each valve.

Pods generally an in. or more long . . . **Diplotaxis**

Pods less than 1 in. long **Roripa**

Flowers white or purple.

Leaves mostly on the stem, not in a whorl at base. **Sisymbrium**

Leaves in a whorl on the stem.

Leaves divided in 3 to 7 radiating divisions or leaflets

. **Dentaria**

Leaves broad, cordate or kidney-formed . . . **Alliaria**

Leaves feather-form (pinnate), lobed or ovate **Cardamine**

Leaves mostly in a whorl or rosette about the base, hairs when present not forked.

Seed pods quite short but generally with several seeds **Draba**

Seed pods linear, hairs simple **Arabis**

Seed pods linear, hairs forked

Petals white **Stenophragma**

Flowers purple **Hesperis**

The arrangement of these groups is based upon a few of the more general characteristics and does not follow the more technical grouping.

FIRST GROUP

Fruit-pod pear-shaped, triangular or oblong, distinctly flattened contrary to the partition.

Flowers white

i. LEPIDIUM, L.

Erect or diffused plants with pear-shaped, feather-formed or deeply lobed leaves. Pods rounded or pear-shaped, flattened, with two seeds, one in each valve of the pod or with only one seed. Stamens sometimes less than 6. Flowers small or petals sometimes wanting.

Stem leaves arrow-formed, clasping with ear-like appendages.

Pods with a somewhat conspicuous slender style *L. Draba*

Pods without the style *L. campestre*

Stem leaves, pear-shaped, on long leaf stalks *L. virginicum*

Pods distinctly pear-shaped *L. sativum*

Pods oval or orbicular.

With wings *L. apetalum*

Without wings *L. rudérale*

Stem leaves feather-formed (pinnatifid).

1. *L. Draba*, L. HOARY CRESS. Plant 10 to 12 in. high, hairy, stem leaves arrow-formed, basal leaves elliptic. Seed pods oval or rounded, flat, without wing-like appendages but with a distinct style at summit. Fields, waste places; rare. Naturalized. May-July.

2. *L. campestre*, (L.) R. Br. FIELD OR CROW CRESS. Stem leaves similar to No. 1, basal rosette of pear-shaped leaves, rounded at apex. Pod without a style, but thin wing-like appendage at sides and especially at summit. Flowers and fruit pod crowded on fruit bearing stem. A weed in cultivated ground, naturalized. April-June.

3. *L. virginicum*, L. (Fig. 1, pl. 54.) WILD PEPPERGRASS. Stem leaves elliptic, deeply notched, basal rosette of pear-shaped leaves, rounded at apex, notched at borders, the leaf stalk feather-formed. Seed pod nearly round with a notch at the summit and a narrow wing-like appendage on either side of it. A weed in cultivated fields and in waste places. May-Nov.

4. *L. sativum*, L. GARDEN OR GOLDEN PEPPERGRASS. Stem about a foot high, smooth, bright green. Leaves, at least the lower, feather-formed, 3-parted, each division feather-formed. Upper leaves more or less linear with deep sinuses cutting into narrow lobes. Seed pod with narrow wing-like border. Waste places. Naturalized. May-Aug.

5. *L. apetalum*, Willd. APETALOUS PEPPERGRASS. Basal rosette of feather-formed leaves, upper nearly linear, more or less distantly notched. Flowers small, petals quite small or wanting. Pods round, notched at top with narrow wing-like border above. Naturalized. May-Aug.

6. *L. rudérale*, L. NARROW-LEAVED PEPPERGRASS. Similar to last, but seed pod has no wing-like margin.

2. *CAPSELLA*, Med. Pfl. Gatt. (*Bursa*, Weber)

Stems spreading, one or more erect. Leaves mostly in a basal rosette, those of the upper part of stem narrow, clasping, more or less arrow-shaped. Those of the rosette lyrate, feather-formed, somewhat hairy. Pod triangular or pear-shaped, several seeds in each cell.

C. Bursa-Pastoris, Med. Pfl. Gatt. (Fig. 6, pl. 54.) SHEPHERD'S PURSE. Very common in waste places.

3. *THLASPI*, L.

Plant $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high. Lower leaves with leaf stalks, pear-shaped, upper stem leaves arrow-shaped without leaf-stalks, toothed or distantly dentate. Pod round or pear-shaped.

T. arvense, L. FIELD PENNY CRESS. Pods nearly round, with a rather deep sinus at apex and with a broad margin of wing-like expansion. Flowers and pods crowded on a long slender stem. In waste places. June-Aug.

4. *CORONOPUS*, Gaertn.

Diffuse, 3 to 15 in. high. Leaves crowded, feather-formed. Flowers in crowded clusters quite small. Stamens 2 to 4. Pods with the lateral diameter greater than the longitudinal. Valves of the pod rough, *depressed at apex*.



PLATE 54

1. *Lepidium virginicum*. 2. *Barbarea vulgaris*. 3. *Sisymbrium officinale*. 4. *Brassica nigra*. 5. *Cakile edentula*. 6. *Capsella Bursa-Pastoris*. 7. *Erysimum cheiranthoides*. 8. *Roripa hispida*.

1. **C. didymus**, (L.) J. E. Smith. LESSER WATER CRESS. Tufted, spreading on the ground, slightly hairy. Flowers quite small. Naturalized; in waste places.

2. **C. procumbens**, Gilbert. SWINE'S CRESS. (*C. coronopus*, (L.) Karst.) Similar to No. 1. Pod with an elevated point at apex. Naturalized; in waste places.

SECOND GROUP

Fruit oval or globular, not flattened or only slightly so

Flowers white or purple

5. **CAKILE**, Gærtn.

Diffuse, smooth, fleshy, with purple or whitish-purple flowers. Pods two jointed, the upper joint larger.

C. edentula, (Bigel.) Hook. (Fig. 5, pl. 54.) AMERICAN SEA ROCKET. Very fleshy and branching. Leaves long and narrow, rounded at apex, border sinuous or notched. Pod of two joints, each with a single seed. Sands at the sea shore.

6. **SUBULARIA**, L.

Small aquatic plant. Leaves all basal and awl-shaped. Stem few flowered. Pods oval or globose, seeds several.

S. aquatica, L. WATER AWLWORT. Plants growing in tufts in shallow water. Maine, New Hampshire, and northward.

7. **BERTEROA**, DC.

Herbs 1 to 2 ft. high, with forked hairs. Leaves narrow, not notched or toothed. Flowers in long terminal clusters. Petals deeply 2-cleft. Pod nearly globose or oval with a short style at apex.

B. incana, (L.) DC. (Fig. 1, pl. 55.) HOARY ALYSSUM. Pods very numerous on short stiff spreading pedicels. In waste places. Introduced.

Flowers yellow

8. **NESLIA**, Desv.

Erect or branching, velvety, hairs stellate. Leaves of the rosette oblong, on long foot-stalks. Seed pod without wings.

N. paniculata, (L.) Desv. (Fig. 6, pl. 55.) NESLIA. Plant 1 to 2 ft. high; stem leaves lance-shaped with broad arrow-shaped bases and no leaf stalk. Flowers small, yellow. Pods round, distinctly reticulated. Waste places. Introduced.

9. **CAMELINA**, Crantz.

Erect herb with soft hairs, simple or branched. Lower leaves with leaf stalks, upper without. Those of the rosette lance-elliptic, those of the stem lance-shaped, clasping the stem. Flowers small. Pod globose with a prominent style at apex.

C. sativa, (L.) Crantz. GOLD OF PLEASURE. FALSE FLAX. In fields, especially in those in which flax has been grown. Introduced from Europe. June-July.

10. **ALYSSUM, L.**

Stems branching, low, hairy, with small flowers. Pod orbicular, with a small style at apex.

A. alyssoides, L. (Fig. 2, pl. 55.) **YELLOW OR SMALL ALYSSUM.** (*A. calycinum, L.*). Leaves, mostly on the flowering stems, small pear-shaped, without teeth or notches. In waste places and fields. Naturalized.

THIRD GROUP

Fruit in linear pods, generally in length more than four times the diameter of the flower.

Flowers yellow

Seeds in a single row in each valve of the pod.

11. **BARBAREA, R. Br.**

Erect branching herbs with angular stems and with leaves with entire margins or with margins deeply lobed, forming distinct segments, or feather-formed. Flowers somewhat conspicuous, petals twice as long as the sepals. Pod long, linear, 4-angled.

Pod acutely 4-angled *B. praecox*
 Pods bluntly 4-angled.
 Diverging strongly from stem *B. vulgaris*
 Standing almost parallel with the stem *B. stricta*

1. **B. vulgaris, R. Br.** (Fig. 2, pl. 54.) **YELLOW ROCKET OR CRESS.** (*B. Barbarea, Mac M.*). Stem 1 to 2 ft. high. Tufted at base. Lower leaves so deeply lobed as to divide them into about 5 distinct leaflets, the terminal one much larger than the others, ovate with rounded extremity and cordate base, the lateral leaflets also ovate and rounded at apex. Upper leaves smooth margined or notched. Lower leaves on slender foot-stalks, upper without foot-stalks. Seed pods diverging from the stem. Naturalized. Common, in fields and waste places. April-July.

2. **B. stricta, Andr.** **ERECT-FRUITED WINTER CRESS.** Similar to No. 1, but the seed pods follow closely the direction of the stem. Naturalized. In fields and waste places. April-July.

3. **B. praecox, (J. E. Smith.) R. Br.** **EARLY WINTER CRESS. BELLE ISLE CRESS.** The segments of lower leaves generally more numerous than in No. 1 or 2, and less rounded. Pods very long and sharply angled. Naturalized. Situations similar to the above.

12. **BRASSICA, L.**

Herbs mostly with basal leaves deeply cut by sinuses (feather-formed), upper leaves toothed or entire. Pods nearly round, terminated by a long beak. Seeds in a single row in each valve.

Upper leaves clasping the stem *B. campestris*
 Upper leaves not clasping.
 Pods nearly parallel with stem *B. nigra*
 Pods spreading.
 Slender, with very long beak *B. juncea*
 Rather thick, beak not very long *B. arvensis*

1. **B. nigra, (L.) Koch.** (Fig. 4, pl. 54.) **BLACK MUSTARD.** Plant somewhat hairy, 2 to 7 ft. high. Upper leaves lance-formed, margins

entire or dentate. Lower leaves on long leaf-stalks, pear-shaped in general outline, but deeply cut by sinuses into more or less feather-form. Apex broadly rounded. Flowers rather large, pods cylindric with 4 angles, nearly parallel with the stem. Common in waste places.

2. *B. juncea*, (L.) Cosson. INDIAN MUSTARD. Plant smooth or slightly hairy, 1 to 4 ft. high. Upper leaves without leaf-stalks, borders mostly entire. Lower leaves on long foot-stalks, broad and cut by sinuses, but less deeply, as a rule, than those in No. 1. Flowers similar to No. 1. Seed pods slender, the beak being nearly or quite $\frac{1}{3}$ as long as the remainder of the pod. Pods more or less spreading. Naturalized. Common in waste places and fields. June-Nov.

3. *B. arvensis*, (L.) BSP. WILD MUSTARD. Similar to last but leaves egg-shaped and much less deeply cut by sinuses. Pods rather thick, somewhat constricted between the seeds. Naturalized. Common. May-Nov.

4. *B. campestris*, L. TURNIP. The ruta-baga or turnip of the gardens is occasionally found wild and sometimes persists in grounds in which it has been cultivated.

13. SINAPIS, L.

Plant erect, branching, hairy. Lower leaves on long stalks, in general outline pear-shaped, but deeply cut by sinuses, the terminal lobe broad, rounded, toothed, the lateral lobes toothed. Upper leaves without leaf stems but cut and toothed. Pods long, constricted between the seeds, densely hairy.

S. alba, L. WHITE MUSTARD. Plant 1 to 2 ft. high, covered with hairs which turn backward. Naturalized. In waste places.

14. ERYSIMUM, L.

Erect herb with narrow lance-shaped leaves, with entire or slightly dentate margins. Pods 4-angled, seeds in one row in each valve of the pod.

E. cheiranthoides, L. (Fig. 7, pl. 54.) WORMSEED. TREACLE-MUSTARD. Plant $\frac{1}{2}$ to 2 ft. high, branching. Leaves lance-formed, narrow, tapering at base, somewhat blunt at apex. Naturalized. In moist places. June-Aug.

Flowers yellow, white or purple

Seeds in a single row in each valve of the pod.

15. SISYMBRIUM, L.

Tall erect herbs, sparingly branched, with feather-formed leaves. Flowers yellow except in *S. humile*, in which they are white or pink. Pod rather long (in No. 2, very long) and slender.

1. *S. officinale*, (L.) Scop. (Fig. 3, pl. 54.) HEDGE MUSTARD. Rather tall and stiff, branching below, not much branched above. The long pods hug the stem, lying in almost their whole length against it. Leaves rather long, in general form more or less triangular or arrow-head-shaped, the lobes toward the inner end extending widely. Flowers small.



PLATE 55

1. *Berteroa incana*. 2. *Alyssum alyssoides*. 3. *Roripa palustris*. 4. *Cardamine pennsylvanica*. 5. *C. bulbosa*. 6. *Neslia paniculata*. 7. *Diplotaxis tenuifolia*. 8. *Arabis lyrata*. 9. *A. hirsuta*.

2. **S. Sophia**, L. FLIXWEED. HERB SOPHIA. (*Sophia Sophia*, Britton.) Herb 1 to 2½ ft. high, hairy, with forked hairs. Stems slender, branching. Leaves doubly feather-formed. Flowers small. Pods 1 to 2 in. long on slender foot-stalks. Naturalized. Waste places. June-August.

3. **S. altissimum**, L. TALL SISYMBRIUM. Stem 2 to 4 ft. high, slender, branching, not hairy or with few hairs. Leaves feather-formed. Flowers small. Pods 2 to 4 in. long, very slender, spreading. Waste places. Naturalized.

4. **S. humile**, Meyer. LOW OR NORTHERN ROCK CRESS. Stem 4 to 10 in. high. Rosette of leaves lance-shaped with sinuses or dentate edges. Stem leaves linear. Pod slender. *Flowers white or pink*. Rocky places; mountains of Vermont, rare. July.

16. RAPHANUS, L.

Erect, branching. Leaves somewhat hairy, long, cut by deep sinuses. Fruit pods not hairy, constricted between the pods, with a long style.

1. **R. Raphanistrum**, L. WILD RADISH. Plant 1 to 2½ ft. high, somewhat hairy. Leaves lyre-shaped, rough; pod tapering at apex to a long style, necklace shaped from the constrictions between the seeds. Naturalized. Fields.

2. **R. sativus**, L. GARDEN RADISH. The garden radish with pale purple petal is sometimes found persistent in old fields.

17. DIPLLOTAXIS, DC.

Plants smooth or nearly so. Leaves long, in general form lance-shaped but cut by sinuses into feather-form. Pod long, somewhat flattened, beak short or absent.

1. **D. tenuifolia**, (L.) DC. (Fig. 7, pl. 55.) WALL ROCKET. A bushy plant 1 to 4 ft. high, with leaves cut almost to the mid-vein by the numerous deep sinuses. The lower leaves 3 to 6 in. long, the lobes generally narrow and the sinuses broad. Fruit pods long and slender on slender foot-stalks about 1/3 the length of the pod. Stems leafy up to the loose cluster of flowers. Introduced. Waste places. Summer.

2. **D. muralis**, (L.) DC. SAND ROCKET. Plant resembling No. 1. The leaves of No. 1 are in general outline egg-shaped or long lance-shaped, broadest near the center or at the anterior third. The leaves of this species are long and narrow the broadest part being near the apex. The sinuses are much more shallow than those of No. 1, the lobes being reduced almost to coarse teeth. The stem above is nearly or quite leafless.

18. RORIPA, Scop.

Very leafy, branching herbs with lobed or dissected leaves. Flowers white in two of our species, yellow in all the others. Fruit pods short in most of the species, sometimes elongated in a few. Seeds in two rows in each valve of the pod.

Flowers white

Aquatic plants.

Leaves mostly trifoliate

Leaves dissected into thread-like divisions

Plants not strictly aquatic

R. Nasturtium

R. americana

R. armoracia

Flowers yellow

Pods elongated.

Slender, not constricted between seeds *S. sylvestris*

About as long as the pedicel and constricted between seeds . . . *R. palustris*

Pods globose or ovoid *R. hispida*

3. *R. armoracia*, (L.) Rusby. RUSBY'S WATER CRESS. Branching plant, floating or spreading and rooting at branches in brooks and ditches. Leaves generally of 3 leaflets, but these may be in greater number, from 5 to 9. Terminal leaflet largest. Brooks and streams. Naturalized. April-Nov.

2. *R. americana*, (Gray) Britton. Aquatic, upper leaves oblong, not divided, immersed leaves pinnately divided and finely dissected. Pods ovoid.

1. *R. Nasturtium*, (L.) Hitchcock. (Fig. 8, pl. 56.) HORSE RADISH. Basal leaves feather-formed, oblong, very large, those of stem lance-form. Roots long and large. Escaped from gardens. Moist grounds, along streams, etc.

4. *R. sylvestris*, (L.) Bess. CREEPING YELLOW WATER CRESS. Stems smooth, angular, from creeping root-stocks. Leaves variable, 3 to 5 in. long and deeply divided pinnately, the sinuses extending to mid-vein. Flowers yellow, pod $\frac{1}{2}$ in. long or less. Moist grounds. Naturalized.

5. *R. palustris*, (L.) Bess. (Fig. 3, pl. 55.) MARSH WATER CRESS. Hairy plant 1 to 2 ft. high, with leaves deeply cut pinnately, the sinuses less completely dividing into leaflets than No. 4. Terminal leaflet larger, sometimes 6 in. long. Flowers $\frac{1}{8}$ in. in diameter, yellow. Pods linear-oblong, turgid, 2 to 6 times as long as thick. Wet places. Naturalized. May-Aug.

6. *R. hispida*, (Desv.) Britton. (Fig. 8, pl. 54.) HISPID YELLOW CRESS. Resembling No. 5, but generally stouter, 1 to 4 ft. high. All parts covered with spreading hairs, pods ovoid or round. Naturalized. Waste places. May-June.

Flowers white or purple

19. DENTARIA, L.

Herbs with 3- or 5-divided leaves; slender and rather long and flat seed pod. Seeds in a single row in each valve, the seed stalks alternating on opposite sides of the valves. Stems naked below, bearing above 2- or 3-parted or rarely 5-parted leaves and a cluster of white or purple flowers. Rootstocks rather fleshy and knotted, mostly horizontal.

1. *D. laciniata*, Muhl. (Fig. 3, pl. 56.) CUT-LEAVED TOOTHWORT. PEPPER ROOT. Plant 8 to 15 in. high, root-stock markedly jointed. Stem branching into 3 leaf-stalks and the flower stem. Leaflets each carrying a leaf 2 to 5 in. broad, divided into 3 leaflets, these sometimes rather deeply divided; teeth coarse. Other leaves start on long leaf-stalks directly from the root. Flowers numerous, white or rose color. Woods. April-June.

2. *D. diphylla*, Michx. (Fig. 4, pl. 56.) TWO-LEAVED TOOTHWORT. Plant about as high as No. 1; stem bearing two leaf-stalks, each 3-parted,

and a flower stalk, the leaflets broad-ovate, with coarse teeth. Root leaves with the single 3-part division. Flowers white. Woods and meadows. May.

3. *D. maxima*, Nutt. LARGE TOOTHWORT. Similar to No. 2, but larger. Leaves generally 3 but there may be but 2, or there may be as many as 7, each with 3 leaflets, the leaflets distinctly stalked. Flowers purple.

4. *D. incisifolia*, Eames. CUT-LEAVED TOOTHWORT. Stem leaves 2, usually opposite. The 3 leaf divisions are *without stalks*. In other respects the plant resembles No. 3. Sherman, Conn.

5. *D. heterophylla*, Nutt. SLENDER TOOTHWORT. Plant 10 to 14 in. high, stem slender and stem leaves, of which there are 2, of 3 quite narrow lance-shaped leaflets, remotely notched. The leaf from the root has a long slender leaf-stalk and the leaflets are broad-ovate. Woods in the southern part of our region. April-May.

20. ALLIARIA, Adams

Branching herb with broad heart-shaped or rounded leaves with the margins cut by deep and broad notches; flowers in a long cluster; seed pods cylindric or nearly so.

A. officinalis, Andr. HEDGE GARLIC. (*A. Alliaria*, (L.) Britton.) Erect branching plant 1 to 3 ft. high. Smooth or with few soft hairs; leaves broad, 2 to 7 in. wide, with conspicuous notches in the margin. Flowers white. May-June.

21. CARDAMINE, L.

Herbs, usually smooth, stems mostly unbranched. Leaves compound (pinnate) or simple. Flowers white or purplish-white, the petals each with a claw at the throat. Pods long and slender, flattened, with the seeds in a single row in each valve.

Leaves pinnately compound (feather-formed).

Leaflets of lower leaves generally as broad as long.

Plant not hairy.

Flowers from $\frac{1}{2}$ to $\frac{3}{4}$ in. broad *C. pratensis*

Flowers $\frac{1}{6}$ to $\frac{1}{4}$ in. broad *C. pennsylvanica*

Plant hairy *C. hirsuta*

Leaflets of lower leaves generally narrow.

Leaflets usually more than 3 pairs in addition to the terminal one

. *C. arenicola*

Leaflets usually not exceeding 3 pairs but more than one.

Seed pods nearly parallel with stem *C. parviflora*

Seed pods decidedly spreading *C. flexuosa*

Leaves not compound, but often conspicuously lobed.

Plants tufted, 2 to 5 in. high *C. bellidifolia*

Plants usually 6 to 15 in. high.

Plants weak, rooting at the joints *C. rotundifolia*

Plants erect.

Flowers purple *C. purpurea*

Flowers white *C. bulbosa*

1. *C. pratensis*, L. (Fig. 1, pl. 56.) MEADOW BITTER CRESS. All the leaves pinnately compound (feather-formed), the lower ones on a somewhat long leaf-stalk, the leaflets orbicular or broadly angular. The upper leaves on shorter foot-stalks, the leaflets narrow, in about half a dozen pairs. Flowers in a terminal cluster, white or purple, $\frac{1}{2}$ to $\frac{3}{4}$ in. broad. Wet meadows and swamps. April-May.



PLATE 56

1. *Cardamine pratensis*. 2. *C. purpurea*. 3. *Dentaria laciniata*. 4. *D. diphylla*. 5. *Draba caroliniana*. 6. *D. incana*. 7. *D. verna*. 8. *Roripa armaria*.

2. *C. hirsuta*, L. (Fig. 8, pl. 57.) HAIRY BITTER CRESS. Whole plant hairy. Leaves nearly all basal, feather-formed, with usually about 5 leaflets, the terminal one orbicular or nearly so, the other more or less oval or oblong. Stem leaves few, their segments linear. Flowers white, pods erect, linear. Moist places, Penna., south and west. March-May.

3. *C. pennsylvanica*, Muhl. (Fig. 4, pl. 55.) PENNSYLVANIA BITTER CRESS. Stem 8 in. to 3 ft. high, leafy up to the clusters of flowers; leaflets of lower leaves rounded, of upper narrow; terminal leaflet pear-shaped with conspicuous notch on each side. Leaflets of all leaves from 4 to 8 pairs. Flowers small, white. Swamps and wet places. April-June.

4. *C. arenicola*, Britton. SAND BITTER CRESS. Stem usually *much branched*, $\frac{1}{2}$ to 1 ft. high. Leaves compound of 4 or more pairs of linear leaflets, the terminal one long and narrow. Flowers white, about $\frac{1}{6}$ in. across. Wet sandy soil. March-April.

5. *C. parviflora*, L. SMALL-FLOWERED BITTER CRESS. Somewhat similar to No. 3, but leaflets less numerous, the stem less branching and flowers smaller. Stem very slender. Dry rocky places. April-May.

6. *C. flexuosa*, With. WOOD BITTER CRESS. Stem 6 to 15 in. high, rather stout; lateral leaflets narrow but broadest toward apex, about 3 pairs, the terminal one pear-shaped or orbicular. Wet woods and along streams. May-Aug.

7. *C. bellidifolia*, L. (Fig. 3, pl. 57.) ALPINE CRESS. A dwarf species on the White Mountains and other elevations. Leaves ovate, the lower on long, the upper on short foot-stalks. Flowers few, white. July.

8. *C. purpurea*, (Torr.) Britton. (Fig. 2, pl. 56.) PURPLE CRESS. Stem not branched, 6 to 15 in. high. Basal leaves orbicular, heart-shaped, on long slender foot-stalks; upper, broad, with coarse toothed borders and without foot-stalks. Flowers purple. Cold wet places. April-May.

9. *C. bulbosa*, (Schreb.) BSP. (Fig. 5, pl. 55.) BULBOUS CRESS. Stems not branching, $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high. Lower leaves orbicular heart-shaped on long slender foot-stalks. Upper, broad and dentate without leaf-stalks. Flowers white. Wet places. April-June.

10. *C. rotundifolia*, Michx. ROUND-LEAVED WATER CRESS. Stem weak, often rooting at the joints and sending out runners. Leaves rounded, somewhat angled; sometimes heart-shaped. Flowers white. In cold springs in the southern part of our area.

22. DRABA, L.

Small herbs growing mostly in tufts; leaves and stems hairy with forked hairs; stems generally with few or no leaves, the leaves, which may be toothed or not, arranged in a rosette at the base. Flowers in elongated or rounded clusters, small, and in our species, white. Pods oval, or linear, flat, oblong, pointed at the apex, few to many seeded. Seeds arranged in two rows in each valve.

Petals 2-cleft	<i>D. verna</i>
Petals not notched or cleft.	
Leaves elliptic, margin without teeth or notches	<i>D. caroliniana</i>
Leaves oblong, margins with teeth	<i>D. incana</i>

1. *D. verna*, L. (Fig. 7, pl. 56.) VERNAL WHITLOW GRASS. A low spreading plant, 1 to 5 in. high, with stems naked from the rosette to the flowers or fruit. Leaves of the basal rosette elliptic, numerous, hairy. Flowers small on foot-stalks $\frac{1}{2}$ to 1 in. long. Fruit an oval or oblong pod. Common in sandy places. Feb.-May.

2. *D. caroliniana*, Walt. (Fig. 5, pl. 56.) CAROLINA WHITLOW GRASS. Plant about the size of the last. One or two pairs of leaves extending upon the flower stem. Pods $\frac{1}{3}$ to $\frac{2}{3}$ in. long. March-June.

3. *D. incana*, L. (Fig. 6, pl. 56.) TWISTED WHITLOW GRASS. Leaves long, lance-shaped or with the apex broadest, remotely toothed with rather conspicuous teeth. Small leaves extending up the flower stem arranged alternately. In the Green Mountains and Adirondacks.

23. ARABIS, L.

Plants usually rather small; hairy or smooth. Pods long and slender, flattened. Flowers white or purple.

Basal leaves not in a rosette	<i>A. patens</i>
Basal leaves in a rosette.	
Leaves of rosette lyre-formed.	
Pods erect	<i>A. lyrata</i>
Pods drooping	<i>A. canadensis</i>
Leaves of rosette narrow elliptic, deeply or not deeply dentate.	
Plant very hairy	<i>A. hirsuta</i>
Plant not very hairy	<i>A. brachycarpa</i>
Leaves of rosette long, narrow and deeply toothed or cut by broad and deep sinuses	<i>A. glabra</i>
Leaves of rosette egg-shaped, dentate.	
Upper stem leaves with entire margins	<i>A. laevigata</i>
Upper stem leaves markedly dentate	<i>A. dentata</i>

1. *A. lyrata*, L. (Fig. 8, pl. 55.) LYRE-LEAVED ROCK-CRESS. Slender plants, in tufts, 4 to 12 in. high. Smooth or sometimes somewhat hairy below. Basal leaves feather-formed, upper narrow, with entire margins and blunt apex. Flowers few in a terminal cluster, white. Pods long and very slender. Sandy places and rocky precipices. April-Sept.

2. *A. patens*, Sulliv. SPREADING ROCK-CRESS. Plant downy, 1 to 2 ft. high. Leaves alternate on the stem, without leaf-stalks and to some extent auricled, the margins sharply toothed or nearly smooth. Flowers white; pods an inch or more long. Eastern Penna., westward. Summer.

3. *A. canadensis*, L. SICKLE-POD. Stem not branching, 1 to 3 ft. high; smooth or with soft hairs below. Basal leaves deeply dentate or feather-formed, stem leaves, the lower rather broadly lance-shaped with dentate margins, the upper ones narrow lance-shaped with entire margins. Pods long and drooping. Flowers greenish-white. Woods. June-Aug.

4. *A. hirsuta*, (L.) Scop. (Fig. 9, pl. 55.) HAIRY ROCK-CRESS. Stem scarcely branching, 1 to 2 ft. high; leaves of rosette deeply dentate or more or less lyrate. Stem leaves narrow lance-shaped, clasping the stem. Whole plant quite hairy. Flowers greenish-white. Pods long and slender. Sandy and rocky places. May-Sept.

5. *A. brachycarpa*, (T. and G.) Britton. PURPLE ROCK-CRESS. Stem branched, 1 to 3 ft. high, smooth except at lower part. Basal

leaves narrow, broadest at apex, 1 to 3 in. long, margins notched. Stem leaves quite narrow, about an inch long, clasping the stem at base. Flowers white or pink, small. June-July.

6. *A. glabra*, (L.) Bernh. (Fig. 6, pl. 57.) TOWER MUSTARD. Stem erect, rarely branching, smooth and light green above; 2 to 4 ft. high. Basal leaves 2 to 10 in. long and $\frac{1}{2}$ to $\frac{3}{4}$ in. wide, margins entire or with prominent and unequal dentation. Leaves of the rosette hairy, those of the stem more or less arrow-shaped, clasping the stem and mostly without hairs. Flowers small yellowish-white in terminal cluster; pods parallel with and close to the stem. Seeds in 2 rows. May-Aug.

7. *A. laevigata*, (Muhl.) Poir. (Fig. 4, pl. 57.) SMOOTH ROCK-CRESS. Whole plant smooth and covered with whitish bloom. Basal leaves broad lance-shaped with deep notches, 2 to 3 in. long. Upper leaves narrow, clasping the stem, notched at the borders. Pods 3 to 4 in. long, spreading and curved downward. Seeds in one row. Flowers greenish-white. Rocky woods. April-May.

8. *A. dentata*, T. and G. TOOTHED ROCK-CRESS. Stem sparingly branching, 1 to 2 ft. high, slender, plant hairy. Lower leaves egg-shaped or pear-shaped, with margins coarsely toothed 2 to 4 in. long. Stem leaves oblong, dentate, clasping at base. Flowers greenish-white, small. Pods spreading. April-June.

24. STENOPHRAGMA, Celak.

An herb resembling *Arabis*. Covered with stiff forked hairs. Stem branched, slender.

S. Thaliana, (L.) Celak. (Fig. 1, pl. 57.) MOUSE-EAR CRESS. Plant ranging from an inch to 16 in. high, with freely branching stem. Leaves of the rosette spatula- or pear-formed, dentate; those of the stem broad ovate without foot-stalks. Flowers small, white. Southern part of our area. April-May.

25. HESPERIS, L.

Erect herbs with simple leaves and large clusters of purple or white flowers. Pods (siliques), slender, linear, cylindric. Petals purple.

H. matronalis, L. (Fig. 2, pl. 57). ROCKET. DAME'S VIOLET. Stem 2 to 3 ft. high. Leaves lance-shaped, borders wavy. Flowers purple, each nearly an inch broad. The Rocket of the gardens, naturalized in places.

FAMILY III.—CAPPARIDACEAE. CAPER FAMILY

The characteristics of this family are much the same as those of the *Crucifers*. So nearly related are these two families that it is not, in the case of every species, easy to distinguish the one family from the other. An important difference is, however, found in the fact that while in the flowers of the *Crucifers* there are four long and two shorter stamens, in the *Caper* family the stamens are equal or nearly so. The number of stamens in our species is 6 as in the *Crucifers*, or more than six.



PLATE 57

1. *Stenophragma Thaliana*. 2. *Hesperis matronalis*. 3. *Cardamine bellidifolia*. 4. *Arabis laevigata*. 5. *A. virginica*. 6. *A. glabra*. 7. *Polanisia graveolens*. 8. *Cardamine hirsuta*. 9. *Cleome spinosa*.

1. CLEOME, L.

Herbs or shrubs. Leaves compound, leaflets radiating, 3- or 7-foliate. Calyx of 4 sepals; stamens 6, equal. Seed-pod elongated, like the silique of mustard, many seeded.

C. spinosa, L. (Fig. 9, pl. 57.) SPIDER FLOWER. Plant 2 to 4 ft. high, erect. Stem and leaves furnished with soft hairs. Leaves divided into 7 leaflets radiating from the common center. Lower leaves with rather long leaf-stalks, upper with short leaf-stalks or none. Leaflets lance-shaped. Above, the leaves become simple, not divided into leaflets, egg-shaped or heart-shaped at base. Flowers of 4 purple or whitish petals, each with a long, slender claw. The flower is about an in. broad. The stamens are two or three times as long as the petals. Seed-pod 2 to 6 in. long. In the southern part of our area, New York and New Jersey.

2. POLANISIA, Raf.

Herbs with a disagreeable odor. Leaves divided into 3 radiating leaflets. Flowers in clusters, small, white or yellowish. Stamens 9 to 12. Pod cylindric.

P. graveolens, Raf. (Fig. 7, pl. 57.) CLAMMY WEED. Branching, $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high. Leaves 3-foliate (clover-formed); leaflets oblong, obtuse, without teeth or notches. Flowers in terminal clusters, yellowish-white. Stamens about 11. Pod 1 to 2 in. long. Sandy shores, our area and southward. June-Aug.

FAMILY IV.—RESEDACEAE. MIGNONETTE FAMILY

Annual or perennial herbs with unsymmetrical flowers, introduced from Europe and only found growing wild in our region in certain localities where the species have become naturalized in waste places near sea-ports. Leaves alternate, either simple or compound, feather-formed. Flowers in spikes; calyx of 4 to 7 parts and corolla of about as many. Stamens, in our species, 3.

RESEDA, L.

Characters as above.

Leaves entire	<i>R. Luteola</i>
Leaves compound (feather-formed).	
Petals greenish-yellow	<i>R. lutea</i>
Petals white	<i>R. alba</i>

1. **R. Luteola**, L. (Fig. 7, pl. 58.) DYER'S ROCKET. YELLOW WEED. Calyx and corolla each of 4 divisions, unequal. Plant 1 to $2\frac{1}{2}$ ft. high. Leaves long, lance-shaped, often with shallow or even rather deep lobes, especially of lower leaves, upper leaves generally with entire edges. Seed capsule rounded. Introduced. In waste places on Long Island and elsewhere.

2. **R. lutea**, L. YELLOW CUT-LEAVED MIGNONETTE. Plant erect or decumbent. Leaves feather-formed, the divisions sometimes rather irregular,

often secondarily divided. Plant hairy. Calyx and corolla each 6-parted, irregularly divided. Petals quite small, greenish-yellow. Introduced. In waste places, in southern part of our area.

3. *R. alba*, L. WHITE CUT-LEAVED MIGNONETTE. Calyx and corolla of 5 divisions each, petals with about 4 teeth, white. Plant smooth, 1 to 3 ft. high. Introduced in widely separated localities.

Order V.—SARRACENIALES. Order of Pitcher Plants

Insectivorous plants which secrete a viscid substance attractive to insects and which aids in their capture. The leaves are all basal and from the midst of this basal cluster of leaves arises a slender flower stem bearing one or several nodding flowers. There are 4 or 5 calyx divisions arising below the ovary and 5 petals. Stamens numerous. Fruit a capsule 3- to 5-celled.

FAMILY I.—SARRACENIACEAE. PITCHER PLANT FAMILY

Characters those of the order, but all leaves are hollow, pitcher-formed or trumpet-shaped.*

I. SARRACENIA, L.

Perennial herbs growing in bogs. Leaves all at the base, hollow or pitcher-shaped, with a wing at one side. Flowers solitary on a tall scape, nodding; calyx of 5 sepals with 3 small bracts at base. Petals 5. The extremity of the pistil spreads out as a broad shield-like plate covering the ovary. Its 5 rays terminate below and constitute as many stigmas. Fruit a capsule of 5 cells.

S. purpurea, L. (Fig. 5, pl. 58.) PITCHER PLANT. SIDE-SADDLE FLOWER. This, the only species in our region, is one of the most curious of our plants. It is found in peat bogs where it often grows in considerable beds. The hollow leaves entice insects within their recesses where, owing to the stiff hairs pointing downward and the viscid secretions, many of the prisoners die. It is supposed that the juice from the insects contribute toward the nutrition of the plant. The flower stem is from 15 to 20 in. high. Flowers purple and yellow. Blooms in June.

FAMILY II.—DROSERACEAE. SUNDEW FAMILY

Delicate herbs growing in mossy bogs. Leaves mostly in a basal whorl covered, especially at the edges, with glandular hairs and in the center with a viscid exudation. Flowers on a slender scape, nodding, with 4 or 5 sepals and 5 petals. Stamens 4 to numerous; pistils 3 to 5; ovary globose with the calyx attached at base.

DROSERA, L.

Bog herbs with the characters of the Family as above.

Leaf blades round, fully as broad as long	<i>D. rotundifolia</i>
Leaf blades spatula-formed, rounded at apex	<i>D. intermedia</i>
Leaf blades linear, but broader than the leaf-stalk	<i>D. longifolia</i>
Leaf blades thread-like, not broader than the leaf-stalk	<i>D. filiformis</i>

1. *D. rotundifolia*, L. (Fig. 1, pl. 58.) ROUND-LEAVED SUNDEW. Plants 4 to 10 in. high. Leaves nearly orbicular, depressed at center, which is occupied by a viscid exudation. Leaf-stem and edges of leaves thick set with glandular hairs. Flowers 4 to 12 on a slender scape with quite short flower stems, white, about 1/6 in. broad. In swamps, throughout our area. July-Aug.

2. *D. intermedia*, Hayne. (Fig. 2, pl. 58.) SPATULATE-LEAVED SUNDEW. Similar to No. 1, but leaves are elongated, spatulate, rounded at apex and narrowed at base. The plant is usually smaller than No. 1 and the color of leaves darker. Less common than No. 1, growing in similar situations. July-August.

3. *D. longifolia*, L. (Fig. 3, pl. 58.) OBLONG-LEAVED SUNDEW. Resembles No. 2, but leaves are still more elongated, and while in Nos. 1 and 2 the leaves lie flat upon the surrounding moss or mud, in this species the leaves are more nearly erect. Whole plant more delicate than either of the preceding species. In bogs, less common than No. 1, blooming at about the same time.

4. *D. filiformis*, Raf. (Fig. 4, pl. 58.) THREAD-LEAVED SUNDEW. Leaves narrowly linear, from 5 to 15 in. long, covered throughout with hairs. Flower scape 8 to 20 in. high with a number of purple flowers which are from 1/3 to 1 in. broad. Sand, near the eastern coast. July-September.

Order VI.—ROSALES. Order of the Rose Alliance

This large order unites within itself plants of widely divergent habits and appearance. They include trees, shrubs and herbs. Mostly they are land plants, but a few find their homes in swamps and one, in our region, *Podostemon*, is an entirely submersed aquatic.

The characteristics which join this greatly varied group into an order are:

1st. The presence of both sepals and petals, the latter of which are distinct, that is, they are not united by their edges as they are in such flowers as the blue-bell or morning glory, but are separate as in the single rose. The sepals of the calyx are to some extent confluent, but always show at least a partial division. To this general law of characterization there are exceptions:



PLATE 58

1. *Drosera rotundifolia*. 2. *D. intermedia*. 3. *D. longifolia*. 4. *D. filiformis*. 5. *Sarracenia purpurea*. 6. *Sedum acre*. 7. *Reseda luteola*. 8. *Sedum ternatum*. 9. *Penthorum sedoides*.

for example, the *Podostemon* has neither sepals nor petals, the style and double stamen being partly surrounded at base by a small spathe. In *Liquidambar* the pistillate flower has a small confluent calyx but no corolla, and from the staminate flower both calyx and corolla are absent. In *Sanguisorba* the petals, and in *Xanthoxylum* the sepals are wanting.

- 2nd. The carpels (seed caskets), are solitary or several may be united in one or collected in a group.
- 3d. The stamens do not, with very few exceptions, arise from a ring just at the base of the ovary, but spring from the calyx or around the summit of the ovary.
- 4th. Except *Podostemon*, which is a submersed aquatic, all are land plants, though a few are found growing in mud or in swamps.
- 5th. In the great majority of species of this order the stamens and pistils are found in the same flower. In exceptional cases the stamens and pistils occupy different flowers. Examples: *Hamamelis*, *Liquidambar* and *Platanus*.

FAMILIES OF THE ORDER ROSALES

Submersed aquatic plant **PODOSTEMACEAE**

Trees, shrubs and herbs, land plants.

Fruit a simple or compound dry capsule.

Stamens less than 20

Fleshy or succulent herbs, leaves without stipules;

ovaries as many as the divisions of the calyx. Sta-

mens inserted on the calyx . . . **CRASSULACEAE**

Herbs or trees, not fleshy, ovaries 2, fewer than the

divisions of the calyx. Stamens inserted on the

calyx **SAXIFRAGACEAE**

Fruit a one-celled globular berry . **GROSSULARIACEAE**

Fruit contained in a rounded woody capsule.

Shrub with alternate undivided leaves, with flowers

appearing in late summer or in autumn, petals 4,

long, strap-like sepals 4 . . . **HAMAMELIDACEAE**

Fruit a rounded bur-like head.

Tree with broad leaves and with fruit in globular heads hanging by long peduncles. Stamens and pistils in different flowers. Flowers without sepals or with minute ones **PLATANACEAE**

Fruit a legume, that is, a pod formed like that of a pea.

Flowers slightly irregular, but not in form of a pea blossom. Stamen filaments united generally in 2 groups **CAESALPINACEAE**

Flowers quite irregular, papilionaceous—having the general shape of a pea blossom **PAPILIONACEAE**

Stamens more than 20

Stamens all free.

Fruit, follicles or achenes, *i. e.*, dry one-celled seed vessels with several seeds, or a dry vessel with a single seed **ROSACEAE**

Fruit a *drupe*, *i. e.*, like a plum or cherry, with a fleshy exterior and woody stone within **DRUPACEAE**

Fruit a *pome*, *i. e.*, a fleshy fruit like the apple or pear
. **POMACEAE**

(In the Hawthorns, Mountain Ash and Shad-berry the fruit is small and less fleshy than the pear and apple.)

FAMILY I.—**PODOSTEMACEAE**. RIVER WEED FAMILY

Only a single species in our region. A fresh water submersed plant with the general appearance of the *Naiads*. The leaves are thread-formed, much divided. Flowers without perianth except a small spathe-like envelope at base of the very simple flower which consists of the ovary and of a rather long stamen filament dividing toward the top into two stamens.

PODOSTEMON, Michx.

Characters as above.

1. **P. ceratophyllum**, Michx. (Fig. 1, pl, 59.) RIVER WEED. THREAD FOOT. Plant submersed, dark green with thread-like leaves forming dense fascicles. Flowers very small, inconspicuous, at axils of leaf branches. In shallow streams, northern New York and southward throughout the range. July-Sept.

FAMILY II.—CRASSULACEAE. ORPINE FAMILY

Fleshy or succulent herbs with alternate leaves and regular flowers in terminal spreading clusters (cymes). Stipules none. Calyx of 4 or 5 sepals. Petals equalling the number of sepals. Stamens equal in number to petals or double the number, generally the latter. Seed caskets (carpels) opposite the petals and of the same number. Fruit, dry seed caskets with several seeds in each casket or follicle.

Minute herbs, stamens equal to number of sepals . . . **Tillaea**

Very fleshy herbs; twice as many stamens as sepals. Leaves small, scale-like **Sedum**

Plant not very fleshy, leaves conspicuous, on leaf stalk.

Flowers in forked terminal clusters (cymes). Petals usually wanting **Penthorum**

1. TILLAEA, L.

Very small smooth plant growing in mud. Leaves opposite. Flowers very small, one in a leaf axil. Petals 3 to 5. Calyx of 3 to 5 sepals. Stamens 3 to 5.

T. aquatica, L. (Fig. 5, pl. 59.) **PIGMY WEED**. Stem $\frac{1}{2}$ to 3 in. high. Leaves linear, opposite. In the axes of the leaves appear the small rounded bud or flower, having calyx lobes, petals and carpels, each 4. The petals are greenish. Muddy banks and streams, mostly near sea coast. July-Sept.

2. SEDUM, L.

Smooth fleshy plants, generally escapes from gardens. Leaves alternate. Flowers with stamens and pistils. Stamens twice as many as the petals. Flowers generally in 5's, exceptionally 4-parted. Stamens 8 or 10.

Flowers with 4 petals and 8 stamens.

Stamens and pistils on different plants *S. roseum*

Flowers with 5 petals and 10 stamens.

Stamens and pistils in the same flower.

Petals purple or white.

Leaves broad and flat, 1 to 2 in. long *S. purpureum*

Leaves less than an inch long.

Flowers white *S. ternatum*

Flowers pink *S. telephioides*

Flowers yellow.

Plant 1 to 3 in. high *S. acre*

Plant 8 to 15 in. high *S. reflexum*

1. **S. roseum**, (L.) Scop. (Fig. 7, pl. 59.) **ROSEWORT**. Stems 5 to 10 in. high. Leaves oval without leaf-stalks, toothed, overlying each other. Cluster of leaves terminal, dense, greenish-yellow, turning purple. A northern species rare in our region, but extending into Maine and further south.

2. **S. purpureum**, Tausch. (Fig. 2, pl. 59.) **GARDEN LIVE-FOR-EVER**.

(*S. Telephium*, Gray.) Stems 1 to 2 ft. high. Leaves broad egg-shaped, without leaf-stalks. Less densely crowded than No. 1. Plant light green. Flowers purple. Escaped from gardens.

3. *S. telephioides*, Michx. AMERICAN ORPINE. Similar to No. 1, but more slender. Flowers pink; petals twice as long as sepals. Southern Penna., and southward.

4. *S. acre*, L. (Fig. 6, pl. 58.) MOSSY STONECROP. Growing in dense mossy tufts. Plant 1 to 3 in. high, with bright yellow blossoms. Leaves short, thick, egg-shaped, about 1/12 in. long. Escaped from gardens.

5. *S. reflexum*, L. (Fig. 6, pl. 59.) CROOKED YELLOW STONECROP. Plant 8 to 15 in. high. Leaves lance-formed, crowded on the stem, 1/4 to 1/2 in. long. Flowers yellow in broadly spreading cluster. Escaped from gardens. Rare.

6. *S. ternatum*, Michx. (Fig. 8, pl. 58.) WILD STONECROP. Growing in mossy tufts. Stems 3 to 8 in. high. Leaves in verticles of 3 or opposite in pairs, 1/2 to 1 in. long. Flower cluster of about 3 spreading branches, thickly studded with purplish or white flowers. Rocky woods in southern part of our region. April-June.

PENTHORUM, L.

Erect, only slightly succulent. Herbs with alternate leaves with foot-stalks. Petals generally absent, when present 5. Calyx of 5 sepals, stamens 10, carpels 5, united to the middle. Flowers in spreading clusters, the branches one-sided and drooping (cymose).

P. sedoides, L. (Fig. 9, pl. 58.) DITCH STONECROP. Leaves lance-shaped, pointed at each end, with foot-stalks 1/2 to 3/4 in. long, finely notched at borders. Wet places, borders of ponds, etc. July-October.

FAMILY III.—SAXIFRAGACEAE. SAXIFRAGE FAMILY

In our region nearly all small herbs; perennial. Leaves mostly alternate or in whorls about the base; less frequently opposite.

Flowers with both stamens and pistils. Sepals 5, generally free, but sometimes adherent to the ovary. Petals 5, rarely wanting. Stamens 10 in all our species. Styles 2, terminating below in a two-celled capsule or a many-seeded casket, opening at the side or, rarely, in a berry.

Herbs

Flowers in clusters or solitary and purple.

Petals with undivided borders.

Styles 2, ovary of 2 lobes, parted about half way up

. **Saxifraga**

Styles 2, ovary of 1 lobe.

Stamens 10 **Tiarella**

Stamens 5 **Heuchera**

Petals fringed at borders	Mitella
Petals mostly absent. Plant aquatic	Chrysosplenium
Flowers not in clusters, white; scape bearing a single star-shaped flower	Parnassia
Leaves opposite	Hydrangea
Leaves alternate	Itea

1. SAXIFRAGA, L.

Herbs, perennial; leaves mostly basal, less frequently opposite and scattered along the stem. Stipules none. In all of our species borders of leaves furnished with sharp teeth. Flowers generally in loose, or crowded, terminal clusters. Petals 5, sepals 5, stamens 10, inserted with the petals. Ovary, generally superior to the calyx, 2-lobed above, joining below.

Flowers purple, leaves opposite, over-lapping	<i>S. oppositifolia</i>
Flowers yellow, or yellowish-green.	
Leaves alternate along the stem	<i>S. aizoides</i>
Leaves mostly in a rosette at base.	
Leaves mostly less than an in. long	<i>S. aizoon</i>
Leaves more than 3 in. long	<i>S. pennsylvanica</i>
Flowers white.	
Leaves trilobate	<i>S. rivularis</i>
Leaves 5 to 12 in. long, less than $\frac{1}{4}$ as broad	<i>S. micranthidifolia</i>
Leaves 1 to 3 in. long, about $\frac{1}{2}$ as broad	<i>S. virginensis</i>
Leaves usually less than an in. long, narrow, with toothed apex	<i>S. stellaris</i>

1. **S. oppositifolia**, L. PURPLE, OR MOUNTAIN SAXIFRAGE. Stems in tufts, 6 to 8 in. long, creeping. Leaves crowded, overlapping, opposite, small rather fleshy 1/12 to 1/6 in. long, oval. Flowers solitary, light purple, showy, petals 5-veined. Wet rocks, Mt. Mansfield and Willoughby Mountain, Vt., and further north.

2. **S. aizoides**, L. (Fig. 4, pl. 59.) YELLOW MOUNTAIN SAXIFRAGE. Stems branched, in tufts, 2 to 6 in. high. Leaves scattered along the flowering stem, linear, rather thick and fleshy; 1/3 to 2/3 in. long, with occasional stiff hairs along the margin. Flowers yellow, conspicuous. In the same location as No. 1.

3. **S. rivularis**, L. (Fig. 8, pl. 59.) ALPINE BROOK SAXIFRAGE. In dense tufts, stems creeping, rooting at leaf nodes. Lower leaves kidney-shaped with 3 to 5 deep lobes, upper leaves oval or lance-shaped. Flowers few (1 to 5), white, $\frac{1}{4}$ in. broad. Calyx lobes nearly as long as the petals. Ovary with two widely diverging tips. Summits of White Mountains and north.

4. **S. aizoon**, Jacq. (Fig. 3, pl. 59.) LIVELONG SAXIFRAGE. Stems viscid, hairy, 6 to 10 in. high; leaves in a dense basal rosette, spatula-shaped, with sharp white firm teeth at borders. A few small leaves along the stem. Flowers in a spreading cluster, white with yellowish spots, about $\frac{1}{4}$ in. broad. Petals twice as long as sepals. Dry rocks, Mt. Mansfield, Vt., and northward.

5. **S. virginensis**, Michx. (Fig. 2, pl. 60.) EARLY SAXIFRAGE. Stems viscid, growing in tufts on wet rocks and moist places. Leaves mostly at base in a rather dense rosette, egg-shaped with blunt teeth at borders.



PLATE 59

1. *Podostemon ceratophyllum*. 2. *Sedum purpureum*. 3. *Saxifraga aizoon*. 4. *S. aizoides*. 5. *Tillaea aquatica*. 6. *Sedum reflexum*. 7. *S. roseum*. 8. *Saxifraga rivularis*. 9. *Chrysosplenium americanum*. 10. *Parnasia caroliniana*. 11. *Hydrangea arborescens*, in fruit.

Stem 4 to 12 in. high. Leaves 1 to 3 in. long, tapering at base to a long leaf-stalk. Flowers white. Early spring, March to May.

6. *S. micranthidifolia*, (Haw.) BSP. LETTUCE SAXIFRAGE. Flower scape somewhat viscid, 1 to 3 ft. high. Flowers small, white in a loose pyramidal cluster. Leaves inversely lance-shaped or oval, from a few in. to 1 ft. long. Coarsely toothed at margins. Bethlehem, Pa., and southward. May-June.

7. *S. pennsylvanica*, L. TALL OR SWAMP SAXIFRAGE. Plant 1 to 3½ ft. high. Leaves mostly basal, broad lance-shaped, 5 to 8 in. long by 1 to 2 in. broad, tapering at base to short leaf stalk, borders toothed. Flowers yellowish-green on tall scape with a few small leaves or none. In wet places in all our range. May.

8. *S. stellaris*, L. FOLIOSE SAXIFRAGE. (*S. comosa*, Britton.) Slender plant 2 to 6 in. high, with a rosette of lance-shaped leaves, broadest at apex with about 3 teeth. Flowers few, white, some of them replaced by small tufts of leaves. Mt. Katahdin, Maine, and northward. Summer.

2. TIARELLA, L.

Herbs, similar in many respects to *Saxifraga*. There are, however, at the base of the leaf-stalks, small stipules, and the ovary, which is 2-lobed in *Saxifraga*, has but a single lobe in *Tiarella* which is divided into 2 unequal valves. Leaves nearly all basal on long leaf-stalks, broadly rounded and deeply 3-lobed to several lobed.

T. cordifolia, L. (Fig. 1, pl. 60.) COOLWORT. FALSE MITERWORT. Leaves basal, rounded, deeply 3- to 7-lobed. Flower scape 6 to 12 in. high, with a long narrow cluster of about a dozen white flowers. Calyx bell-shaped of 5 sepals; petals slightly longer than sepals. In moist woods in early spring, throughout our range.

3. HEUCHERA, L.

Perennial herbs with rounded, heart-shaped leaves, principally from the root. When leaves are found on the stem they are alternate. Calyx bell-shaped, 5-cleft, the tube adhering to the ovary. Petals small, often shorter than the sepals. Stamens 5; styles 2, slender; capsule 1-celled.

1. *H. americana*, L. (Fig. 5, pl. 60.) ALUM ROOT. Stem 2 to 3 ft. high, stout, hairy. Leaves all or nearly all from the base, on long leaf-stalks, round or roundish with 5 to 9 rounded lobes and with blunt teeth; the veinlets radiating from the stem insertion. Calyx broadly bell-shaped; petals very small, greenish. Stamens extending much beyond the calyx and petals. Dry woods, Conn., and southward. May-August.

2. *H. pubescens*, Pursh. DOWNY HEUCHERA. Plant much like the preceding, more decidedly downy, the lobes of the leaves deeper. *Petals exceeding the calyx lobes, purplish.* Stamens scarcely longer than the petals. Mountains of Pennsylvania and southward. May-June.

4. MITELLA, L.

Herbs with the general character of *Saxifraga*. Leaves mostly basal but, in our species, the flower scape has, near the center, a pair of broad



PLATE 60

1. *Tiarella cordifolia*. 2. *Saxifraga virginiensis*. 3. *Mitella nuda*. 4. *M. diphylla*. 5. *Heuchera americana*.

leaves (one or even both wanting in *M. nuda*). Petals fringed. Ovary 1-lobed, 1-valved.

1. *M. diphylla*, L. (Fig. 4, pl. 60.) TWO-LEAVED BISHOP'S CAP. MITERWORT. Basal leaves broadly heart-shaped. Flowering stem 10 to 18 in. high, with a pair of broad leaves less than half way up. Flowers clustered along the upper part of the slender stem. Petals white, two or three times longer than the sepals, beautifully fringed. In rich woods. Early spring. In all our range.

2. *M. nuda*, L. (Fig. 3, pl. 60.) NAKED BISHOP'S CAP. MITERWORT. Flowering stem 3 to 7 in. high. Leaves all basal or with one small leaf half way up the stem; rounded, heart-shaped at base, hairy. The hairy flower stem bears about half a dozen white flowers, the petals being more deeply cut and delicately fringed than No. 1. In similar situations as No. 1. Blooms in early spring and also again in autumn.

5. CHRYSOSPENIUM, L.

Low, creeping, rather fleshy herbs, growing in wet places. Leaves, in our species, opposite, without stipules. Flowers minute, greenish, springing in the axils of the leaves. Petals wanting. Stamens 8 to 10. Ovary of 1 cell, separating above into 2 lobes. Lobes of the calyx, which are the conspicuous elements of the flower, yellowish-green.

C. americanum, Schwein. (Fig. 9, pl. 59.) WATER CARPET. GOLDEN SAXIFRAGE. Stems 3 to 8 in. long, creeping, branched, smooth and shining. Lower leaves opposite, round or broadly ovate, with shallow notches in margin. Flowers yellowish or purplish. In wet places, not common. In the central part of our region. From the northern to southern part of our area. Early spring.

6. PARNASSIA, L.

Smooth herbs, with basal leaves on long leaf stalks and with slender flower stems bearing a single leaf near the middle. Leaves with 5 end-to-end veins. Stem with a single terminal conspicuous white flower. Ovary 1-lobed, 1-celled with short styles or none. Stamens 10 or more, 5 of which are fertile, the others without anthers.

P. caroliniana, Michx. (Fig. 10, pl. 59.) GRASS-OF-PARNASSUS. Flowering scape 8 to 24 in. high, with a broad heart-shaped leaf clasping below the middle. Basal leaves on long slender leaf-stalks, somewhat heart-shaped at base and decurrent on the leaf-stalk, 1 to 2 in. long, nearly as wide. Flower white with several greenish veins $2/3$ to $1\frac{1}{2}$ in. in diameter; calyx segments $1/3$ as long as petals, light green. In swamps, brook-sides and wet meadows, throughout our area. June-September.

7. HYDRANGEA, L.

Our species a shrub with opposite egg-shaped leaves and terminal clusters of flowers. Leaves without stipules. The exterior flowers of the spreading cluster are often sterile and without petals, but with large and conspicuous calyx lobes. Calyx tube of fertile flowers hemispheric with 8 or 10 ribs. Stamens 8 to 10. Petals generally 5, sometimes 4. Ovary 2- to 4-lobed with 2 diverging styles. External to the ovary are 10 to 12 vertical ribs.

H. arborescens, L. (Fig. 11, pl. 59.) WILD HYDRANGEA. Shrub 2 to 10 ft. high. Leaves smooth, young twigs somewhat hairy. Leaves ovate, sharp pointed with leaf-stalks about 1/6 as long as the leaves. Flowers in a rounded, spreading cluster. Along streams, New York and New Jersey and southward.

8. ITEA, L.

Shrub with alternate leaves. Flowers small, white, in narrow elongated cluster. Calyx tube rounded. Sepals 5. Petals 5, much longer than sepals. Stamens 5. Fruit capsule oblong, 2-lobed, spreading above into two slightly diverging styles.

I. virginica, L. (Fig. 1, pl. 61.) VIRGINIA WILLOW. Shrub 4 to 10 ft. high. Leaves oblong, pointed with small serrations at borders. Wet places in southern part of our area, New Jersey and Pennsylvania. May-June.

FAMILY IV.—GROSSULARIACEAE. GOOSEBERRY FAMILY

This family contains only the single genus, *Ribes*, gooseberries. The species are all shrubs with alternate leaves which are, however, often in groups or fascicles. The leaves are broad and generally deeply cut by sinuses which divide the blade into 3 or 4 lobes. At the base of the leaf stem are two small stipules. The stems are, in some species, armed with sharp spines just below the leaf axils, in other species the spines or sharp bristles are dispersed along the stem, while in some the stems are entirely destitute of spines or of bristles. The flowers are, in some species, solitary or in groups of 2 to 4, while in others they are numerous, arranged along a main flower stem in a long slender cluster (raceme). At the base of each small foot-stalk for the flower is a small bract. The calyx has 4 or 5 sepals, sometimes colored; petals 4 or 5, generally 5, inserted into the throat of the calyx; they are small, usually less than the sepals. There are 5 stamens and 3 styles which unite at base into a one-celled ovary. The fruit is a berry containing several seeds.

RIBES, L.

The only genus. The characters are those of the family.

Flowers few (1 to 4), in the leaf axils.

Berries covered with long bristles *R. cynosbati*

Berries smooth or with few bristles.

Spines below the leaf clusters, slender and generally single, sometimes wanting.

Stamens not longer than the lobes of the calyx *R. oxycanthoides*

Stamens longer than the lobes of the calyx *R. rotundifolium*

Spines at leaf axils stout, usually 3 together, branches not bristly *R. grossularia*

Flowers in long slender pendulous clusters.

Spines below leaf clusters, and bristles dispersed along stem *R. lacustre*

Spines absent.

Branches prostrate or spreading *R. prostratum*

Branches erect.

Calyx bell-shaped, fruit black *R. floridum*

Calyx cylindric, fruit red *R. vulgare*

1. *R. Cynosbati*, L. (Fig. 2, pl. 61.) WILD GOOSEBERRY. Shrub; branches with prickles at base of leaf clusters; leaves about 5-lobed; flowers 1 to 3 at the leaf axils, succeeded by rather large ovate berries with many rather long bristle-like prickles. Rocky woods, throughout our area. April-June.

2. *R. oxyacanthoides*, L. (Fig. 3, pl. 61.) HAWTHORN GOOSEBERRY. NORTHERN GOOSEBERRY. Prickles at base of leaf groups, solitary or none; bristles on stem dispersed or absent. Leaves deeply 5-lobed. Stamens not longer than sepals. Berry smooth, reddish-purple or red. Throughout all but the most southern part of our area.

3. *R. rotundifolium*, Michx. EASTERN WILD GOOSEBERRY. Similar to No. 2, but stamens are distinctly longer than the long segments of the calyx. Berry smooth. Rocky woods, in eastern border of our region. May-July.

4. *R. Grossularia*, L. GARDEN GOOSEBERRY. (*R. Uva-crispa*, L.). Three stout spines at base of leaf cluster. Leaves 3-lobed. Berry large, smooth or with a few weak bristles. Escaped from gardens, along roadsides.

5. *R. lacustre*, (Pers.) Poir. (Fig. 7, pl. 61.) SWAMP GOOSEBERRY. Stem covered with prickles. Spines below leaf clusters several, generally 2 below each leaf cluster. Leaves deeply incised, the lobes angular, toothed. Flowers 10 to 20, arranged in a pendulous cluster along a main flower stalk, green. Fruit covered with long prickles. Disagreeable to taste. In swampy places. May-June.

6. *R. prostratum*, L'Her. (Fig. 4, pl. 61.) FETID CURRANT. Branches prostrate or widely spreading. Stems without spines or prickles. Leaf stems long and slender. Leaves 3- to 5-lobed. Flowers 10 to 20, small, green. Fruit red, about the size of the garden currant and resembling it, but covered with bristles. Taste disagreeable. On mountains and in wet places. May-June.

7. *R. floridum*, L'Her. (Fig. 6, pl. 61.) WILD BLACK CURRANT. Branches erect, without prickles or spines; leaves 3- to 5-lobed, somewhat dotted below. Flowers numerous, in pendulous clusters, the calyx cylindrical, bracts exceeding the length of the flower pedicels. Fruit black, smooth, insipid. In woods, rather common. April-May.

8. *R. vulgare*, Lam. (Fig. 5, pl. 61.) RED CURRANT. The garden currant, sometimes growing wild. Fruit red, pleasantly acid.

FAMILY V.—HAMAMELIDACEAE. WITCH HAZEL FAMILY

In our region, a small tree or shrub, with alternate broad leaves and with clusters of yellow flowers on the newer branches *in the late summer or autumn*. Calyx small, greenish, of 4 sepals rolled backward, corolla of 4 elongated strap-shaped yellow petals. Stamens 4 or more. Fruit a 2-celled woody capsule.

I. HAMAMELIS, L.

Tall shrubs or small trees. The genus is sufficiently described under our only species, below.



PLATE 61

1. *Itea virginica*. 2. *Ribes cynosbati*. 3. *R. oxycanthoides*. 4. *R. prostratum*. 5. *R. vulgare*. 6. *R. floridum*. 7. *R. laeustre*. 8. *Platanus occidentalis*. 9. *Liquidambar styraciflua*. 10. *Hamamelis virginiana*.

H. virginiana, L. (Fig. 10, pl. 61.) WITCH HAZEL. Shrub or small tree. Leaves on short leaf-stalks, broadly oval, somewhat heart-shaped and unequal at base, covered, at least when young, with soft hairs; borders with rounded teeth. Flowers in clusters of several, making tufts of yellow, the long narrow petals appearing like threads of yellow in the tuft. They appear, as the leaves fall or earlier, at the axis of the coming leaves. An interesting shrub in damp woods. Blooms Aug.-Dec.

2. LIQUIDAMBAR, L.

In our region, a tree with broad 5-fingered or 5-lobed leaves. Stamens and pistils in different flowers which are in different groups on the same tree. Stamens in staminate flowers numerous, calyx and corolla absent. Pistillate flowers have a small calyx the sepals of which are confluent. Petals none.

L. Styraciflua, L. (Fig. 9, pl. 61.) SWEET GUM. ALLIGATOR TREE. A forest tree 60 ft. or more high. Trunk covered by deeply furrowed bark. Leaves broader than long, divided into 5 deep, sharp pointed, lobes. Fruit in a compact pendulous ball consisting of numerous capsules each with 1 or 2 seeds. Connecticut, southern New York and southward.

FAMILY VI.—PLATANACEAE. PLANE TREE FAMILY

Large tree with broad, lobed leaves and sheathing stipules, bark falling in large scales. Stamens and pistils in different groups of flowers on same tree; clusters of fertile flowers forming at length a globose mass of capsules with many bristly projecting points. Sterile flowers also in spherical masses which hang from a thin pendulous stem, the globular masses forming at intervals. The individual flowers have an insignificant calyx and corolla and few stamens. Fruit a nutlet.

PLATANUS, L.

Characters of the family.

P. occidentalis, L. (Fig. 8, pl. 61.) BUTTON WOOD. SYCAMORE. Our largest tree, 80 to 130 ft. high. Bark falling in thin plates, exposing the grayish-white new bark beneath. Leaves orbicular, angularly lobed, points of lobes sharp. Heads of lobes hanging on long peduncles. Wet woods and along streams. May.

FAMILY VII.—ROSACEAE. ROSE FAMILY

A large family consisting of herbs, shrubs and trees. In all our species the leaves, which are simple or compound, are alternate and the flowers are all regular and contain both stamens and pistils. In most species the leaves are subtended by stipules, often quite conspicuous. Calyx of 5 sepals either free or attached to the ovary. Petals 5, or, in a few cases, none. Stamens usually

numerous (more than 10). Seed carpels one to many, distinct, ripening into one-seeded or several-seeded hard dry fruit.

Shrubs

Stamens numerous.

Ovaries naked, *i. e.*, not completely surrounded by the calyx.

Leaves simple, not deeply lobed **Spiraea**

Leaves deeply 3-lobed (rarely 5-lobed). Flowers in dense spherical cluster **Physocarpus**

Leaves mostly trifoliate, rarely 5-foliate; flowers in loose clusters or solitary **Rubus**

Ovaries enclosed in tube of calyx but free from it.

Leaves pinnate (*i. e.*, leaflets arranged in pairs along the central leaf stem except the terminal leaflet) **Rosa**

Stamens only 5 **Sibbaldia**

Herbs

Flowers green in rather dense heads **Alchemilla**

Flowers not green, not in dense heads or spikes.

Leaves not basal, nearly orbicular, not lobed, except at base **Dalibarda**

Leaves all at base.

Flowers yellow

Bracts of calyx shorter than sepals . **Waldsteinia**

Bracts of calyx longer than the sepals . **Duchesnea**

Flowers white, plant sending out runners . **Fragaria**

Leaves along the stem as well as at base.

Flowers arranged in a long slender spike **Agrimonia**

Flowers in loose clusters or solitary.

Petals nearly as broad as long.

Fruit in a spongy receptacle . . **Comarum**

Fruit dry.

Carpels with tail-like appendages

Petals not more than 5 . . **Geum**

Petals more than 5 **Dryas**

Carpels without tail-like appendages

. **Potentilla**

Carpels 2-ovuled; leaves pinnate

. **Filipendula**

Petals 3 times as long as broad	Gillenia
Flowers white in dense elongated heads or spikes; flowers without petals	Sanguisorba
Flowers without petals, in slender spikes forming a compound cluster	Aruncus

1. PHYSOCARPUS, Maxim.

Branching shrubs with alternate, broad, deeply lobed leaves. Flowers in dense terminal rounded clusters, white. Calyx bell-shaped, with 5 sepals; petals 5, inserted in the throat of the calyx. Fruit 1 to 5 dry, several seeded carpels inflated.

P. opulifolius, Maxim. (Fig. 2, pl. 62.) NINEBARK. (*Opulaster opulifolius*, (L.) Kuntze. *Spiraea opulifolia*, L.). A rare and beautiful shrub, 3 to 10 ft. high. Leaves 1 to 2 in. long, roundish with 3 lobes and notched borders. Bark loose, falling in strips. Stipules falling early. Clusters of white flowers nearly spherical. River banks and rocky hills of our region. June.

2. SPIRAEA, L.

Shrubs with alternate simple leaves without lobes. Sepals 5; petals 5; stamens 10 to 50. Fruit dry, several seeded carpels, 3 to 12. Flowers in terminal clusters, white or rose color, not yellow.

Flowers in pyramidal cluster.

Twigs smooth, yellowish-brown; flowers white *S. salicifolia*

Twigs smooth, reddish-brown; flowers white or light pink *S. latifolia*

Twigs hairy, flowers rose color *S. tomentosa*

Flowers in flattened cluster *S. corymbosa*

1. **S. salicifolia**, L. (Fig. 1, pl. 62.) WILLOW-LEAVED MEADOW SWEET. Erect shrub with smooth yellowish-brown twigs and elliptic, egg-shaped or lance-shaped leaves on short leaf-stalks. Borders of leaves sharply toothed. Flowers in a pyramidal group, individual flowers 1/6 to 1/4 in. broad, white or pinkish-white. In moist grounds and on hill-sides in southern section of our range. June-Aug.

2. **S. latifolia**, Borkh. MEADOW SWEET. Similar to No. 1, but twigs are reddish or reddish-brown. Color of flowers as in No. 1. Common in pastures, etc. June-Aug.

3. **S. tomentosa**, L. (Fig. 3, pl. 62.) HARDHACK. STEEPLE BUSH. Erect, slender shrub, generally with few or no branches. Stem covered with soft hairs. Flowers in a tall conical cluster, purple or pink. In old fields and pastures in our area. July-Sept.

4. **S. corymbosa**, Raf. CORYMBED SPIRAEA. Leaves broadly oval or egg-shaped. Flowers in a spreading flattened cluster (corymb), white. Rocky places, New Jersey and south. May-June.

3. GILLENIA, Mœnch. (Porteranthus, Britton)

Erect herbs from a perennial root. Leaves 3-foliate with conspicuous stipules. Flowers white or pink with 5 long narrow petals inserted into the throat of the calyx. Calyx tubular, of 5 sepals. Stamens 10



PLATE 62

1. *Spiraea salicifolia*. 2. *Physocarpus opulifolius*. 3. *Spiraea tomentosa*.
 4. *Gillenia trifoliata*. 5. *G. stipulata*. 6. *Rubus Chamaemorus*. 7. *R. odoratus*.

to 20, quite short. Seed carpels 5, united at base, each carpel with 2 to 4 seeds.

Stipules linear, not leaf-like *G. trifoliata*
 Stipules large, leaf-like *G. stipulata*

1. *G. trifoliata*, (L.) Moench. (Fig. 4, pl. 62.) INDIAN PHYSIC. BOWMAN'S ROOT. Plant 2 to 4 ft. high. Leaves 3-foliate; at the base, where the leaflets unite at the stem, are 2 narrow lance-shaped stipules without teeth. Flowers in loose terminal clusters, the ovary small, the petals long, slender, spreading, white or pink. Pods reddish. Woodlands, southern part of our region. May-June.

2. *G. stipulata*, (Muhl.) Trel. (Fig. 5, pl. 62.) AMERICAN IPECAC. Resembles the last species, but at the base of the 3 leaflets, which have a short leaf-stalk, is a pair of broad leaf-like stipules, giving the appearance of having 5 leaflets. The stipules are toothed like the leaflets. Flowers similar to No. 1, rose color. In the western part of our region. June-July.

4. ARUNCUS, Adams

Herbs with flowers of two kinds, the staminate and pistillate on different plants, perennial. Flowers in long slender clusters (spikes) white, the spikes forming a pyramidal compound cluster. Leaves compound, doubly feather-formed. Stamens numerous; petals as many as the calyx lobes, mostly 5; pistils usually 3. Seed casket (follicle), usually 2-seeded.

A. sylvester, Kosteletsky. GOAT'S-BEARD. Stem erect, branched, 3 to 7 ft. high. Leaves doubly compound of 3 to many leaflets. Leaflets egg-shaped, toothed, with or without leaf-stalks. Rich woods, mountains of Penna., and south. May-July.

5. RUBUS, L.

Perennial shrubs, rarely herbs or trailing vines often armed with prickles. Leaves mostly compound, usually of 3 or 5 leaflets, rarely of more. Calyx 5-parted; corolla of 5 petals; stamens and pistils, each numerous. Fruit a berry with many seeds, or an aggregation of small drupes.

Leaves not consisting of several leaflets.

Flowers purple *R. odoratus*
 Flowers white *R. Chamaemorus*

Leaves consisting of 3 or more leaflets.

Fruit concave beneath and when ripe falling away from the dry receptacle.

Raspberries

Stem armed with prickles.

Fruit dark purple *R. occidentalis*

Fruit light red *R. strigosus*

Fruit dark red *R. neglectus*

Stem not armed with prickles *R. triflorus*

Fruit not separating from the juicy receptacle.

Blackberries

Stems stout, erect or curved.

Stems 2 to 12 ft. high.

Lower surface of leaves covered with white down *R. cuneifolius*

Lower surface of leaves not white-downy.

Leaflets mostly in 3's *R. frondosus*

Leaflets mostly in 5's.

Fruit cylindric *R. alleghaniensis*

Fruit oval or oblong *R. canadensis*

Stems prostrate, mostly trailing.

- Leaves generally of 5 leaflets, plant not trailing.
 Hairs tipped with glands *R. setosus*
 Hairs not glandular *R. nigricans*
 Leaves generally of 3 leaflets.
 Stems trailing.
 Stem bristly, scarcely prickly *R. hispidus*
 Stem prickly.
 Leaflets somewhat downy beneath. Rounded or heart-shaped at base
 *R. Baileyanus*
 Leaflets smooth, both sides, not rounded or heart-shaped at base
 *R. villosus*

(Many new species of blackberries have recently been proposed. Those described below are established and recognized forms. Many of the others may be varieties or hybrids.)

Raspberries

1. *R. odoratus*, L. (Fig. 7, pl. 62.) PURPLE-FLOWERING RASPBERRY. An erect shrub, 3 to 5 ft. high, with broad 3- to 5-lobed leaves with small stipules or none, and covered, especially along the veins of the lower side, with hairs. At base the leaf is heart-shaped, often nearly or quite a foot wide. Flowers in loose terminal clusters, each flower 1 to 2 in. broad, purple, showy; calyx with a long slender appendage. Fruit red when ripe, broad, thin and dish-shaped, sometimes called thimble berry because the fruit fits over the end of the finger. Along the borders of woods and in hedges. June-Aug.

2. *R. Chamaemorus*, L. (Fig. 6, pl. 62.) MOUNTAIN RASPBERRY. CLOUDBERRY. Herbaceous, 3 to 10 in. high. Leaves rounded, 3- to 5-lobed; borders finely toothed, 1 to 3 in. broad. Flower solitary, white, from $\frac{1}{2}$ to 1 in. broad. Peat bogs and swamps. New England. June-July.

3. *R. strigosus*, Michx. (Fig. 1, pl. 63.) WILD RED RASPBERRY. Shrub, 3 to 6 ft. high. Stem covered with stiff bristles, older stems armed with prickles. Leaflets 3 (rarely 5), rounded or heart-shaped at base, pointed at apex; borders doubly notched. Under side of leaflets whitish with fine hairs. Flowers in loose clusters, white. Fruit red. In cultivation varieties with yellow or with white fruit occur. Along fences, and in dry pastures. May-June.

4. *R. neglectus*, Peck. PURPLE WILD RASPBERRY. Stem recurved and rooting at the tip, smooth, but stems sparingly bristly and prickly. Leaflets egg-shaped, sharply toothed. Inflorescence a flattened cluster, rather compact. Flowers nearly $\frac{1}{2}$ in. broad; petals white. Fruit nearly hemispheric, dark red or purple. Dry rocky soil, New England to Penna. June-July.

5. *R. occidentalis*, L. (Fig. 3, pl. 63.) BLACK RASPBERRY. THIMBLEBERRY. Stems from 5 to 12 ft. high, not much branched, recurved and armed with strong hooked prickles. Leaflets 3, ovate, pointed, covered, as are also the newer stems, with a whitish down. Flowers white, petals shorter than the sepals. Fruit purple-black. Common in pastures.

6. *R. triflorus*, Richards. (Fig. 5, pl. 63.) DWARF RASPBERRY. Stems 6 to 12 in. high, generally trailing, without prickles or bristles. Leaflets 3, broadly and somewhat angularly egg-shaped with double serrations. Flowers few, white, petals recurved. Fruit red-purple, of a few grains. Swamps, most of our region. May-July.

Blackberries

7. *R. frondosus*, Bigel. (Fig. 7, pl. 63.) HIGH BLACKBERRY. (*R.*

villosus, Gray.) Stems 3 to 10 ft. high, erect or recurved, armed with strong curved prickles. Young branches and lower surface of leaves covered with short hairs. Leaflets 3, rarely 5. Stipules at base of common leaf-stem linear; borders of leaves coarsely serrate. Flowers white in terminal conic or pyramidal clusters. Fruit black, sweet and pulpy. Dry soil, New England and southward. May-June.

8. *R. alleghaniensis*, Porter. (Fig. 8, pl. 63.) MOUNTAIN BLACKBERRY. Similar to last, but stems more slender and leaflets, often 5, generally narrower, while the fruit is quite narrow, cylindric, less pulpy and of different flavor from the preceding species. Dry soil northern New York to Penna., and southward. Aug.-Sept.

9. *R. canadensis*, L. MILLSPAUGH'S BLACKBERRY. (*R. Millspaughii*, Britton.) Stem with few or no prickles. Berry shorter than either of last two species. Adirondack and White Mountains.

10. *R. cuneifolius*, Pursh. (Fig. 4, pl. 63.) SAND BLACKBERRY. Stems much branched, 1 to 3 ft. high, upright with strong straight or recurved prickles. Young branches and under side of leaves whitish downy. Leaflets generally 3, sometimes 5, deeply serrate at borders; rounded at apex, the terminal one broadly wedge-shaped. Fruit black. Sandy woods, in southern part of our area.

11. *R. hispidus*, L. (Fig. 2, pl. 63.) RUNNING SWAMP BLACKBERRY. Stems trailing, slender with many weak bristles. Branchlets ascending. Leaflets 3, broad at apex, pointed at base. Fruit of a few grains, black. In moist shaded places. June-July.

12. *R. setosus*, Bigel. (Fig. 9, pl. 63.) BRISTLY BLACKBERRY. Similar to last, but stems stouter and less trailing. Older branchlets covered with stout reflexed bristles which are tipped with glands. Leaflets generally in 5s, narrower and longer than those of No. 10. Fruit small, sour. Northern New York and eastern Penna. July-Aug.

13. *R. nigricans*, Rydb. PECK'S DEWBERRY. Stouter than Nos. 10 and 11, and more upright. Stems armed with fine prickles, which are *not tipped with glands*. Leaves, the lower, at least, in 5s; both surfaces smooth; leaflets on short stalks.

14. *R. Baileyanus*, Britton. BAILEY'S BLACKBERRY. Stems generally trailing, 3 to 6 ft. long, armed with many prickles. Leaflets generally 3, broadly oval, downy; margins coarsely serrate. Flowers rather large, white; fruit small. Woods and shady places, Maine to southern New York and southward. May-June.

15. *R. villosus*, Ait. (Fig. 6, pl. 63.) LOW BLACKBERRY. DEWBERRY. (*R. procumbens*, Muhl.). Stems trailing, 3 to 12 ft long, the ascending branches 4 to 12 in. high. Trailing stem and erect branches armed with prickles. Flowers white, rather large. Fruit black, juicy and of fine flavor. Throughout our area.

6. DALIBARDA, L.

A low herb of the general appearance of a violet. Stem and leaves downy. Leaves nearly orbicular with heart-shaped bases. Flower solitary, white, with calyx of 5 or 6 parts, generally 3 longer than the others. Petals 5; stamens numerous.

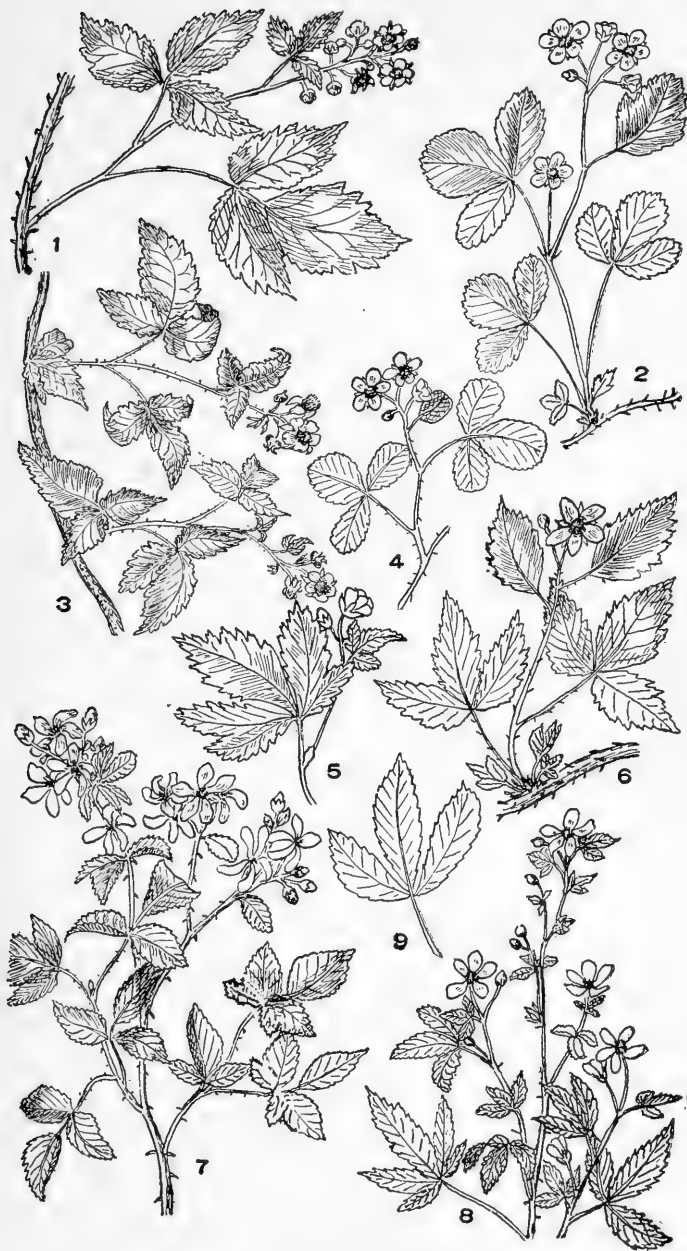


PLATE 63

1. *Rubus strigosus*. 2. *R. hispidus*. 3. *R. occidentalis*. 4. *R. cuneifolius*.
 5. *R. triflorus*. 6. *R. villosus*. 7. *R. frondosus*. 8. *R. alleghaniensis*. 9. *R.*
setosus.

D. repens, L. (Fig. 1, pl. 64.) DALIBARDA. Stems creeping, sending up tufts of leaves and naked scapes each terminated by a single spreading flower. Borders of leaves serrated. At base of leaf-stalks are found narrow stipules. Found in moist woods; most of our area.

7. FRAGARIA, L.

Herbs, with leaves and flower stalks springing from the root, propagating largely by runners. Leaves of 3 leaflets, coarsely serrated, hairy, as are the leaf stems. At base of leaf stems are narrow linear stipules. Flowers white in loose terminal clusters. Stamens numerous. Fruit a pulpy berry on a conical receptacle, red when ripe.

1. *F. virginiana*, Duchesne. (Fig. 3, pl. 64.) STRAWBERRY. Leaves in tufts; leaf stems hairy, 2 to 6 in. high. Fruit a juicy pulp in which is imbedded many yellowish *achenes* or seeds. Form of fruit broad oval or round. In all of our range.

2. *F. canadensis*, Michx. (Fig. 4, pl. 64.) NORTHERN STRAWBERRY. Plant more slender, less hairy than No. 1, fruit narrow cylindric, and less juicy. Leaflets generally on leaf-stalks.

3. *F. Terrae-novae*, Rydb. NEWFOUNDLAND STRAWBERRY. Leaflets almost or entirely without leaf-stalks. Otherwise nearly like No. 2.

8. DUCHESNEA, J. E. Smith

An herb with general appearance of the strawberries, but with *yellow flowers* and with red fruit much resembling the strawberry, but not pulpy.

D. indica, (Andr.) Focke. (Fig. 2, pl. 64.) YELLOW OR INDIAN STRAWBERRY. Introduced from India and found occasionally in waste places. Southern part of our area.

9. POTENTILLA, L.

Herbs, rarely shrubs, generally with perennial roots, rarely annual. Leaves, which are furnished with stipules, are compound of three or more leaflets. Flowers white, yellow or purple, with both pistils and stamens, the latter generally numerous, rarely 5 or 10. Calyx double, that is, with 5 sepals and with 4 or 5 bracts below. Corolla of 5, rarely of 4 petals. The seed carpels grouped upon a dry receptacle.

Shrubs	<i>P. fruticosa</i>
Herbs (a few with woody stems at base).	
Flowers white.	
Leaflets 3	<i>P. tridentata</i>
Leaflets 7 to 11	<i>P. arguta</i>
Flowers yellow.	
Leaflets 3.	
Plant $\frac{1}{2}$ to 2 in. high	<i>P. Robbinsiana</i>
Plant $\frac{1}{2}$ to 2 $\frac{1}{2}$ ft. high	<i>P. monspeliensis</i>
Leaflets 5, exceptionally 7.	
Leaves silvery white beneath	<i>P. argentea</i>
Leaves green both sides.	
Plants erect or nearly so.	
Leaflets incised at border.	
Flowers about $\frac{1}{4}$ in. broad	<i>P. intermedia</i>
Flowers about $\frac{2}{3}$ in. broad	<i>P. recta</i>
Leaflets feather-formed, the incisions extending to the mid-rib	<i>P. pennsylvanica</i>
Plant recumbent, trailing	<i>P. canadensis</i>
Leaflets 5 to 11	<i>P. paradoxa</i>
Leaflets 7 to 25. Plant recumbent, trailing	<i>P. Anserina</i>



PLATE 64

1. *Dalibarda repens*. 2. *Duchesnea indica*. 3. *Fragaria virginiana*. 4. *F. canadensis*. 5. *F. americana*. 6. *Potentilla paradoxa*. 7. *P. Robbinsiana*. 8. *P. pennsylvanica*.

1. *P. arguta*, Pursh. (Fig. 7, pl. 66.) TALL CINQUEFOIL. Stems stout, erect, 1 to 4 ft. high, hairy. Leaves compound, of 7 to 11 leaflets, borders coarsely serrate, broad oval or rhomboid; stipules membranous. Flowers in a rather close cluster, creamy-white, about $\frac{1}{2}$ in. diameter. Dry places. Maine to southern New Jersey. June-July.

2. *P. argentea*, L. (Fig. 4, pl. 65.) SILVERY CINQUEFOIL. Small, tufted, stem branching, 4 to 12 in. long, half prostrate, silvery-white, as is also the under surface of the leaves. Leaflets 5, each deeply cut into about 5 narrow segments. Flowers in loose terminal clusters, yellow, $\frac{1}{2}$ to $\frac{2}{3}$ in. diameter. In dry pastures, etc., in our area. May-Sept.

3. *P. intermedia*, L. (Fig. 3, pl. 66.) DOWNY CINQUEFOIL. Stems leafy, much branched, 1 to $2\frac{1}{2}$ ft. long, partly prostrate, hairy. Leaves of 3 to 5 leaflets, which are oblong or pear-shaped, with coarsely serrate borders. Flowers numerous, in loose terminal clusters. Mass., New York and New Jersey.

4. *P. recta*, L. (Fig. 2, pl. 66.) ROUGH-FRUITED CINQUEFOIL. Erect, hairy, stems 1 to 2 ft. high, branching mostly in 2s at the top. Leaflets narrow oblong or lance-shaped, 5, less often 7, spreading from a common center, borders coarsely serrate; stipules rather conspicuous, the lower ones leaf-like. Flowers in loose terminal cluster, each $\frac{1}{3}$ to $\frac{1}{2}$ in. broad. In waste places, New York and southward. June-Sept.

5. *P. Robbinsiana*, Oakes. (Fig. 7, pl. 64.) ROBBIN'S CINQUEFOIL. (*P. frigida*, Gray.) Dwarf, $\frac{1}{2}$ to 2 in. high, growing in dense tufts; plant silky. Leaves of 3 egg-shaped leaflets, coarsely toothed. Flowers small, generally solitary, the sepals and adjoining bracts equal. White Mountains, N. H.

6. *P. monspeliensis*, L. (Fig. 1, pl. 66.) ROUGH CINQUEFOIL. (*P. norvegica*, L.). Stems $\frac{1}{2}$ to 2 ft. high, rough-hairy. Leaflets 3; stipules leaf-like. Flowers in close leafy terminal clusters. Calyx as large as, sometimes larger, than the corolla. Petals falling quickly. Common in dry soil. June-Sept.

7. *P. paradoxa*, Nutt. (Fig. 6, pl. 64.) BUSHY CINQUEFOIL. Plant bushy, 1 to 3 ft. high, decumbent or erect, soft downy. Leaves pinnately compound with 6 to 11 leaflets, except the very upper ones which are trifoliate; stipules conspicuous, egg-shaped or oval. Flowers scattered, terminal to the branches or branchlets, yellow, $\frac{1}{4}$ to $\frac{1}{2}$ in. broad. New York, shores of Great Lakes and southward. June-Sept.

8. *P. pennsylvanica*, L. (Fig. 8, pl. 64.) COAST CINQUEFOIL. (*P. littoralis*, Rydberg.) Stems erect or prostrate, $\frac{1}{2}$ to 2 ft. high, slightly hairy or smooth. Leaflets 5, sometimes 7, feather-form, incised to the mid-rib. Flowers small, about $\frac{1}{4}$ in. broad, in terminal clusters. Coast of Maine and New Hampshire. June-July.

9. *P. fruticosa*, L. (Fig. 3, pl. 65.) SHRUBBY CINQUEFOIL. Low, much branched shrubs growing in tufted groups. Stems $\frac{1}{2}$ to 4 ft. high, with shreddy bark. Leaflets 5 (or 7), narrow oblong, without serrations at borders, silky, the margins rolling. Flowers yellow, about an inch broad, terminal. In moist pastures, Maine to New Jersey. June-Sept.

10. *P. tridentata*, Soland. (Fig. 2, pl. 65.) THREE-TOOTHED CINQUEFOIL. Stems 1 to 10 in. high, woody at base. Plants growing in

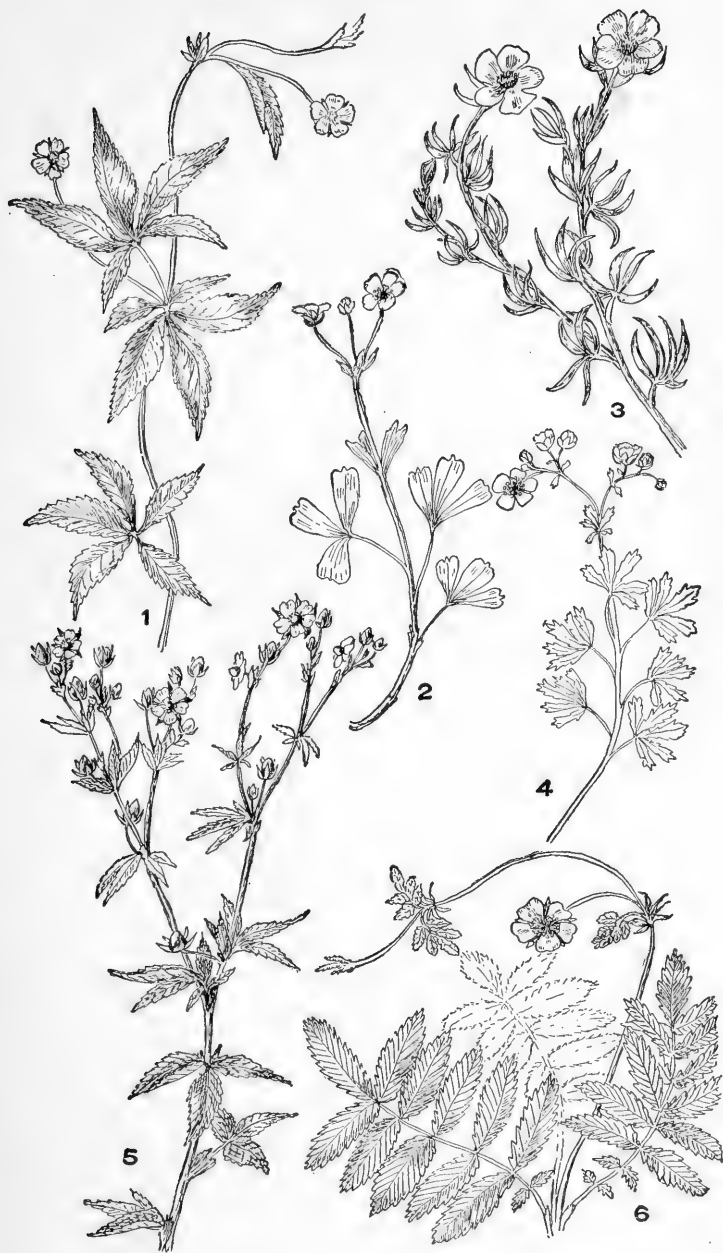


PLATE 65

1. *Potentilla canadensis*. 2. *P. tridentata*. 3. *P. fruticosa*. 4. *P. argentea*. 5. *P. monspeliensis*. Var. *norvegica*. 6. *P. Anserina*.

tufts. Leaflets 3, oblong, broad at apex and terminated by 3 conspicuous teeth. Flowers white, about 1/3 in. broad, few, in terminal cluster. Rocky places, especially on high mountains. June-Aug.

11. *P. Anserina*, L. (Fig. 6, pl. 65.) SILVER WEED. GOOSE GRASS. Stem slender, trailing, rooting at nodes. Leaflets many, silky. Flowers yellow, about 1 in. broad, solitary. Moist places, throughout our area. June-Sept.

12. *P. canadensis*, L. (Fig. 1, pl. 65.) FIVE-FINGER. COMMON CINQUEFOIL. Stems slender, running on ground and spreading by runners which are from a few inches to 2 ft. long. Leaflets 5 from a common center, toothed at borders. Common in fields and road-sides. April-August.

10. COMARUM, L.

A stout herb, nearly smooth, with purple flowers. General appearance that of a *Potentilla* (*P. palustris* of Gray). Stamens and pistils numerous.

C. palustre, L. (Fig. 4, pl. 66.) PURPLE CINQUEFOIL. MARSH FIVE-FINGER. (*Potentilla palustris*, (L.) Scop.). Prostrate herb with stems $\frac{1}{2}$ to 2 ft. long, rooting along the stems. Leaves of 5, or more frequently 7 leaflets, which are oblong, but broader at apex than at base, sharply toothed at borders, 1 to 3 in. long. Stipules broad, enfolding the leaf stems. Flowers purple inside, about 1 in. broad. In swamps and peat bogs, north to south as far as New Jersey. June-Aug.

11. SIBBALDIA, L.

Low, decumbent, shrubby plant found on summit of high mountains. Leaves of 3 leaflets. Flowers with broad calyx of 5 divisions and with small petals extending only about $\frac{1}{2}$ the length of the calyx segments. Stamens 5, pistils 5 or 10.

S. procumbens, L. (Fig. 5, pl. 66.) SIBBALDIA. Creeping, densely tufted, woody stems. Leaflets 3, wedge-shaped. Flowers yellow, the calyx much larger than corolla. Summits of White Mountains.

12. WALDSTEINIA, Willd.

Herb with appearance of strawberry. Leaves and flowering stem from the root, 3 leaflets, each broadly wedge-shaped, with lobed and serrated borders. Flowers of 5 yellow petals and 5 sepals, the calyx top- or inverted cone-shaped. Stamens numerous, inserted into the throat of the calyx. Seed cases 2 to 6.

W. fragarioides, (Michx.) Tratt. (Fig. 6, pl. 66.) BARREN STRAWBERRY. Plant 4 to 6 in. high. The flower scape bearing 3 to 8 yellow flowers. Wooded hills, New England and westward. May-June.

13. GEUM, L.

Herbs. Pistils numerous, each carpel with one ovule; the seed casket becoming dry fruit when ripe, the styles becoming hairy tails. Calyx of 5 parts with 5 alternating small bracts. Leaves compound, feather-formed, *i. e.*, of several leaflets arranged along each side of the common leaf stalk, the terminal leaflet being in most instances much larger than

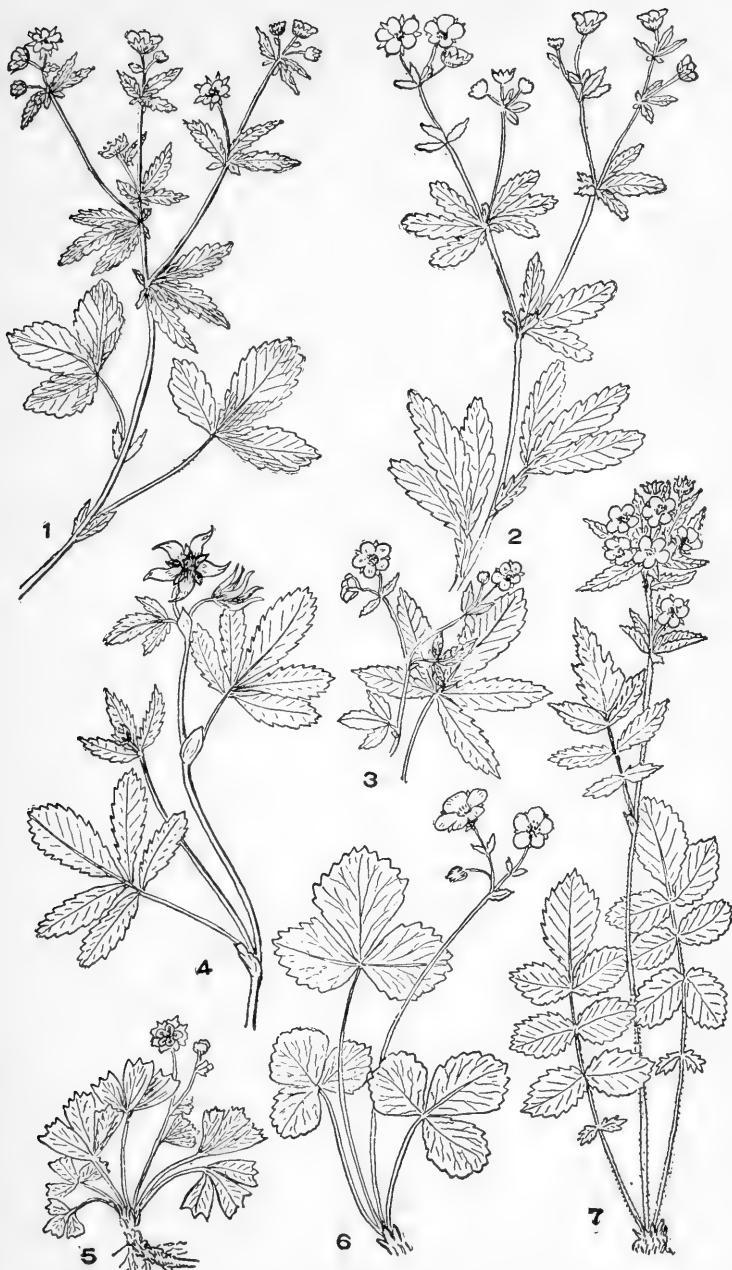


PLATE 66

1. *Potentilla monspeliensis*. 2. *P. recta*. 3. *P. intermedia*. 4. *Comarum palustre*. 5. *Sibbaldia procumbens*. 6. *Waldsteinia fragarioides*. 7. *Potentilla arguta*.

the lateral ones. Leaves attended by stipules. Stamens many. Petals 5, rounded, exceeding the divisions of the calyx.

Flowers white.

Plant silky, pubescent *G. canadense*
 Plant with stiff hairs *G. virginianum*

Flowers yellow.

Leaflets rarely more than 3, basal often of an individual leaf . . . *G. vernum*
 Leaflets 3 to 7. Terminal one orbicular or kidney-formed . . . *G. Peckii*
 Terminal one generally elongated, flowers creamy-yellow . . . *G. flavum*
 Leaflets numerous, the terminal large, rounded and deeply lobed . . . *G. macrophyllum*

Leaflets 5 to 7, terminal one egg-shaped, about 3 lobed . . . *G. strictum*

Flowers purple.

Flowers nodding *G. rivale*
 Flowers erect *G. triflorum*

1. *G. rivale*, L. (Fig. 1, pl. 68.) PURPLE AVENS. WATER AVENS. Plant erect, 1 to 3 ft. high, hairy. Basal leaves compound, feather-formed with the terminal leaflets much larger than the others. Flowers few, nodding, petals and sepals purple. Seed caskets with plumed tails. Moist grounds, Maine to Pennsylvania. May-July.

2. *G. triflorum*, Pursh. (Fig. 2, pl. 67.) LONG-PLUMED PURPLE AVENS. (*G. ciliatum*, Pursh.). Plant erect, $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high; basal leaves in tufts much divided, the terminal ones not large. Flowers erect, light purple, plumes of the seed caskets 1 to 2 in. long. Dry soil. Northern New York and New England. May-June.

3. *G. Peckii*, Pursh. (Fig. 5, pl. 67.) YELLOW MOUNTAIN AVENS. (*G. radiatum*, Michx.). Erect, $\frac{1}{2}$ to 2 ft. high, branching at top, simple below. Basal leaves of several leaflets, the terminal one very large (3 to 6 in. broad), nearly round, or kidney-shaped. Flowers yellow. White Mountains and in Maine. July-Aug.

4. *G. vernum*, (Raf.) T. and G. (Fig. 4, pl. 67.) SPRING AVENS. Erect, or ascending, $\frac{1}{2}$ to 2 ft. high, slender, few leaved. Leaflets 3 to 5, sometimes the leaf is simple. Leaflets all egg-shaped. Flowers yellow, few. Calyx reflexed, bracts at base of calyx absent. Fruit head stalked but not plumed. Shady places. New Jersey and southern New York. April-June.

5. *G. canadense*, Jacq. (Fig. 1, pl. 67.) WHITE AVENS. (*G. album*, Gmelin.) Erect, slender, $1\frac{1}{2}$ to $2\frac{1}{2}$ ft. high, sparingly covered with soft hairs. Basal leaves of 3 to 5 leaflets or of a simple leaf. Of the compound leaves the terminal leaflet is broadly egg-shaped or pear-shaped. Flowers white, $\frac{3}{4}$ in. broad; calyx lobes reflexed; receptacle bristly. Shaded places. Generally distributed. June-Aug.

6. *G. virginianum*, L. (Fig. 3, pl. 68.) ROUGH AVENS. Much stouter than preceding species. Covered with stiff hairs. The reflexed sepals exceed in length the white petals. Moist grounds, throughout our area. May-July.

7. *G. flavum*, (Porter.) Bicknell. (Fig. 6, pl. 67.) CREAM COLORED AVENS. Erect, 1 to 3 ft. tall. Stem bristly below. Basal leaves sometimes of 3 leaflets, in other cases more. Stem leaves, lower ones often 5-parted, the terminal leaflet often elongated, upper leaflets egg- or lance-shaped. Flowers cream-yellow, petals shorter than the reflexed segments of the calyx. Woods. New York, southward. June-August.

8. *G. macrophyllum*, Willd. (Fig. 3, pl. 67.) LARGE-LEAVED

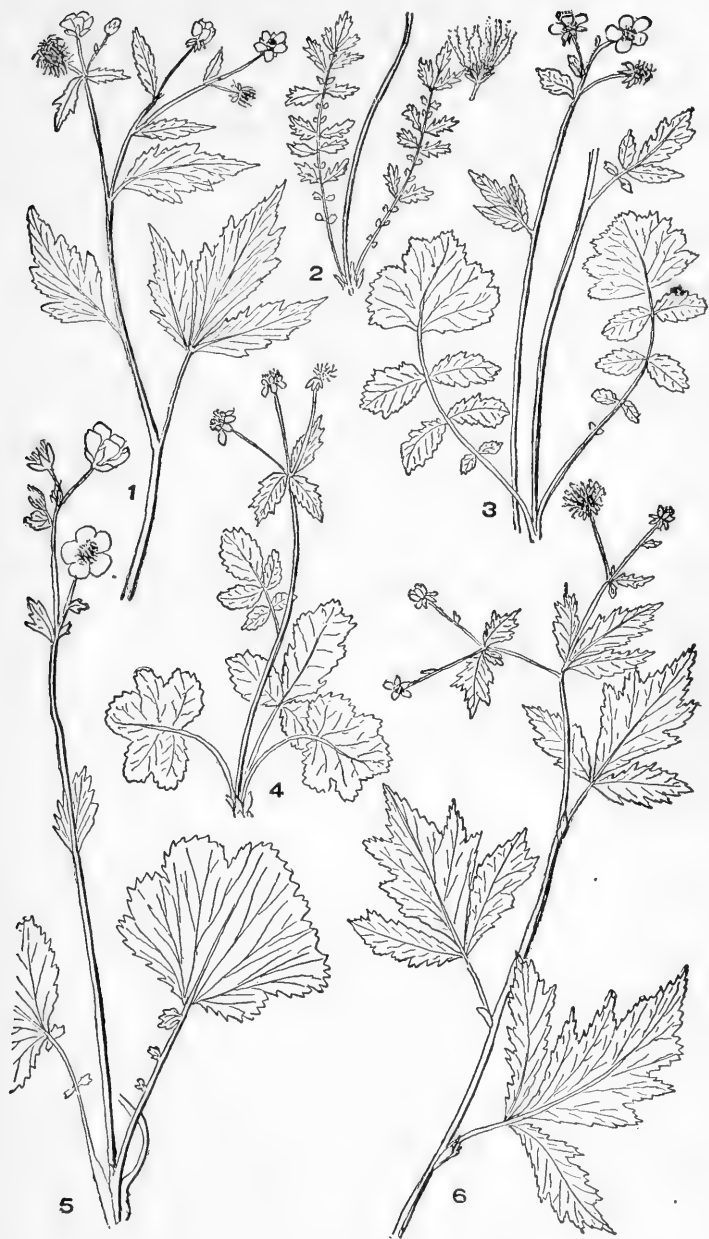


PLATE 67

1. *Geum canadense*. 2. *G. triflorum*. 3. *G. macrophyllum*. 4. *G. vernum*.
5. *G. Peckii*. 6. *G. flavum*.

AVENS. Erect, 1 to 3 ft. high, bristly hairy. Stem simple, branched above. Leaflets of basal leaves numerous, the terminal one very large and heart-shaped at base with several lobes at margin. Lateral leaflets quite small. Flowers yellow, petals exceeding the reflexed sepals. Receptacle nearly naked. Low grounds. New England, New York and northward. May-July.

9. *G. strictum*, Ait. (Fig. 2, pl. 68.) YELLOW AVENS. Erect, 3 to 5 ft. high. Somewhat hairy. Leaflets of root leaves 5 to 7; terminal one generally of 3 to 5 lobes. Flowers yellow; receptacle covered with soft hairs. Low grounds, Maine to Penna. June-Aug.

14. DRYAS, L.

Low matted plant, found on the White Mountains by Prof. Peck. Flowers white, rather large, solitary with 8 or 9 petals and many stamens and seed heads, which have plumose tails.

D. integrifolia, Vahl. (Fig. 4, pl. 68.) ENTIRE-LEAVED DRYAS. Summit of White Mountains.

15. FILIPENDULA, (Tourn.) Hill. (*Ulmaria*, Hill)

Perennial herbs with compound feather-parted (pinnate) leaves and with flowers in loose inverted pyramidal clusters. Petals 5; calyx 5-lobed; stamens numerous; pistils 5 to 15; ovary with 2 ovules.

Leaflets hand-shaped *F. rubra*
 Leaflets on each side of the leaf stem, not lobed except the terminal one
 *F. Ulmaria*

1. *F. rubra*, Hill. QUEEN-OF-THE-PAIRIE. Herb, 2 to 8 ft. high, smooth. Leaves sometimes 3 ft. long, compound, the leaflets, except the terminal, on each side of the leaf stem, with stipules at the base, the leaflets themselves hand-shaped compound, the borders sharply toothed. Flowers in a loose cluster, pink or purple. Introduced. Escaped from gardens in some parts of our area. June-July.

2. *F. Ulmaria*, (L.) Barnhart. MEADOW-SWEET. Stem 2 to 4 ft. high. Plant resembles No. 1, but, except the terminal leaflet, which is hand-shaped compound, the leaflets are egg-shaped. Flowers yellowish-white. Also an escape from gardens. June-Aug.

16. ALCHEMILLA, L.

Low herb with rounded and lobed leaves and small greenish flowers in crowded clusters. Stipules conspicuous and leaf-like. Calyx inversely conical of 4 or 5 lobes, petals wanting. Stamens 1 to 4.

A. vulgaris, L. (Fig. 6, pl. 69.) LADY'S MANTLE. DEW-CUP. Stems a few inches long, more or less reclining. Leaves round or kidney-shaped with 5 or more distinct lobes; stipules toothed. Flowers small, many in the rather crowded cluster. Calyx usually of 4 lobes. In grassy places, roadsides, etc., mostly in northern part of our area and only occasional. May-Sept.

17. AGRIMONIA, L.

Perennial herbs, all of ours 1 to 5 ft high, with compound feather-formed leaves, the leaflets arranged on opposite sides of the leaf-stalk with a terminal leaflet and with several small, apparently partly-developed

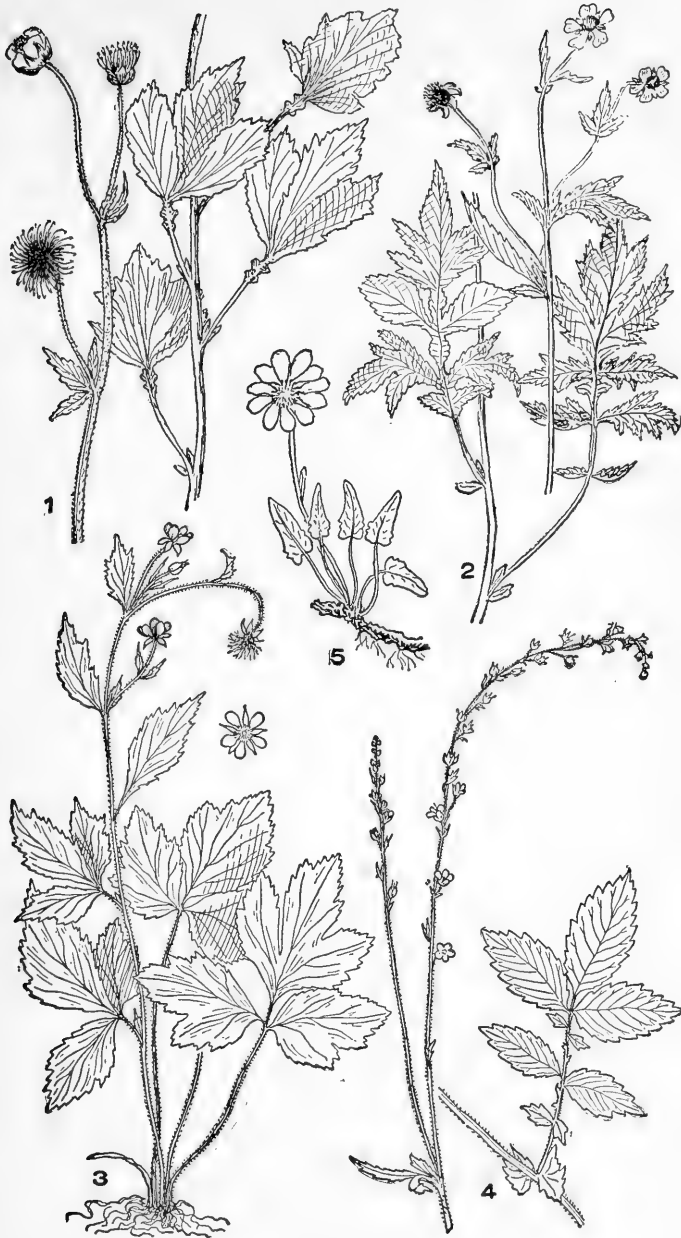


PLATE 68

1. *Geum rivale*. 2. *G. strictum*. 3. *G. virginianum*. 4. *Dryas integrifolia*. 5. *Agrimonia gryposepala*.

leaflets interspersed among those fully formed. Stipules at base of leaf-stalks conspicuous, deeply toothed. Flowers arranged along a slender flower stem, small, yellow. Calyx 5-lobed; petals 5; stamens 5 to 15; seed carpels 1 or 2, included in the tube of the calyx.

Leaflets, 3 to 5	<i>A. microcarpa</i>
Leaflets, generally 7.	
Elliptic or oblong	<i>A. gryposepala</i>
Pear-shaped	<i>A. striata</i>
Egg-shaped or oblong	<i>A. mollis</i>
Leaflets generally more than 7.	
Elliptic or egg-shaped	<i>A. Brittoniana</i>
Narrow, lance-shaped	<i>A. parviflora</i>

1. **A. gryposepala**, Wallr. (Fig. 5, pl. 68.) TALL HAIRY AGRIMONY. (*A. Eupatoria*, Gray's Manual, 6th ed.). Leaflets 5 to 7, elliptic or oblong, pointed at each end, teeth coarse. Plant hairy with stiff hairs. Petals twice as long as sepals. Roots not tubrous. Flower scape long with many yellow flowers. Woods and thickets, common. July-Sept.

2. **A. striata**, Michx. (Fig. 1, pl. 69.) WOODLAND AGRIMONY. Leaflets 5 to 7, oblong or pear-shaped. Plant with only a few hairs. Flower scapes short, quite slender, with few small flowers. Roots tubrous. Woods and thickets, Connecticut and southward. July-Sept.

3. **A. mollis**, (T. and G.) Britton. (Fig. 2, pl. 69.) SOFT AGRIMONY. Plant with soft hairs. Leaflets narrowly oblong or pear-shaped with a pale pubescence beneath. Roots tubrous. Flowers small on slender spike. Woods and thickets, Connecticut, westward and southward. July-Sept.

4. **A. Brittoniana**, Bicknell. BRITTON'S AGRIMONY. Similar to last, but roots are not tubrous, stem and leaves with stiffer hairs and leaflets generally 9 to 11. Thickets and roadsides, northern New York and southward. June-Sept.

5. **A. parviflora**, Soland. (Fig. 3, pl. 69.) MANY-FLOWERED AGRIMONY. Stems covered with coarse brown hairs. Roots not tubrous. Leaflets 11 to 17, narrow lance-shaped. Southern New York and southward. July-Oct.

6. **A. microcarpa**, Wallr. SMALL-FRUITED AGRIMONY. (*A. pumilla*, Muhl.). Plant slender, 1 to 2 ft. high, with few branches. Stem hairy. Leaves mostly of 3 leaflets, but often of 5 leaflets, small, elliptic, sharply toothed. Flowers few, small. Dry soil, Penna., and southward. Aug.

18. SANGUISORBA, L.

Herbs with feather-formed compound leaves. Calyx of 4 lobes, petals wanting, stamens 4 to many. Fruit a single nut-like seed enclosed in the dry, angular calyx.

1. **S. minor**, Scop. (Fig. 4, pl. 69.) SALAD BURNETT. (*S. Sanguisorba*, Britton.) Slender, about 1 ft. high. Leaflets generally 11 to 13, arranged along the leaf-stalk, rounded, toothed. Flowers in terminal dense rounded clusters, greenish with a sprinkling of red. Occasional. Introduced, from gardens. June-Sept.

2. **S. canadensis**, L. (Fig. 5, pl. 69.) GREAT AMERICAN BURNETT. Stem 1 to 6 ft. high. Smooth or with pubescence toward the base. Leaflets 7 to 15, egg-shaped, rounded or heart-shaped at base, coarsely



PLATE 69

1. *Agrimonia striata*. 2. *A. mollis* 3. *A. parviflora*. 4. *Sanguisorba minor*. 5. *S. canadensis*. 6. *Alchemilla vulgaris*.

toothed. Flowers in a conspicuous cylindric or pyramidal head, sepals 4, stamens 4, long, white; the long spike taking its color from these exerted filaments. Bogs and wet meadows. July-Oct.

S. officinalis, L., and *S. minor*, Scop., the former with more dense spikes than No. 1, which are brownish or purplish-red, the latter with globular greenish heads, established in a few places.

19. ROSA, L.

Shrubs with, usually, prickly stems and compound, feather-formed leaves, subtended by stipules, which are united to the sides of the leaf-stalk. Flowers solitary or, in our species, in loose clusters. Petals 5, spreading, calyx tube urn-shaped, contracted at the mouth. Stamens numerous, inserted on the ring that lines the calyx tube, within which are the numerous pistils.

Stems without prickles	<i>R. blanda</i>
Stems with both slender and stiff prickles	<i>R. nitida</i>
Stems with stiff prickles only.	
Prickles straight and slender	<i>R. humilis</i>
Prickles recurved, short and slender, stipules narrow	<i>R. carolina</i>
Prickles stout, recurved.	
Leaf borders with single row of teeth	<i>R. canina</i>
Leaf borders with double row of teeth	<i>R. rubiginosa</i>

1. *R. blanda*, Ait. (Fig. 2, pl. 70.) SMOOTH OR MEADOW ROSE. Shrub 1 to 4 ft. high, growing in moist rocky places; stems wholly unarmed or with very few (rarely many) prickles. Stipules broad, extending nearly to the first pair of leaflets, not toothed. Leaflets 5 to 7, elliptic or narrowly oblong. Serration simple. Flowers pink, 2 to 3 in. broad. Sepals entire. Moist rocky places. June-July.

2. *R. carolina*, L. (Fig. 1, pl. 70.) SWAMP ROSE. Shrub often 8 ft. high, growing in swamps. Stems usually straight and stout. Prickles, below the stipules generally recurved, short, in pairs. Leaflets 5 to 9, usually 7; narrowly oblong, pointed at the ends; usually silky beneath; serrations of leaves simple. Flowers 2 to 3 in. broad, pink. Calyx lobes simple. Wet grounds; swamps. June-Aug.

3. *R. humilis*, Marsh. (Fig. 5, pl. 70.) LOW OR PASTURE ROSE. Shrub, $\frac{1}{2}$ to 3 ft. or more high. Stem slender, armed with *straight, slender prickles*. Stipules long and narrow; leaflets mostly 7, narrowly oblong, pointed at ends; borders simply toothed. Flowers few or solitary, 2 to 3 in. broad, the petals dilated above and usually lobed. Sepals with prickles and somewhat lobed. Dry soils.

Var. *lucida*, Ehrh. Leaves shining above and flowers more numerous. Moist places. (Sometimes described as a species, *R. virginiana*, Mill.)

4. *R. nitida*, Willd. (Fig. 3, pl. 70.) NORTHEASTERN ROSE. Low bushy shrub. Stems armed thickly with prickles; spines slender. Leaflets 5 to 9. Stipules rather broad. Flowers few or solitary. Margins of swamps. June-July.

5. *R. canina*, L. DOG ROSE. WILD BRIAR. Shrub, reaching height of 10 ft. Stems armed with stout recurved prickles. Leaflets 5 to 7, borders with simple serrations. Sepals, lobed at free extremities. Roadsides and waste places. Naturalized. June-July.

6. *R. rubiginosa*, L. (Fig. 4, pl. 70.) EGLANTINE. SWEET BRIAR. Shrub, similar to last. Stems wand-like, curving, armed with strong re-



PLATE 70

1. *Rosa carolina*. 2. *R. blanda*. 3. *R. nitida*. 4. *R. rubiginosa*. 5. *R. humilis*.

curved prickles. Leaflets with *doubly serrated borders*, resinous and very aromatic beneath. Dry pastures. June-July.

FAMILY VIII.—**POMACEAE**, APPLE FAMILY

Trees or shrubs. Leaves alternate, simple or compound (feather-formed). Flowers regular, sepals and petals generally 5 each. Stamens numerous (rarely few). Ovary 1- to 5-celled, most frequently 5. Fruit consists of a wall or walls of stiff parchment-like texture or of a more woody structure which encloses the seeds and of a fleshy substance which envelopes the 5 or less seed caskets and their contents.

Shrubs and trees armed with thorns **Crataegus**
Shrubs and trees without thorns.

Leaves compound (feather-formed) **Sorbus**
Leaves simple.

Fruit usually more than an inch in diameter.
Flowers usually white; flesh with gritty cells **Pyrus**
Flowers mostly pink; flesh without gritty cells
. **Malus**

Fruit small, less than $\frac{1}{2}$ in. in diameter.
Seed cells partially or completely doubled.
Small trees **Amelanchier**
Seed cells not doubled.
Low shrubs **Aronia**

I. **SORBUS**, L.

Trees or shrubs, with compound leaves with about 10 to 16 leaflets arranged on the sides of the leaf-stalk, and with an odd terminal leaflet. Flowers in a compact, terminal, nearly flat cluster. Fruit small, berry-like, red.

- 1. **S. americana**, Marsh. (Fig. 1, pl. 71.) AMERICAN MOUNTAIN ASH. (*Pyrus americana*, (Marsh.) DC.). Small trees, reaching a height of 50 ft. Leaflets 11 to 17, narrow, lance-shaped with tapering points, without hairs, above or below, except when young. Berries as large as peas, red when ripe. Swamps and mountain woods, mostly in northern half of our area.
- 2. **S. sambucifolia**, (A. Gray.) Roem. WESTERN MOUNTAIN ASH. (*Pyrus stitchensis*, (Roem.) Piker.) Leaflets 7 to 15, oblong or oval, to lance-shaped; less tapering at points than those of No. 1, and usually clothed with soft hairs beneath. Fruit larger than that of No. 1. Northern New England and northward.

2. **PYRUS**, L.

Trees, sometimes shrubs, with simple leaves. Flowers white or pink,

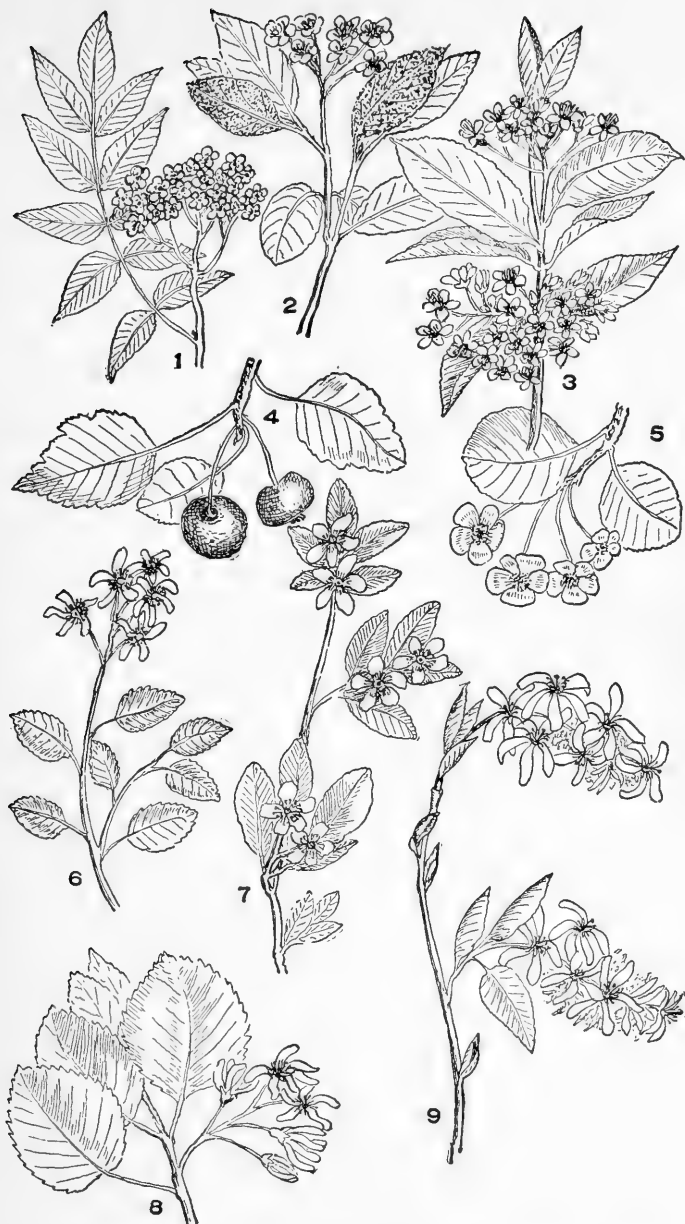


PLATE 71

1. *Sorbus americana*. 2. *Aronia arbutifolia*. 3. *A. nigra*. 4. *Malus coronaria*. 5. *Pyrus communis*. 6. *Amelanchier spicata*. 7. *A. oligocarpa*. 8. *A. rotundifolia*. 9. *A. canadensis*.

showy, in a flat or flattish cluster, the flower stalks of the outer rows being longer than those at the center; the center flowers blooming first. Calyx of 5 acute lobes, urn-shaped. Petals 5, stamens numerous, styles usually 5. Fruit containing many grit-cells; not depressed where attached to stem.

P. communis, L. (Fig. 5, pl. 71.) PEAR. Tree well known in cultivation and found also wild, escaped from cultivation.

3. MALUS, Juss.

Trees and shrubs, with simple leaves; with umbel-like clusters of flowers; fruit fleshy without grit-cells, depressed at stem attachment.

Leaves often heart-shaped at base *M. sylvestris*
 Leaves not heart-shaped, generally nearly triangular *M. coronaria*
 Leaves narrowly oblong *M. angustifolia*

1. **M. sylvestris**, (L.) Mill. APPLE. (*M. Malus*, (L.), Britton.) Leaves broad egg-shaped, more or less heart-shaped at base, or rounded, point tapering, smooth above, silky hairy beneath. Fruit globose, depressed at insertion of stem. In woods, escaped from cultivation. Southern New York, New Jersey and Pennsylvania.

2. **M. coronaria**, (L.) Mill. (Fig. 4, pl. 71.) AMERICAN CRAB APPLE. A tree, smaller and more slender than the common apple. Leaves broadly egg-shaped or triangular, with lobes toward the base. Borders deeply serrated. Flowers white or rose color. Fruit 1 in. to 1½ in. diameter, globular, or the stem insertion slightly depressed. In thickets, occasional throughout our area.

3. **M. angustifolia**, (Ait.) Michx. NARROW-LEAVED CRAB APPLE. Small tree resembling No. 2, but leaves are narrow-oblong or lance-form. Fruit rather smaller than No. 2. Occasional in southern part of our area.

4. ARONIA, Pers.

Low shrubs with fruit resembling the huckleberry in size and form and with leaves oblong or lance-shaped. Flowers in terminal compound clusters. Calyx of 5 lobes; petals 5, spreading; stamens numerous; styles 3 to 5 united at base.

Fruit red. Flower cluster hairy *A. arbutifolia*
 Fruit black. Flower cluster not hairy *A. nigra*

1. **A. arbutifolia**, (L.) Ell. (Fig. 2, pl. 71.) RED CHOKE BERRY. Shrub, 1 to 4 ft. high; leaves oblong or inversely lance-shaped, silky beneath. Compound clusters of flowers silky. Flowers white or tinged with red. Fruit 1/6 to 1/4 in. diameter, astringent. Swamps and damp thickets. March-May.

2. **A. nigra**, (Willd.) Britton. (Fig. 3, pl. 71.) BLACK CHOKE BERRY. Leaves similar, but sometimes more and at other times less pointed than those of No. 1. Compound cluster of white or reddish flowers without hairs on the flower stems. Moist shady places. March-June.

5. AMELANCHIER, Medic.

Shrubs or trees. Leaves simple; stems unarmed; flowers in clusters, white. Calyx of 5 parts; corolla of 5 petals; stamens numerous; pistils 5, joined below. Fruit a berry with 10 seeds, when all mature.

1. *A. canadensis*, (L.) Medic. (Fig. 9, pl. 71.) SHAD BUSH. SERVICE BERRY. Tree, usually small and slender, but sometimes attaining a considerable size. Leaves egg-shaped to oblong, usually heart-shaped at base, borders sharply serrated, 1 to 3 in. long, not woolly beneath. Braets at base of flower stems purplish, silky, falling early. Flowers large, white, in drooping graceful clusters. Fruit about $\frac{1}{2}$ in. diameter, globose; on long stems, crimson or purple, sweet. In dry woodlands. A handsome tree when in bloom in early spring. Woods and swamps. March-May.

2. *A. Botryapium*, DC. SHAD BUSH. Tree similar to No. 1, rarely 30 ft. high. Leaves densely white-woolly beneath. Swamps. April-May.

3. *A. spicata*, (Lam.) Dec. (Fig. 6, pl. 71.) LOW JUNE BERRY. Stems 2 to 9 ft. high. Leaves $\frac{3}{4}$ to $\frac{1}{2}$ in. long. Flowers about half as large as those of No. 1 or No. 2. Southern part of our area. Grows among rocks, from long creeping roots. Blooms in May.

4. *A. rotundifolia*, (Michx.) Roem. (Fig. 8, pl. 71.) ROUND-LEAVED JUNE BERRY. Similar to No. 1, but leaves broad and rounded at both ends, coarsely toothed at borders, sometimes heart-shaped at base, smooth on both surfaces. Fruit similar to that of No. 1, but ripening after that has fallen. Woods and thickets, New York and westward.

5. *A. oligocarpa*, (Michx.) Roem. (Fig. 7, pl. 71.) OBLONG-FRUITED JUNE BERRY. (*A. arguta*, Nutt.) Low shrub, 2 to 4 ft. high. Leaves oblong, pointed at each end with fine serrations at borders, 1 to 2 in. long. Flowers, only from 1 to 4, generally 2, in the cluster. Fruit pear-shaped, dark purple, $\frac{1}{4}$ to $\frac{1}{3}$ in. long. Northern borders of our area. May.

6. CRATAEGUS, L.

Trees or shrubs armed with woody thorns and with umbel-like clusters of white or pink flowers. Leaves simple or deeply lobed. Calyx of 5 parts, short; petals 5, spreading; stamens numerous; pistils 1 to 5. Ovary 1 to 5 celled with a single seed in each cell or when two they are not alike. Fruit small, nearly globular, with thin fleshy parts and rather large nutty seeds.

Leaves pear-shaped or oblong, not deeply lobed or incised.

Flowers in clusters.

Leaves without hairs *C. Crus-Galli*

Leaves silky beneath *C. punctata*

Flowers single *C. uniflora*

Leaves broad, nearly orbicular or broadly egg-shaped, with deeply incised or lobed borders.

Leaves abrupt or heart-shaped at base *C. coccinea*

Leaves acute at base.

Fruit pear-shaped.

Flower stems without hairs *C. rotundifolia*

Flower stems hairy.

Fruit smooth *C. tomentosa*

Fruit hairy *C. mollis*

Fruit globular *C. macracantha*

Leaves 3- to 7-lobed *C. Oxyacantha*

1. *C. Crus-Galli*, L. (Fig. 3, pl. 72.) COCKSPUR THORN. Shrub or small tree, with horizontal branches, growing in pastures and thickets. Branches armed with thorns 2 to 4 in. long. Leaves dark shining green above, broadest at apex (pear-shaped) and tapering to a short leaf stalk. Serrations at borders except at basal third. Fruit globular, red, $\frac{1}{3}$ in. broad. Common in pastures. Blooms, May or June.

2. **C. punctata**, Jacq. (Fig. 6, pl. 72.) **LARGE-FRUITED THORN**. Small tree, similar to above, leaves generally broader, and thorns only about $\frac{1}{2}$ as long. Leaves, when young at least, hairy beneath. Fruit about 1 in. diameter, globose, red or yellow.

3. **C. uniflora**, Muench. (Fig. 4, pl. 72.) **DWARF THORN**. Shrub, 3 to 8 ft. high, with slender thorns about 1 to 2 in. long. Leaves pear-shaped, with serrate borders. Fruit globose. Flowers with narrow lance-shaped deeply incised calyx lobes, petals shorter than sepals; flowers not generally in clusters but single or few. In southern part of our section.

4. **C. coccinea**, L. (Fig. 2, pl. 72.) **SCARLET THORN**. Shrub or small tree, with reddish branches and stout spines $1\frac{1}{2}$ to 2 in. long. Leaves on slender leaf-stalks, broad and abrupt at base or somewhat heart-shaped, borders serrate and deeply incised, point acute. Flowers many in a cluster, each about an in. in diameter. Fruit red, globose. Growing in thickets and pastures. Blooms in April or May.

5. **C. rotundifolia**, (Ehrh.) Borek. (Fig. 1, pl. 72.) **GLANDULAR THORN**. Small tree similar to above, with smaller leaves which are *tapering at base* and rather smaller than No. 4. Flowers about the size of No. 4. Fruit pear-shaped, red. Often grows with *C. coccinea* and blooms later.

6. **C. tomentosa**, L. **PEAR THORN**. Small tree much like the two preceding. Thorns generally less numerous. Leaves serrated and deeply incised and tapering to base, rather rounded at apex. *The leaf-stalks and larger prominent veins of leaves quite downy* when young. Fruit oblong. Less common than Nos. 4 and 5.

7. **C. macracantha**, Lodd. (Fig. 5, pl. 72.) **LONG-SPINED THORN**. Similar to last three. Spines much larger, 2 to 5 in. long. Leaves resemble those of No. 6. Fruit hairy, rather larger than that of No. 4.

8. **C. Oxyacantha**, L. (Fig. 8, pl. 72.) **HAWTHORN**. Leaves 3- to 7-lobed. Clusters many flowered. Fruit small. Usually a shrub but sometimes a tall tree. Sparingly escaped from cultivation. May.

9. **C. mollis**, (T. and G.) Scheele. (Fig. 7, pl. 72.) **RED-FRUITED THORN**. Resembles *C. tomentosa*, but fruit is quite hairy. Rarely in northern section of our area. May.

FAMILY IX.—DRUPACEAE. PLUM FAMILY

Trees and shrubs, bearing fleshy fruit enclosing a hard woody "stone," which is irregularly grooved or smooth. Bark exuding a clear gum. Leaves simple, alternate, with small stipules which fall early. Flowers in flat or, less frequently, in elongated clusters. Petals 5; sepals 5; stamens numerous; pistil 1.

I. PRUNUS. L.

Shrubs and trees with, mostly, edible fruit. Fruit a fleshy drupe or stone fruit. Flowers white or purplish in clusters of various forms. Petals 5; sepals 5; stamens numerous.



PLATE 72

1. *Crataegus rotundifolia*. 2. *C. coccinea*. 3. *C. Crus-Galli*. 4. *C. uniflora*.
 5. *C. macracantha*. 6. *C. punctata*. 7. *C. mollis*. 8. *C. Oxycantha*.

Drupes smooth, with a bloom on the skin, stone more or less flattened.

PLUMS

- Leaves egg-shaped.
 Fruit red, leaves and calyx-lobes glandular *P. nigra*
 Fruit yellow, leaves and calyx-lobes not glandular *P. americana*
 Leaves narrow, lance-shaped *P. angustifolia*
 Shrubs.
 Leaves lance-shaped *P. alleghaniensis*
 Leaves elliptic *P. maritima*
 Leaves rounded *P. Gravesii*
 Leaves pear-shaped; branches thorny *P. spinosa*

Drupes smooth, without bloom on the skin, stone smooth, globular.

CHERRIES

- Shrubs, $\frac{1}{2}$ to 4 ft. high.
 Stems prostrate or reclining; leaves pointed at each end *P. pumila*
 Stems erect; leaves rounded at apex *P. cuneata*
 Shrub 3 to 10 ft. high *P. virginiana*
 Trees 20 to 70 ft. high.
 Fruit black *P. serotina*
 Fruit red *P. pennsylvanica*

PLUMS

1. *P. nigra*, Ait. (Fig. 7, pl. 73.) HORSE PLUM. Tree, sometimes 30 ft. high. Leaves egg-shaped, rounded at base, tapering in a lengthened point at apex, about 1 in. broad. Fruit egg-shaped, about an in. long, red. Woods and thickets. May.

2. *P. americana*, Marshall. (Fig. 9, pl. 73.) WILD YELLOW OR RED PLUM. Tree, sometimes 35 ft. high, generally, however, about 15 to 20 ft. Branches somewhat thorny. Leaves directly or inversely egg-formed, with the apex conspicuously taper-pointed, and the borders coarsely or doubly serrate; base rounded. Fruit rounded, $\frac{3}{4}$ to 1 in. in diameter, orange or red. Stone flattened. The pulp of the fruit has a pleasant taste, the skin tough and acrid. Woods and river banks. Blooms April to May.

3. *P. angustifolia*, Michx. CHICKASAW PLUM. Tree or shrub, 8 to 15 ft. high. Branches scarcely thorny. Leaves narrow lance-form with both ends tapering, or less frequently with base somewhat rounded, serrations not coarse. Fruit round, $\frac{1}{2}$ to $\frac{3}{4}$ in. diameter, red. Stone nearly globular. Southern part of our region only.

4. *P. alleghaniensis*, Porter. PORTER'S PLUM. Low straggling shrub or small tree, seldom thorny. Leaves egg-shaped to lance-shaped with sharp teeth at the margins; apex slender tapering. Flowers in an elongated cluster. Fruit globose or egg-shaped. Eastern Conn. Across the Alleghany mountains to Pa. April.

5. *P. maritima*, Wang. (Fig. 8, pl. 73.) BEACH PLUM. Shrub, 1 to 7 ft. high, straggling, growing on sandy sea beaches. Leaves egg-shaped or pear-shaped. Fruit about $\frac{1}{2}$ in. diameter, purple, sweet.

6. *P. Gravesii*, Small. (Fig. 10, pl. 73.) GRAVE'S BEACH PLUM. Leaves round or slightly oval. Fruit smaller than No. 4. Rare. Groton, Conn.

7. *P. spinosa*, L. (Fig. 4, pl. 73.) SLOE, BUCKTHORN. Although not native is sometimes found along roadsides. Shrub, 2 to 10 ft. high. It has egg-shaped leaves, pointed at each end, branches thorny. Flower clusters consisting of one or two blossoms. Fruit nearly black.



PLATE 73

1. *Prunus virginiana*. 2. *P. pumila*. 3. *P. pennsylvanica*. 4. *P. spinosa*.
 5. *P. serotina*. 6. *P. cuneata*. 7. *P. nigra*. 8. *P. maritima*. 9. *P. americana*.
 10. *P. Gravesii*.

CHERRIES

Fruit small, without bloom on the skin, red or nearly black. Stone rounded or egg-shaped, destitute of margins.

8. *P. pumila*, L. (Fig. 2, pl. 73.) DWARF CHERRY. SAND CHERRY. A dwarf shrub about 1 ft. high, though it may bloom at the height of 6 in. or grow to a height of 6 ft., the latter very rare. Stems and slender branches smooth and often reclining. Leaves narrow, inversely lance-shaped, but pointed at each end, pale beneath, deep green above; teeth at borders except toward the base. Flowers few (2 to 4 in cluster); fruit dark red or nearly black. Banks of streams and wet sandy places. April-May.

9. *P. cuneata*, Raf. (Fig. 6, pl. 73.) APPALACHIAN CHERRY. A small shrub similar to the last, but erect. Leaves rather broader and distinctly rounded at apex. Wet or rocky places. New Hampshire, westward and southward.

10. *P. virginiana*, L. (Fig. 1, pl. 73.) CHOKE CHERRY. Shrub, growing along fences, in fields or along river banks; generally from 5 to 7 ft. high, but more rarely 2 to 10 ft. Leaves broadly oval, pointed at each end. Flowers in narrow elongated clusters, pendulous or nearly erect, 20 or more in the cluster. The fruit, which hangs in long clusters is nearly black when ripe, and has an astringent unpleasant taste. Blooms, April-May.

11. *P. pennsylvanica*, L. (Fig. 3, pl. 73.) WILD RED CHERRY. PIN CHERRY. Tree, 20 to 35 ft., rarely shrubby. Bark smooth, reddish-brown. Leaves oblong-egg-shaped or lance-shaped, tapering at each end or rounded at base, shining above and below. Flowers white on long slender flower-stalks in an umbel-like cluster. Fruit small, red, rather acid. Common at borders of woods and as "second growth" tree. Blooms, April to June. Fruit ripens in August.

12. *P. serotina*, Ehrh. (Fig. 5, pl. 73.) WILD BLACK CHERRY. Large tree, sometimes 80 or 90 ft. high. Bark black and rough. Leaves oval, tapering at each end and somewhat rounded at base, smooth and shining above, unequally serrate, 3 to 5 in. long. Flowers rather small, numerous, in long cylindric clusters. Fruit in grape-like clusters of nearly black cherries with an agreeable taste. In woods and borders of fields. Common. Blooms, May. Fruit ripe in August.

Besides those above described, a number of species of *Prunus* are found occasionally in thickets or woods where they remain in deserted grounds or have found a lodgment as escapes from cultivation.

FAMILY X.—CAESALPINACEAE. SENNA FAMILY

Herbs, shrubs or trees, with flowers of some species closely approaching the typical form of the pea flower, in others nearly symmetrical and regular. Pod resembling the pod of the pea. Leaves alternate, simple or, more generally, compound, feather-formed with from 8 to many leaflets arranged along the leaf stem. Trees.



PLATE 74

1. *Cassia nictitans*. 2. *C. Chamaecrista*. 3. *C. marylandica*. 4. *Cereis canadensis*. 5. *Gymnocladus dioica*. 6. *Gleditsia triacanthos*.

With simple leaves	Cercis
With compound feather-formed leaves.	
Flowers greenish	Gleditsia
Flowers, white, showy	Gymnocladus
Herbs	Cassia

1. CERCIS, L.

Small tree, with simple, broad leaves heart-shaped at base, and with clusters of purple flowers which appear before the leaves. Corolla of 5 unequal petals, nearly pea-flower shaped. Stamens 10; pod like that of the pea with several seeds.

C. canadensis, L. (Fig. 4, pl. 74.) RED BUD. AMERICAN JUDAS TREE. Tree, usually 15 to 30 ft. high, but occasionally higher. In early spring the purple blooms cover the tree before the leaves expand. Southern part of our area. April.

2. CASSIA, L.

Our species herbs with compound leaves, feather-formed with an equal number of leaflets on each side of the leaf-stalk, no odd terminal leaflet. Flowers yellow. Corolla of 5 petals only slightly pea-blossom-shaped or almost regular. Seeds in an elongated pod, numerous.

1. **C. nictitans**, L. (Fig. 1, pl. 74.) SENSITIVE PEA. WILD SENSITIVE PLANT. A low annual, somewhat erect or spreading upon the ground, much branching. Stipules long and narrow at base of common leaf-stalk. Leaves sensitive. If a few leaflets are touched by the finger they and those directly opposite close; if the touch is more rude or if repeated, the whole leaf drops at the hinge-like connection with the stem. Leaflets about 30, narrow lance-formed. Flowers solitary, or two or three together between the leaf-stalks, but considering the plant as a whole, flowers numerous, 1/6 to 1/4 in. diameter. Pod linear, an inch or more in length. Mostly in dry sandy soil. July-October.

2. **C. Chamaecrista**, L. (Fig. 2, pl. 74.) PARTRIDGE PEA. LARGE-FLOWERING SENSITIVE PEA. Resembles No. 1, but is larger and flowers are an inch to 1½ in. broad. Petals spotted with purple; pod linear, 1½ to 2½ in. long. Leaves sensitive. Dry sandy soil. July-Sept.

3. **C. marylandica**, L. (Fig. 3, pl. 74.) WILD OR AMERICAN SENNA. Herb, 3 to 8 ft. high. Leaflets elliptic, 12 to 20, one or two inches long. Flowers generally less than an inch broad, clustering at the base of the leaves at the upper part of the plant. Moist places. July-August.

3. GLEDITSIA, L.

Large trees with conspicuous thorns, with leaves compound or doubly compound, feather-formed, without the odd terminal leaflet. Flowers greenish, some perfect, some imperfect, in slender elongated clusters. Pod long, straight or twisted, many seeded.

G. triacanthos, L. (Fig. 6, pl. 74.) HONEY LOCUST. SWEET LOCUST. THREE-THORNED ACACIA. A large tree with rough bark and with

many stout branching thorns from the trunk. Pods linear, 1 to 1½ ft. long, twisted. Woods and along fences. May-July.

4. GYMNOCLADUS, Lam.

Tree with doubly feather-formed leaves with showy white, perfect or imperfect flowers in clusters. Pods sickle formed.

G. dioica, (L.) Koch. (Fig. 5, pl. 74.) KENTUCKY COFFEE TREE. Large tree with rough bark. Leaflets broadly egg-shaped, rounded at base, 7 to 12, with or without the odd terminal leaflet. Rich woods. Southern part of our area.

FAMILY XI.—PAPILIONACEAE. PEA FAMILY

Herbs, shrubs, vines and trees. Flowers perfect (with stamens and pistils), with the petals very unequal, the superior petal (known as the "standard" or "banner") more or less completely enclosing the two lateral ones and the two lower being more or less united (known as the "keel"). Stamens 10, generally in a group of 9, more or less united, with a single one free (diadelphous) but less frequently all united in a single bundle (monadelphous), or still less frequently all the stamens are free or separate. Pistil 1. Fruit a pod similar to that of the pea (a legume) with one, two or many seeds, dividing into two valves.

Leaves generally simple, not divided into leaflets.

- Pods flat **Genista**
- Pods much inflated **Crotalaria**

Leaflets 3.

The three leaflets springing from a common center. (Example, Clover.)

- The two stipules similar to leaflets, giving appearance of 5 leaflets **Lotus**

The stipules differing from the leaflets.

- Stamens 10, all distinct and equal, flowers yellow **Baptisia**

Stamens 10, 1 distinct, 9 united in a group.

Pod (legume) sickle-shaped or spiral **Medicago**

Pod, egg-shaped or globose, not included in the calyx; flowers in terminal, elongated clusters **Melilotus**

Pod included in the calyx; flowers in rounded head **Trifolium**

The 3 leaflets arranged as a pair and an odd one.

- Pods (legumes) not jointed.
- One-seeded **Lespedeza**
- Several-seeded.
- Calyx of 4 teeth **Galactia**
- Calyx of 5 teeth.
- Flowers 1 to 4, pod 4 to 5 inches long **Centrosema**
- Flowers 1 to 3, pod about an inch long **Clitoria**
- Flowers small, in elongated clusters.
- Vines, not hairy **Phaseolus**
- Vines, hairy **Amphicarpa**
- Flowers in small heads or umbels **Strophostyles**
- Pods two jointed, one-seeded, flowers yellow **Stylosanthes**
- Pods (loment) of several joints and seeds numerous **Desmodium**
- Leaflets 3 on the leaf of a single blade **Cytisus**
- The leaflets consisting of stiff spines **Ulex**
- Leaflets more than 3 (5 to 10), all arising from a common center **Lupinus**
- Leaflets more than 3, arranged symmetrically along both sides of the leaf-stalk.
- Number of leaflets equal on both sides, terminating abruptly, or by a tendril.
- Wings (side petals) attached to the keel (*i. e.*, the united lower petals) **Vicia**
- Wings nearly free **Lathyrus**
- Leaflets more than 3, arranged with an odd one at the extremity.
- Trees **Robinia**
- Herbs.
- Pods jointed.
- Flowers purple, in an umbel **Coronilla**
- Flowers purple, in an elongated cluster **Hedysarum**
- Flowers reddish-yellow, few in cluster or solitary **Aeschynomene**

Pods not jointed.

Stem erect, pod linear, flat **Cracca**

Stem erect or decumbent, pod turgid,
oblong **Astragalus**

Stem twining **Apios**

1. BAPTISIA, Vent.

Herbs with leaves of three leaflets, which arise apparently from the same center (or rarely with simple, undivided leaves). Stipules leaf-like, small, or none. Calyx of 4 or 5 parts cleft half way. Petals (of our species) yellow and of nearly equal length, somewhat united. Stamens 10, all distinct. Pods inflated, with generally, many seeds.

1. **B. tinctoria**, (L.) R. Br. (Fig. 1, pl. 75.) WILD INDIGO. YELLOW BROOM. Clusters of flowers numerous, yellow, plant 3 to 4 ft. high, much branched. Leaflets pear-shaped, the whole plant more or less covered with a whitish bloom. Stipules very small and falling early. Pods egg-shaped or nearly globose. Growing in dry or sandy soil. June-Sept.

2. **B. australis**, (L.) R. Br. BLUE WILD INDIGO. Leaflets less blunt than those of No. 1. Flowers blue. Otherwise much like *B. tinctoria*. Western Penna., and westward. June-Aug.

2. CROTALARIA, L.

Herbs, with simple undivided leaves (in our region), and with yellow flowers in loose, somewhat elongated clusters. Calyx 5-parted, stamens 9 united, 1 free. Pod oblong to globose, much inflated. Seeds several, loose when ripe.

C. sagittalis, L. (Fig. 2, pl. 75.) RATTLE BOX. Erect, branching, generally less than 1 ft. high. Plant covered with silky pubescence. Leaves simple, oval or oblong, 1 to 2 in. long, 1/3 as broad, with very short leaf-stalks. Flowers solitary or 2 to 4 in loose cluster, yellow. Pod oblong about 1 in. long, much inflated. June-Sept.

3. LUPINUS, L.

Herbs. Leaves of about 7 to 15 *radiating* leaflets. Flowers showy in long spikes. Calyx 5-toothed, upper lip of 2 teeth, lower of 3, sometimes without division. Stamens, 9 united, 1 free. Pod flattened, uneven, constricted between the seeds.

L. perennis, L. (Fig. 4, pl. 75.) COMMON LUPINE. Sometimes erect, more frequently procumbent, spreading. Stems about a foot long, nearly smooth. Leaflets 7 to 9, soft, downy on long leaf-stalks. Flowers in a long slender spike, blue varying to white. Sandy hillsides and roadsides. May-June.

4. GENISTA, L.

Shrubby plants, with simple leaves and clustered yellow flowers. Calyx of 2 lips, the upper one 2-cleft, the lower with 3 teeth. Stamens, 9 united, 1 free. Pods flat with several seeds.

G. tinctoria, L. (Fig. 5, pl. 75.) DYEWEEED. WOAD WAXEN.

Branches round, the flowering ones erect, 1 to 2 ft. high. Leaves not compound, lance-shaped, broadest at middle, without leaf-stalks, shining. Flowers numerous, yellow, in loose terminal clusters. Dry hills, eastern part of our region. Summer.

5. ULEX, L.

Shrubs with spiny branches, the leaves stiff, linear, spiny. Flowers large, generally thickly distributed among the spiny leaves. Calyx divided almost completely into 2 lips. Stamens united in a single group. Pod egg-shaped or elongated.

U. europaeus, L. (Fig. 3, pl. 75.) FURZE. GORSE. Shrub, 2 to 6 ft. high, branching. Leaves spiny. Flowers yellow, appearing among the spiny leaves. Escaped from cultivation in southern part of our area. May-July.

6. CYTISUS, L.

Shrubs with 3-foliate leaves or leaves undivided, the stems often spiny. Flowers showy, in clusters. Calyx divided to base into 2 lips. Stamens in a single group. Pod, flat, oblong to linear, several seeded.

C. scoparius, (L.) Link. (Fig. 6, pl. 75.) BROOM. Stiff, wiry shrub, 3 to 5 ft. high, stem angular, erect, branching. Leaves trifoliate or of a single blade, small. Flowers bright yellow about 1 in. long. Waste places, introduced sparingly.

7. MEDICAGO, L.

Herbs, with trifoliate leaves, the leaflets arising from a common center. Flowers small, yellow or violet, terminal or from the leaf axils. Leaflets commonly slightly toothed, the veins terminating in the teeth. Calyx of 5 nearly equal parts. Pods curved or twisted.

Flowers blue or violet *M. sativa*
Flowers yellow.

Stipules fringed at borders.

Leaflets with a purple spot *M. arabica*

Leaflets without a purple spot *M. hispida*

Stipules toothed, not fringed *M. lupulina*

1. **M. sativa**, L. (Fig. 1, pl. 76.) ALFALFA. LUCERNE. Cultivated for fodder in southern and western States. Much branched, erect or decumbent, 1 to 1½ ft. high. Leaflets inversely lance-shaped or wedge-shaped, the middle one on rather longer leaf-stalk than the others. Flowers blue, in elongated slender clusters. Fields and waste places. Blooms all summer.

2. **M. lupulina**, L. (Fig. 7, pl. 75.) BLACK MEDIC. NONESUCH. Branches spreading, decumbent, 1 to 1½ ft. long, downy. Leaflets wedge-shaped or egg-shaped to nearly orbicular, toothed at apex. Flowers yellow, small, in dense oblong or cylindric heads. Pods when ripe, black, curved into a spiral, one-seeded. Fields and waste places. March-Dec.

3. **M. hispida**, Gaertn. TOOTHED MEDIC. (*M. denticulata*, Willd.). Leaflets larger than the last and decidedly wedge-shaped. Stipules large and fringed at borders. Flowers small, yellow. The spiral pods elegantly reticulated, the edges armed with curved prickles. Waste places, etc., mostly near sea-ports. Summer.



PLATE 75

1. *Baptisia tinctoria*. 2. *Crotalaria sagittalis*. 3. *Ulex europaeus*. 4. *Lupinus perennis*. 5. *Genista tinctoria*. 6. *Cytisus scoparius*. 7. *Medicago lupulina*. 8. *M. arabica*. 9. *Trifolium hybridum*.

4. *M. arabica*, All. (Fig. 8, pl. 75.) SPOTTED MEDIC. Leaflets inversely heart-shaped. Stipules similar to those of No. 3. Leaflets with 1 or more purple spots near the center. Pod with reticulations and with marginal prickles. Waste places. All summer.

8. MELILOTUS, (Tourn.) Hill.

Tall herbs, with trifoliate leaves and with numerous small flowers in long slender spikes. Calyx teeth 5, nearly equal. Pod ovoid with one or more seeds. Plants very fragrant.

Flowers white *M. alba*
Flowers yellow *M. officinalis*

1. *M. alba*, Desv. (Fig. 5, pl. 76.) WHITE SWEET CLOVER. Erect; branching, with slender branches, 3 to 10 ft. high. Leaflets oblong or inversely lance-shaped, notched or rounded at extremity. Flowers white. Along roadsides and waste places. June-Nov.

2. *M. officinalis*, (L.) Lam. (Fig. 4, pl. 76.) YELLOW SWEET CLOVER. Resembles No. 1, but leaflets are mostly rather broader and flowers are yellow.

9. TRIFOLIUM, L.

Tufted or spreading herbs with (in our species) trifoliate leaves, the leaflets usually toothed. Flowers small, in more or less dense heads. Stamens, 9 united, 1 more or less free. Pod oblong or cylindric, 1 to 6 seeded, often included in the calyx.

Flowers yellow.

Stipules long and narrow (length at least 3 times the breadth) *T. agrarium*
Stipules broad (length not more than twice the breadth).

Flowers in the head usually more than 20 *T. procumbens*
Flowers in head few (10 to 12) *T. dubium*

Flowers pink and purple.

Leaflets oval, with a pale spot on upper side *T. pratense*

Leaflets oblong, without the pale spot *T. medium*

Leaflets pear-shaped or wedge-shaped *T. incarnatum*

Flowers white.

Calyx teeth long, silky, nearly hiding the small white or slightly pink

corolla *T. arvense*

Calyx teeth not hiding the corolla.

Plant 1 to 2 ft. high *T. hybridum*

Plant 6 to 12 in. high *T. repens*

Flowers yellow

1. *T. agrarium*, L. (Fig. 6, pl. 76.) YELLOW CLOVER. HOP CLOVER. Stems bending, ascending. Leaflets inversely ovate, finely notched at summit. Stipules narrowly lance-shaped, tapering to a sharp point. Flowers bright yellow in dense heads, the flowers of which are, as they mature, turned back, calyx teeth not equal, the inferior being twice as long as the superior. Along roadsides, in waste places. All summer.

2. *T. procumbens*, L. (Fig. 7, pl. 76.) LOW OR HOP TREFOIL. HOP CLOVER. Stems more spreading than No. 1 and more silky, 3 to 6 in. long. Leaflets wedge-shaped, rounded and generally notched at apex. Stipules egg-shaped, rather greater in length than breadth. Heads of 20 to 40 flowers, turned back when mature. Sandy fields and roadsides. All summer.

3. *T. dubium*, Sibth. (Fig. 3, pl. 76.) LEAST HOP CLOVER. Stems similar to last. Leaflets decidedly notched at apex. Flowers only 3 to 15 in head. Waste places. Summer.



PLATE 76

1. *Medicago sativa*. 2. *Trifolium incarnatum*. 3. *T. dubium*. 4. *Melilotus officinalis*. 5. *M. alba*. 6. *Trifolium agrarium*. 7. *T. procumbens*. 8. *T. repens*.

Flowers pink or purple

4. **T. incarnatum**, L. (Fig. 2, pl. 76.) CRIMSON CLOVER. Stems erect, $\frac{1}{2}$ to 3 ft. high, hairy. Leaflets wedge-shaped, hairy. Heads of flowers on rather long stalks, oblong or long egg-shaped. Introduced. Summer.

5. **T. pratense**, L. RED CLOVER. Erect or decumbent, stems $\frac{1}{2}$ to 2 ft. high, silky. Leaves on long or short leaf-stalks. Leaflets oblong, often notched at apex, often with a pale spot near base. Stipules broad with bristle points. Heads without much of a flower stalk, round or oblong. Cultivated in fields and growing in rich soils commonly.

6. **T. medium**, L. ZIG-ZAG CLOVER. Resembles the last. Heads longer and on a flower stem. Flowers of deeper color. Leaves without central spot. Dry fields. Introduced. Summer.

Flowers white

7. **T. arvense**, L. (Fig. 1, pl. 83.) RABBIT FOOT. STONE CLOVER. Plant velvety, branching, mostly procumbent. Leaflets oblong, narrow, notched at summit. Flowers small, *white or rosy*. Nearly hidden by the long silky calyx teeth. Heads cylindric. Fields, waste places. Summer.

8. **T. repens**, L. (Fig. 8, pl. 76.) WHITE CLOVER. Stems prostrate, rooting. Leaves on long leaf-stalks, leaflets inversely ovate or nearly round, finely notched at borders and abruptly terminated by one or two teeth at apex. Flowers white, sometimes rose. Common. Summer.

9. **T. hybridum**, L. (Fig. 9, pl. 75.) ALSATIAN CLOVER. A larger plant than the last and more generally erect. Leaves on shorter leaf-stalks; leaflets elliptic, borders notched; stipules oval with sharp points. Heads globose; flowers white, later rose. Roadsides. Summer.

10. **LOTUS**, L. (*Hosackia*, Douglas)

Herbs, with (in our species) 3-foliate leaves and small reddish yellow flowers in loose umbellate clusters (3 to 12 in cluster). Calyx teeth equal or nearly so. Standard (two upper united petals) orbicular or ovate; stamens, 9 united, 1 free. Pod linear, compressed, 1 to several seeded.

L. corniculatus, L. (Fig. 1, pl. 77.) BIRD'S-FOOT TREFOIL. Stems slender, decumbent. Leaflets 3, but the two stipules, which are about the size and shape of the leaflets, appear to make 5 leaflets. Flowers in an umbel, corolla bright yellow, the standard frequently red or reddish. Introduced. June-Sept.

11. **CRACCA**, L. (*Tephrosia*, Pers.)

Hairy herbs, with compound feather-formed leaves, with an odd number of leaflets; flowers white or purple in terminal or lateral clusters. Leaflets (in our species) about 13 to 25, elliptic. Stamens all united or one free. Pod linear, several seeded.

1. **C. virginiana**, L. (Fig. 2, pl. 77.) GOATS RUE. Plant silky with whitish hairs. Stem erect, not branching, 1 to 2 ft. high. Flowers in clusters, large and often numerous, yellowish-white marked with purple. Dry sandy soil. June-July.



PLATE 77

1. *Lotus corniculatus*. 2. *Cracca virginiana*. 3. *Robinia Pseudacacia*. 4. *Astragalus alpinus*. 5. *A. Robbinsii*. 6. *Aeschynomene virginica*. 7. *Hedysarum boreale*. 8. *Coronilla varia*.

12. **ROBINIA, L.**

Our species a tree with long pendant clusters of showy white flowers. Leaves feather-formed; stipules small, sometimes spiny. Calyx teeth slightly unequal. Standard large, rounded and turned backward. Pod flat, linear, several seeded.

R. Pseudacacia, L. (Fig. 3, pl. 77.) **COMMON LOCUST.** Our common locust tree has rough bark and grows to height of 80 ft., but is usually not more than from 30 to 50 ft. high. Pod 2 to 4 in. long. Leaflets 8 to 12 pairs with an odd one at the end. Stipules are often spiny. May-June.

13. **ASTRAGALUS, L.**

Herbs, leaves compound, mostly with an odd number of leaflets; purple, white or yellow flowers in spikes, loose clusters or solitary. Stamens, 9 united, 1 free; calyx of 5 nearly equal teeth. Standard erect, ovate or oblong, usually narrow, keel blunt; pod several seeded, generally turgid.

1. **A. Robbinsii, (Oakes.) A. Gray.** (Fig. 5, pl. 77.) **ROBBINS'S MILK VETCH.** Nearly smooth, erect, $\frac{1}{2}$ to 1 ft. high. Leaflets 9 to 25. *Flowers white or purplish*, $\frac{1}{4}$ to $\frac{1}{2}$ in. long, in loose elongated or short clusters. Rocky places, Maine and northern Vermont. June-July.

Var. *A. Robbinsii Jesupi*, Eggleston and Sheldon, has larger, darker purple flowers, longer pod, and a flower-stalk longer than the calyx. Localities as above.

2. **A. alpinus, L.** (Fig. 4, pl. 77.) **ALPINE MILK VETCH.** Plant branching, decumbent or erect, $\frac{1}{2}$ to 1 ft. high, smooth or slightly hairy. *Flowers violet-purple.* Rocks, northern New England. June.

3. **A. canadensis, L.** **CAROLINA MILK VETCH.** (*A. carolinianus*, L.). Plant 1 to 4 ft. high. Leaflets 15 to 31. Stipules lance-shaped. *Flowers yellowish.* Pod without stem, 2-celled. Shores of Lake Champlain. (Brainerd.)

14. **CORONILLA, L.**

Herbs with several pairs of leaflets and an odd one. Flowers purple or yellowish, in an umbel. Pod linear, jointed. Calyx teeth nearly equal. Standard nearly orbicular.

C. varia, L. (Fig. 8, pl. 77.) **CORONILLA.** Leaflets 6 to 7 pairs and an odd one. Flower stalks longer than the compound leaves. Flowers light purple (standard pink, wings white or purple). Plant 1 to 2 ft. high, generally reclining on shrubs or other plants. Connecticut and southern New York. Introduced. June-August.

15. **HEDYSARUM, L.**

Herbs with several pairs of leaflets and an odd one. Flowers showy in axillary clusters. Calyx of 5 awl-shaped teeth, nearly equal. Stamens, 9 united, 1 free. Pod flattened and distinctly jointed.

H. boreale, Nutt. (Fig. 7, pl. 77.) **HEDYSARUM.** (*H. americanum*, (Michx.) Britton.) Plant $\frac{1}{2}$ to $2\frac{1}{2}$ ft. high, erect or somewhat decumbent. Leaflets 13 to 21, oblong to lance-shaped, nearly smooth. Stipules scaly. Flowers purple in a many-flowered cluster. Pods of 3 or 4 joints, smooth

and marked with reticulations. Northern parts of our region. June-July.

16. AESCHYNOMENE, L.

Herbs, resembling *Hedysarum*, with odd pinnate leaves and clusters of yellow flowers. Stamens in two groups of 5 each. Pod on a lengthened stalk, jointed.

A. virginica, (L.) BSP. (Fig. 6, pl. 77.) SENSITIVE JOINT VETCH. Erect, 2 to 5 ft. high, rough hairy. Leaves of 25 to 55 leaflets, which are somewhat sensitive, closing when touched. Flowers few, reddish-yellow with veined petals. Pod linear of 5 to 10 nearly square joints. Southern part of our area. Aug.-Sept.

17. STYLOSANTHES, Swartz.

Low herbs, branching, with wiry stems and 3-foliate leaves. Stipules sheathing and uniting with the leaf-stalk. Flowers small, yellow, in terminal clusters. Calyx tube slender, bell-shaped, the 4 upper teeth somewhat united. Standard (upper petal) orbicular. Stamens in two groups, each of 5. Pod short, strongly reticulated.

S. biflora, (L.) Swartz. (Fig. 3, pl. 83.) PENCIL FLOWER. Growing in tufts, stems $\frac{1}{2}$ to 2 ft. long, nearly erect or decumbent. Leaflets lance-shaped. Clusters few flowered, yellow. Pine barrens, L. I. June-September.

18. DESMODIUM, DC. (*Meibomia*, Adams)

Erect or trailing herbs, with (in our species), 3-foliate leaves, the leaflets of which are arranged as a pair and an odd leaflet. Flowers purple, usually small, in terminal or axillary clusters. Calyx small, its divisions being more or less united as two lips. Upper petals (standard) round or pear-shaped, side petals (wings) adherent to the keel by means of a small transverse band. Stamens in 1 or 2 groups. Pod (loment) flat, stalked, consisting of one to several joints. These joints roughened by short hairs which aid in their dissemination.

Stamens 10 in a single group. Pods constricted on lower side.

Leaves and flowers on separate stalks *D. nudiflorum*

Leaves and flowers on the same stalk.

Flower stalk long, with many flowers *D. grandiflorum*

Flower stalk bearing but few flowers *D. pauciflorum*

Stamens 9, united, 1 more or less free. Pods constricted above and below, though scarcely on the upper margins in Nos. 5, 6 and 11.

Stems trailing or reclining.

Leaflets nearly orbicular *D. rotundifolium*

Leaflets egg-shaped.

Plant decidedly hairy, flowers nearly white *D. ochroleucum*

Plant nearly smooth, flowers purple *D. glabellum*

Stems erect, not trailing nor decumbent.

Leaflets narrow, lance-shaped or linear.

Leaf stalk wanting or nearly so *D. sessilifolium*

Leaf stalk present.

Flowers in elongated simple cluster *D. strictum*

Flowers in a compound cluster *D. paniculatum*

Leaflets egg-shaped.

Length more than 3 times the breadth.

Plant quite hairy *D. canadense*

Plant not hairy *D. bracteosum*

Length less than 3 times the breadth.

Joints of pod decidedly longer than broad, plant de-

cidedly hairy, leaflets abrupt at each end *D. canescens*

Joints about as long as broad.

- Plant smooth, almost without hairs.
 Leaflets an inch or more in length, not
 velvety *D. laevigatum*
 Leaflets 1 to 3½ in. long, velvety beneath
 *D. viridiflorum*
 Leaflets less than an in. in length
 *D. marylandicum*
- Plant more or less hairy.
 Leaflets rough to touch *D. rigidum*
 Leaflets not rough to touch.
 Oblong or oblong-egg-shaped *D. Dillenii*
 Round ovate *D. obtusum*

1. *D. nudiflorum*, (L.) DC. (Fig. 1, pl. 78.) NAKED-FLOWERED TICK-TREFOIL. This plant is easily recognized by its long naked, or almost naked flower stalk springing from the root and the leafy stem at the summit of which all the leaves are crowded. The flower scape often reaches a height of 2 ft. or more. Leaves of 3 broadly egg-shaped leaflets. Flowers purple, not very numerous; pod 2 to 3 jointed. Common in dry woods. July-August.

2. *D. grandiflorum*, (Walt.) DC. (Fig. 2, pl. 78.) POINTED-LEAVED TICK-TREFOIL. Plant 1 to 5 ft. high, erect; leaves crowded at top from which arises the elongated flower stalk. Leaflets round-ovate with long taper points. Flowers large, purple. Pod 2 to 3 jointed. Dry woods. June-Sept.

3. *D. pauciflorum*, (Nutt.) DC. FEW-FLOWERED TICK-TREFOIL. Plant erect or more or less decumbent, 1 to 3 ft. high. Somewhat hairy. Leaflets oval or egg-shaped, the end one rhomboid, silky, pale beneath. Flowers few on a terminal, or axillary naked flower-stalk. Woods. July-August.

4. *D. rotundifolium*, DC. (Fig. 4, pl. 78.) PROSTRATE TICK-TREFOIL. Stems prostrate, 2 to 6 ft. long, soft hairy; leaflets orbicular, the odd one less rounded. Flowers purple; pods constricted nearly equally at both margins, 3 to 5 joints. Dry rocky woods. July-Sept.

5. *D. ochroleucum*, M. A. Curtis. CREAM-FLOWERED TICK-TREFOIL. Stems with scattered hairs, prostrate; leaflets smooth, egg-shaped, yellowish-green. Flower stalks much elongated; flowers whitish. Pods 2 to 4 jointed, twisted. Woods in southern part of our area. Aug-Sept.

6. *D. glabellum*, (Michx.) DC. TRAILING TICK-TREFOIL. Plant procumbent, stems sometimes 8 ft. long, smooth or nearly so. Leaflets egg-shaped or oval, the terminal one somewhat rhomboid. Flower clusters terminal or axillary, flowers purple. Pods 2 to 5 jointed, the joints somewhat rough to the touch. Dry woods. Aug-Sept.

7. *D. sessilifolium*, (Torr.) T. and G. (Fig. 6, pl. 78.) SESSILE-LEAVED TICK-TREFOIL. Stems silky, 2 to 4 ft. high. Leaflets linear, obtuse at each end, almost without leaf-stalk. Upper surface rough, lower silky. Flowers small in long simple or compound clusters. Dry soil in eastern part of our region. July-Sept.

8. *D. strictum*, (Pursh.) DC. STIFF TICK-TREFOIL. Erect, very straight, 2 to 3 ft. high, silky. Leaflets narrow linear, 1 to 2 in. long, obtuse at base, strongly reticulated, not hairy, smooth, on leaf stalks which are ¼ to ½ in. long. Joints of pod 1 to 3 (mostly 1). Flowers small on slender scapes. July-Sept.

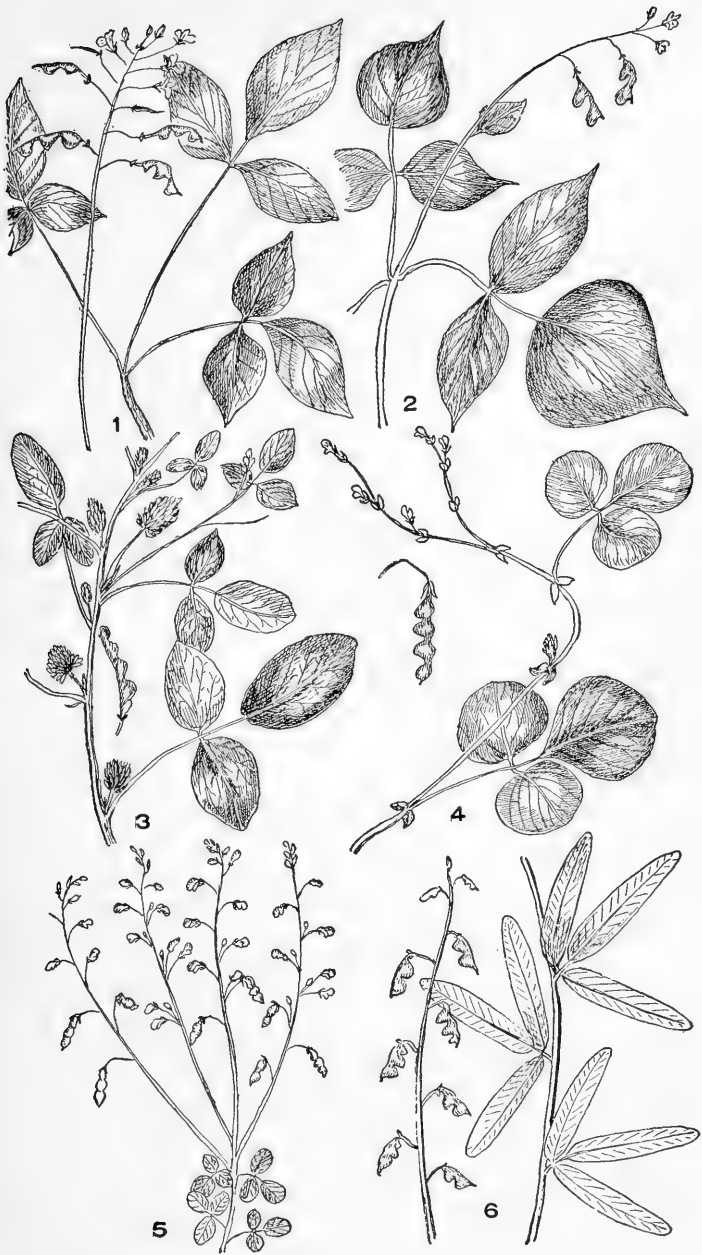


PLATE 78

1. *Desmodium nudiflorum*. 2. *D. grandiflorum*. 3. *D. canescens*. 4. *D. rotundifolium*. 5. *D. marylandicum*. 6. *D. sessilifolium*.

9. *D. canescens*, (L.) DC. (Fig. 3, pl. 78.) HOARY TICK-TREFOIL. Stems branching, densely hairy with soft downy hairs, 3 to 5 ft. high. Leaflets egg-shaped, on leaf stalks about as long as the terminal leaflets, rather rough above and below, the under side reticulated and whitish. Flowers small on long hairy scapes. Pods of about 4 joints. Mass., and southward. July-Sept.

10. *D. bracteosum*, (Michx.) DC. LARGE-BRACTED TICK-TREFOIL. Erect, straight, smooth below, somewhat silky on the flower stalk, 3 to 6 ft. high. Leaflets 2 to 8 in. long, egg-shaped with long slender points. Flowers large, purple. Joints of pod 3 to 5. Thickets. Common. Aug-Sept.

11. *D. paniculatum*, (L.) DC. PANICLED TICK-TREFOIL. Slender, erect, 2 to 4 ft. high, nearly smooth. Leaflets linear or oblong, blunt at each end, 3 to 5 in. long on short leaf-stalks. Small purple flowers in compound clusters, the branches of the clusters being in many instances at right angles to the main stem. Common. July-Sept.

12. *D. laevigatum*, (Nutt.) DC. SMOOTH TICK-TREFOIL. Stems erect, straight, smooth, 2 to 4 ft. high. Leaflets egg-shaped, 2 to 3 in. long, on long leaf-stalks. Flowers in compound clusters. Joints of pod 4 or more. Aug-Sept.

13. *D. viridiflorum*, (L.) Beck. VELVET-LEAVED TICK-TREFOIL. Leaves rough above, velvety with long silky hairs beneath. Flowers purple. In form of leaf and general appearance otherwise like *D. laevigatum*. Eastern Penna., southern New York, and westward. Aug-Oct.

14. *D. Dillenii*, Darl. DILLON'S TICK-TREFOIL. Stem 2 to 3 ft. high, erect, silky with hairs scattered. Leaflets oblong or somewhat egg-shaped, blunt at both ends, 2 to 4 in. long, on leaf-stalks 1 to 2 in. long, pale beneath. Flowers in compound clusters. Pods 2 to 4 jointed, the joints nearly triangular. Common. June-Sept.

15. *D. canadense*, (L.) DC. (Fig. 11, pl. 79.) SHOWY TICK-TREFOIL. Stem stout, erect, quite hairy, 2 to 8 ft. high. Leaflets oblong-lance-shaped, blunt at base, blunt or somewhat sharp at apex. Flowers large, in somewhat dense showy clusters. Common. July-Sept.

16. *D. rigidum*, (Ell.) DC. (Fig. 10, pl. 79.) RIGID TICK-TREFOIL. Stems rigid, branched, somewhat whitish hairy, as is the lower surface of the leaves. Height 2 to 3 ft. Leaflets long egg-shaped, blunt at each end, hairy underneath and on edges. Flowers small, purplish, in compound clusters. Pods 1 to 3 jointed. Common. July-Oct.

17. *D. marylandicum*, (L.) DC. (Fig. 5, pl. 78.) SMOOTH SMALL-LEAVED TICK-TREFOIL. Erect, slender, nearly smooth, 2 to 3 ft. high. Leaflets broad egg-shaped with rounded ends $\frac{1}{4}$ to $\frac{1}{2}$ in. long on a leaf-stalk about the length of the lateral ones. Flowers quite small, purplish. Pods 1 to 3 jointed. Common. July-Sept.

18. *D. obtusum*, (Muhl.) DC. HAIRY SMALL-LEAVED TICK-TREFOIL. Much like the last, but covered with silky rather rough hairs. Leaves crowded on short leaf-stalks, leaflets broad egg-shaped or round. Common. July-Oct.

19. *LESPEDEZA*, Michx.

Herbs, with 3-foliate leaves, with small stipules or without any. Flowers



PLATE 79

1. *Lespedeza angustifolia*. 2. *L. violacea*. 3. *L. Stuevei*. 4. *L. procumbens*.
 5. *L. capitata*. 6. *L. virginica*. 7. *L. frutescens*. 8. *L. hirta*. 9. *L. Nuttallii*.
 10. *Desmodium rigidum*. 11. *D. canadense*.

often of two kinds (staminate and pistillate, and pistillate only), the former with purplish corolla, the latter without petals or with minute ones. Pods of a single, one-seeded joint, lens-shaped. Keel of the corolla very obtuse.

All the flowers having stamens and pistils, corolla yellowish or whitish, flowers in dense spikes or heads.

Leaflets broadly oval or nearly round *L. hirta*

Leaflets oblong or narrowly oblong *L. capitata*

Leaflets linear *L. angustifolia*

Flowers purple, of 2 kinds, those which are perfect (stamens and pistils) but seldom fertile. The smaller, pistillate only, with very small or no petals.

Plants trailing or procumbent;

Leaves covered with woolly hairs *L. repens*

Leaves not very hairy *L. procumbens*

Plants not trailing or procumbent;

Leaves linear *L. virginica*

Leaves oblong;

Flower stalks slender, longer than the leaves;

Inflorescence in compact, elongated heads;

Plant not velvety above *L. Nuttallii*

Plant decidedly velvety above *L. Brittonii*

Inflorescence loose clusters, few flowered *L. violacea*

Flower stalks shorter than the leaves;

Leaves downy on both sides *L. Stuevei*

Leaves downy only on lower side *L. frutescens*

1. *L. hirta*, (L.) Ell. (Fig. 8, pl. 79.) HAIRY BUSH-CLOVER. Erect, hairy, somewhat shrubby. Stems scarcely branching, 2 to 4 ft. high. Leaf stalks not as long as leaves. Leaflets broadly oval or nearly round. Clusters of flowers in elongated cylindric dense heads. All the flowers perfect, reddish-white. Calyx teeth as long or longer than the lens-shaped pod. Dry woods, New Jersey and southward. Aug.-Sept.

2. *L. capitata*, Michx. (Fig. 5, pl. 79.) ROUND-HEADED BUSH-CLOVER. Erect, hairy, half-shrubby, stems with few or no branches, 2 to 5 ft. high. Leaves on short leaf-stalks, leaflets narrow, elliptic, 1 to 1½ in. long by ¼ as wide, blunt at each end. Flower clusters of dense rounded or oblong heads; flowers yellowish-white with a purple spot on the standard. Dry soils, New England and southward. Aug.-Sept.

3. *L. angustifolia*, (Pursh.) Ell. (Fig. 1, pl. 79.) NARROW-LEAVED BUSH-CLOVER. Erect, simple or somewhat branched above, somewhat downy, 2 to 3 ft. high. Leaves on very short leaf-stalks, leaflets narrow, linear, 1 to 1½ in. long, blunt at each end. Flower stems considerably longer than the leaves, clusters rounded or somewhat cylindric, flowers whitish. Calyx teeth longer than the pod. Dry sandy soil. Aug.-Sept.

4. *L. repens*, (L.) Bart. CREEPING BUSH-CLOVER. Stem prostrate, spreading, smooth or slightly hairy. Leaflets oval or pear-shaped, rounded at apex, generally narrow at base. Flower stems thread-like, few flowered, the lower flowers being without petals. Petalous flowers purple. Dry soils. Aug.-Sept.

5. *L. procumbens*, Michx. (Fig. 4, pl. 79.) TRAILING BUSH-CLOVER. Stems procumbent, spreading, with silky hairs. Leaflets oval or nearly round, upper surface with few or no hairs, lower surface pubescent. Petalous flowers violet. Dry soils. Aug.-Sept.

6. *L. Nuttallii*, Darl. (Fig. 9, pl. 79.) NUTTALL'S BUSH-CLOVER. Erect or somewhat reclining, downy, 2 to 3 ft. high. Leaflets oval to rounded, obtuse at each end or with a notch and a terminal bristle at apex, smooth above, silky beneath. Flower stems mostly exceeding the

leaves. Flower clusters in heads or somewhat cylindric spikes. Petal bearing flowers violet-purple. Calyx teeth shorter than pod. Southern portion of our area. Aug.-Sept.

7. *L. Brittonii*, Bicknell. BRITTON'S BUSH-CLOVER. Stems partly upright, wand-like, 15 to 40 in. long, with short flowering branches. Plant densely velvety above, the upper surface of leaves smooth. Flower branches short; terminal clusters spike-formed on slender stems. Lower clusters few flowered. Corolla pinkish-purple, much longer than the calyx. Pod egg-shaped to oblong, downy, about twice the length of the calyx lobes. Bronxville, New York, also eastern Mass. Aug.-Sept.

8. *L. violacea*, (L.) Pers. (Fig. 2, pl. 79.) BUSH-CLOVER. Erect, usually much branched, with few hairs, 2 to 3 ft. high. Leaflets elliptic or oval, blunt at each end, $\frac{1}{2}$ to 2 in. long, on short leaf-stalks. Flowers in loose clusters, violet-purple. Calyx teeth shorter than pod. Dry soil, in all of our area. Aug.-Sept.

9. *L. Stuevei*, Nutt. (Fig. 3, pl. 79.) STUEV'S BUSH-CLOVER. Stems erect, branching or simple, very velvety, and *very leafy*, 2 to 4 ft. high. Leaflets oval to rounded, blunt at each end, silky white beneath and sometimes above. Flower stalks short, clusters terminal or axillary, those with petals violet-purple. Calyx teeth shorter than the nearly round pod. Dry soil, Vermont, Massachusetts and south and west. Aug.-Sept.

10. *L. frutescens*, (L.) Britton. (Fig. 7, pl. 79.) WAND-LIKE BUSH-CLOVER. Similar to above, but less hairy and hairs shorter. Leaflets smooth above, somewhat silky beneath. Upper flowers violet-purple. Dry soil, our area. Aug.-Sept.

11. *L. virginica*, (L.) Britton. (Fig. 6, pl. 79.) SLENDER BUSH-CLOVER. Erect, with a simple stem or somewhat branched above. Leaflets linear with or without fine soft hairs. Flower clusters close to main stem without lengthened flower-stalks, violet-purple. Dry soil, New Hampshire, and southward. Aug.-Sept.

20. VICIA, L.

Climbing or trailing vines with feather-formed leaves, leaflets of an even number, the leaf terminated by a tendril. Stipules conspicuous. Flowers in axillary clusters, generally conspicuous, mostly blue or violet-purple. Standard egg-shaped or oblong with a depression at the summit; wings oblong, adhering to the curved keel. Stamens, 9 united, 1 free. Style slender, curved, with a ring or tuft of hairs at summit or throughout its extent. Pod 2-valved, 2 to several seeded.

Flowers on elongated flower-stems.

Leaflets about $\frac{1}{2}$ as broad as long;

Stipules broad with conspicuous teeth *V. americana*

Leaflets generally less than $\frac{1}{2}$ as broad as long.

Ends sharp or rounded.

Flowers in dense clusters, usually more than 20 . . . *V. Cracca*

Flowers from 8 to 20 in cluster *V. caroliniana*

Flowers 1 to 6 in cluster.

Leaflets rounded or pointed at both ends . . . *V. tetrasperma*

Leaflets abrupt at apex *V. hirsuta*

Flowers with very short or with no flower stems.

Leaflets abrupt at apex.

One-third as wide as long *V. sativa*

One-half as wide as long *V. sepium*

Leaflets sharp at apex *V. angustifolia*

1. *V. Cracca*, L. (Fig. 1, pl. 80.) TUFTED VETCH. Trailing vine 2 to 4 ft. long, with leaves of 9 to 12 pairs of leaflets and with flowers overlapping in a rather dense one-sided cluster (20 to 40 flowers). Leaflets linear, pointed at each end or somewhat rounded with a bristle-point at apex. Flower clusters on long stalks from the axils of the leaves. Stem square, somewhat downy as are also the leaflets. A slender climber or trailer with blue or purple flowers. Dry soil, New Jersey and northward. June-Aug.

2. *V. americana*, Muhl. (Fig. 1, pl. 81.) AMERICAN VETCH. Trailing vine, 1 to 3 ft. long, nearly without hairs. Stipules broad with several conspicuous teeth. Leaflets, 4 to 7 pairs, elliptic to egg-shaped on the one hand or lance-shaped on the other, blunt at each end. Flowers 4 to 8, bluish-purple, the flower-stem shorter than the leaf-stalk. Pod about an inch long, 4- to 7-seeded. Moist grounds, New York and southward. May-August.

3. *V. caroliniana*, Walt. (Fig. 2, pl. 80.) CAROLINA VETCH. Slender vine, 4 to 6 ft. long, smooth. Leaflets 4 to 6 pairs, oblong or linear. Flowers 8 to 20 in a cluster, the stem of which is generally somewhat shorter than the leaf-stalks. Flowers nearly white or pale blue, the banner tipped with purple. Moist places, our area. May-July.

4. *V. tetrasperma*, (L.) Moench. (Fig. 4, pl. 80.) SLENDER VETCH. Stem slender, clinging, smooth or nearly so. Leaflets 3 to 6 pairs, linear, obtuse or rather sharp at the ends. Stipules simple, narrow, spread at base. Flower stem slender, shorter or about equalling the leaf-stalk, carrying from 1 to 6 pale blue or purple small flowers. Calyx tube of 5 unequal teeth. Pod linear-oblong with 2 or 3 globular seeds. Fields and waste places. May-Sept.

5. *V. hirsuta*, (L.) Koch. HAIRY VETCH. Vine, somewhat hairy, stem branching. Leaflets 8 to 10 pairs; individual leaflets having the appearance of having been cut off at the end, a small bristle appearing as the termination of the mid-vein. Flowers small, purplish. Pod somewhat velvety, oblong, dark, crimped, 2-seeded, about $\frac{1}{2}$ in. long. Fields and waste places. May-Sept.

6. *V. sepium*, L. (Fig. 3, pl. 81.) BUSH VETCH. WILD TARE. Leaflets 10 to 18, broad egg-shaped very blunt or depressed at apex. Flowers few, without flower-stalks. Waste places, only in northern part of our area. May-July.

7. *V. sativa*, L. (Fig. 3, pl. 80.) COMMON VETCH. Stem flexible, clinging by the leaf tendrils, more or less hairy, angular. Leaflets 4 to 7 pairs, inversely oval, the base narrowed, the apex rounded with a rather deep notch at center and with a bristly point to the central vein. Flowers large, bluish-purple, without leaf-stalks, or with very brief ones, generally 2 flowers at the leaf-axils. Pods solitary or in pairs, broad, strongly veined, dark brown when ripe. Fields. Introduced from Europe where it is cultivated for fodder. May-August.

8. *V. angustifolia*, Roth. (Fig. 2, pl. 81.) SMALLER COMMON VETCH. Stems numerous, branching, partly erect, 1 to 2 ft. long. Stipules simple or toothed. Leaflets 3 to 8 pairs, narrowly linear, $\frac{1}{2}$ to $1\frac{1}{2}$ in. long. Purple flowers without flower-stalks or with very short ones in upper



PLATE 80

1. *Vicia Cracca*. 2. *V. caroliniana*. 3. *V. sativa*. 4. *V. tetrasperma*.

leaf-axils. Pod linear, terminated by a recurved beak, somewhat hairy. Mostly near the coast. April-July.

21. LATHYRUS, L.

Vines, mostly trailing, some species partly or wholly erect. Leaves of an even number of leaflets, the leaf-stalk terminating by a tendril. *The nervules are usually nearly parallel with the central nerve.* Flowers in clusters or single, nearly like those of *Vicia*, often large. Stamens, 9 united, 1 free, or 10 united.

Leaflets broadly oval or elliptic.

Flowers purple.

Stipules broad halberd-shaped, not divided at apex *L. maritimus*

Stipules deeply divided from apex *L. venosus*

Leaflets narrow lance-shaped or somewhat egg-shaped.

Stems with wings at the angles *L. palustris*

Stems angled, but not winged.

Stipules broad, arrow-head-formed and divided *L. myrtifolius*

Flowers yellowish.

Stipules narrow, leaf-like, lance-shaped *L. pratensis*

Stipules broad *L. ochroleucus*

1. *L. maritimus*, (L.) Bigel. (Fig. 3, pl. 82.) BEACH PEA. Nearly erect, or decumbent, stout, stems about 1 ft. high, angled. Stipules very conspicuous, halberd-shaped and nearly as large as the leaflets. Leaflets elliptic or oval, 1 to 2 in. long, $1/3$ to $1/2$ as wide. Flowers showy, purple, in thick clusters on flower-stalks rather shorter than the compound leaves. Pod linear with a beak turned at a sharp angle. Sand at seashores. May-August.

2. *L. venosus*, Muhl. (Fig. 7, pl. 81.) VEINY PEA. Stem climbing, nearly smooth or covered with soft hairs, 2 to 3 ft. high, strongly 4-angled. *Stipules very small and slender.* Leaflets 4 to 6 pairs, broadly elliptic or oval. Flowers purple about as large as those of No. 1, and on a stem about as long as the compound leaf. Pod linear with a beak not much bent. Southern part of our region. May-July.

3. *L. palustris*, L. (Fig. 4, pl. 82.) MARSH VETCHLING. Stems slender, usually with wings at the angles, smooth or nearly so. Stipules broad, split down the center. Leaflets 2 to 4 pairs, narrow lance-shaped, about 1 to 2 in. long and $1/5$ as wide. Flowers in loose clusters (2 to 6 in cluster), purple, each about $\frac{1}{2}$ in. long. Pod narrow $1\frac{1}{2}$ to $2\frac{1}{2}$ in. long. Moist places, northern part of our area. May-August.

4. *L. myrtifolius*, Muhl. (Fig. 2, pl. 82.) MYRTLE-LEAVED MARSH PEA. Stems slender, angled but not winged. Stipules broad and long, resembling leaflets. Leaflets 2 to 4 pairs, oval or oblong, $2/3$ to 2 in. long. Flowers purple, 2 to 9 in cluster. Pods long, the beak recurved. Moist places, our area. May-July.

5. *L. pratensis*, L. (Fig. 5, pl. 81.) MEADOW PEA. Climbing or straggling, 1 to 3 ft. long. Leaves of a single pair of leaflets which are linear or broad-linear, $\frac{1}{2}$ to 1 in. long. Stipules of similar form and size so that apparently there are 4 leaflets, the lower pair attached to the stem. Flowers in a long slender cluster on a long flower stalk, *yellow*. Maine to New York. June-Aug.

6. *L. ochroleucus*, Hook. (Fig. 6, pl. 81.) CREAM-COLORED VETCHLING. Stem somewhat angled, climbing, 1 to $2\frac{1}{2}$ ft. high. Stipules broad,



PLATE 81

1. *Vicia americana*. 2. *V. angustifolia*. 3. *V. sepium*. 4. *Amphicarpa monoica*. 5. *Lathyrus pratensis*. 6. *L. ochroleucus*. 7. *L. venosus*. 8. *Galactia regularis*.

leaf-like. Leaflets 3 to 5 pairs, broadly oval or egg-shaped. Flowers yellowish-white in clusters of 5 to 9, $\frac{3}{4}$ in. long. Pod straight, beak curved. Distributed through most of our area. May-July.

22. CENTROSEMA, DC. (Bradburya, Raf.)

Slender twining herb, with 3-foliate leaves, a pair and an odd one. Both leaves and leaflets stipulate. Flowers in axillary clusters or solitary, showy. Calyx short, bell-shaped, its teeth nearly equal. The large standard erect and rounded with a spur-shaped projection on the back toward the base. Wings pear-shaped, keel broad and curved. Style bearded. Pod long and slender, flat with elongated point. Stamens, 9 united, 1 more or less free.

C. virginianum, (L.) Benth. SPURRED BUTTERFLY PEA. Somewhat rough hairy, stem trailing 2 to 4 ft. long. Leaflets egg-shaped to oblong or linear, shining. Flower stalks each bearing 1 to 4 showy violet handsome flowers about an inch long. Pods 4 to 5 in. long, very slender, with a long awl-shaped point. Southern part of our area. July-August.

23. CLITORIA, L.

Climbing, erect or trailing herbs or more or less woody vines. Leaves 3-foliate, a pair and an odd one. Leaflets with stipulate bracts. Calyx tubular, 5-toothed. Flowers large, the standard rounded, erect with a distinct depression at summit *and with no spur at the back*. Stamens, 9 united, 1 more or less free. Pod slender, flattened, knotty, several-seeded.

C. mariana, L. (Fig. 6, pl. 83.) BUTTERFLY PEA. Stem 1 to 3 ft. high, reclining or partly erect, smooth. Leaflets oblong or very narrow egg-shaped. Stipules awl-shaped. Flower stalk short, with 1 to 3 showy pale blue flowers about 2 in. long. Southern part of our area. June-July.

24. AMPHICARPA, Ell. (Falcata, Gmel.)

Slender herbs, twining, the stem clothed with brown hairs. Leaves 3-foliate, the leaflets broad. Flowers small, white or violet, in simple slender clusters (in our species). Flowers of two kinds, those of the upper branches having colored petals, those on lower branches solitary without petals, but producing seed.

1. **A. monoica**, (L.) Ell. (Fig. 4, pl. 81.) WILD PEA-NUT. HOG PEA-NUT. Leaflets 3, $\frac{1}{2}$ to 2 in. long. Flower clusters simple and generally nodding; flowers purplish or white. Bracts at base of flowers egg-shaped. Common. Aug-Sept.

2. **A. Pitcheri**, (T. and G.) PITCHER'S HOG PEA-NUT. Leaflets 3, 2 to 4 in. long. Bracts below flowers orbicular. Western New York. Aug-Sept.

25. APIOS, Moench.

Twining vines climbing on trees and shrubs with leaves of 3 to 7 leaflets. Flowers in compact, short, often branching clusters, brownish-purple or red. Calyx bell-shaped, somewhat 2-lipped. Standard very broad and turned backward, the long keel twisted. Stamens, 9 united, 1 free. Pod linear.



PLATE 82

1. *Apios tuberosa*. 2. *Lathyrus myrtifolius*. 3. *L. maritimus*. 4. *L. palustris*.

A. tuberosa, (L.) Moench. (Fig. 1, pl. 82.) **GROUND-NUT**. A vine, climbing on shrubs and trees often found along banks of streams. The underground tubers are said to be edible. Flowers brownish-purple. Moist grounds. July-Sept.

26. GALACTIA, P. Browne

Prostrate or twining herbs, with 3-foliate leaves and small stipules, which fall early. Calyx 4-lobed, the lobes narrow and sharp at apex and nearly equal in length. Standard orbicular, keel nearly straight, wings narrow. Stamens, 9 united, 1 free. Pod straight linear, few seeded.

1. **G. regularis**, (L.) BSP. (Fig. 8, pl. 81.) **MILK PEA**. Mostly prostrate, smooth. Leaflets elliptic, oblong, obtuse at each end, shining above, somewhat hairy beneath, about 1 to 1½ in. long. Flower cluster from leaf axils on somewhat lengthened flower-stalks, the cluster about as long as leaves. Flowers purple, greenish on the outside, rather large. Dry soils, near the coast, southern New York, and southward. Aug-Sept.

2. **G. volubilis**, (L.) Britton. **DOWNY MILK PEA**. Generally twining, stem covered with silky hairs, several feet long. Leaflets similar in form to No. 1. *Silky and whitish beneath*. Flower cluster generally extending beyond the leaves. Flowers smaller than those of No. 1. Dry soils, southern part of our area. June-Aug.

27. PHASEOLUS, L.

Herbaceous twining or trailing plants, with 3-foliate leaves with stipules which fall early. Flowers in clusters from the leaf axils. Calyx 5-toothed or lobed, the upper two somewhat united. Standard orbicular, keel *spirally twisted*. Pod sickle-shaped or nearly straight.

1. **P. polystachyus**, (L.) BSP. (Fig. 5, pl. 83.) **WILD BEAN**. **BEAN VINE**. (*P. perennis*, Walt.). Vine, often many feet long, climbing and twining on other plants, often forming extensive masses of the light green vine. Leaflets large, broadly egg-shaped, 1½ to 3 in. long, acute at apex, rounded at base. Flower clusters narrow, long, loose flowered. Flowers light purple. Pod about 2 in. long, with compressed dark purple seeds. Common. July-Sept.

2. **P. helvolus**, L. (Fig. 2, pl. 83.) **TRAILING WILD BEAN**. (*Strophostyles helvola*, Britton.) Stem slender, trailing, 2 to 8 ft. long, rather rough-hairy. Leaflets egg-shaped, acute or obtuse at apex. Flower-stalk much longer than the compound leaves. Flower clusters of few (2 to 6) flowers. Corolla greenish-purple. Keel not twisted, but slender and curved. Sandy shores and river banks, eastern section of our area. July-Oct.

28. STROPHOSTYLES, Ell.

Similar to *Phaseolus*, but keel of corolla is *not spirally* coiled, but is strongly incurved.

S. umbellata, (Muhl.) Britton. (Fig. 4, pl. 83.) **PINK WILD BEAN**. Resembles *Phaseolus helvolus*, but the leaflets are often narrower and often with one or more shallow lobes at border. Long Island and southward. July-Sept.



PLATE 83

1. *Trifolium arvense*. 2. *Phaseolus helvolus*. 3. *Stylosanthes biflora*. 4. *Strophostyles umbellata*. 5. *Phaseolus polystachyus*. 6. *Clitoria mariana*.

Order VII.—GERANIALES. Order of the Geraniums

This order includes families differing so widely that they do not appear related except to the expert. There are, however, certain common characteristics. There are present the calyx and corolla except in rare instances. The ovary is superior to and free from the calyx and the divisions of the calyx (sepals) are, in nearly all cases distinctly separate from each other to the base or nearly to it. The stamens are few, usually 5 or 10 in flowers in which the petals are all similar (flowers regular), but in flowers in which the petals of the same flower are dissimilar the number is reduced. The carpels (ovule bearing parts of the pistils) 5 or less, are united, retaining, however, their dividing partitions, but in *Geranium* these carpels separate when ripe. The *ovules are pendulous* from the part of the carpel entering into the constitution of the central axis of the combined carpels, and the ridge which connects the two ends of the ovule (*the raphe*) *lies toward this central axis*.

Herbs.

With colored, showy flowers.

Flowers symmetrical.

Leaves with radiating lobes . . . **GERANIACEAE**

Leaves 3-foliate **OXALIDACEAE**

Leaves not lobed or divided **LINACEAE**

Flowers unsymmetrical **POLYGALACEAE**

With mostly inconspicuous flowers, plants with milky juice

. **EUPHORBIACEAE**

Small aquatic plants with very slender stems, opposite

leaves and minute axillary flowers . **CALLITRICHACEAE**

Trees.

Leaves of not more than 13 leaflets . . . **RUTACEAE**

Leaves of from 13 to more than 40 leaflets **SIMARUBACEAE**

FAMILY I.—GERANIACEAE. GERANIUM FAMILY

Herbs, rarely shrubby, the stems of which often divide in pairs. Leaves usually deeply lobed, nearly always with stipules at the

base of the leaf stalk. Flowers generally regular the calyx and corolla each of 5 divisions. In some foreign species the calyx has less than 5 sepals. Stamens 10, united at the base, 5 long and 5 short, in *Geranium* all fertile, in *Erodium* 5 only fertile. Styles 5, adherent to a central column, the whole forming a slender beak. Ovary free with 5 cells, the cells each with 2 ovules.

Stamens 10, all bearing anthers **Geranium**

Stamens 10, 5 only bearing anthers **Erodium**

I. GERANIUM, L.

All of our species herbs, the stem swollen at the nodes. Leaves opposite or alternate usually cut or lobed, our species all with stipules at foot of leaf stalk. Flowers regular with 5 petals, 5 sepals, 10 stamens, 5 long and 5 short, usually ripening at different times. Ovary 5-celled, terminating in a long beak. Fruit when mature of 5 one-seeded carpels. These at maturity elastically separate from the central column, a thread-like portion of the carpel to which the seed is attached coiling upward. (Fig. 1a, pl. 84.)

Flowers 1 in. broad or more *G. maculatum*
Flowers about $\frac{1}{2}$ in. broad.

Leaves divided to the base into 3 compound leaflets, the middle one at least with a stem *G. Robertianum*

Leaves cleft nearly to the base into 3 compound divisions, the middle one not on stem.

Flower stalks exceeding the leaves *G. columbinum*

Flower stalks not exceeding the leaves.

Beak of seed capsule 1 in. long *G. Bicknellii*

Beak of seed capsule about $\frac{1}{2}$ in. long *G. dissectum*

Leaves cleft from $\frac{1}{3}$ to $\frac{1}{2}$ to the base.

Flower stalk with a single flower *G. sibiricum*

Flower stalk with 2 flowers.

Leaves nearly round, sinuses extending not more than half way to base *G. rotundifolium*

Sinuses extending more than half way to base.

Flowers in compact clusters *G. carolinianum*

Flowers in loose clusters, leaves rounded.

Carpels hairy *G. pusillum*

Carpels not hairy *G. molle*

Leaves divided into 7 parts *G. pratense*

1. **G. maculatum, L.** (Fig. 1, pl. 84.) CRANE'S BILL. Stem 1 to 2 ft. high, erect, hairy; leaves about 5-parted nearly or quite $\frac{2}{3}$ to base, the basal ones on long leaf-stalks, more or less rounded, 3 to 6 in. wide. Flowers in loose clusters at upper end of stem. Petals light purple; sepals slender pointed. Common in woods. April-July.

2. **G. Robertianum, L.** (Fig. 3, pl. 84.) HERB ROBERT. Annual or biennial. Extensively branching, the branches prostrate or partly erect, often covered with sticky hairs. Leaves deeply divided into lobes which are distinct to the base, the lobes also deeply incised. Leaf-stalks longer than the leaves. Flowers, 2 on a stalk exceeding the leaves; petals red-purple, sepals velvety, awl-shaped. The plant has a strong and rather unpleasant odor. Common in rocky woods. May-Oct.

3. **G. carolinianum, L.** (Fig. 2, pl. 84.) CAROLINA CRANE'S-BILL. Erect, diffusely branched, stems hairy, 6 to 15 in. high. Leaves divided into about 5 to 7 lobes, the sinuses extending rather more than half way

to base; lobes also cleft into numerous divisions. Flower stalks rather short, branched, each branch with 2 flowers. *Sepals as long as the pale purplish petals*. Beak about 1 in. long. Barren soil, east Mass., westward and southward. April-Aug.

4. *G. Bicknellii*, Britton. BICKNELL'S CRANE'S-BILL. Similar to last, but flower-stalks do not exceed the leaf-stalks. New York, New England and northward. May-Sept.

(The following species, introduced, are more or less naturalized and are found in limited localities in our area.)

5. *G. dissectum*, L. (Fig. 5, pl. 84.) CUT-LEAVED CRANE'S-BILL. *Petals not longer than the sepals. Sepals not curved outward*. Flower-stalks shorter than leaves, two flowered.

6. *G. columbinum*, L. (Fig. 8, pl. 84.) LONG-STALKED CRANE'S-BILL. Slender, mostly prostrate; leaves 1 to 1½ in. diameter. *Sepals and petals of about the same length. Borders of sepals curved outward*. Flower-stalks longer than leaves.

7. *G. pusillum*, L. (Fig. 4, pl. 84.) SMALL-FLOWERED CRANE'S-BILL. Stems procumbent, diffusely branching, with soft hairs. *Petals longer than sepals*. Carpels not wrinkled. Stamens 5.

8. *G. molle*, L. (Fig. 9, pl. 84.) DOVE'S-FOOT CRANE'S-BILL. Similar to last, but more hairy. Petals about twice as long as sepals. Carpels transversely wrinkled. Stamens 10.

9. *G. rotundifolium*, L. (Fig. 7, pl. 84.) ROUND-LEAVED CRANE'S-BILL. Stems decumbent, slightly hairy. Leaves divided nearly to base; lobes linear; general form rounded. Sepals velvety. Fruit and seeds with long silky hairs tipped with purple glands.

10. *G. sibiricum*, L. (Fig. 6, pl. 84.) SIBERIAN CRANE'S-BILL. Stems decumbent, freely branched, silky. Leaves deeply 3-parted, divisions strongly toothed. *Flowers dull white, generally solitary*.

11. *G. pratense*, L. SPREADING CRANE'S-BILL. Leaves mostly 7-parted, the narrow lobes deeply cut. Flower stems downy. Corolla deep purple. Maine and locally in Mass.

2. ERODIUM, L'Her.

Resembles *Geranium*, but leaves are, in our species, pinnate, *i. e.*, feather-formed. Of the stamens 5 are perfect, the others sterile, greatly reduced or wanting.

E. cicutarium, (L.) L'Her. HEMLOCK STORK'S-BILL. HERON'S-BILL. Growing in tufts. Hairy, low, spreading. Leaves of opposite leaflets on an elongated axis, the leaflets deeply cut. Flowers purple, nearly ½ in. broad. The beak very long. Introduced. April-Sept.

FAMILY II.—OXALIDACEAE. WOOD-SORREL FAMILY

Herbs, with 3-foliate leaves, 10 stamens, of which 5 are shorter than the remaining 5 (rarely 15); 5 styles, more or less coherent. Sepals 5; petals 5; symmetrical. Fruit a capsule with 5 valves. Ovules several in each cavity. Leaves basal or alternate.

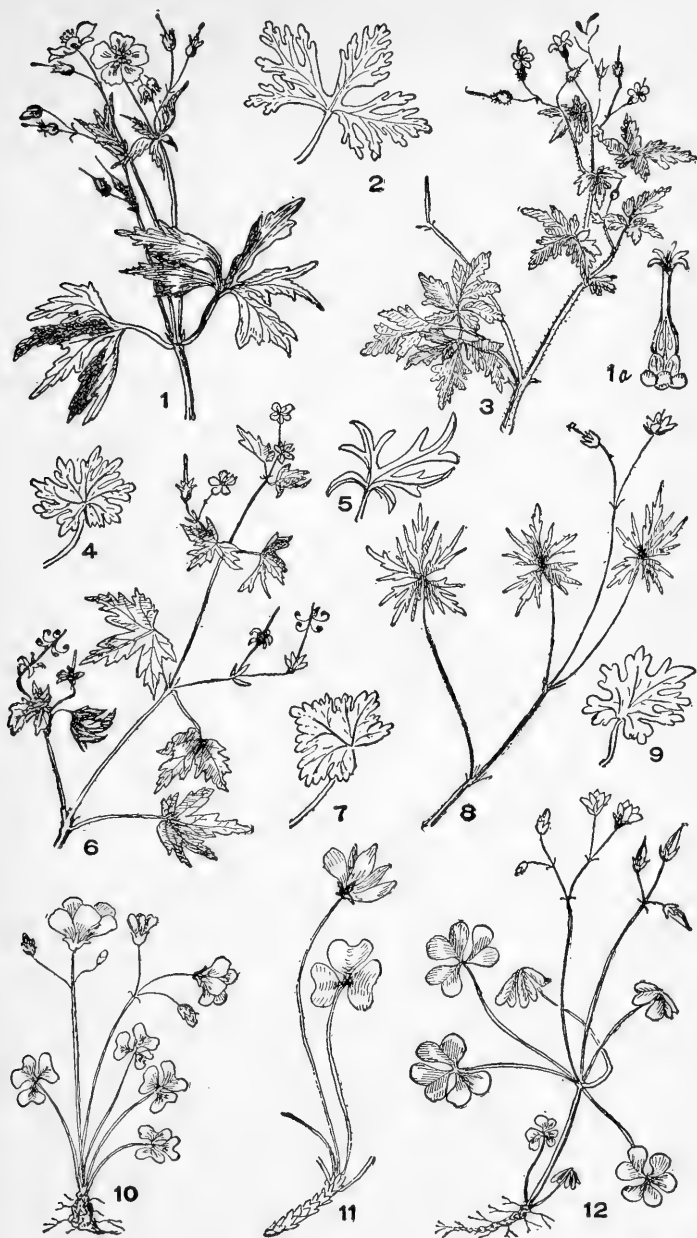


PLATE 84

1. *Geranium maculatum*. 1a. Pistil of *G. maculatum*. 2. *G. carolinianum*. 3. *G. Robertianum*. 4. *G. pusillum*. 5. *G. dissectum*. 6. *G. sibiricum*. 7. *G. rotundifolium*. 8. *G. columbinum*. 9. *G. molle*. 10. *Oxalis violacea*. 11. *O. Acetosella*. 12. *O. stricta*.

I. OXALIS, L.

Characters as above.

Leaves and flower-stems directly from the rootstock.

Flower-stem one-flowered *O. Acetosella*

Flower-stem several-flowered *O. violacea*

Leaves and flower-stems not from the rootstock.

Stipules conspicuous *O. corniculata*

Stipules not conspicuous *O. stricta*

1. *O. Acetosella*, L. (Fig. 11, pl. 84.) WHITE WOOD-SORREL. Herbs, 2 to 6 in. high; leaves all from the base. Rootstock creeping and scaly. Flower stem from the root, one-flowered; petals white with reddish veins. Moist woods. May-July.

2. *O. violacea*, L. (Fig. 10, pl. 84.) VIOLET WOOD-SORREL. Root bulbous, scaly. Flower stems from root, with from 3 to 12 flowers, which are rose-purple or nearly white. Rocky woods. May-June.

3. *O. corniculata*, L. YELLOW WOOD-SORREL. Stems branching, mostly procumbent, 1 to 6 in. long. Flowers yellow, 2 to 6 on a flower-stem. Pods linear. *Stipules conspicuous*. Less common than No. 4. Summer.

4. *O. stricta*, L. (Fig. 12, pl. 84.) UPRIGHT WOOD-SORREL. Stems erect, stipules not conspicuous. Plant without hairs. Flowers yellow. Common in woods and fields. April-Oct.

In addition to the above a considerable number of forms found in our area are reported as species by Dr. Small.

FAMILY III.—LINACEAE. FLAX FAMILY

Herbs (always in our area), with alternate or opposite leaves which are simple, with borders entire, attached directly to the stem (sessile) and without stipules. Flowers regular, symmetrical, in our genus of 5 petals; sepals 5. Stamens 5 fertile, 5 sterile or suppressed, the fertile alternate with the petals. Ovary mostly of 5 cells.

In our area we have only one genus.

LINUM, L.

Which has the characters of the family, *i. e.*, sepals 5, petals 5, longer than the calyx; stamens 5; styles 3 to 5. Seed capsule globular.

Flowers blue *L. usitatissimum*

Flowers yellow.

Flowers about $\frac{1}{2}$ in. broad, stem striped or angular . . . *L. virginianum*

Flowers about $\frac{1}{8}$ in. broad, stem not striped . . . *L. medium*

Flowers about $\frac{1}{4}$ in. broad, branches sharply angled or winged . . . *L. striatum*

Flowers $\frac{1}{2}$ in. broad or more, stem angled with wings . . . *L. sulcatum*

1. *L. usitatissimum*, L. (Fig. 1, pl. 85.) FLAX. LINSEED. Stem branching above, generally simple below, erect, about 12 to 20 in. high. Flowers bell-shaped, large, in loose clusters, each flower on a slender more or less elongated flower stalk. Sepals oval, sharply pointed. Found occasionally spontaneous. Introduced. Summer.

2. *L. virginianum*, L. (Fig. 2, pl. 85.) SLENDER YELLOW FLAX.



PLATE 85

1. *Linum usitatissimum*. 2. *L. virginianum*. 3. *L. medium*. 4. *L. striatum*. 5. *Ptelea trifoliata*. 6. *Xanthoxylum americanum*.

Erect, 1 to 2 ft. high, lower part of stem simple, upper branching, striped or somewhat angular. Branches all reaching nearly the same height. Leaves oblong, without leaf-stalks. Flowering stems spreading or recurved. Flowers small, sepals ovate, pointed. Styles distinct. Dry woods, our area. June-Aug.

3. *L. medium*, (Planch.) Britton. (Fig. 3, pl. 85.) STIFF YELLOW FLAX. Similar to No. 2, but branches do not recurve, and stems are never angular. Most of our area.

4. *L. striatum*, Walt. (Fig. 4, pl. 84.) RIDGED YELLOW FLAX. Generally numerous stems together, all erect and branched above; leaves generally opposite, lance-shaped. Stem and branches *sharply angled* with about 4 wing-like angles, somewhat viscid. Wet grounds, Mass., and southward. Summer.

5. *L. sulcatum*, Riddell. GROOVED YELLOW FLAX. Stem erect, simple, branching only at the upper part. Stem and branches winged or grooved, at least above. Leaves alternate, lance-shaped, the upper ones with *glandular hairs* along the borders, 3-nerved. In place of stipules are dark glands. Most of our area.

FAMILY IV.—RUTACEAE. RUE FAMILY

The members of this family in our area are trees and shrubs. Flowers bearing stamens on one tree and pistils on another in *Xanthoxylum*, staminate pistillate and perfect flowers on the same tree in *Ptelea*. Sepals 4 or 5 or more, stamens twice as many as sepals or equal in number. Petals 4 or 5. Pistils 2 to 5 generally united. Fruit a capsule or a winged fruit (*samara*). Leaves of our species compound, alternate or opposite and abounding with a pungent or heavy aromatic volatile oil.

1. XANTHOXYLUM, L.

Staminate and pistillate flowers on different plants. Sepals 4 or 5 or none, petals 4 or 5. Pistils 2 to 5, separate above, but united below. Capsule thick and fleshy.

X. americanum, Mill. (Fig. 6, pl. 85.) PRICKLY ASH. TOOTHACHE TREE. A small tree or more frequently a shrub, sometimes 25 ft. high, the stems and often the leaf-stalks prickly. Leaves compound of about 4 pairs and an odd leaflet. Flowers in umbellate clusters in the axils of the leaves, greenish, appearing before the leaves. Calyx none, petals 4 or 5. Woods, throughout our area. April-May.

2. PTELEA, L.

Flowers perfect or staminate only or pistillate only. Petals and stamens 3 to 5. Ovary of 2 cells, pistils 2 above. Fruit a 2-celled, 2-seeded, broad-winged samara. Leaves 3-foliate; flowers greenish-white in compound clusters.

P. trifoliata, L. (Fig. 5, pl. 85.) THREE-LEAVED HOP-TREE. Rather tall shrub, with 3-foliate leaves, the leaflets egg-shaped, pointed, 2 to 5

in. long, the group on a long leaf-stalk. Flowers in compound cluster, greenish-white. Seeds, 2 in a broad winged fruit, the wings reticulated, nearly round, about $\frac{3}{4}$ in. in diameter. In southern part of our area. Not common. June.

FAMILY V.—SIMARUBACEAE. AILANTHUS FAMILY

Trees or shrubs. Flowers regular, with calyx and corolla, generally 5 sepals, 5 petals and twice as many stamens; staminate and pistillate flowers separate. Carpels generally free or united above. Fruit (in our species) winged. Leaves compound, without stipules.

AILANTHUS, Desf.

A. glandulosa, Desf. The only species in our region, the Ailanthus, planted as a shade tree, grows to a height of from 40 to 90 ft. The compound leaves are often 2 or 3 ft. long with from 6 to 20 pairs of leaflets and an odd one.

FAMILY VI.—POLYGALACEAE. MILKWORT FAMILY

In our area, all herbs, with unsymmetrical flowers; calyx of 5 sepals and corolla usually of 3 petals; two of the sepals resembling petals. Stamens generally 8, sometimes 6. Ovary of 2 cells. Style simple. Fruit a capsule.

POLYGALA, Tourn.

Flowers generally showy, colored, quite irregular, in grape-like clusters. Calyx of 5 sepals, the upper and the two lower small and greenish, the two side sepals large and colored like petals. Three petals only are developed, the anterior of which is much the largest and is covered by the two posterior. The large petal is 3-lobed, the middle lobe being fringed or tufted, the whole petal resembling the keel of a boat or in some species it is spoon-like. Stamens 6 to 8. Fruit a 2-seeded pod.

Principal leaves mostly in whorls.

Flower heads in close contact with leaves *P. cruciata*

Flower heads removed from leaves by elongated flower stems.

Heads of flowers cylindric or rounded, blunt *P. brevifolia*

Heads (spikes) slender and spindle-formed *P. verticillata*

Lower leaves only in a whorl *P. ambigua*

Leaves alternate.

Flowers orange-yellow *P. lutea*

Flowers purple to white;

In spindle-shaped spikes or heads.

Leaves linear to narrow lance-shaped, not distant from each other,

flowers greenish or yellowish-purple *P. Nuttallii*

Leaves linear, quite distant from each other. Flowers pink *P. incarnata*

Flowers in rounded heads, blunt at top.

Bracts persistent *P. sanguinea*

Bracts deciduous *P. mariana*

Flowers in elongated spikes.

Leaves linear *P. polygama*

Leaves lance-shaped *P. serotina*

Flowers few, showy, in loose clusters *P. paucifolia*

1. **P. cruciata**, L. (Fig. 11, pl. 86.) CROSS-LEAVED MILKWORT.
MARSH MILKWORT. Erect, 4 to 16 in. high, branching above, nearly or

quite simple below, stem somewhat winged at the angles, or square. Leaves in whorls of 4, or a few scattered, linear obtuse at apex, $\frac{1}{2}$ to $1\frac{1}{2}$ in. long, quite narrow ($\frac{1}{12}$ to $\frac{1}{6}$ in. wide). Clusters of flowers condensed, oval, quite blunt above, on very short flower stalks, the leaves extending around and above the cluster. Flowers purple, greenish or white. Wet grounds, our area. July-Sept.

2. *P. brevifolia*, Nutt. (Fig. 8, pl. 86.) SHORT-LEAVED MILKWORT. Similar to No. 1; leaves in whorls of 4s but shorter; flower stem extending considerably above leaves. Wet sandy places, Rhode Island, Mass., and southward. June-Sept.

3. *P. verticillata*, L. (Fig. 3, pl. 86.) WHORLED MILKWORT. Very slender, 4 to 10 in. high, with many branches. Leaves in whorls of 4, rarely more, narrow, *sharp pointed*, $\frac{1}{4}$ to $1\frac{1}{4}$ in. long. Flowers in spindle-shaped clusters on long flower-stalks. Flowers greenish-purple. Common in dry or moist fields. June-Nov.

4. *P. ambigua*, Nutt. (Fig. 4, pl. 86.) LOOSE-SPIKED MILKWORT. Resembles No. 3, but leaves, except the lower ones, which may be in one or two whorls, are scattered along the stem. Flower groups more extended, and slender, nearly cylindric. Dry soil, our area. June-Nov.

5. *P. lutea*, L. (Fig. 10, pl. 86.) ORANGE MILKWORT. Erect, few branches except at top, leaves alternate, narrow spatulate; flowers in rounded heads, *yellow*. In southern part of our area. June-Oct.

6. *P. Nuttallii*, T. G. (Fig. 5, pl. 86.) NUTTALL'S MILKWORT. Stems very slender, 4 to 6 in. high. Simple below, branching above. Leaves scattered along the stem $\frac{1}{4}$ to $\frac{3}{4}$ in. long, very slender linear. Flowers in spindle-shaped heads, greenish-purple. Dry soil. Aug-Sept.

7. *P. incarnata*, L. (Fig. 9, pl. 86.) PINK MILKWORT. Erect, heads of flowers spindle-shaped or more or less interrupted and cylindric. Leaves narrow linear situated at long distances from each other. Dry soils, southern part of our area. June-Oct.

8. *P. polygama*, Walt. (Fig. 6, pl. 86.) BITTER POLYGALA. Erect, not branching, leafy, several stems from the same root, 4 to 20 in. high. Leaves scattered, lance-shaped or linear, obtuse at end. Flowers in an elongated spike (1 to 3 in.), rather loosely clustered, purple to light rose or even white, with a tinge of rose, showy. Dry soil. June-July.

9. *P. sanguinea*, L. (Fig. 7, pl. 86.) PURPLE MILKWORT. (*P. viridescens*, L.). Erect, branching above, 6 to 15 in. high. Leaves linear, alternate, $\frac{3}{4}$ to $1\frac{1}{4}$ in. long. Heads of flowers rounded, blunt at top, red to purplish-white. Moist meadows, wet grounds. July-Oct.

10. *P. mariana*, Mill. MARYLAND MILKWORT. Resembles *P. sanguinea*. The two little bracts at the base of each short flower stem in the cluster of flowers are, in *P. sanguinea* persistent. In the present species these bracts fall early. Flowers rose-purple. Southern New Jersey and southward. July-Sept.

11. *P. senega*, L. (Fig. 1, pl. 86.) SENEGA SNAKEROOT. Erect, smooth, scarcely branching, leafy 8 to 14 in. high. Leaves alternate, lance-shaped tapering at each end, apex sharp. Flowers in rather close spike, white. Rocky woods. May-June.

12. *P. paucifolia*, Willd. (Fig. 2, pl. 86.) FRINGED POLYGALA.



PLATE 86

1. *Polygala senega*. 2. *P. paucifolia*. 3. *P. verticillata*. 4. *P. ambigua*.
 5. *P. Nuttallii*. 6. *P. polygama*. 7. *P. sanguinea*. 8. *P. brevifolia*. 9. *P.*
incarnata. 10. *P. lutea*. 11. *P. cruciata*.

Stems simple, half prostrate or erect, 3 to 4 in. high. Leaves crowded, egg-shaped or oblong 1 to $1\frac{1}{2}$ in. long, $\frac{1}{2}$ as wide, the leaves below the main cluster are reduced to scales or very small leaves. Flowers few, showy rose-purple, the keel beautifully fringed. Another form of flowers small, greenish, are found close to the ground or beneath the surface. In rich grounds, often at foot of rocks. One of the most attractive of our spring flowers. May.

FAMILY VII.—EUPHORBIACEAE. SPURGE FAMILY

In our region all herbs, with pistils and stamens in different flowers, sometimes on the same plant in other cases on different plants. Whole plant abounds in acrid milky juice. Leaves opposite or alternate. Flowers without petals or with. Stamens few or numerous. In fertile flowers the ovary is composed of from 2 to 9 or more carpels (mostly 3) fused to a central prolongation of the axis. An ovule or a pair of ovules may hang from the summit of each cell of the ovary.

Flowers in spikes.

Staminate uppermost **Croton**

Pistillate uppermost **Acalypha**

Flowers in loose clusters.

Staminate flowers (2 or 3 in the loose group) above the pistillate, which is generally solitary . . . **Crotonopsis**

Staminate and pistillate flowers enclosed in the same involucre (leafy bracts resembling a calyx), the ovary generally, toward maturity, becoming exserted and nodding on its little stalk. (Fig. 1. pl. 88.) **Euphorbia**

Flowers solitary, at leaf-axils **Phyllanthus**

1. PHYLLANTHUS, L.

Herbs, with wiry stems and alternate, entire leaves. Staminate and pistillate flowers separate, but on the same plant without flower stems. Calyx 4- to 6-parted. Stamens usually 3, the filaments more or less united. Capsule globe-formed.

P. carolinensis, Walt. (Fig. 6, pl. 87.) **CAROLINA PHYLLANTHUS**. Slender, 4 to 20 in. high. Leaves oblong or pear-shaped, $\frac{1}{4}$ to $\frac{3}{4}$ in. long. Calyx lobes 6, linear. Stamens and styles each, 3. Gravelly soil, eastern Penna., west and south. May-Oct.

2. CROTON, L.

Inconspicuous weeds. Leaves, in our species, alternate. Flowers of two kinds on the same flower stalk, the upper bearing stamens, the lower pistils. Calyx of staminate flowers of 5 sepals. Petals usually rudimentary. Stamens 5 or more. Pistillate flowers, calyx 5 to 10 sepals. Petals wanting. Ovary of 3 cells, each with one seed.



PLATE 87

1. *Acalypha ostryaefolia*. 2. *A. virginica*. 3. *A. gracilens*. 4. *Crotonopsis linearis*. 5. *Croton capitatus* 6. *Phyllanthus carolinensis*.

C. capitatus, Michx. (Fig. 5, pl. 87.) **CAPITATE CROTON**. Stem densely woolly, leaves woolly on both sides, oblong-lance-shaped with the base rounded or heart-shaped. Clusters of inconspicuous staminate flowers just above the more dilated group of pistillate flowers. These staminate flowers have 5 small petals and 10 or more stamens. Pistillate flowers in a rounded group. Only in southern part of our area. May-October.

3. CROTONOPSIS, Michx.

Herbs, with silky but shining leaves, leaves alternate (opposite in our species). Calyx 5-parted. Petals, none. Stamens 5. Flowers in loose branching clusters, staminate above.

C. linearis, Michx. (Fig. 4, pl. 87.) **CROTONOPSIS**. Whole plant silvery from shining scales. Stem erect, branching in regular pairs, 12 to 18 in. high. Leaves 1 to 1½ in. long, narrow lance-shaped or broader, to narrow egg-shaped, on short leaf-stalks, *opposite*. Flowers very small in terminal spikes or masses. Southern part of our area. July-Sept.

4. ACALYPHA, L.

Our species herbs, with pistils and stamens occupying different flowers on the same plant. Stems erect and branching. Leaves alternate. The staminate flowers in axillary spikes *below* the pistillate flowers with calyx of 4 sepals. Pistillate flowers each subtended by a leafy bract, calyx of 4 or 5 sepals. Ovary 3-celled, styles 3; cells each with one seed.

1. **A. ostryaefolia**, Ridd. (Fig. 1, pl. 87.) **THREE-SEEDED MERCURY**. Stem branched, hairy, 1 to 2 ft. high; leaves on leaf-stalks about ½ length of leaves or more; leaves egg-shaped, sharp pointed at apex, rounded or heart-shaped at base, with toothed borders, 2 to 4 in. long. Staminate flowers very small on somewhat lengthened spikes. Corolla absent. Plant resembles a nettle, hence its name, *Acalypha*, an ancient name for the nettle.

2. **A. virginica**, L. (Fig. 2, pl. 87.) **VIRGINIA THREE-SEEDED MERCURY**. Plant 1 to 2 ft. high becoming purple. Leaves egg-shaped, not heart-shaped at base but somewhat tapered. Flowers of both kinds are enclosed within a fringed leafy bract.

3. **A. gracilens**, A. Gray. (Fig. 3, pl. 87.) **SLENDER THREE-SEEDED MERCURY**. Leaves linear or lance-shaped. Stems very slender. The staminate spike generally exceeds the fringed bract. Otherwise the plant has characters of No. 2.

5. EUPHORBIA, L.

Herbs, with staminate and pistillate flowers on the same plant and generally surrounded by the same involucre. These involucre are bell-shaped, having 4 or 5 segments resembling petals which alternate with as many gland-like teeth (Fig. 1, pl. 88). The involucre are subtended by bracts which are often brightly colored. Stamens scattered over the inner surface of the involucre; pistillate flower solitary, the ovary is situated on a pedicel, which increases until it lifts the ovary in general outside the bell-shaped involucre, where it droops outward and downward. Capsule 3-lobed.



PLATE 88

1. A flower of *Euphorbia Darlingtonii*. 2. *Euphorbia polygonifolia*. 3. *E. maculata*. 4. *E. helioscopia*. 5. *E. Peplus*. 6. *E. Lathyris*. 7. *E. corollata*. 8. *E. nutans*. 9. *E. Ipecacuanhae*. 10. *E. Esula*. 11. *E. lucida*. 12. *E. Cyparissias*.

Flowers in axils of the opposite leaves not in umbel-like clusters, usually one only.

- Plant prostrate.
 Borders of leaves without teeth *E. polygonifolia*
 Borders of leaves with teeth.
 Stem and leaves without hairs *E. glyptosperma*
 Stem and leaves hairy.
 Involucres split on one side *E. humistrata*
 Involucre not split *E. maculata*
- Plant erect.
 Leaves notched *E. nutans*
 Leaves entire *E. Ipecacuanhae*
- Flowers in umbel-like clusters subtended by a whorl of leaves.
 Appendages to involucre petal-like *E. corollata*
 No petal-like appendages.
 Rays of the umbel 3, rarely more. Stem leaves with leaf stalks *E. Peplus*
 Rays of the umbel 4 *E. Lathyrus*
 Rays of the umbel 5 to 8.
 Floral leaves broad heart-shaped.
 Stem leaves elliptic lance-shaped *E. Darlingtonii*
 Stem leaves pear-shaped *E. helioscopia*
 Stem leaves oblong, blunt at each end *E. lucida*
 Stem leaves linear, sharp at both ends.
 Whorl of leaves at base of umbel not repeated *E. Esula*
 Whorls 2 to several, one below the other on main stem *E. cyprisias*

1. *E. polygonifolia*, L. (Fig. 2, pl. 88.) SEA-SIDE SPURGE. Stems spreading, prostrate, 3 to 8 in. long, lying flat upon the sand. Leaves $\frac{1}{4}$ to $\frac{3}{4}$ in. long, opposite, very narrow with blunt ends, fleshy, *borders not serrated*. Flowers, a single involucre at the axil of one of a pair of leaves, seeds egg-shaped. Sandy shores. July-Sept.

2. *E. glyptosperma*, Engelm. RIDGE-SEEDED SPURGE. Smooth, prostrate, spreading, stems 2 to 15 in. long. Leaves oblong or narrow, broader at base, and generally very unequal there; blunt at each end, *borders with small serrations* toward the blunt apex. Involucres often clustered; seeds 4-angled. June-Oct.

3. *E. maculata*, L. (Fig. 3, pl. 88.) MILK PURSLANE. *Hairy*, both leaves and stem. Stems prostrate, much branched, 2 to 15 in. long. Leaves about $\frac{1}{2}$ in. long, reddish, usually blotched with a brown-red spot near center, oblique at base with small serrations toward the apex. Flowers in dense leafy axillary clusters. Seeds ovate with 4 sharp angles and 4 shallow grooves. Common, sandy places. June-Nov.

4. *E. humistrata*, Engelm. HAIRY SPREADING SPURGE. Resembles No. 3, but leaves are less hairy beneath and color of leaves and stems light green. Leaves about $\frac{1}{3}$ to $\frac{1}{2}$ in. long, oblong or oval. Involucres in lateral clusters, *split on one side*. Aug.-Oct.

5. *E. nutans*, Lag. (Fig. 8, pl. 88.) LARGE OR UPRIGHT SPOTTED SPURGE. Stems upright, simple or more generally branching above $\frac{1}{2}$ to 2 ft. high. Leaves opposite, irregularly and unsymmetrically oblong, slightly notched on the borders. Flowers white or red. Common in sandy soil. May-Oct.

6. *E. corollata*, L. (Fig. 7, pl. 88.) FLOWERING SPURGE. Erect, 1 to 3 ft. high, bright green, simple below, branched as an umbel above. Leaves forming the whorl subtending the umbel, narrow, 3 to 6, those of the stem narrow lance-shaped, alternate, those of the umbel also narrow

lance-shaped or linear. Rays of the umbel 3 or more. Flowers (involucres) terminal with white petal-like divisions. Sandy soil. April-Oct.

7. *E. Ipecacuanhae*, L. (Fig. 9, pl. 88.) WILD IPECAC. Spreading or erect, 4 to 10 in. high. Leaves opposite, varying from linear to orbicular, mostly oval. Involucre on a very long slender peduncle. Dry sandy soil, south and east part of our region. May-Oct.

8. *E. Lathyris*, L. (Fig. 6, pl. 88.) CAPER SPURGE. Erect, stout, 1 to 3 ft. high. Branched as an umbel above. Leaves of the whorl and stem narrow lance-shaped or linear, those of the stem scattered, those of the umbel broadly egg-shaped with sharp points. Introduced. May-Aug.

9. *E. Darlingtonii*, A. Gray. DARLINGTON'S SPURGE. Stem stout, erect, 1 to 5 ft. high, branching as an umbel at top. Rays of umbel 5 to 8. Leaves of whorl several, lance-shaped, those of stem also lance-shaped tapering at each end, those of umbel broad heart-shaped or kidney-shaped. (For the flower see Fig. 1, pl. 88.)

10. *E. helioscopia*, L. (Fig. 4, pl. 88.) SUN SPURGE. Stem about 1 ft. high, often branched at base. Stem leaves spatulate, those of the whorl inversely egg-shaped or nearly round as are those of the umbel. Rays of the umbel 3 to 5, flowers yellowish. Introduced. June-Sept.

11. *E. Esula*, L. (Fig. 10, pl. 88.) LEAFY SPURGE. Stems 1 to 2 ft. high, branched above. Rays of umbel 4 to 8. Leaves of stem and whorl linear, those of umbel broadly heart-shaped. Introduced. May-Oct.

12. *E. lucida*, Waldbl. and Kit. (Fig. 11, pl. 88.) NICAean SPURGE. (*E. nicaeensis*, All.). Stem 1 to 1½ ft. high. Rays of umbel 4 to 7. Stem leaves linear or oblong, those of the whorl and of the umbel broad heart-shaped or kidney-shaped. Flowers (involucres), yellowish. Introduced. July-Sept.

13. *E. Cyparissias*, L. (Fig. 12, pl. 88.) CYPRESS SPURGE. Stems mostly erect, about 1 ft. high. Plant bright green, the involucres of the umbel showing yellow. Grows in patches, escaped from gardens. Rays of the umbel numerous. Whorls of linear leaves; leaves of the stem thickly scattered, also linear; those of the umbel broadly egg-shaped. Along roadsides where, for the most part, it has been thrown from gardens. May-Sept.

14. *E. Peplus*, L. (Fig. 5, pl. 88.) PETTY SPURGE. Plant 4 to 12 in. high. Leaves of the stem pear-shaped, on leaf-stalks. Seeds with 2 grooves on the back and with several pits on the inner face. New Jersey, New York, and southward. June-Sept.

FAMILY VIII.—CALLITRICHACEAE. WATER STARWORT FAMILY

Small aquatic herbs, with opposite leaves which are simple, and with entire (not serrated or notched) borders. Flowers solitary in the axils of the leaves very minute, without corolla, but in some species, with two colored bracts. Stamens and pistils generally not in the same flowers, but on the same plant. Generally 1 stamen, exceptionally 2. Ovary of 4 cells. Styles 1. Stems very slender. Leaves spatula-formed or linear.

CALLITRICHE, L.

Characters, those of the family.

Without colored bracts.

Terrestrial, growing in mud *C. deflexa*
 Aquatic, submersed *C. autumnalis*

With colored bracts.

Aquatic, submersed or growing in mud.

Fruit oval *C. palustris*
 Fruit pear-shaped *C. heterophylla*

1. *C. deflexa*, A. Br. (Fig. 5, pl. 89.) TERRESTRIAL STARWORT. (*C. Austini*, Engelm.). Plant forming tufts on moist soil, stem $\frac{1}{2}$ to 2 in. high. Leaves very small (about $\frac{1}{10}$ in. long), spatula-formed, 3-nerved, tapering at base. Fruit notched at each end. In wet soil. Summer.

2. *C. palustris*, L. (Fig. 6, pl. 89.) VERNAL WATER STARWORT. Growing in mud or in the water. Stems 2 to 10 in. long, very slender. Leaves of two sorts, the floating pear-shaped or spatula-formed, about $\frac{1}{2}$ in. long, the submersed, linear of about the same length. Fruit borne in the axils of the higher leaves, enclosed in two small bracts. Common in stagnant waters. July-Sept.

3. *C. heterophylla*, Pursh. (Fig. 7, pl. 89.) LARGE WATER STARWORT. Resembles No. 2. In No. 2 the fruit is higher than broad, thickest at base, without a visible pedicel, its lobes keeled, or acutely angled. In this species the fruit is broader than high, its lobes obtusely angled. In quiet waters. July-Sept.

4. *C. autumnalis*, L. (Fig. 8, pl. 89.) NORTHERN WATER STARWORT. (*C. bifida*, (L.) Morong.) Stem entirely submersed; leaves all alike, linear or narrow lance-shaped, notched at the apex, somewhat clasping at the stem. In flowing waters. July-Sept.

Order VIII.—SAPINDALES. Order of the Sapindales or Soapberries

The plants of this order have the general characteristics of the last (Geranium Order), except that the ovules are in an opposite position, that is, with the ovules pendulous, but with the ridge connecting the two ends (the *raphe*) away from the axis of the ovary, or ascending from the base of the ovary and inverted. On this somewhat obscure and quite technical character the classification of this large group depends. The families of the order include herbs, woody heath-like plants (*empetraceae*), shrubs and trees.

Herbs.

Flowers regular or nearly so LIMNANTHACEAE

Flowers very irregular BALSAMINACEAE

Woody, heath-like, depressed plants EMPETRACEAE

Shrubs and trees.

Fruit of two long winged *samaras*; veins of the leaves radiate from the end of the leaf-stem . . . **ACERACEAE**

Fruit a much inflated, bladder-like capsule; veins of the leaves diverging from a mid-vein . . . **STAPHYLEACEAE**

Fruit a berry-like drupe; veins of leaves diverging from a mid-vein.

Flowers in terminal, generally dense clusters
 **ANACARDIACEAE**

Flowers in axillary, generally few-flowered clusters;
 leaves alternate **ILICACEAE**

Fruit in a 2- to 5-celled pod, leaves opposite **CELASTRACEAE**

Fruit a nut enclosed in a spiny bur-like capsule. Leaflets radiating from the leaf-stem . . . **HIPPOCASTANACEAE**

Fruit a 3-seeded berry, leaves pinnate . . . **SAPINDACEAE**

FAMILY I.—**EMPETRACEAE.** CROWBERRY FAMILY

Low spreading plants, with slender woody stems, which are freely branching and covered with small narrow leaves. Flowers inconspicuous, of two kinds, pistillate and staminate, both on the same plant or the two on separate plants. Berry black or red with several hard nutlets within.

1. **EMPETRUM, L.**

Our only species a branching and depressed woody plant with slender stems and thickly scattered, small, linear leaves. Flowers having both calyx and corolla or with calyx only; the pistils and stamens in different flowers on the same plant or on different plants. Calyx of 2 or 3, usually 3, sepals. Stamens of the staminate flowers 3. Flowers toward the summit of the slender stem in the axils of the leaves. Corolla present.

E. nigrum, L. (Fig. 9, pl. 89.) **BLACK CROWBERRY.** A small prostrate shrub growing on White Mountains and other elevated places and on northern part of our coast.

2. **COREMA, Don.**

Corolla absent, flowers in terminal clusters. Otherwise resembling *Empetrum*.

C. Conradii, Torr. (Fig. 10, pl. 89.) **CONRAD'S CROWBERRY.** Low bushy tufted shrub, 1 ft. high. In pine barrens.

FAMILY II.—**LIMNANTHACEAE.** FALSE MERMAID FAMILY

Herbs, with alternate compound leaves, without stipules. Stamens few (6 to 10), twice as many as the petals. Sepals and petals equal in number. Carpels equal in number to the stamens, uniting in a single style, which above, is cleft into as many stigmas as there are carpels.

FLOERKEA, Willd.

Small plant with compound feather-formed leaves (about 2 pairs of leaflets and an odd one), growing in marshes and on river and lake banks. Sepals usually 3, longer than the 3 oblong petals.

F. proserpinacoides, Willd. (Fig. 4, pl. 89.) FALSE MERMAID. A small slender plant growing in marshes and on river banks. Stems about 1 ft. long prostrate or partly submersed. Leaves of 5 leaflets, those submersed of three leaflets or divisions. Flowers, in the leaf axils, white. Fruit one or two globular carpels.

FAMILY III.—**ANACARDIACEAE.** SUMAC FAMILY

Trees or shrubs, with resinous milky acrid juice, with alternate compound leaves in our species; flowers which may be perfect, but which often contain either stamens only or pistils only. Calyx, and corolla usually each of 5 members. Stamens usually 10 or twice the number of the sepals, but by suppression the number may be reduced to 1. Ovary 1- to 4-celled, 1-seeded. Styles 1 to 3 but, when 1, divided into 3 stigmas at top. Fruit a pulpy berry-like drupe with hard seed-coats. Of the family we have but one genus.

RHUS, L. (**Toxicodendron**, Mill.)

Trees, shrubs and woody vines. Leaves mostly compound. Flowers usually small, in dense clusters. Fruit small with a central strong seed. Seed inverted on a stalk that rises from the base of the ovary.

Trees or shrubs.

Leaves of 3 leaflets *R. canadensis*

Leaves of 9 to 21 leaflets.

Leaf-stalk between the leaflets wing-margined *R. copallina*

Leaf-stalk between the leaflets not winged.

Leaves and new branches velvety *R. typhina*

Leaves and new branches not velvety.

Leaflets generally more than 13 *R. glabra*

Leaflets from 7 to 13 *R. Vernix*

Woody vine *R. toxicodendron*

1. **R. copallina**, L. (Fig. 1, pl. 90.) DWARF SUMAC. MOUNTAIN SUMAC. Small tree or shrub. Branches and leaf-stalks silky. Leaves of 4 to 10 pairs of leaflets with an odd one. The common leaf stalk broadens, between the leaflets, into a wing on each side which differentiates it from all the other species of *Rhus*. It is usually a low shrub or tree, but may rise to a height of 20 or even 30 ft. The cluster of flowers

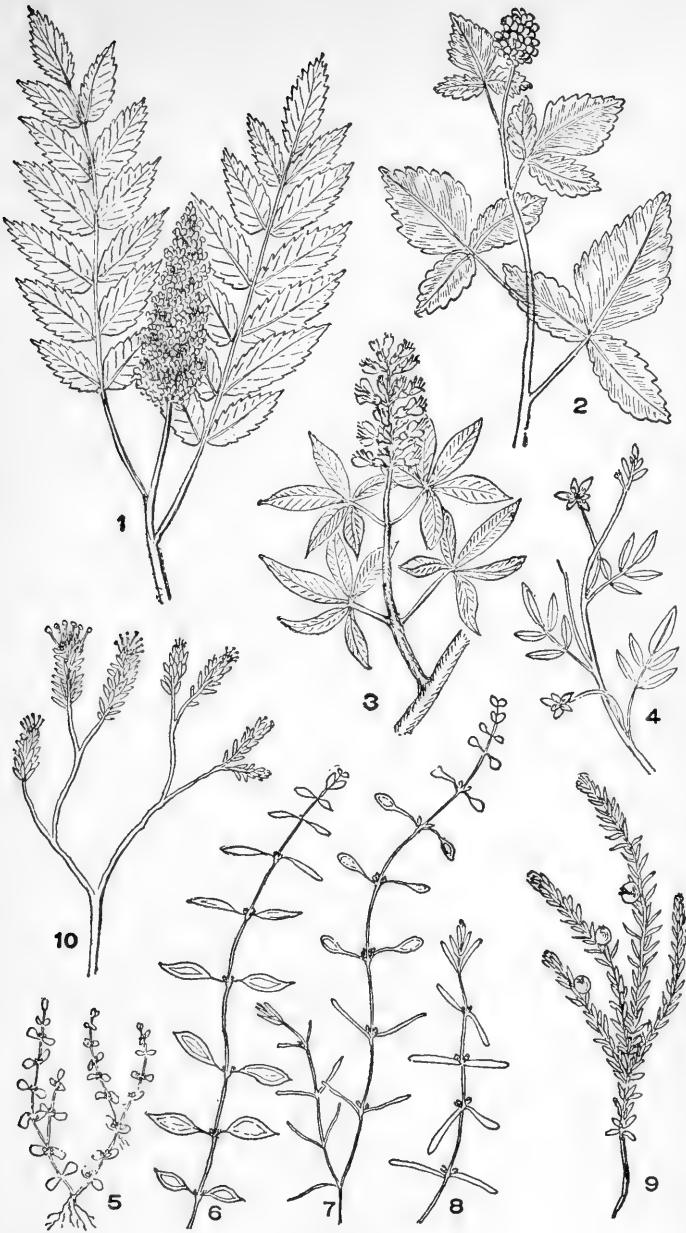


PLATE 89

1. *Rhus glabra*. 2. *R. canadensis*. 3. *Aesculus glabra*. 4. *Floerkea proserpinacoides*. 5. *Callitriche deflexa*. 6. *C. palustris*. 7. *C. heterophylla*. 8. *C. autumnalis*. 9. *Empetrum nigrum*. 10. *Corema Conradii*.

is dense and spindle-shaped of greenish flowers. Found throughout our region on hillsides and in pastures. June-Aug.

2. *R. typhina*, L. (Fig. 2, pl. 90.) STAGHORN SUMAC. (*R. hirta*, (L.) Sudw.). Branches and common leaf-stalks *densely silky or velvety*. Leaves of 11 to 31 leaflets, the compound leaf being from 7 to 30 in. long. Leaf-stalks not winged. A small tree generally 15 to 20 ft. high, but often reaching a height of more than 30 ft. Common. June-Aug.

3. *R. glabra*, L. (Fig. 1, pl. 89.) SMOOTH UPLAND SUMAC. Shrub or tree, 10 to 30 ft. high, with long compound leaves, leaflets from about 11 to about 31. *Leaflets and leaf-stems smooth*, lance-shaped, with serrated edges, very acute at outer extremity, pale beneath. No wings on the main leaf stem. Hillsides. June-August.

4. *R. canadensis*, Marsh. (Fig. 2, pl. 89.) (*R. aromatica*, Ait.). Shrub, 3 to 8 ft. high. Leaves trifoliate. Leaflets egg-shaped or rhombic, aromatic, with coarse teeth at edges. Flowers yellowish-green in dense rounded or oblong masses. Flowers appearing before the leaves. Woods, not common. March-April.

5. *R. Vernix*, L. (Fig. 3, pl. 90.) POISON SUMAC. A shrub or small graceful tree, very poisonous. Height from 6 to 25 ft. Leaflets 7 to 13, smooth or when young somewhat downy, oval and without teeth. Flowers green, in clusters much less dense than those of the preceding species. Found in swamps. Is more poisonous than the following species.

6. *R. toxicodendron*, L. (Fig. 4, pl. 90.) POISON IVY. (*R. radicans*, L.). Climbing vine, adhering to rocks or trees by rootlets which shoot from the stem. Often erect as a low bushy shrub. Leaves of 3 egg-shaped leaflets which have smooth edges. Flowers greenish. Along fences and thickets or climbing trees.

A pernicious species which is too often permitted to grow to the detriment of the health of many people, even when not poisoned by contact. Many persons living in neighborhoods where this vine is tolerated become ill from obscure nervous troubles, which are often considered as malarial and the value of property is in such places reduced since the localities acquire the reputation of being "malarial." This is especially the case with many interesting localities along the Hudson River.

FAMILY IV.—ILICACEAE. HOLLY FAMILY

Trees or shrubs, with small white flowers in the leaf axils, generally of 4 or 6 petals, 3 to 6 sepals and 4 to 6 stamens. Fruit a berry-like drupe. Leaves alternate and simple.

Petals oval or oblong *Ilex*
 Petals linear *Ilicioides*

1. ILEX, L.

Shrubs or small trees, with alternate leaves and with flowers, several or solitary, appearing at the leaf-axils. Petals, in our species, 4 to 6; stamens as many as the petals (No. 5 has from 4 to 8 petals). Calyx minute of 4 or 6 divisions. Fruit a round berry inclosing 4 or 6 small nutlets. The flowers may enclose both stamens and pistils or stamens may be found in one flower and pistils in another.



PLATE 90

1. *Rhus copallina*. 2. *R. typhina*. 3. *R. Vernix*. 4. *R. toxicodendron*.

Leaves evergreen.

With spiny tips at borders *I. opaca*

Without spiny tips *I. glabra*

Leaves falling in autumn.

Flowers on short flower stalks.

Nutlets ribbed *I. monticola*

Nutlets not ribbed.

Twigs not gray *I. verticillata*

Twigs gray *I. bronxensis*

Flowers on long flower stalks *I. laevigata*

1. *I. opaca*, Ait. (Fig. 2, pl. 91.) AMERICAN HOLLY. A tree, 20 to 40 ft. high, with evergreen glossy foliage, the leaves having wavy margins with spiny tips. Flowers in axillary clusters of from 3 to 10, white, of 4 petals and 4 stamens. Fruit a round berry turning red when mature. Moist woods, near the seacoast. April-June.

2. *I. glabra*, (L.) A. Gray. (Fig. 6, pl. 91.) INKBERRY. Shrub, 2 to 3 ft. high, with evergreen spineless leaves which are inversely lance-shaped or elliptic. Flowers, the pistillate generally single on rather long peduncles, the staminate in groups of 3 to 6. Sandy ground, near the coast. June.

3. *I. monticola*, A. Gray. (Fig. 3, pl. 91.) LARGE-LEAVED HOLLY. Usually a shrub, but less commonly a tree with falling leaves, which are thin, lance-shaped or oval lance-shaped, from 2 to 6 in. long, with serrated borders and with leaf-stems $\frac{1}{4}$ to $\frac{1}{3}$ the length of the leaves. Flower pedicels very short and bear a single flower, but the staminate flowers may grow in clusters while the pistillate are solitary. *The nutlets within the berry are ribbed.* Woods. May.

4. *I. verticillata*, (L.) A. Gray. (Fig. 5, pl. 91.) BLACK ALDER. Shrub, resembling the last. Leaves usually broader, thicker, more shining and of dark green color. Petals and stamens usually 6. Veins on lower side of leaves downy. Flowers on very short pedicels. Nutlets within the berry *are not ribbed.* In wet grounds. June-July.

5. *I. bronxensis*, Britton. BRONX WINTER-BERRY. Similar to No. 4, but with light gray twigs, pear-shaped leaves and with larger orange-red fruit. Swamps, Maine to New Jersey, and west.

6. *I. laevigata*, (Pursh.) A. Gray. (Fig. 4, pl. 91.) SMOOTH WINTER-BERRY. A shrub, usually rather smaller than the last, with similar leaves. Petals and stamens 4 to 8 each. Flowers on long pedicels, usually solitary, but the staminate growing 2 or more together in some cases. Swamps. May-June.

2. ILICIOIDES, Dumont. (Nemopanthes, Raf.)

A smooth shrub with falling leaves, which are without serrations at the borders and which have flowers bearing stamens, others bearing pistils and yet others bearing both sets of organs. Petals 4 or 5 *linear*. Berries on long stalks deeply grooved.

I. mucronata, (L.) Britton. MOUNTAIN HOLLY. A branching shrub with gray bark resembling *Ilex*. Found in damp woods. May.

FAMILY V.—CELASTRACEAE. STAFF TREE FAMILY

Shrubs or trees. Our species all shrubs, some of which are climbing. Leaves simple and ours, except *Celastrus*, opposite.



PLATE 91

1. *Celastrus scandens*. 2. *Ilex opaca*. 3. *I. monticola*. 4. *I. laevigata*. 5. *I. verticillata*. 6. *I. glabra*. 7. *Euonymus americanus*. 8. *E. obovatus*. 9. *Staphylea trifolia*.

Petals 4 or 5, stamens as many and alternate with the petals. Flowers usually with petals, sepals, stamens and pistils. Fruit a rounded or more or less angular pod which splits at maturity. The dominant characters are the regularity of the flowers and the equality in numbers of petals and stamens.

1. EUONYMUS, L.

Erect shrubs, with opposite leaves and small axillary purple or greenish flowers on rather long pedicels, which spring at the leaf-axils. Calyx of 4 or 5 divisions, flat and spreading. The disc on which the 5 stamens are inserted is above the 4 or 5 (5 in our 2 species), petals which are rounded and spreading into a flat greenish or purple corolla. The pistil is short as are the stamens. The capsule or pod is more or less lobed or angular and splits from below upward showing the seeds.

1. *E. americanus*, L. (Fig. 7, pl. 91.) STRAWBERRY BUSH. Shrub, 2 to 5 ft. high, somewhat simple or branching. Leaves, almost without leaf-stalks, lance-egg-shaped with finely toothed edges, the veins nearly opposite and symmetrical, outer extremity acutely pointed. Flowers 1 or more on a single rather long pedicel, which is solitary in the leaf axil. Petals greenish, generally 5; stamens of the same number alternate with petals. Pod or berry rough, warty, bright red when ripe. When the pod splits the seeds are seen adherent to the central column or *aril*, which is bright scarlet.

2. *E. obovatus*, Nutt. (Fig. 8, pl. 91.) RUNNING STRAWBERRY BUSH. A low trailing bush, rising about a foot from the ground. *Leaves pear-shaped*. Flowers similar to the last, but smaller, 3 or 4 on the single long pedicel. Low wet places. April-May.

3. *E. atropurpureus*, Jacq. BURNING BUSH. Shrub, 6 to 14 ft. high, with elliptic or long oval leaves the borders of which are finely serrated, outer extremity sharp pointed. Length of leaf about 2 to 5 in. Twigs 4-angled. Flowers purple, several on the single long pedicel arising at the leaf axil. Pods *smooth*, deeply lobed, crimson, very showy. In copses and borders of woods. June.

2. CELASTRUS, L.

Our species a climbing woody vine, bearing an abundance of clusters of orange capsules which remain during the winter and are very ornamental. Leaves alternate with small stipules which fall early. Petals and stamens, each 5, which are inserted at the margin of a flattened disk below which the petals are inserted. Flowers in elongated clusters at the ends of the branches. Pod globose, orange-colored when ripe and splitting into 3 valves which expose the scarlet seeds.

C. scandens, L. (Fig. 1, pl. 91.) BITTERSWEET. The twining vine which in the autumn adorns many of our tall trees with its clusters of bright berries.

FAMILY VI.—STAPHYLEACEAE. BLADDER-NUT FAMILY

In our region only one representative, which is a shrub with

opposite, 3-foliate leaves supplied with small stipules and drooping clusters of whitish flowers from the leaf-axils. Stamens 5; petals 5, alternate with the petals. Ovary of 2 or 3 parts, numerous ovules. Pod a large membranous inflated capsule of 3 cells, each containing 1 to 4 hard seeds.

STAPHYLEA, L.

Characters as above.

S. trifolia, L. (Fig. 9, pl. 91.) **AMERICAN BLADDER NUT.** A shrub, 6 to 12 ft. high, with smooth striped bark. Found in thickets. April-May.

FAMILY VII.—ACERACEAE. MAPLE FAMILY

Trees or shrubs, with opposite leaves. Flowers which are generally small in pendulous or spicate clusters may be perfect, having both stamens and pistils or these organs may find their homes in separate flowers, on the same plant or perfect and imperfect flowers may be found on the same tree. There is usually a calyx and a corolla, each of 5 divisions. Stamens 3 to 10. There are 2 carpels or dry seed capsules which are joined together and to each of which is attached a winged appendage, a *samara* (see Fig. 51, p. 39), the "Maple Key."

ACER, L.

Characteristics of the family.

Leaves simple and generally deeply lobed.

Flowers in lateral pendulous fan-shaped clusters, appearing before the leaves.

Leaves silvery white beneath *A. saccharinum*

Leaves dull white beneath *A. rubrum*

Leaves pale green beneath *A. saccharum*

Leaves full green both sides *A. nigrum*

Flowers in elongated, more or less spicate clusters.

Clusters drooping *A. pennsylvanicum*

Clusters erect *A. spicatum*

Leaves compound, of 3 to 5 leaflets on a leaf-stem (pinnate) *A. Negundo*

1. **A. saccharinum, L.** (Fig. 4, pl. 92.) **SILVER MAPLE. WHITE MAPLE.** Tree, 50 to 100 ft. high. Leaves deeply 5-lobed, the sinuses acute and the lobes narrow with irregular teeth; at base the leaf is cut almost squarely off or is slightly heart-shaped. Flowers appear before the leaves, corolla absent. The *samaras* diverge and become nearly or quite 2 in. long each, or often are unequally developed. Found in woods. Flowers open February to April.

2. **A. rubrum, L.** (Fig. 1, pl. 92.) **RED MAPLE. SWAMP MAPLE.** Tree, generally of less height than No. 1. Twigs red or reddish. Leaves 2 to 6 in. long, 3- to 5-lobed, length exceeding width; the middle lobe generally longer than the others. The sinuses are acute and the lobes are irregularly and coarsely toothed. Flowers with both calyx and corolla, the latter of 4 or 5 red petals. Stamens scarlet, 5 or 6 in number. The *key* is scarlet borne on drooping stem 4 or 5 in. long. The wings

at first incurved but later diverging, forming a key from an inch to 2 inches across. Leaves turn brilliant crimson in early autumn. Found along river banks and in swamps but often grows in dry places. Flowers, March-April.

3. *A. saccharum*, Marsh. (Fig. 2, pl. 92.) SUGAR MAPLE. Tree, similar to No. 1. Leaves 3 to 6 in. long, width greater than length, the 5 lobes separated by rounded sinuses. Base of leaf heart-shaped, margin with few or no teeth except the extremities of the secondary lobes. Color dark green above, light green beneath. Flowers appearing with the leaves, greenish-yellow. Perfect or imperfect flowers in separate clusters; corolla wanting. Stamens 7 or 8. Wings of the "key" diverging, each from $\frac{1}{2}$ to 1 in. long. The key hangs pendulous from a long and slender footstalk. Flowers appear in May. Tree found in woody uplands. From it is produced most of the maple sugar of the market. April-May.

4. *A. nigrum*, Michx. BLACK SUGAR MAPLE. Tree similar to the last. Leaves dark green both sides. Found in similar situations. Flowers appear in May.

5. *A. pennsylvanicum*, L. (Fig. 3, pl. 92.) STRIPED MAPLE. WHISTLE WOOD. MOOSE WOOD. A small tree, mostly in damp and shady woods. Height generally less than 30 ft. Leaves 5 to 8 in. long, rounded or heart-shaped at base, free end of 3 sharp lobes; border sharply toothed. Flowers yellow in long, narrow, drooping clusters, those bearing stamens usually in different clusters from those bearing pistils. Calyx and corolla present. The bark of this beautiful tree is of a dark green marked with streaks of reddish-brown. When young striped with lighter lines. In woods, most of our area.

6. *A. spicatum*, Lam. (Fig. 5, pl. 92.) MOUNTAIN MAPLE. A small bushy tree, or more frequently a shrub. Leaves 3 to 5 in. long, rounded or heart-shaped at base, terminated by 3 lobes, the larger of which are often slightly divided into two. Flowers greenish-yellow in slender, erect clusters 5 to 7 in. long. The keys are from $1\frac{1}{2}$ to 2 in. across. Rocky woods, our area. Flowers in May.

7. *A. Negundo*, L. (Fig. 6, pl. 92.) BOX ELDER. Small tree, with compound leaves of from 3 to 5 leaflets. These latter are from 2 to 4 in. long, oval or egg-shaped, sharply pointed at apex and generally rounded at base. They are irregularly and coarsely toothed, the terminal one often 3-lobed. The "keys" are similar to those of other maples, but the wings are less diverging. Occasional in most of our area.

The NORWAY MAPLE, *Acer platanoides*, with leaves more rounded than the native sugar maples and with sinuses more shallow and color of darker green, is common as a planted tree in parks and along streets of cities and villages; and the SYCAMORE MAPLE, *A. pseudo-platanus*, with smaller leaves, with more rounded lobes is also extensively planted as an ornamental tree. Neither are native species.

FAMILY VIII.—HIPPOCASTANACEAE. BUCKEYE FAMILY

Trees and shrubs, with opposite compound leaves and conspicuous flowers in large clusters. Flowers irregular. Stamens 5 to 8.



PLATE 92

1. *Acer rubrum*. 2. *A. saccharum*. 3. *A. pennsylvanicum*. 4. *A. saccharinum*. 5. *A. spicatum*. 6. *A. Negundo*.

Ovary 3-celled. Fruit a leathery capsule studded with spines enclosing 1 to 3 smooth roundish seeds.

AESCULUS, L.

Characters as above.

1. **A. Hippocastanum**, L. HORSE CHESTNUT. A large tree, extensively planted as an ornamental tree. Leaves opposite, compound, of 7 leaflets all springing from a common center. Each leaflet wedge-shaped and notched along the borders. The two outer leaflets smaller than the others. The showy, erect clusters of white (sometimes purple) flowers are conspicuous in parks and along roadsides in May and June.

2. **A. glabra**, Willd. (Fig. 3, pl. 89.) OHIO BUCKEYE. Leaflets 5. Otherwise much resembling No. 1, but with yellow flowers. Found in southern Pennsylvania of our region.

FAMILY IX.—SAPINDACEAE. SOAPBERRY FAMILY

Trees, shrubs or herbaceous vines, with alternate leaves, which are usually compound. Flowers regular or slightly irregular. Calyx division 4 or 5; petals 3 to 5. Stamens 5 to 10. A single species in our region.

CARDIOSPERMUM, L.

Description included with the only species in our area.

C. Halicacabum, L. (Fig. 8, pl. 93.) BALLOON VINE. HEART SEED. A slender vine, climbing on shrubs and trees, 2 to 6 ft. long. Leaves alternate and doubly compound, *i. e.*, of 3 divisions, each of 3 wedge-shaped or oval leaflets, these coarsely toothed. Flowers in small clusters, the two lower footstalks of each cluster changed to tendrils. Divisions of calyx 4, of which two are larger than the other two; petals also 4, with similar disproportion between two pairs, white. Stamens 8, unequal. Fruit a much inflated bladder-like capsule 1 in. long, containing black globose seeds. Escaped from cultivation, occasional only.

FAMILY X.—BALSAMINACEAE. JEWEL WEED FAMILY

Annual herbs, with succulent stems, with simple alternate leaves and very unsymmetrical flowers. Calyx of 3 sepals, unequal and unlike; stamens 5; petals 5 or 3, two of them divided into unequal and dissimilar lobes. Ovary compound, of 5 cells; pistil very short. Fruit in our genus a cylindric capsule which bursts elastically on pressure.

IMPATIENS, L.

Divisions of calyx colored like the corolla. Petals apparently 2, the lower being united with the two lateral. Joints of stem swollen.

1. **I. biflora**, Walt. (Fig. 1, pl. 93.) SPOTTED TOUCH-ME-NOT. JEWEL WEED. Succulent herb, 2 to 5 ft. high, with ovate or elliptic leaves, the



PLATE 93

1. *Impatiens biflora*. 2. *I. pallida*. 3. *Rhamnus cathartica*. 4. *R. alnifolia*. 5. *R. Frangula*. 6. *Ceanothus americanus*. 7. *C. ovatus*. 8. *Cardiospermum Halicacabum*. 9. *Tilia americana*.

edges of which are coarsely toothed. They are thin, pale and smooth. Flowers orange-yellow mottled with brown, in pairs at extremities of branches. The lower sepal forms a conical spur which is elongated and curved. *Sac broader than long*. In moist places, borders of streams mostly. July-Oct.

2. *I. pallida*, Nutt. (Fig. 2, pl. 93.) PALE JEWEL WEED. TOUCH-ME-NOT. (*I. aurea*, Muhl.). Plant similar to preceding species, but leaves larger and longer. Flowers pale yellow, with a few brown dots. Spur short. *Sac longer than broad*. In situations similar to last.

Order IX.—RHAMNALES. Order of the Buckthorns

Shrubs, small trees or climbing vines, with or without thorns. Leaves always simple, not lobed. *Stamens as many as the divisions of the calyx and alternate with them*. When petals are present the stamens are opposite them.

FAMILY I.—RHAMNACEAE. BUCKTHORNS

Leaves opposite or alternate, not lobed or compound. Stipules present but small and falling early. Flowers in clusters either terminal or from the axils, always small, regular of 4 or 5 sepals and when petals are present they are of the same number and inserted on the calyx. Stamens of same number as sepals and alternate with them. Fruit a dry berry-like drupe or a capsule. Seeds solitary in the cells of the drupe or capsule.

Shrubs with axillary clusters of flowers . . . **Rhamnus**

Shrubs of herbaceous appearance with terminal umbels
of flowers **Ceanothus**

I. RHAMNUS, L.

Small shrubs with alternate leaves and clusters of small flowers in the axils. Calyx of 4 or 5 divisions, petals inconspicuous or absent. Fruit a berry-like drupe with from 2 to 4 hard seeds.

Leaves toothed at borders,

Long and narrow *R. lanceolata*

Egg-shaped.

Branches thorny *R. cathartica*

Branches without thorns *R. alnifolia*

Leaves without teeth at borders *R. Frangula*

Leaves with remote teeth *R. caroliniana*

1. *R. cathartica*, L. (Fig. 3, pl. 93.) BUCKTHORN. Shrub with thorny branches, cultivated for hedges. Leaves egg-shaped or broadly elliptic. Flowers small, greenish, a few clustered in the axils. Calyx divisions 4. Stamens of like number. Berries round, black. Escaped from cultivation. May-June.

2. *R. lanceolata*, Pursh. LANCE-LEAVED BUCKTHORN. Tall erect

shrub. Leaves 1 to $3\frac{1}{2}$ in. long, about $\frac{1}{4}$ as wide, very finely toothed. Flowers in the leaf-axils, a few in a cluster, greenish, mostly staminate and pistillate on different plants. Moist soil. Penna., and westward. May.

3. *R. alnifolia*, L'Her. (Fig. 4, pl. 93.) DWARF ALDER. ALDER-LEAVED BUCKTHORN. A low shrub, growing in clumps in swamps or wet grounds, height 2 or 3 ft. Leaves oval or rounded at the base, 2 to 4 in. long with fine serrations at borders. Flowers small, yellow, at leaf axils. Fruit black.

4. *R. Frangula*, L. (Fig. 5, pl. 93.) ALDER BUCKTHORN. Shrub resembling the last, but with larger leaves, which are not serrated at borders. Flowers at the axils borne on foot-stalks $\frac{1}{2}$ in. long. Found in bogs, Long Island and other points in southern part of our area. May-June.

5. *R. caroliniana*, Walt. CAROLINA BUCKTHORN. Tall shrub or small tree, thornless. Leaves elliptic or oblong, 2 to 6 in. long. Flowers at the leaf-axils on foot-stalks, all with stamens and pistils. Wet grounds, New Jersey, and southward.

2. CEANOTHUS, L.

Low shrubby plants resembling herbs. Leaves alternate; flowers in terminal, nearly umbellate, clusters. Calyx of 5 lobes. Corolla of 5 small hooded petals, white or yellowish-white. Fruit dry, 3-lobed.

1. *C. americanus*, L. (Fig. 6, pl. 93.) NEW JERSEY TEA. RED ROOT. Stems 1 to 3 ft. high, slender, branching at top. Leaves oval with 3 prominent ribs running longitudinally. *More or less covered with soft hairs*, especially above. Flowers in dense umbel-like clusters at summit of naked flower branches. Dry woods. May-July.

2. *C. ovatus*, Desf. (Fig. 7, pl. 93.) SMALLER RED ROOT. Similar to No. 1, but leaves smaller, less pointed at apex and less rounded at base and *without hairs* or nearly so. Occasional, not common in our area. May-July.

FAMILY II.—VITACEAE. GRAPE FAMILY

Vines climbing by tendrils. Rarely shrubs, but never in our area. Leaves simple, alternate, broad, with the principal veins starting from a common center at the extremity of the foot-stalk or of 5 leaflets starting from a common center. Flowers small, greenish, in elongated, conical clusters. Stamens 4 or 5, opposite the petals. Stamens and pistils not always in the same flower and sometimes not on the same plant. Fruit a grape berry.

Leaves simple	Vitis
Leaves compound, of several leaflets	Cissus

1. VITIS, L.

Characters as above.

Leaves decidedly downy beneath.

Generally 3-lobed with shallow sinuses *V. labrusca*Generally 5-lobed with deep sinuses *V. aestivalis*

Leaves not downy.

Not lobed or only slightly lobed *V. cordifolia*3-lobed toward apex *V. vulpina*3- to 5-lobed, lobes extending back *V. bicolor*

1. *V. labrusca*, L. (Fig. 2, pl. 94.) FOX GRAPE. NORTHERN PLUM GRAPE. Leaves broad, generally 3-lobed at the apex and rounded or heart-shaped at base. Decidedly downy beneath. Berries large, few, brownish-purple. In thickets. This is the original of several varieties of cultivated grapes: Concord, Isabella, Catawba, etc.

2. *V. aestivalis*, L. (Fig. 1, pl. 94.) SMALL GRAPE. SUMMER GRAPE. Leaves of about 5 lobes with deep sinuses; downy beneath. Berries small, deep blue. Clusters wanting opposite each third leaf. Thickets and shady banks.

3. *V. bicolor*, Le Conte. (Fig. 4, pl. 94.) WINTER GRAPE. Similar to No. 2, but leaves not downy or with few hairs. Fruit dark blue, ripening after the frosts. New Hampshire, and southward.

4. *V. vulpina*, L. (Fig. 3, pl. 94.) SWEET-SCENTED GRAPE. Leaves smaller than either of the preceding species, heart-shaped at base, slightly 3-lobed at summit. Berries bluish-black, rather sweet. In situations similar to those of other species.

5. *V. cordifolia*, Michx. (Fig. 5, pl. 94.) FROST GRAPE. Leaves cordate, not lobed or only slightly so. Smooth and shining on both sides. Berries black, ripening after frosts. In thickets and along streams.

2. CISSUS, L.

Climbing vines, the tendrils being, in our species, terminated by expanding tips which adhere to supporting surfaces. Flowers much like those of *Vitis* but in more expanding clusters.

C. *Ampelopsis*, Pers. (Fig. 6, pl. 94.) VIRGINIA CREEPER. (*Parthenocissus quinquefolia*, Planch. *Ampelopsis quinquefolia*, Michx.). A slender woody vine climbing upon trees. Leaves of 5 diverging leaflets. Common in woods and thickets.

Order X.—MALVALES. Order of the Mallows

Leaves net veined, petals distinct, carpels united into a compound ovary. Ovaries free from the calyx and above it. Stamens numerous. Sepals, in bud, meeting at the edges, not overlapping. Ovule bearing surface forming a central column within the capsule.

Trees TILIACEAE

Herbs MALVACEAE



PLATE 94

1. *Vitis aestivalis*. 2. *V. labrusca*. 3. *V. vulpina*. 4. *V. bicolor*. 5. *V. cordifolia*. 6. *Cissus Ampelopsis*.

FAMILY I.—**TILIACEAE.** LINDEN FAMILY

Trees, shrubs or herbs. In our area trees only. Leaves alternate (rarely opposite) not compound. Stipules present but small and falling early. Divisions of calyx generally 5, falling; petals of the same number when present. Stamens numerous in several united sets. Fruit a dry rounded berry or nutlet containing 1 or more seeds.

TILIA, L.

Trees, with simple heart-shaped leaves, one side of which develops larger than the other. Flowers yellowish, in clusters, the foot-stalks of these clusters subtended by a broad bract to which the foot-stalk is also to some extent attached.

1. **T. americana, L.** (Fig. 9, pl. 93.) **BASSWOOD. AMERICAN LINDEN.** A large tree with comparatively smooth bark. Leaves heart-shaped, one side larger than the other, *smooth on both sides* or with hairs along the under side of the nerves only. This is our common Basswood growing in woods and fields throughout our area. Blooms May and June.

2. **T. pubescens, Ait.** **SOUTHERN BASSWOOD.** Leaves rather smaller than No. 1, and *decidedly downy* or densely woolly beneath. In southern part of our area.

3. **T. heterophylla, Vent.** **WHITE BASSWOOD.** Leaves larger than either of the above. White downy beneath. In New York, southern Pennsylvania and south from there.

4. **T. europaea, L.** **EUROPEAN LINDEN.** Has smaller and more regular leaves. Our native species have scales at the base of the petals. This has none. Planted extensively as an ornamental tree.

5. **T. Michauxii, Nutt.** **MICHAUX'S LINDEN.** Resembles *T. heterophylla*, but while in this the floral bract is recurrent along the flowering stem to its base or nearly so, in *T. Michauxii* it extends within $\frac{1}{2}$ in. of the end of the stem. Penna., and westward.

FAMILY II.—**MALVACEAE.** MALLOW FAMILY

Herbs, in our area, elsewhere herbs and trees, with alternate leaves with small falling stipules. Flowers regular, with both stamens and pistils. Stamens numerous, forming a single set in union which forms a column around the pistil. Ovary often lobed, several seeded.

Columns of stamens bearing anthers only at top

Involucre of 6 to 9 bractlets **Althaea**

Involucre of 3 distinct bracts.

Summit of pistil (stigma) linear **Malva**

Bracts of involucre absent. Summit of pistil a flattened cap.

Carpels, each one seeded **Sida**

Carpels, each 3 to 9 seeded **Abutilon**

Bracts of involucre incised, each forming 3 teeth **Kosteletzkya**

Columns of stamens bearing anthers along much of their lengths

Bracts of involucre numerous **Hibiscus**

1. ALTHAEA, L.

Below calyx an involucre of 6 to 9 bracts which unite at base. Styles numerous, the stamens forming a column about them. Petals 5; calyx of 5 sepals. Divisions of the ovary several, 1-seeded each.

A. officinalis, L. (Fig. 2, pl. 95.) MARSH MALLOW. Leaves large, somewhat 3-lobed, serrated at borders; downy on both sides. Flowers large and showy, in axils of leaves. Pink. Abundant in salt marshes.

2. MALVA, L.

Herbs, leaves often deeply divided. Flowers generally conspicuous, petals 5, calyx of 5 sepals with a 3-leaved involucre at the base. Pistils numerous, the *stigma* running down the inner side. Fruit a depressed disk-like body ("a cheese"), which, at maturity separates into many 1-seeded divisions.

1. **M. sylvestris**, L. (Fig. 3, pl. 95.) HIGH MALLOW. Stem erect, 2 to 3 ft. high; leaves rounded but somewhat divided into 7 lobes more or less angular, hairy. Flowers reddish-purple crowded toward the summit of the stem. Frequent along way-sides, blooming through the summer. Sometimes called "pink cheeses."

2. **M. rotundifolia**, L. (Fig. 5, pl. 95.) DWARF OR COMMON MALLOW. CHEESES. Stems spreading upon the ground, 4 to 10 in. long; leaves heart-shaped at base, on very long foot-stalks. Flowers pale blue, or whitish, at the leaf axils. Fruit a flattened, disk-like collection of carpels. Common about cultivated grounds, door yards and way-sides.

3. **M. verticillata**, L. WHORLED MALLOW. Flowers clustered in the axils appearing to surround the stem. Rare except as an escape from gardens.

4. **M. moschata**, L. (Fig. 4, pl. 95.) MUSK MALLOW. Stem 1 to 2 ft. high. Leaves 5-parted, the divisions again once or twice parted into linear segments. Basal leaves round. Flowers 1 to 2 in. broad, rose-pink, at the summit of the stem.

3. SIDA, L.

Herbs, with alternate leaves. Bracts at the base of the calyx wanting, sepals and petals, each 5. Stigma (summit of pistil) a small head.

S. spinosa, L. (Fig. 8, pl. 95.) PRICKLY SIDA. A weed 10 to 20 in. high. Leaves egg-shaped to oblong, serrate, downy, on leaf-stalks $\frac{1}{2}$ as long as the leaves. Flowers at the axils of the leaves, yellow, small. Waste places. Summer.

4. **ABUTILON**, Gaertn.

Our only species an herb with broad heart-shaped leaves. Flowers at the axils; the carpels each 2- to 9-seeded. Calyx with no bracts at base. In general appearance like *Sida*.

A. Theophrasti, Medic. (Fig. 6, pl. 95.) **VELVET LEAF. INDIAN MALLOW.** (*A. Abutilon*, (L.) Rusby.) Plant 2 to 6 ft. high, whole plant downy. Leaves rounded, heart-shaped, acute at apex, 4 to 12 in. wide, on long leaf-stalks. Flowers yellow, $\frac{1}{2}$ to 1 in. broad. Fruit about an in. in diameter. In wet places. Aug.-Oct.

5. **KOSTELETZKYA**, Presl.

Our species an herb, downy, with angular leaves. At base of calyx some small bracts, incised, forming linear segments. Stamens, all united about the pistils which are 5 in number, and have capped summits.

K. virginica, (L.) A. Gray. (Fig. 7, pl. 95.) **VIRGINIA KOSTELETZKYA.** Plant 2 to 4 ft. high. Leaves 2 to 5 in. long, generally less than $\frac{1}{2}$ as wide. Point of leaves long and narrow, base rounded; at $\frac{1}{3}$ distance from base to apex is a rather pronounced angle at each side. Flowers pink, $1\frac{1}{2}$ to $2\frac{1}{2}$ in. broad. Southern New York and southwards. In brackish marshes. August.

6. **HIBISCUS**, L.

Shrubs or herbs. In tropical regions sometimes trees. Leaves simple. Flowers large and showy. The column of stamens which surrounds the pistils bears anthers throughout much of its length. Calyx of 5 sepals subtended by a fringe of linear bracts. Fruit a 5-celled pod with several or many seeds in each cell.

1. **H. Moscheutos**, L. (Fig. 1, pl. 95.) **SWAMP ROSE MALLOW.** Leaves 3 to 7 in. long, egg-shaped or lance-shaped, rounded or heart-shaped at base, slender tapered at apex, downy white beneath, smooth, green above. The lower leaves often 3-lobed. Flowers 4 to 7 in. broad, pink or white. Pod smooth. Salt marshes on the eastern coast. Aug.-Sept.

2. **H. oculiroseus**, Britton. **CRIMSON-EYE ROSE MALLOW.** Corolla white with a dark crimson center. Growing with *H. Moscheutos* and blooming at the same time.

3. **H. Trionum**, L. **FLOWER-OF-AN-HOUR.** Plant, low, branching, rather hairy, annual. Leaves much incised, the middle one of the 3 main divisions much the longest. Flowers pale yellow with a purple center, the edges of the petals also tinged with purple. Flowers open only a few hours. Pods much inflated, 5-winged. Waste places. Introduced. Aug.-Sept.

Order XI.—PARIETALES. Order of the Violets

Generally herbs, rarely shrubs and still more rarely trees. Leaves opposite, alternate or from the root. Flowers with stamens and pistils, the former numerous or few. Petals 3 to 5, distinct. *Sepals or divisions of calyx overlap each other* or are longitudinally rolled.



PLATE 95

1. *Hibiscus Moscheutos*. 2. *Althaea officinalis*. 3. *Malva sylvestris*. 4. *M. moschata*. 5. *M. rotundifolia*. 6. *Abutilon Theophrasti*. 7. *Kosteletzkya virginica*. 8. *Sida spinosa*.

The ovules are generally attached, not to a central column as in the preceding order, but to the sides of the capsule, or rarely to a central axis.

Herbs or shrubs with opposite leaves.

Plants from a few to many in. high, without stipules

. **HYPERICACEAE**

Minute marsh plants with stipules . . **ELATINACEAE**

Herbs (not climbing) with alternate leaves or leaves from the root.

Flowers regular **CISTACEAE**

Flowers irregular **VIOLACEAE**

Climbing woody vines **PASSIFLORACEAE**

FAMILY I.—**HYPERICACEAE**. ST. JOHN'S-WORT FAMILY

Herbs or shrubs, with opposite leaves, which are neither lobed nor serrated at borders and with no stipules. Flowers regular, ours all yellow. Stamens generally numerous, commonly collected in 3 or more clusters or bundles. Petals in bud mostly rolled longitudinally. Pod 1-celled.

Divisions of calyx 4, in 2 unequal pairs **Ascyrum**

Divisions of calyx 5, all alike.

Stamens numerous **Hypericum**

Stamens 10 or less, leaves scaly **Sarothra**

Stamens usually 9 or more, leaves not scaly . . **Elodea**

1. **ASCYRUM**, L.

Low, somewhat shrubby, smooth plants, with opposite leaves without serrations at borders. Petals 4, sepals 4, 2 of which are larger than the other pair. Stamens numerous, scarcely collected in clusters.

1. **A. stans**, Michx. (Fig. 4, pl. 96.) ST. PETER'S-WORT. Stem simple, 1 to 2 ft. high, but with a few branches at top. Leaves oval without foot-stalks. Flowers about an in. broad, bright yellow, one to three at summit of stem, showy. Dry soils. July-Aug.

2. **A. hypericoides**, L. (Fig. 6, pl. 96.) ST. ANDREW'S CROSS. Stems much branched and partly decumbent. Leaves narrow oval or egg-shaped. Flowers in the leaf axils along the stem, the petals scarcely exceeding the sepals. Dry sandy soil. Eastern coast. July-Aug.

2. **HYPERICUM**, L.

Herbs or shrubs, with opposite leaves dotted with black points, without serrations and with no stipules. Flowers regular, yellow, sepals and petals each 5; stamens numerous, either distinct from each other or, more commonly, collected in 3 to 5 clusters.

Stamens 25 to 100, more or less united in groups.

Styles five.

Leaves egg-shaped or nearly oval.

Flower an in. or more broad *H. Ascyron*

Leaves oblong-linear, flower nearly an in. broad *H. Kalmianum*

Styles three, rarely four.

Plants shrubby, at least at base.

Leaves lance-shaped or oblong.

Flowers an in. broad *H. prolificum*

Flowers $\frac{1}{2}$ in. broad *H. densiflorum*

Plants not shrubby.

Creeping at base, stem winged *H. adpressum*

Creeping at base, stamens not in phalanges *H. Bissellii*

Erect, not creeping at base.

Leaves elliptic, styles united at base *H. ellipticum*

Leaves oblong or linear *H. perforatum*

Leaves egg-shaped, obtuse *H. maculatum*

Stamens 5 to 15. Flowers small.

Clusters of flowers with leafy bracts *H. boreale*

Clusters of flowers with narrow awl-shaped bracts.

Leaves egg-shaped or oval *H. mutilum*

Leaves linear, obtuse at apex *H. canadense*

Leaves lance-shaped, acute at apex *H. majus*

1. *H. Ascyron*, L. (Fig. 2, pl. 96.) GIANT ST. JOHN'S-WORT. (*H. pyramidatum*, Ait.) Plant, 2 to 6 ft. high. Leaves oblong egg-shaped with rather blunt points, 2 to 5 in. long, clasping at base. Flowers bright yellow about 1 in. broad. On dry hills also along banks of streams. July-Aug.

2. *H. Kalmianum*, L. (Fig. 1, pl. 96.) KALM'S ST. JOHN'S-WORT. Shrubby, at least at base, 1 to 2 ft. high. Leaves narrow-oblong, obtuse but with the mid-vein protruding as a stiff bristle; about 2 in. long, $\frac{1}{4}$ in. wide at apex, narrowed at base; rather numerous. Branches 4-angled. Clusters of flowers mostly terminal. Individual flowers about $\frac{3}{4}$ in. broad. Fruit capsule 5-celled, tipped with 5 styles.

3. *H. prolificum*, L. SHRUBBY ST. JOHN'S-WORT. Shrubby, 2 to 4 ft. high. Leaves very numerous, oblong, narrow, rounded at tip, narrowed to a short leaf-stalk at base, 1 to 3 in. long. Flowers yellow, numerous, $\frac{1}{2}$ to $\frac{3}{4}$ in. broad. Branches 2-edged. Sandy soil. July-Sept.

4. *H. densiflorum*, Pursh. BUSHY ST. JOHN'S-WORT. Similar to No. 3, but branches, leaves and flowers smaller and crowded. July-Sept.

5. *H. adpressum*, Bart. CREEPING ST. JOHN'S-WORT. Shrubby at base, 1 to 2 ft. high. Leaves oblong-linear, 1 to 2 in. long, rounded at tip, branches 2-winged. Flowers in terminal clusters, without leaves, each about $\frac{1}{2}$ in. broad. Styles 3 to 4.

6. *H. Bissellii*, Robinson. BISSELL'S ST. JOHN'S-WORT. Resembles *H. adpressum*. Stamens in the latter are separable into phalanges, in this not. Capsule of *H. adpressum* partly divided into 3 or 4 cells, this has only 1 cell. Southington, Conn. July-Aug.

7. *H. ellipticum*, Hook. (Fig. 5, pl. 96.) ELLIPTIC-LEAVED ST. JOHN'S-WORT. Smooth with 4-angled stem, $\frac{1}{2}$ to 2 ft. high. Leaves thin, rather broadly elliptic, rounded at tip, without leaf-stalk at base. Flowers few, terminal, pale yellow, $\frac{1}{2}$ in. broad. In marshy grounds and along streams. July-Aug.

8. *H. perforatum*, L. (Fig. 7, pl. 96.) COMMON ST. JOHN'S-WORT. Stems 1 to 2 ft. high, 2-winged, much branched. Leaves oblong, rounded at tip, attached directly to stem, many shoots commonly springing from

leaf-axils. Leaves black dotted, generally broader at tip than at base. Clusters of flowers nearly terminal, of many flowers, leafy. Common in pastures, etc. July-Sept.

9. *H. maculatum*, Walt. (Fig. 9, pl. 96.) SPOTTED ST. JOHN'S-WORT. (*H. punctatum*, Lam.). Shrubby at base, 1 to 3 ft. high. Leaves oval, *broadest at base*, abundantly sprinkled with black dots, 1 to 3 in. long. Flowers small, crowded; petals black dotted, much longer than the sepals. Styles 3. Capsule 3-celled. Moist soil. July-Sept.

10. *H. boreale*, (Britton) Bicknell. (Fig. 11, pl. 96.) NORTHERN ST. JOHN'S-WORT. Stems rounded or somewhat 4-angled, 1 to 1½ ft. high. Leaves elliptic, ¼ to 1 in. long, 1/12 to 1/3 in. wide, commonly 3-nerved. *Clusters leafy*, few flowered. Stamens few. Capsule purple, longer than the sepals or petals. Wet soil. July-Sept.

11. *H. mutilum*, L. (Fig. 10, pl. 96.) DWARF ST. JOHN'S-WORT. Stems slender, ½ to 2 ft. high, abundantly branched, 4-angled. Leaves oblong, clasping at base, somewhat rounded at tip, 5-nerved. Flower clusters *not leafy*, but with awl-shaped bracts. Flowers small. A slender species. Low grounds. July-Sept.

12. *H. majus*, (A. Gray) Britton. LARGER CANADIAN ST. JOHN'S-WORT. Stems 1 to 3 ft. high, stouter than No. 12, branched above. Leaves lance-shaped, clasping at base, tapering but rounded at tips, 5-nerved. Moist soil. June-Sept.

13. *H. canadense*, L. (Fig. 8, pl. 96.) CANADIAN ST. JOHN'S-WORT. Stems ½ to 1½ ft. high, branching. Leaves *linear*, ½ to 2 in. long, rounded at tip. Flower clusters with awl-like bracts. Flowers small. Low grounds. July-Sept.

3. SAROTHTRA, L.

Small branching herb, with leaves reduced to scales. Flowers small, yellow, along the stem in the axils of some of the scales. Petals 5; sepals 5, stamens 5 to 10.

S. gentianoides, L. (Fig. 3, pl. 96.) ORANGE-GRASS. (*Hypericum nudicaule*, Walt.). Stems wiry, 3 to 9 in. high. In sandy fields. Common. June-Oct.

4. ELODEA, Pursh. (Triadenum, Raf.)

Perennial herbs growing in marshes. Leaves opposite and without lobes or teeth. Flowers in terminal clusters also in smaller clusters in the leaf axils. Calyx of 5 divisions; petals 5; stamens 9 or more in 3 groups. Alternating with these stamen groups are three large glands resembling petals. The presence of these glands forms the distinctive feature of the flower of *Elodea*.

1. *E. virginica*, (L.) Nutt. (Fig. 3, pl. 97.) MARSH ST. JOHN'S-WORT. Opposite leaves oblong, blunt at each end and *attached directly to the stem without intervention of leaf-stalk*, dotted with black dots. Flowers reddish-purple each about ½ in. broad. Swamps. July-Aug.

2. *E. petiolata*, Pursh. LARGER MARSH ST. JOHN'S-WORT. Plant usually larger than No. 1, and leaves *attached to the stem by a short leaf-stalk*.

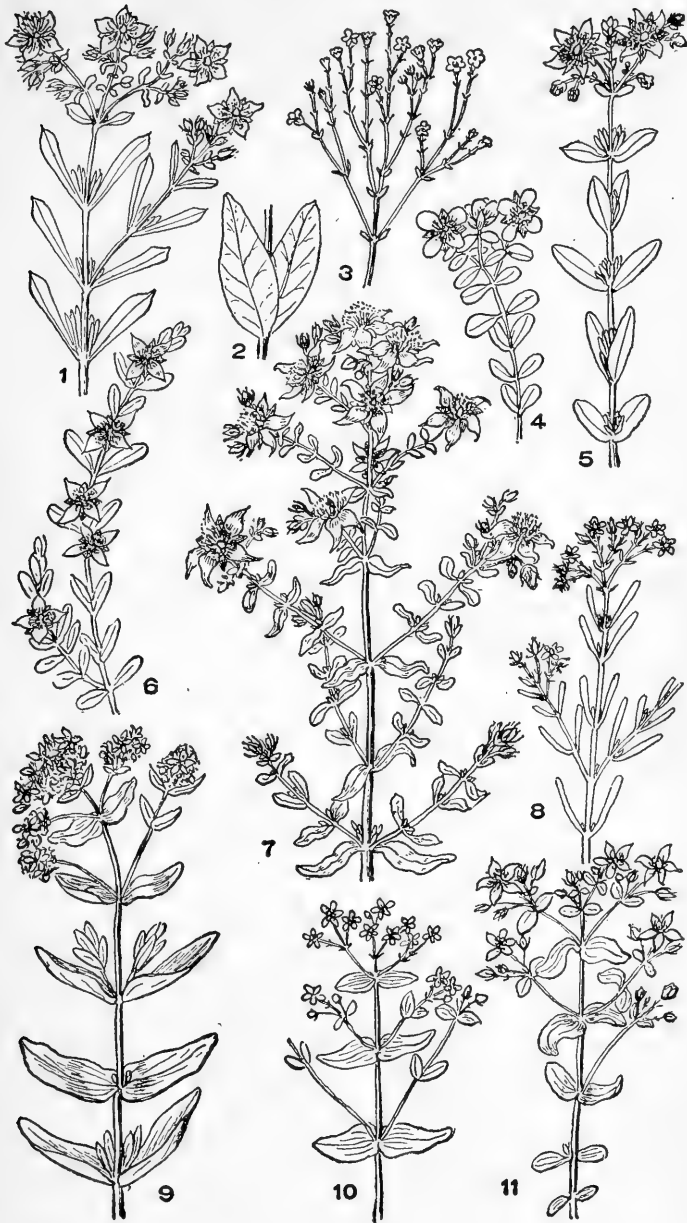


PLATE 96

1. *Hypericum Kalmianum*. 2. *H. Ascyron* (leaves). 3. *Sarothra gentianoides*. 4. *Ascyrum stans*. 5. *Hypericum ellipticum*. 6. *Ascyrum hypericoides*. 7. *Hypericum perforatum*. 8. *H. canadense*. 9. *H. maculatum*. 10. *H. mutilum*. 11. *H. boreale*.

FAMILY II.—**ELATINACEAE**. WATER-WORT FAMILY

Low herbs, with opposite leaves; in our species with undivided borders; provided with small membranous stipules between the opposite leaves. Flowers of our species mainly solitary in the leaf axils. Pod round, 2- to 4-celled.

ELATINE, L.

Divisions of calyx and of corolla 2 to 4. Stamens usually as many as petals. Dwarf plants growing in mud or in water, often rooting at the leaf nodes.

E. americana, (Pursh.) Arn. (Fig. 4, pl. 97.) WATER-WORT. MUD PURSLANE. Tufted, spreading, stems 1 to 1½ in. long; leaves obtuse. Flowers generally solitary in leaf-axils. Margins of ponds and sluggish streams. Blooms all summer.

FAMILY III.—**CISTACEAE**. ROCK ROSE FAMILY

Low, shrubby plants, mostly of herbaceous aspect with regular flowers, but with the two outer sepals (when 5 sepals are present) smaller than the others, resembling small bracts. Petals 3 to 5, falling early. Stamens generally numerous, each free from the others. Fruit capsule one-celled with 3 to 5 valves. Leaves simple, not lobed or serrate, upper alternate, lower usually differing in size and form from the stem leaves, usually opposite.

Petals five.

Flowers small yellow.

Style long and slender **Hudsonia**

Flowers large, yellow.

Style very short or none **Helianthemum**

Petals three. Flowers small, greenish-purple . . . **Lechea**

I. **HELIANTHEMUM, Tourn.**

Woody herbs, with conspicuous yellow flowers, also, in our species, with other flowers without petals and therefore inconspicuous. Petals of the large yellow flowers falling on the day following the opening of the flowers. Valves of the capsule 3. Stamens numerous.

1. **H. majus**, (L.) BSP. (Fig. 1, pl. 97.) HOARY FROSTWEED. Stems 1 to 2 ft. high, *frosted* with grayish-white hairs. Leaves oblong lance-shaped, the main stem leaves alternate ½ to 1½ in. long. Flowers in a terminal cluster of 5 to 10, bright yellow about an inch broad. Calyx hoary like the stem, the outer sepals nearly as long as the three inner. Later there appear at the leaf axils branches bearing flowers without petals. *These apetalous flowers grow directly upon the stem or with very short foot-stalks.* Dry soils. June-July.



PLATE 97

1. *Helianthemum majus*. 2. *H. canadense*. 3. *Elodea virginica*. 4. *Elatine americana*. 5. *Hudsonia ericoides*. 6. *H. tomentosa*. 7. *Lechea intermedia*. 8. *L. minor*. 9. *L. juniperina*. 10. *L. racemulosa*.

2. *H. canadense*, (L.) Michx. (Fig. 2, pl. 97.) LONG-BRANCHED FROSTWEED. Resembles the last, but the apetalous flowers are furnished with foot-stalks longer than those of No. 1, and the branches bearing the apetalous flowers overtop those which have borne the petalous flowers, which is not the case with No. 1. Dry places. May-June.

3. *H. corymbosum*, Michx. PINE-BARREN FROST-WEED. All the flowers are borne at summit of stem in a rather broad spreading cluster (corymb). Pine barrens, New Jersey, and southward.

2. HUDSONIA, L.

Low, heath-like little shrubs, the stems covered with small scale-like or minute awl-shaped leaves. Flowers small, bright yellow, crowded among the small leaves along the upper part of the branches. Petals 5, sepals 3 subtended by 2 others much smaller. Stamens 9 to 30.

1. *H. tomentosa*, Nutt. (Fig. 6, pl. 97.) WOOLLY HUDSONIA. FALSE HEATHER. Low, tufted little shrub with *scale-like leaves* which are about 1/12 in. long overlapping one another. Flowers mostly toward the summit of the stem; the whole plant downy-grayish. Sands by the sea shore and in pine barrens. May-July.

2. *H. ericoides*, L. (Fig. 5, pl. 97.) HEATH-LIKE HUDSONIA. Leaves much more slender than No. 1, and more in circling clusters. Flowers scattered along the whole length of stem. Dry sandy soil. May-June.

3. LECHEA, L.

Inconspicuous perennial herbs often shrubby at base. Flowers very small, greenish-purple. Petals 5; sepals 5 or 3, of which when 5, the outer 2 are very minute. Stamens 3 to 12.

Plant decidedly hairy.	
Outer sepals distinctly longer than inner	<i>L. minor</i>
Outer sepals not longer than inner	<i>L. villosa</i>
Plant hairy only at base.	
Plant shrubby	<i>L. maritima</i>
Plant not shrubby.	
Branches spreading	<i>L. racemulosa</i>
Branches nearly erect	<i>L. juniperina</i>
Whole plant hairy	<i>L. stricta</i>
Plant with few or no hairs.	
Leaves narrowly linear.	
Inner sepals 1-nerved	<i>L. tenuifolia</i>
Inner sepals 3-nerved	<i>L. Leggettii</i>
Leaves at the base oval	<i>L. intermedia</i>

1. *L. villosa*, Ell. LARGER PIN-WEED. Plant, erect, hairy, 1 to 2½ ft. high. Leaves of the stem elliptic, those from the basal shoots oval or rounded. Flowers small, crowded. *The outer sepals are shorter than the inner or less frequently equal to them.*

2. *L. minor*, L. (Fig. 8, pl. 97.) THYME-LEAVED PIN-WEED. Less hairy, in most other respects similar to No. 1. *The outer sepals are longer than the inner.*

3. *L. racemulosa*, Michx. (Fig. 10, pl. 97.) OBLONG-FRUITED PIN-WEED. Stem and stem leaves scarcely hairy, but stem and leaves of basal shoots hairy. Upper stem leaves *linear*, those of basal shoots oval. Flowering branches decidedly spreading; outer sepals shorter than inner. Dry sandy soil. July-Aug.

4. *L. maritima*, Leggett. BEACH PIN-WEED. Shrubby, especially at base from which spring many hairy shoots with oval leaves. Stem leaves linear, blunt at the ends. Flowers much crowded, petals reddish; the outer sepals shorter than the inner. Sea-shore and pine barrens. July-August.

5. *L. tenuifolia*, Michx. NARROW-LEAVED PIN-WEED. Slender, 4 to 10 in. high. Growing in dense tufts. Branches spreading. Leaves linear, *as are those of the basal shoots*. Outer sepals equalling the inner. Petals red or purple. Dry soil, eastern Mass., and westward. July-Aug.

6. *L. Leggettii*, Britt. and Hol. LEGGETT'S PIN-WEED. Resembles the last but is higher; 1 to 2 ft. high. Outer sepals nearly equalling the inner. Long Island, westward and southward. July-Aug.

7. *L. intermedia*, Leggett. (Fig. 7, pl. 97.) LARGE-PODDER PIN-WEED. Plant, 1 to 2 ft. high. *Leaves elliptic*, smooth but basal shoots hairy. Basal leaves oval. Outer and inner sepals about equal. Dry places throughout most of our area. Aug.

8. *L. juniperina*, Bicknell. (Fig. 9, pl. 97.) MAINE PIN-WEED. Growing in tufts, $\frac{1}{2}$ to 2 ft. high. Very leafy, the leaves more or less in whorls, the mid-vein with very short hairs which give to the plant a grayish-hoary appearance. All branches short and so nearly erect that the outline of the plant is slender. Coast of Maine. July-Sept.

9. *L. stricta*, Leggett. BUSHY PIN-WEED. Very slender and straight, densely branched, the branches nearly erect, *covered with a fine, thin down*. Inflorescence spine-like. Open places, western New York, and southward. July-Aug.

FAMILY IV.—VIOLACEAE. VIOLET FAMILY

Herbs or shrubs, with mostly irregular flowers often of two kinds, first those which open and are showy, second, those which do not open, but are usually hidden beneath dead leaves or even by the soft soil. These last are known as *cleistogamous*. They are not fertilized by insects yet bear an abundance of seeds. The leaves are furnished with stipules, are all basal or, when on a stem, alternate. Petals 5, the lowest the largest; sepals 5, the latter nearly equal. Ovary of 1 cell with many seeds, the capsule splits into 3 wedge-like valves at maturity.

I. VIOLA, L.

Small herbs. Leaves all from the base or alternate on a stem, stipulate. Flowers of two kinds. The closed form is known as *cleistogamous*. These pollinate themselves, being furnished with abundance of pollen. The larger lower petal of the open flower is spurred as are the 2 lower of the 5 stamens. *Sepals not united*, each free from the others.

§. *Leaves and flowers all arising from the rootstock*

Flowers blue.

Leaves heart-shaped or rounded, not deeply incised or parted.

Leaves and stems hairy.

Leaves spreading on the ground *V. villosa*.

Leaves erect *V. sororia*.

- Leaves and stems without hairs or with very few hairs.
 Rootstock short thick and erect.
 Capsule not 3-angled *V. cucullata*
 Capsule 3-angled *V. septentrionalis*
 Rootstock very slender, horizontal.
 Spur of flower $\frac{1}{3}$ in. long *V. Selkirkii*
 Spur of flower $\frac{1}{12}$ in. long *V. palustris*
- Leaves deeply incised.
 The middle lobe broad.
 Leaves and stem smooth or with few hairs.
 Leaves arrow-shaped *V. sagittata*
 Leaves egg-shaped in outline *V. notabilis*
 Leaves and stem hairy.
 Leaves as broad as long *V. palmata*
 Leaves longer than broad *V. ovata*
- All lobes narrow lance-shaped.
 Flower scapes higher than the leaves *V. atlantica*
 Flower scapes about equal to leaves *V. pedata*
 Flower scapes shorter than the leaves *V. Mulsfordae*
- Flowers yellow *V. rotundifolia*
 Flowers white.
 Leaves nearly or quite orbicular.
 Decidedly hairy *V. renifolia*
 Smooth or nearly so *V. blanda*
 Leaves ovate or oval *V. primulaefolia*
 Leaves narrow lance-shaped *V. lanceolata*

†. *Leaves and flowers arising from stems above the rootstock*

- Flowers blue or whitish.
 Stipules not fringed or deeply incised *V. canadensis*
 Stipules fringed.
 Spur of flower shorter than the corolla.
 Flowers never creamy-white *V. labradorica*
 Flowers varying to creamy-white *V. striata*
 Spur as long or longer than corolla.
 Spur about as long as corolla, plant hairy *V. arenaria*
 Spur longer than corolla, plant not hairy *V. rostrata*
- Flowers yellow.
 Leaves halberd-shaped *V. hastata*
 Leaves broadly egg-shaped or nearly round.
 Hairy *V. pubescens*
 Not hairy *V. scabriuscula*

§ *Leaves and flowers all from the rootstock*

Leaves not incised. Flowers blue

1. *V. cucullata*, Ait. (Fig. 4, pl. 98.) HOODED BLUE VIOLET. (*V. obliqua*, Hill.) Stems and leaves smooth or with few hairs. Rootstock thick and short. Early in season of bloom flower scapes are usually shorter than leaves, but later they usually much exceed the leaves. Leaf blades vary from egg-shaped to orbicular, not deeply incised but with coarse teeth at margins. Woods and meadows. April-June.

2. *V. septentrionalis*, Greene. NORTHERN BLUE VIOLET. Similar to *V. cucullata*, capsule of *V. cucullata* strongly 3-angled, that of the present form not angled and plant extending more northward. Extending from Ontario into northern New England.

3. *V. villosa*, Walt. SOUTHERN WOOD VIOLET. Leaves rounded or less frequently egg-shaped; downy, lying flat upon the ground. Petals bearded, blue. Only in the southern part of our area. April-May.

4. *V. sororia*, Willd. (Fig. 2, pl. 98.) WOOLLY BLUE VIOLET. Rootstock thick, generally oblique. Leaves heart-shaped, from egg-shaped to orbicular, covered, as are the leaf-stalks and flower scapes, with long soft hairs. Dry soils, mostly in southern part of our area. April-May.



PLATE 98

1. *Viola palmata*. 2. *V. sororia*. 3. *V. pedata*. 4. *V. cucullata*. 5. *V. atlantica*. 6. *V. sagittata*.

5. *V. palustris*, L. (Fig. 3, pl. 99.) MARSH VIOLET. Leaves kidney-form, round or broadly egg-shaped. Not hairy. Rootstock slender. Flower spur very short; petals slightly bearded. In wet grounds. Mountains of New England and northward. May-July.

6. *V. Selkirkii*, Pursh. (Fig. 6, pl. 99.) SELKIRK'S VIOLET. Leaves broadly egg-shaped to round, heart-shaped at base. Flower spur nearly as long as the petals, blunt. Moist soil, woods, throughout our area. April-May.

Leaves incised. Flowers blue

7. *V. palmata*, L. (Fig. 1, pl. 98.) EARLY BLUE VIOLET. Downy; rootstock thick, usually oblique. Flower scapes at first shorter than leaves, later generally longer. Leaf-stalks generally much longer than leaf-blades, the latter as broad or broader at base than the length, it is incised at base, forming from a few to 11 or 13 lobes, the middle lobe remaining broad and egg-shaped, while the lateral ones are narrow, often with only shallow incisions. Division of calyx linear or narrow lance-shaped. Lateral petals bearded. Hidden flowers numerous. In dry woods, throughout our area. April-May.

8. *V. Mulfordae*, Pollard. MISS MULFORD'S VIOLET. Leaves and flowers from the root-stock. Whole plant somewhat downy. Leaf blades oblong or egg-shaped in general outline but the margin cut into several lobes on each side. The lateral lobes lance-shaped, acute at apex, the terminal lobe much larger, oblong to lance-oblong, the margins finely toothed. Flower stems shorter than the leaves or at first somewhat longer than the leaves. Flowers violet-purple about $\frac{3}{4}$ in. broad. Dry sandy soil, Hempstead Plains, L. I. May.

9. *V. atlantica*, Britton. (Fig. 5, pl. 98.) COAST VIOLET. Leaves on long slender leaf-stalks, nearly or quite smooth. Leaves deeply incised but middle lobe rather broadest, the others narrow and diverging. *The lower leaves are small, nearly or quite undivided, egg-shaped or club-shaped.** Upper leaves 4 to 8 in. high. Flower scapes as high or higher. Lateral petals bearded. Somewhat rare. Eastern Mass., and southward. May-June.

10. *V. notabilis*, Bicknell. ELEGANT VIOLET. Flowers and leaves from the root-stock. Leaves in outline broadly egg-shaped or oblong, heart-shaped at base, obtuse or rounded at apex, divided at lower half or third, several oblong obtuse lobes cut half way or less to the mid-rib, the basal lobe broader and itself toothed or lobed. Flower stems generally exceeding the leaves, becoming 8 to 10 in. high. Flowers very large, deep purple. Southwestern Long Island, low grounds.

11. *V. sagittata*, Ait. (Fig. 6, pl. 98.) ARROW-LEAVED VIOLET. Leaves long, halberd-shaped, generally incised at base, smooth, hollowed but not heart-shaped at base which is somewhat winged, the wings being more or less lobed. Petals densely bearded, dark blue. Dry hills, throughout our area. April-May.

In the form *V. emarginata*, Le Conte, the leaves are more nearly triangular.

* According to the author's specimens, by others not so specified.

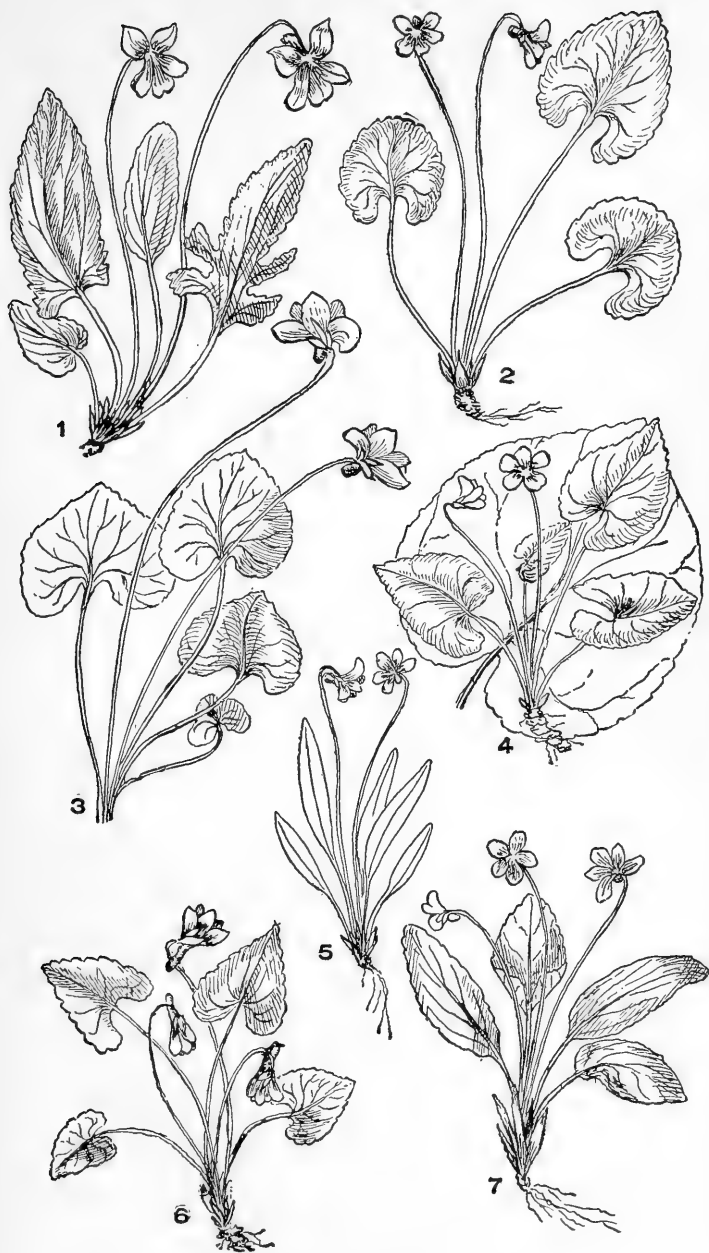


PLATE 99

1. *Viola ovata*. 2. *V. blanda*. 3. *V. palustris*. 4. *V. rotundifolia*. 5. *V. lanceolata*. 6. *V. Selkirkii*. 7. *V. primulaefolia*.

12. *V. ovata*, Nutt. (Fig. 1, pl. 99.) OVATA-LEAVED VIOLET. Leaves, leaf-stalk and flower scapes hairy; long egg-shaped, rounded at apex, incised, not winged at base. Southern part of our area. April-May.

13. *V. pedata*, L. (Fig. 3, pl. 98.) BIRD'S-FOOT VIOLET. Rootstock short, thick, erect. Leaves parted nearly to leaf stem into 5 to 9 narrow lobes which are smooth-bordered or somewhat toothed toward apex. All parts smooth. One of our most beautiful violets. Color, lilac to dark blue. Dry fields, somewhat prevalent. April-June.

Flowers yellow

14. *V. rotundifolia*, Michx. (Fig. 4, pl. 99.) ROUND-LEAVED VIOLET. Leaves smooth or slightly downy; broadly egg-shaped when young becoming nearly round at length; heart-shaped at base, the sinus nearly closed. Flower scapes short (2 to 4 in. high); flowers yellow. The plant sends out many stolons later in the season as well as many hidden (cleistogamous) flowers. Woods, in rich soil. April-May.

Flowers white

15. *V. blanda*, Willd. (Fig. 2, pl. 99.) SWEET WHITE VIOLET. Leaves cordate at base, round, kidney-formed or broadly egg-shaped. All parts except the flower scape usually smooth, the latter generally somewhat hairy. Flowers white, with purple veins. Wet places. April-May.

16. *V. primulaefolia*, L. (Fig. 7, pl. 99.) PRIMROSE-LEAVED VIOLET. Leaves lance-egg-shaped, suddenly contracted at base, the edge of the leaf following along the leaf-stalk. Flowers white, petals beardless. Long stolons late in summer with many hidden (cleistogamous) flowers. Open moist soil, New York, New England, and southward. April-May.

17. *V. lanceolata*, L. (Fig. 5, pl. 99.) LANCE-LEAVED VIOLET. Leaves smooth, lance-shaped, tapering at base. Flowers white. Many stolons late in season and many cleistogamous flowers. Moist meadows, prevalent to some extent throughout our area. April-June.

18. *V. renifolia*, A. Gray. KIDNEY-LEAVED VIOLET. All parts of plant hairy. Leaves broad, egg-shaped, kidney-shaped or round. More or less heart-shaped at base. Flowers white. Stoloniferous. Woods and fields, New York and westward. April-June.

†*Leaves and Flowers all springing from a stem*

Flowers yellow

19. *V. pubescens*, Ait. (Fig. 1, pl. 100.) HAIRY YELLOW VIOLET. Plant 5 to 20 in. high. Leaves broadly egg-shaped to round, toothed, those at the base of stem having leaf-stalks longer than the blades, while of the upper leaves the blades excel the leaf-stalks in length. The lower leaves at blooming time are usually wanting. Stipules not fringed or divided, egg-shaped or lance-shaped. Whole plant covered with soft hairs. Flowers bright yellow. Woods. April-May.

20. *V. scabriuscula*, Schwein. (Fig. 5, pl. 100.) SMOOTH YELLOW VIOLET. Resembles No. 16, but the hairy covering is nearly or quite absent and the surface of the stem is rough. Lower leaves generally present at blooming time. Stipules similar to those of No. 16. Flowers yellow. Woods. April-May.



PLATE 100

1. *Viola pubescens*. 2. *V. rostrata*. 3. *V. labradorica*. 4. *V. arenaria*. 5. *V. scabriuscula*. 6. *V. canadensis*.

21. *V. hastata*, Michx. HALBERD-LEAVED VIOLET. Leaves halberd-shaped or oblong with heart-shaped base, slightly toothed, apex acute, stipules small, egg-shaped. Mountains of Penna. and southward. May.

Flowers blue

22. *V. canadensis*, L. (Fig. 6, pl. 100.) CANADIAN VIOLET. Stems 4 to 14 in. high. Leaves egg-shaped, heart-shaped at base, apex sharp pointed. Whole plant smooth or nearly so. *Stipules not fringed or divided, egg-shaped.*

23. *V. striata*, Ait. PALE VIOLET. STRIPED VIOLET. Similar in size and general growth to No. 22. Leaves round or egg-shaped, the apex less sharply pointed than No. 22. Stipules long, narrow, *with sharp teeth at borders.* Flowers on long flower stalks, light blue to white. Spur $\frac{1}{4}$ as long as the corolla. Woods. May-July.

24. *V. labradorica*, Shrank. (Fig. 3, pl. 100.) AMERICAN DRY VIOLET. Stem weak, half reclining. Leaves from broadly egg-shaped to kidney-form or round, finely toothed at borders; plant smooth. Stipules lance-shaped with fringed borders. Flowers on long flower stems, spur half as long as the corolla, obtuse at the end. Color pale purple. Wet places. March-May.

25. *V. arenaria*, DC. (Fig. 4, pl. 100.) SAND VIOLET. Resembles No. 24, but plant is covered with soft hairs. Color somewhat darker. Stipules are longer and are deeply incised. Sandy soil, Maine and westward. May-June.

26. *V. rostrata*, Pursh. (Fig. 2, pl. 100.) LONG-SPURRED VIOLET. Plant smooth, erect; leaves as in Nos. 24 and 25. Stipules fringed. Petals bearded. Spur longer than the corolla. Moist woods, generally distributed. June-July.

V. tricolor, L., and *V. odorata*, L., are sometimes found in our region as escapes from gardens.

2. **HYBANTHUS**, Jacq. (*Cubelium*, Raf. *Solea*, Spring)

Our species an erect leafy plant with rather inconspicuous greenish flowers growing from the leaf axils. Sepals equal, narrow lance-shaped. *Petals* nearly equal, the lower one 2-lobed and with a blunt spur. Stamens uniting to form a sort of sheath about the ovary.

H. concolor, (Forst.) Raf. (Fig. 4, pl. 101.) GREEN VIOLET. Plant slightly downy, 1 to 2 ft. high. Leaves alternate, lance-shaped, 3 to $4\frac{1}{2}$ in. long, $\frac{1}{3}$ as wide, tips very slender and tapering. Flowers 2 or 3 in the axils, on short flower-stems, greenish. Moist woods, northern New York and southward. May-June.

FAMILY V.—**PASSIFLORACEAE**. PASSION FLOWER FAMILY

Sepals more or less united, forming a tube from which project 5 points. The throat of the calyx is covered by rows of sterile stamen filaments. Above these is the corolla. Fertile stamens 5. Our single species is a climbing, tendril-bearing, vine.

PASSIFLORA, L.

In our species leaves lobed, alternate. Flowers axillary, single or in pairs on rather long flower stems. Petals greenish-yellow, longer than the sepals. Fruit a berry with many seeds.

P. lutea, L. (Fig. 6, pl. 101.) **YELLOW PASSION FLOWER**. Vine, 3 to 10 ft. long, trailing or climbing. Leaves much broader than long, 3-lobed. Flowers and tendrils from the axils. Flowers yellow. In southern part of our area. May-July.

Order XII.—OPUNTIALES. The Order of the Cacti

An order of fleshy, generally spiny plants of which we have but a single species. *The ovary is inferior to the calyx and attached to it.* The flowers are regular with an indefinite number of petals and stamens. The stems are fleshy and the leaves often rudimentary.

The **FAMILY CACTACEAE** is the only one of the order and in our North Eastern States we have only a single Genus.

OPUNTIA, Mill.

With its succulent branching stems and spiny leaves. Flowers upon the sides of the stem, with numerous petals, which are slightly united at base. Stamens also numerous. Fruit a pear-shaped spiny berry.

O. vulgaris, Mill. (Fig. 7, pl. 101.) **EASTERN PRICKLY PEAR**. (*O. Opuntia*. (L.) Coult.) Is our only species, growing on rocks and in dry soil in the southern and eastern section of our region June-Aug.

Order XIII.—THYMELEALES. Moose Wood Order

The species of this order are, in our area, all shrubs. The calyx extends upward upon the ovary, covering it and adhering to it. The flowers are without petals. The ovary has but a single ovule. For other characters, see those of the two Families.

Leaves green **THYMELEACEAE**

Leaves silver-scurfy **ELAÆAGNACEAE**

FAMILY I.—THYMELEACEAE. MOOSE WOOD FAMILY

Our only native species a small shrub. *Flowers without petals.* Ovary with a single ovule. The inner bark is tough and fibrous, the leaves without lobes and with entire borders are alternate. Flowers with colored calyx, stamens and pistils, the calyx of 4 sepals. Fruit a hard, dry, ovoid drupe. Another species, an

escape from cultivation, occasionally found is the *Daphne* or Spurge Laurel, a shrub of small size.

1. DIRCA, L.

With the characters above mentioned. The only species is:

D. palustris, L. (Fig. 1, pl. 101.) LEATHERWOOD. MOOSE WOOD. A shrub 2 to 6 ft. high, with tough yellow bark, oval leaves and small yellow flowers. Stamens much longer than the yellow sepals. Fruit a small oval red berry. The flowers appear in April, before the leaves. The bark is used for withes and binders. Mostly in wet soil.

2. DAPHNE, L.

Small shrubs, with alternate leaves and purple or white flowers in clusters, in our species encircling the stem at the inter-nodes of leaves. The flower is without petals, the 4 spreading lobes of the calyx forming the perianth. Stamens 8, arising from the calyx, usually included within the tube of the calyx. Ovary 1-celled; style very short. Fruit an ovoid drupe.

D. Mezereum, L. (Fig. 3, pl. 101.) SPURGE LAUREL. A fragrant shrub, 1 to 5 ft. high, with lance-shaped leaves and purple or white flowers. Escaped from gardens. April-May.

FAMILY II.—ELAEAGNACEAE. OLEASTER FAMILY

Shrub, in our region, with a silvery scurf. Leaves with lobes or teeth, opposite in our species, without stipules. Flowers springing at the leaf axils or at the nodes of the twigs of the preceding season in small clusters. Corolla absent. The calyx divided into 4 sepals. Stamens few. Ovary 1-celled with a single ovule. Seeds erect. Our only Genus is:

SHEPHERDIA, Nutt. (*Lepargyrea*, Raf.)

With opposite leaves and small flowers. Staminate flowers with 8 stamens. Calyx tube investing the ovary but not adhering to it. Fruit berry-like.

S. canadensis, (L.) Nutt. (Fig. 2, pl. 101.) CANADIAN BUFFALO BERRY. A shrub, 4 to 8 ft. high, with elliptic leaves, smooth above, covered below with hairs and silvery scales. An ornamental shrub growing on banks and along streams. April-June.

Order XIV.—MYRTALES. Order of the Myrtles

Herbs, shrubs or trees. Flowers, with rare exceptions, regular, the calyx rising partly or completely above the ovary and adhering to it or entirely free. Styles usually fused into one, ovaries with many ovules, carpels 2. Petals present except in the small flowered water plants of the family *Haloragidaceae*.



PLATE 101

1. *Dirca palustris*. 2. *Shepherdia canadensis*. 3. *Daphne Mezereum*. 4. *Hybanthus concolor*. 5. *Rotala ramosior*. 6. *Passiflora lutea*. 7. *Opuntia vulgaris*.

Ovary completely free or only partly inferior.

Anthers opening by a longitudinal split **MELASTOMACEAE**

Anthers opening by a pore at the summit **LYTHRACEAE**

Ovaries inferior to the calyx, the calyx adhering to it.

Water plants with finely divided leaves **HALORAGIDACEAE**

Water plants with broad floating leaves . **TRAPACEAE**

Land plants or marsh plants . . . **ONAGRACEAE**

FAMILY I.—**LYTHRACEAE**. LOOSESTRIFE FAMILY

In our region all herbs except *Decodon*. Leaves opposite, except in *Lythrum*. Flowers regular or somewhat irregular. Ovary free or more or less adherent to the calyx, 2- to several-celled. Stipules none. Calyx of 4 or more lobes. Petals as many as the principal lobes of the calyx, but sometimes absent. Anthers attached to the filament of the stamen near the middle and opening longitudinally.

Flowers regular.

Flowers large, many **Decodon**

Flowers small, few.

 Capsule bursting at the partitions between the cells

 **Rotala**

 Capsules bursting irregularly . . . **Ammannia**

 Calyx cylindric **Lythrum**

 Calyx tubular, swollen below **Cuphea**

1. **AMMANNIA**, L.

Our plant an herb, 2 to 6 in. high, with opposite leaves, in the axils of which are 1 to 3 inconspicuous flowers with bell-shaped calyx and 4 small purple petals which fall early. Stamens 4. Low herbs of no special beauty.

1. **A. Koehnei**, Britton. **KOEHNE'S AMMANNIA**. Plant, rather more than 1 ft. high, sometimes less; smooth. Leaves mostly lance- or spatula-shaped, with blunt extremities, the base of the upper ones clasping with ear-like lobes at base. Flowers 1 to 3 in each upper axil, quite inconspicuous. In Hackensack marshes, New Jersey, and south. Flowers all summer.

2. **A. coccinea**, Rottb. **LONG-LEAVED AMMANNIA**. Leaves sharp-pointed at extremity, narrow lance-shaped. Swamps and muddy banks. New Jersey, and southward. July-Sept.

2. **ROOTALA**, L.

Low inconspicuous herb, with opposite leaves and small axillary flowers, generally solitary. Calyx 4-lobed with as many accessory teeth between the lobes.

R. ramosior, (L.) Koehn. (Fig. 5, pl. 101.) **ROTALA**. Leaves narrow, oblong, about an in. long. Flowers 1 in each axil. Swamps. July-Sept.

3. **DECODON**, Gmel. (**Lythrum**, L.)

Herbaceous shrub, with leaves in whorls and with dense whorl-like clusters of flowers at the axils. Calyx short, broadly bell-shaped with 5 to 7 lobes and as many slender accessory teeth, one at each sinus. Petals 5, stamens 10, inserted on the calyx tube, alternately longer or shorter.

D. verticillatus, Ell. (Fig. 5, pl. 102.) **SWAMP LOOSESTRIFE**. **WILLOW HERB**. Plant, 2 to 8 ft. high, growing at edges of streams and in swamps. Stems 4- to 6-angled; leaves opposite or in whorls of about 4, lance-shaped, 2 to 5 in. long and rather less than $\frac{1}{4}$ as wide. In the axils of the upper whorls of leaves are clusters of purple flowers, each nearly an inch broad of lance-shaped petals and with 10 stamens, which considerably exceed the petals in length. July-Sept.

4. **LYTHRUM**, L.

Slender herbs, with 4-angled stems and opposite or alternate leaves and purple or white flowers which are found at the axils or in terminal slender clusters. Petals 4 to 6, usually 6. Stamens the same number as the petals or double the number, inserted on the calyx. Capsule 2-celled.

Flowers in tall slender clusters	<i>L. Salicaria</i>
Flowers at the leaf axils.	
Leaves opposite	<i>L. lineare</i>
Leaves mostly alternate.	
Leaves acute at apex	<i>L. alatum</i>
Leaves rounded at apex	<i>L. Hyssopifolia</i>

1. **L. Hyssopifolia**, L. (Fig. 7, pl. 102.) **HYSSOP LOOSESTRIFE**. Plant, 6 to 10 in. high; leaves oblong-linear, obtuse at apex, without leaf-stalk, longer than the inconspicuous pale purple flowers. Marshes along our coast. June-Sept.

2. **L. alatum**, Pursh. (Fig. 6, pl. 102.) **WING-ANGLED LOOSESTRIFE**. Tall, slender, branches with winged edges or simply angled. Stem 1 to 4 ft. high. Leaves without leaf-stalks, alternate or the lowest opposite, lance-shaped or oblong, acute or nearly so at the end, rounded at base. Flowers deep purple, stamens of some of the flowers longer than the petals. Low swampy grounds. June-Aug.

3. **L. lineare**, L. (Fig. 8, pl. 102.) **LINEAR-LEAVED LOOSESTRIFE**. Stem tall, slender (2 to 4 ft. high). Leaves opposite, very narrowly linear, an inch or less in length. Petals whitish-purple. In some flowers the style is long, stamens short, in others stamens are long, style short. Salt marshes. July-Sept.

4. **L. Salicaria**, L. (Fig. 4, pl. 102.) **SPIKED LOOSESTRIFE**. Slender, 2 to 4 ft. high. Leaves opposite or in whorls of about 3, lance-shaped, rounded or heart-shaped at base, sharp at apex, 2 to 3 in. long. Flowers purple in a long narrow terminal cluster. In respect to the length of stamens and style there are three forms. Swamps, wet meadows. June-August.

5. CUPHEA, Jacq. (*Parsonsia*, P. Br.)

An herb, with opposite leaves and showy flowers, in clusters or from the axils. Calyx tubular, inflated, 12-ribbed, oblique at the mouth, with 6 teeth and as many secondary ones. Petals 6, unequal. Stamens 11 or 12, in 2 sets; unequal. Ovary with a curved gland at base. Capsule oblong, few seeded, included in the calyx.

C. petiolata, Rusby. (Fig. 9, pl. 102.) BLUE WAX WEED. CLAMMY CUPHEA. Petals ovate, purple. Leaves lance-shaped on leaf-stalks about $\frac{1}{2}$ as long as the leaves. Dry fields. July-Oct.

FAMILY II.—MELASTOMACEAE. MEADOW BEAUTY FAMILY

Herbaceous plants (or woody), with opposite leaves or leaves in whorls. Leaves without stipules, 3- to 5-nerved. Flowers regular, showy, with stamens and pistils. *The anthers open by a pore at the summit.* In other respects similar to family *Onagraceae*.

RHEXIA, L.

Calyx tube 4-cleft, urn-shaped, adhering to the ovary below. Petals 4, large. Stamens 8; style 1. Low perennial herbs with showy flowers.

Stem square with wing-like angles.

Leaves oval-lance-shaped

Leaves linear-oblong

Stem round

R. virginica

R. aristosa

R. mariana

1. **R. virginica**, L. (Fig. 1, pl. 102.) MEADOW BEAUTY. Flowers bright purple; petals 4; *stems and leaves downy*. Sandy swamps. June-Sept.

2. **R. aristosa**, Britton. (Fig. 3, pl. 102.) AWN-PETALED MEADOW BEAUTY. Stem square; flowers bright purple; petals 4; stem and leaves *not downy*. Sandy swamps. July-Aug.

3. **R. mariana**, L. (Fig. 2, pl. 102.) MARYLAND MEADOW BEAUTY. Leaves narrow, lance-shaped. Stem round; plant downy or hairy, 1 to 2 ft. high. Flowers pale purple of 4 petals. Swamps and pine barrens, New Jersey and southward. June-Sept.

FAMILY III.—ONAGRACEAE. EVENING PRIMROSE FAMILY

Herbs, rarely shrubs, with opposite or alternate leaves without stipules; calyx tube adherent to the ovary and rising above it, 2- to 6-lobed. Petals usually 4, but may be more or less, or rarely absent. Stamens usually in 2 rows and twice as many as the petals. Ovary usually 4-celled, styles united.

Petals and sepals, each 4.

Leaves opposite **Isnardia**

Leaves alternate.

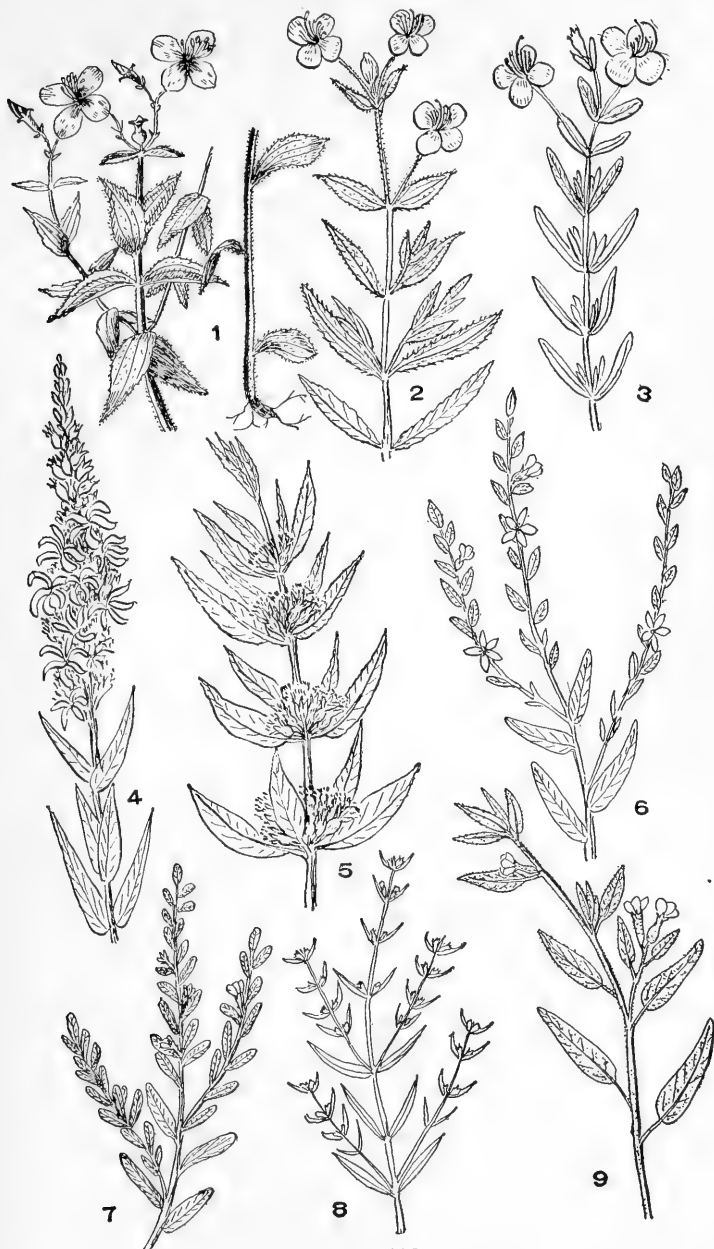


PLATE 102

1. *Rhexia virginica*. 2. *R. mariana*. 3. *R. aristosa*. 4. *Lythrum salicaria*.
 5. *Decodon verticillatus*. 6. *Lythrum alatum*. 7. *L. Hyssopifolia*. 8. *L. lineare*. 9. *Cuphea petiolata*.

- Calyx tube not longer than the ovary.
 Seeds without hairs **Ludwigia**
 Seeds with silky hairs **Chamaenerion**
- Calyx tube longer than the ovary.
 Seeds with silky hairs **Epilobium**
 Seeds without hairs.
Flowers yellow.
 Stamens of equal length.
 Ovules, 2 rows in each of the 4 divisions of
 the ovary lying *horizontally* and by com-
 pression angled in the long axis . **Onagra**
 Ovules in 1 row in each of the 4 divisions,
upright and not angular . **Oenothera**
 Stamens of unequal length **Kneiffia**
Flowers pink **Gaura**
- Petals and sepals, each 2 **Circaea**

1. LUDWIGIA, L.

Herbs, with alternate leaves and with rather inconspicuous axillary flowers. Lobes of the calyx 4, adherent to the ovary but not prolonged beyond it. Petals 4, often wanting; stamens 4 inserted into the petals. Ovary 4- or 5-celled. Capsule short or cylindrical, winged or ribbed. Seeds very small.

Capsules nearly globe-formed.

Flowers small, without flower stalks, in the leaf-axils, with small greenish petals or none.

Bractlets at base of capsule very small or none . . . *L. sphaerocarpa*

Bractlets at base of capsule as long as capsule . . . *L. polycarpa*

Capsules much longer than broad *L. linearis*

Flowers showy.

Plant hairy *L. hirtella*

Plant not hairy *L. alternifolia*

1. **L. sphaerocarpa**, Ell. (Fig. 10, pl. 103.) **GLOBE-FRUITED LUDWIGIA**. Plant growing in swampy or wet places, 2 to 3 ft. high. Leaves lance-shaped or linear, some leaves with very small teeth at borders, alternate, 2 to 4 in. long. Whole plant or at least upper part of it finely downy. Bractlets at base of flowers minute or absent. Capsules globular. Petals very minute or none. Calyx 4-parted, generally shorter than the capsule. Swamps, eastern Mass., southern New York and southward. July-Sept.

2. **L. polycarpa**, Short and Peter. (Fig. 9, pl. 103.) **MANY-FRUITED LUDWIGIA**. Plant growing in swamps, 1 to 3 ft. high, with runners at base. Leaves narrowly lanceolate, borders not toothed, acute at each end, without leaf-stalk, 2 to 4 in. long. Leaves of the runners spatula-formed. Bractlets at base of flowers linear and conspicuous. Wet places. July-Oct.

3. **L. linearis**, Walt. **LINEAR-LEAVED LUDWIGIA**. Plant, 1 to 2 ft.

high, often with runners at base. Leaves very narrow lance-shaped, tapering at base to a flower stalk, 1 to 2 in. long, without teeth. Flowers in axils, petals pale yellow. Capsule a reversed 4-sided pyramid, longer than the calyx lobes. Swamps, New York and southward. June-Sept.

4. *L. hirtella*, Raf. (Fig. 8, pl. 103.) HAIRY LUDWIGIA. Plant erect, 1 to 2 ft. high, decidedly *hairy with stiff hairs*. Leaves oblong, more or less egg-shaped, blunt at ends. Flower-stem in leaf-axil with 2 bracts. Petals showy, yellow, longer than the sepals. Pod 4-angled, winged, nearly globular. Swamps, New Jersey and southward. June-July.

5. *L. alternifolia*, L. (Fig. 7, pl. 103.) SEED BOX. Erect, 2 to 3 ft. high, *not hairy*. Leaves lance-shaped, sharp at each end, 2 to 4 in. long. Flower-stems at the axils, 2 bracted. Petals yellow, longer than the *purple* sepals. Pod 4-angled, winged. Swamps, Mass., to northern New York.

2. ISNARDIA, L.

General characters similar to those of *Ludwigia*, but *leaves are opposite*.

I. palustris, L. (Fig. 4, pl. 103.) MARSH PURSLANE. (*Ludwigia palustris*, Ell.) Plant, lying flat in the mud, floating or partly erect, branching, 4 to 15 in. long. Leaves oval or spatula-formed, tapering at base to a leaf-stalk $\frac{1}{3}$ as long as the leaf. Flowers at the axils, small, solitary, without bracts below the calyx. Pod oblong, 4-angled. Stem and leaves reddish. Muddy ditches and swamps, generally distributed. June-Nov.

3. CHAMAENERION, Adams. (*Epilobium*, L.)

A single species, in our region which has been more generally known as the most conspicuous *Epilobium*. A showy herb with alternate leaves and perfect irregular flowers in terminal pyramidal clusters. Calyx tube adherent to the ovary, but not exceeding it in length, of 4 segments. Petals 4. Capsule 4-celled, 4-angled.

C. angustifolium, L. (Fig. 5, pl. 103.) WILLOW HERB. Simple, not branching, erect, 2 to 8 ft. high. Leaves lance-shaped, 2 to 6 in. long. Flowers purple, in a long pyramidal cluster, a small bract below each flower. Petals 4, unequal, sepals 4, seeds with silky down. In recently burned lands, along fences, a conspicuous herb in mid-summer. June-Sept.

4. EPILOBIUM, L.

Our species all herbs, with alternate or opposite leaves and with flowers in terminal clusters. Petals 4, sepals 4, the calyx tube adhering to the ovary and produced beyond the latter. Stamens 8. Ovary of 4 cells, capsules elongated, 4-angled. Seeds small, each with a tuft of silky hairs attached. Flowers purple or less frequently white.

Plant densely hairy.

Flowers about 1 in. broad *E. hirsutum*

Flowers less than $\frac{1}{2}$ in. broad *E. molle*

Plant not hairy or with few hairs, lower leaves broadly oval and opposite . . . *E. alpinum*

Leaves narrowly linear *E. lineare*

Leaves lance-shaped.

Without serrations at borders *E. palustre*

Borders serrated.

Pods densely hairy *E. adenocaulon*

Pods only slightly hairy *E. coloratum*

Pods free from hairs *E. Hornemannii*

1. *E. hirsutum*, L. (Fig. 6, pl. 103.) HAIRY WILLOW HERB. Plant, stout, branching, 3 to 5 ft. high, densely hairy. Some of the leaves opposite, lance-shaped or oblong, sharply toothed, without leaf-stalks. Flowers in terminal clusters or in the axils of the upper leaves, about an inch broad, purple. Waste grounds. June-Sept.

2. *E. alpinum*, L. ALPINE WILLOW HERB. (*E. lactiflorum*, Haussk.) Plant, from 6 to 12 in. high, not hairy. Lower leaves opposite, broadly elliptic or oval, slightly toothed, obtuse at apex, tapering to a leaf-stalk at base. A few of the upper leaves alternate and lance-shaped. Flowers few from the upper axils, small, white. Adirondack and White mountains. June-Sept.

3. *E. palustre*, L. SWAMP WILLOW HERB. Plant, slender, about 1 ft. high, branched, with fine down; leaves lance-shaped, somewhat pointed at apex, rounded at base, without leaf-stalks, nearly all opposite. Flowers few, in upper axils, pink or whitish. Marshy places. White mountains and north. June-Sept.

4. *E. lineare*, Muhl. (Fig. 2, pl. 103.) LINEAR-LEAVED WILLOW HERB. (*E. densum*, Raf.) Plant, 1 to 2 ft. high, slender, usually branched. Leaves alternate or to some extent opposite, very narrow, 1 to 2 in. long by 1/12 as wide, sharply pointed at each end. Flowers pale pink, numerous. Bogs. July-Sept.

5. *E. molle*, Torr. DOWNY WILLOW HERB. (*E. strictum*, Muhl. *E. densum*, Raf.) Erect, 1 to 2 ft. high, somewhat densely covered with soft whitish hairs. Leaves lance-shaped, broader than those of No. 4. Flowers in upper axils, small, pink or whitish. Bogs, generally distributed. July-Sept.

6. *E. coloratum*, (Muhl.) (Fig. 1, pl. 103.) PURPLE-LEAVED WILLOW HERB. Tall, branching, 1 to 3 ft. high. Leaves rather large, lance-shaped, distinctly toothed at borders, sharp pointed at apex, tapering at base, with leaf-stalk. Above, plant slightly downy. Flowers numerous in leafy clusters from the axils, pale purple. Wet places. July-Sept.

7. *E. adenocaulon*, Haussk. (Fig. 3, pl. 103.) NORTHERN WILLOW HERB. Differs little from No. 6, but leaves are less sharp at apex and the long seed capsules are covered with a dense growth of soft hairs. Wet places. July-Sept.

8. *E. Hornemanni*, Reichenb. HORNEMANN'S WILLOW HERB. Plant, not much branched, $\frac{3}{4}$ to $1\frac{1}{2}$ ft. high; smooth. Leaves egg-shaped on short leaf stalks, with few remote teeth. Flowers in the terminal leaf axils, purple. White Mountains. July-Sept.

5. ONAGRA, Adams

Herbs, with erect stems, alternate leaves and yellow flowers which open in the evening. They are arranged in long slender clusters. The calyx is prolonged beyond the ovary and has 4 lance-shaped lobes. Petals 4. Capsule long, 4-sided, 4-celled, the ovules in 2 rows in each cell, compressed and angular.

Flowers small, petals narrow about 1/12 in. broad *O. cruciata*
Flowers large, petals broad.

Capsules an inch long *O. biennis*

Capsules more than an inch long *O. Oakesiana*



PLATE 103

1. *Epilobium coloratum*. 2. *E. lineare*. 3. *E. adenocaulon*. 4. *Isnardia palustris*. 5. *Chamaenerion angustifolium*. 6. *Epilobium hirsutum*. 7. *Ludwigia alternifolia*. 8. *L. hirtella*. 9. *L. polycarpa*. 10. *L. sphaerocarpa*.

1. *O. biennis*, (L.) Scop. (Fig. 5, pl. 104.) EVENING PRIMROSE. Stout, erect, 1 to 9 ft. high, slightly branching, with a few or many downy hairs. Leaves lance-shaped to oblong, narrowed at base and somewhat clasping, 1 to 6 in. long. Flowers bright yellow, opening in the evening, about 2 in. broad. Calyx adherent to ovary and much longer than the latter. Capsule hairy. In waste places. Common, June-Oct.

2. *O. cruciata*, (Nutt.) Small. SMALL-FLOWERED EVENING PRIMROSE. Similar to No. 1, but petals are lance-shaped and much smaller than those of *O. biennis*. June-Oct.

3. *O. Oakesiana*, (A. Gray) Britton. OAKES'S EVENING PRIMROSE. Resembles No. 1, but is more slender, leaves generally narrower, and plant not hairy or with few hairs. Flowers about $\frac{1}{2}$ as broad as those of No. 1. Capsule about $\frac{1}{3}$ longer than that of No. 1. Dry waste places in northern section of our area. June-Oct.

6. OENOTHERA, L.

Similar to *Onagra*, but seeds not compressed and not angular.

1. *O. humifusa*, Nutt. (Fig. 4, pl. 104.) SEASIDE EVENING PRIMROSE. Plant, $\frac{3}{4}$ to $1\frac{1}{2}$ ft. high, much branched, generally reclining, covered with a silvery down. Leaves narrow with wavy, somewhat toothed, margins $\frac{1}{2}$ to 2 in. long. Flowers yellow, from the leaf-axils, not numerous, $\frac{1}{2}$ to $\frac{2}{3}$ in. across. Sea beaches, New Jersey and southward. June-Sept.

2. *O. laciniata*, Hill. SINUATE-LEAVED EVENING PRIMROSE. Plant, about the size of the last. Leaves deeply waved, the sinuses reaching nearly to mid-vein. Hairs not silvery and much less dense than in No. 1. Sandy soil, New Jersey, Pennsylvania and westward. May-June.

7. KNEIFFIA, Spach.

Herbs, usually more slender than the species of *Onagra*. Leaves mostly narrow, without teeth or with low teeth. Flowers yellow in terminal clusters, petals 4, calyx segments 4. Stamens 8, the alternate ones longer. Ovary 4-angled; pistil 4-cleft at summit. Seeds numerous, not angled.

Plants not covered with coarse hairs.

Leaves without teeth or divisions.

Plants reclining *K. Alleni*

Plants erect *K. pumila*

Leaves with toothed or wavy borders.

Foot-stalk of the capsule longer than the capsule *K. longipedicellata*

Foot-stalk of the capsule shorter than the capsule.

Leaves broadest toward the apex *K. linearis*

Leaves broadest toward base *K. fruticosa*

Plants covered with coarse hairs *K. pratensis*

1. *K. Alleni*, Small. ALLEN'S SUNDROPS. Plant, reclining, much branched, stems from 3 in. to 2 ft. long. Leaves inversely lance-shaped without teeth; the whole plant covered with fine down. Flowers yellow $\frac{2}{3}$ to 1 in. broad in more or less terminal clusters. Capsule 4-angled, winged, nearly globe- or pear-shaped, on a foot-stalk longer than itself. Sandy places on Long Island. June-Aug.

2. *K. longipedicellata*, Small. (Fig. 3, pl. 104.) LONG-STEMMED



PLATE 104

1. *Kneiffia linearis*. 2. *K. pumila*. 3. *K. longipedicellata*. 4. *Oenothera humifusa*. 5. *Onagra biennis*. 6. *Gaura biennis*. 7. *Circaea lutetiana*. 8. *C.*

SUNDRUPS. Slender, 1 to 2½ ft. high, somewhat downy; stem red, not much branched. Lower leaves spatula-shaped, upper narrow lance-shaped with wavy borders, without leaf-stalks or with very short ones. Flowers yellow, 1 to 2 in. broad in terminal clusters. Calyx hairy, of linear segments. Capsule pear-shaped with 4 wings, hairy, *on a foot-stalk longer than itself*. Sandy soil. May-Aug.

3. **K. linearis**, (Michx.) Spach. (Fig. 1, pl. 104.) **NARROW-LEAVED SUNDRUPS.** Plant, ½ to 2 ft. high, sometimes much branched above. Leaves inversely lance-shaped, the upper ones quite narrow, with wavy borders. Generally with few hairs. Flowers yellow, about 1 in. broad. Capsule pear-shaped or elongated, winged, *on foot-stalk not as long as itself*. Sandy soil. June-Sept.

4. **K. pumila**, (L.) Spach. (Fig. 2, pl. 104.) **SMALL SUNDRUPS.** Plant, quite slender, generally about 8 to 10 in. high, but may reach height of 2 ft.; covered with soft down. Leaves narrow lance-shaped, blunt at apex, *not wavy or toothed* at borders. Lower leaves spatula-formed. Flower from 1/3 to 1 in. broad, yellow, in a narrow leafy cluster. Capsule pear-shaped, slightly winged. Dry fields. June-Aug.

5. **K. pratensis**, Small. **HAIRY SUNDRUPS.** Stem 15 to 30 in. high. Whole plant covered with coarse spreading hairs. Leaves oblong-lance-shaped, both sides hairy. Low grounds, Maine to Conn.

6. **K. fruticosa**, (L.) Raimann. **COMMON SUNDRUPS.** Plant, 1 to 3 ft. high, usually much branched, downy. Leaves lance-shaped generally wavy with low teeth. Flowers 1 to 2 in. broad in terminal loose cluster. Capsule oblong with conspicuous wings on a very short foot-stalk or without one. Common in dry soil. June-Aug.

8. GAURA, L.

Herbs, somewhat woody at base with alternate narrow leaves and rose-colored or white flowers. Calyx tubular, with 4 narrow sepals turned backward. Stamens 8. Petals 4, unequal, narrow with a long narrow claw extending down the calyx tube. Fruit nut-like with prominent ribs or angles.

1. **G. biennis**, L. (Fig. 6, pl. 104.) **BIENNIAL GAURA.** Plant slender, slightly downy, branching above; leaves lance-shaped, sharp pointed at each end, wavy with remote teeth. Flowers in terminal clusters, rose-colored or white. Dry soil. July-Sept.

2. **G. coccinea**, Pursh. **SCARLET GAURA.** Resembling the last, but with scarlet flowers, established about Rochester, N. Y. July-Sept.

9. CIRCAEA, L.

Low, rather delicate herbs, ours growing in deep shades. Leaves opposite on slender leafstalks. Flowers small, white, in long slender clusters. Calyx tubular, *its 2 lobes* prolonged beyond the ovary. Petals 2, stamens 2, alternate with the petals. Ovary 1- or 2-celled. Fruit small, ovoid, *bristly with hooked hairs*.

1. **C. lutetiana**, L. (Fig. 7, pl. 104.) **ENCHANTER'S NIGHTSHADE.** Plant, from 1 to 2 ft. high, very fine hairs. Leaves egg-shaped, wavy, toothed, the stem swollen where the opposite leaves join it. Flowers

white in a tall spike, each on a short foot-stalk. Damp woods. Common. June-Aug.

2. *C. alpina*, L. (Fig. 8, pl. 104.) SMALLER ENCHANTER'S NIGHTSHADE. Plant, 3 to 8 in. high. The leaves heart-shaped at base, teeth more conspicuous than in No 1. Damp woods. July-Sept.

FAMILY IV.—TRAPACEAE. WATER-NUT FAMILY

Aquatic herbs, the submersed leaves of which are finely dissected, feather-formed, those which float are rounded and deeply indented. Of these last the leaf-stalks are inflated. Petals and sepals, each 4; stamens 4. Fruit a large spiny nut.

1. TRAPA, L.

Characteristics as above.

T. natans, L. (Fig. 11, pl. 105.) SWIMMING WATER-NUT. A large leaved aquatic, which has been introduced in lakes and parks and which has become naturalized in a few localities. June-July.

FAMILY V.—HALORAGIDACEAE. WATER MILFOIL FAMILY

Our species all aquatic herbs. Calyx adherent to the ovary. Leaves in whorls or opposite, or rarely alternate, often finely dissected. Flowers with stamens and pistils or with those having one set of these organs on one plant and those with the other on another plant or with the two kinds of flowers on one plant. Petals small or none, when present 2 to 4. Stamens 1 to 8. Ovary oblong or cylindric, ribbed or angled.

Stamen 1, ovary 1-celled *Hippuris*

Stamens 2 to 8; ovary 3- to 4-celled.

Fruit sharply angled *Proserpinaca*

Fruit splitting into 4 carpels *Myriophyllum*

1. HIPPURIS.

Stems erect, not branching. Leaves simple, without serrations, arranged in whorls. Flowers greenish, in the leaf axils, having a single stamen on the margin of the calyx and a single style, which is longer than the stamen. Petals absent. Fruit a small 1-celled drupe.

H. vulgaris, L. (Fig. 1, pl. 105.) MARE'S TAIL. JOINT WEED. Plant, 1 to 2 ft. high. Leaves narrow linear, sharply pointed at the apex, attached directly to the stem at base where about 6 or more are arranged in a whorl. In borders of ponds and in marshes, in the northern part of our area. Flowers found all summer.

2. PROSERPINACA, L.

Aquatic; stems not generally branching, reclining at base, finally erect.

Leaves alternate, toothed or finely dissected. Flowers in the leaf axils, small, without petals. Stamens 3; pistils 3. Fruit long, 3- or 4-celled.

1. *P. palustris*, L. (Fig. 9, pl. 105.) MERMAID-WEED. Aquatic. Plant from $\frac{1}{2}$ to 2 ft. long. Leaves which float are narrow lance-shaped or elliptic, with sharp serrations. Those submersed are finely feather-formed. Common in swamps. June-July.

2. *P. pectinata*, Lam. (Fig. 10, pl. 105.) CUT-LEAVED MERMAID-WEED. Aquatic. Leaves all finely feather-formed. Otherwise much like the former species. Plant 5 to 10 in. long. Rare in our section. Swamps.

3. MYRIOPHYLLUM, L.

Aquatic herbs, with creeping roots; leaves in whorls or alternate and with greenish flowers. Leaves, which are wholly under water, are dissected into capillary segments, those above toothed or with smooth borders. The upper flowers are generally stamen bearers, those below are pistillate. Petals none, calyx 4-toothed. Stamens 4 to 8. Some of the flowers have both stamens and pistils. Fruit of 4 nut-like hard carpels, which are coherent at their angles.

Flowers in narrow spikes above the submersed leaves.

Leaves of the flower spike very small; flowers in whorls . . . *M. spicatum*.

Leaves of the flower spike longer than the flowers and much dissected;

submersed leaves in dense whorls, stamens 8 . . . *M. verticillatum*

Plant nearly leafless, the leaves being reduced to small bract- or hair-like

appendages, stamens 4 . . . *M. tenellum*

Flowers on both submersed and emersed parts of the plant.

Plant with a few scattered leaves, those of the upper part linear, those

of the lower part feather-formed, dissected; stamens 4 . . . *M. humile*

Leaves of flower bearing portion of stem in whorls of 4 or 5, not thread-like, with conspicuous teeth; stamens 4.

Flowers alternate . . . *M. alterniflorum*

Floral leaves linear . . . *M. scabratum*

Floral leaves lance-shaped or egg-shaped . . . *M. heterophyllum*

Flowers only on spikes which are submersed . . . *M. Farwellii*

1. *M. spicatum*, L. (Fig. 4, pl. 105.) SPIKED WATER-MILFOIL. Plant, growing in deep water, the submersed leaves finely dissected into capillary segments, in whorls of 4 or 5 leaves. At the summit is a long spike with whorls of inconspicuous greenish flowers which are accompanied or not by leaves reduced to bracts, which are shorter than the small flowers. Stamens 8. In ponds and quiet waters.

2. *M. alterniflorum*, DC. LOOSE-FLOWERED WATER-MILFOIL. Submersed leaves finely feather-formed. Flowers alternate. Ponds, lakes and streams, Mass. and Lake Champlain.

3. *M. verticillatum*, L. (Fig. 5, pl. 105.) WHORLED WATER-MILFOIL. Plant of deep or shallow water. The arrangement of submersed leaves similar to that of No. 1. The floral leaves are conspicuous and like those under water are finely dissected. Stamens 8.

4. *M. tenellum*, Bigel. (Fig. 2, pl. 105.) SLENDER WATER-MILFOIL. Plant, growing mostly at borders of ponds, 3 to 10 in. high. Stems nearly leafless, or with very small capillary appendages. Flowers in a spike on upper part of stem. Stamens 4.

5. *M. humile*, (Raf.) Morong. (Fig. 3, *a* and *b*, pl. 105.) LOW WATER-MILFOIL. Plant of ponds and ditches. The form growing in mud, out of water, Fig. 3, *b*, about 1 to 2 in. high, with the upper leaves,

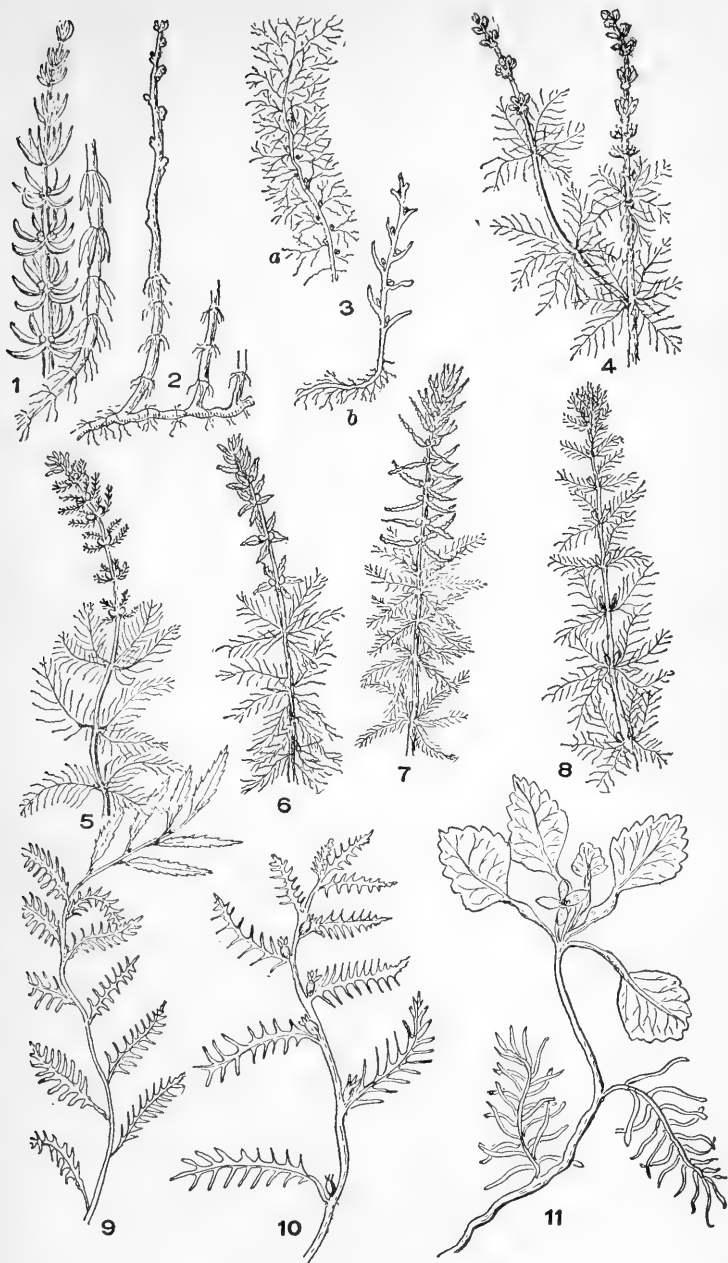


PLATE 105

1. *Hippuris vulgaris*. 2. *Myriophyllum tenellum*. 3a. *M. humile*, aquatic form. 3b. *M. humile*, land form. 4. *M. spicatum*. 5. *M. verticillatum*. 6. *M. heterophyllum*. 7. *M. scabratum*. 8. *M. Farwellii*. 9. *Proserpinaca palustris*. 10. *P. pectinata*. 11. *Trapa natans*.

among which are found the small flowers, narrowly linear. The form growing in water has finely dissected leaves. Fig. 3, a. Stamens 4.

6. *M. heterophyllum*, Michx. (Fig. 6, pl. 105.) **VARIOUS-LEAVED WATER-MILFOIL**. Plant of ponds and still waters. Stems stout. Lower leaves dissected into fine capillary segments; the upper, floral leaves, egg-shaped or lance-shaped with conspicuous teeth. Flowers with 4 stamens.

7. *M. scabratum*, Michx. (Fig. 7, pl. 105.) **PINNATE WATER-MILFOIL**. (*M. pinnatum*, (Walt.) BSP.) Resembles No. 5, but floral leaves are linear, with conspicuous teeth.

8. *M. Farwellii*, Morong. (Fig. 8, pl. 105.) **FARWELL'S WATER-MILFOIL**. Leaves in whorls of 3s or 6s or scattered, narrow, feather-parted, the divisions thread-like, in 5 to 7 opposite pairs with minute black spines at the axils. Petals 4, oblong; styles 4. Still water. Maine, westward.

Order XV.—UMBELLALES. Order of Umbelliferous Plants.

Herbs, shrubs or trees. Flowers in umbels or umbel-like heads. Ovary surrounded by the calyx which is superior to it; each cell of the ovary containing a single ovule. Calyx segments little developed or absent. Stamens free from each other and equal in number with the petals, alternate with them.

Stamens 5, flowers in umbels.

Fruit composed of 2 dry carpels, which separate at maturity **UMBELLIFERAE**

Fruit a fleshy berry **ARALIACEAE**

Stamens 4. Trees and shrubs. Flowers in heads or umbel-

like groups **CORNACEAE**

FAMILY I.—**ARALIACEAE**. GINSENG FAMILY

Herbs, shrubs or trees, perennial. Leaves all compound. Flowers small; stamens 5. Fruit a fleshy berry. Calyx tube surrounding and adhering to the ovary, 5-toothed.

Leaves alternate **Aralia**

Leaves in a whorl **Panax**

1. **ARALIA**, L.

Herbs, shrubs or trees, with alternate compound leaves and small white or greenish flowers in umbels or heads. Calyx of 5 divisions; petals 5; stamens 5; ovary 5-celled.

Shrub or tree *A. spinosa*
Herbs.

Umbel compound on a lengthened axis *A. racemosa*

Umbels of about 3 secondary umbels *A. nudicaulis*

Umbel of a single head *A. hispida*



PLATE 106

1. *Panax trifolium*. 2. *Aralia nudicaulis*. 3. *A. hispida*. 4. *A. racemosa*.
5. *Panax quinquefolium*.

1. *A. spinosa*, L. HERCULES'S CLUB. ANGELICA TREE. Shrub or low tree, with thick stem, with prickles on the branches. Leaves doubly compound, of several pairs of egg-shaped, thick leaflets, with an odd one for each division. River banks, in southern part of our region. June-Aug.

2. *A. racemosa*, L. (Fig. 4, pl. 106.) AMERICAN SPIKENARD. A large, much branched herb, with egg-shaped leaflets, which are heart-shaped at base and slender pointed at apex. Umbel on an extended axis, giving the cluster of flowers a more or less pyramidal shape. Flowers greenish; fruit a dark purple or brown berry. Rich woods. July-Aug.

3. *A. nudicaulis*, L. (Fig. 2, pl. 106.) WILD SARSAPARILLA. Stem divides before or almost immediately after leaving the ground into a leaf-stem and a flower-stem. The former axis straight and slender about 1 ft. high, when it divides into 3 branches, each bearing 3 or 5 leaflets, which are oval or egg-shaped. The flower-stem is shorter and naked to the summit where a three branched umbel is found, each branch of the umbel bearing a small rounded umbel or head. In woods. Common. May-June.

4. *A. hispida*, Vent. (Fig. 3, pl. 106.) WILD ELDER. A plant, shrubby at base, more or less bristly, 1 to 2 ft. high. Leaves doubly compound; leaflets egg-shaped, toothed at the edges. Umbels on long slender flower-stems. Common about decaying stumps and rocky places. July-Aug.

2. PANAX

Herbs or shrubs. Our species herbs, arising from a globose or spindle-shaped root with a slender stem branching into 3 leaf-stalks at the top, each bearing 5 or less leaflets, which are inversely lance-shaped, or inversely egg-shaped, and a single flower-stem bearing a rounded umbel of a few white flowers. Stamens 5. Fruit a somewhat flattened berry.

1. *P. trifolium*, L. (Fig. 1, pl. 106.) DWARF GINSENG. GROUND NUT. Plant, 3 to 8 in. high, in moist woods. Leaflets 3 to 5, the lower pair single, the upper ones inversely lance-shaped. Root globular. Woods. common. April-June.

2. *P. quinquefolium*, L. (Fig. 5, pl. 106.) GINSENG. A large plant, 8 to 15 in. high. Root spindle-shaped. Leaves inversely egg-shaped. Rich woods, New England. April-May.

FAMILY II.—UMBELLIFERAE. CARROT OR PARSLEY FAMILY

Herbs, with usually hollow stems and alternate leaves which, in all but a few species, are compound. Leaf-stalks expanded, often forming a sheath to the stem. Flowers in umbel, that is, the flower stems of the cluster of flowers all spring from one point and radiate like the rays of an umbrella. In general each primary ray gives off a secondary group, which is known as an *umbellet*, on which are borne the flowers. The flowers are small and individually inconspicuous, but the groups or umbels constitute showy heads or clusters, as for example, those of the wild carrot. At the base of the umbel in certain species there is found a whorl of bracts

which is known as the *involucre*, this involucre may be simple or divided. In several species in which no involucre is found when the umbel is mature some small bracts may be found at an earlier stage, but these fall as the umbel approaches the mature state. In other species while there is no whorl of bracts, involucre, at the base of the primary umbel, there is an *involucel* at the base of the *umbellet*. This involucel may be found also in connection with the involucre. The small corolla has 5 petals; calyx 5-toothed, adhering to the ovary; stamens 5; pistils 2. Fruit of 2 dry cohering carpels. The fruit is usually oval or rounded but is sometimes long and spindle-shaped and, in case of the *Sanicles*, the fruit is covered with hooked spines forming a bur-like body.

Flowers white, or at least not yellow; *seeds rounded or oval*.

Leaves not compound.

Leaves long, narrow, with spiny teeth . . . **Eryngium**

Leaves round **Hydrocotyle**

Leaves reduced to hollow leaf-stalks . . . **Liliaeopsis**

Leaves compound.

Involucre to main umbel present.

The bracts dissected or at least divided.

Leaves dissected.

Fruit flattened, ribs bearing bristly
hairs **Daucus**

Fruit oval, without bristles **Ptilimnium**

Bracts of the main umbel not finely divided or at
most only toothed or ternately cleft.

Leaves of 3 sets of trifoliate leaflets **Ligusticum**

Leaves of 3 to 5 leaflets radiating from a
common center **Sanicula**

Leaves of stem compound, feather-formed,
(*once pinnate*).

Involucre of linear bracts . . . **Sium**

Involucre of broad leaf-like bracts **Berula**

Leaves compound, doubly feather-formed.

Segments of leaflets narrowly linear **Carum**

Segments somewhat broad.

Stem spotted **Conium**

Main umbel without involucre or with few small
bracts which fall early.

Umbellets with involuclers.

Segments of leaflets rather broad **Conioselinum**Segments narrow linear **Aethusa**Leaflets not dissected **Cicuta**Fruit compressed **Angelica**

Umbellets without involuclers.

Fruit densely bristly . . **Caucalis**

Fruit not bristly.

Leaves finely dissected **Apium**Leaves simply or doubly feather-formed
compound.Fruit compressed. Leaves not dis-
sected **Angelica**Leaflets round deeply toothed **Pimpinella**Leaflets lance-shaped **Oxypolis**Leaflets linear **Cicuta**

Leaves of 3 broad leaflets (ternate).

Flower umbels regular . . **Heracleum**Flower umbels irregular . **Cryptotaenia**

Leaves doubly ternate.

Sea coast plant . . . **Coelopleurum**Inland plant **Aegopodium***Fruit long spindle-shaped*

Fruit less than an in. long.

Long tapering at base

. . . . **Chaerophyllum**Blunt at base . . **Osmorhiza**

Fruit and appendage more than an

inch long **Scandix***Flowers Yellow*Leaves undivided, the stem appearing to penetrate the leaf
plate **Bupleurum**Leaves feather-formed, of deeply lobed leaflets . . **Pastinaca**

Leaves ternately or bi-ternately divided.

Borders of leaflets notched.

Fruit laterally flattened **Zizia**Fruit not flattened **Thaspium**

Borders of leaflets not notched	Pimpinella
Leaves of 3 to 7 radiating lobes	Sanicula

Flowers Purple

Leaves radiating	Sanicula
Leaves ternately divided	Thaspium

*Flowers white. Seeds rounded or oval**Leaves not compound***I. ERYNGIUM, L.**

Herbs, with spiny toothed elongated leaves. In our two species the leaves are grass-like, with spines along both edges. Flowers are collected in dense heads, below each of which is an involucre of conspicuous bracts both at the base of the individual head and at the base of the group of heads. Calyx lobes somewhat leafy; petals white or bluish.

1. **E. aquaticum**, L. (Fig. 6, pl. 109.) **BUTTON SNAKE-ROOT**. Stem 2 to 6 ft. high. Leaves from 1 to 2 ft. long, about an in. wide, with parallel veins and with the edges armed with spines. Heads rounded, averaging about $\frac{1}{2}$ in. diameter. Low grounds, New Jersey and westward. July-Aug.

2. **E. virginianum**, Lam. (Fig. 5, pl. 109.) **VIRGINIA ERYNGO**. Stem 1 to 3 ft. high; leaves, the upper grass-like with spines at the borders; 2 to 8 in. long. The basal leaves long and narrow on a leaf-stalk. Heads about $\frac{1}{2}$ in. diameter. Marshes near sea-coast, New Jersey and southward. July-Sept.

By some authorities this is regarded as only a variety of *E. aquaticum*.

2. HYDROCOTYLE, L.

Marsh herbs, ours quite small, prostrate and rooting at joints. Leaves of our species round with leaf-stem near the middle; whole plant smooth. Flowers small, white in small heads, either simple or one head above the other on the flower stem.

1. **H. umbellata**, L. (Fig. 4, pl. 111.) **MARSH PENNYWORT**. Stem creeping, several in. long, rooting at joints. Leaf-stem arising from the creeping stem and above the small fasciculus of roots. Leaves round, veins radiating from near the center. Flowers in small round heads or umbels at the summit of the flower stem. Wet places, eastern Mass., and southward. Nearly all summer.

2. **H. Canbyi**, C. and R. (Fig. 5, pl. 111.) **CANBY'S PENNYWORT**. Resembles No. 1, but flowers are in several small heads, one above the other on the flower stem. *Flower stem considerably longer than leaves*. Wet grounds, New Jersey and southward. June-Sept.

3. **H. verticillata**, Thumb. (Fig. 6, pl. 111.) **WHORLED MARSH PENNYWORT**. Flower heads very small, one above the other; *the flower stem shorter than the leaves*. Mass., and southward. June-Sept.

4. **H. americana**, L. (Fig. 7, pl. 111.) **AMERICAN MARSH PENNYWORT**. Stems thread-like; leaf stem affixed near the border of the rounded

heart-shaped leaves. Flowers on a very short flower stem, only from 1 to 5 very small flowers in the cluster. Wet places, throughout our area. June-Sept.

3. LILAEOPSIS, Greene. (*Crantzia*, Nutt.)

Small creeping herbs, rooting at the joints, in the mud. Leaves simply hollow cylindric stems. The few white flowers in small heads, with involucre below the head.

L. lineata, (Michx.) Greene. (Fig. 6, pl. 107.) LILAEOPSIS. Leaves about 1 to 3 in. high, from the creeping root. In salt marshes. July-Aug.

Leaves compound; seeds rounded. Involucre to main stem present. Involucre bracts finely dissected

4. DAUCUS.

Herbs, with more or less bristly hairs and with much-divided leaves and with leaf-like bracts of the involucre, which are divided into linear or thread-like segments. Flowers white in compound umbels. Fruit oval with 5 slender ribs which are winged, each rib bearing a single row of barbed hairy prickles.

D. carota, L. WILD CARROT. Our wild carrot, now found too abundant in meadows and fields as well as at roadsides. All summer.

5. PTILIMNIUM, Raf. (*Discopleura*, DC.)

Herbs, smooth, branching, annual. Leaves finely dissected. Involucre of leaf-like bracts which are divided into thread-like segments. Flowers white, in secondary umbels each with its involucre. Fruit egg-shaped, ribs without bristles. Calyx teeth small or none.

P. capillaceum, (Michx.) Hollick. (Fig. 1, pl. 111.) MOCK BISHOPWEED. Plant 1 to 2 ft. high, leaves dissected into thread-like segments. Umbels compound with involucre and involucels. Wet soil. June-Oct.

Flowers white. Fruit rounded, involucre bracts not divided or at most only toothed or ternately cleft

6. LIGUSTICUM, L.

Plant smooth, with compound leaves. Umbels subtended by narrow bracts or none. Leaves of our species of 3 divisions each terminated by 3 wedge-shaped, deeply notched leaflets, each leaflet from 1 to 4 in. long.

L. scoticum, L. (Fig. 10, pl. 111.) SEA PARSLEY. SCOTCH LOVAGE. Plant growing at seaside, 1 to 2 ft. high. Stem simple, or slightly branched above. Leaflets wedge-shaped, mostly 3-lobed and deeply notched. Fruit oblong. July-Aug.

7. SANICULA, L.

Plants smooth with alternate leaves, which are divided into 3 to 5 segments, which radiate from the leaf stem. Rays of umbel few, each terminated by from 1 to 3 or more bur-like heads. Involucre leaf-like of 2 or more broad greenish bracts, which in Nos. 1 and 3 are ternately divided. Fruit globular, without ribs but thickly beset by hooked prickles.

1. *S. marylandica*, L. (Fig. 1, pl. 109.) SANICLE. Plant, 1 to 4



PLATE 107

1. *Zizia cordata*. 2. *Z. aurea*. 3. *Apium leptophyllum*. 4. *Caucalis anthriscus*. 5. *Pimpinella integrerrima*. 6. *Lilaeopsis lineata*. 7. *Angelica villosa*.

ft. high. Leaves of 3 to 7 radiating lobes, the divisions sharply toothed. Involucre of broad leaf-like bracts often ternately divided. Flowers greenish-white. Several sterile flowers in each group on *long pedicels*. In rich woods throughout our region. May-July.

2. *S. gregaria*, Bicknell. (Fig. 2, pl. 109.) CLUSTERED SANICLE. Similar to No. 1, but plants thickly clustered and *flowers yellow*. Woods and thickets, southern New York and southward. May-June.

3. *S. canadensis*, L. (Fig. 4, pl. 109.) SHORT-STYLED SANICLE. Similar to No. 1, but there are few sterile flowers and those on *short pedicels*. Flowers white. Dry woods, Mass., southward. June-Aug.

4. *S. trifoliata*, Bicknell. (Fig. 3, pl. 109.) LARGE-FRUITED SANICLE. More slender than either of the other forms. 1 to 2½ ft. high. Leaves *ternately* divided as are the broad bracts of the umbel. Flowers white. Woods, southern New York, Conn., and northward. June-July.

8. SIUM, L.

Herbs of wet places, with feather-formed stem leaves, the lower leaves being often dissected, and with compound umbels and umbellets having involucre of narrow bracts. Flowers white. Fruit oval or egg-shaped, compressed, prominently ribbed, not bristly.

S. cicutaefolium, Gmel. (Fig. 4, pl. 108.) HEMLOCK WATER PARSNIP. A stout plant in marshes, 2 to 6 ft. high. Leaf-stems sheathing at base, the leaf consisting of from 7 to 17 linear leaflets, these sharply notched at borders. The lowest leaves often finely dissected. In swamps and salt marshes. July-Oct.

Var. *S. Carsonii*, Durand. CARSON'S WATER PARSNIP. More slender than No. 1, 1 to 2 ft. high. Leaf of 3 to 7 linear or lance-shaped leaflets, sharply toothed. In streams. July-Aug.

9. BERULA, Hoffm.

Smooth plant in marshes or in water. Leaves feather-formed, the leaflets, about 15, more or less, often partly divided but all with sharp teeth. Fruit orbicular with smooth slender ribs.

B. erecta, (Huds.) Hoffm. (Fig. 9, pl. 111.) CUT-LEAVED WATER PARSNIP. In swamps and streams, 1 to 2 ft. high, stout, branched. Leaflets 7 to 19, oval, often partly divided, borders sharply notched. Umbels with rather conspicuous involucre, umbellets with small narrow bracts. Fruit orbicular with inconspicuous ribs. July-Sept.

10. CARUM, L.

Our species an herb, escaped from cultivation. Leaves feather-formed or doubly feather-formed, the leaflets of thread-like segments. Involucre for the main umbel. Leaf-stem clasping. Seeds aromatic.

C. carui, L. CARAWAY. Plant, 1 to 2 ft. high. Involucre of 1 to 3 narrow bracts. Waste places. May-July.

11. CONIUM, L.

Tall smooth herb, in waste places, generally in rich soil. Stems branching, spotted. Leaves twice feather-formed, the segments deeply incised.

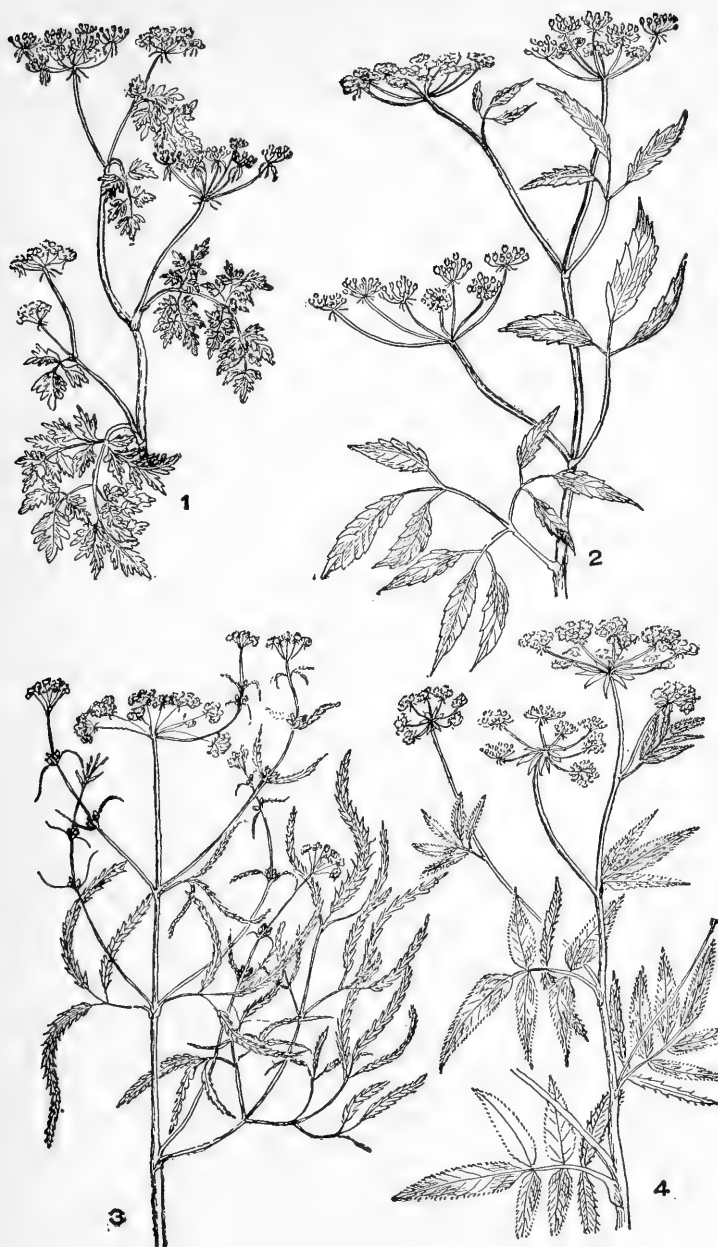


PLATE 108

1. *Conium maculatum*. 2. *Cicuta maculata*. 3. *C. bulbifera*. 4. *Sium cicutaefolium*.

Flowers small, white in many rayed umbels. The umbels and umbellets supplied with involucre bracts. Calyx teeth obscure or absent; petals small. Fruit flattened, wavy ribbed.

C. maculatum, L. (Fig. 1, pl. 108.) POISON HEMLOCK. Leaves finely dissected, the divisions, however, not thread-like, but deeply notched narrow plates. In waste places throughout our area. June-July.

12. CAUCALIS, L.

Plants, in stems and foliage much resembling the carrot. Involucre absent. Flower umbels of our species either in the form of a rather close head or of an umbel with few rays. Calyx teeth 5, prominent. Flowers white or tinged with pink. Fruit with prickles or hooks arranged along the ribs.

1. **C. nodosa**, (L.) Hudson. KNOTTED HEDGE PARSLEY. Stem reclining, branched only at base. Leaves dissected into linear segments. Flowers in heads opposite the leaves. Fruit long-oval armed with long stiff hairs or prickles. Waste places. May-Aug.

2. **C. anthriscus**, (L.) Hudson. (Fig. 4, pl. 107.) ERECT HEDGE PARSLEY. Plant, 2 to 3 ft. high, erect. Leaflets not so finely dissected as in No. 1. Flowers in few rayed umbels. Fruit long-oval, very bristly. Waste places, Philadelphia, etc. July-Sept.

13. CONIOSELINUM, Hoffm.

Tall slender herbs, without hairs, with finely dissected, doubly compound leaves. Involucre to main umbel absent, or of a few bracts which fall early. Involucels of secondary umbels present. Fruit oval, flattened, ribs on the back prominent, those of the sides extended into wings. Calyx teeth absent.

C. chinense, (L.) BSP. (Fig. 3, pl. 111.) HEMLOCK PARSLEY. Stem round, 2 to 5 ft. high, striped. The lower leaves on long leaf-stalks, the upper with short stalks or none. Flower umbels 9 to 16 rayed, the umbellets with a few narrow bracts. Wings of the seed nearly as broad as the seed itself. Cold swamps, southern New York and northward. Aug-Oct.

14. AETHUSA, L.

Poisonous herbs, with much the appearance of the Carrot in respect to stem and foliage. Umbels not flattened at tip like carrot, but more or less rounded. The two bracts of the umbellet are narrow and long and both turn in the same direction.

A. cynapium, L. (Fig. 11, pl. 109.) FOOL'S PARSLEY. Stem 1 to 2 ft. high. In waste grounds that have been cultivated. Waste places throughout our area. June-Aug.

15. CICUTA, L.

Tall poisonous herbs, found in swamps. Leaves doubly compound but leaflets not dissected. Umbels of white flowers, involucre absent or falling early. Involucels present, of many bracts. Fruit smooth, ribs not prominent.



PLATE 109

1. *Sanicula marylandica*. 2. *S. gregaria*. 3. *S. trifoliata*. 4. *S. canadensis*, basal leaf. 5. *Eryngium virginianum*. 6. *E. aquaticum*. 7. *Thaspium trifoliatum*. 8. *Coelopleurum Gmelini*. 9. *Aegopodium Podagraria*. 10. *Chaerophyllum procumbens*. 11. *Aethusa cynapium*.

1. *C. maculata*, L. (Fig. 2, pl. 108.) WATER HEMLOCK. SPOTTED COWBANE. Stem stout, 2 to 6 ft. high, streaked with purple and arising from fleshy tuberous root-stocks. Leaves doubly or trebly compound; leaflets lance-shaped, 1 to 5 in. long coarsely toothed at margins. Umbels of many rays, without bracts. *Flowers white. Plant very poisonous in all its parts.*

2. *C. bulbifera*, L. (Fig. 3, pl. 108.) BULB-BEARING WATER HEMLOCK. Plant much branched, 1 to 3 ft. high. Leaflets linear. The upper leaves bear bulblets at the axis of the leaves. Swamps throughout our area. July-Sept.

16. ANGELICA, L.

Stout, erect, branching herbs, with twice or thrice compound leaves and large umbels of white or greenish flowers. Involucres absent or scanty. Involucels of several small bracts. Umbels compound, of white flowers; many rays. Calyx teeth absent. Fruit strongly flattened, the primary ribs very prominent, the laterals forming distinct wings.

1. *A. Curtisii*, Buckley. CURTIS'S ANGELICA. Erect, 2 to 3½ ft. tall, smooth; leaves doubly or trebly compound, the leaflets, 5 to 7, egg-shaped and one sided with sharp irregular teeth at margins. Southern part of our area. Aug.-Sept.

2. *A. atropurpurea*, L. (Fig. 5, pl. 110.) PURPLE-STEMMED ANGELICA. A very stout plant, from 4 to 6 ft. high, with dark purple stem. Leaves compound, the segments of from 5 to 7 leaflets which are lance- or egg-shaped with sharp teeth at margins. River banks. June-July.

3. *A. villosa*, (Walt.) BSP. (Fig. 7, pl. 107.) PUBESCENT ANGELICA. More slender than No. 1 or 2; 2 to 6 ft. high. The umbels and upper part of the stem densely downy. Dry soil, Connecticut and southward. July-Aug.

17. APIUM, L.

Annual and biennial smooth herbs. Leaves compound, divided in 3 main segments, which latter may be composed of broad or of narrow linear elements. Umbels compound with no bracts or with few. Flowers white. Fruit oval, laterally compressed.

A. leptophyllum, (DC.) F. Muell. (Fig. 3, pl. 107.) FINE-LEAVED MARSH PARSLEY. Plant, 3 to 24 in. high, slender, branched. Leaves divided in 3 parts, each subdivided into fine linear segments. Umbels of inconspicuous white flowers. New Jersey and southward. June-Aug.

18. PIMPINELLA, L.

Smooth herbs, with leaves once or twice compound. Involucres and involucels absent. Flowers white or yellow. Fruit 5-angled.

Flowers white *P. saxifraga*
Flowers yellow *P. integerrima*

1. *P. saxifraga*, L. BURNETT SAXIFRAGE. Smooth, erect, 1 to 3 ft. high. Leaves feather-formed, the leaflets, 9 to 19, egg-shaped or nearly round, with very compound sharp teeth at the margins. Flowers white. Waste places, southern part of our area. June-Oct.

2. *P. integerrima*, (L.) A. Gray. (Fig. 5, pl. 107.) YELLOW PIM-

PERNELL. Smooth with a whitish bloom on stem and leaves; 1 to 3 ft. high, branching. Leaflets lance- or egg-shaped, not dissected and without marginal teeth. Rays of the umbel numerous. *Flowers yellow*. Rocky or sandy soil, eastern Pennsylvania and in New Jersey. May-June.

19. OXYPOLIS, Raf. (*Tiedemannia*, DC.)

Erect aquatic herb, without hairs. Leaves simple feather-formed (in our species). Rays of umbel few, compound, ours without involucre. Flowers white. Calyx teeth 5. Fruit without bristles, ribbed, the lateral ribs winged.

O. rigidus, (L.) Britton. (Fig. 6, pl. 110.) COWBANE. Plant growing in swamps, 2 to 5 ft. high. Leaves, the lower ones sometimes a foot long of 3 to 9 narrow but thick leaflets, remotely toothed on the margins. New York and southward. Aug.-Sept.

20. HERACLEUM, L.

Tall herb, leaves ternate, of broad leaflets each of which is deeply lobed. Umbels of white flowers, the latter rather larger than those of most species in this family. Petals heart-shaped or 2-lobed. Involucels of several narrow bracts.

H. lanatum, Michx. (Fig. 11, pl. 111.) COW PARSNIP. Plant 4 to 8 ft. high, woolly with grooved stem, which is thick and rigid. Leaves, on leaf-stalks, divided into 3 large rounded or egg-shaped lobed leaflets, which beside the deep lobes are sharply toothed at the margins. The flowers, on large umbels, are larger and individually more showy than any of the family, bearing white flowers, in our region. Moist grounds, throughout our area. June-July.

21. CRYPTOTAENIA, DC. (*Deringa*, Adams)

Erect plant, with 3-parted leaves and umbels of very unequal rays. Fruit oblong, carpel with 5 ribs, calyx teeth absent. Involucre and involucels absent.

C. canadensis, DC. (Fig. 2, pl. 110.) HONE WORT. Plant smooth, 1 to 2 ft. high. Leaves of 3 large ovate leaflets which are toothed at the margins, the center leaflet generally only slightly lobed, the side leaflets commonly deeply lobed. Fruit narrow at both ends. Flowers small, white. Moist woods, throughout our area. June-July.

22. COELOPLEURUM, Ledeb.

Stout smooth herb, found at sea-coast with leaves once or twice 3-parted. Leaves on leaf-stalks which are greatly inflated. Umbels large, involucre absent or falling very early. Involucels of narrow bracts often deciduous, never conspicuous. Fruit oblong to globose, the lateral ribs slightly broadest. Flowers greenish-white.

C. Gmelini, (DC.) Ledeb. (Fig. 8, pl. 109.) SEA COAST ANGELICA. Plant 1 to 3 ft. high. Leaflets egg-shaped, deeply toothed and often lobed at margins. Fruit about 1/5 in. long. Sea coasts, Mass., and northward. Summer.

23. **AEGOPodium**, L.

Coast herb, with leaves once or twice 3-parted. Leaflets egg-shaped, sharply toothed, umbels large; calyx teeth absent. Fruit egg-shaped, smooth with thread-like ribs. Seed cylindric.

A. Podagraria, L. (Fig. 9, pl. 109.) GOUTWEED. Plant 1 to 2½ ft. high. Found in waste places. June-Aug.

Fruit long, spindle-shaped

Flowers White

24. **CHAEROPHYLLUM**, L.

Herbs, with leaves twice 3-parted, the leaflets deeply incised, making feather-formed segments. Flowers white; calyx teeth absent. Fruit oblong to linear. Umbels of few rays, compound, the umbellets also few rayed. Involucres absent, involucels of several small bracts.

C. procumbens, (L.) Crantz. (Fig. 10, pl. 109.) SPREADING CHERVIL. Plant somewhat downy, ½ to 1½ ft. high. Leaves on long leaf-stalks. Flowers few in each umbel. Moist grounds, New York and southward. April-June.

25. **OSMORHIZA**, Raf. (*Washingtonia*, Raf.)

Ours, downy herbs, with compound leaves and white flowers. Umbels few rayed, involucres absent, involucels of a few bracts. Calyx teeth absent. *Fruit linear* with short beak, 5-angled. Roots thick, aromatic.

1. **W. Claytoni**, (Michx.) Clarke. (Fig. 8, pl. 111.) WOOLLY SWEET-CICELY. Somewhat stout, *decidedly downy*. Leaves twice 3-parted, the central leaflet of each division more or less feather-formed, and all the divisions more or less incised. Umbels 2 to 6 rayed. Fruit about ½ in. long. Woods, throughout our area. May-June.

2. **W. longistylis**, (Torr.) DC. SMOOTHER SWEET-CICELY. Much less hairy than No. 1. Woods, common. May-June.

26. **SCANDIX**

Herbs, with finely dissected leaves and with few rayed umbels and white flowers. Involucre absent or of a single bract, involucels present. Fruit *greatly elongated*, the "beak" much longer than the body.

S. Pecten-Veneris, L. (Fig. 4, pl. 110.) VENUS'S COMB. SHEPHERD'S NEEDLE. Plant 6 in. to 18 in. high, much branched. Leaves finely dissected. Fruit with its beak 2 in. or more in length. Waste places. Introduced. May-July.

Flowers Yellow

(*Thaspium trifoliatum*, Purple)

27. **BUPLEURUM**, L.

Herb, with clasping leaves or with the stems apparently passing through the leaves and with compound umbels of yellow flowers. Involucre absent, involucels of 5 conspicuous, rather broad bracts. Calyx teeth absent. Fruit oblong; ribs slender.



PLATE 110

1. *Pastinaca sativa*. 2. *Cryptotaenia canadensis*. 3. *Bupleurum rotundifolium*. 4. *Scandix Pecten-Veneris*. 5. *Angelica atropurpurea*. 6. *Oxypolis rigidus*.

B. rotundifolium, L. (Fig. 3, pl. 110.) HARE'S EAR. MODESTY. Plant 1 to 2 ft. high, common in cultivated grounds. July-Aug.

28. PASTINACA, L.

Tall, stout, smooth herb, with large feather-formed leaves, broad umbels without involucre or involucels and with yellow flowers. Fruit oval, smooth, much flattened. Ribs very slender.

P. sativa, L. (Fig. 1, pl. 110.) WILD PARSNIP. Plant 2 to 5 ft. high; stem grooved. Leaflets about 3 pairs and an odd one, broadly egg-shaped, or lobed; margins with coarse teeth. In waste lands. June-Sept.

29. ZIZIA, Koch.

Herbs, smooth with at least the upper leaves once or twice 3-divided or the basal leaves undivided. Umbels of yellow flowers without involucre, the involucels consisting of a few small bracts. Fruit ovate or oblong.

1. **Z. aurea**, Koch. (Fig. 2, pl. 107.) GOLDEN ALEXANDERS. GOLDEN MEADOW PARSNIP. Erect, 1 to 2½ ft. high. Lower leaves on long leaf-stalks, the very upper ones of three leaflets without leaf-stalk, the intermediate on moderately long leaf-stalks twice 3-parted. Leaflets egg-shaped, with sharply toothed margins. Rays of the umbel 12 to 25. Flowers yellow. Wet fields, throughout our area. April-June.

2. **Z. cordata**, DC. (Fig. 1, pl. 107.) HEART-LEAVED ALEXANDERS. Branched, 1 to 3 ft. high. Lower leaves undivided, margins toothed, on long leaf-stalks. Stem leaves 3 or 5 parted, with egg-shaped or lance-shaped leaflets. Woods and moist places, southern New Jersey, New York, Connecticut, and southward. May-June.

30. THASPIUM, Nutt.

Herbs, 2 to 5 ft. high, with 3-parted or twice ternate leaves, the leaflets of which are sometimes lobed and always deeply toothed. The basal leaves sometimes without division. Flowers in compound umbels without involucre but with involucels of a few bracts. Color of flowers yellow or purple. Fruit oval, the carpels ribbed and winged.

1. **T. trifoliatum**, (L.) Britton. (Fig. 7, pl. 109.) PURPLE MEADOW PARSNIP. Plant 1 to 2 ft. high. Basal leaves sometimes undivided, upper ones once or twice 3-parted. Leaflets egg-shaped or lance-shaped, with serrated margins. Petals dark purple. Rare, Rhode Island, New Jersey, and southward. June-July.

2. **T. barbinode**, (Michx.) Nutt. HAIRY JOINTED MEADOW PARSNIP. Erect, 2 to 4 feet, branched. At joints a tuft of hairs. Leaves once, twice or thrice 3-parted. Leaflets egg-shaped to lance-shaped, sometimes lobed, margins toothed. Flowers bright yellow. Banks of streams, throughout our area. May-June.

FAMILY III.—CORNACEAE. DOGWOOD FAMILY

Shrubs or trees; one plant, *Cornus canadensis*, in our area, small, herbaceous in appearance. Leaves without stipules, opposite



PLATE 111

1. *Ptilimnium capillaceum*. 2. *Imperatoria ostruthium*. 3. *Conioselinum chinense*. 4. *Hydrocotyle umbellata*. 5. *H. Canbyi*. 6. *H. verticillata*. 7. *H. americana*. 8. *Osmorhiza Claytoni*. 9. *Berula erecta*. 10. *Ligusticum scoticum*. 11. *Heracleum lanatum*.

or rarely alternate. In all of our species the margins are entire. Flowers in umbel and umbel-like clusters. They have generally 4 or 5 divisions of the calyx, which is joined to the ovary. Petals also 4 or 5, alternate with the calyx teeth, or they may be absent. Stamens equal in number with the petals when petals are present, and opposite to them. Style 1. Ovary surrounded by the calyx, which adheres to it, of 1 or 2 cells. Fruit a fleshy berry with 1 or 2 hard woody seeds.

1. CORNUS, L.

Leaves opposite or in a whorl or, in a single instance in our region, alternate. Flowers with stamens and pistils, small, in heads or umbels. When in heads the group of flowers is surrounded by an involucre of broad white bracts which simulate petals.

Low herbaceous appearing plants, flowers greenish *C. canadensis*
 Tree with greenish flowers in a head with 4 large petal-like bracts . . . *C. florida*
 Shrubs with umbel-like clusters of flowers, without involucre.

Leaves alternate *C. alternifolia*
 Leaves opposite.

Under surface of leaves covered with a woolly pubescence.

Leaves nearly round *C. circinata*
 Leaves oval or nearly lance-shaped, fruit blue . . . *C. Amonum*
 Leaves oval, the upper surface and the young branches
 rough, fruit white *C. asperifolia*

Under surface of leaves smooth or with fine silky hairs.

Young twigs red or bright purple *C. stolonifera*
 Young twigs gray *C. paniculata*

1. *C. canadensis*, L. (Fig. 4, pl. 112.) BUNCH BERRY. DWARF CORNEL. A low herbaceous plant, woody only at the base. Leaves in a whorl toward the summit of the stem with a pair or two pairs of small opposite leaves below. The bracts of the involucre, resembling broad petals are white and 4 in number. The real flowers are in the head, enclosed by three bracts and are green. In fruit the plant bears a rounded cluster of bright red berries. In damp woods, common. May-July.

2. *C. florida*, L. (Fig. 2, pl. 112.) FLOWERING DOGWOOD. A slender tree, with spreading branches, with opposite broadly egg-shaped leaves without teeth at the margins and with tapering pointed tips. Flowers greenish-yellow in a crowded head which is surrounded by the 4 large and conspicuous white bracts of the involucre. In woods, generally distributed. April-June.

3. *C. alternifolia*, L. (Fig. 6, pl. 112.) ALTERNATE-LEAVED DOGWOOD. Small tree or shrub, with alternate leaves which are oval with narrow pointed tips on slender leaf-stalks; the young twigs bright red-dish-purple. Branches warty. Flowers white or cream color in umbel-like clusters. Fruit globular, blue when ripe. Woods, common. May-July.

4. *C. circinata*, L'Her. (Fig. 3, pl. 112.) ROUND-LEAVED DOGWOOD. Shrub, with opposite leaves which are broadly oval, nearly round, the tip narrowed to a point, silky white beneath slightly downy above, 2 to 6 in. long. Branches warty. Flowers white in dense umbel-like clusters. Fruit globular, light blue. Shady places, common. May-June.

5. *C. Amonum*, Mill. (Fig. 7, pl. 112.) SILKY DOGWOOD. (*C.*



PLATE 112

1. *Cornus asperifolia*. 2. *C. florida*. 3. *C. circinata*. 4. *C. canadensis*. 5. *C. paniculata*. 6. *C. alternifolia*. 7. *C. Amonum*.

scricea, L.) Branches purple, the smaller woolly. Leaves elliptic or egg-shaped, densely silky with brownish hairs beneath. Flowers yellowish-white, the umbellate clusters rather compact. Fruit dark blue. Woods, and along streams. May-July.

6. *C. asperifolia*, Michx. (Fig. 1, pl. 112.) ROUGH-LEAVED DOGWOOD. General appearance of the shrub similar to last. Leaves rough, hairy above, downy beneath. Fruit globular, white. Wet places. May-June.

7. *C. stolonifera*, Michx. RED OSIER. Shrub, often sending out runners, which take root. Branches slender, the younger bright reddish-purple. Leaves egg-shaped on slender leaf-stalks, with few soft hairs above, whitish silky beneath. Berries bluish-white. Moist places. May-June.

8. *C. paniculata*, L'Her. (Fig. 5, pl. 112.) PANICLED DOGWOOD. (*C. candidissima*, Marsh.) Branches gray, smooth. Leaves lance-shaped or somewhat egg-shaped. Pale, silky beneath. Clusters of flowers pyramidal. Berries bluish-white.

2. NYSSA, L.

Our species large trees, with rough bark. Leaves alternate without teeth at the margins. Flowers small, greenish, the stamens and pistils on different flowers or different trees or perfect and imperfect flowers on the same tree. Petals 5, minute and fleshy; stamens 10. Pistillate flowers few in a group, staminate flowers numerous. Berry oval, one-seeded.

1. *N. sylvatica*, Marsh. PEPPERAGE. SOUR GUM. Large tree, with rough bark. Leaves alternate, oval, smooth at margins, pointed at each end. Berry nearly black. Swamps and rich soil. April-June.

2. *N. biflora*, Walt. SOUTHERN TUPELO. Similar to No. 1. Leaves mostly smaller, oval or pear-shaped, mostly obtuse at apex. Swamps and along ponds. New Jersey and southward.

Sub-Class II. SYMPETALAE

Called also Gamopetalae, or Monopetalae

Plants, the flowers of which nearly always have both a calyx and corolla and which have the petals more or less united at the base, forming a corolla, which seems to be a single, undivided or only partially divided envelope.

SYMPETALOUS OR MONOPETALOUS EXOGENS

Of the groups of plants thus far described we have found either an absence of petals or when, as in the greater number of groups there has been present a corolla, it has consisted of several petals, as in case of the rose, the buttercups, and the members of the pea family.

In case of the sub-class now to follow, the general rule is that all the petals are so united as to appear as a single member, as in the morning glory and the blue bell. To this complete union there are, however, some exceptions, for the clethra and some of the pyrolas and even some plants of the heath family besides a few others, have corollas divided nearly or quite to the base, thus forming an envelope of several petals. Other characters of these plants hold them in the sub-class to which they really belong, yet to which they form, in respect to the petals, exceptions. Thus, for example, the corolla in some pyrolas is composed of a single member with moderate sinuses between its 5 elementary parts. In case of other pyrolas the sinus is so deep that the corolla is practically divided into 5 distinct petals. Yet these pyrolas are evidently closely allied to each other.

In a few cases, as in *Fraxinus* and *Glaux*, the corolla is absent.

In general the calyx has 5 points and, as we observe in the morning glory, the corolla is usually 5 pointed.

There are, in a considerable group, 5 stamens; in another group this number is doubled, while in still another group there may be less than 5 or more than 10 stamens.

KEY TO THE ORDERS OF SUB-CLASS II

The Sympetalous or Monopetalous Exogens

(Characters are for plants within our area only).

1. OVARY SUPERIOR

(The corolla and calyx form, each a whorl *below* the ovary to which neither is attached. Exceptions: Family *Vacciniaceae*, Family *Symplocaceae*.)

1st. Group. Stamens as many as the lobes of the corolla and *alternate* with them; or stamens twice as many as the corolla lobes. *Stamens* free from the corolla or very nearly so.

. ORDER I. **ERICALES**

2nd. Group. Five stamens *inserted into the corolla*, each *opposite to a lobe of the corolla*, or twice as many as the lobes, or more.

Herbs ORDER II. **PRIMULALES**

Eight to 16 stamens, inserted into the tube of the 4-lobed corolla. Shrubs and trees . ORDER III. **EBENALES**

3rd. Group. Stamens 5 or less, inserted into the corolla tube. When equal in number to the lobes of corolla, *alternate with them*.

Ovaries 2, distinct (except in *Gentianaceae* and in *Mentyanthes*). Flowers regular; leaves mostly opposite; stamens attached to the *lower part* of the corolla tube

. ORDER IV. **GENTIANALES**

Ovary 1, compound; *flowers regular* (irregular in *Echium*).

Stamens mostly joined to corolla tube *above the middle*.

Herbs twining or erect . . ORDER V. **TUBIFLOREAE**

Ovary 1, mostly deeply 4-lobed, around the style. Flowers irregular (regular in *Solanaceae*, in *Mentha* and *Lycopus*).

All irregular corollas 2-lipped. Stamens as many as the lobes of the corolla. Herbs. Capsule 2, rarely 1-seeded.

Leaves mostly opposite . ORDER VI. **VERBENINALES**

Calyx and corolla each of 4 lobes, the latter dry, membranous. Stamens 4. Styles 2, one short, one longer and feathery ORDER VII. **PLANTAGINALES**

2. OVARY INFERIOR

(The calyx and corolla are inserted *above the ovary* and are attached to it.)

Stamens as many as the corolla lobes and free from each other, not forming a tube about the pistils

. ORDER VIII. **RUBIALES**

Stamens fewer than the lobes of the corolla

. ORDER IX. **VALERIANALES**

Stamens at their summit united or leaning toward each other nearly in union ORDER X. **CAMPANULALES**

Order I.—ERICALES. Order of the Heaths

Herbs, shrubs and trees. Corolla with petals united except in a few instances. Stamens as many as the lobes of the corolla and alternate with them, or twice as many, free from the corolla or nearly so, and not forming a tube about the pistils except in Fam. *Diapensiaceae*. Ovary superior to the calyx and corolla to which these are not attached.

Stamens free from the corolla.

Shrubs, the ovary 3-celled, the leaves not persistent, the petals divided so nearly to the base as to be practically polypetalous **CLETHRACEAE**

Perennial herbs, mostly evergreen, ovary 4- or 5-celled. Stamens twice as many as the slightly united petals **PYROLACEAE**

Herbaceous plants, growing from the roots of other plants and without green leaves, petals more or less separate **MONOTROPACEAE**

Ovary superior; shrubs, often with evergreen leaves; stamens usually twice as many as the corolla lobes; ovary 2- to 5-celled **ERICACEAE**

Ovary inferior, the calyx adhering to it; the summit of the
stamens with two prominences,—“two horned.” Fruit a
berry **VACCINIACEAE**

Ovary superior; low tufted shrubs; stamens 5, arising from
the throat of the corolla and alternate with the lobes
. **DIAPENSIACEAE**

FAMILY I.—CLETHRACEAE. WHITE ALDER FAMILY

Our only species a shrub. Flowers regular; sepals 5; petals 5.
Leaves alternate, with serrate borders and with leaf-stalks, falling
in autumn. Flowers in long slender clusters (II, p. 37), white.
Stamens 10. Ovary 3-angled, 3-celled, with numerous ovules.

CLETHRA, L.

Characters, those of the family.

C. alnifolia, L. (Fig. 3, pl. 115.) **WHITE ALDER.** Shrub, 3 to 10 ft.
high; leaves pear-shaped, with sharply toothed borders, except toward the
base. Wet places, mostly near the coast. July-Aug.

FAMILY II.—PYROLACEAE. WINTERGREEN FAMILY

Perennial herbs, low, with long branching root-stocks. Flowers
regular, with stamens and pistils; calyx of 4 or 5 divisions, equal
to the divisions of the corolla. Stamens twice as many as the
lobes of the corolla. The anthers without horns. Style short or
long and slender; often bent toward one side. Capsule 4- or
5-celled. seeds numerous, very small.

Flowers in tall slender spikes (I, p. 37) **Pyrola**
Flowers solitary **Moneses**
Flowers few in a loose umbel-like cluster **Chimaphila**

I. PYROLA, L.

Low herbs, with the leaves crowded at base. Roots branching at base.
Flowers on a slender spike. Corolla of 5 lobes or divisions. Calyx of 5
sepals. Flowers nodding (in case of No. 1, ascending); the pistil in most
cases doubly curved and the stamens leaning toward the outer side of the
corolla. Capsule nearly globular, but compressed, 5-lobed.

Flowers White or Greenish

Style with a double curve, stamens leaning to one (the outer) side of the corolla.
Petals lance-shaped and sharply pointed *P. oxypetala*
Petals broad, obtuse at apex.
Leaves shining *P. rotundifolia*
Leaves dull green.
Leaf-blades leathery, generally shorter than the leaf-stalk
. *P. chlorantha*

Leaf-blades not leathery, generally longer than the leaf-stalk	<i>P. elliptica</i>
Style straight, stamens not leaning to one side.	
Leaves rounded	<i>P. minor</i>
Leaves elliptic	<i>P. secunda</i>

Flowers Pink or Purple

Leaves more or less heart-shaped at base	<i>P. asarifolia</i>
Leaves not heart-shaped at base	<i>P. uliginosa</i>

1. ***P. oxypetala***, Austin. SHARP-PETALED WINTERGREEN. Leaves leathery, dull, egg-shaped, on leaf-stalks longer than the blades. Flowers greenish, about 9 on a slender flower-stalk which is about 8 in. high. Petals lance-shaped with sharply tapering points. Rare. Found in Delaware Co., N. Y., by C. F. Austin. June.

2. ***P. rotundifolia***, L. (Fig. 1, pl. 113.) ROUND-LEAVED WINTERGREEN. (*P. americana*, Sweet.) Leaves shining, nearly round or round egg-shaped; leaf-stalk dilated above. Flower scape $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high with about a dozen nodding white flowers. Style with a double curve; stamens leaning to one side. Common in woods. June-July.

3. ***P. chlorantha***, Swartz. (Fig. 4, pl. 113.) GREEN-FLOWERED PYROLA. Leaves round or broadly oval, leathery, dull green, on leaf-stalks longer than the blades. Flowers greenish, nodding. Calyx segments short and obtuse. Leaves much smaller than those of No. 2 or No. 4. Woods. June-July.

4. ***P. elliptica***, Nutt. (Fig. 2, pl. 113.) PEAR-LEAVED PYROLA. SHIN-LEAF. Leaf blades dark green, broadly oval, thin, not leathery, about $\frac{1}{2}$ as wide as long. Flower scape 5 to 10 in. high, with about a dozen nodding white flowers. Calyx lobe triangular, style with a double curve, stamens leaning to one side. Rich woods. June-Aug.

5. ***P. minor***, L. (Fig. 7, pl. 113.) SMALLER PYROLA. LESSER WINTERGREEN. Leaves rounded on leaf-stalks as long as the blades and dilated toward the blade. Flowers nodding, white; *style straight* and stamens not leaning to one side. On high hills and mountains, northern New England. June-Aug.

6. ***P. secunda***, L. (Fig. 5, pl. 113.) ONE-SIDED PYROLA. Leaves elliptic, thin, on leaf-stalks generally shorter than leaves. Flower scape 4 to 10 in. high, with the nodding white flowers *all on one side* of the scape. *Style straight*, stamens not leaning to one side. Woods and thickets, common.

7. ***P. asarifolia***, Michx. LIVER-LEAVED PYROLA. Leaves round or kidney-shaped, the base heart-shaped, leathery, shorter than the leaf-stalk. Flowers nodding, *purple* with curved style and leaning stamens. Wet woods. Mass., northern New York and northward. June-July.

8. ***P. uliginosa***, Torr. BOG PYROLA. Resembles *P. rotundifolia*, but flowers are purple. A swamp plant, central New York, New England and northward. June.

2. MONESES, Salisb.

A low, smooth herb, with leaves at the base of the stem, which are nearly round with fine serrations at the borders. Stem leaning at base. From the cluster of leaves a flower stem arises bearing a solitary white

nodding flower. Stamens 10; pistil straight, the stigma 5-lobed. Calyx lobes and petal lobes each 4 or 5, generally 5.

M. uniflora, (L.) A. Gray. (Fig. 3, pl. 113.) ONE-FLOWERED WINTERGREEN. Stem with a few whorls of leaves at base. Flower stem 2 to 4 in. high. Flower about $\frac{1}{2}$ to $\frac{3}{4}$ in. broad, shallow cup-shaped. Woods, common. June-Aug.

3. CHIMAPHILA, Pursh.

Small herbs, with shining, thick leaves, which are coarsely toothed at borders, growing near the ground. Flower stem with a few flowers in a spreading umbel-like cluster. Calyx lobes and lobes of corolla each 5. Stamens 10. Ovary 5-lobed.

1. **C. umbellata**, (L.) Nutt. (Fig. 6, pl. 113.) PRINCE'S PINE. Leaves green, shining, long, broader toward apex, the apex blunt. Woods, common. June-Aug.

2. **C. maculata**, (L.) Pursh. (Fig. 8, pl. 113.) SPOTTED WINTERGREEN. Leaves 2-colored, long and narrow, broader toward the base and tapering toward the apex. Woods, common. June-Aug.

FAMILY III.—MONOTROPACEAE. INDIAN PIPE FAMILY

Low herbs, without green foliage, growing mostly as parasites from the roots of trees in dark shady places. Leaves reduced to scale-like bracts. Flowers regular, white; stamens 6 to 12. Petals 3 to 6; calyx 3 to 6 parts. Ovary above the calyx and corolla, 4- to 6-lobed.

Corolla egg- or bell-shaped **Pterospora**
Corolla of several parts.

Flowers solitary **Monotropa**

Flowers several **Hypopitys**

1. PTEROSPORA, Nutt.

A reddish or purple leafless plant, woolly, consisting of a slender scape, from which hang rounded bells or globose fruit, arising from a rounded mass of roots. Calyx 5-parted; corolla with 5 lobes; stamens 10; capsule 5-lobed.

P. andromedea, Nutt. (Fig. 5, pl. 118.) PINE DROPS. Scape 6 to 30 in. high, with from 12 to 50 or more nodding white flowers. In rich woods; rare. June-Aug.

2. MONOTROPA, L.

White, succulent parasitic herb, without leaves, but with white or yellowish bracts along the stem and with a solitary nodding flower which at length becomes more or less upright. Sepals 2 to 4; petals 5 or 6; stamens 10 to 12. Ovary 5-celled.

M. uniflora, L. (Fig. 4, pl. 118.) INDIAN PIPE. Scapes generally in clusters, 4 to 6 in. high, surmounted by the nodding white bell-shaped flower about 1 in. long. In rich woods. June-Aug.

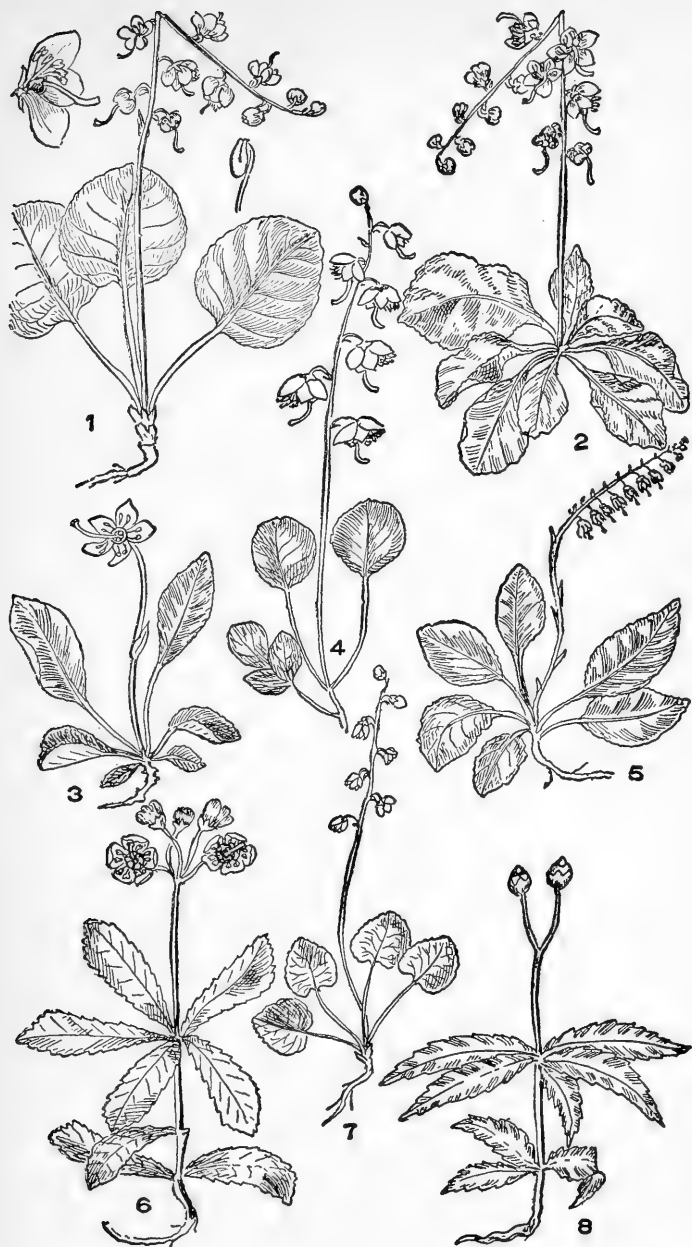


PLATE 113

1. *Pyrola rotundifolia*. 2. *P. elliptica*. 3. *Moneses uniflora*. 4. *Pyrola chlorantha*. 5. *P. secunda*. 6. *Chimaphila umbellata*. 7. *Pyrola minor*. 8. *Chimaphila maculata*.

3. HYPOPITYS, Adams

White, succulent, parasitic herb. Scape slender, with a number of flowers in a narrow cluster at summit. Lower flowers with 3 or 4 petals, terminal one with 5; stamens 8 to 10; capsule 4- to 5-celled. Root a mass of fibers.

H. americana, Small. (Fig. 3, pl. 118.) PINE SAP. (*H. Hypopitys*, Small.) Scapes 4 to 12 in. high, clustered, more or less hairy. Flowers yellowish-white. The lateral flowers have 8 stamens and 4 petals; the terminal one 10 stamens and 5 petals. Woods, throughout our area. June-Oct.

FAMILY IV.—ERICACEAE. THE HEATH FAMILY

Mostly shrubs, rarely, in our region, small trees. Leaves often evergreen, not divided or lobed. Flowers regular or slightly irregular; commonly stamens twice as many as lobes of the corolla, *free from the petals*. Stamen summits (anthers) often sending out on each side a projection or so-called "horn." Ovary 2- to 5-celled. Fruit a berry.

Low undershrubs mostly with the general aspect of herbs

Corolla egg-formed.

Leaves oblong-linear.

Flowers erect *Chamaecistus*

Flowers nodding.

Plant heath-like *Phyllodoce*

Plant moss-like *Cassiope*

Leaves spatula-formed or pear-shaped.

Berry red *Arctostaphylos*

Berry black *Mairania*

Leaves oval.

Fruit a red berry *Gaultheria*

Fruit a globose capsule *Epigaea*

Erect shrubs

Corolla of separate petals.

Leaves brown, woolly beneath *Ledum*

Leaves not woolly beneath *Dendrium*

Corolla formed of united petals.

Corolla very irregular, 2-lipped *Rhodora*

Corolla slightly irregular.

Bell-shaped, stamens 10 *Rhododendron*

Funnel-form, stamens 5 *Azalea*

Corolla regular.

Saucer-shaped, holding anthers in 10 sacs . . . **Kalmia**

Ovoid.

Leaves linear **Andromeda**

Leaves oblong.

Flowers in long, narrow, lateral clusters, not

leafy **Leucothöe**

Flowers in lateral clusters attended by leafy

bracts **Pieris**

Flowers in long, lateral, leafy clusters

. **Chamaedaphne**

Corolla globular **Xolisma**

Leaves minute, overlapping each other . . . **Calluna**

Tree, 15 to 60 ft. high

Corolla ovoid **Oxydendron**

1. LEDUM, L.

Our species a small evergreen shrub, with alternate leaves which are smooth and green above and brown-woolly beneath and are rolled at the borders. Flowers white, in broad umbel-like clusters. Calyx minute; corolla of 5 spreading petals; stamens generally 10; capsule globose.

L. groenlandicum, Oeder. (Fig. 6, pl. 114.) LABRADOR TEA. Shrub, $\frac{1}{2}$ to $2\frac{1}{2}$ ft. high; the younger twigs downy. Leaves elliptic, green above and woolly beneath, borders recurved, $\frac{1}{2}$ to $1\frac{1}{2}$ in. long. Flowers $\frac{1}{4}$ in. broad, about a dozen in a cluster. In bogs and swamps in our area and northward. May-July.

2. DENDRIUM, Desvaux

A very small shrub, with leathery evergreen alternate leaves and many small white flowers in terminal clusters. Calyx 5-parted; petals 5; stamens 10, longer than the petals. capsule egg-shaped.

D. buxifolium, Desvaux. (Fig. 9, pl. 117.) SAND MYRTLE. (*Leio-phyllum buxifolium*, Pers.) Shrub, $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high. Leaves crowded along the stem, oval or oblong, obtuse at apex, shining above, black dotted beneath. Flowers several in broad terminal clusters. Dry sandy places, New Jersey and southward. April-June.

3. CHAMAECISTUS, Oeder. (Loiseluria, Desv.)

A small evergreen plant, with straggling branches, growing in tufts; leaves opposite, leathery, very narrowly elliptic or linear, the margins turned back. Flowers white, small, erect, a few in a terminal cluster. Calyx 5-parted, corolla 5-lobed; capsule egg-shaped, 2-celled.

C. procumbens, L. (Fig. 11, pl. 117.) ALPINE AZALIA. Found on summits of White Mountains. July-Aug.

4. PHYLLODOCE, Salisb.

Low, heath-like shrubby plant, with evergreen leaves crowded about

the stems, which are more or less reclining. Leaves linear with blunt points. Flowers rather large on long slender pedicels. Calyx 5-parted, corolla egg-shaped with 5 low teeth at the spreading border. Stamens 10; ovary 5-celled.

P. coerulea, (L.) Babington. (Fig. 5, pl. 117.) MOUNTAIN HEATH. A minute shrub, 4 to 6 in. high, on summits of White Mountains. July-Aug.

5. CASSIOPE, D. Don.

A minute shrub, with a mossy aspect; evergreen; leaves small, overlapping, stem an inch to 3 in. high, terminated by a bell-shaped white or pinkish-white nodding flower. Calyx and corolla 4- or 5-lobed. Stamens 8 to 10; capsule globe-formed, 4- or 5-celled.

C. hypnoides, (L.) D. Don. MOSS PLANT. CASSIOPE. Found on the summits of the higher Adirondack Mountains and of the White Mountains. ("I have never seen it on the Adirondacks and do not think it is there now, though it was on Mt. Marcy many years ago.—C. H. PECK.")

6. ARCTOSTAPHYLOS, Adams

Low trailing shrubby plant, with alternate, thick leathery leaves, evergreen. Flowers white or pink, small, in terminal clusters. Calyx 5-parted; corolla egg-shaped; stamens 10, rarely less. Fruit a red berry.

A. Uva-Ursi, Spreng. (Fig. 6, pl. 117.) UVA-URSI. RED BEARBERRY. Trailing and much branched, stems 6 to 24 in. long. Leaves spatula-formed. Found mostly on cold hills or on mountains, our area and northward and westward.

7. MAIRANIA, Necker.

Low, trailing shrub, with deciduous leaves and white egg-shaped flowers in scattered or terminal clusters. Calyx 4- to 5-parted. Fruit a black berry.

M. alpina, Desvaux. ALPINE BLACKBERRY. (*Arctostaphylos alpina*, Spreng.) Leaves pear-shaped, notched at margins; flowers mostly in terminal clusters. Found on summits of White Mountains.

8. GAULTHERIA, L.

Our species a small plant with alternate, evergreen, shining leaves, with a few flowers at the leaf axils. These are urn-shaped, white or pink. Calyx 5-parted; stamens 10. Fruit an aromatic red berry.

G. procumbens, L. (Fig. 1, pl. 115.) WINTERGREEN. CHECKERBERRY. Stem 2 to 6 in. high. Leaves clustered toward the ends of branches. Found extensively in woods, especially those in which evergreen trees prevail.

9. EPIGAEA, L.

Plant trailing, flat upon the ground; stems woody. Leaves alternate, evergreen, broad, nearly orbicular, hairy beneath, smooth but rusty colored above. Flowers in a terminal cluster, salver-form. Stamens 10; capsule 5-celled.

E. repens, L. (Fig. 8, pl. 115.) TRAILING ARBUTUS. MAYFLOWER. Stems hairy, 10 to 15 in. long, trailing flat upon the ground; leaves alternate, 1 to 3 in. long, more or less heart-shaped at base and blunt at



PLATE 114

1. *Azalea canescens*. 2. *A. nudiflora*. 3. *A. lutea*. 4. *A. viscosa*. 5. *Rhododendron maximum*. 6. *Ledum groenlandicum*.

apex. Tube of the corolla hairy within; flowers with a delicate spicy fragrance. It is one of the earliest plants to bloom in the spring, its charming white blooms often in close proximity to a belated snow drift. March to May.

10. RHODORA, L.

A small branching shrub, with alternate leaves (deciduous) and purple flowers which grow in a terminal umbel-like cluster. The corolla is deeply divided into two parts, the upper part or lip composed of 2, mostly 3 parts, the lower of two long narrow segments. Calyx small. Stamens 10. Capsule 5-celled.

R. canadensis, L. (Fig. 8, pl. 117.) **RHODORA**. (*Rhododendron canadensis*, BSP.) A handsome shrub, 2 to 3 ft. high, with terminal clusters of large flowers. Leaves appearing with or later than the flowers, oblong, downy beneath. Bogs and wet hillsides. May.

11. RHODODENDRON, L.

Shrubs, with evergreen leaves and large white, pink, or purple flowers. Corolla bell-shaped with rather short tube and rounded spreading lobes, nearly equal. Calyx small, 5-parted; capsule woody, with 5 to 20 cells and numerous seeds.

1. **R. lapponicum**, (L.) Wahlenberg. (Fig. 7, pl. 117.) **LAPLAND ROSE BAY**. A dwarf shrub, with elliptic leaves and purple flowers in a spreading terminal cluster. The leaves clustered toward the summit of the stems, $\frac{1}{2}$ to $\frac{3}{4}$ in. long, nearly half as broad, with brownish scales above and below. Flowers purple $\frac{3}{4}$ in. broad. Summits of the higher Adirondacks and White Mountains.

2. **R. maximum**, L. (Fig. 5, pl. 114.) **AMERICAN ROSE BAY**. A splendid shrub or small tree, growing in wet places, with evergreen leaves which are from 4 to 7 in. long and from 1 to 3 in. wide. Shining above and dark green below. Stems crooked and branching, growing in clusters. Flowers in large clusters, white or rose-colored, each $1\frac{1}{2}$ to 2 in. long and an inch broad at mouth; the lobes rounded and indented. Before the blooms are expanded the cluster is enveloped in a covering of broad sticky bracts, an inch or more in length. It is found in a few localities in New England, but is more abundant in the middle States. In low grounds and along borders of streams. Blooms latter part of June or in July.

12. AZALEA, L. (*Rhododendron*, L.)

Erect shrubs, with conspicuous flowers, mostly in terminal clusters. Leaves deciduous. Calyx 5-parted; corolla funnel-formed, the lobes spreading, the tube long and viscid. Stamens 5, exserted from the mouth of the flower. Capsule oblong, 5-celled.

Flowers expanding before leaves.

Corolla white or pink.

Leaves gray-downy beneath *A. canescens*

Leaves not downy beneath *A. nudiflora*

Flowers expanding after the leaves *A. viscosa*

Flowers yellow or orange *A. lutea*

Flowers white *A. arborescens*

1. **A. nudiflora**, L. (Fig. 2, pl. 114.) **PINK AZALEA**. **PINKSTER**. Branching shrub, 2 to 6 ft. high. Leaves, alternate, narrowly oblong or



PLATE 115

1. *Gaultheria procumbens*. 2. *Andromeda polifolia*. 3. *Clethra alnifolia*.
 4. *Calluna vulgaris*. 5. *Kalmia latifolia*. 6. *K. glauca*. 7. *K. angustifolia*.
 8. *Epigaea repens*.

oval, tapering at each end, margins with stiff hairs. Flowers large, consisting of a long slender tube which is covered by soft down, and of 5 broad and spreading lobes which are, each, rather shorter than the tube and which are somewhat unequal. Both stamens and pistil are much exserted beyond the tube. Color pink to nearly white. Rocky woods and thickets. April-May.

2. *A. canescens*, Michx. (Fig. 1, pl. 114.) MOUNTAIN AZALEA. In general a taller shrub than No. 1; 4 to 15 ft. high. Leaves wider and shorter than those of No. 1 and covered beneath by a soft gray down, while along the principal veins grow stiff hairs. Leaves margined with stiff hairs. Flowers rose color to white, very fragrant. Stamens less exserted than in No. 1. Flower at lobes 2 in. broad. Woods; Catskill Mountains; Mass., and southward. April-May.

3. *A. viscosa*, L. (Fig. 4, pl. 114.) SWAMP PINK. WHITE AZALEA. Branching shrub, 4 to 8 ft. high, the whole plant sticky. Leaves alternate, pear-shaped, 2 to 4 in. long, with bristly hairs on the veins beneath. Flowers expanding after the leaves, white or tinged with pink, less broad than No. 1 or No. 2. Stamens exserted. The whole flower viscid. In swamps and at borders of ponds, general in our area. June-July.

4. *A. lutea*, L. (Fig. 3, pl. 114.) FLAME AZALEA. (*A. calendulacea*, Torr.) Shrub, 4 to 15 ft. high, with terminal umbellate clusters of yellow or orange flowers. Leaves pear-shaped, with finely toothed margins. Flowers appearing with the leaves, yellow or orange, very showy. Dry woods, southern part of our area. May-June.

5. *A. arborescens*, Pursh. TREE AZALEA. A shrub, 8 to 20 ft. high, without hairs on stems or leaves. Leaves oval pear-shaped or inversely lance-shaped. Flowers white or tinged with pink, very fragrant. Woods; southern Penna., and southward. June-July.

13. KALMIA, L.

Evergreen shrubs, with flowers in terminal or lateral clusters and with shining leaves; calyx 5-parted; corolla wheel-shaped, cupped, with 10 small sacs or depressions for the lodgment of the anthers. Capsule globose, 5-celled. Stamens 10, extending only to the pits in the corolla. In our species the showy flowers are in an umbel-like terminal cluster, or a dense whorl a little below the terminal portion of the branch.

Leaves opposite or in 3s.

Flowers in terminal clusters *K. glauca*

Flowers in lateral clusters *K. angustifolia*

Leaves alternate *K. latifolia*

1. *K. angustifolia*, L. (Fig. 7, pl. 115.) SHEEP LAUREL. Shrub, erect, branching, $\frac{1}{2}$ to 3 ft. high. Leaves usually opposite, but often in whorls of 3, whitish beneath, oblong or lance-shaped, tapering at each end. Flowers numerous in collar-like clusters which enrich the stem below the termination of the branch. Found in moist places, cold hillsides and often at borders of bogs. May-June.

2. *K. latifolia*, L. (Fig. 5, pl. 115.) MOUNTAIN LAUREL. Shrub, 2 to 15 ft. high, with commonly alternate leaves and with terminal flower clusters. Leaves oval or elliptic, tapering at each end, bright green on both sides. Flowers numerous in very showy clusters, rose-color to white.

This shrub often forms dense thickets and when growing in woods often attains the height of 20 ft. or more. May-June.

3. *K. glauca*, Ait. (Fig. 6, pl. 115.) PALE OR SWAMP LAUREL. (*K. polifolia*, Wang.) A smooth shrub, $1\frac{1}{2}$ to 2 ft. high, with leaves opposite or in 3s. Leaves long, narrow, tapering at each end, bright green above, whitish beneath, the borders rolled backward. Flowers in loose terminal clusters, purple. In bogs. May-Aug.

14. LEUCOTHOE, D. Don.

Shrubs, with alternate leaves and many egg- or cylindric-shaped small flowers in lengthened slender clusters, axillary or terminal. Calyx of 5 sepals; corolla cylindric or egg-shaped; stamens 10; capsule 5-lobed, 5-celled.

L. racemosa, (L.) A. Gray. (Fig. 2, pl. 118.) SWAMP LEUCOTHÖE. Shrub, 3 to 10 ft. high. Leaves oblong to egg-shaped, tapering at each end, 1 to 3 in. long, $\frac{1}{2}$ as wide. Flowers in long spike-like clusters, each flower with a bract at the flower pedicel, the clusters more or less ascending. Swamps and thickets. April-June.

15. ANDROMEDA, L.

A shrub, with globose or egg-shaped white flowers, in a terminal cluster. Leaves evergreen, linear or narrowly oblong, the margins rolled backward, whitish beneath. Calyx 5-parted; corolla globose or egg-shaped; stamens 10; capsule nearly globose, 5-celled.

A. polifolia, L. (Fig. 2, pl. 115.) WILD ROSEMARY. A shrub, 1 to 3 ft. high. Leaves narrow with margins rolled back, dark green above, whitish beneath. Umbels of flowers terminal, few-flowered. Bogs, northern New Jersey, Penna., and northward. May-June.

16. PIERIS, D. Don.

Our species a shrub, with alternate leaves and cylindric or egg-shaped white or pinkish flowers in lateral clusters, the flower pedicels attended by sharply tapering bracts. Stamens 10; capsule 5-celled.

P. mariana, (L.) Benth. and Hook. (Fig. 1, pl. 118.) STAGGER BUSH. (*Lyonia mariana*, D. Don.) Shrub, 2 to 4 ft. high; leaves oblong or oval, 1 to 3 in. long, $\frac{1}{2}$ as wide. Flowers nodding in lateral clusters, appearing on the nearly leafless stems of the preceding season. Corolla about $\frac{1}{2}$ in. long, pink or pinkish-white. Low wet grounds, southeastern New York and along the eastern coast from Rhode Island southward. May-July.

17. CHAMAEDAPHNE, Moench. (Cassandra, D. Don.)

Low, much branched, erect shrub, with alternate, leathery, nearly evergreen leaves and with many white ovoid flowers in one-sided leafy clusters. Calyx of 5 rigid sepals bracted at the base. Corolla 5-toothed, narrowed at the throat. Stamens 10. Capsule globose, depressed, splitting when ripe, into an inner and an outer layer, the inner dividing into 10, the outer into 5 valves.

C. calyculata, (L.) Moench. (Fig. 7, pl. 118.) LEATHER LEAF. DWARF CASSANDRA, Shrub, 2 to 4 ft. high, branching. Leaves oblong,

obtuse, $\frac{1}{2}$ to $1\frac{1}{2}$ in. long, densely covered with scurfy scales, at least when young. Upper leaves reduced to floral bracts. Bogs and swamps throughout most of our area. Also on high mountains. April-June.

18. XOLISMA, Raf.

A bushy tree, found in low grounds, with alternate leaves and terminal clusters of small globe-formed flowers. Calyx 4- or 5-parted; stamens 8 to 10; capsule 4- or 5-celled, globose.

X. ligustrina, (L.) Britton. (Fig. 6, pl. 118.) PRIVET ANDROMEDA. (*Andromeda ligustrina*, Muhl.) Shrub, 3 to 15 ft. high. Leaves oblong, oval or pear-shaped, with fine serrations at margins, tapering at each end. Corolla globular or nearly so. Swamps and wet soil, New England, New York and southward. May-July.

19. CALLUNA, Salisb.

A low shrub, naturalized from Europe. Evergreen, branching; our species with minute overlapping leaves and with long slender clusters of bell-shaped flowers. Calyx of 4 sepals; corolla with 4 lobes; stamens 8; capsule 8-angled, 4-celled.

C. vulgaris, (L.) Hull. (Fig. 4 pl. 115.) HEATHER. Found occasionally in sandy or rocky soil. Flowers pink. July-Sept.

20. OXYDENDRON, DC.

Tree, 15 to 60 ft. high, with alternate, deciduous leaves which are oblong or broad lance-shaped, sharp pointed at apex and tapering at base, sour to the taste. Flowers numerous, ovoid, white, in long one-sided slender clusters. Stamens 10. Calyx of 5 nearly distinct sepals; corolla 5-toothed; capsule pyramidal, 5-celled, 5-valved.

O. arboreum, (L.) DC. SOUR WOOD. A tree found in rich woods of Penna., and further south. June-July.

FAMILY V.—VACCINIACEAE. HUCKLEBERRY FAMILY

Shrubs, with alternate, undivided leaves and small bell- urn- or egg-shaped flowers. The calyx is adherent to the ovary through the whole extent of the latter, the 5 (rarely 4) sepals expanding above the ovary. The petals are united to form an undivided corolla though in exceptional cases the lobes are somewhat deeply cleft, as in the oxycoccus (cranberry). Stamens twice as many as the petals, arising from the base of the pistil or from the corolla. Fruit a berry.

Corolla bell-cylindric or egg-shaped.

Berries not white.

Seeds 10 Gaylussacia

Seeds small, numerous Vaccinium

Berries white Chiogenes

Corolla deeply cleft, with recurved lobes . . . Oxycoccus



PLATE 116

1. *Vaccinium vacillans*. 2. *V. pennsylvanicum*. 3. *V. pennsylvanicum*, fruit. 4. *V. stamineum*. 5. *V. corymbosum*. 6. *V. caespitosum*. 7. *V. Vitis-Idaea*. 8. *Gaylussacia resinosa*. 9. *G. dumosa*.

1. GAYLUSSACIA, HBK.

Shrubs, with alternate, undivided leaves and with small white or reddish flowers in lateral clusters. Flower pedicels usually with 2 small bracts. Calyx 5-lobed. Corolla tubular. Fruit a dark blue or black berry with 10 hard seed-nutlets.

- Fruit blue, leaves with a whitish bloom beneath *G. frondosa*
 Leaves leathery, without whitish bloom *G. brachycera*
 Fruit black, both sides of leaves green.
 Bracts at the flower pedicels leaf-like, oval, persistent *G. dumosa*
 Bracts of the pedicels small and falling early *G. resinosa*

1. *G. frondosa*, (L.) Torr. and Gray. DANGLEBERRY. Shrub, 3 to 6 ft. high, smooth, young shoots green or yellowish; leaves oblong or pear-shaped, $1\frac{1}{2}$ to 2 in. long, blunt at apex tapering at base, pale whitish beneath. Flowers in slender loose lateral clusters; corolla small, bell-shaped. Flower pedicel with a small bract at base. Fruit dark blue with a whitish bloom, sweet. Moist woods, New York, New Hampshire and southward. May-June.

2. *G. resinosa*, (Ait.) Torr. and Gray. (Fig. 8, pl. 116.) BLACK HUCKLEBERRY. HIGH-BUSH HUCKLEBERRY. (*G. baccata*, C. Koch.) Shrub, 1 to 3 ft. high, branching, the young stems often deep red, leaves oval or oblong, pointed or rather blunt at apex, tapering at base, with a resinous covering when young, studded with resinous dots. Clusters of flowers one-sided, with few reddish-yellow flowers. Bracts at the base of the flower pedicel small and falling early. Fruit black with a bloom. Woods and thickets, extent of our area. May-June.

3. *G. dumosa*, (Andr.) Torr. and Gray. (Fig. 9, pl. 116.) BUSH HUCKLEBERRY. Shrub, 1 to 3 ft. high, young branches somewhat downy. Leaves pear-shaped or oblong, green on both sides, thick and shining when old. Bracts at the base of flower pedicels large, leaf-like, oval, persistent. Flowers in loose, slender clusters, corolla bell-shaped. Fruit black without a bloom, insipid. The whole plant more or less sprinkled with resinous dots. Sandy swamps, from north to south in our area. May-June.

4. *G. brachycera*, (Michx.) A. Gray. BOX HUCKLEBERRY. Branching shrub, about 1 ft. high, with oval, finely toothed leaves, which are thick and leathery and without leaf-stalks or with very short ones. Corolla cylindric-bell-shaped, white or pink in short close clusters. Wooded hills, Penna., southward. May.

2. VACCINIUM, L.

Shrubs, branching, mostly quite low, with scattered leaves and small flowers solitary or in curreant-like clusters. Corolla monopetalous with 4 or 5 teeth at free margin or 4- or 5-lobed. Stamens twice as many as lobes of corolla and included within it. Fruit a berry with numerous small seeds, smaller and less observable than those of Gaylussacia.

Corolla rather deeply cleft, lobes expanding.

- Lobes 4 *V. Vitis-Idaea*
 Lobes 5 *V. stamineum*

Corolla cylindric or ovate, generally more or less contracted at the throat.

Flowers solitary or only 2 to 4 together; alpine dwarf species.

- Corolla mostly 4-toothed *V. uliginosum*
 Corolla 5-toothed *V. caespitosum*

Flowers in slender currant-like clusters.

Flower 2 or 3 times as long as broad.

Leaves not usually toothed.

Leaves smooth or only slightly downy *V. corymbosum*

Leaves, under surface, densely downy, especially on veins

V. atrococcum

Leaves toothed *V. simulatum*

Flower nearly as broad as long.

Leaves lance-oblong, not downy *V. pennsylvanicum*

Leaves lance-oblong, downy *V. canadense*

Leaves oblong.

Fruit black *V. nigrum*

Fruit blue *V. vacillans*

1. *V. Vitis-Idaea*, L. (Fig. 7, pl. 116.) MOUNTAIN CRANBERRY.

A little evergreen shrub, found where cold winds sweep the northern coasts of our region and on the summits of the White Mountains. Its stems are creeping with erect branches rising from 3 to 8 in. in height. Its broadly oval or pear-shaped leaves, leathery, green and shining above and black dotted beneath, curve backward at their margins and are crowded near the summit of the slender stems. Flowers in a small cluster at the extremity of the stem, the corolla bell-shaped, rather thickly cleft into 4 lobes which expand from the throat. They are white or pinkish and nodding. Fruit a globular dark red berry about 1/3 in. in diameter. August-Sept.

2. *V. stamineum*, L. (Fig. 4, pl. 116.) DEERBERRY. A branching shrub, with deciduous leaves and large numbers of bell-shaped flowers dangling in leafy bracted lengthened clusters. Stems 2 to 5 ft. high. Leaves oval, oblong or rarely broader toward base than at center, 1 to 4 in. long, on rather short leaf-stems, light green above, paler beneath. Corolla rather deeply cleft into 5 lobes, which expand into a bell-shaped flower of purplish tinge. The stamens project somewhat beyond the bell of the corolla. Berry greenish-white, yellowish or dull red. Woods and thickets, frequent, especially in the southern half of our area. April-June.

3. *V. uliginosum*, L. BOG WORTLEBERRY. A dwarf shrub, found on the summits of the Adirondack and White Mountains. Stems ½ to 2 ft. high, much branched. Leaves pear-shaped, or oblong, ½ to 1 in. long, thick, dark green above, lighter beneath. Flowers solitary or in clusters of 3 or 4, about ½ as long as the leaves. Fruit a large blue berry. June-July.

4. *V. caespitosum*, Michx. (Fig. 6, pl. 116.) DWARF BILLBERRY. Dwarf, much branching shrub, growing in dense tufts, stems 3 to 6 in. high, found on summits of White Mountains and Adirondacks. Leaves broad at apex, narrow at base, ½ to 1 in. long, with blunt teeth at margins. Calyx 5-toothed; corolla egg-shaped, 5-toothed, contracted at throat. Stamens 10. Berry blue, with a bloom. June-July.

5. *V. corymbosum*, Michx. (Fig. 5, pl. 116.) HIGH-BUSH BLUEBERRY. A tall shrub (6 to 10 ft. high), with oval or oblong leaves and clusters of white flowers and sweet blue berries with a bloom. Leaves on short leaf-stems, 1 to 3 in. long, smooth above, very slightly downy, if at all, beneath. Corolla ¼ to ½ in. long, cylindric or constricted at throat, white or pink. Fruit a blue berry with a bloom. Swamps and moist woods. May-June.

6. *V. atrococcum*, (A. Gray) Heller. BLACK BLUEBERRY. Differs from *V. corymbosum* in the absence of bloom on the berry, in the down on the under side of the leaf, which is dense, and in the form of the flower, which is smaller and more round. Leaf borders entire. Swamps and wet woods, throughout our area. May-June.

7. *V. simulatum*, Small. SERRULATE-LEAVED BLUEBERRY. Shrub, resembling the last two. Leaves elliptic to oblong-lance-shaped, acute at apex and usually at base, smooth, bright green above, somewhat downy beneath at least on the veins; *margins notched with fine teeth*. Berry with a bloom. New York and southward.

8. *V. pennsylvanicum*, Lam. (Figs. 2 and 3, pl. 116.) LOW-BUSH BLUEBERRY. A nearly prostrate shrub, with stems $\frac{1}{2}$ to 2 ft. long, found in dry rocky soil, mostly on high hills. Stem branching, the newer shoots light green, warty, the older stems reddish. Leaves elliptic-lance-shaped, green and smooth on both sides, the apex tapering to a hard tip. Flower bell-shaped, white, in few flowered, short clusters. Calyx 5-toothed. Fruit a round berry $\frac{3}{8}$ in. in diameter, blue with a thick white bloom. The sweetest and earliest of the blueberries. May-June. Fruit ripe June-July.

9. *V. canadense*, Richards. CANADIAN BLUEBERRY. Similar to last, but leaves somewhat broader and somewhat downy. The fruit ripens later and is the latest of the blueberries to appear in market. May-June. Fruit ripe July-Sept.

10. *V. nigrum*, Britton. LOW BLACK BLUEBERRY. Similar to No. 8, often growing with it, but has a broader leaf, which is commonly more rounded at base, and rounder bell than the latter and the black berry has no bloom on its surface.

11. *V. vacillans*, Kalm. (Fig. 1, pl. 116.) BLUE HUCKLEBERRY. A branching shrub, $\frac{1}{2}$ to 4 ft. high, with oval leaves or with leaves sometimes broadest toward apex, 1 to $2\frac{1}{2}$ in. long. Margins entire or finely serrated, sharp points at apex, terminated by a sharp bristle. Flowers pink or greenish-white, bells $\frac{1}{2}$ in. long, cylindric, constricted at throat. Fruit a round blue berry with a bloom. A fine fruit. Dry, sandy soil. May-June. Fruit ripe July to Sept.

3. CHIOGENES, Salisb.

Our species a trailing evergreen, with delicate stem, scarcely woody, with small roundish oval, alternate leaves. Calyx adherent to the ovary except at the summit, 4-lobed; corolla bell-shaped rather broad at the throat. Fruit a white berry with many seeds.

C. hispidula, L. (Fig. 4, pl. 117.) CREEPING SNOWBERRY. Leaves $1\frac{1}{4}$ to $1\frac{1}{3}$ in. long; flowers small, at the leaf-axils. Found in shady woods and on mountains, throughout our area. May-June.

4. OXYCOCCUS, Hill

Our species delicate creepers found in bogs. Stem extremely slender; leaves small, alternate, oval or ovate, with margins rolled back. Calyx adherent to the ovary to its summit, its border 4- or 5-cleft. Corolla deeply cleft, nearly divided into 4 petals, these turning outward and

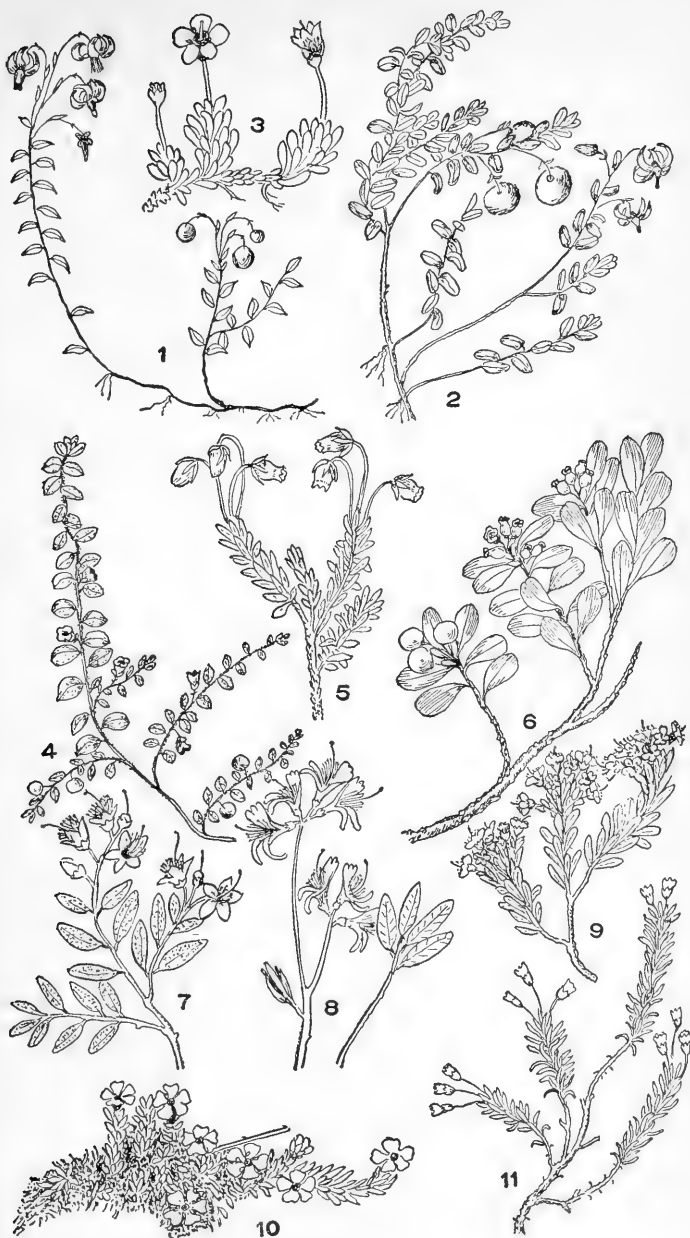


PLATE 117

1. *Oxycoceus palustris*. 2. *O. macrocarpus*. 3. *Diapensia lapponica*. 4. *Chiogenes hispidula*. 5. *Phyllodoce coerulea*. 6. *Arctostaphylos Uva-Ursi*. 7. *Rhododendron lapponicum*. 8. *Rhodora canadensis*. 9. *Dendrium buxifolium*. 10. *Pyxidanthera barbulate*. 11. *Chamaecistus procumbens*.

backward. Stamens 10, the anthers in contact forming a cone about the pistil. Fruit a red acid berry.

1. *O. palustris*, Pers. (Fig. 1, pl. 117.) SMALL CRANBERRY. (*O. Oxycoccus*, (L.) Mc. M.) Stem 6 to 18 in. long. Leaves egg-shaped, 1/6 to 1/3 in. long, acute at apex, margins strongly rolled back. Flowers all terminal. Berries red, 1/3 in. in diameter. May-July.

2. *O. macrocarpus*, (Ait.) Pers. (Fig. 2, pl. 117.) LARGE AMERICAN CRANBERRY. Leaves oval, 1/4 to 2/3 in. long, margins *slightly* rolled back, points blunt. Flowers not generally terminal. Berries red 1/3 in. in diameter. June-Aug.

FAMILY VI.—DIAPENSIACEAE. DIAPENSIA FAMILY

In our region only two species which are very small, moss-like, tufted, evergreen plants of herbaceous appearance but with woody stems, small crowded leaves without stipules and with perfect bell-formed or wheel-shaped flowers. Calyx deeply 5-parted; corolla 5-lobed; stamens, 5 pollen bearers and 5 rudimentary. Ovary free from the calyx and superior to it; capsule 3-celled, many seeded.

1. DIAPENSIA, L.

Calyx partly invested by 2 to 4 bracts below its base; corolla bell-shaped. Small Alpine mossy plant growing in dense tufts. Leaves opposite, overlapping, small, spatula-shaped. Stem 1 to 3 in. high, terminated by a single white bell-shaped flower.

D. lapponica, L. (Fig. 3, pl. 117.) DIAPENSIA. Found on summits of the Adirondack and White Mountains. June-July.

2. PYXIDANTHERA, Michx.

Moss-like plant, resembling *Diapensia*, the stems longer, prostrate, creeping, corolla wheel-shaped. Flowers solitary, white or rose-color, numerous.

P. barbulata, Michx. (Fig. 10, pl. 117.) PYXIE. This little plant blooms early in April or even in March and is welcomed as the first flower of Spring. Grows in rounded tufts, in the pine barrens of New Jersey and farther south.

Order II.—PRIMULALES. Order of the Primroses

Flowers regular; corolla of united petals. Stamens borne on the corolla, as many as the lobes of the corolla and opposite to them or twice as many or more. Ovary superior to the calyx and corolla or in exceptional instances these are more or less attached to it. Ovules arising from a central placata. *Style single*; fruit a capsule.

FAMILY I.—**PRIMULACEAE.** PRIMROSE FAMILY

Herbs, with mostly undivided leaves and regular flowers, with both stamens and pistils. Corolla of united petals (absent in *Glaux*); stamens as many as the lobes of the corolla and inserted opposite them. Ovary of 1 cell with a free column in the interior supporting the ovules.

Leaves all at the base of the stem.

- | | |
|--|-------------------|
| Aquatic, leaves feather-formed | Hottonia |
| Terrestrial | Primula |
| Leaves alternate | Samolus |
| Leaves in whorls of more than 4 | Trientalis |
| Leaves opposite or in whorls of not more than 4. | |
| Flowers white | Glaux |
| Flowers red | Anagallis |
| Flowers yellow. | |
| In axillary dense clusters | Naumburgia |
| Solitary in the axils or in loose axillary clusters. | |
| Stamens 5 and rudiments 5 | Steironema |
| Stamens 5 to 7, no rudiments | Lysimachia |

1. **HOTTONIA, L.**

Aquatic plant, with feather-formed, composite leaves and hollow flower stems fringed with bands of whitish flowers. Calyx 5-parted, its divisions linear and longer than the corolla which is tubular with 5 lobes. Stamens 5; capsule 5-valved, many seeded.

H. inflata, Ell. **AMERICAN FEATHERFOIL.** In stagnant pools and ditches, Mass., central New York and south. June-Aug.

2. **PRIMULA, L.**

Herb, with a radicle rosette of leaves at the base and a spike surmounted by an umbel of a few flowers, below which is a whorl of bracts, an involucre. Calyx bell-formed or tubular with 5 lobes. Corolla nearly tubular, expanding at the throat into a wheel-shaped 5-lobed border. Stamens 5 inserted on the tube.

1. **P. farinosa**, L. (Fig. 1, pl. 119.) **BIRD'S EYE PRIMROSE.** Plant, 4 to 18 in. high; leaves long, narrow, broadest above the center, tapering to the leaf-stalk which is about $\frac{1}{2}$ as long as the blade. Leaves and involucre covered with a white mealiness. Flowers pink or lilac with a yellowish eye. Moist places, northern part of our area.

2. **P. mistassinica**, Michx. **CANADIAN PRIMROSE.** Smaller than No. 1, 1 to 6 in. high. Leaves oval, not broadest above the center. *Leaves not covered with mealiness.* Northern part of our area.

3. SAMOLUS

A smooth herb of wet places, with alternate, undivided, leaves and small flowers in elongated terminal clusters. Calyx adhering to the ovary below, 5-cleft. Corolla bell-shaped, 5-lobed. Stamens 5 fertile, and commonly 5 sterile. Capsule globose, many seeded.

S. floribundus, HBK. (Fig. 6, pl. 119.) WATER PIMPERNELL. BROOK WEED. Plant, 6 to 18 in. high, branching. Leaves 1 to 3 in. long, rounded at apex, narrowed at base. Growing in wet places. June-Sept.

4. TRIENTALIS, L.

Low, smooth perennial, with simple erect stem surmounted by a whorl of thin lance-shaped leaves and by one or more white star-like flowers borne on long, very slender pedicels. The stem also bears a few minute scale-like bracts or leaves alternately arranged. Calyx of about 7 linear segments, corolla spreading, flat and star-like with about 6 or 7 rays.

T. americana, Pursh. (Fig. 5, pl. 119.) STAR FLOWER. Stem 3 to 9 in. high; leaves $1\frac{1}{2}$ to 4 in. long, tapering at both ends. Flower about $\frac{1}{2}$ in. broad. In moist woods. May-June.

5. GLAUX, L.

A low, fleshy perennial, with many opposite fleshy leaves, which are oblong and undivided and without teeth. Flowers in the axils of the leaves, solitary but opposite. Calyx 5-parted, the lobes colored like petals, the latter wanting. Stamens 5, at the base of the calyx, opposite the corolla lobes. Capsule 5-valved, few seeded.

G. maritima, L. (Fig. 4, pl. 119.) SEA MILKWORT. Plant, 2 to 8 in. high, leaves $\frac{1}{4}$ to $\frac{1}{2}$ in. long, oblong, oval or linear. Growing in salt marshes and on sea beaches. June-Aug.

6. ANAGALLIS, L.

Our species a low spreading herb found in moist pastures and waste places, with opposite leaves and solitary scarlet or whitish flowers. Calyx of 5 narrow tapering lobes; corolla wheel-shaped of 5 rather deeply-parted lobes; ovary globose, the top separating like a lid to allow the escape of the minute seeds.

A. arvensis, L. (Fig. 7, pl. 119.) SCARLET PIMPERNELL. POOR MAN'S WEATHER GLASS. Plant procumbent, stems 4 to 12 in. long, 4-sided. Leaves broadly egg-shaped without leaf stems. Flowers in leaf-axils, on slender pedicels generally opposite; petals rounded, somewhat deeply separated. Moist places. Naturalized. June-Aug.

7. NAUMBURGIA, Moench.

A plant of cold swamps. Erect, leaves opposite, the lower reduced to scales, smooth; flowers in dense rounded tufts from the leaf-axils, yellow, the calyx and corolla each 5- to 7-parted, sepals and petals linear; stamens 5 to 7, extending beyond the corolla. Ovary globose.

N. thyrsiflora, (L.) Duby. (Fig. 5, pl. 120.) TUFTED LOOSESTRIFE.



PLATE 118

1. *Pieris mariana*. 2. *Leucothoe racemosa*. 3. *Hypopitys americana*. 4. *Monotropa uniflora*. 5. *Pterospora andromedea*. 6. *Xolisma ligustrina*. 7. *Chamaedaphne calyculata*.

Stem 1 to 2 ft. high; leaves lance-shaped tapering at each end. May-July.

8. STEIRONEMA, Raf.

Perennial smooth herbs, with opposite leaves, or leaves in whorls on the flowering branches. Flowers yellow, spreading or nodding; calyx 5-parted; corolla wheel-formed, lobes rounded *each with a tooth at apex*, the base of each folding on a stamen. Fertile stamens 5, sterile as many. Capsule 10- to 20-seeded.

Leaves egg-shaped, the leaf-stalk hairy *S. ciliatum*
Leaves lance-shaped, tapering at each end *S. lanceolatum*
Leaves linear *S. quadriflorum*

1. *S. ciliatum*, (L.) Raf. (Fig. 4, pl. 120.) FRINGED LOOSESTRIFE. Erect; stems 1 to 4 ft. high. Leaves egg-shaped, broadly or narrowly, *the leaf stems hairy*, the blade 2 to 6 in. long. Flowers on thread-like pedicels arising at the leaf-axils; calyx 5-parted, the lobes sharp; corolla wheel-formed, the petals rounded, fringed, at outer margin. Capsule extending beyond the calyx. Moist thickets throughout our region. June-Aug.

2. *S. lanceolatum*, (Walt.) A Gray. (Fig. 2, pl. 120.) LANCE-LEAVED LOOSESTRIFE. Similar to the last, but leaves are narrow and tapering at each end and petals are not fringed at border, but have a tooth at outer extremity. Moist soil, throughout the area. June-Aug.

3. *S. quadriflorum*, (Sims.) Hitchc. PRAIRIE MONEYWORT. Stem stiff, erect, 4-angled, 1 to 3 ft. high. Stem leaves narrowly linear, 2 to 4 in. long, smooth and shining. Corolla $\frac{3}{4}$ to 1 in. broad. Along streams, western New York and southward. June-July.

9. LYSIMACHIA, L.

Perennial herbs, with leafy stems, the leaves opposite or in whorls of 3 or 4, or more. Leaves without divisions or teeth, commonly dotted. Flowers wheel-shaped, yellow. Calyx 5- or 7-parted, free from the ovary; corolla 5- to 7-parted; the petals without teeth at border. Stamens 5 to 7, inserted in the throat of the corolla. Capsule globose; seeds few or many.

Prostrate, creeping herb *L. Nummularia*
Erect herbs.
Leaves arranged in whorls of 4s, corolla lobes dark streaked *L. quadrifolia*
Leaves in whorls of 3 or more, corolla pure yellow.
Flowers in terminal leafy clusters *L. vulgaris*
Flowers from the leaf axils *L. punctata*
Leaves opposite, flowers in pyramidal cluster *L. terrestris*

1. *L. vulgaris*, L. (Fig. 2, pl. 119.) GOLDEN LOOSESTRIFE. Erect, branching, 2 to 3½ ft. high, densely covered with soft hairs. Leaves, opposite or in whorls of 3s or 4s, on short leaf-stalks, oval or broadly lance-shaped, tapering at each end, 2 to 4 in. long. Yellow flowers an inch, more or less, in diameter, in terminal leafy clusters. A naturalized species, not very common. June-Aug.

2. *L. punctata*, L. SPOTTED LOOSESTRIFE. Another naturalized species, not common. Resembles the last, but flowers arise in the leaf-axils down the stem. Waste places. June-July.

3. *L. quadrifolia*, L. (Fig. 2, pl. 120.) CROSSWORT. WHORLED

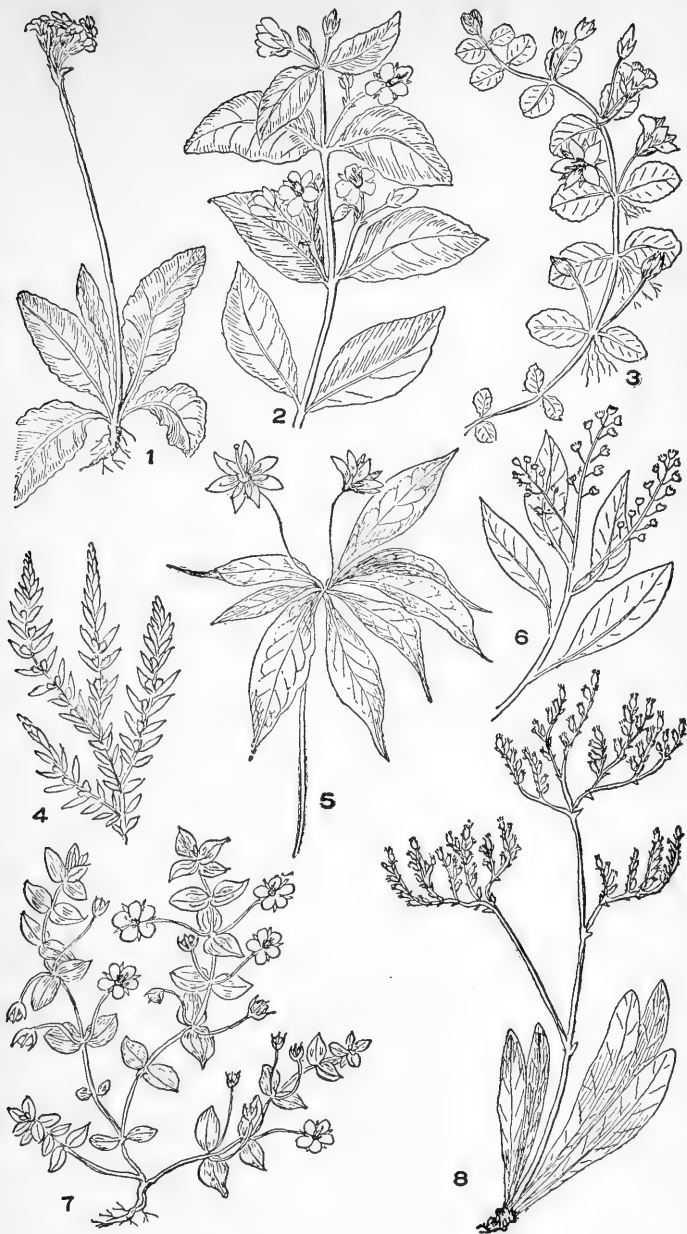


PLATE 119

1. *Primula farinosa*. 2. *Lysimachia vulgaris*. 3. *L. Nummularia*. 4. *Glaux maritima*. 5. *Trientalis americana*. 6. *Samolus floribundus*. 7. *Anagallis arvensis*. 8. *Limonium carolinianum*.

LOOSESTRIFE. Plant slightly downy or smooth, 1 to 2 ft. high; leaves in whorls of 4s, sometimes of 5s, or more or less than 4, without leaf-stalks, lance-shaped or oblong, 1 to 4 in. long. Flowers in whorls at the leaf-axils, on long thread-like pedicels. Corolla wheel-shaped, the petals oblong-egg-shaped. Moist soils. Common. June-Aug.

4. ***L. terrestris***, (L.) Ait. (Fig. 1, pl. 120.) **BULB-BEARING LOOSESTRIFE.** (*L. stricta*, Ait.) Stems 1 to 2 ft. high, often bearing small globular bulbs at the axils. Leaves opposite or rarely some of them alternate, lance-shaped, tapering at each end with short leaf-stalks or none, 1 to 3 in. long, often dotted with black points. Flowers yellow with purple streaks, about $\frac{1}{4}$ in. broad, in terminal pyramidal cluster, each on a thread-like pedicel. Swampy places. July-Sept.

5. ***L. Nummularia***, L. (Fig. 3, pl. 119.) **CREeping LOOSESTRIFE.** An introduced species, from Europe, escaped from gardens, not common. Stems creeping, extending 1 to 2 ft. Leaves roundish, opposite on short leaf-stalks, $\frac{1}{2}$ to 1 in. long. Flowers yellow about an in. broad. July-Sept.

FAMILY II.—PLUMBAGINACEAE. PLUMBAGO FAMILY

Herbs, ours with the leaves all radicle. Flowers perfect but small, in clusters at the summit of a flower stem. Calyx not adherent to ovary, its parts more or less united, tubular, with 5 points. Corolla of 5 lobes; stamens 5 opposite the petals; *styles* 5. Fruit a dry one-seeded pod. A single species in our region.

LIMONIUM, Adams. (Statice, Tour.)

Herb growing at the sea-side, with thick perennial leaves arising at the base and with naked, branching flowering stem bearing large numbers of lavender-colored flowers. Flowers one-sided on the branches; calyx 5-lobed; the lobes linear; corolla bell-formed, tubular, 5-parted. Stamens 5, usually attached to the lobes of the corolla.

L. carolinianum, (Walt.) Britton. (Fig. 8, pl. 119.) **SEA LAVENDER. MARSH ROSEMARY.** Leaves narrow, broadest toward the apex, tapering into long leaf-stems, one conspicuous rib tipped with a bristly point. Stems with flower cluster 1 to 2 ft. high. Salt meadows, all along our coast. July-Oct.

Order III.—EBENALES. Order of the Ebonys

Shrubs or trees, with hard wood. Flowers with stamens as many as the corolla lobes or twice as many; with both stamens and pistils or staminate and pistillate flowers separate. Fruit a berry.

FAMILY I.—EBENACEAE. EBONY FAMILY

Calyx well developed, 5- to 7-parted, but its parts united below the fruit. Ovary free from calyx; in the staminate flowers it is



PLATE 120

1. *Lysimachia terrestris*. 2. *Steironema lanceolata*. 3. *Lysimachia quadrifolia*. 4. *Steironema lanceolata*. 5. *Naumburgia thyrsiflora*.

only partially or not at all developed. Fruit a berry containing one or more seeds.

DIOSPYROS, L.

A tree of considerable size in southern part of our area, common further south. Bark furrowed, dark; leaves broad egg-shaped or oval, 2 to 5 in. long, about $\frac{1}{2}$ as wide, dark green above, light beneath. Corollas with petals united but parted $\frac{1}{2}$ way into 4 lobes or more. Stamens 8 to 20; styles 2 to 6. In the sterile flowers stamens reach the highest number, in the fertile flowers very few or no stamens. Berry pulpy. The berry has an extremely astringent taste before ripening, but when ripe is sweet and palatable.

D. virginiana, L. (Fig. 11, pl. 121.) PERSIMMON. Is occasionally found in the south eastern part of our area. Blooms May-June. Fruit ripe Sept. to Nov.

Order IV.—GENTIANALES (Contortae, Engler). Order of the Gentians

An order including herbs and trees. Stamens borne on the corolla, when this is present, *as many as the corolla lobes or fewer*. The corolla is not dry and chaffy, in contrast with that of the Plantains. Flowers regular, stamens attached to the lower part of the corolla only. Leaves in our species opposite except in *Menyanthes*, in which they are from the root. Ovary superior to calyx. Trees **OLEACEAE**

Herbs. With water juice.

Leaves from the stem.

With stipules **LOGANIACEAE**

Without stipules **GENTIANACEAE**

Leaves from the rootstock . . . **MENYANTHACEAE**

Herbs. With milky juice.

Stamens distinct, styles united . . . **APOCYNACEAE**

Stamens grouped, styles distinct . . **ASCLEPIADACEAE**

FAMILY I.—OLEACEAE. OLIVE FAMILY

Trees or shrubs; leaves opposite, mostly compound feather-formed with an odd leaflet. Flowers of our species of 4 divisions of the corolla when it is present, and 4 divisions of the calyx in all cases. Stamens mostly 2, sometimes 4. Fruit a capsule, a winged *samara*, a berry or drupe.

FRAXINUS, L.

Trees, with opposite compound leaves, which are feather-formed, with several pairs and an odd leaflet. Flowers small, green, rarely with both stamens and pistils in the same flower and generally with staminate and pistillate flowers on different trees, in compound crowded clusters, which appear with the leaves, or before them in the axils of the leaves of the preceding year. Petals none or 2 or 4, small; calyx small with 4 points or the points may be wanting or irregular. Fruit a flat winged *samara*, or "key," usually 1-seeded.

Leaflets stalked.

Wing extending along the sides of the samara.

Under side of leaf not velvety *F. lanceolata*

Under side of leaf velvety.

Leaf margins with very fine teeth *F. pennsylvanica*

Leaf margins entire *F. Michauxii*

Wing only at the outer end of the samara *F. americana*

Leaflets not stalked *F. nigra*

1. *F. americana*, L. (Fig. 7, pl. 121.) WHITE ASH. Large forest tree. Leaflets 5 to 9, egg-shaped or narrow-egg-shaped. The twigs smooth, leaves without teeth or with very fine dentations. Fruit a rounded body appended to which is a wing 2 or 3 times as long as itself and extending only from the outer extremity, in form elliptic lance-shaped. April-May.

2. *F. lanceolata*, Borkh. (Fig. 10, pl. 121.) GREEN ASH. Forest tree, not as large usually as No. 1. Leaflets 5 to 9, egg-shaped or oblong, tapering at each end, sometimes with small serrations toward the outer extremity. Samara 1 to 3 in. long, the wing extending along the sides, blunt at the apex. April-May.

3. *F. pennsylvanica*, Marsh. (Fig. 9, pl. 121.) RED ASH. Large tree. Leaflets 5 to 9, egg-shaped or narrow-egg-shaped. The twigs, leaf-stalks and the lower surface of the leaves *downy or velvety*. Pistillate and staminate flowers on different trees. Body of the samara surrounded by the wing on all sides and which extends beyond it to a length equal to the body, the whole being elliptic or spatula-formed.

4. *F. Michauxii*, Britton. MICHAUX'S ASH. Leaf margins entire; leaves thick, either velvety or smooth; samaras broadly spatula-formed. Swamps, New York and southward.

5. *F. nigra*, Marsh. (Fig. 8, pl. 121.) BLACK ASH. HOOP ASH. Large forest tree. Leaflets without stalks, 7 to 11, lance-shaped, tapering at each end, sharply indented at borders. Samara 1 to 2 in. long, the wing extending all around, broad at apex, usually with an indentation. Swamps and other wet places. April-May.

FAMILY II.—LOGANIACEAE. LOGANIA FAMILY

Herbs, shrubs or trees. Leaves opposite or in whorls, with stipules or with a membrane between the opposite leaf-stalks. Flowers regular, ours with calyx and corolla each 5-parted; the calyx below the ovary.

1. SPIGELIA, L.

Herb, with opposite leaves with entire margins. Flowers in long narrow one-sided clusters. Stamens 5; style 1, slender; capsule short.

S. marylandica, L. MARYLAND PINK-ROOT. Stem simple, 4-angled, erect, 1 to 2 ft. high. Leaves without leaf-stalks, a membrane passing from one to its opposite, egg-shaped or lance-shaped. Corolla tubular with 5 narrow segments above, scarlet outside, yellow within. Flowers in one-sided cluster. Woods, New Jersey, and south.

2. POLYPREMUM, L.

Smooth, diffusely branched annual herb, with narrowly linear or awl-shaped opposite leaves with their bases connected by a membrane representing stipules. Flowers small, white, in terminal bracted clusters. Corolla not longer than the calyx, almost wheel-shaped with 4 lobes. Stamens 4, short; style 1, short. Capsule ovoid, notched at apex.

P. procumbens, L. POLYPREMUM. Flowers in the forks at the ends of the branches. Dry sandy fields, New York, Pennsylvania, and southward. June-Oct.

FAMILY III.—GENTIANACEAE. GENTIAN FAMILY

Smooth herbs, with opposite (rarely whorled) leaves and conspicuous flowers, the corolla of which is tubular, bell-shaped or wheel-shaped, and which, in the bud is twisted. The divisions of the calyx are 4 to 10 which are united at base. The corolla lobes are as many as the divisions of the calyx and the stamens number as many as the corolla lobes and are inserted alternately with them into the throat. Styles united into one, but sometimes wanting. Ovary 1-celled; capsule many seeded.

Leaves reduced to scales, whole extent of stem . . .	Bartonia
Lower leaves reduced to scales	Obolaria
Leaves fully developed.	
Often in whorls	Frasera
Opposite.	
Corolla with horns	Halenia
Corolla without horns or spurs.	
Wheel- or bell-shaped, deeply cleft	Sabbatia
Tubular.	
Style short or none	Gentiana
Style long, slender	Erythraea

1. ERYTHRAEA, Rencalm

Herbs; leaves opposite without leaf-stalks, sometimes clasping the stem; flowers numerous, rather small; corolla a long slender tube with 4 or 5

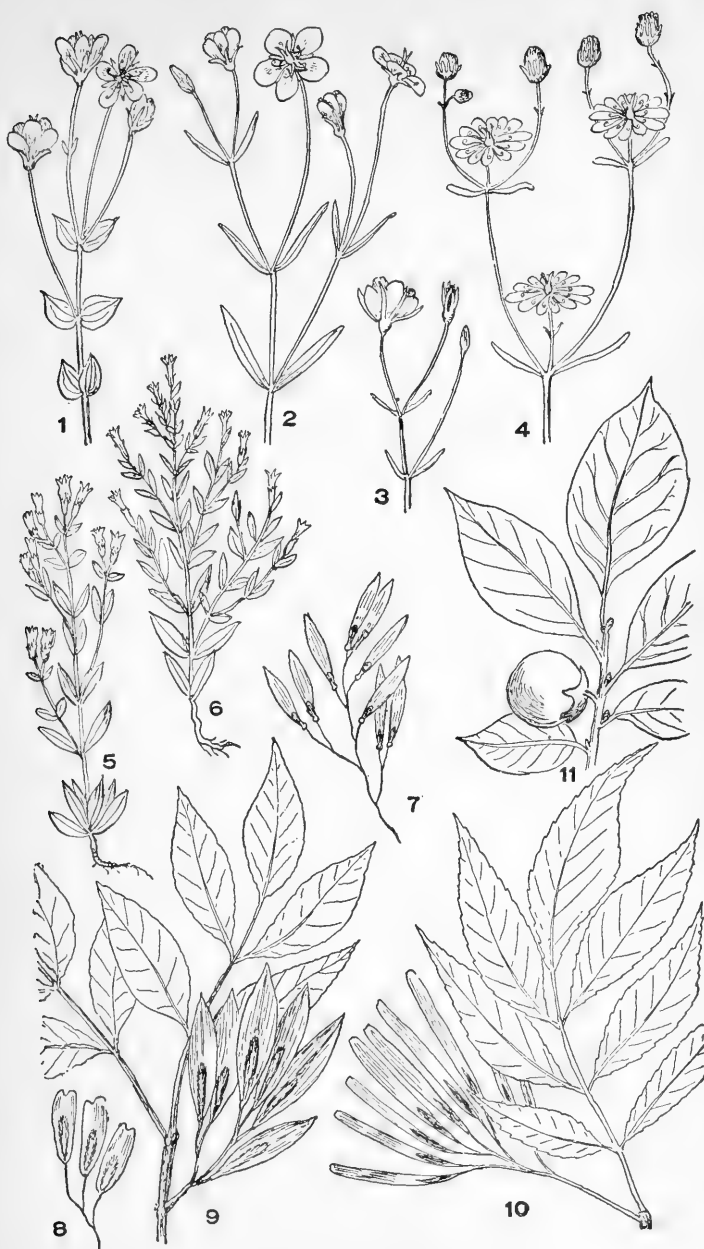


PLATE 121

1. *Sabbatia angularis*. 2. *S. stellaris*. 3. *S. gracilis*. 4. *S. dodecandra*. 5. *Erythraea centaurium*. 6. *E. pulchella*. 7. *Fraxinus americana*. 8. *F. nigra*. 9. *F. pennsylvanica*. 10. *F. lanceolata*. 11. *Diospyros virginiana*.

short lobes; calyx 4- or 5-parted. Anthers twisting spirally and extending beyond the throat of the tube. Low branching annuals with purple, white or yellow flowers.

1. *E. centaurium*, (L.) Pers. (Fig. 5, pl. 121.) CENTAURY. (*Centaurium umbellatum*, Gilib.) Stem upright, branching, 6 to 12 in. high; leaves oblong, obtuse at apex, narrowed at base, at the base of the stem the leaves form a rosette. Clusters of flowers form a *nearly flat-topped compound cluster* of purple flowers which have very short flower stems. Waste grounds. June-Sept.

2. *E. spicata*, (L.) Pers. SPIKED CENTAURY. (*Centauria spicata*, Fernald.) Resembles No. 1, but flowers are arranged in slender spikes. Coast of Nantucket. May-Sept.

3. *E. pulchella*, Fries. (Fig. 6, pl. 121.) BRANCHING CENTAURY. (*E. ramossissima*, Pers. *Centauria*, Druce.) Low, much branched, 2 to 6 in. high; leaves mostly oval, not in a rosette at base; stem widely forking above, the flowers forming a diffuse cluster, all the flowers on flower stems. Fields and wet places. Southern part of our area. June-Sept.

2. SABBATIA, Adams

Slender stemmed annual or biennial herbs, with diffusely clustered, showy flowers and with opposite or whorled leaves. Corolla 4- to 12-parted, as is also the calyx; stamens 4 to 12, inserted in the tube of the corolla, which is shallow, the lobes expanding to a wheel-shaped flower. Ovary 1-celled; style slender, 2-cleft.

Calyx and corolla, each 8- to 12-parted *S. dodecandra*

Calyx and corolla 4- to 5-parted.

Branches opposite.

Flowers white *S. lanceolata*

Flowers pink *S. angularis*

Branches alternate.

Flowers white *S. gracilis*

Flowers pink, center yellow *S. stellaris*

1. *S. lanceolata*, (Walt.) T. and G. LANCE-LEAVED SABBATIA. Stem simple, slender, 2 to 3 ft. high, with opposite branches at top bearing diffuse cluster of white 5-rayed flowers. Leaves 3-nerved, egg-shaped, the upper sharp-pointed. Wet pine barrens, southern part of our area. May-Sept.

2. *S. angularis*, (L.) Pursh. (Fig. 1, pl. 121.) ROSE PINK. Stems 1 to 2½ ft. high, somewhat 4-winged; leaves opposite, broadly egg-shaped, somewhat heart-shaped at base, apex tapering, 5-nerved. Flowers in loose clusters above, corolla of 5 radiating lobes which are rounded at apex and are twice as long as the linear calyx lobes. Flowers pink, with a greenish or yellowish star in the center, on long slender flower stems. Thickets. Rich soil. Southern part of our area. July-Aug.

3. *S. stellaris*, Pursh. (Fig. 2, pl. 121.) MARSH PINK. Stem ½ to 2 ft. high, slightly angular or round; branches alternate; leaves opposite, lance-shaped or linear. Flowers pink or white with a yellowish starry center. Calyx 5-pointed, the points linear, *half as long as the lobes of the corolla*. Corolla 5-lobed, the lobes spreading and rounded at apex. Salt marshes. July-Sept.

4. *S. gracilis*, (Michx.) Salisb. (Fig. 3, pl. 121.) SLENDER MARSH

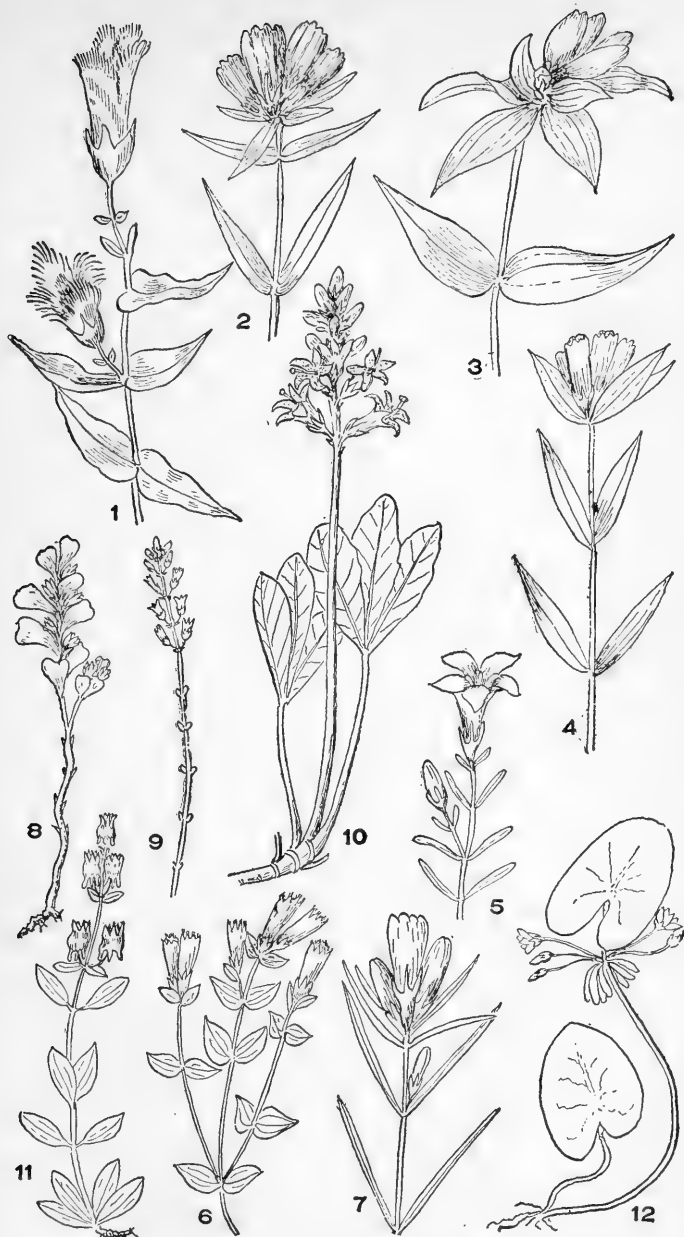


PLATE 122

1. *Gentiana crinita*. 2. *G. saponaria*. 3. *G. Andrewsii*. 4. *G. rubricaulis*.
 5. *G. Porphyrio*. 6. *G. quinquefolia*. 7. *G. linearis*. 8. *Obolaria virginica*. 9. *Bartonia virginica*. 10. *Menyanthes trifoliata*. 11. *Halenia deflexa*.
 12. *Limnanthemum lacunosum*.

PINK. (*S. campanulata*, (L.) Torr.) Stem very slender, 1 to 2 ft. high, diffusely branched above, the branches alternate. Leaves opposite, the lowest oval, those along the stem linear, reduced to narrow thread-like bracts. Flowers in diffuse clusters, pink with a yellow eye, *the calyx points as long as the 5 lobes of the corolla and thread-like*. Salt marshes, rare, in fresh water swamps. May-Aug.

5. **S. dodecandra**, (L.) BSP. (Fig. 4, pl. 121.) **LARGE MARSH PINK.** Stem 1 to 2 ft. high, branching above, branches alternate; leaves opposite, those at base spatula-formed, those above linear. Calyx lobes 8 to 12, linear; corolla 8 to 12 lobes, radiating, rose-colored or nearly white. Sandy borders of brackish ponds. July-Sept.

3. GENTIANA, L.

Herbs, with opposite or rarely whorled leaves which have entire, or in some cases, hairy margins, and with flowers in terminal and axillary groups or solitary at the end of the stem. Flowers blue, purple, yellow or white. Calyx mostly 4-parted, but may have 5 to 7 lobes; corolla also of 4 lobes, but less frequently 5 to 7, often with intermediate folds or plaits at the sinuses. Stamens equal in number to the lobes of the corolla, inserted at the throat and alternate with the lobes. Styles short or none. Capsule 2-valved.

Corolla without folds or teeth at the sinuses

Borders of corolla fringed, leaves egg-shaped or lance-shaped . . .	<i>G. crinita</i>
Borders of corolla lobes fringed, leaves linear	<i>G. procera</i>
Borders of lobes not fringed	<i>G. quinquefolia</i>

Corolla with teeth or folds in the sinuses

Flowers blue or bluish-white.

Corolla closed, club-shaped, margin of leaf rough.

Corolla lobes distinct, longer than, or as long, as the intermediate plaits

Corolla lobes obscure or absent, the plaits very broad

Corolla open, margins of leaves smooth.

Flowers in terminal clusters.

Leaves narrow lance-shaped

Leaves broad at base, tapering toward apex

Flowers solitary

Flowers green, striped with white

Flowers yellow

G. Saponaria

G. Andrewsii

G. linearis

G. rubricaulis

G. Porphyrio

G. villosa

G. flavida

1. **G. crinita**, Froel. (Fig. 1, pl. 122.) **FRINGED GENTIAN.** Stem 1 to 2 ft. high, branching above; leaves lance-shaped or egg-shaped with the base heart-shaped or rounded. Calyx lobes 4, unequal and extending the length of the corolla tube. Corolla 4-lobed, the lobes rounded and strongly fringed at the borders. Ovary tall, conical. Found in wet places and flowering in autumn.

2. **G. procera**, Holm. **SMALLER FRINGED GENTIAN.** (*G. detonsa*, Rottb.) Similar to *G. crinita*, but smaller, with linear leaves, the base not rounded or heart-shaped. Western New York and westward. July-Sept.

3. **G. quinquefolia**, L. (Fig. 6, pl. 122.) **STIFF GENTIAN.** Stem slender, stiff, usually branched, 1 to 2 ft. high. Leaves egg-shaped, partly clasping the stem, generally 5-nerved (or 3- or 7-nerved), tipped by a sharp point. Flowers in clusters at the end of the stem or at the axils; calyx about 1/3 as long as the corolla. Corolla pale blue, its lobes tri-

angular, tipped with bristle points. Capsule spindle-shaped. Flowers smaller than those of the Fringed Gentian and nearly cylindric. Moist places, southern Maine and southward. Aug.-Oct.

4. *G. saponaria*, L. (Fig. 2, pl. 122.) SOAPWORT GENTIAN. Stem erect, without or with a few short branches above, 1 to 2 ft. high. Leaves oval-lance-shaped, tapering at each end, the borders rough with short stiff hairs. Flowers in close branches at top of stem and often a single or a few flowers at each of several leaf axils, large, bright blue, closed at top. Calyx of 5 egg-shaped segments. Corolla lobes evident, as long as or longer than the intermediate plaits. In wet soil and usually in shady places. Aug.-Oct.

5. *G. Andrewsii*, Griseb. (Fig. 3, pl. 122.) CLOSED GENTIAN. Very similar to the last, 1 to 2 ft. high; corolla lobes scarcely evident, the intermediate plaits being broad and somewhat fringed, nearly obscuring the narrow lobes (Fig. 5, pl. 122). Stamens gathered into an adhering ring. Moist, shady places. Aug.-Oct.

6. *G. linearis*, Froel. (Fig. 7, pl. 122.) NARROW-LEAVED GENTIAN. Stem mostly without branches, $\frac{1}{2}$ to 2 ft. high; leaves very narrow lance-shaped, $1\frac{1}{2}$ to 3 in. long, $\frac{1}{6}$ to $\frac{1}{3}$ in. wide, smooth at borders. Flower branches at top of stem and one or more at each of several leaf-axils. Corolla funnel-shaped, open at top, about $1\frac{1}{2}$ in. long. Lobes 5, intermediate plaits much narrower than lobes. Calyx tube funnel-shaped, the 5 linear lobes as long as the tube. In bogs and other wet places. Aug.-Sept.

7. *G. rubricaulis*, Schwein. (Fig. 4, pl. 122.) RED-STEMMED GENTIAN. Stem 1 to 2 ft. high; leaves $1\frac{1}{2}$ to $2\frac{1}{2}$ in. long, oval, narrow, or broadened at base and tapering to a sharp point at apex, 3-nerved, margins somewhat rough. Stem tinged with red, leaves brown or reddish. Flowers bunched at top of stem, the bunch being subtended by 2 broad leaf-like bracts. Corolla open at top, the 5 lobes conspicuously longer than the 5 intermediate plaits, bright blue or greenish-blue. The whole plant has a somewhat marked appearance of rigid regularity. Wet soil, central New York and northward. Aug.-Sept.

A form with leaves broad at the base was regarded by Dr. Gray as a variety of *G. linearis*, (var. *latifolia*).

8. *G. Porphyrio*, J. F. Gmel. (Fig. 5, pl. 122.) ONE-FLOWERED GENTIAN. Stem simple or branched, slender, $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high. Leaves linear. Flowers terminal, solitary; corolla 5 lobes, the lobes spreading, much longer than the plaits. Calyx lobes thread-like. Color of flower bright blue, sometimes whitish or greenish. Pine barrens, southern part of our area. Aug.-Oct.

9. *G. villosa*, L. STRIPED GENTIAN. Stem $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high. Leaves broadly ovate, widest toward apex, narrowed at base. Flower branches at top of stem and one or more at some of the leaf-axils. Calyx tube funnel-shaped, the lobes thread-like, longer than the tube; corolla open at top, greenish-white striped on the inside with green veins and purple stripes; lobes much longer than the appendages. Shady places, southern part of our area. Sept.-Nov.

10. *G. flavida*, A. Gray. YELLOWISH GENTIAN. Stout, 1 to 3 ft.

high. Leaves 2 to 5 in. long, broad at the rounded base, tapering to a sharp point, smooth at margins. Flowers bunched at top of stem with one or more in upper axils. Calyx tubular, the lobes short, triangular. Corolla funnel-formed, 5 lobes and 5 appendages. Color, yellow or greenish-white. Moist soil, occasional in most of our area. Aug.-Oct.

4. FRASERA, Walt.

Tall showy herbs, bearing opposite or whorled leaves. Stem mostly simple; flowers in terminal spreading clusters. Calyx, a shallow tube and 4 narrow sepals. Corolla 4-lobed, spreading; stamens 4, inserted at base of the corolla tube. Capsule oval, flattened, few seeded.

F. caroliniensis, Walt. AMERICAN COLUMBO. Stem stout, 3 to 8 ft. high; leaves mostly in whorls of 4, oblong or lance-shaped, the lower spatula-formed, 3 to 6 in. long. Flower cluster pyramidal; corolla about 1 in. broad, greenish-yellow with brown purple dots. Rich soil, western section of our area. June-Aug.

5. HALENIA, Borkh. (*Tetragonanthus*, Kuntze)

Small herbs, usually growing in tufts; leaves opposite; flowers terminal and in the upper leaf-axils. Tube of calyx shallow, lobes narrow and long; corolla of 4 lobes, *each lobe with a hollow spur projecting below*; stamens 4 or 5; ovary 1-celled, many seeded.

H. deflexa, (J. E. Smith) Griseb. (Fig. 11, pl. 122.) SPURRED GENTIAN. Stem simple or branched above, $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high; leaves oval or egg-shaped, sharp pointed at apex, 3- to 5-nerved, 1 to 2 in. long. Flowers purplish or white, bell-shaped, the spurs cylindric, $\frac{1}{4}$ to $\frac{1}{2}$ as long as the 4-lobed corolla. Damp woods, most of our area. July-Aug.

6. OBOLARIA, L.

A low perennial plant, purplish-green with a simple or branched stem and opposite fleshy scales which occupy the place of leaves. Flowers axillary and terminal, the 2 divisions of the calyx leaf-like. Corolla 4-cleft; stamens 4, inserted at the sinuses of the corolla. Capsule ovoid; seeds numerous.

O. virginica, L. (Fig. 8, pl. 122.) PENNYWORT. Root and stem fleshy, stem 3 to 6 in. high. Stem leaves scale-like, those among the flowers about $\frac{1}{2}$ in. long, purplish, triangular, broad at the apex, narrowed and extending down the stem at base. Flowers about $\frac{1}{2}$ in. long, pale purple or whitish, longer than the 4 stamens. Southern part of our area. April-May.

7. BARTONIA, Muhl.

Small slender herbs, with simple stems or with few branches, and with opposite leaves, which are reduced to awl-shaped scales; some of these scales may be alternately arranged. Flowers small, white or yellow, arranged in slender upright clusters. Calyx 4-parted; corolla 4-lobed, bell-shaped; stamens 4, short. Capsule oval or oblong, flattened and pointed with the persistent style. Seeds numerous.

1. **B. virginica**, (L.) BSP. (Fig. 9, pl. 122.) YELLOW BARTONIA. Stem thread-like, 4 to 12 in. high, 5-angled; scales about $\frac{1}{10}$ in. long;

flowers opposite, yellow, from 2 to several pairs, less than $\frac{1}{4}$ in. long. Moist soil, most of our area. July-Sept.

2. *B. iodandra*, Robinson. PURPLISH BARTONIA. Stem 2 to 8 in. high, simple or alternately branched. Scales alternate. Corolla distinctly purplish, about twice as long as the calyx. In sphagnum, New Jersey, northward.

3. *B. paniculata*, (Michx.) Robinson. PANICLED BARTONIA. Slender, 8 to 16 in. high. Stem beset by scales in place of leaves, these often alternate. Flowers yellowish or greenish-white. Wet woods and swamps, Mass., southward. Aug-Oct.

FAMILY IV.—MENYANTHACEAE. BUCKBEAN FAMILY

Perennial herbs, growing in marshes. Root-stock stem-like. An aerial stem absent, the long leaf-stalks arising from the root-stock as does also the flower-bearing scape. Flowers in clusters, regular, bearing both stamens and pistils. Calyx 5-cleft; corolla 5-lobed; stamens 5, arising between the lobes of the corolla. Fruit a capsule.

1. MENYANTHES, L.

Leaves 3-foliate on long leaf-stalks arising from the root-stock; leaflets oval or pear-shaped, each about 1 to 2 in. long. Flowers borne on a tall scape forming a cylindric cluster consisting of from 10 to 20 tubular purple flowers, the corolla lobes triangular, spreading, the tube and lobes bearded with white hairs. Stamens shorter than the corolla; capsule egg-shaped, tipped by the permanent style.

M. trifoliata, L. (Fig. 10, pl. 122.) BUCKBEAN. A beautiful plant found in sphagnum bogs. May-June.

2. LIMNANTHEMUM, S. G. Gmelin. (Nymphoides, (Tourn.) Hill

Leaves floating, the leaf-stalks arising from the root-stock which is buried in mud. The leaf is broadly oblong or nearly orbicular, with a deep sinus and with leaf-stalk from 1 to 10 ft. long, from the summit of which arise, the leaf, which is small in proportion to the length of the leaf-stalk (1 to 2 in. long), an umbel of small white flowers and a cluster of narrow tubers each of which may produce a new plant. Primary leaves submersed, without flowers or tubers.

1. *L. lacunosum*, (Vent.) Griseb. (Fig. 12, pl. 122.) FLOATING HEART. Found in ponds. Flowers white, leaves 1 to 2 in. long. July-Aug.

2. *L. aquaticum*, (Walt.) Britton. LARGE FLOATING HEART. The plant is stouter, the sinus shallow and leaves 2 to 6 in. long. Southern part of our area. May-Aug.

FAMILY V.—APOCYNACEAE. DOGBANE FAMILY

Plants, all of which in our region, have acrid milky juice. Leaves sometimes alternate but generally opposite. Flowers regular;

calyx deeply 5-cleft (rarely 4-cleft); corolla 5-lobed; stamens 5 (lobes of corolla sometimes 4 and stamens 4, but not in our species). Stamens not united, inserted on the corolla. Ovaries (in our species) 2, free from the calyx; styles united into 1.

Leaves opposite.

Flowers solitary **Vinca**

Flowers in clusters, small **Apocynum**

1. VINCA, L.

Herbs, with opposite leaves and solitary blue or whitish flowers arising from leaf-axils. Our species a trailing herb which has escaped from cultivation. The leaves smooth at the edges, firm, dark green on both sides, egg-shaped, with short leaf-stalks. Flowers solitary, generally blue, with a short cylindric tube and 5 broad spreading lobes. Ovaries of 2 long cylindric follicles.

V. minor, L. MYRTLE. PERIWINKLE. In borders of woods and at roadsides. Blooms nearly all summer.

2. APOCYNUM, L.

Perennial herbs, with opposite leaves and white or pink flowers in spreading clusters, generally terminal. Calyx small, deeply 5-cleft; corolla bell-shaped, bearing at the throat 5 small triangular appendages. Stamens 5, inserted at base of corolla. Seeds in two long cylindric carpels.

Branches spreading *A. androsaemifolium*

Branches erect or nearly so.

Base of leaves tapering *A. cannabinum*

Base of leaves rounded *A. hypericifolium*

1. **A. androsaemifolium**, L. (Fig. 1, pl. 123.) SPREADING DOGBANE. Stem 1 to 4 ft. high; branches spreading. Leaves broadly elliptic or oval, sharply pointed or blunt at apex, generally rounded at base. Corolla pink, *the lobes shorter than the tube*. Fields and roadsides, throughout our area. June-July.

2. **A. cannabinum**, L. (Fig. 3, pl. 123.) INDIAN HEMP. Resembles No. 1, but branches more erect; base of leaves narrowed or somewhat rounded. *Lobes of corolla as long as or longer than the tube*. Fields and thickets. June-Aug.

3. **A. hypericifolium**, Ait. (Fig. 2, pl. 123.) CLASPING-LEAVED DOGBANE. Plant smooth with a whitened bloom, 1 to 2 ft. high. Leaves oblong to oval, obtuse at apex, heart-shaped or clasping the stem at base. Central New York, Maine and northward.

(Several forms, found in our area and differing in some respects from these have been described as species by some, as varieties by others.)

FAMILY VI.—ASCLEPIADACEAE. MILKWEED FAMILY

Plants, with milky juice, with leaves opposite or in whorls or less frequently alternate, without lobes or teeth. Flowers in termi-

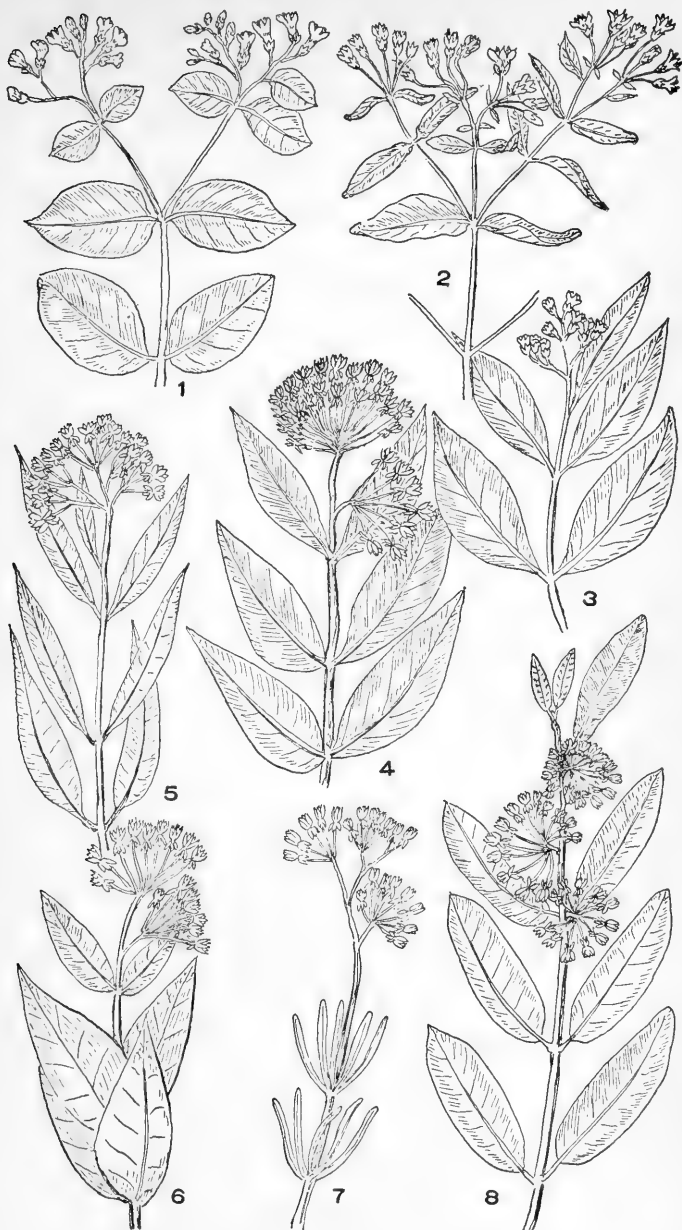


PLATE 123

1. *Apocynum androsaemifolium*. 2. *A. hypericifolium*. 3. *A. cannabinum*.
 4. *Asclepias purpurascens*. 5. *A. lanceolata*. 6. *A. rubra*. 7. *A. verticillata*. 8. *Acerates viridiflora*.

nal or axillary clusters; calyx 5-parted, the sepals turned back; corolla bell-shaped, urn-shaped or wheel-shaped. Between the corolla and the stamens is a 5-lobed crown attached either to the corolla or to the stamens. Stamens 5, the anthers in close connection with the summit of the pistil. The pollen grains cohere in masses. Ovary of two long pods.

Crown of 5 hooded bodies, each with an incurved horn. Leaves opposite **Asclepias**

Crown without the incurved horns, leaves alternate.

Erect plant **Acerates**

Trailing vine **Cynanchum**

I. ASCLEPIAS

Our species have opposite, whorled or scattered leaves, a milky juice, and small flowers in terminal or axillary umbels. Crown of 5 hood-like bodies each bearing an incurved horn.

Stem reclining *A. decumbens*

Stem erect.

Leaves scattered.

Flowers orange *A. tuberosa*

Leaves opposite, not whorled.

Flowers bright red or deep purple.

Leaves narrow lance-shaped *A. lanceolata*

Leaves egg-shaped, the apex narrow tapering *A. rubra*

Leaves egg-shaped with blunt taper *A. purpurascens*

Flowers pink or light purple.

Plant not hairy *A. incarnata*

Plant downy or hairy *A. pulchra*

Flowers greenish-purple.

Leaves blunt at each end.

Plant downy *A. syriaca*

Plant not downy *A. obtusifolia*

Leaves tapering at each end *A. exaltata*

Flowers white or partly purplish *A. variegata*

Leaves, at least a part of them, in a whorl of 4 *A. quadrifolia*

Leaves in whorls of 3 to 7 *A. verticillata*

1. **A. tuberosa**, L. (Fig. 3, pl. 124.) BUTTERFLY WEED. PLEURISY ROOT. Stems rather stout, 1 to 2 ft. high, hairy, rough, bearing at the summit a number of umbels of orange-colored flowers. Leaves linear to lance-shaped, attached directly to the stem or by a short leaf-stalk. Pods erect on pedicels which first dip downward then curve upward. Dry fields. June-Sept.

2. **A. decumbens**, L. DECUMBENT BUTTERFLY-WEED. Plant hairy; stems decumbent; leaves oblong or elliptic. Flowers dark orange. Dry fields, Conn., not common in our area. June-Aug.

3. **A. lanceolata**, Walt. (Fig. 5, pl. 123.) (*A. paupercula*, Michx.) Stem slender, few if any branches, 2 to 4 ft. high, smooth, without hairs, as are the leaves. Leaves opposite, 4 to 10 in. long, linear or narrowly lance-shaped, rough on the edges, tapering at each end, but broadest toward the base, generally on very short leaf-stalks. Flowers in terminal umbels, one or more, each with from 5 to 12 flowers; corolla segments red, hoods deep orange. Pod erect, about 4 in. long. Wet places, mostly near the coast, southern part of our area. June-Aug.



PLATE 124

1. *Asclepias syriaca*. 2. *A. variegata*. 3. *A. tuberosa*. 4. *A. exaltata*. 5. *A. quadrifolia*. 6. *A. pulchra*. 7. *A. obtusifolia*.

4. *A. rubra*, L. (Fig. 6, pl. 123.) RED MILKWEED. Plant with few if any hairs, stem 1 to 4 ft. high, few if any branches. Leaves opposite, 2 to 6 in. long, egg-shaped to lance-shaped, the base rounded, apex tapering to a very sharp point, on very short leaf-stalks or none, bright green. Umbels terminal of many purplish-red flowers, the incurved horns long and slender. Pods slender, spindle-shaped, about 4 in. long. Moist soil, southern part of our area. June-July.

5. *A. purpurascens*, L. (Fig. 4, pl. 123.) PURPLE MILKWEED. Stem rather stout, with few if any branches, slightly downy or free from hairs, 2 to 4 ft. high. Leaves opposite, elliptic or oblong, the upper ones taper pointed, base of all rounded or narrowed, the under side downy, upper smooth, on short leaf-stalks, 3 to 8 in. long. Flowers in terminal umbels, color deep purple. Pods 4 to 5 in. long, downy, nearly erect. Dry grounds, New Hampshire and northward. June-Aug.

6. *A. incarnata*, L. SWAMP MILKWEED. Stem 2 to 3 ft. high, smooth or slightly downy, very leafy, branching or rarely without branches. Leaves opposite, lance-shaped, sharply tapering at each end or somewhat rounded at base, 3 to 6 in. long. Flowers light purple or rarely white, horns of the crown longer than the hoods, slender, needle-pointed. Pod 2 to 3½ in. long, slender. Common in swamps.

7. *A. pulchra*, Ehrh. (Fig. 6, pl. 124.) HAIRY MILKWEED. Similar to No. 5, but leaves are broader and more rounded or slightly heart-shaped at base and the under surface of leaves is decidedly velvety. Flowers light red, pink or white. Moist fields throughout our area. July-Sept.

8. *A. obtusifolia*, Michx. (Fig. 7, pl. 124.) BLUNT-LEAVED MILKWEED. (*A. amplexicaulis*, Sm.) Stem 2 to 3 ft. high. Leaves oblong, usually wavy, very blunt at apex and base, on very short leaf-stalks or clasping at base, 2½ to 5 in. long. Flowers green-purple, in a many-flowered terminal umbel. Dry fields throughout our area. May-Aug.

9. *A. exaltata*, Muhl. (Fig. 4, pl. 124.) TALL MILKWEED. POKE MILKWEED. (*A. phytolaccoides*, Pursh.) Stem 3 to 6 ft. high, with 2 downy lines. Leaves opposite, oval or egg-shaped, thin, tapering at each end, 4 to 9 in. long, 1½ to 4 in. wide, the lower sometimes broadest toward the apex, sometimes downy beneath. Umbels terminal and from the leaf-axils. Flowers greenish with white crown. Horns each with a long projecting slender point. Moist thickets and woods. June-Aug.

10. *A. variegata*, L. (Fig. 2, pl. 124.) WHITE MILKWEED. Stem 1 to 2 ft. high, somewhat downy above when young. Leaves opposite, thick, egg-shaped, oval, or pear-shaped, sometimes about the middle of the stem whorled, rather blunt at each end, the margins wavy or toothed, 3 to 6 in. long, on leaf-stalks about ¼ in. long. Flowers in 1 to 4 compact terminal umbels or rarely also in one or two lateral umbels, white with purple or purplish crown. Dry woods, southern part of our area. June-July.

11. *A. quadrifolia*, Jacq. (Fig. 5, pl. 124.) FOUR-LEAVED MILKWEED. Stem slender, 1 to 2 ft. high, mostly leafless below or with a pair of egg-shaped leaves at lower third, with one or two whorls of 4 or 5 leaves about the middle and sometimes one or two pairs of leaves immediately below or above these whorls. Leaves of the whorls more or less broadly lance-

shaped, tapering at each end, thin, 2 to 6 in. long, $\frac{1}{2}$ to $2\frac{1}{2}$ in. wide, on short leaf-stalks. Flowers in 1 to 4 terminal umbels (rarely some small umbels in upper axils), pink or white. Woods and thickets. May-July.

12. *A. syriaca*, L. (Fig. 1, pl. 124.) COMMON MILKWEED. Stem stout, branching little, if any, slightly downy above, 3 to 5 ft. high. Leaves opposite, oblong or oval, blunt at each end, densely downy beneath, 4 to 9 in. long. Flowers dull green-purple to whitish, in numerous umbels. Fields, rich grounds. June-Aug.

13. *A. verticillata*, L. (Fig. 7, pl. 123.) WHORLED MILKWEED. Stem slender, sometimes branched, leafy, 1 to $2\frac{1}{2}$ ft. high. Leaves linear in whorls of 3 to 7 or more. Flowers in terminal umbels, greenish-white. Dry hills, New York and southward. July-Sept.

2. ACERATES, Ell.

Herbs similar to *Asclepias*, but the hoods compassing the crown are without the horn which is characteristic of *Asclepias*.

A. viridiflora, Eaton. (Fig. 8, pl. 123.) GREEN MILKWEED. Stem whitish, downy, at least when young, without branches, reclining or nearly erect, 1 to 3 ft. high. Leaves opposite, or, less frequently alternate, egg-shaped, on short leaf-stalks, thick, 1 to 3 in. long, $\frac{1}{4}$ as wide, slightly rough, base rounded, upper blunt. Flowers in axillary umbels, green. Pod long and slender. Dry sandy soil. June-Sept.

3. CYNANCHUM, L. (*Vincetoxicum*, Moench)

A trailing vine, with opposite or whorled leaves and umbels of small flowers which resemble those of *Asclepias*. Calyx and corolla wheel-formed; crown cup-like, not divided into 5 distinct parts as in *Asclepias*, but has 5 lobes.

C. nigrum, Pers. BLACK SWALLOW-WORT. Twining vine, 2 to 5 ft. long, with lance egg-shaped leaves, rounded at base, tapering at apex. Flowers dark purple. Pod slender, resembles that of *Asclepias*. Escaped from gardens. June-Sept.

Order V.—TUBIFLORALES. Order of Tubular Flowers

Flowers almost always regular, the corolla of a single envelope more or less parted into 5 lobes at the border. Stamens 5 *inserted with the corolla* and alternating with its lobes. Seed pods (carpels) 2 to 5, always above and free from the calyx. Style nearly always simple.

Ovary deeply 4-lobed.

Corolla regular (except in Genus *Echium*), pods (carpels) separating as nutlets. Herbs, not trailing or twining vines **BORAGINACEAE**

Ovary not 4-lobed.

Corolla regular; *twining vines*.

Yellowish-white leafless vines, parasites **CUSCUTACEAE**

Vines with normal leaves, not parasitic

. **CONVOLVULACEAE**

Herbs, not vines.

Ovary 3-celled. Flowers in umbel-like, spreading clusters, rarely solitary, or in a loose irregular compound cluster, stamens not plumose . . **POLEMONIACEAE**

Ovary 1-celled, stamen filaments plumed with rather long hairs **HYDROPHYLLACEAE**

FAMILY I.—CONVOLVULACEAE. MORNING-GLORY FAMILY

Herbs, mostly with twining vines. Leaves alternate, without stipules. Flowers regular, corolla of a single petal (by concrescence of 5); calyx 5-parted; margin of corolla in 5 lobes; stamens 5, inserted at the very base of the corolla or with it. Ovary superior to the calyx and not connected directly with it; styles 1 to 3. Fruit a capsule or 2 to 4 pods, distinct.

Styles 2, or one deeply 2-parted **Breweria**
Style 1.

Stigmas 2 **Convolvulus**
Stigma 1 **Ipomoea**

1. BREWERIA, R. Br.

Ours a slender species, nearly or quite prostrate, with long narrow leaves and axillary bell-shaped flowers resembling those of *Convolvulus*. Capsule globose, 2-celled.

B. Pickeringii, (M. A. Curtis) A. Gray. (Fig. 4, pl. 125.) PICKERING'S BREWERIA. Stem 1 to 2 ft. long, downy. Leaves very narrowly linear, tapering at base. Flower stems spring at axils, bearing from 1 to 3 flowers. Southern part of our area. June-Aug.

2. IPOMOEA, L.

Twining or trailing vines. Corolla funnel-form to bell-form, the margin only slightly lobed. *Calyx without bracts* at the base. Style undivided, terminated by a single cap or 2 or 3 globose nearly united caps. Capsule globular.

Flowers white.
Corolla 2 to 3 in. long *I. pandurata*
Corolla $\frac{1}{2}$ to $\frac{3}{4}$ in. long *I. lacunosa*
Flowers pink or purple.
Leaves deeply lobed *I. hederacea*
Leaves not deeply lobed *I. purpurea*

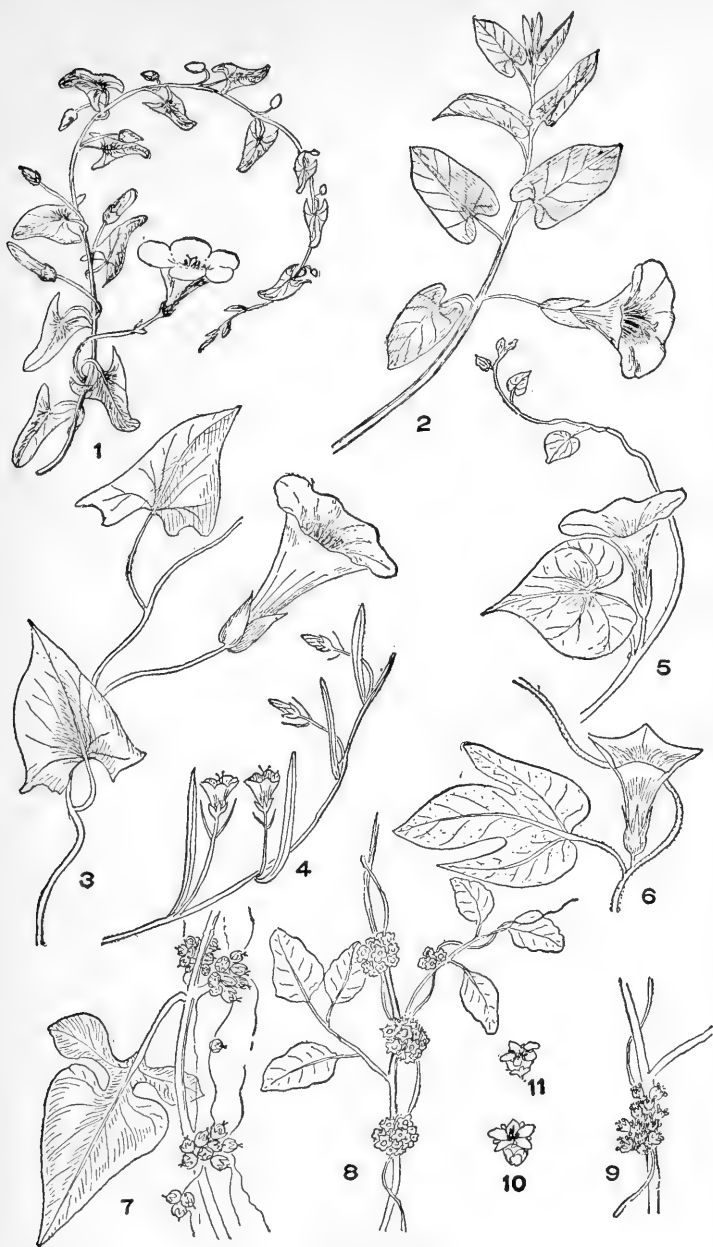


PLATE 125

1. *Convolvulus arvensis*. 2. *C. spithameus*. 3. *C. sepium*. 4. *Breweria Pickeringii*. 5. *Ipomea pandurata*. 6. *I. hederacea*. 7. *Cuscuta arvensis*, growing on Nightshade. 8. *C. Gronovii*, on Jewel weed. 9. *C. Coryli*. 10. *C. compacta*, single flower. 11. *C. cephalanthi*, single flower.

1. *I. pandurata*, (L.) Meyer. (Fig. 5, pl. 125.) WILD POTATO VINE. Perennial vine from a very large root, smooth or slightly downy, stems 2 to 12 ft. long. Leaves alternate, broadly egg-shaped, heart-shaped at base, sharp pointed at apex, without teeth at margins and generally without lobes, but sometimes contracted at middle, giving leaf a fiddle-shaped outline or some of the later ones angular. Flower stem usually longer than the leaf-stalk, with from 1 to 5 white, funnel-form flowers with pink or purple stripes in the throat, the corolla about 3 in. long and as broad. Dry soils. Connecticut and southward. May-Sept.

2. *I. lacunosa* L. SMALL-FLOWERED WHITE MORNING-GLORY. Stem trailing, 2 to 8 ft. long, downy or hairy. Leaves on slender leaf-stalks, heart-shaped at base, egg-shaped or 3-lobed. Flower stem shorter than the leaves; flower white, $\frac{1}{2}$ to $\frac{3}{4}$ in. long. Penna., and southward. July-Sept.

3. *I. purpurea*, (L.) Roth. COMMON MORNING-GLORY. Climbing vine, escaped from gardens. Stem 4 to 10 ft. long, hairy. Leaves broadly ovate, heart-shaped at base, sharp pointed at apex, sometimes more or less lobed, hairy. Flower stems slender, 1- to 5-flowered. Flowers funnel-formed, purple, blue, pink, etc. Ovary 3, rarely 2-celled, capsule globose. Waste places, mostly from gardens. July-Oct.

4. *I. hederacea*, Jacq. (Fig. 6, pl. 125.) IVY-LEAVED MORNING-GLORY. Stem 2 to 5 ft. long, hairy. Leaves deeply 3-lobed, lobes acute, heart-shaped at base, hairy. Flower stem bearing 1 to 3 funnel-shaped flowers nearly white, the rim light blue or purple, 1 to 5 in. long. Ovary 3-celled, capsule globose. Southern part of our area. July-Oct.

3. CONVOLVULUS, L.

Herbs, with trailing or climbing vines or erect stems. Leaves in our species without teeth at margins and without stipules; the vines with heart-shaped, or arrow-shaped leaves, the erect plant with oval leaves; corolla funnel-shaped, pink, purple or white, the border 5-angled, plaited, or continuous. Calyx with or without bracts at its base. Pistil dividing into 2 near the top. Stamens 5, inserted at the base of the corolla. Capsule globose.

Stems climbing or trailing, leaves heart-shaped at base.

Stems 3 to 10 ft. long *C. sepium*

Stems 1 to 2½ ft. long *C. arvensis*

Stems not climbing or trailing *C. spithameus*

1. *C. sepium*, L. (Fig. 3, pl. 125.) RUTLAND BEAUTY. HEDGE BINDWEED. Stems trailing or twining, 3 to 10 ft. long, smooth or slightly hairy. Leaves triangular spear-shaped on slender leaf-stalks, acute at apex, deeply depressed at base. Flowers, one on an elongated flower stem, arising from a leaf-axil; corolla white or pink, about 2 in. long and as broad across the border. Bracts at the base of the corolla large, egg-shaped, heart-shaped at base. On stone walls and in thickets. June-Aug.

2. *C. arvensis*, L. (Fig. 1, pl. 125.) SMALL BINDWEED. Trailing on the ground, stems 1 to 2½ ft. long. Leaves triangular, arrow-shaped, 1 to 2½ in. long, the basal lobes spreading. Flowers 1 to 4 on a flower stem, which is shorter than the leaves, with 1 to 3 bracts at the summit.

Corolla about an in. long and as broad, pink or white. Calyx without bracts at base. Waste places. May-Sept.

3. *C. spithameus*, L. (Fig. 2, pl. 125.) UPRIGHT BINDWEED. Stems erect or curving upward, smooth or mostly downy, not twining or the summit slightly twining, $\frac{1}{2}$ to 1 ft. high. Leaves alternate oblong, with or without a heart-shaped base, round at apex. Corolla 2 in. long, white, a single flower on the flower stem. Calyx enclosed by 2 large bracts. Dry sandy soil. May-Aug.

FAMILY II.—CUSCUTACEAE. DODDER FAMILY

Long thread-like white, yellowish or reddish vines with leaves reduced to small scales, rising from the ground, but becoming entirely parasitic, lying upon or twining about herbs or shrubs to which they adhere by means of suckers. Flowers in more or less densely compact rounded or irregular clusters, white or yellowish. Flowers with calyx and corolla, pistil and stamens. Calyx below the ovary and not adherent to it, of 5 lobes or divisions; corolla bell-shaped, urn-shaped or egg-shaped, in the tube of which are, alternating with the corolla lobes, 5 scales which are finely toothed or fringed. At the sinuses of the corolla lobes and above the scales arise the 5 short filamented stamens. Pistils 2. Capsule globose.

CUSCUTA, L.

Characters as above.

The scales within the corolla bordered with small rounded teeth. Summit of pistil elongated.

The scales not incurved *C. Epilinum*

The scales strongly incurved *C. Epithymum*

The scales within the corolla bordered by a fringe. Summit of pistil rounded.

Flowers without flower stems *C. arvensis*

Flowers with short flower stems.

Calyx not deeply divided.

Tips of corolla lobes sharp, turning in *C. Coryli*

Tips of corolla lobes rounded, turning out.

Capsule pointed *C. Gronovii*

Capsule globose *C. cephalanthi*

Calyx deeply divided *C. compacta*

1. *C. Epilinum*, Weihe. FLAX DODDER. Stem yellow or reddish, very slender. Flowers globular, in dense heads, flowers closely connected with the stem without flower stem. Corolla with 5 lobes, scarcely exceeding the divisions of the calyx; scales within the corolla rounded, the upper border with rounded teeth which do not curve inward. The lobes of the corolla spreading outward. Growing on flax, hence its name. June.

2. *C. Epithymum*, Murr. THYME DODDER. CLOVER DODDER. Stem reddish, thread-like. Flowers in small dense rounded clusters, without flower-stems, the clusters pinkish. Corolla tube longer than the calyx; scales within the tube toothed, and strongly curved inward. Found on clover and alfalfa in this country. In Europe on thyme, hence its name. July-Sept.

3. *C. arvensis*, Beyrich. (Fig. 7, pl. 125.) FIELD DODDER. Stems pale yellow, slender. Flowers small, each on a *very short flower-stem*, clusters few flowered. Corolla bell-shaped, with 5 shallow lobes, the scales within being *fringed around the whole margin*. *The acute tips of the lobes of the corolla are strongly turned in*. Found on various plants on rather dry soil. July-Aug.

4. *C. Coryli*, Engelm. (Fig. 9, pl. 125.) HAZEL DODDER. Stem coarse, twining about stems of shrubs, etc. Flowers with distinct flower-stems in dense elongated clusters. Calyx of 5 lobes, not deeply divided, triangular; corolla bell-shaped, 4- or 5-lobed. Scales inside the corolla small, obtuse with a scant fringe or the scale reduced to a few fringe elements. Corolla lobes angular, deflected inward at apex. Grows on hazels and other shrubs or on coarse herbs.

5. *C. Gronovii*, Willd. (Fig. 8, pl. 125.) GRONOVII'S DODDER. LOVE VINE. The most common of the dodders. Stems coarse, sometimes climbing high. Corolla lobes rounded, the tips turning out. Scales within deeply fringed; pistils with rounded heads (stigmas). Wet shady places. July-Aug.

6. *C. compacta*, Juss. (Fig. 10, pl. 125.) COMPACT DODDER. Stem coarse, flowers in densely compact clusters, each without flower-stem. Calyx of 5 parts, *deeply divided from each other*, subtended by 3 to 5 bracts resembling the calyx lobes. Corolla salver-form, the 5 lobes spreading, obtuse at tip, scales narrow, fringed. On shrubs in damp woods. July-Sept.

7. *C. cephalanthi*, Engelm. (Fig. 11, pl. 125.) BUTTON-BUSH DODDER. Stems yellow, coarse, high climbing. Flowers in compact masses, the lobes of the corolla rounded, *spreading or rolling outward*. Tall herbs and shrubs, Pennsylvania, south and westward. July-Aug.

FAMILY III.—POLEMONIACEAE. PHLOX FAMILY

Herbs with alternate or opposite leaves and with regular and perfect flowers; a 3-celled ovary superior to the calyx; the pistil 3-parted above; stamens 5, inserted on the corolla tube and alternate with the corolla lobes; calyx tubular or bell-shaped, 5-parted; corolla funnel-formed, bell-shaped, wheel- or saucer-shaped. Capsule splitting at the sides, 3-valved.

Leaves simple, opposite Phlox

Leaves compound (feather-formed), alternate Polemonium

I. PHLOX, L.

Ornamental herbs, with opposite leaves and terminal clusters of flowers. Calyx tubular with 5 narrow divisions, 5-ribbed. Corolla a long slender tube abruptly expanding into a flat wheel-like expanse, the border 5-lobed. Stamens 5, inserted into the tube of the corolla at about its middle, pistil



PLATE 126

1. *Phlox divaricata*. 2. *P. paniculata*. 3. *P. maculata*. 4. *P. pilosa*. 5. *P. subulata*. 6. *Polemonium coeruleum*. 7. *P. reptans*.

1, divided near summit into 3 branches. Capsule 3-celled, each cell 1-seeded.

Leaves flat, opposite.

Stems strictly erect.

Stem with purple spots *P. maculata*

Stem without purple spots *P. paniculata*

Stem more or less decumbent, at least at the base.

Calyx not hairy *P. ovata*

Calyx hairy.

Flowers blue or lilac *P. divaricata*

Flowers purple, pink or white *P. pilosa*

Leaves awl-shaped, in whorls *P. subulata*

1. *P. maculata*, L. (Fig. 3, pl. 126.) WILD SWEET-WILLIAM. Stem erect, $1\frac{1}{2}$ to 3 ft. high, generally flecked with purple spots; leaves opposite, lance-shaped, rounded or more or less heart-shaped at base, tapering to an acute point at apex, not hairy. Flowers in an elongated rather compact cluster. Calyx teeth triangular, lance-shaped, without hairs. Corolla purple, pink or rarely white. Moist woods, southern and central part of our area. June-Aug.

2. *P. paniculata*, L. (Fig. 2, pl. 126.) GARDEN PHLOX. An escape from gardens which has become naturalized in the very southern part of our area. Stem erect, 2 to 6 ft. high. Leaves opposite, lance-shaped, tapering at both ends, the upper sometimes heart-shaped at base. Flowers in a large pyramidal cluster; calyx teeth awl-shaped. Corolla pink to white. Not found wild except in southern section of our area. Common in gardens. Established in a few localities. June-July.

3. *P. ovata*, L. MOUNTAIN PHLOX. Stems leaning at base, 1 to 2 ft. high, whole plant without or with very few hairs. Leaves opposite, more or less leathery, the upper egg-shaped, or somewhat lance-shaped, the base broad and rounded or even heart-shaped, 1 to 2 in. long, tapering to a point at apex, the lower leaves pear-shaped. Calyx teeth lance-shaped, not hairy or viscid, nearly $\frac{1}{2}$ as long as the corolla tube. Corolla pink or red. Woods in the very southern part of our area. May-Aug.

4. *P. pilosa*, L. (Fig. 4, pl. 126.) DOWNY PHLOX. Stem slender, mostly more or less decumbent at base, the upper part of stem erect or nearly so. Whole plant soft downy. Leaves opposite, linear or narrow lance-shaped, tapering at each end, 1 to 4 in. long. Flowers in rather flat clusters. Calyx viscid, hairy. Corolla pink-purple or red, rarely purplish-white. Dry woods, New Jersey and south. April-June.

5. *P. divaricata*, L. (Fig. 1, pl. 126.) WILD BLUE PHLOX. Stems decumbent at base, $\frac{3}{4}$ to $1\frac{1}{2}$ ft. high, viscid downy. Leaves opposite, lance-shaped, rounded or heart-shaped at base, pointed at apex. Cluster of flowers broad, rather flat, loosely flowered; lobes of corolla notched at the end, rarely entire, blue or pale lilac. Rocky damp woods. April-June.

6. *P. subulata*, L. (Fig. 5, pl. 126.) MOSS PINK. Common in gardens in New England and New York. In southern part of our area found often in extensive patches forming in spring a large expanse of bright pink or purple color. Stems decumbent, $\frac{1}{4}$ to $\frac{1}{2}$ ft. long; leaves linear, awl-shaped, in whorls about the stem. Flowers in terminal flat clusters. Corolla lobes notched at the end. Dry hills, New York, southward and westward. April-June.

2. **POLEMONIUM, L.**

Perennial (rarely annual) herbs, with alternate compound (feather-formed) leaves and with clusters of blue, white or yellow flowers. Calyx bell-shaped. Corolla funnel-formed; stamens 5, inserted at the summit of the short tube of the corolla. Capsule ovoid, few to several seeded.

1. **P. coeruleum**, A. Gray. (Fig. 6, pl. 126.) AMERICAN JACOB'S LADDER. (*P. Van Bruntiae*, Britton.) Stem 1 to 3 ft. high, erect, smooth or slightly hairy above. Compound leaves alternate, the lower ones consisting of from 9 to 21 leaflets, the upper mostly of 3 leaflets, egg-shaped, pointed at each end, $\frac{1}{2}$ to $1\frac{1}{2}$ in. long. Flowers in a loose terminal cluster; divisions of the calyx longer than its tube; the 5 lobes of corolla rolled outward; stamens and pistil extending considerably beyond the corolla. Flowers blue. Swamps and wet places and on mountains, Vermont, northern New York and southward. May-July.

2. **P. reptans**, L. (Fig. 7, pl. 126.) GREEK VALERIAN. Stems more or less reclining, about 1 ft. high or less, smooth or slightly downy. Leaflets 5 to 15; oblong, pointed at each end, the upper leaves of 3 leaflets. Calyx lobes obtuse; stamens not extending beyond the corolla. Color light blue. Woods, New York, southward and westward. May-June.

FAMILY IV.—**HYDROPHYLLACEAE.** WATER-LEAF FAMILY

Herbs, mostly with alternate, large, deep-lobed leaves, generally hairy, with regular flowers, blue, purple or white. Calyx inferior to and free from the ovary, 5-cleft, often with an appendage at the cleft. Corolla tubular bell-shaped, 5-lobed, often with 10 horny scales near the base. Stamens 5, inserted into the corolla. Style deeply bifid. Capsule 1- to 2-celled, ovoid.

Stamens extending beyond the corolla.

Anthers linear or oblong **Hydrophyllum**

Anthers egg-shaped **Phacelia**

Stamens not extending beyond the corolla **Ellisia**

1. **HYDROPHYLLUM, L.**

Herbs, with large, lobed or somewhat feather-formed, leaves and with floweres *in clusters*. Other characters as above.

Calyx with a reflexed appendage between the sepals at base . . . *H. appendiculatum*

Calyx without appendages between the sepals.

Plant sparingly if at all downy *H. virginianum*

Leaves downy at least beneath *H. canadense*

1. **H. appendiculatum**, Michx. APPENDAGED WATER LEAF. Stems usually branched, 1 to 2 ft. high, usually covered with viscid hairs above. Leaves deeply 5-lobed, the lobes with acute tips; margins coarsely toothed, leaves on long leaf-stalks. Appendages between the sepals deflexed. Corolla violet, blue or purple. Woods. May-June.

2. **H. virginianum**, L. (Fig. 1, pl. 127.) VIRGINIA WATER LEAF.

Stems slender, 1 to 3 ft. high. Not hairy or with very few hairs. Leaves deeply 5-lobed, the lobes sharp pointed and with coarse sharp teeth, the lower leaves with 5- to 7-lobes, feather-formed. *Calyx without appendages between the sepals.* Flowers white or pale purple. Woods. May-Aug.

3. *H. canadense*, L. (Fig. 2, pl. 127.) BROAD-LEAVED WATER LEAF. Stem slender, 1 to 2 ft. high. Leaves nearly round with 5 to 7 acute lobes and with coarse teeth. Appendages between the sepals absent. Lower side of leaves somewhat downy or hairy. Woods. June-Aug.

2. *ELLISIA*, L. (*Macrocalyx*, Trew.)

Our species a hairy branching, slender herb, with alternate feather-lobed leaves and solitary star-shaped flowers. Calyx equally 5-parted, large; the bell-shaped corolla much enlarged in fruit. *Appendages between sepals absent.* Stamens 5, inserted at base of corolla and included within it. Capsule 2- to 4-seeded.

E. Nyctelea, Kuntze. NYCTELEA. Stem much branched; leaves pinately divided. Flowers white, solitary; calyx, in flower about 1/6 to 1/4 in. broad, in fruit about 1 in. or more broad. Capsule globose. Moist soil, southern part of our area. April-July.

3. *PHACELIA*, Juss.

Small annual herbs, usually with stiff hairs. Leaves alternate, sometimes entire, but more frequently deeply cut or lobed. Flowers in coiled clusters (cymes). Calyx 5-lobed. Corolla open bell-shaped, tubular or funnel-formed. Styles united below, stamens included in the corolla or exserted.

1. *P. dubia*, (L.) Small. SMALL-FLOWERED PHACELIA. Small branching plant, 5 to 12 in. high. Leaves divided into 3 to 5 oblong segments, opposite and terminal. Flowers in narrow clusters, the clusters not much coiled, blue or white, 5 to 15 in a cluster. Capsule globular, 6- to 12-seeded. Moist shady places, New York, and southward. April-June.

2. *P. Purshii*, Buckl. (Fig. 3, pl. 127.) PURSH'S PHACELIA. Branching, 6 to 18 in. high. Lower leaves on leaf-stalks, narrow, much lobed; upper without leaf-stalks less lobed; cluster partly one sided, scarcely coiled, with 10 to 20 blue or white open bell flowers with exserted stamens. Calyx lobes linear. Penna., southward, locally further north. April-June.

FAMILY V.—BORAGINACEAE. BORAGE FAMILY

Herbs, annual, biennial or perennial. Leaves alternate or rarely opposite. Flowers, mostly blue, generally in one-sided, curved or coiled clusters. Flowers mostly regular, with both stamens and pistils, the corolla of one piece forming a tube and a spreading border, which is divided into 5 lobes. At the throat of the corolla often a slight crest. Stamens 5, alternate with corolla lobes and inserted at the throat of the corolla or deeper. Pistil 1, simple or divided at top. Ovary superior, of 2 rounded pods each



PLATE 127

1. *Hydrophyllum virginianum* 2. *H. canadense*. 3. *Phacelia Purshii*.
 4. *Cynoglossum officinale*. 5. *Lappula virginiana*. 6. *L. echinata*. 7. *Pneumonia maritima*. 8. *Heliotropium europaeum*. 9. *Mertensia virginica*.

2-seeded, the base of the ovary being 4-lobed except in *Heliotropium*. Fruit mostly 4 one-seeded nutlets.

Ovary not lobed **Heliotropium**

Ovary 4-lobed.

Corolla borders regular, tube not bent

Nutlets (the 4 divisions of the ovary) armed with barbed prickles.

Corolla funnel-form, the nutlets spreading . **Cynoglossum**

Corolla salver-form, the nutlets incurved . . . **Lappula**

Nutlets not armed with prickles.

Corolla throat closed by scales.

Fleshy herb **Pneumaria**

Herbs not fleshy.

Corolla star-shaped, the lobes sharp pointed, no tube **Borago**

Corolla with a long tube . . . **Symphytum**

Corolla throat not closed by scales.

Lobes of the corolla erect, tube cylindric

. **Onosmodium**

Lobes of the corolla spreading, rounded, the tube

tapering **Myosotis**

Lobes of corolla forming a bell-shaped body.

Flowers white or yellow . . **Lithospermum**

Flowers blue or purple **Mertensia**

Corolla border irregular, tube not bent

Flowers blue, lobes of the corolla unequal **Echium**

Tube of corolla bent

Flowers blue **Lycopsis**

1. HELIOTROPIUM, L.

Herbs, some of which have more or less woody stems, rarely shrubs, our only species purely herbaceous. Leaves alternate, rarely lobed or notched at margin. Flowers in slender one-sided clusters which coil nearly to the extent of forming a ring. Corolla small, funnel-form or salver-form, the 5 lobes rounded, calyx with 5 lance-shaped lobes. Ovary, although of 2 cells, each containing 2 seeds, is not deeply lobed as is the case with other genera of this family.

H. europaeum, L. (Fig. 8, pl. 127.) EUROPEAN HELIOTROPE. Much branched, $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high. Leaves oval, apex obtuse; the whole plant rough hairy. Flowers white in terminal curved spikes. Naturalized from Europe. In southern part of our area. June-Oct.

2. CYNOGLOSSUM, L.

Mostly rough hairy tall herbs. Leaves alternate, with smooth margins, the lower with long leaf-stalks. Flowers in curved clusters; corolla funnel- or salver-form with short tube, throat closed by 5 scales. Calyx 5-parted. Ovary deeply 4-lobed, the lobes spreading and covered with short barbed prickles.

1. **C. officinale**, L. (Fig. 4, pl. 127.) HOUND'S TONGUE. GIPSY FLOWER. Stem $1\frac{1}{2}$ to 3 ft. high, usually branched, downy, *leafy to the top*. Lower leaves narrow-oblong, $\frac{1}{2}$ to 1 in. long, upper lance-shaped without leaf-stalks. Flowers in terminal curved clusters in which there are no leafy bracts. Corolla dull purple. Plant with an unpleasant odor. In fields and waste places. May-Sept.

2. **C. virginianum**, L. WILD COMFREY. Plant much larger than No. 1, $1\frac{1}{2}$ to $2\frac{1}{2}$ ft. high, and leaves broader and longer, 4 to 12 in. long, obtuse at apex. *Leafless above*, leaves below oblong. Flowers blue. Woods. April-May.

3. LAPPULA, Moench. (Echinosperrum, Sw.)

Herbs, mostly rough hairy. Leaves alternate, margins entire. Flowers in long, somewhat curved and more or less one-sided spikes, with leafy bracts among the flowers. Nutlets erect or curving with barbed prickles on the bank.

1. **L. echinata**, Gilibert. (Fig. 6, pl. 127.) EUROPEAN STICKSEED. (*L. Lappula*, Karst.) Whole plant hairy, branching, 1 to 2 ft. high. Leaves lance-shaped to linear, without leaf-stalks. Flowers in long and slender spike, scattered, with a bract below each flower. Nutlets with prickles in 2 rows. Waste places. May-Sept.

2. **L. virginiana**, (L.) Greene. (Fig. 5, pl. 127.) VIRGINIA STICKSEED. Plant downy, 2 to 4 ft. high. Leaves broadly oval, the lower, 3 to 8 in. long and sometimes nearly round. Flowers in slender spikes, several from the main stem, *bracted only* at the base of the spikes. Flowers white or purplish-white. Dry woods and thickets, Maine and southward. June-Sept.

4. PNEUMARIA, Hill. (Pulmonaria, L. Mertensia, S. F. Gray)

A fleshy, smooth, diffusely-branching herb, with alternate leaves, entire at margins and with small blue-purple or pinkish flower in loose terminal, leafy clusters. Corolla tubular, crested in throat, 5-lobed. Ovary 4-lobed, rounded; style 1. Nutlets fleshy not armed with prickles.

P. maritima, (L.) Hill. (Fig. 7, pl. 127.) SEA LUNGWORT. OYSTER PLANT. Branches spreading 3 to 15 in. long, pale green. Leaves thick, fleshy, egg-shaped, oblong or pear-shaped, obtuse at apex. Flowers blue or purple. Sandy sea shores, rare, Long Island, Mass., and northward. May-Sept.

5. **MERTENSIA**, Roth.

Perennial herbs, stem and leaves usually smooth. Leaves alternate, sometimes dotted with pelucid dots. Flowers in slender or spreading clusters. Corolla tubular, spreading above, 5-lobed, without scales at the throat. Stamens 5, inserted at the top of the tube. Nutlets smooth; ovary 4-lobed.

M. virginica, (L.) Link. (Fig. 9, pl. 127.) VIRGINIA COWSLIP. Stem somewhat decumbent or erect, very smooth, branched, 1 to 2 ft. high. Leaves, the lower large, 2 to 5 in. long, obversely or directly egg-shaped, lower on leaf-stems, the upper without. Flowers in terminal cluster not one-sided; corolla trumpet-shaped, blue to lilac, handsome, about 1 in. long, erect or pendant. Nutlets rounded, not prickly. Moist places, most of our area. March-May.

6. **MYOSOTIS**, L.

Low herbs, branching, somewhat decumbent or erect, hairy or downy. Flowers in slender curved clusters, spikes not bracted, or with a few small bracts at base of cluster. Calyx 5-lobed; corolla funnel- or salver-form, border of 5 lobes, throat closed by scales. Stamens 5, inserted into lower part of corolla tube. Nutlets egg-shaped, smooth.

Hairs on the calyx minute and straight.

Lobes of calyx shorter than calyx tube *M. scorpioides*

Lobes as long as tube *M. laxa*

Hairs on calyx stiff and bent backward at end.

Fruit-stems longer than calyx *M. arvensis*

Fruit-stems shorter than calyx.

Corolla yellow, changing to bluish *M. versicolor*

Corolla white *M. virginica*

1. **M. scorpioides**, L. (Fig. 1, pl. 128.) FORGET-ME-NOT. (*M. palustris*, (L.) Lam.) Plant downy or nearly smooth, leaves lance-shaped or oblong, blunt at apex. Flowers in one-sided curved spikes (XII, p. 38); corolla blue with a yellow eye. Escaped from gardens. In brooks and marshes, more especially in the northern half of our area. May-July.

2. **M. laxa**, Lehm. (Fig. 2, pl. 128.) SMALLER FORGET-ME-NOT. Leaves long and narrow, blunt at apex. Flowers in very loose curved spikes, the fruit stem much longer than the calyx which has short soft hairs. Corolla blue with yellow center. In muddy places and in water throughout our range. May-July.

3. **M. arvensis**, (L.) Hill. Lam. FIELD SCORPION GRASS. Very hairy, leaves long and narrow; the hairs on the calyx stiff and turned back at end. Stem of fruit much longer than calyx. Corolla blue. Moist fields, northern part of our area. June-Aug.

4. **M. versicolor**, (Persh.) Reichenb. (Fig. 3, pl. 128.) YELLOW AND BLUE SCORPION GRASS. Stem slender, leaves long and narrow. Plant very hairy; slender flower spikes without bracts; calyx 5-parted; corolla pale yellow, changing to violet; *stem of fruit not as long as calyx*. Fields and roadsides, southern part of our area. May-July.

5. **M. virginica**, (L.) BSP. (Fig. 4, pl. 128.) SPRING SCORPION GRASS. Very hairy; lower leaves spatula-form. Calyx longer than the fruit stem. Flowers white. Dry hills, northern part of our area. April-June.



PLATE 128

1. *Myosotis scorpioides*. 2. *M. laxa*. 3. *M. versicolor*. 4. *M. virginica*. 5. *Lithospermum arvense*. 6. *L. latifolium*. 7. *L. canescens*. 8. *L. officinale*. 9. *Onosmodium hispidissimum*. 10. *O. virginianum*.

7. LITHOSPERMUM, L.

Hairy herbs, the hairs soft or rigid. Stems from a thick reddish root. Flowers white, yellow or blue, in leafy spikes or terminal spreading clusters. Calyx 5-parted; corolla funnel- or salver-form, border 5-lobed. Stamens 5, included in the corolla; head of pistil bifid; nutlets 4, horny, rough or smooth.

Flowers white.

Nutlets brown *L. arvense*

Nutlets white.

Leaves lance-shaped *L. officinale*

Leaves egg-shaped, the flowers yellowish-white *L. latifolium*

Flowers yellow.

Corolla tube bearded within *L. Gmelini*

Corolla tube not bearded *L. canescens*

1. *L. arvense*, L. (Fig. 5, pl. 128.) CORN GROMWELL. Stem erect, usually branched, 12 to 15 in. high. Whole plant hairy, the stems rough hairy, leaves downy. Leaves alternate, narrow lance-shaped, 1 to 2 in. long, obtuse at apex, without leaf-stems. Flowers small, white in the axils of the upper leaves. Nutlets brown, hard, shining. A weed, in waste places, May-Aug.

2. *L. officinale*, L. (Fig. 8, pl. 128.) OFFICINALE GROMWELL. Stem very branching, 1 to 2 ft. high; leaves lance-shaped, sharp pointed at apex. Flowers small, white in leaf-axils. Whole plant hairy, rough; leaves gray-green. Nutlets white. Waste places, in most of our range. June-July.

3. *L. latifolium*, Michx. (Fig. 6, pl. 128.) BROAD-LEAVED GROMWELL. Stems erect not much branched. Leaves round egg-shaped, tapering at each end. Flowers at leaf-axils, yellowish-white or white. Corolla crested at throat of tube. Nutlets shining white dotted with small points. Dry woods and thickets, New York and northward and westward. May-June.

4. *L. Gmelini*, (Michx.) Hitchcock. HAIRY GROMWELL. Stems erect, usually clustered, 1 to 2 ft. high, hairy. Leaves lance-shaped sharp pointed at apex, no leaf-stem. Flowers nearly an inch long in terminal spreading clusters; corolla yellow; calyx segments about $\frac{1}{2}$ as long as corolla tube. Dry woods, New York and westward. April-June.

5. *L. canescens*, (Michx.) Lehm. (Fig. 7, pl. 128.) HOARY PUC-COON. Stems in clusters 6 to 18 in. high, hairy with soft hairs. Leaves lance-shaped rather sharp at apex, without leaf-stem. Flowers handsome, yellow, crowded near the top of the stem. Corolla not bearded at throat; nutlets white, shining. Dry places, throughout most of our range. April-June.

8. ONOSMODIUM, Michx.

Coarse hairy herbs, with alternate, strongly veined leaves, without leaf-stems. Flowers in one-sided, more or less coiled spikes or loose one-sided clusters. Calyx 5-parted, the divisions linear; corolla tubular, or funnel-form, without crest at throat. Stamens 5, inserted in the tube or at the throat of the corolla, not extending beyond the corolla. Nutlets bony, white, smooth, 4, of which generally only one is perfected.

1. *O. hispidissimum*, Maekenzie. (Fig. 9, pl. 128.) SHAGGY FALSE GROMWELL. (*O. carolinianum*, DC.) Plant, 1 to 3 ft. high, the whole

plant shaggy with long, spreading, loose hairs. Leaves broad lance-shaped, acute at apex; corolla tubular, 5-lobed, the lobes sharp pointed the points hairy outside. Flowers yellowish-white. Dry fields, woods and thickets, Mass., and southward. May-July.

2. *O. virginianum*, (L.) DC. (Fig. 10, pl. 128.) VIRGINIA FALSE GROMWELL. Similar to No. 1, but leaves blunt at apex, and lobes of corolla narrow, awl-shaped, very sparingly hairy on outside. Flowers yellowish-white. New York, New England and southward. May-July.

9. SYMPHYTUM, L.

Coarse hairy perennial herbs, with thick bitter mucilaginous roots, the clusters of flowers somewhat one-sided and nodding. Corolla tubular, inflated above, the border more or less spreading, the throat closed with the 5 very narrow, awl-like scales. Calyx, 5-cleft, the segments narrow. Flowers yellow, blue or purple. Stamens 5, inserted on corolla tube, not extending beyond tube. Style 1, thread-form. Nutlets 4, smooth.

S. officinale, L. (Fig. 8, pl. 129.) COMFREY. Whole plant very hairy, stem 2 to 3 ft. high. Leaves broad lance-shaped, the lower nearly a foot long on narrow leaf-stalk, the upper shorter without leaf-stalk, the insertion extending down the stem, forming wings. Flowers in rather spreading clusters, yellowish or purplish. Moist places, escaped from gardens. June-Aug.

10. BORAGO, L.

Hairy herbs, with alternate leaves and star-shaped, showy blue flowers in loose terminal clusters. Calyx 5-parted, deeply cleft, hairy; corolla wheel-shaped, with the 5 acute lobes forming a star, the tube shallow. Stamens 5, inserted into tube of corolla, the 5 anthers cohering about the pistil. Nutlets 4, smooth.

B. officinalis, L. (Fig. 1, pl. 129.) BORAGE. Stem 1 to 2 ft. high; leaves oblong to egg-shaped, 2 to 5 in. long without leaf-stalks, mostly clasping the stem. Flowers bright blue. Escaped from gardens. June-Sept.

11. LYCOPSIS, L.

Bristly herbs, with alternate leaves and small blue flowers. Calyx 5-parted; corolla somewhat irregular, tubular, *the tube curved*, the border 5-lobed; throat closed with scales. Nutlets 4, wrinkled.

L. arvensis, L. (Fig. 2, pl. 129.) SMALL BUGLOSS. Stem branched, 1 to 2 ft. high, covered with stiff hairs. Leaves alternate with stiff hairs, lance-shaped or narrowly oblong, obtuse at apex, without leaf-stalks. Flowers in a narrow crowded, one-sided coiled spike. Fields and waste places, generally in our area. June-Sept.

12. ECHIU, L.

Plants covered with bristly hairs, with alternate leaves and with rather large, blue or rarely white, flowers in leafy, more or less one-sided clusters. Calyx 5-parted, corolla tubular, spreading at border, 5-toothed or lobed, the lobes unequal. Stamens 5, inserted low in corolla tube, unequal in

length, the longer ones extending beyond the corolla tube. Nutlets 4, rough.

E. vulgare, L. (Fig. 3, pl. 129.) **BLUE WEED. VIPER'S BUGLOSS.** Somewhat branching, 1 to 2 ft. high. Flowers showy, blue, varying to reddish-purple; corolla about an inch long, lobes unequal. Leaves lance-shaped, pointed at apex. A weed in fields and waste places. June-July-

Order VI.—VERBENINALES. Order of the Vervanes

Flowers mostly irregular. Carpel or nutlet usually containing 2 seeds or rarely 1 seed. Leaves mostly opposite or in whorls. Fruit mostly dry carpels. Flowers not in one-sided spikes. In other respects the characters of this order are similar to the preceding (of which this is a sub-order, according to Engler, but here advanced to an order in the interest of simplicity and convenience).

Nutlets 1- to 2-seeded.

Corolla 2-lipped.

Ovary not lobed, 2- to 4-celled . . . **VERBENACEAE**

Ovary 4-lobed around the style, the lobes ripening
into 1-seeded nutlets **LABIATAE**

Nutlets several seeded.

Flowers regular, stamens 5; ovary 2-celled **SOLANACEAE**

Flowers more or less irregular, mostly 2-lipped; stamens
2 or 4 **SCHROPHULARIACEAE**

Flowers 2-lipped. Marsh or water plants without leaves
or with leaves, mostly thread-like at the root
. **LENTIBULARIACEAE**

Flowers 2-lipped, plants nearly destitute of green, para-
sites **OROBANCHACEAE**

Flowers trumpet-shaped, somewhat irregular; vines and
trees **BIGNONIACEAE**

Corolla 5-lobed, nearly regular, 2-lipped, stamens 4, 2
long, 2 short; ovary 2-celled, the cells several seeded
. **ACANTHACEAE**

Corolla nearly cylindric, 2-lipped; ovary 1-celled, 1-
seeded. Calyx in fruiting season reflexed to side of
stem **PHRYMACEAE**

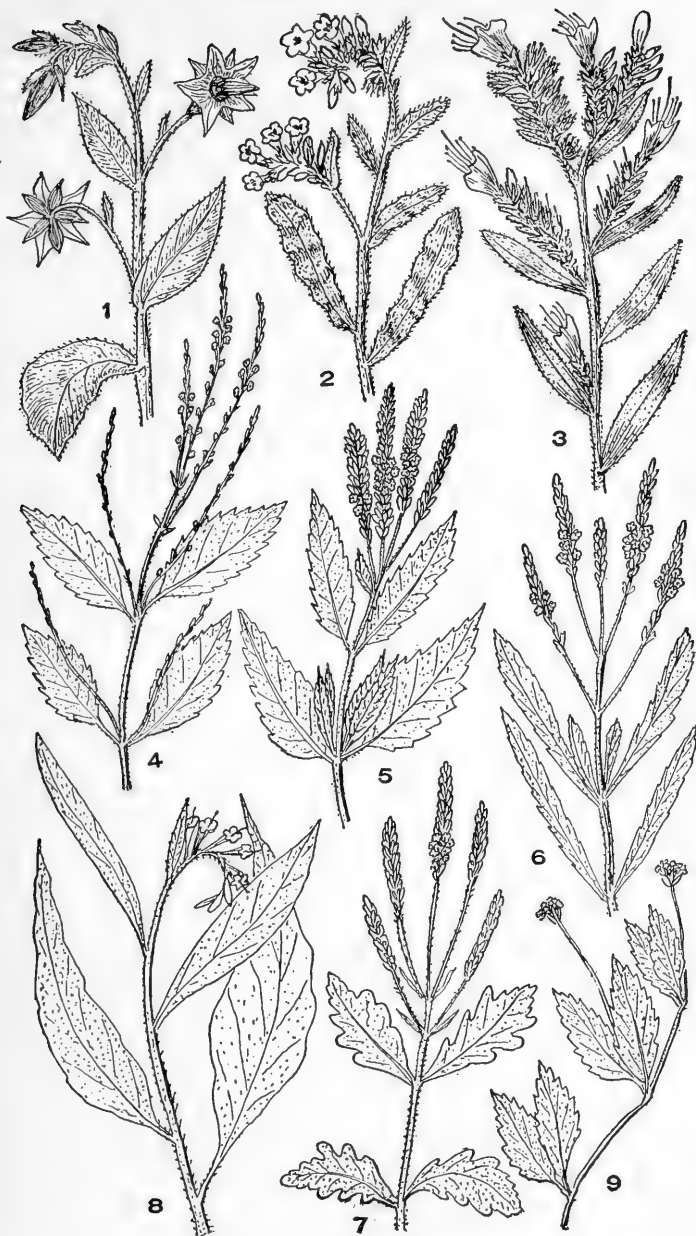


PLATE 129

1. *Borago officinalis*. 2. *Lycopsis arvensis*. 3. *Echium vulgare*. 4. *Verbena urticifolia*. 5. *V. hastata*. 6. *V. angustifolia*. 7. *V. officinalis*. 8. *Symphytum officinale*. 9. *Lippa lanceolata*.

FAMILY I.—**VERBENACEAE.** Vervain Family

American species, herbs, rarely shrubs, with opposite or whorled leaves. Corolla of our species 4- or 5-lobed, generally regular or more or less 2-lipped, generally with a cylindric tube and spreading 4- or 5-lobed border. Stamens attached to corolla tube generally not the same number as the corolla lobes, often 4, 2 of which are longer than the other 2. Sometimes there are 2 stamens and in other cases 5, alternate with the corolla lobes. Pistil simple with one or two caps (stigmas). Ovary superior to the calyx and corolla; the fruit composed of 2 nutlets (carpels) which at maturity split into 4.

1. **VERBENA, L.**

American species, herbs. Leaves opposite or in whorls, with notched or deeply incised borders. Flowers in slender spikes; corolla usually slightly 2-lipped, 5-lobed border and with a curved or straight tube. Stamens 4; 2 long, 2 shorter, rarely 2 only. Ovary 4-celled with a single ovule in each cell. Fruit at first a single nutlet, which at length divides into 4, each 1-seeded.

Flowers blue or purple.

Margins of leaves deeply incised *V. officinalis*

Margins of leaves notched.

Leaves egg-shaped *V. hastata*

Leaves obversely lance-shaped *V. angustifolia*

Flowers white *V. urticifolia*

1. ***V. hastata*, L.** (Fig. 5, pl. 129.) **BLUE Vervain.** Perennial, rather rough; stems erect, slightly branching; leaves opposite, broad lance-shaped or egg-shaped with coarse teeth at margins. Flowers dark blue in slender spikes, several of which at summit of stem form a more or less pyramidal outline. Low wet grounds, throughout our region. June-Sept.

2. ***V. officinalis*, L.** (Fig. 7, pl. 129.) **EUROPEAN Vervain.** Flowers on slender spikes similar to those of No. 1, but spikes few. Leaves deeply incised. Otherwise quite similar to No. 1. Moist grounds, generally distributed. June-Sept.

3. ***V. angustifolia*, Michx.** (Fig. 6, pl. 129.) **NARROW-LEAVED Vervain.** Spike of purple flowers usually solitary. Leaves narrow, linear, broadest toward apex, the margin toward apex, notched. Dry fields, Mass., southward. June-Aug.

4. ***V. urticifolia*, L.** (Fig. 4, pl. 129.) **WHITE Vervain.** General aspect of plant similar to No. 1, but flowers white. Waste places, throughout our region. June-Sept.

2. **LIPPIA, L.**

Herbs and shrubs. Leaves opposite or in whorls, rarely alternate. Flowers small, each attended by a bract, in compact heads or spikes. Calyx small, membranous, 2- to 4-cleft; corolla 2-lipped with 4 lobes, the lower one often partly divided. Stamens 4, of different lengths.

Ovary 2-celled with a single ovule in each cell. Style short. Fruit at length separating into 4 nutlets.

L. lanceolata, Michx. (Fig. 9, pl. 129.) FOG FRUIT. Stem procumbent, rooting at the nodes, the erect part little if at all branched. Smooth or with a few hairs. Leaves opposite, lance-shaped, notched at margins. Flowers blue, in rounded heads. Moist soil, New Jersey, westward and southward. June-Aug.

FAMILY II.—**LABIATAE**. MINT FAMILY

In our region all the labiates are herbs, with opposite leaves without stipules, generally the stem is 4-sided. Many of these herbs are aromatic. Flowers are, in general, irregular. The calyx, 5-parted, is regular or irregular, in the latter case the divisions are more or less 2-lipped, the upper being of 3, the lower of 2 teeth. Corolla tubular, expanding above into 2 lips, the upper of 2 lobes which often coalesce to the extent of appearing as one; the lower of 3 distinct lobes. Stamens borne on the tube of the corolla, mostly 4, two of which are longer than the other two (didynamous). Sometimes the anterior (lower) pair is longer than the upper and less frequently the posterior (upper) pair is longest. In a certain number of species one pair of stamens is sterile or absent. The pollen sacs are usually double, lying parallel with each other along the filament or diverging from each other, forming with the filament a sort of cross. The ovary is always above and free from the calyx; it is 4-lobed or deeply divided into 4 parts. Fruit 4 one-seeded nutlets.

1. *The Mint Tribe*

Corolla of 4 nearly equal lobes, one of which is concave or plane at top. Stamens 4, 2 longer than the other pair.

Stamens all fertile	MENTHA
Two stamens fertile, two rudimentary	LYCOPUS

2. *The Thyme Tribe*

Corolla clearly 2-lipped; the upper lip plane or feebly concave; stamens 4, straight or divergent, the anterior or lower pair the longest.

Creeping herb, leaves very small	THYMUS
Erect herbs.	

Calyx tubular, with 5 equal teeth, 15-nerved. Longest stamens extending much beyond the corolla. Leaf margin not incised or toothed	HYSSOPUS
Calyx oval bell-shaped with 5 nearly equal teeth, 10- to 13-nerved.	

Anther sacs divergent	ORIGANUM
Anther sacs parallel	PYCNANTHEMUM

3. *Balm Tribe*

Corolla clearly 2-lipped; upper lip plane or only slightly concave.

Stamens 4, *diverging at base, converging above, the anterior (lower) pair longest.*

Calyx with 5 equal teeth, bell-shaped, naked at the throat, 10-nerved; corolla tube straight SATUREIA

Calyx tubular (not bell-shaped), 2-lipped, mostly 13-nerved; corolla tube much longer than calyx, naked or hairy at throat; anther sacs divergent CLINOPODIUM

Calyx somewhat bell-shaped, 2-lipped; *corolla tube* curved. Stamens scarcely extending beyond tube. Anther sacs divergent MELISSA

4. *The Sage Tribe*

Corolla clearly 2-lipped; *fertile stamens 2 only*, the other pair when existent reduced to rudimentary organs.

The two sacs of the anthers divergent.

Between the two sacs of the anther is a bridge of connection as broad as the anther sac. At one extremity is a fertile sac, at the other a sterile one SALVIA

The connection between the two anther sacs is not broad or well developed, the two sacs coalescing at their extremities.

Superior lip of the corolla erect or arched. Calyx tubular, 15-nerved, the teeth equal MONARDA

Calyx 13-nerved, the teeth unequal. Throat of corolla tube not hairy, the two stamens extending beyond the upper lip BLEPHILIA

Stamens not extending beyond the upper lip. Throat of corolla hairy HEDEOMA

The two anther sacs parallel; calyx equally 5-toothed, corolla tube hairy CUNILA

5. *The Hedge-Nettle Tribe*

Corolla plainly 2-lipped; the upper lip concave. Stamens 4; the anterior (lower) pair longest. Stamens approaching above under the upper lip of the corolla.

Calyx not distinctly 2-lipped, teeth 3 to 10.

Calyx nearly equally 5-toothed, the teeth membranous; anther cells parallel to the filaments PHYSOSTEGIA

Anterior branch of the style longer than the posterior PHLOMIS

Branches of the style nearly equal.

Anthers with 2 equal sacs which are divergent.

Teeth of the calyx spiny LEONURUS

Teeth of the calyx not spiny LAMIAM

Anthers with divergent sacs each of which is transversely

2-valved GALEOPSIS

Anther sacs divergent, but not transversely 2-valved.

Calyx funnel-form, the 5 teeth spreading into a fringe;

anther sacs divergent BALLOTA

Corolla tube *not longer* than the calyx, anther sacs divergent; filaments lean outward STACHYS

Calyx tube 5- to 10-nerved, corolla tube longer than the calyx. Anther sacs parallel. Lower leaf-stalks very long BETONICA

6. *The Skullcap Tribe*

Corolla 2-lipped. Stamens 4, shorter than the upper lip of the corolla and ascending under it. The upper lip arched over stamens.

Calyx deeply 2-lipped, 10-nerved, upper lip of 3 short teeth, lower of 2 lance-shaped teeth PRUNELLA
Calyx with a protuberance on the upper side . . . SCUTELLARIA
Calyx without a protuberance.
Calyx spiny-pointed MARRUBIUM
Calyx not spiny-pointed MEEHANIA

7. *The Catmint Tribe*

Corolla 2-lipped; stamens 4, the *posterior (upper)* longest. Anther cells divergent or parallel. Stamens shorter or scarcely longer than the upper lip of the corolla.

Calyx tubular with 5 sharp teeth, not 2-lipped, but the upper 2 teeth longer than the 3 lower, 15-nerved, erect plant . . . NEPETA
Anther sacs diverging and at right angles to the connecting bridge. Creeping herb GLECOMA
Calyx with 5 sharp teeth, the upper largest, the whole calyx covered with *long hairs*. Calyx tubular, 15-nerved DRACOCEPHALUM
Anther cells parallel or nearly so. Very tall herbs, with long cylindric clusters of flowers AGASTACHE

8. *Horse Balm Tribe*

Of the 5 lobes of the corolla 4 are nearly equal, while the 5th is very long and dependent, its border fringed COLLINSONIA

9. *Wood Sage Tribe*

Corolla border very irregular, stamens 4, extending beyond the tube of the corolla, the anterior longer. Calyx 5- to 10-nerved.

Corolla border very irregular; tube straight; the upper lip very short AJUGA
Corolla border very irregular, the tube and parts of the border hairy, stamens longer than corolla TEUCRIUM
Corolla small, with spreading lobes; calyx short; stamens very much longer than corolla TRICHOSTEMA
Calyx tubular, corolla small, the lobes distinct and rounded, stamens shorter than corolla ISANTHUS

‡ *Corolla of 4 nearly equal divisions, one of which is concave at the summit. Stamens 4, in Mentha all fertile, in Lycopus 2 fertile*

1. MENTHA, L.

Aromatic herbs, with 4-angled stems and dentate bordered leaves. Flowers white, pink or purple, in axillary clusters or in dense terminal

spikes. Calyx bell-shaped or tubular with 5 equal or nearly equal teeth. Corolla tube short, nearly or quite included in the calyx, the border spreading, of 4 nearly or quite equal lobes or the upper lobe broadest. Stamens 4, all equal or nearly so and all fertile. Ovary 4-parted.

Flower spikes narrow, leafless, the flowers densely crowded; leaves without leaf-stalks.

Plants not hairy.

Spikes long, narrow, interrupted below *M. spicata*

Spikes thick, mostly dense.

Leaves lance-shaped *M. piperita*

Leaves broad, egg-shaped *M. citrata*

Plants more or less hairy.

Spikes slender, dense or interrupted.

Leaves lance-shaped *M. longifolia*

Leaves broad, elliptic or egg-shaped *M. rotundifolia*

Spikes not slender, dense.

Leaves without leaf-stems *M. alopecuroides*

Leaves with leaf-stems, some of which are quite short.

Leaves with simple teeth at margin *M. aquatica*

Leaves deeply incised *M. crispata*

Flowers not in spikes, but in axillary whorls.

Leaf margins with rounded teeth *M. arvensis*

Leaf margins with sharp teeth.

Lower leaves egg-shaped, sharp pointed at apex, more or less

rounded at base *M. cardiaca*

Leaves narrow, tapering at both ends.

Calyx hairy all over *M. canadensis*

Calyx hairy at border *M. gentilis*

1. *M. spicata*, L. (Fig. 2, pl. 130.) SPEARMINT. Plant nearly or quite smooth; leaves oblong or nearly egg-shaped, coarsely toothed, without leaf-stems or with very short ones. Flowers in long slender spikes, tapering at end, interrupted, the central one much the longest. Flowers pale purple. Wet places, throughout our range. July-Sept.

2. *M. piperita*, L. (Fig. 1, pl. 130.) PEPPERMINT. Plant smooth or with a few hairs; branching, pungent to taste, 1 to 3 ft. high; leaves oblong-lance-shaped or lance-shaped, coarsely toothed and tapering at each end. Flowers in terminal spikes of many closely related dense whorls, the ends of which are blunt. Wet places, throughout our range. July-Sept.

3. *M. citrata*, Ehrh. (Fig. 3, pl. 130.) BERGAMOT MINT. Stem 1 to 2 ft. long, nearly erect or decumbent; whole plant smooth. Leaves egg-shaped, rounded at base, the lower rather blunt, upper sharp pointed at apex, on rather long leaf-stems, larger leaf blades 2 in. long, nearly as wide. Flowers in dense terminal whorls and also in the upper axils. Wet soil. Not common. July-Sept.

4. *M. longifolia*, Huds. (Fig. 7, pl. 130.) HORSEMINT. This plant bears a strong resemblance to *M. spicata* (No. 1), but is covered with hairs, while the latter is smooth. Found in southern part of our region. July-Oct.

5. *M. rotundifolia*, Huds. (Fig. 12, pl. 130.) ROUND-LEAVED MINT. Plant covered with long hairs; stem $1\frac{1}{2}$ to $2\frac{1}{2}$ ft. high; leaves round-egg-shaped or broad elliptic, without leaf-stalks, somewhat clasping the stem at base; upper surface dark green, lower whitish-silky. Borders with rounded teeth; flowers in terminal slender interrupted spikes; corolla slightly downy. Waste places in all of our area. July-Sept.

6. *M. alopecuroides*, Hull. (Fig. 9, pl. 130.) WOOLLY MINT. Plant densely hairy, stem $1\frac{1}{2}$ to 3 ft. high. Leaves with sharp teeth at the mar-



PLATE 130

1. *Mentha piperita*. 2. *M. spicata*. 3. *M. citrata*. 4. *M. arvensis*. 5. *M. crispa*. 6. *M. canadensis*. 7. *M. longifolia*. 8. *M. gentilis*. 9. *M. alopecuroides*. 10. *M. aquatica*. 11. *M. cardiaca*. 12. *M. rotundifolia*.

gins. Otherwise resembles No. 5. Roadsides and waste places. July-Oct.

7. *M. aquatica*, L. (Fig. 10, pl. 130.) WATER MINT. Plant downy, rarely smooth; stem usually branched, $1\frac{1}{2}$ to $2\frac{1}{2}$ ft. high. Leaves broadly egg-shaped; flowers in terminal, interrupted whorls, on short flower stems and often with one or more clusters in the upper axils; hairs of the stem point downward. Wet places, ditches, etc. Aug.-Oct.

8. *M. crispa*, L. (Fig. 5, pl. 130.) CURLED MINT. Plant smooth or nearly so, stem $1\frac{1}{2}$ to 3 ft. high; leaves, at least the lower, on short leaf-stalks deeply incised, wavy, or the upper simply deeply toothed. Flowers in terminal more or less interrupted spikes. Swamps and ditches, southern part of our area. Aug.-Oct.

9. *M. arvensis*, L. (Fig. 4, pl. 130.) CORN MINT. Plant generally hairy; stem branching or simple, $\frac{1}{2}$ to 2 ft. high; leaves oblong lance-shaped, the marginal teeth rounded. Flowers all in axillary whorls; calyx downy, the teeth triangular. Stamens extending beyond the corolla. Dry places in most of our range. July-Sept.

10. *M. gentilis*, L. (Fig. 8, pl. 130.) CREEPING WHORLED MINT. Plant more or less decumbent, branched, soft downy, 1 to 2 ft. high; leaves oval on short leaf-stems; flowers in axillary whorls, on short flower stems, the marginal teeth sharp. Calyx hairy only at the upper border, between or on the calyx teeth. Waste places, many localities in our range.

11. *M. cardiaca*, Gerarde. (Fig. 11, pl. 130.) MARSH WHORLED MINT. (*M. sativa*, L.?) More hairy than No. 10, and calyx is covered through its whole extent with hairs. Waste places. Escaped from cultivation. Aug.-Sept.

12. *M. canadensis*, L. (Fig. 6, pl. 130.) AMERICAN WILD MINT. Stem more or less downy, $\frac{1}{2}$ to $2\frac{1}{2}$ ft. high. Leaves from lance-shaped to oblong egg-shaped, tapering at each end on slender leaf-stalks, margins toothed with sharp teeth, blade of larger leaves 2 to 3 in. long. Flowers all in axillary whorls, the whorl not usually covering the flower stem. Calyx densely hairy. Wet places throughout our area. July-Oct.

2. LYCOPUS, L.

Perennial herbs, with stolons or suckers, with erect or diffuse stems and opposite leaves; flowers in dense whorls at the leaf-axils, white or purple. Calyx tubular nearly regular, 4- or 5-toothed, the teeth spinous; corolla nearly equally 4-lobed, not distinctly 2-lipped. Fertile stamens 2; ovary deeply 4-parted. Slender style, 2-parted at summit.

Calyx teeth usually 4, the mature nutlets exceeding them in height . *L. virginicus*
Calyx teeth 5, very sharp, exceeding the mature nutlets in height.

Corolla twice as long as the calyx.

Leaves without leaf-stalks *L. sessilifolius*

Leaves with leaf-stalks *L. rubellus*

Corolla not twice as long as the calyx.

Leaves deeply incised *L. americanus*

Leaves with coarse teeth at margins, not deeply incised, oblong
or egg-shaped *L. europaeus*

1. *L. virginicus*, L. (Fig. 3, pl. 131.) BUGLE WEED. Stem acutely 4-angled, $\frac{1}{2}$ to 2 ft. high; smooth or slightly downy; leaves oblong to

lance-shaped, rather coarsely toothed, the teeth sharp, toward the base the border plane, $1\frac{1}{2}$ to 3 in. long, tapering at each end, on short leaf-stalks. Shady moist grounds. July-Sept.

2. *L. sessilifolius*, Gray. SESSILE-LEAVED WATER HOARHOUND. Stem stout, 4-angled, smooth or slightly downy above; leaves without leaf-stalks, coarsely dentate, lance-shaped or narrowly egg-shaped, 1 to 2 in. long; calyx teeth awl-shaped, rigid. Moist soil. Aug.-Oct.

3. *L. rubellus*, Moench. (Fig. 2, pl. 131.) STALKED WATER HOARHOUND. Stem 4-angled, angles not acute, smooth or nearly so; leaves lance-shaped, coarsely toothed at margins, except toward the base, *on leaf-stalks*. Calyx teeth less acute than in No. 2. Southern part of our region. Aug.-Oct.

4. *L. americanus*, Muhl. (Fig. 1, pl. 131.) CUT-LEAVED WATER HOARHOUND. (*L. sinuatus*, Ell.) Stem acutely 4-angled, 1 to 2 ft. high; leaves on leaf-stalks, lance-shaped or oblong, the margins *deeply incised*, the teeth sharp, tapering at each end. Calyx teeth awl-shaped. Wet soil. June-Oct.

5. *L. europaeus*, L. (Fig. 4, pl. 131.) WATER HOARHOUND. More or less downy, stems branching, 1 to $2\frac{1}{2}$ ft. high; leaves egg-shaped on short leaf-stalks, margins with very coarse teeth; calyx teeth narrow lance-shaped. Found naturalized in a few places, southern part of our area. July-Sept.

‡ *Corolla 2-lipped, upper lip plane or concave; stamens 4 straight or divergent, anterior (lower) pair longest*

3. THYMUS, L.

Perennial herbs, or creeping shrubby plants, with opposite smooth-margined leaves and with flowers in dense terminal clusters, or sometimes in the upper leaf-axils. Corolla distinctly 2-lipped, the upper one flat and nearly straight, slightly notched at apex; calyx egg-shaped, with 3 long, lance-shaped teeth and 2 short ones, 13-nerved; stamens 4, lower pair longest, the 2 longer extending beyond the upper lip of the corolla.

T. serpyllum, L. (Fig. 5, pl. 131.) WILD THYME. Stems creeping, slender, much branched, 4 to 12 in. high, usually forming dense mats. Leaves oblong rounded at apex, somewhat tapering at base, edges entire. Flowers in terminal clusters and sometimes in axillary whorls. Naturalized in places, in woods, thickets and roadsides. June-Sept.

4. HYSSOPUS, L.

Erect herb, with erect, scarcely branching stem and with linear leaves, entire at borders, and blue or purple flowers in dense clusters in the upper axils. Calyx tubular, 15-nerved, equally 5-toothed; corolla short, 2-lipped, upper lip flat, erect, notched, lower 3-lobed, the middle one much the longer and 2-cleft. Stamens 4, diverging, all extending beyond the corolla.

H. officinalis, L. (Fig. 7, pl. 131.) HYSSOP. Naturalized, roadsides and waste places. June-Oct.

5. ORIGANUM, L.

Herbs, sometimes shrubby plants, with opposite, nearly or quite entire leaves and with pink or purple flowers in dense spreading terminal clusters. Calyx bell-shaped, hairy in the throat, 5-toothed, 13-nerved; corolla 2-lipped, the upper lip erect, notched at apex, lower of 3 lobes. Stamens 4, the upper 2 extending above the upper lip, the shorter pair exerted from the corolla tube.

O. vulgare, L. (Fig. 8, pl. 131.) WILD MARJORAM. Erect, hairy, the flower clusters spreading into broad nearly umbel-like groups. Leaves round egg-shaped. Roadsides. June-Oct.

6. PYCNANTHEMUM, Michx. (Koellia, Moench)

Upright herbs, with the odor of mint, with short spreading branches; leaves among the flower clusters often whitened; flowers small, white or dotted with purple. Calyx ovate or tubular, about 13-nerved, the 5 teeth being equal or the 3 upper teeth being more or less united, not hairy at the throat; corolla 2-lipped, the upper lip plane or notched at apex, the lower 3-cleft. Stamens 4, nearly equal, the *lower pair somewhat the longer, the two sacs of the anther parallel*. Ovary deeply 4-parted, the nutlets smooth or rough.

Leaves linear or narrow lance-shaped.

Plant not hairy or with few hairs.

Calyx teeth bristle-tipped, rigid, $\frac{1}{3}$ as long as the corolla tube

P. flexuosum

Calyx teeth triangular, $\frac{1}{2}$ as long as tube of corolla . . . *P. virginianum*

Plant decidedly hairy.

Calyx teeth bristle-tipped.

Not hairy between teeth *P. verticillatum*

Long hairs between teeth *P. clinopodioides*

Leaves not linear or narrow lance-shaped.

Calyx teeth bristle-tipped.

Leaves with a minute hoary down, flowers in a dense head *P. aristatum*

Leaves whitish downy above, with white wool beneath . . . *P. incanum*

Calyx teeth not bristle-tipped *P. muticum*

1. **P. flexuosum**, (Walt.) B. S. P. (Fig. 7, pl. 132.) NARROW-LEAVED MOUNTAIN MINT. (*P. unifolium*, Pursh.) Stem erect, stiff, slender, smooth, $1\frac{1}{2}$ to $2\frac{1}{2}$ ft. high. Leaves linear, tapering at both ends, 1 to 3 ft. high. Leaves lance-shaped, *rounded at base*, tapering at apex. Calyx teeth triangular, hairy. Flowers in dense heads in spreading terminal clusters. Fields and thickets, Maine, southward and westward. July-Sept.

2. **P. virginianum**, (L.) D. and J. (Fig. 1, pl. 132.) VIRGINIA MOUNTAIN MINT. (*P. lanceolatum*, Pursh.) Stem erect, stiff, not hairy, 1 to 2 in. long. Flowers in compact terminal heads in spreading clusters. Calyx tubular, the 5 teeth equal, triangular, but each tipped with a short bristle point. Fields and thickets, Mass., and southward. July-Sept.

3. **P. verticillatum**, (Michx.) Pers. (Fig. 8, pl. 132.) TORRY'S MOUNTAIN MINT. (*P. Torryi*, Benth.) *Slightly downy*, stem 1 to $2\frac{1}{2}$ ft. high, erect, stiff, slender. Leaves lance-shaped, tapering at each end, without indentations at margins. Calyx teeth white-downy with bristle-shaped tips. Corolla downy, the tube somewhat exceeding the calyx. Dry hills, Vermont, southward and westward. July-Sept.



PLATE 131

1. *Lycopus americanus*. 2. *L. rubellus*. 3. *L. virginicus*. 4. *L. europaeus*.
 5. *Thymus serpyllum*. 6. *Cunila mariana*. 7. *Hyssopus officinalis*. 8. *Origanum vulgare*. 9. *Satureia hortensis*. 10. *Melissa officinalis*.

4. *P. clinopodioides*, T. and G. (Fig. 3, pl. 132.) BASIL MOUNTAIN MINT. Downy, stems 1 to 2½ ft. high. Leaves broadly lance-shaped on short leaf-stalks, *with sharp teeth at margins*. Heads larger than in the previous forms and fewer. Calyx with long hairs in the sinuses between the teeth. Dry soil, New York and Penna., and southward. Aug.-Sept.

5. *P. aristatum*, (Michx.) (Figs. 4 and 5, pl. 132.) AWNED MOUNTAIN MINT. Minutely downy, hairy. Stem 1 to 2 ft. high. Leaves egg-shaped, tapering at apex rounded at base, margins sharply dentate. The bracts at base of flowers *long awned*. (Fig. 4, pl. 132.) Calyx teeth with long bristle points. Pine barrens, New Jersey and southward. July-Sept.

6. *P. incanum*, (L.) Michx. (Fig. 2, pl. 132.) HOARY MOUNTAIN MINT. Stem downy, 1½ to 3 ft. high. Leaves egg-shaped, sharply dentate, downy above and *white with long woolly hairs beneath*, the upper leaves white on both sides. Calyx teeth unequal, somewhat bristle pointed. Dry thickets and hillsides. Aug.-Oct.

7. *P. muticum*, (Michx.) Pers. (Figs. 4 and 6, pl. 132.) SHORT-TOOTHED MOUNTAIN MINT. Nearly smooth or somewhat hoary, stem 1 to 2½ ft. high, much branched; leaves egg-shaped, dentate, tapering at apex, rounded at base or slightly heart-shaped at base, mostly without leaf-stalks. *Calyx teeth white downy, triangular*. (Fig. 6, pl. 132.) In general aspect No.'s 5 and 7 are so similar that either is fairly represented by Fig. 4, but the bracts at base of flowers are shown at Figs. 5 and 6 of the plate. Sandy soil. July-Sept.

‡ *Corolla 2-lipped; upper lip plane or concave; stamens 4, divergent at base, convergent above, the anterior (lower) pair longest*

7. SATUREIA, L.

Aromatic herb, with small undivided leaves with smooth margins and with purple flowers in somewhat spiked clusters. Calyx bell-shaped, 10-nerved, 5-toothed; corolla 2-lipped, the upper lip flat, erect, notched or plane at apex, the lower 3-parted. Stamens 4, converging under the upper lip, the lower pair longest

S. hortensis, L. (Fig. 9, pl. 131.) SUMMER SAVORY. Downy; stem 6 to 18 in. high; leaves linear, flowers few in the axillary clusters. Calyx teeth unequal, hairy. Escaped from gardens. July-Sept.

8. *CLINOPODIUM*, L. (*Calamintha*, Moench. *Satureia*, (Tourn.) Lee.

In our area all herbs, with somewhat dentate or smooth margined leaves and with purplish or white flowers. Calyx tubular, 13-nerved, hairy (mostly), *2-lipped*. Stamens 4, ascending under the upper lip of the corolla. Nutlets smooth.

Leaves egg-shaped,	
Leaves 1 to 2 in. long	<i>C. vulgare</i>
Leaves ½ to ¾ in. long	<i>C. Acinos</i>
Leaves linear	<i>C. glabrum</i>

1. *C. vulgare*, L. (Fig. 10, pl. 132.) WILD BASIL (*Calamintha Clinopodium*, Benth.) Erect, 1 to 2 ft. high, quite hairy; leaves egg-



PLATE 132

1. *Pycnanthemum virginianum*. 2. *P. incanum*. 3. *P. clinopodioides*. 4. *P. aristatum*. 5. Calyx of *P. aristatum*. 6. Calyx of *P. muticum*. 7. *P. flexuosum*. 8. *P. verticillatum*. 9. *Clinopodium Acinos*. 10. *C. vulgare*. 11. *C. glabrum*. 12. *Salvia lyrata*. 13. *S. pratensis*. 14. *Hedecoma pulegioides*.

shaped, rounded at base, tapering at apex, dentate. Flowers in dense axillary and terminal groups. Woods and thickets throughout our range. June-Oct.

2. **C. Acinos**, (L.) Kuntze. (Fig. 9, pl. 132.) **BASIL BALM**. (*Satureia acinos*, Scheele.) Stems slender, branched from the base, 6 to 8 in. high. Leaves oblong, more acute at base than at apex, a few notches toward apex. Flowers purplish, in loose axillary and terminal clusters; calyx very hairy, teeth bristle-formed, unequal. Waste places. Naturalized. May-Aug.

3. **C. glabrum**, (Nutt.) Kuntze. (Fig. 11, pl. 132.) **LOW CALAMINT**. (*Satureia glabra*, Fernald.) Smooth, stems very slender, much branched, 4 to 12 in. high. *Leaves linear*, the margins slightly curled backward. Flowers, 1 to 4 in the axils. Runners from base of stem have short egg-shaped leaves. Damp soil, western New York and westward. May-Aug.

9. MELISSA, L.

Ours an herb, with broad dentate leaves and rather small flowers in axillary clusters. Calyx bell-shaped, 13-nerved. *Corolla tube bent*, border 2-lipped. Stamens 4, ascending under the upper lip. Ovary deeply 4-parted.

M. officinalis, L. (Fig. 10, pl. 131.) **LEMON BALM**. Upright, branching, leaves broadly egg-shaped, with coarse teeth. Flowers a few in the axillary clusters, white. Escaped from gardens. June-Aug.

‡ *Corolla 2-lipped; fertile stamens 2, the 2 sacs of the anther divergent*

10. SALVIA, L.

Northern United States species, herbs, mostly with rather large showy flowers in spikes. The single species in our region with lyre-shaped leaves below, egg-shaped leaves above. Calyx 2-lipped, the upper lip 3-toothed or entire. Corolla deeply 2-lipped, upper lip straight, sometimes arched. *Fertile stamens 2*, on short filaments. Ovary deeply 4-parted. Nutlets smooth.

1. **S. lyrata**, L. (Fig. 12, pl. 132.) **LYRE-LEAVED SAGE**. Stem 12 to 30 in. high, somewhat hairy. Basal leaves tufted, lyrate, upper egg-shaped or narrow without leaf-stalks. Flowers in loose whorls, blue-purple; corolla downy, about an inch long, straight. Southern part of our area. May-July.

2. **S. pratensis**, L. (Fig. 13, pl. 132.) **MEADOW SAGE**. Leaves egg-shaped, the lower heart-shaped at base, borders with rounded-teeth. Atlantic Co., N. J., locally introduced.

11. MONARDA, L.

Erect aromatic herbs, with opposite, rounded or sharply serrate-toothed leaves, and conspicuous heads of scarlet, purple, white or yellowish flowers, the clusters usually terminal, but occasionally also axillary. Calyx tube narrow, 15-nerved, teeth nearly equal, each terminated by a bristle- or awl-like point or simply triangular without the bristle point. Corolla always conspicuous, markedly 2-lipped, the upper lip linear and some-



PLATE 133

1. *Monarda didyma*. 2. *M. fistulosa*. 3. *M. punctata*. 4. *M. media*. 5. *M. clinopodia*. 6. *Blephilia hirsuta*. 7. *B. ciliata*.

what arching, the lower lip 3-lobed, the middle one much the longest. Fertile stamens 2, usually extending somewhat beyond the upper lip. Ovary deeply 4-parted.

Leaves broad, more or less egg-shaped.

Flower whorls mostly terminal and sometimes with a smaller secondary whorl above the main whorl.

Corolla bright scarlet *M. didyma*

Corolla yellowish-pink, leaves with leaf-stalks, membranous

Corolla yellowish-pink or purple, leaves not membranous *M. clinopodia*

Corolla deep purple or purple-red *M. fistulosa*

Corolla deep purple or purple-red *M. media*

Leaves narrow, lance-shaped *M. punctata*

(These species, except *M. punctata*, are found in nearly all parts of our region.)

1. *M. didyma*, L. (Fig. 1, pl. 133.) MOUNTAIN MINT. BEE BALM. Stem branching, 2 to 4 ft. high, acutely 4-angled; leaves egg-shaped or broad lance-shaped, tapering at each end, sharply toothed at margins. Flowers in terminal and perhaps sub-terminal heads; corolla brilliant scarlet. Moist soil. Often cultivated. July-Sept.

2. *M. clinopodia*, L. (Fig. 5, pl. 133.) BASIL BALM. Stem slender, not much branched, 1 to 3 ft. high. Leaves egg-shaped or broad lance-shaped, slender tapering at apex, somewhat rounded at base. Flowers in terminal whorls or heads. Bracts among the flowers pale or white. Calyx scarcely hairy; corolla yellowish-pink. Woods and thickets. June-Aug.

3. *M. fistulosa*, L. (Fig. 2, pl. 133.) WILD BERGAMOT. Stem 2 to 3 ft. high, slender. Leaves egg-shaped to broad lance-shaped, slender pointed, base rounded, on leaf-stalks. Flowers in large terminal heads, corolla pale lilac or yellowish-pink. Dry hills and thickets. June-Sept.

4. *M. media*, Willd. (Fig. 4, pl. 133.) PURPLE BERGAMOT. Stem 2 to 3½ ft. high. Leaves thin, not membranous, broadly egg-shaped, slender tapering at apex, rounded at base, on short leaf-stalks. Flowers in large terminal heads. Corolla deep purple or red. Moist thickets. June-Aug.

5. *M. punctata*, L. (Fig. 3, pl. 133.) HORSE MINT. Stem 2 to 3 ft. high, usually much branched; the whole plant commonly hairy or downy. Leaves narrow, lance-shaped to linear. Heads of flowers terminal and axillary, usually several. Corolla yellowish with brown or purple spots. Dry fields, southern part of our area. (New York, and southward.) July-Oct.

12. BLEPHILIA, Raf.

General aspect similar to *Monarda*, but flower whorls usually several. Flowers rather small; calyx unequally 5-toothed, 13-veined. Corolla tube short, border 2-lipped. Stamens 2.

1. *B. ciliata*, Raf. (Fig. 7, pl. 133.) DOWNY BLEPHILIA. Stem 1 to 2 ft. high, usually not branching. Whole plant downy. Leaves opposite, the pairs distant, lance-shaped, rounded at base, acute at apex. Flowers in 2 or more whorls; corolla purple, downy. Dry woods and thickets, southern New England and southward. June-Aug.

2. *B. hirsuta*, Torr. (Fig. 6, pl. 133.) HAIRY BLEPHILIA. Stem 1½ to 3 ft. high, usually branched; whole plant hairy. Leaves broad egg-shaped on long leaf-stalks, margins sharply toothed. Flowers in several whorls. Corolla pale purple. Damp woods, Vermont and southward. June-Sept.

13. HEDEOMA, Pers.

Low, odorous, branching plants, with small opposite leaves and loose clusters of small blue or purple flowers at the axils. Calyx egg-shaped or tubular, 13-nerved, bearded in the throat, somewhat 2-lipped or the 5 teeth nearly equal. Corolla 2-lipped, the upper lip erect, entire, notched at apex, lower, 3-lobed. Fertile stamens 2. Ovary deeply 4-parted.

H. pulegioides, (L.) Pers. (Fig. 14, pl. 132.) AMERICAN PENNY-ROYAL. Low, branching from the base, hairy. Leaves oblong, few toothed, narrow at each end. Whorls axillary, about 6-flowered; corolla equalling the calyx, bluish. Aroma very pungent. Dry hillsides and fields. July-Sept.

14. CUNILA, L.

Herbs or shrubs, with small white or purplish flowers and opposite leaves. Calyx ovoid-tubular, equally 5-toothed. Corolla longer than the calyx, 2-lipped, upper lip erect, flat, mostly notched, lower lip spreading, 3-lobed. Stamens 2, extending beyond the corolla.

C. mariana, L. (Fig. 6, pl. 131.) DITTANY. (*C. origanoides*, (L.) Britton.) Stems stiff, branched, plant tufted, 1 ft. high. Leaves egg-shaped, without leaf-stalks, toothed at margins, rounded at base. Flowers in loose spreading terminal clusters. Corolla purplish-pink. Plant aromatic. Dry woods. Aug.-Sept.

‡ *Corolla 2-lipped, upper concave; stamens 4, the anterior (lower) pair longest. Stamens approaching under upper lip of corolla*

15. PHYSOSTEGIA, Benth.

Erect herbs, mostly smooth with wand-like stems and oblong or lance-shaped leaves without leaf-stalks, margins usually toothed. Calyx nearly equally 5-toothed, about 10-nerved, short-tubular. Corolla funnel-formed, the throat much dilated, the border 2-lipped, the upper lip erect or somewhat arched, the lower 3-lobed. Stamens 4, ascending under the upper lip, the lower pair the longer.

P. virginiana, (L.) Benth. (Fig. 1, pl. 134.) FALSE DRAGON HEAD. Stem rather stout, erect, not branched or only above, terminated by one or more spikes of purple or rose-colored flowers. Leaves opposite, obversely lance-shaped, coarsely toothed at margins without leaf-stalks. Calyx tubular bell-shaped, its teeth about the length of the tube. Corolla about 1 in. long. Wet grounds. July-Sept.

16. PHLOMIS, Tourn.

Tall herbs or shrubs. Calyx tubular, nearly equally 5-toothed. Corolla 2-lipped, the upper lip arched, the lower spreading, 3-lobed. Within the mouth of the corolla tube is a ring of woolly hairs. Stamens 4, ascending under the upper lip of the corolla, the anterior pair longest.

P. tuberosa, L. JERUSALEM SAGE. Plant 3 to 6 ft. high, smooth, with large egg-shaped leaves, heart-shaped at base, blunt at apex, with coarse rounded teeth at margins, on leaf-stalks. Flowers pale purple to white in clusters terminal and in the upper axils. Waste places, naturalized in places. June-Sept.

17. **LEONURUS, L.**

Upright herbs, with deeply incised opposite leaves and whorls of small white or pink flowers in the leaf-axils. Calyx tube bell-shaped, 5-toothed, 5-nerved, hairy, the teeth rigid. Corolla 2-lipped, the tube slightly exceeding the calyx. Stamens 4, the anterior pair longer, ascending under the upper lip of the corolla. Nutlets 3-angled.

1. **L. cardiaca, L.** (Fig. 3, pl. 134.) **MOTHERWORT.** Stem 2 to 5 ft. high, commonly branched; plant hairy, leaves on long leaf-stalks, spreading into 3 principal, more or less triangular lobes, these plane or toothed at the margins. Flowers in whorls at the axils. Corolla purple, bearded within. Roadsides and waste places. June-Sept.

2. **L. Marrubiastrum, L.** (Fig. 4, pl. 134.) **HOARHOUND MOTHERWORT.** Stem 2 to 5 ft. tall, branched; plant hairy; leaves on rather long leaf-stalks, egg-shaped, rounded or tapering at base, blunt at apex, the borders deeply divided by rounded teeth. Corolla shorter than the calyx, whitish, the tube not bearded within. Waste places. June-Sept.

3. **L. sibiricus, L.** (Fig. 2, pl. 134.) **SIBERIAN MOTHERWORT.** Resembles No. 1, but leaves are more deeply 3-parted, the lobes, especially of lower leaves, incised. Waste grounds, Penna., and southward. May-Sept.

18. **LAMIUM, L.**

Upright herbs, with rounded cut-lobed leaves and whorls of small flowers in axillary whorls. Calyx tubular, bell-shaped, 5-nerved and with 5 nearly equal awl-pointed teeth. Corolla tube longer than the calyx, 2-lipped, the upper arched, the lateral lobes of the lower lip quite small, the middle lobe notched or divided. Stamens 4, under the upper lip of the corolla.

1. **L. amplexicaule, L.** (Fig. 7, pl. 134.) **HENBIT.** Plant 6 to 20 in. high; stems weak, slender, partly decumbent or erect. Leaves rounded and deeply incised or toothed, the lower small, on very short leaf-stalks, the upper $\frac{1}{2}$ to 1 in. broad, clasping or partly clasping the stem. Flowers few, in axillary clusters, purple or red, corolla about $\frac{1}{2}$ in. long. Cultivated grounds and waste places. April-Oct.

2. **L. maculatum, L.** **SPOTTED DEAD NETTLE.** Stems weak, partly decumbent or erect, branching. Leaves rounded, somewhat pointed at apex, heart-shaped at base; on leaf-stalks, marked usually with a white spot on the upper face. Flowers few, in the axil, purple. Escaped from gardens. May-Oct.

3. **L. album, L.** **WHITE DEAD NETTLE.** Stem rather stout and more or less decumbent, branched, 1 to 1½ ft. long. Leaves egg-shaped on short leaf-stalks, deeply cut into large teeth at the margins. Flowers few, axillary, white. Waste places. Naturalized. April-Oct.

4. **L. purpureum, L.** (Fig. 8, pl. 134.) **RED DEAD NETTLE.** Similar to No. 1, but *all the leaves* have leaf-stalks and the plant is more or less downy. Waste grounds and cultivated soil. From Europe. April-May.

19. **GALEOPSIS, L.**

Herbs, with opposite leaves and small flowers in the upper axils or forming dense terminal heads or spikes. Calyx bell-shaped, 5-toothed,

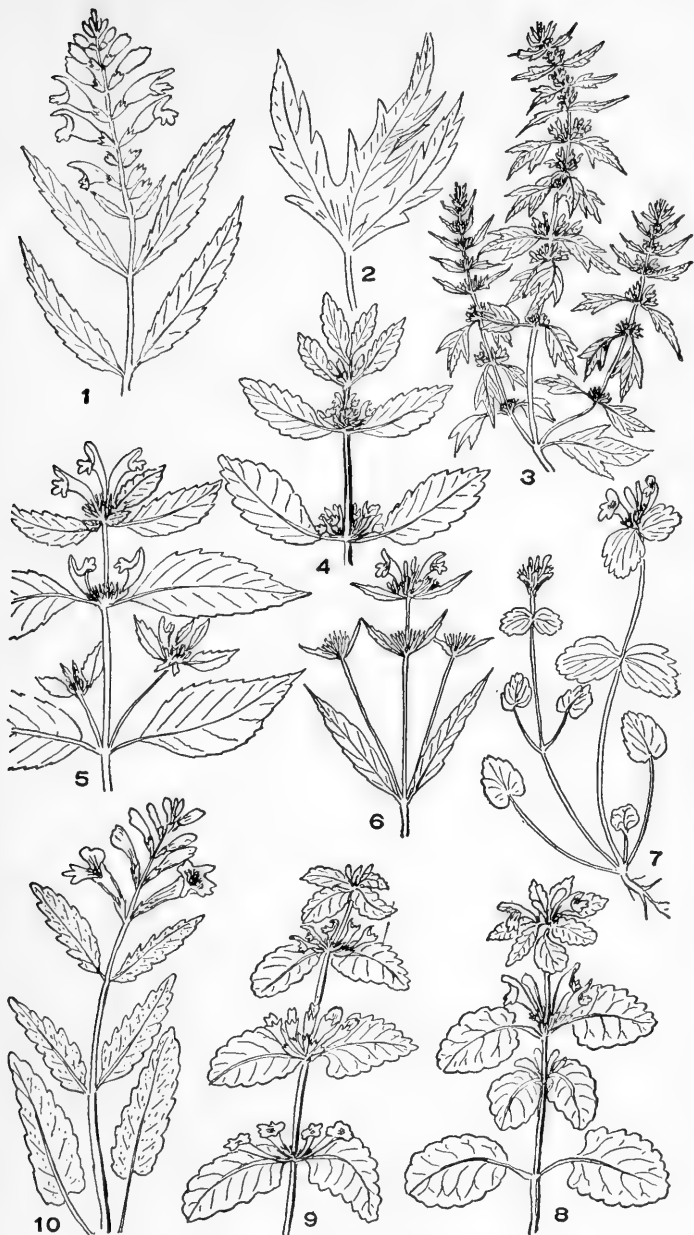


PLATE 134

1. *Physostegia virginiana*. 2. *Leonurus sibiricus* (leaf). 3. *L. cardiaca*.
 4. *L. Marrubiastrum*. 5. *Galeopsis Tetrahit*. 6. *G. Ladanum*. 7. *Lamium*
amplexicaule. 8. *L. purpureum*. 9. *Ballota nigra*. 10. *Betonica officinalis*.

the teeth nearly equal, spiny, 5- to 10-nerved; corolla with a narrow tube, 2-lipped, dilated at throat, upper lip arched, entire, lower spreading, 3-cleft. Stamens 4, ascending under the upper lip, the anterior pair the longest. Style 2-cleft at the summit.

1. **G. Ladanum**, L. (Fig. 6, pl. 134.) RED HEMP NETTLE. Stem downy, 6 to 18 in. long, erect. Leaves oblong lance-shaped, tapering at each end, downy; corolla red or rose color, frequently spotted with yellow, much longer than the calyx. Waste places. Rare. July-Oct.

2. **G. Tetrahit**, L. (Fig. 5, pl. 134.) COMMON HEMP NETTLE. Stem 1 to 3 ft. high, erect, the whole plant rough hairy. Leaves egg-shaped, on leaf-stalks, coarsely toothed. Corolla purple varied with white, twice as long as the calyx. Waste places. Naturalized. June-Sept.

20. BALLOTA, L.

Downy or woolly herbs, sometimes shrubs. With opposite dentate leaves and axillary whorls of small flowers. Calyx funnel-form, 10-nerved, expanding into a border of from 5 to 10 teeth. Corolla 2-lipped, the upper erect, concave or notched, lower 3-lobed, tube about as long as the calyx; the throat hairy. Stamens 4, ascending under the upper lip of the corolla, the anterior pair longer. Style 2-cleft at summit.

B. nigra, L. (Fig. 9, pl. 134.) BLACK HOARHOUND. Stem $1\frac{1}{2}$ to 3 ft. high; the whole plant hairy but green. Leaves egg-shaped on slender foot-stalks, borders with coarse rounded teeth. Axillary whorls of flowers dense. Calyx teeth 5, longer than the tube of the purple corolla. Waste places. Naturalized. June-Oct.

21. STACHYS, L.

Herbs, with opposite leaves and with flowers in axillary whorls. Calyx bell-shaped, 5- to 10-nerved, equally 5-toothed. Corolla 2-lipped, all of ours purple, the tube not exceeding the calyx, narrow, not dilated at the throat. Stamens 4, the anterior pair longer, ascending under the upper lip of the corolla.

Leaves linear *S. hyssopifolia*
Leaves more or less egg-shaped or oblong.

Stems erect.

Stems smooth *S. tenuifolia*

Stem hairy on the angles *S. aspera*

Stems hairy on the sides and angles.

Leaves densely pubescent, both sides, not more than half

an inch wide *S. arenicola*

Leaves not densely pubescent, more than half an inch wide

. *S. palustris*

Stems decumbent *S. arvensis*

1. **S. hyssopifolia**, Michx. (Fig. 1, pl. 135.) Stem about 1 ft. high, smooth or slightly hairy at the nodes. Leaves linear, entire, tapering at both ends, without leaf-stalks. Flowers light purple in a kind of terminal spike consisting of a few whorls of 4 to 6 flowers each. Moist fields, Mass., and southward. July-Sept.

Var. *ambigua*, A. Gray. (Fig. 2, pl. 135.) Stoutier. Leaves with low teeth, plant somewhat hairy. Eastern Penna., southward and westward.

2. **S. tenuifolia**, Willd. (Fig. 3, pl. 135.) SMOOTH HEDGE NETTLE. Stem 1 to $2\frac{1}{2}$ ft. high, smooth or rough with minute bristly hairs on the

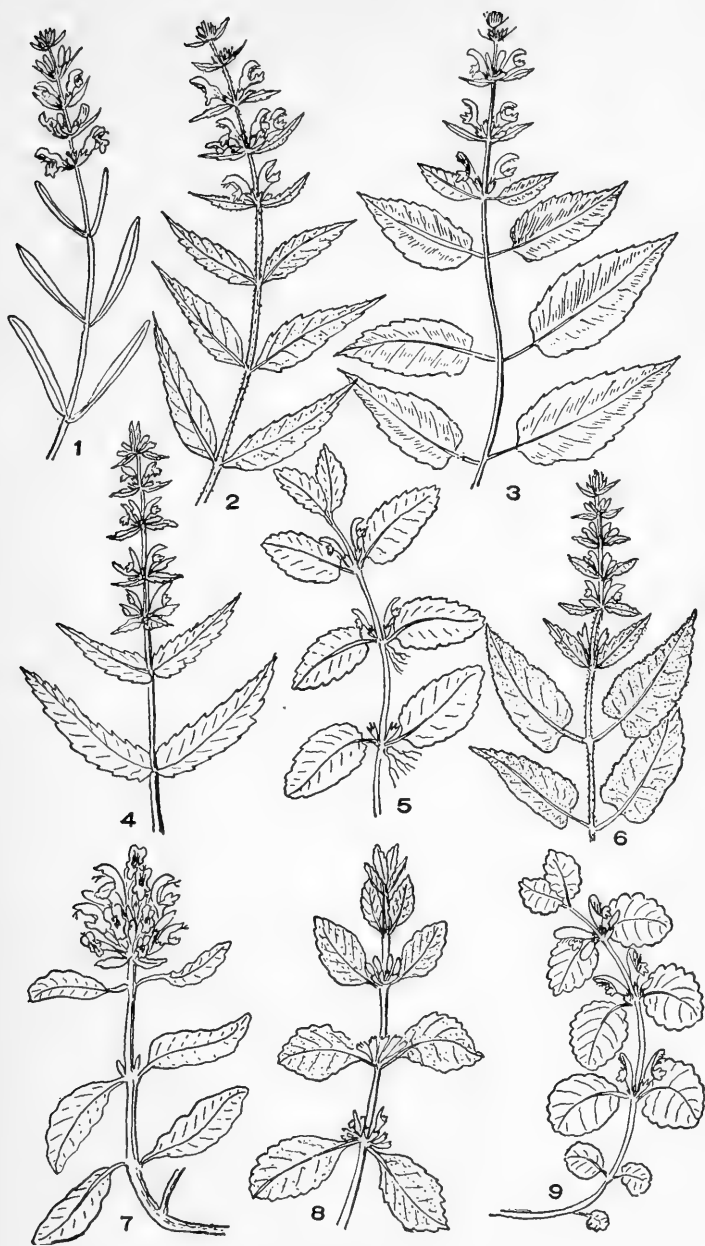


PLATE 135

1. *Stachys hyssopifolia*. 2. *S. ambigua*. 3. *S. tenuifolia*. 4. *S. palustris*.
 5. *S. arvensis* 6. *S. aspera*. 7. *Prunella vulgaris*. 8. *Marrubium vulgare*.
 9. *Glechoma hederacea*.

angles, usually branched; leaves oblong, lance-shaped, rounded at base, narrow tapering at apex, the borders toothed, on leaf-stalks. Flowers in a terminal spike of several whorls of pale red or purple flowers. Moist fields. June-Aug.

3. *S. arvensis*, L. (Fig. 5, pl. 135.) FIELD WOUNDWORT. Stem decumbent, branched, hairy, $\frac{1}{4}$ to 1 ft. long. Leaves egg-shaped, rather blunt at apex, heart-shaped at base. Flowers in the axils, whorls few flowered. Corolla purple. Waste places; naturalized in places about eastern seaports. (Regarded by Fernald as a Var. of *S. tenuifolia*.) July-Oct.

4. *S. arenicola*, Britton. HAIRY HEDGE NETTLE. Stem 12 to 24 in. high, very hairy. Leaves lance-shaped or linear, very hairy on both sides. Flowers in a dense, partly interrupted spike. Corolla inconspicuous. Sandy soil, New York, westward.

5. *S. palustris*, L. (Fig. 4, pl. 135.) HEDGE NETTLE. Stem erect, 1 to 4 ft. high, the whole plant hairy. Leaves lance-shaped, rounded at base, without leaf-stalks, tapering toward the apex. Flowers in a spike, of whorls of purple or pale red flowers. Moist soil, western New York, westward and southward. June-Sept.

6. *S. aspera*, Michx. (Fig. 6, pl. 135.) ROUGH HEDGE NETTLE. Stem 2 to 4 ft. high, the angles beset with stiff hairs which turn downward. Leaves egg-shaped, mostly heart-shaped at base, on short leaf-stalks, smooth or hairy. Flowers in terminal spikes of whorls of red-purple blooms. Stamens hairy. Wet grounds. Common.

22. BETONICA, L.

Herbs, resembling *Stachys*, the corolla beardless. Lower leaves in a cluster on long leaf-stalks, egg-shaped, heart-shaped at base, upper leaves egg-shaped or lance-shaped, with no leaf-stalks or short ones. Whole plant hairy. Flowers purple in terminal spike.

B. officinalis, L. (Fig. 10, pl. 134.) BETTONY. Escaped from gardens. Flowers purple in a terminal spike. Waste places. July-Sept.

‡ *Corolla 2-lipped; stamens 4, shorter than the upper lip of the corolla, lower longest, the upper lip arching over the stamens.*

Calyx deeply 2-lipped

23. PRUNELLA, L.

Our only species a low, often prostrate herb, with opposite egg-shaped leaves on long leaf-stalks and with a cylindric head of purple flowers, plentifully interspersed with green bracts. Calyx deeply 2-lipped, the lower lip of 2 very acute lance-shaped teeth, the upper of 3 triangular or blunt teeth. Corolla arching over the stamens.

P. vulgaris, L. (Fig. 7, pl. 135.) SELF-HEAL. A common weed about door yards and in waste places. May-Oct.

24. SCUTELLARIA, L.

Herbs, with opposite leaves and with flowers at the leaf-axils, or terminal forming spikes. Calyx 2-lipped, the upper one with a crest or protuberance upon its back. Corolla 2-lipped, upper lip vaulted, the lower

dilated, the tube much exceeding the calyx. Stamens 4, ascending beneath the upper lip. Style usually 2-cleft.

Flowers solitary in the axils (opposite).

Leaves with leaf-stalks.

Not white hoary *S. serrata*
White hoary *S. incana*

Leaves without leaf-stalks.

Borders deeply dentate.

Nutlets not winged *S. nervosa*

Nutlets winged *S. galericulata*

Borders not dentate *S. parvula*

Flowers not solitary or some of them in terminal groups.

In long narrow spikes from the axils, more or less one-sided . . . *S. lateriflora*

Flowers few, largely terminal.

Leaves on leaf-stems, borders toothed *S. pilosa*

Leaves not on leaf-stems; borders entire. Leaves linear . . . *S. integrifolia*

1. *S. lateriflora*, L. (Fig. 1, pl. 136.) MAD-DOG SKULLCAP. Leaves opposite, on leaf-stalks, egg-shaped, rounded at base, tapering toward apex, borders coarsely toothed. Flowers in opposite narrow spikes from the axils, the flowers turning mostly to one side, numerous, small, blue varying to nearly white. Waste places. Common. July-Sept.

2. *S. serrata*, Andr. (Fig. 3, pl. 136.) SHOWY SKULLCAP. Stem 1 to 2 ft. high, erect. Leaves large, egg-shaped, on leaf-stalks, notched at margins, the upper reduced to floral bracts without leaf-stalks. Flowers in the terminal axils, opposite; corolla blue. Woods, southern New York, Penna., and southward. May-June.

3. *S. pilosa*, Michx. (Fig. 6, pl. 136.) HAIRY SKULLCAP. Stem slender, 1 to 2½ ft. high. Leaves opposite on leaf-stalks, oval or egg-shaped, notched at margins; the whole plant hairy or downy. Flowers in terminal pairs, the cluster short, corolla blue. Dry woods, southern New York and Penna., southward and westward. May-July.

4. *S. integrifolia*, L. (Fig. 7, pl. 136.) HYSSOP SKULLCAP. Stem ½ to 2 ft. high, downy. Leaves opposite linear to oblong, 1 to 2 in. long, or with very short leaf-stalks. Flowers in a loose terminal cluster; corolla blue at summit varying to nearly white at base. Sandy woods, New England and southward. May-July.

5. *S. parvula*, Michx. (Fig. 5, pl. 136.) SMALL SKULLCAP. Stem 3 to 12 in. high, somewhat branched, smoothed or slightly downy. Leaves opposite, broadly egg-shaped, rounded at base, attached directly to stem, blunt at apex, ¼ to 1 in. long, nearly as wide as long. Flowers solitary in the axils, opposite, blue to violet. Moist sandy soil, eastern part of our area. April-July.

6. *S. galericulata*, L. (Fig. 2, pl. 136.) HOODED SKULLCAP. Stem 1 to 3 ft. high, simple or branched. Leaves opposite, lance-shaped with heart-shaped base dentate at margins, without leaf-stalk or the lower with short leaf-stalks. Flowers in the axils, few; corolla blue. Swamps and wet places, Maine to New Jersey. June-Sept.

7. *S. nervosa*, Pursh. (Fig. 4, pl. 136.) VEINED SKULLCAP. Stem ½ to 2 ft. high. Leaves opposite, egg-shaped, the lower on short leaf-stalks, the upper directly attached to stem, coarsely toothed. Flowers in the axils only, opposite, blue. Moist woods. May-Aug.

8. *S. incana*, Muhl. (Fig. 8, pl. 136.) DOWNY SKULLCAP. Leaves

egg-shaped or oval, on rather long leaf-stalks, the lower surface of the leaves and the flowers covered with a whitish down. Southern Penna., and southward. June-Aug.

25. MARRUBIUM, L.

Perennial herbs, branching, more or less covered with whitish, woolly hairs, of bitter aromatic taste, with axillary clusters of flowers of white or purplish color. Calyx nearly equally 5- to 10-toothed, the teeth somewhat spiny-pointed; corolla 2-lipped, the *upper lip erect*, lower spreading, 3-lobed. Stamens 4, *included* in the tube of the corolla, the anterior (lower) pair longest. Style 2-cleft.

M. vulgare, L. (Fig. 8, pl. 135.) COMMON HOARHOUND. Stem 1 to 3 ft. high, woolly. Leaves opposite, round egg-shaped with coarse rounded teeth at the margins, on rather long leaf-stalks. Flowers axillary, in dense rounded clusters; corolla small, white. Common in waste places.

26. MEEHANIA, Britton

Low herb, spreading. Leaves on long leaf-stalks, opposite, heart-shaped at base. Calyx only slightly 2-lipped, 5-toothed, the teeth long and sharp, rather unequal, 15-nerved. Corolla rather large, swollen at throat, 2-lobed, the lower lobe 3-cleft. Stamens 4, two long and two short, included in the upper lip. Cells of the anthers parallel.

M. cordata, (Nutt.) Britton. MEEHANIA. A low plant, 3 to 8 in. high, with hairy runners. Leaves broadly egg-shaped or nearly orbicular, heart-shaped, on long leaf-stalks, rounded teeth at margin. Flowers blue, showy, in whorls of a few flowers each, the leaves at the whorls shorter than the calyx, the corolla hairy inside. Moist woods and thickets, southwest Penna., and southward and westward. May-July.

‡ *Corolla 2-lipped; stamens 4, the posterior (upper) pair longest, shorter than or scarcely longer than the upper lip of the corolla*

27. NEPETA, L.

Perennial herbs, with opposite, dentate leaves and with terminal and axillary clusters of purplish flowers. Calyx obliquely 5-toothed; corolla dilated at the throat, 2-lipped, upper lip erect, lower 3-lobed, the middle lobe much the largest. Stamens 4, ascending under the upper lip, the anterior pair shortest.

N. Cataria, L. (Fig. 10, pl. 136.) CATMINT. CATNIP. Whole plant downy; stem branched, 1 to 3 ft. high. Leaves heart-shaped, on leaf-stalks, sharply tapering at apex, the upper bract-like, small, all with rounded coarse teeth at margins. Flowers mostly in terminal spikes, corolla whitish-purple. About dwellings. Common. July-Sept.

28. GLECOMA, L.

A prostrate herb, resembling *Nepeta* in many respects; the upper leaves *not* small and bract-like, and the apex of leaf is rounded. Flowers not numerous, in axillary loose clusters.

G. hederacea, L. (Fig. 9, pl. 135.) GILL-OVER-THE-GROUND. (*Nepeta*

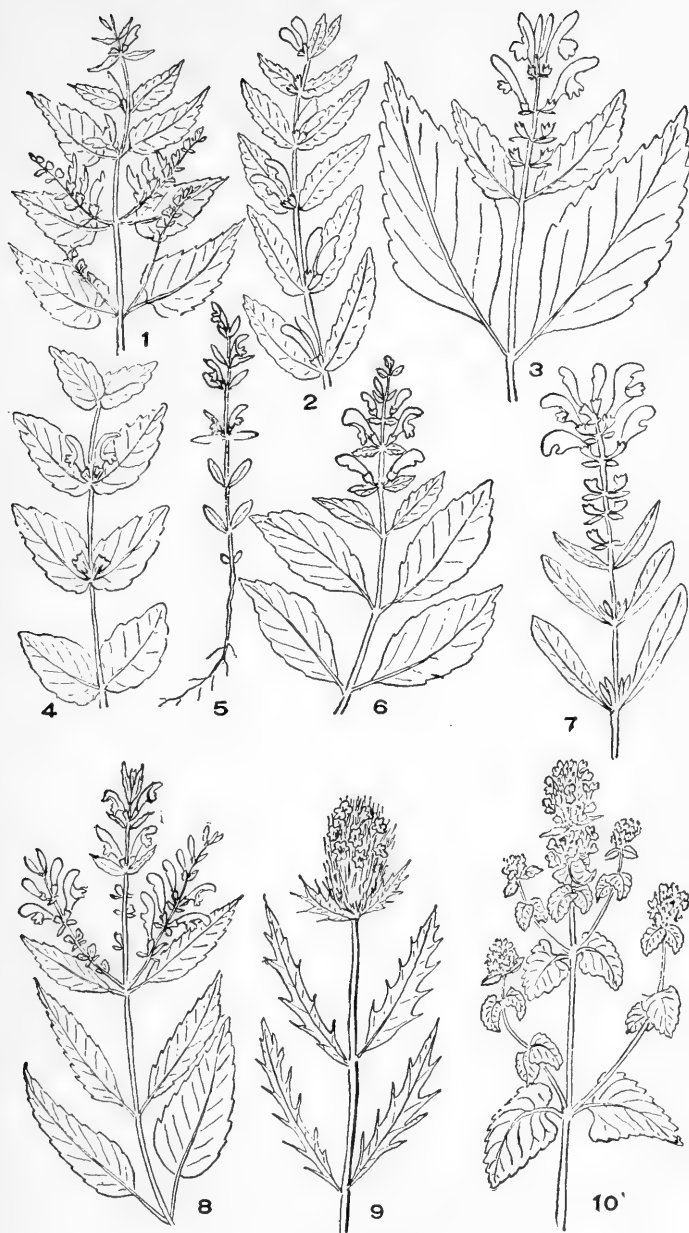


PLATE 136

1. *Scutellaria lateriflora*. 2. *S. galericulata*. 3. *S. serrata*. 4. *S. nervosa*.
 5. *S. parvula*. 6. *S. pilosa*. 7. *S. integrifolia*. 8. *S. incana*. 9. *Dracocephalum parviflorum*. 10. *Nepeta Cataria*.

hederaea, Trevisan.) Stems creeping and trailing. Leaves rounded or kidney-shaped. Corolla light blue. Damp places, mostly about dwellings. March-May.

29. DRACOCEPHALUM, L.

Perennial herbs, with opposite leaves and with blue or purple flowers in terminal or axillary clusters. Calyx tubular, very hairy, 5-toothed, the upper tooth usually much longer than the others. Corolla 2-lipped, the upper arched, lower 3-lobed. Stamens 4, ascending under the upper lip, the upper pair longest.

D. parviflorum, Nutt. (Fig. 9, pl. 136.) AMERICAN DRAGON-HEAD. Leaves egg-shaped to lance-shaped, very deeply cut at margins, the teeth very sharp. Clusters of flowers dense, crowded in terminal spikes. Dry soil, northern New York and westward. May-Aug.

30. AGASTACHE, Clayt. (*Lophanthus*, Benth.)

Tall herbs, with opposite leaves on rather long leaf-stalks, margins coarsely toothed with rounded teeth. Calyx bell-shaped, 5-toothed, the upper teeth longest. Corolla 2-lipped, the tube scarcely exceeding the calyx. Stamens 4, the upper pair longest. Anther sacs nearly parallel.

1. **A. nepetoides**, (L.) Kuntze. (Fig. 1, pl. 137.) CATNIP GIANT-HYSSOP. Stem 2 to 5 ft. high, sharply 4-angled, smooth. Leaves egg-shaped, pointed at apex, rounded or somewhat tapering at base, coarsely toothed with rounded teeth, 2 to 4 in. long. Flowers in terminal spike 5 or 6 in. high. *Calyx teeth slightly shorter than corolla tube.* Corolla greenish-yellow. Woods, Vermont and southward and westward. July-Sept.

2. **A. scrophulariaefolia**, (Willd.) Kuntze. (Fig. 2, pl. 137.) FIG-WORT GIANT-HYSSOP. Stem obtusely 4-angled, *plant downy*. Calyx teeth very sharp, decidedly shorter than calyx tube, Woods, Connecticut and westward and southward. July-Oct.

‡ *Corolla 5-lobed, one lobe much longer than the others, which are nearly equal; border of the longer lobe fringed*

31. COLLINSONIA, L.

Tall herbs, with opposite leaves on long leaf-stalks and with loose terminal clusters of yellowish flowers. Calyx bell-shaped, 2-lipped, 2 of the teeth much longer than the other 3. Corolla much longer than calyx, 5-lobed, 4 of the lobes nearly equal, the 5th much longer and depending, bordered with a fringe.

C. canadensis, L. (Fig. 5, pl. 137.) HORSE-BALM. Stem 2 to 5 ft. high, smooth; leaves egg-shaped or oblong, bordered by coarse rounded teeth, 6 to 10 in. long, the upper on short leaf-stalks. Flowers in loose spreading, pyramidal clusters, aromatic, corolla yellow. Moist woods. July-Oct.

‡ *Corolla border very irregular. Stamens 4, extending beyond the tube of the corolla, the anterior longer. Calyx 5- to 10-nerved*



PLATE 137

1. *Agastache nepetoides*. 2. *A. serophulariaefolia*. 3. *Isanthus brachiatus*.
 4. *Ajuga reptans*. 5. *Collinsonia canadensis*. 6. *Trichostema lineare*. 7. *T. dichotomum*. 8. *Teucrium canadense*. 9. *T. occidentale*.

32. *AJUGA*, L.

Herbs, with opposite leaves and with flowers in axillary clusters. Calyx egg-shaped or bell-shaped, nearly equally 5-toothed. Corolla border 2-lipped the upper small, the lower much larger, the middle lobe largely exceeding the side lobes.

A. reptans, L. (Fig. 4, pl. 137.) **BUGLE**. Stem $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high, nearly smooth. From the base extend runners (stolons), which reach out from the stem. Leaves at the base in a tuft, stem leaves rounded or egg-shaped, without leaf-stalks. Flowers few in the leaf-axils, corolla blue, much exceeding the calyx. Naturalized. Fields, Maine to southern New York. May-June.

33. *TEUCRIUM*, L.

Herbs, with opposite leaves and purple flowers in a narrow terminal spike. Calyx bell-shaped, nearly equally or somewhat unequally 5-pointed. Stamens 4, extending beyond the corolla. Corolla border irregularly 5-lobed.

1. **T. canadense**, L. (Fig. 8, pl. 137.) **WOOD SAGE**. Stem 1 to 2 ft. tall. Leaves lance-shaped on short leaf-stalks, sharply toothed, rounded at base, tapering toward the apex, downy. Flowers nearly an in. long, blue; calyx covered with short grayish hairs. Waste thickets. June-Sept.

2. **T. occidentale**, Gray. (Fig. 9, pl. 137.) **HAIRY GERMANDER**. Calyx covered with long loose hairs. Somewhat rare. Moist soil, eastern Penna., and southward. July-Sept.

(Bicknell describes several other forms found in our area as new species.)

34. *TRICHOSTEMA*, L.

Herbs, annual or perennial, with branched stems and opposite leaves with entire borders, and with small flowers in terminal loose-spreading clusters. Calyx bell-shaped, with 5 very unequal teeth, the 3 upper much the longest and partly united, the 2 lower short. Corolla 5-lobed, the lobes nearly equal in length, the tube in our species extending notably beyond the calyx and somewhat curved. Stamens 4, the anterior pair longer, extending beyond the corolla.

1. **T. dichotomum**, L. (Fig. 7, pl. 137.) **BLUE CURLS**. Stem slender, much branched, $\frac{1}{2}$ to 2 ft. high. Leaves oblong or lance-shaped, on leaf-stalks, 1 to 3 in. long, $\frac{1}{3}$ to 1 in. wide, the whole plant somewhat viscid. Flowers loosely clustered, 2 or, less frequently, 3 borne together. Corolla blue, pink or rarely white. Dry fields, Maine to Florida. July-Oct.

2. **T. lineare**, Nutt. (Fig. 6, pl. 137.) **NARROW-LEAVED BLUE CURLS**. Leaves linear, in other respects much like No. 1. Dry fields, Maine to Florida. July-Aug.

35. *ISANTHUS*, Michx.

Low herb, viscid, much branching, with narrow lance-shaped leaves, with entire margins and with small blue flowers in loose axillary clusters. Calyx bell-shaped, 5-lobed, the teeth equal; corolla somewhat longer than

the calyx, the border somewhat unequally 5-lobed, the lobes rounded and spreading. Stamens 4, not longer than the corolla, anterior pair longer than the others.

I. brachiatus, (L.) BSP. (Fig. 3, pl. 137.) FALSE PENNYROYAL. Stem much branched, $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high. Leaves lance-shaped, tapering at each end, without teeth or with a few sharp ones. Flowers at the axils, 1 to 3 in a cluster, blue. Sandy soil, Maine, southward. July-Sept.

FAMILY III.—**SOLANACEAE.** POTATO FAMILY

Herbs, vines, rarely shrubs (none in our area), with alternate leaves and regular flowers with 5 divisions of the calyx, 5 lobes of the corolla and 5 stamens. Fruit a capsule of 2 cells or a berry. Style single. Stamens alternate with the lobes of the corolla, and inserted in the tube. Calyx below the ovary. Seeds numerous. Fruit a pulpy berry.

Calyx, in fruit forming a large colored, inflated sac
about the berry **Physalis**

Calyx 5-lobed, fitting closely about the berry **Leucophysalis**

Calyx 5-lobed, not investing the berry . . . **Solanum**

Fruit a capsule.

Calyx enclosing the fruit, not covered with spines
. **Hyoscyamus**

Calyx covered with spines **Datura**

Calyx only partly covering the fruit . . . **Nicotiana**

1. **PHYSALIS**, L.

Herbs with, in our species, wavy bordered leaves and yellow or white flowers. Calyx 5-parted, increasing as fruit develops, forming an inflated enclosure for the large berry. Corolla open-bell-shaped, the 5 stamens inserted near the base of the corolla tube.

Leaves decidedly heart-shaped at base *P. pruinosa*
Leaves egg-shaped, sometimes slightly heart-shaped at base.

Margins coarsely toothed *P. heterophylla*

Margins generally entire *P. pubescens*

Leaves tapering at both ends.

Plant quite hairy *P. virginiana*

Plant not hairy *P. philadelphica*

1. **P. pruinosa**, L. (Fig. 5, pl. 138.) TALL HAIRY GROUND CHERRY. Annual, much branched, erect or decumbent; leaves egg-shaped, heart-shaped at base, margins wavy or with some sharp teeth, whole plant very hairy. Flowers yellow, tinged with purple or spotted with brown. Low grounds, Mass., and southern part of our area. July-Sept.

2. **P. pubescens**, L. (Fig. 1, pl. 138.) LOW HAIRY GROUND CHERRY. A very diffuse annual, when mature decumbent. Leaves 1 to $2\frac{1}{2}$ in. long, egg-shaped, at base oblique, one side usually longer than the other, the border entire or with distant angular teeth. Stem and leaves downy, but

leaves becoming in some cases smooth, except along the veins. Calyx lobes narrow; corolla yellow spotted with purple in the center. Anthers violet. Pennsylvania and southward. July-Sept.

3. *P. philadelphica*, Lam. (Fig. 2, pl. 138.) PHILADELPHIA GROUND CHERRY. Leaves lance-shaped or egg-shaped, tapering at each end, on rather long leaf-stalks. Plant sometimes 4 or 5 ft. high, smooth or with few hairs. Calyx closely investing the large red or purple fruit. Corolla yellow, with purple in throat. In cultivated soils, Rhode Island, and southward. July-Sept.

4. *P. virginiana*, Mill. (Fig. 3, pl. 138.) VIRGINIA GROUND CHERRY. Stem 1 to 3 ft. high, diffusely branched; erect or decumbent. Leaves oblong or egg-shaped, tapering at each end, wavy or sharp toothed at margins; the whole plant hairy. Corolla about an in. broad, yellow. Cultivated grounds, New York, westward and southward. July-Sept.

5. *P. heterophylla*, Nees, (Fig. 4, pl. 138) CLAMMY GROUND CHERRY. Perennial, decidedly downy or hairy with jointed hairs; stem at first erect, later decumbent, spreading, 1 to 3 ft. long. Leaves egg-shaped to oval, blades generally 2 in. or more in length, somewhat heart-shaped at base or bluntly tapering, borders with coarse teeth. Corolla greenish-yellow with a dark eye at center. Fruit a large yellow berry. Rich soil, somewhat common.

2. LEUCOPHYSALIS, Rydberg.

Tall, viscid hairy annual. Leaves not toothed, egg-shaped or lance-shaped, tapering at each end. Calyx bell-shaped, 5-toothed, fitting closely around the large berry. Corolla open-bell-shaped, yellow.

L. grandiflora, (Hook) Rydberg. (Fig. 6, pl. 138.) LARGE WHITE FLOWERED GROUND CHERRY. (*Physalis grandiflora*, Hook.) Plant erect, 1 to 3 ft. high. Flower about 1½ in. broad, white, resembling the Morning-glory flower, but with short tube. In valley of Lake Champlain. May-July.

3. SOLANUM, Tourn.

Herbs and vines, with alternate leaves, the larger of which are often accompanied by smaller lateral ones. Flowers in clusters, white, blue, dark purple or yellow. Calyx 5-cleft, wheel-shaped; corolla wheel-shaped, the 5 lobes often extending nearly to the base. Stamens inserted in throat of corolla, the anthers converging around the style. Berry 2-celled, globose.

Stems mostly erect, not prickly	<i>S. nigrum</i>
Stems mostly erect, prickly.	
Calyx not prickly	<i>S. carolinense</i>
Calyx prickly	<i>S. rostratum</i>
Stems, climbing or straggling	<i>S. Dulcamara</i>

1. *S. nigrum*, L. (Fig. 3, pl. 139.) COMMON OR BLACK NIGHTSHADE. Low, much branching, generally without hairs, 1 to 2½ ft. high. Leaves egg-shaped, tapering at each end, on leaf-stalks, a small leaf often springing from the side of the leaf-stalk. Flowers in small umbel-like clusters, directed laterally from the stem; corolla star-shaped, the converging anthers form a sharp cone in the center. Berries globular, black. In rich shaded grounds. July-Oct.

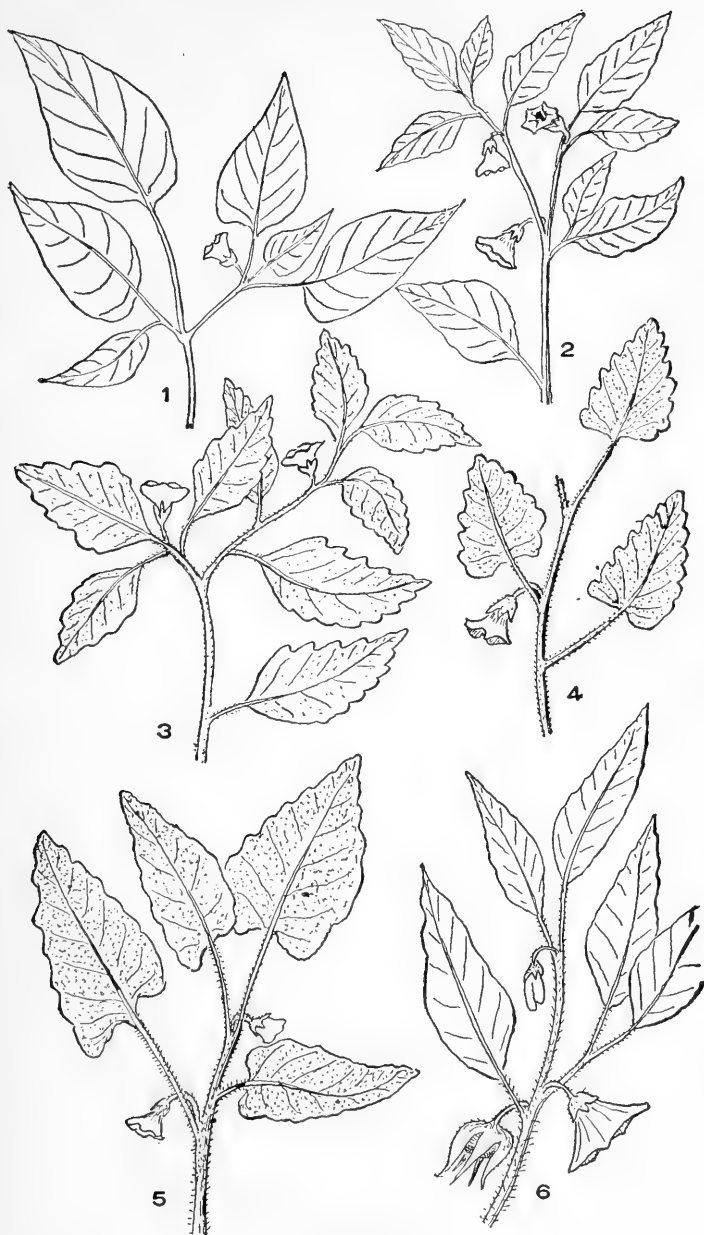


PLATE 138

1. *Physalis pubescens*. 2. *P. philadelphica*. 3. *P. virginiana*. 4. *P. heterophylla*. 5. *P. pruinosa*. 6. *Leucophysalis grandiflora*.

2. *S. carolinense*, L. (Fig. 1, pl. 139.) HORSE NETTLE. Stem much branching, 1 to 4 ft. high, armed with long slender prickles. Leaves in general outline egg-shaped, but deeply sinuate, the sinuses extending sometimes nearly to the midvein. Flowers in a terminal cluster; corolla star-shaped, the lobes extending half way to the base; anthers forming a pyramidal cone. Fruit a yellow berry.

3. *S. rostratum*, Dunal. (Fig. 2, pl. 139.) SAND BUR. Very prickly, 1 to $2\frac{1}{2}$ ft. high. Leaves sinuate lobed, some of the sinuses extending to the midvein, all lobes rounded; surface of leaves covered with a copious yellowish down. Calyx covered with long slender prickles. Fruit a large globular berry. Sandy waste places. May-Sept.

4. *S. Dulcamara*, L. (Fig. 4, pl. 139.) BITTERSWEET. NIGHTSHADE. Perennial climbing or trailing vine, more or less downy. Leaves, the upper halberd-shaped, the lower egg-shaped, heart-shaped at base. Flowers in side clusters, corolla blue or dark purple. Calyx not enclosing fruit. Fruit an oval, red berry. Moist shady places, mostly about dwellings. June-Sept.

4. HYOSCYAMUS, L.

Coarse, fetid weeds, with alternate deeply lobed leaves and large regular flowers from the leaf-axils. Calyx bell- or urn-shaped, 5-lobed, striped; corolla funnel-form with a 5-lobed, more or less unequally spreading border. Stamens spreading. Fruit a capsule enclosed in the calyx.

H. niger, L. (Fig. 5, pl. 139.) BLACK HENBANE. Stem stout, 1 to $2\frac{1}{2}$ ft. high. Leaves clasping the stem, deeply sinuate. Flowers on very short flower stems; corolla greenish-yellow with purple markings. Capsule oblong. Escaped from gardens. June-Sept.

5 DATURA, L.

Coarse weeds, with unpleasant odor, poisonous. Leaves with sinuate borders, the lobes irregular and often deep. Flowers large, showy in the forks of the stem. Calyx 5-lobed, prismatic, covered with hooklets; corolla large, funnel-form.

1. *D. Stramonium*, L. (Fig. 6, pl. 139.) STRAMONIUM. Whole plant very dark green, 1 to 5 ft. high, branching. Leaves 3 to 8 in. long, irregularly sinuate. Flower large, about $3\frac{1}{2}$ in. long, 2 in. broad. White. In rich waste grounds. Summer.

2. *D. Tatula*, L. PURPLE STRAMONIUM. Taller than No. 1, and flowers pale violet-purple. Fields and waste places. May-Sept.

3. *D. Metel*, L. ENTIRE-LEAVED THORN-APPLE. Leaves broadly egg-shaped, unequal on the two sides, rounded at base or heart-shaped. Flowers white. Waste places, Rhode Island, southward. July-Sept.

6. NICOTIANA, L.

Coarse, rank herbs, with large entire leaves and terminal clusters of large flowers. Calyx tubular, 5-cleft; corolla funnel-form. Stamens 5, inserted in tube of corolla. Capsule 2-celled.

N. rustica, L. WILD TOBACCO. Leaves egg-shaped, borders entire, 2 to 8 in. long. Calyx teeth low triangular; corolla cylindric funnel-form,



PLATE 139

1. *Solanum carolinense*. 2. *S. rostratum*. 3. *S. nigrum*. 4. *S. Dulcamara*.
5. *Hyoscyamus niger*. 6. *Datura Stramonium*.

greenish-yellow. Southern part of our area. Relic of Indian culture. June-Sept.

FAMILY IV.—SCROPHULARIACEAE. FIGWORT FAMILY

In our area nearly all the species are herbs, a single species, *Paulownia*, is a tree. Elsewhere shrubs and trees are found within the family. The leaves may be opposite or alternate, always simple, but the borders may be entire or more or less indented. The flowers may be solitary or in variously formed clusters. Flowers *always* more or less irregular, though in the first tribe the irregularity is slight. Calyx persistent 5- or 4-toothed or deeply divided. Corolla with a united petal more or less 2-lipped with a tube of greater or less extent. Stamens free from each other, inserted in the tube of the corolla, 5 or mostly 4 when 2 are longer than the other 2, or in some cases only 2 fertile stamens. Pistil 1; fruit sometimes a berry more frequently a capsule. Seeds numerous.

1. The Mullen Tribe

Corolla nearly regular, wheel-form, generally with 5 fertile stamens VERBASCUM

2. The Snapdragon Tribe

Corolla decidedly irregular, 2-lipped, the upper lip, in bud, covering the lower; *in bloom the lower lip approaches the upper so as nearly to close the throat (personate)*. Stamens (fertile) 4. Leaves usually opposite, at least below.

Herbs.

Corolla tube prolonged into a spur or forming a sac or swelling anteriorly.

Tube with a spur.

Leaves with veins diverging from mid-vein.

Flowers solitary ELATINOIDES

Flowers in clusters LINARIA

Tube saccate ANTIRRHINUM

Corolla not spurred or saccate.

Stamens 4.

Tube of corolla inflated the 5th stamen represented by a scale, attached to the upper side of the corolla SCROPHULARIA

Tube not inflated, clearly 2-lipped, the 5th stamen present, but shorter than the others and sterile; seeds winged CHELONE

The 5th stamen about as long as the other, sterile; seeds without wings PENTSTEMON

Tube of corolla 2-cleft nearly to base . . . COLLINSIA

Large tree PAULOWNIA

3. *The Monkey Flower Tribe*

Corolla clearly irregular, 2-lipped, not saccate or spurred, the posterior lobes covered, in bud, by the lateral lobes. Fertile stamens 2 or 4, when 4, 2 long and 2 short. Capsule splitting at maturity in the seams running from below upward.

*Herbs**Stamens 4. Corolla 2-lipped*

Stamens included within the tube of the corolla.

Stamens not ascending under its upper lip.

Throat of the corolla closed.

Leaves opposite in pairs.

Leaves coarsely toothed MIMULUS

Leaves entire BACOPA

Throat of corolla not closed COLLINSIA

Stamens ascending under the upper lip.

Leaves opposite in pairs.

Flowers in narrow spikes.

Corolla not hairy RHINANTHUS

Corolla hairy ODONTITES

Flowers solitary.

Leaves rounded EUPHRASIA

Leaves lance-shaped MELAMPYRUM

Leaves in whorls LEPTANDRA

Leaves all from the root LIMOSELLA

Leaves alternate CASTILLEJA

Corolla not 2-lipped, but sub-equally 5-lobed

Leaves opposite.

Flowers purple.

Leaves linear, entire GERARDIA

Leaves egg-shaped or lance-shaped, borders toothed

. BUCHNERA

Flowers yellow DASYSTOMA

Leaves alternate, flowers yellow.

Leaves deeply lobed, the borders toothed PEDICULARIS

Leaves simple (not lobed), the borders not toothed,

corolla decidedly 2-lipped SCHWALBEA

Stamens 2

Corolla 2-lipped.

Calyx 5-parted.

Sterile filaments absent or minute GRATIOLA

Sterile filaments evident and forked ILYSANTHES

Calyx 4-parted MICRANTHEMUM

Corolla not 2-lipped, but sub-equally 4-parted VERONICA

Tree PAULOWNIA

1. *VERBASCUM, L.*

Herbs, with alternate leaves, biennial or rarely perennial. Flowers in

terminal spikes; corolla wheel-form with the 5 lobes unequal. Stamens 5, leaning outward, all fertile. Calyx 5-parted or 5-cleft.

1. **V. Thapsus**, L. GREAT MULLEN. VELVET PLANT. Stem erect, sometimes with one or two branches above, 2 to 7 ft. high. Leaves large (4 to 12 in. long), with small teeth or none, the base of the leaf running down the stem each side, making winged angles to the stem; whole plant rough, with dense wool. Flowers in long club-shaped spikes, yellow; stamens unequal. In dry fields and waste places. June-Sept.

2. **V. phlomoides**, L. (Fig. 3, pl. 140.) CLASPING-LEAVED MULLEN. Similar to the last, but usually less high and less stout. The leaves, which in *V. Thapsus*, extend along the stem below the insertion, in this species are scarcely or not at all decurrent. Introduced in parts of New England from Europe. Also on Long Island. June-Aug.

3. **V. Lychnitis**, L. (Fig. 2, pl. 140.) WHITE MULLEN. Stem angled, considerably branched, 2 to 5 ft. high; the whole plant white with short soft hairs except the upper surface of the leaves. Leaves oblong to oblong-lance-shaped, with rounded teeth at borders, tapering at each end, 2 to 7 in. long. Flowers white or cream-color, in a pyramidal cluster of many flowered spikes. Mostly in southern or western part of our area, in dry waste places. June-Sept.

4. **V. Blattaria**, L. (Fig. 1, pl. 140.) MOTH MULLEN. Stem erect, branching above, 1 to 3 ft. high, without hairs or only slightly downy. Leaves oblong, egg-shaped or lance-shaped, broad and clasping the stem at base, tapering toward the apex, with coarse rounded teeth at margins. Flowers in a terminal slender spike, yellow or white, marked with brown at the back; spike 2 to 12 in. long, with narrow bracts at the base of the flowers. Stamens purplish, unequal. Dry fields, waste grounds. June-Sept.

2. ELATINOIDES, Wetts

Spreading or creeping herbs, with veins spreading from mid-vein. Flowers 2-lipped with a conspicuous spur at base of tube. Throat of corolla closed by a sort of palate. Stamens 4, inclosed within the corolla. Flowers solitary from the leaf-axils.

1. **E. spuria**, (L.) Wetts. (Fig. 9, pl. 140.) ROUND-LEAVED TOAD FLAX. (*Linaria spuria*, (L.) Mill.) Leaves nearly round, blunt at apex, heart-shaped at base, without leaf-stalks. Flowers yellowish-purple. Waste places. From Europe. June-Sept.

2. **E. Elatine**, (L.) Wetts. (Fig. 10, pl. 140.) SHARP-POINTED TOAD FLAX. (*Linaria elatine*, (L.) Mill.) Leaves arrow-shaped on short leaf-stalks, downy. Corolla yellowish-purple. From Europe. Waste places. June-Sept.

3. LINARIA, Juss.

Herbs, with alternate leaves (at least the upper ones) with simple margins and with flowers axillary or in terminal clusters, ours spikes. Corolla 2-lipped, the throat nearly closed; a conspicuous spur extending backward from the tube of the corolla. Calyx 5-parted, the parts nearly equal. Capsule oval or globose.



PLATE 140

1. *Verbascum Blattaria*. 2. *V. Lychnitis*. 3. *V. phlomoides*. 4. *Linaria cymbalaria*. 5. *L. canadensis*. 6. *L. vulgaris*. 7. *L. repens*. 8. *L. genistacifolia*. 9. *Elatinoides spuria*. 10. *E. Elatine*.

Flowers axillary	<i>L. Cymbalaria</i>
Flowers in spikes.	
Flowers yellow.	
Leaves linear	<i>L. vulgaris</i>
Leaves lance-shaped	<i>L. genistaefolia</i>
Flowers blue or bluish.	
Corolla spur long	<i>L. canadensis</i>
Corolla spur short	<i>L. repens</i>

1. *L. vulgaris*, Mill. (Fig. 6, pl. 140.) BUTTER AND EGGS. YELLOW TOAD FLAX. Stem erect, smooth, 1 to 3 ft. high. Leaves very numerous, linear, alternate. Flower cluster narrow, densely flowered; the corolla about an inch long, or including the slender spur, longer, light yellow. Seeds winged. Common, fields and roadsides. June-Oct.

2. *L. genistaefolia*, (L.) Mill. (Fig. 8, pl. 140.) BROOM-LEAVED TOAD FLAX. Leaves broader, lance-shaped, and flowers smaller and seeds not winged. Flowers yellow. Sparingly naturalized. June-Aug.

3. *L. canadensis*, (L.) Dumont. (Fig. 5, pl. 140.) BLUE TOAD FLAX. Stem smooth, slender, simple or somewhat branched, $\frac{1}{2}$ to $2\frac{1}{2}$ ft. high. Leaves linear, blunt at apex, the basal leaves forming a dense rosette. Flowers blue. Sandy soil, common in southern part of our area. May-Sept.

4. *L. repens*, (L.) Mill. (Fig. 7, pl. 140.) PALE-BLUE TOAD FLAX. Stem more or less decumbent, $\frac{1}{2}$ to $2\frac{1}{2}$ ft. long. Leaves linear to lance-shaped. Flowers nearly white with a bluish tint. In waste places. From Europe; sparingly naturalized. June-Oct.

5. *L. cymbalaria*, (L.) Mill. (Fig. 4, pl. 140.) KENILWORTH IVY. Smooth, trailing, rooting at nodes, 2 to 12 in. long. Leaves round, radiate veined, leaf-stalks about 2 in. long. Flowers blue or lilac on long flower stems. Capsule globose, several seeded. Waste places, from Europe. June-Aug.

4. ANTIRRHINUM, L.

Herbs, with alternate leaves and flowers in terminal clusters or with flowers solitary in the axils. Calyx 5-parted, nearly regular; corolla decidedly 2-lipped, the throat nearly closed, the tube not spurred, but somewhat inflated. Stamens 4, included in the corolla. Capsule ovoid or globose. Seeds numerous, not winged.

1. *A. Orontium*, L. LESSER SNAPDRAGON. Stem about 1 ft. high, nearly smooth; leaves narrowly linear, scattered. Flowers in the leaf-axils, solitary. Calyx segments as long as or longer than the corolla. Corolla white. Waste places, a European species. June-Aug.

2. *A. majus*, L. GREAT SNAPDRAGON. Stem 1 to 3 ft. high. Leaves lance-shaped or linear, 1 to 3 in. long. Flowers large, corolla about $1\frac{1}{2}$ in. long, purple or red. Calyx segments shorter than corolla. Waste places, escaped from gardens. June-Sept.

5. SCROPHULARIA, L.

Rank herbs, usually with opposite leaves and with small, purple-greenish flowers in loose clusters (panicles). Calyx 5-parted, the segments obtuse. Corolla tubular or more or less globular without a spur, the border of 5 very unequal lobes, the 2 upper much longer than the 3 lower. Stamens

4, unequal, bent to one side, a fifth stamen rudimentary. Capsule many seeded.

1. *S. marylandica*, L. (Fig. 1, pl. 141.) MARYLAND FIGWORT. A coarse herb, 3 to 10 ft. high, with opposite leaves, which are egg-shaped, 3 to 12 in. long, on long leaf-stalks, the borders serrate, apex sharp, base tapering, rounded or even heart-shaped. Flowers in a large, more or less pyramidal, terminal cluster, composed of a number of umbel-like groups. Flowers greenish-purple. In woods and meadows, New York and southward. July-Sept.

2. *S. leporella*, Bicknell. (Fig. 2, pl. 141.) HARE FIGWORT. Leaves on short leaf-stalks, narrower than those of No. 1. Woods and waysides, in stations the same as No. 1. June-Sept.

6. CHELONE, L.

Herbs, with opposite leaves and large flowers in dense spikes or axillary clusters, growing in mud by side of streams or in swampy places. Calyx 5-parted, the segments nearly equal. Corolla 2-lipped, the superior lip erect, the lower of 3 lobes, spreading; tube enlarged above, *the throat not closed*, woolly within. Stamens 5, 4 only fertile, enclosed in the corolla. Capsule ovoid.

C. glabra, L. (Fig. 3, pl. 141.) TURTLE-HEAD. SNAKE-HEAD. Stem erect, 4-sided, 1 to 3 ft. high. Leaves lance-shaped, sharp pointed at apex, narrowed at base on very short leaf-stalks, borders sharply toothed. Flowers large, in a dense terminal cluster, white or tinged with pink. Along the borders of streams or in other wet places. Throughout our area. July-Sept.

7. PENTSTEMON, Soland

Perennial herbs, with opposite leaves and terminal clusters of showy flowers. Calyx short, 5-parted. Corolla tubular, enlarged at the outer half of the tube, the border somewhat 2-lipped. Stamens, 4 fertile and 1 sterile, included in the corolla. Style slender. Capsule ovoid or globose.

1. *P. hirsutus*, (L.) Willd. (Fig. 6, pl. 141.) HAIRY BEARD-TONGUE. Stem 1 to 3 ft. high, erect, slender. Leaves opposite, viscid hairy, oblong to lance-shaped, the upper clasping the stem by a broad rounded base, the lower tapering at the base to a broad or slender leaf-stalk, the upper leaves serrate at borders, the lower wavy. Corolla purple or violet, inflated toward the throat, which later is densely bearded, the border 5-lobed; flower about an in. long. Dry grounds, Maine, southward to Florida. May-July.

2. *P. laevigatus*, Ait. (Fig. 5, pl. 141.) FOXGLOVE BEARD-TONGUE. Stem 2 to 5 ft. high. Lower leaves oval or oblong, with entire or somewhat wavy borders, the upper egg-shaped, heart-shaped and clasping the stem, usually sharp toothed. Whole plant, except in the flowering part, smooth. Corolla $\frac{3}{4}$ to 1 in. long, white. Fields, Maine, New York, and westward. May-July.

Var. *P. Digitalis*, Gray. Corolla larger, about $1\frac{1}{2}$ in. long, and its tube expands suddenly above the calyx.

Var. *P. Pentstemon*, (L.) Britton. SMOOTH BEARD-TONGUE. Resembles No. 2, but with purple corolla. Escape from gardens.

8. **COLLINSIA**, Nutt.

Slender branching herbs, with opposite leaves or leaves in whorls, and showy flowers in umbel-like clusters. Calyx 5-cleft. Corolla tipped to one side, the 2 lips divided nearly to the base, the upper lip 2-cleft, lower 3-cleft, larger. Stamens 4, enclosed in the 3-parted lower lip. Capsule 4- to many-seeded.

C. verna, Nutt. (Fig. 4, pl. 141.) INNOCENCE. Stem weak, $\frac{1}{2}$ to 2 ft. high. Leaves thin, opposite, rounded or egg-shaped, the upper clasping by the heart-shaped base, the lower on leaf-stalks, all coarsely toothed at margins. Flowers in a terminal umbel-like cluster of 4 to 6 flowers, the lower lip blue, the upper purple or nearly white. Moist woods, western part of our area. May-June.

9. **PAULOWNIA**, Sieb.

A large spreading tree, with broad opposite leaves and large purple flowers in terminal loose clusters. Calyx deeply 5-cleft. Corolla a long tube with an irregular 5-lobed border. Stamens 4, included in the tube. Style slender. Capsule woody, egg-shaped, many seeded.

P. tomentosa, (Thunb.) Baill. (Fig. 7, pl. 141.) PAULOWNIA. A very large tree, branching freely. Leaves broadly egg-shaped, 6 to 15 in. long, on long leaf-stalks. Flowers deep purple about $2\frac{1}{2}$ in. long. In southern part of our area. Escaped from cultivation. May-July.

10. **MIMULUS**, L.

Herbs, with opposite leaves and handsome irregular flowers. Flowers from the axils, tube cylindric, the lips broad and reflexed or erect, rounded; the throat closed. Stamens 4, inserted in the corolla. Style 2-parted at top.

Flowers violet.

Leaves without leaf-stalks *M. ringens*
Leaves with leaf-stalks *M. alatus*

Flowers yellow.

Stem smooth.

Leaves egg-shaped or pear-shaped *M. guttatus*
Leaves round or broadly egg-shaped *M. Jamesii*

Stem hairy *M. moschatatus*

1. **M. ringens**, L. (Fig. 1, pl. 142.) SQUARE-STEMMED MONKEY-FLOWER. Stem 1 to 3 ft. high, smooth, 4-angled. Leaves oblong or lance-shaped, coarsely toothed, *clasping the stem at base*, tapering to the apex. Flowers, one in each of the upper leaf-axils, on flower stems longer than the flower. Color violet-blue, varying sometimes to bluish-white. Along the wet borders of streams, and in swamps. June-Sept.

2. **M. alatus**, Ait. (Fig. 3, pl. 142.) SHARP-WINGED MONKEY-FLOWER. Plant about as large as No. 1, the stem very sharply 4-angled. Leaves oblong, egg-shaped, the upper tapering at each end, the lower somewhat rounded, *on leaf-stalks*. Corolla violet. Along borders of streams and in swamps. Connecticut and northward. June-Sept.

3. **M. guttatus**, DC. (Fig. 2, pl. 142.) YELLOW MONKEY-FLOWER. (*M. Langsdorpii*, Don.) Leaves pear-shaped, the lower on leaf-stalks, coarsely toothed. Flowers yellow. In fields. Norfolk, Conn. June-Sept.

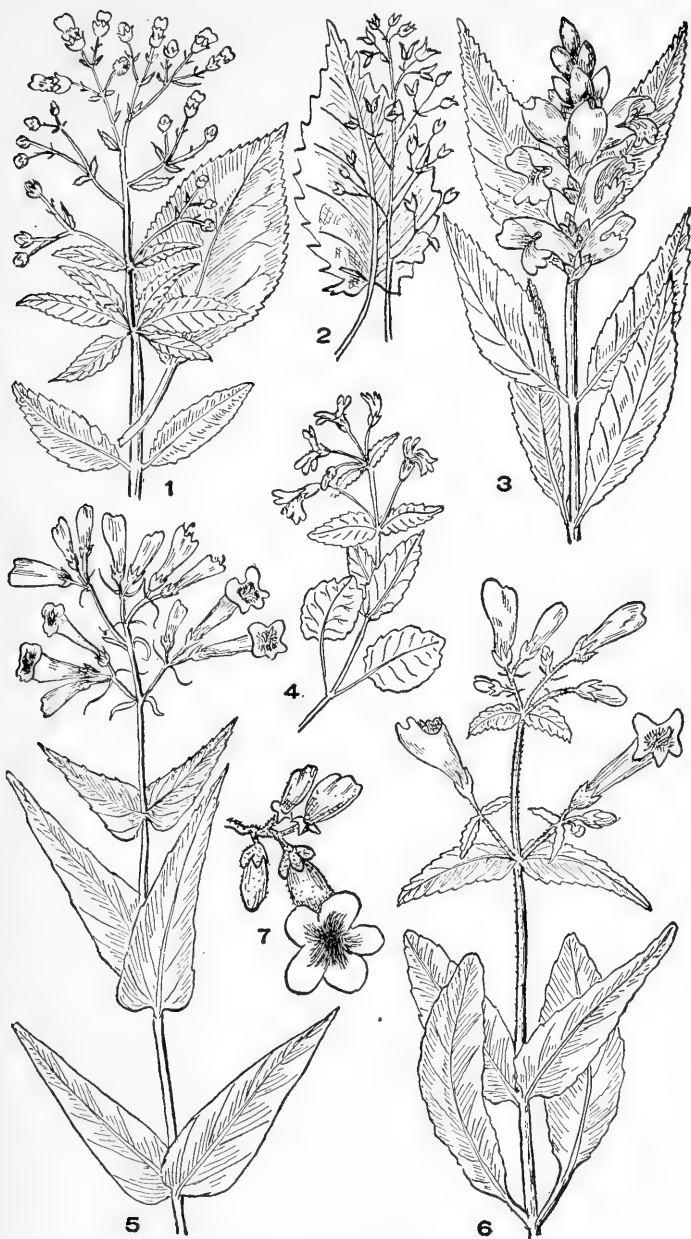


PLATE 141

1. *Scrophularia marylandica*. 2. *S. leporella*. 3. *Chelone glabra*. 4. *Collinsia verna*. 5. *Penstemon laevigatus*. 6. *P. hirsutus*. 7. *Paulownia tomentosa*.

4. **M. Jamesii**, T. and Gray. (Fig. 4, pl. 142.) JAMES'S MIMULUS. Creeping at base and rooting at nodes. Smooth, 6 to 18 in. long. Leaves rounded or kidney-shaped, the lower with short leaf-stalks, the upper sessile, mostly heart-shaped at base. Veins radiating from the stems insertion. Flowers yellow. Pocono, Pa. (G. T. S.), and westward. June-Sept.

5. **M. moschatus**, Dougl. MUSK-FLOWER. Stems creeping; leaves egg-shaped, on very short leaf-stalks. Whole plant hairy and viscid. Flowers an in. long, yellow. Rare, Locust Valley, Long Island; Middle Grove, Saratoga Co., N. Y. June-Sept.

11. BACOPA, Aublet. (Monniera, Michx. Herpestris, Gartn.)

Low herbs, with opposite leaves and flowers solitary in the leaf-axils. Calyx 5-toothed, 5-angled, nearly uniform in size from end to end. Corolla tubular with a spreading 5-lobed, more or less 2-lipped, border. Stamens 4, unequal, included within the corolla. Style slender, dilated or 2-parted at top.

B. caroliniana, (Walt.) Kuntze. (Fig. 11, pl. 142.) BLUE HEDGE HYSSOP. Stems creeping at base, rooting at lower nodes, hairy, $\frac{1}{2}$ to 2 ft. long. Leaves broadly oval or egg-shaped, blunt at apex, clasping the stem at base, the leaf borders entire. Flowers on stems shorter than the leaves, generally shorter than the calyx. Corolla blue. Margins of ponds. Pine barrens, N. J.

12. GRATIOLA, L.

Low herbs, with opposite leaves without leaf-stalks and with yellow or white 2-lipped flowers, which spring mostly singly from the upper axils. Calyx 5-parted, the divisions narrow and nearly equal, below the calyx in our species, are two bracts. The upper lip of the corolla entire, or more or less 2-cleft, tube cylindric. Fertile stamens 2. Style slender, the cap slightly 2-lobed. Fruit a capsule with numerous seeds.

1. **G. virginiana**, L. (Fig. 8, pl. 142.) CLAMMY HEDGE HYSSOP. Stem erect, toward the top widely branched, 3 to 12 in. high, hairy, clammy. Leaves lance-shaped, with a few teeth at margins or without teeth, acute at apex, narrow at base, without leaf-stalks. Flowers yellow *on flower stems as long or nearly as long as the leaves*. Common in wet places. May-Oct.

2. **G. sphaerocarpa**, Ell. (Fig. 5, pl. 142.) ROUND-FRUITED HEDGE HYSSOP. Stem 5 to 10 in. high, stout, smooth. Leaves oval or oblong, with sharp teeth. Flowers on flower stems *scarcely longer than the calyx*, yellow. Pod globular, about $\frac{1}{4}$ in. in diameter. Wet places, southern part of our area. June-Sept.

3. **G. aurea**, Muhl. (Fig. 7, pl. 142.) GOLDEN HEDGE HYSSOP. Small plant, stem slender, leaning, $2\frac{1}{2}$ to 12 in. high. Leaves lance-shaped, not toothed at margins. Flower stem nearly as long as the leaves. Corolla yellow or white, yellow within. Swamps, most of our area. June-Sept.

4. **G. pilosa**, Michx. (Fig. 6, pl. 142.) HAIRY HEDGE HYSSOP. Leaves broadly egg-shaped or oblong. Clasping the stem at base, rounded at apex, with few teeth, the whole plant, which is from $\frac{1}{2}$ to 2 ft. high, covered with coarse hairs. Flowers with very short flower stems or none. Corolla purplish or white. Wet grounds, most of our area. May-Aug.

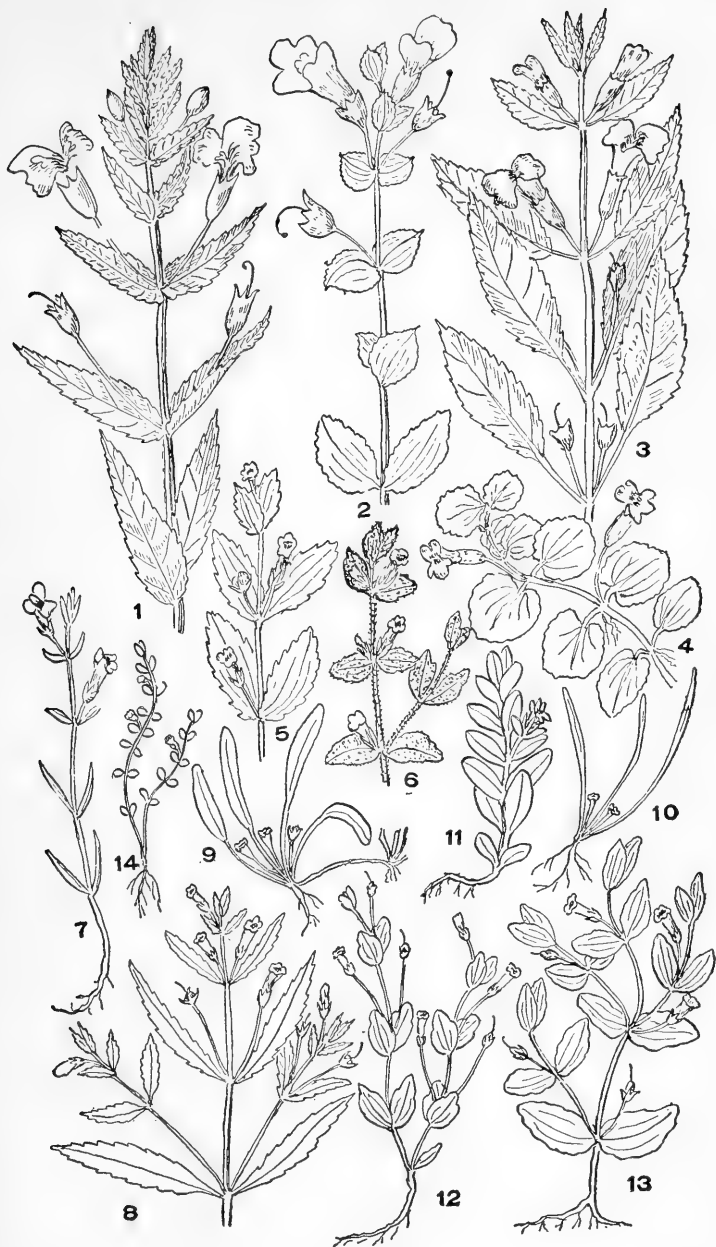


PLATE 142

1. *Mimulus ringens*. 2. *M. guttatus*. 3. *M. alatus*. 4. *M. Jamesii*. 5. *Gratiola sphaerocarpa*. 6. *G. pilosa*. 7. *G. aurea*. 8. *G. virginiana*. 9. *Limosella aquatica*. 10. *L. tenuifolia*. 11. *Bacopa caroliniana*. 12. *Hysanthus gratioloides*. 13. *I. attenuata*. 14. *Micranthemum micranthemoides*.

13. *ILYSANTHES*, Raf.

Branching herbs, with opposite leaves and small 2-lipped, purple flowers singly in the leaf-axils, the *flower stems without bracts*. Fertile stamens 2, sterile stamens 2. Fruit a rounded, many-seeded capsule.

1. *I. gratioloides*, (L.) Benth. (Fig. 12, pl. 142.) LONG-STALKED FALSE PIMPERNEL. Stem slender, much branched, 2 to 8 in. high. Leaves egg-shaped, clasping the stem by the heart-shaped bases, somewhat acute at apex, a few teeth at margins. Flowers single in the axils on flower stems much exceeding the leaves in length. Corolla purple. Wet places, New England, southward. July-Sept.

2. *I. attenuata*, (Muhl.) Small. (Fig. 13, pl. 142.) SHORT-STALKED FALSE PIMPERNEL. Plant generally rather larger than No. 1, and flowers on flower stems *shorter than the leaves*. Wet places, Maine, southward and westward. May-Oct.

14. *MICRANTHEMUM*, Michx.

Very small herbs, smooth, creeping or nearly erect, tufted, growing in mud or shallow water. Leaves opposite, calyx 4- or 5-parted; corolla very irregular, 2-lipped, the upper considerably shorter than the lower or absent. Stamens 2. Style short, many-seeded capsule globose.

M. micranthemoides, Wettst. (Fig. 14, pl. 142.) NUTTALL'S MICRANTHEMUM. (*M. Nuttallii*, Gray.) Stem 1 to 2 in. high. Leaves oval or egg-shaped, 1/12 to 1/6 in. long. Calyx 4-toothed, bell-shaped. Corolla very irregular, upper lip nearly or quite wanting, the middle lobe of lower lip much longer than the lateral lobes. Appendages at base of stamens about as long as stamens. Tidal mud. Aug.-Oct.

15. *LIMOSELLA*, L.

Small plants growing in mud, usually by the sea shore, creeping by slender runners, with long-linear or spatulate leaves and small, white or pink flowers on flower stems directly from the base of the plant. Calyx 5-lobed; corolla nearly regular, the border 5-cleft. Stamens 4; style club-shaped; the many-seeded capsule globular.

L. aquatica, L. (Fig. 9, pl. 142.) NARROW-LEAVED MUDWORT. Stems only in the form of runners, no upright stem. Leaves linear or thread-like, 1 to 5 in. long, in a group arising from a notched node. Flowers also arising by a flower stem shorter than the leaves from the root node, single. Muddy shores of tidal streams. June-Sept.

Var. *tenuifolia*, Wolf. (Fig. 10, pl. 142.) Leaves linear, thread-like.

16. *VERONICA*, L.

Herbs (some exotic species trees and shrubs), with opposite or, less frequently, alternate leaves and small flowers, terminal or in the axils. Calyx 4-parted, rarely 5-parted; corolla flat, rounded, border generally 4-parted, the lower lobe usually narrow, the upper broader. Stamens 2, extending beyond the corolla. Style entire. Capsule compressed, flattened or turgid, many seeded.

Clusters of flowers narrow or somewhat spreading, springing from the leaf-axils.

Plants essentially without hairs.

Leaves broad, more or less egg-shaped.

Leaves with leaf-stalks *V. Anagallis-aquatica*

Leaves without leaf-stalk *V. americana*

Leaves linear *V. scutellata*

Plants decidedly hairy.

Leaves oval on leaf-stalks *V. officinalis*

Leaves egg-shaped, with large teeth, leaf-stalks wanting *V. Chamaedrys*

Clusters of flowers in narrow terminal spikes.

Flower-stem shorter than the calyx.

Leaves broadly oval or elliptic *V. alpina*

Leaves narrowly oval, linear or oblong *V. peregrina*

Flower stem as long or longer than the calyx *V. serpyllifolia*

Flowers singly in the axils.

Leaves broadly obtuse or heart-shaped at base *V. hederæfolia*

Leaves narrowed at base.

Flower stems much longer than the leaves *V. arvensis*

Flower stem much longer than the leaf *V. agrestis*

Flower stem about as long as the leaf *V. Byzantina*

1. *V. Anagallis-aquatica*, L. (Fig. 3, pl. 143.) WATER SPEEDWELL. Plant smooth or slightly downy above, decumbent, rooting at the lower nodes, then erect. Leaves opposite, egg-shaped to lance-shaped, toothed at margins, clasping the stem at base. Flowers in slender elongated clusters, arising in the leaf-axils. Corolla pale blue, striped with purple. Capsule nearly orbicular, somewhat compressed. Brooks and swamps, throughout our area. May-Sept.

2. *V. americana*, Schwein. (Fig. 6, pl. 143.) AMERICAN BROOK-LIME. Smooth, decumbent at base, rooting at the lower nodes, then erect, stem 8 in. to 3 ft. long. Leaves opposite, oblong or egg-shaped, coarsely toothed at margins, *generally on leaf-stalks*. Flowers in loose, rather slender clusters, small, very light blue, purple striped. Capsule nearly orbicular, compressed. Brook-sides and swamps, throughout our area. April-Sept.

3. *V. scutellata*, L. (Fig. 1, pl. 143.) MARSH SPEEDWELL. Stem slender, decumbent and rooting at base, $\frac{1}{2}$ to 2 ft. high, generally smooth. Leaves opposite, linear or narrow lance-shaped. Flowers in slender clusters from the leaf-axils, small, blue. Capsule much flattened, depressed at top. Swamps, southern New Yorw, and northward. May-Sept.

4. *V. officinalis*, L. (Fig. 11, pl. 143.) COMMON SPEEDWELL. Stem decumbent, rooting at base, then partly erect; whole plant hairy. Leaves opposite, oval, toothed. Flowers in slender spikes, many flowered, the flower stem shorter than the calyx; corolla blue. Capsule somewhat triangular, notched at summit. Dry fields, borders of woods. May-Aug.

5. *V. Chamaedrys*, L. (Fig. 10, pl. 143.) GERMANDER SPEEDWELL. Stem creeping at base, then ascending, more or less hairy. Leaves opposite, broadly egg-shaped, generally heart-shaped at base, with coarse teeth at margins, without leaf-stalks or with very short ones. Flowers in slender spikes. Flower stems longer than the calyx. Capsule, heart-shaped above. Fields and waste places, introduced. May-July.

6. *V. alpina*, L. (Fig. 2, pl. 143.) ALPINE SPEEDWELL. Stem erect, branched from the base, 2 to 12 in. high, hairy. Leaves opposite, broadly elliptic, attached directly to the stem. Flowers in a short narrow terminal cluster, light blue. Capsule tall, notched at top. High mountains of New England, etc.

7. *V. serpyllifolia*, L. (Fig. 7, pl. 143.) THYME-LEAVED SPEEDWELL. Stem somewhat creeping at base, 2 to 4 in. high, much branched, smooth or nearly so. Leaves opposite broadly oblong or egg-shaped, rounded at both ends, obscurely notched at margins. Flowers in the upper axils forming a narrow terminal spike. Corolla pale blue or white with stripes. Capsule broader than long, notched above.

8. *V. peregrina*, L. (Fig. 9, pl. 143.) PURSLANE SPEEDWELL. Stem 4 to 9 in. high, branched at base, somewhat downy or smooth. Lowest leaves opposite, oblong or oval, sometimes on short leaf-stalks, the upper leaves alternate, narrow, elliptic or oblong without leaf-stalks. Flowers in the axils forming a rather loose spike of bluish, nearly white flowers. Capsule nearly orbicular, slightly notched at top. Waste places and as a weed in cultivated grounds. April-June.

9. *V. arvensis*, L. (Fig. 8, pl. 143.) CORN SPEEDWELL. Stem 3 to 8 in. high, branched or simple, hairy. Lower leaves opposite, egg-shaped, on leaf-stalks, upper alternate, egg-shaped, without leaf-stalks. Flowers solitary in the leaf-axils, small, blue to white. Fields and waste places. March-Sept.

10. *V. agrestis*, L. FIELD SPEEDWELL. Stem 3 to 8 in. high, branched or simple, hairy. Lower leaves opposite on leaf-stalks, toothed, upper alternate without leaf-stalks, egg-shaped. Flowers solitary in most of the axils, on flower stems much longer than the leaves. Corolla small, blue. Capsule round, sharply notched. Waste places, naturalized. May-Sept.

11. *V. Byzantina*, BSP. (Fig. 5, pl. 143.) BYZANTINE SPEEDWELL. Stem $\frac{1}{2}$ to 1 ft. high, branched, whole plant hairy. Lower leaves opposite, upper alternate, egg-shaped, borders toothed. Flowers solitary in the leaf-axils on flower stems as long as the leaves, corolla blue. Capsule twice as broad as high, broadly notched. Waste places, naturalized. May-Sept.

12. *V. hederæfolia*, L. (Fig. 4, pl. 143.) IVY-LEAVED SPEEDWELL. Stem slender, branched, 3 to 18 in. long, hairy. Leaves round or heart-shaped at base with a few deep notches at margins. Flowers solitary in the leaf-axils on flower stems rather shorter than the leaves. Fields and thickets, southern New York and southward. April-Oct.

17. LEPTANDRA, Nutt.

Tall erect herbs, with whorled, or sometimes opposite, leaves and with dense terminal spikes of white or blue flowers. Corolla tube much longer than the calyx and longer than the border. Stamens 2, extending beyond the throat of the corolla; style as long as the stamens. Capsule higher than broad, many seeded.

L. virginica, L. (Fig. 1, pl. 144.) CULVER'S ROOT. (*Veronica virginica*, L.) Erect, smooth or somewhat downy, 2 to 3 ft. high. Leaves in whorls of 3 to 9, mostly 4, on short leaf-stalks, lance-shaped, with sharp teeth at margins, 3 to 6 in. long. Flowers small, nearly white in spikes, usually 3 or more, but less frequently one, the middle one first developed. Rich fields and woods. July-Aug.



PLATE 143

1. *Veronica scutellata*. 2. *V. alpina*. 3. *V. Anagalis-aquatica*. 4. *V. hederifolia*. 5. *V. Byzantina*. 6. *V. americana*. 7. *V. serpyllifolia*. 8. *V. arvensis*. 9. *V. peregrina*. 10. *V. Chamaedrys*. 11. *V. officinalis*.

18. *BUCHNERA*, L.

Rough, hairy herbs, which turn black in drying. Leaves opposite or the upper alternate. Flowers white, blue or purple, opposite in a terminal narrow cluster, rather large. Calyx tubular with 5 equal teeth; corolla tube cylindric, the border of 5 radiating lobes, nearly regular. Stamens 4, not extending beyond the throat of corolla.

B. americana, L. (Fig. 2, pl. 144.) BLUE HEARTS. Rough hairy, stem 1 to 2 ft. high, slender. Leaves oblong to lance-shaped, with deep indentations at margins. Corolla deep purple. Western New York, New Jersey. Sandy soils. June-Aug.

19. *DASYSTOMA*, Raf. (*Gerardia*, L.)

Erect, branching herbs, with opposite leaves, usually deeply lobed, or upper leaves sometimes alternate and with yellow trumpet-shaped showy flowers in leafy clusters. Calyx 5-lobed; corolla lobes slightly unequal, yellow, the tube lined with hairs. Stamens 4, not extending beyond the throat of the corolla, quite unequal. Capsule spindle-shaped.

Plant hairy.

Corolla hairy *D. pedicularia*

Corolla not hairy *D. flava*

Plant not hairy.

Leaves mostly entire or somewhat toothed *D. laevigata*

Leaves mostly deeply cut *D. virginica*

1. *D. pedicularia*, L. (Fig. 5, pl. 144.) FERN-LEAVED FALSE FOXGLOVE. Stem branched above, 1 to 4 ft. high, plant more or less covered with sticky hairs. Leaves opposite or a few upper ones alternate, fern-like, with the margins of the lobes finely toothed. Corolla 1 to 2 in. long, downy outside and inside. Dry woods, throughout our area. Aug.-Sept.

2. *D. flava*, (L.) Wood. (Fig. 6, pl. 144.) DOWNY FALSE FOXGLOVE. Grayish downy, stem 2 to 4 ft. high, with few branches, often more. Leaves oblong or lance-shaped, obtuse at apex, the upper with plane margins, the lower with margins lobed. Corolla 1½ to 2 in. long, smooth on outside, hairy within. Dry woods, southern New York, eastern Mass., and northward. July-Aug.

3. *D. virginica*, (L.) Britton. (Fig. 4, pl. 144.) SMOOTH FALSE FOXGLOVE. Smooth, stem sparingly or not at all branched. Leaves long and narrow, deeply incised with double incisions of margins. Corolla 1½ to 2 in. long, smooth on the outside, hairy within. Stem 3 to 6 ft. high. Rich woods, throughout our region. July-Sept.

4. *D. laevigata*, Raf. (Fig. 3, pl. 144.) ENTIRE-LEAVED FOXGLOVE. Stem simple or sparingly branched, 1 to 3 ft. high. Plant not hairy or only slightly so. Leaves usually with leaf-stalks, lance-shaped or somewhat egg-shaped, the margins without teeth or lobes, or the lower leaves toothed or incised. Flower stem shorter than the calyx. Corolla 1 to 1½ in. long. Dry woods and thickets, Penna., and southward. July-Aug.

20. *GERARDIA*, L.

Plants, in our region, all slender herbs, with opposite linear leaves and large showy trumpet-shaped flowers, usually purple. Calyx 5-toothed, the



PLATE 144

1. *Leptandra virginica*. 2. *Buchnera americana*. 3. *Dasystoma laevigata*.
4. *D. virginica*. 5. *D. pedicularia*. 6. *D. flava*.

teeth sharp, short. Corolla with a long tube expanding toward the border, border of 5 spreading lobes. Stamens 4, unequal, not extending beyond the throat of the corolla, the filament hairy. Capsule egg-shaped or globose. Flowers opposite, in the axils of the upper leaves, the tube generally dotted with red or yellow.

Flower stems shorter than the calyx.

Corolla about 1 in. long *G. purpurea*

Corolla about $\frac{1}{2}$ in. long *G. paupercula*

Flower stems as long as or longer than the calyx, rarely twice as long *G. maritima*

Flower stems more than three times as long as the calyx and longer than the flower *G. tenuifolia*

Flower stems longer than the calyx, about as long as the flower. Plant rough *G. Skinneriana*

1. *G. purpurea*, L. (Fig. 4, pl. 145.) LARGE PURPLE GERARDIA. Stem 1 to 3 ft. high, smooth, slender, branched, the branches spreading. Leaves opposite, broadly or narrowly linear, 1 to $1\frac{1}{2}$ in. long. Flowers forming a diffuse cluster at the summit of the branches; corolla purple or rarely purplish-white, 1 in. long. Calyx teeth triangular. Capsule globose. Moist grounds, mostly near the coast, north and south in our area. Aug.-Oct.

2. *G. paupercula*, (A. Gray) Britton. (Fig. 2, pl. 145.) SMALL-FLOWERED GERARDIA. Stem $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high, smooth, slender, branching with nearly erect branches. Leaves narrowly linear, opposite. Flowers in a diffuse cluster at summit of branches. Corolla $\frac{1}{2}$ to nearly 1 in. long, purple, borders as broad as the length of corolla, hairy in the throat. Stamens fringed with long hairs. Bogs and low marshes, New Jersey, northward. July-Sept.

3. *G. maritima*, Raf. (Fig. 1, pl. 145.) SEA-SIDE GERARDIA. Stem smooth, 8 to 16 in. high, with a sort of rosette of leafy branches at the base. Leaves fleshy, linear, obtuse at apex, the upper short and remote. Flowers purple, $\frac{1}{2}$ to $\frac{3}{4}$ in. long, on flower stems as long or nearly as long as the calyx, longer in fruit. Capsule globose. Salt marshes, extent of our area. July-Aug.

4. *G. tenuifolia*, Vahl. (Fig. 5, pl. 145.) SLENDER GERARDIA. Stem 1 to $1\frac{1}{2}$ ft. high, much branched, smooth. Leaves narrowly linear, the margins smooth or more frequently rough, 1 to $1\frac{1}{2}$ in. long. Flowers purple, spotted, rarely white, usually more than $\frac{1}{2}$ in. long on flower stems as long as the flower. Capsule globose. Light soil, throughout our area. Aug.-Oct.

5. *G. Skinneriana*, Wood. (Fig. 3, pl. 145.) SKINNER'S GERARDIA. Stem rough, striped, 1 to $1\frac{1}{2}$ ft. high, branched, with nearly erect branches. Leaves generally opposite, linear, very rough, generally less than 1 in. long. Flowers pale purple, $\frac{1}{2}$ in. long, on flower stems hardly as long as the flowers. Eastern Mass., and southward.

21. CASTILLEJA, Mutis.

Herbs, parasitic on roots of other plants, with alternate leaves, those among the flowers being dilated and more highly colored than the yellow or purplish flowers themselves. Flowers in spikes; calyx tubular, compressed, on the upper side cleft, the opposite side cleft or entire. Corolla very irregular, its tube included within the calyx, its upper lip long, nar-

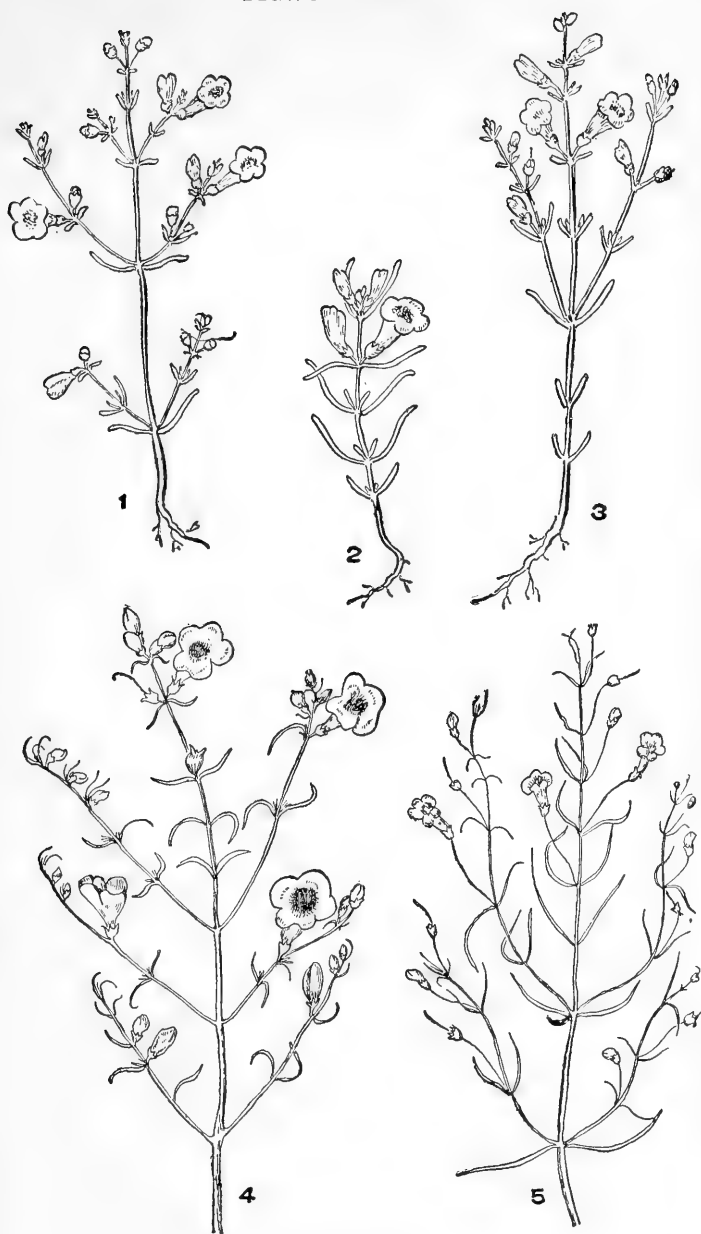


PLATE 145

1. *Gerardia maritima*. 2. *G. paupercula*. 3. *G. Skinneriana*. 4. *G. purpurea*. 5. *G. tenuifolia*.

row and arched, flattened laterally. Lower lip short, 3-lobed. Stamens 4, unequal.

1. *C. coccinea*, (L.) Spreng. (Fig. 4, pl. 146.) SCARLET PAINTED-CUP. Annual, stem angular, erect, not branched or with few branches, 1 to 2 ft. high, whole plant hairy. Lower leaves clustered, margins mostly entire, upper leaves deeply about 3- to 5-lobed, the segments nearly linear. Flowers dull yellow, inconspicuous by reason of the bright scarlet bracts which exceed the flowers in length and brilliancy, one flower in the axil of each of the colored bracts. A showy and beautiful plant. In wet meadows, Not common. May-June.

2. *C. pallida*, (L.) Spreng. (Fig. 5, pl. 146.) LANCE-LEAVED PAINTED-CUP. (Var. *septentrionalis*, Gray.) Leaves all entire at borders, alternate, lance-shaped, without leaf-stalks. Flower bracts large, obtuse at apex and generally dentate, yellowish or greenish-white, as long as the flowers, corolla yellowish. Higher regions of the White Mountains. June-Aug.

22. SCHWALBEA, L.

Perennial herb, with alternate leaves and large purple flowers in a bracted spike. Calyx tubular, the 5 teeth quite unequal, at the base of the calyx 2 narrow bracts. Corolla very irregular, the tube long, slender, the upper lip entire, arched, lower lip 3-lobed. Stamens 4, unequal, in the upper lip of the corolla. Capsule oblong, many seeded, seeds chaffy.

S. americana, L. CHAFF-SEED. Stem 1 to 2 ft. high, erect, downy. Leaves oblong or egg-shaped, the upper small, narrow, passing into bracts of the flower spike. Flowers 1 to 1½ in. long, without flower stems; corolla yellowish-purple. Wet soil, eastern Mass., and southward. May-July.

23. EUPHRASIA, L.

Small herbs, generally branching, parasitic on the roots of other plants. Leaves opposite, dentate or incised. Flowers small, white, blue or yellow in leafy bracted spikes. Calyx tubular, 4-cleft. Upper lip of corolla 2-lobed, erect, the sides turned back. Lower lip 3-cleft, spreading. Stamens 4, unequal, under the upper lip. Capsule oblong, flattened, seeds numerous.

1. *E. americana*, Wettst. (Fig. 8, pl. 146.) HAIRY EYEBRIGHT. Stem 3 to 10 in. high; whole plant hairy or mostly smooth. Leaves without leaf-stalks, opposite, rounded, large teeth at margin. Flowers in a terminal rounded cluster or a slightly elongated spike, purple, varying to white, the cluster with leafy bracts, the bracts sharply toothed. Fields and hills, Maine. All summer.

2. *E. Oakesii*, Wettst. (Fig. 7, pl. 146.) OAKES'S EYEBRIGHT. Stem 1 to 2 in. high. Stem leaves 1 or 2 pairs. Flower cluster round, the bracts bluntly toothed. Summits of the White Mountains.

Several species and varieties of *Euphrasia*, resembling the species above described but differing in some slight particulars, are reported as found locally by Robinson and others.

24. ODONTITES, Gmel.

Herbs, with opposite leaves and slender spikes of red or yellow flowers.



PLATE 146

1. *Pedicularis canadensis*. 2. *P. lanceolate* (leaf). 3. *P. Furbishiae* (leaf). 4. *Castilleja coccinea*. 5. *C. pallida*. 6. *Rhinanthus Crista-galli*. 7. *Euphrasia Oakesii*. 8. *E. americana*.

Calyx equally 4-cleft. Corolla tube narrow, upper lip entire, *the sides not folded back*. Stamens 4, unequal. Capsule nearly globose, seeds few.

O. rubra, (L.) Gilib. RED EYEBRIGHT. Annual, stem roughish, 6 to 15 in. high, branching, somewhat hairy. Leaves opposite, without leaf-stalks, narrow lance-shaped, with remote teeth. Flowers in slender spikes, loosely flowered, corolla red or pink. Fields and waste places. Naturalized. June-Sept.

25. PEDICULARIS, L.

Perennial herbs, with leaves alternate, opposite or rarely in whorls and with very irregular flowers in leafy spikes. Calyx tubular, 2- to 5-lobed. Corolla strongly 2-lipped, the upper flattened laterally and strongly arched, the lower 3-lobed. Stamens 4, unequal, within the upper lip. Anthers transverse.

1. **P. lanceolata**, Michx. (Fig. 2, pl. 146.) SWAMP LOUSEWORT. Plant smooth or nearly so throughout; stem *upright*, 1 to 3 ft. high, with few if any branches. Leaves 2 to 5 in. long, partly opposite, in general outline oblong-lance-shaped, the margins lobed nearly half way to the mid-vein, the margins of the lobes with rounded teeth. Flower spikes with lance-shaped, toothed leaves at the base of the flowers. Corolla yellow, about an inch long with a short abrupt beak at the apex. Swamps, Connecticut and northward and westward. Aug-Oct.

2. **P. canadensis**, L. (Fig. 1, pl. 146.) WOOD BETONY. Stems in clusters, half prostrate, *hairy*. Leaves scattered or some of them opposite, in general outline rather broadly lance-shaped, lobed on each side half way to the mid-vein, margins of the lobes toothed. Spikes of flowers leafy, short and dense. Calyx split on the lower side; corolla yellow, hooded, 2-toothed, under the apex. In woods and dry thickets, rather common. April-June.

3. **P. Furbishiae**, Watson. (Fig. 3, pl. 146.) MISS FURBISH'S PEDICULARIS. Stem erect, 2 to 3 ft. high, downy or smooth. Leaves lobed *on each side to the mid-vein* (pinnate), the lobes coarsely toothed and the teeth themselves dentate. Corolla yellow. In swamps and along streams. Maine. July-Sept.

26. RHINANTHUS, L.

Herbs, with opposite leaves and flowers in one-sided leafy spikes, or solitary in the upper axils. Calyx 4-toothed, much inflated. Corolla very irregular, 2-lipped, the upper arched, laterally compressed, minutely 2-toothed at the apex, lower lip 3-lobed, spreading. Stamens 4, unequal, under the upper lip. *Anthers fringed*, seeds winged.

1. **R. Crista-galli**, L. (Fig. 6, pl. 146.) RATTLE BOX. Stem slender, branching at the axils, the branches shorter than the principal stem, usually streaked with black lines, 6 to 18 in. high. Leaves lance-shaped, coarsely toothed, without leaf-stalks. Flowers yellow, $\frac{3}{4}$ in. long, often with a purple spot on one or both lips. Along parts of the coast and on the White Mountains. June-Aug.

2. **R. oblongifolius**, Fernald. Usually a smaller plant than No. 1, 5 to 16 in. high. Few or no branches from the axils and the stem with-

out black lines. Corolla yellow without the purple or dark spots on the lips. Mountains of Maine and New Hampshire and Adirondack Mountains.

27. MELAMPYRUM, L.

Erect herbs, annual, branching, with opposite leaves and flowers solitary in the axils. Calyx 4-toothed, the 2 upper longer. Corolla irregular, 2-lipped with narrow tube; which is gradually enlarged toward the throat. Upper lip arched and flattened laterally. Stamens 4, unequal, under the upper lip.

M. lineare, Lam. (Fig. 14, pl. 147.) **NARROW-LEAVED COW-WHEAT.** Downy, stem slender, obscurely 4-sided, $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high. Leaves opposite, lance-shaped to linear, tapering at each end, on short leaf-stalks. The leaves among the flowers with 4 to 6 conspicuous bristle-point teeth. Corolla yellowish-white on short flower stems. Dry woods, north and south in our area.

FAMILY V.—LENTIBULARIACEAE. BLADDERWORT FAMILY

Flowers 2-lipped. Marsh or water plants without leaves or with mostly thread-like leaves at the root or the root leaves sometimes broad. Flower scapes erect. Flowers solitary or in few-flowered clusters, terminal, on short flower stems, at the foot of each being a small bract. Calyx below the ovary, 2- to 5-parted. Corolla 2-lipped, the throat closed. Stamens 2. Ovary 1-celled.

Aquatic or bog plants **Utricularia**
Terrestrial plants **Pinguicula**

I. UTRICULARIA, L.

Mostly aquatic herbs, floating free in the water or rooting in mud. The floating species with branching spreading stems with finely dissected leaves and a scape, leaflets or with scale-like leaves, bearing at the summit a few or several irregular flowers. In some species the thread-like leaves are bladder bearing, in others the bladders are borne on leafless stems. Also in certain species there are two kinds of flowers, the open flowers on the scape and a closed flower like a bulblet growing among the leaves. Calyx 2-lobed; corolla 2-lipped, quite irregular, closed at throat, a spur or sac protruding from the corolla tube.

Plants rooting in the mud, without dissected leaves and with or no air bladders.

Flower scape very straight, leaves reduced to scales, flowers open.

Flowers yellow *U. cornuta*

Flowers purple *U. resupinata*

Flower scape zig-zag *U. subulata*

Flower scape hair-like, flowers without spur, closed, bulb-like *U. cleistogama*

Plants floating or creeping in mud, the branches and finely dissected leaves

floating. Air bladders numerous.

Flowers purple *U. purpurea*

Flowers yellow on leafless scapes.

Whorl of dissected leaves on cylindric and inflated leaf-stalks *U. inflata*

Stems and stem leaves spreading, the latter dissected and thread-like.

Bladders and closed flowers, borne among the thread-like leaves	<i>U. clandestina</i>
Bladders but not closed flowers borne among the thread-like leaves.	
Spur of corolla about as long as the lip. Flowers 1 to 3	<i>U. biflora</i>
Spur of corolla usually obtuse, shorter than the lip of the corolla.	
Flowers 1 or 2	<i>U. gibba</i>
Flowers 2 to 8	<i>U. minor</i>
Flowers 5 to 12, the thread-like leaves feather-form	<i>U. vulgaris</i>
Bladders usually borne on leafless branches.	
Leaf segments flat	<i>U. intermedia</i>
Leaf segments round	<i>U. fibrosa</i>

1. *U. cornuta*, Michx. (Fig. 5, pl. 147.) HORNED BLADDERWORT. Flower scape 9 to 12 in. high, rooting in the mud, branches, when present, root-like, leaves reduced to scales, or none. Flowers 1 to 6, yellow, large, spur long and acute, corolla lips widely parted. Soft mud and shallow pools, northern to southern limits of our area. June-Aug.

2. *U. resupinata*, Green. (Fig. 9, pl. 147.) REVERSED BLADDERWORT. Scape arising from rooting shoots, 2 to 7 in. high, with a solitary purple flower; the spur directed nearly horizontally. Muddy shores, bogs, Maine to Florida. July-Aug.

3. *U. subulata*, L. (Fig. 8, pl. 147.) ZIG-ZAG BLADDERWORT. Flower scape thread-like, zig-zag from flower to flower, leaves few, linear, or none. Flowers yellow, lower lip 3-lobed, spur conic. Springs, wet sandy soil, Nantucket and southward. March-Aug.

4. *U. cleistogama*, (Gray) Britton. (Fig. 4, pl. 147.) CLOSED BLADDERWORT. Scape 1 to 3 in. high, bearing 1 or 2 closed purplish flowers not larger than a pin's head. Wet soil, eastern Mass., and New Jersey. August.

5. *U. inflata*, Walt. (Fig. 6, pl. 147.) SWOLLEN BLADDERWORT. Flower scape 3 to 20 in. high; about its middle a whorl of leaves with inflated leaf-stalks, the leaves themselves finely divided. Lower leaves dissected, without inflated leaf-stalks. Among both sets of leaves are many air bladders. Corolla yellow. Ponds, throughout our area. March-Aug.

6. *U. purpurea*, Walt. (Fig. 7, pl. 147.) PURPLE BLADDERWORT. Flower scape 1 to 6 in. high, without leaves or with scale-like leaves, bearing 1 to 4 flowers. Branches long, floating, the dissected leaves bearing numerous air bladders. Corolla purple. Ponds, mostly near the coast. May-Aug.

7. *U. vulgaris*, L. (Fig. 1, pl. 147.) COMMON BLADDERWORT. Flower scape with a few scales or none, stout, 3 to 14 in. high, bearing from 3 to 20 rather large yellow flowers. Branches floating, sometimes a foot long, leaves in thread-like divisions, the segments round, bearing bladders. Brooks and ponds, our area. June-Aug.

8. *U. clandestina*, Nutt. (Fig. 12, pl. 147.) HIDDEN-FRUITED BLADDERWORT. Scape slender, 2 to 5 in. high, bearing from 3 to 5 yellow flowers. Branches floating, spreading, with many finely divided leaves with bladders and with closed bulblets (cleistogamic flowers), on rather long flower stems arising from the branches among the leaves. Shallow ponds, mostly near the coast. July.

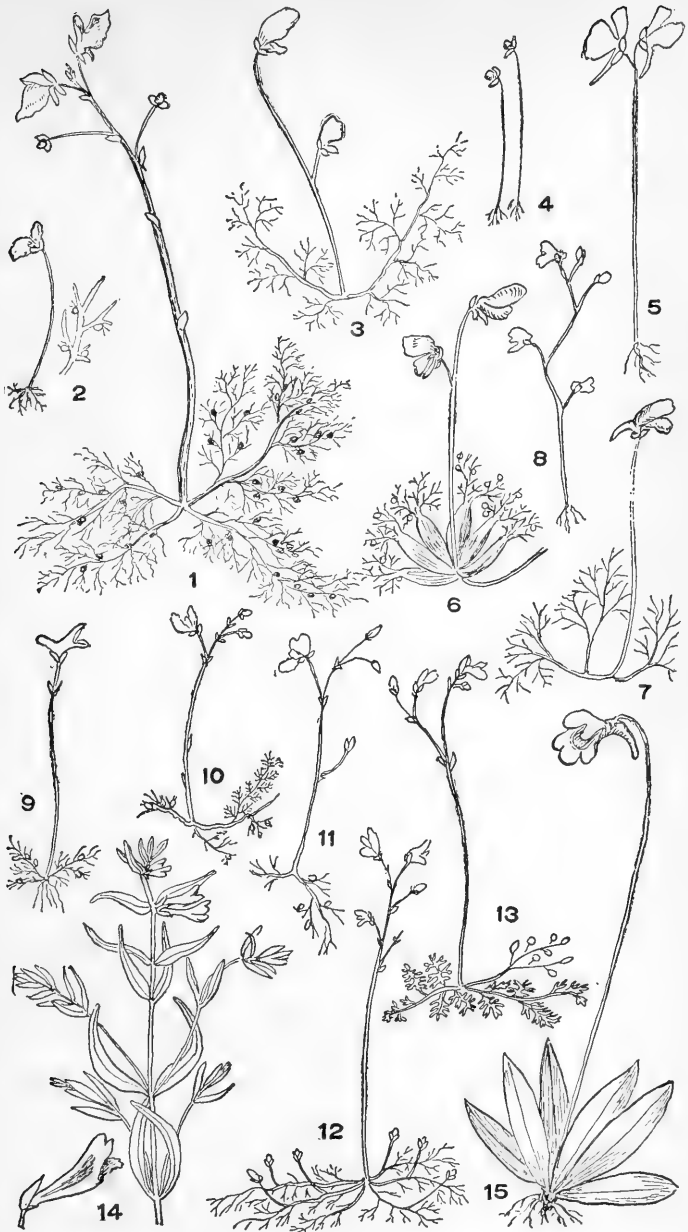


PLATE 147

1. *Utricularia vulgaris*, 2. *U. gibba*, 3. *U. biflora*, 4. *U. cleistogama*, 5. *U. cornuta*, 6. *U. inflata*, 7. *U. purpurea*, 8. *U. subulata*, 9. *U. resupinata*, 10. *U. minor*, 11. *U. fibrosa*, 12. *U. clandestina*, 13. *U. intermedia*, 14. *Melampyrum lineare*, 15. *Pinguicula vulgaris*.

9. *U. intermedia*, Hayne. (Fig. 13, pl. 147.) **FLAT-LEAVED BLADDERWORT.** Flower scape with a few scales 2 to 10 in. high, bearing 2 to 5 yellow flowers. Branches floating. Leaves with 2 ranks of *flattened, compound linear leaflets*. Separate stems bear numerous large air bladders. Pools, our area. June-Aug.

10. *U. fibrosa*, Walt. (Fig. 11, pl. 147.) **FIBROUS BLADDERWORT.** Flower scape 5 to 12 in. high, with a few small scales, bearing 1 to 6 yellow flowers, the middle lobe striped with red. Branches floating. Leaves with few thread-like divisions, bearing bladders or not; bladders sometimes on separate branches. Shallow pools, Long Island and southward. June-July.

11. *U. minor*, L. (Fig. 10, pl. 147.) **LESSER BLADDERWORT.** Scape 2 to 7 in. high, bearing 1 to 10 yellow flowers. Branches floating; leaves in 2 ranks, the leaflets short, thread-like. Bladders among the leaves, few or absent. Upper lip of corolla shorter than lower. Spur reduced to a broad flat protuberance. Shallow pools and ponds, our area. June-July.

12. *U. gibba*, L. (Fig. 2, pl. 147.) **HUMPED BLADDERWORT.** Scape 1 to 5 in. high, bearing 1 or 2 yellow flowers. Branches floating with very few thread-like leaves, and few air bladders. The leaves root-like, buried in mud or rising above it. Corolla spur blunt and short. Shallow pools and ponds, throughout our area. July-Aug.

13. *U. biflora*, Lam. (Fig. 3, pl. 147.) **TWO-FLOWERED BLADDERWORT.** Scape 2 to 5 in. high. Branches long, floating. Leaf divisions few, hair-like, often bearing many bladders. Flowers 1 to 3 on the scape, yellow, *the lips nearly equal*. Shallow pools and ponds, eastern New England.

2. PINGUICULA, L.

Herbs, with leaves arising from the root and with slender, naked, one-flowered scape. Upper surface of leaves viscid. Corolla 2-lipped, the upper 2-cleft, lower 3-cleft; from the tube extends a long spur, extending, generally, upward. Calyx 4- to 5-parted.

P. vulgaris, L. (Fig. 15, pl. 147.) **MARSH VIOLET.** Leaves in a basal rosette, lance-shaped or approaching egg-shaped, blunt at apex, 1 to 2 in. long. Scape 2 to 6 in. high, smooth, bearing a single violet-purple nodding flower, the long spur pointing upward. Wet places, Vermont and northern New York. July-Aug.

FAMILY VI.—OROBANCHACEAE. BROOMRAPE FAMILY

Parasitic herbs growing from roots of other plants. Fleshy, leafless, white, yellow or purplish-brown, with perfect 2-lipped flowers, solitary or several on the spike. Calyx 4- to 5-toothed, inferior to the ovary, nearly or quite equally divided. Corolla long tubular, the tube generally bending, lips 5-lobed. Stamens 4, unequal, inserted in the tube and alternate with its lobes (a rudimentary 5th stamen completing the alternations). Ovary 1-celled, free from the calyx, seeds numerous.

Flower solitary, terminating the stem	Thalesia
Flowers in a single dense spike, a row of stiff hairs running up the upper lip of the corolla	Orobanche
Flowers in a dense spike, anthers of the stamens <i>fringed</i>	Conopholis
Flowers on several spikes branching from main stem	Epifagus

1. **THALESIA**, Raf. (**Orobanche**, (Tourn.) L. **Aphyllon**, (Mitchel Gray)

Single or several stemmed, more or less viscid herbs, with solitary flowers terminating a naked scape. Calyx 5-cleft, corolla slightly 2-lipped, the tube long and curved, upper lip 2-lobed, lower 3-lobed. Stamens 4, unequal.

T. uniflora, (L.) Britton. (Fig. 1, pl. 148.) ONE-FLOWERED BROOMRAPE. Stem, mostly buried in the ground, very short, with a few scales. Scapes 2 or more, 3 to 8 in. high, somewhat downy, each with a single flower about $\frac{1}{2}$ in. long, with a decided curve to the tube. Rich woods and thickets, throughout our area. April-June.

2. **OROBANCHE**, L.

Flowers in a dense spike, without flower-stems. Calyx split before and behind nearly to the base, both lips 2-lobed. Stamens 4, unequal, included within the corolla. Parasites on roots of other plants.

O. minor, Smith. (Fig. 2, pl. 148.) CLOVER BROOMRAPE. Spike 4 to 12 in. high, terminating in a narrow, dense cluster of purplish flowers generally parasitic on the roots of clover. Introduced from Europe. May-July.

3. **CONOPHOLIS**, Wallr.

Parasitic herb, with stout, unbranching stem densely scaly terminating in a thick scaly spike of yellow flowers. Calyx irregular, 4- to 5-toothed, at its base 2 bracts. Corolla tubular, swollen at base, strongly 2-lipped. Stamens 4, unequal, extending beyond the throat of the corolla.

C. americana, Wallr. (Fig. 4, pl. 148.) SQUAW ROOT. Plants brown, usually clustered, from thick bases. Flowers about $\frac{1}{2}$ in. long, the upper lip strongly arched, the lower drooping, 3-cleft. In woods, mostly oak, growing in the midst of the fallen leaves. Our area. May-June.

4. **EPIFAGUS**, Nutt. (**Leptamnium**, Raf.)

Branching parasitic herb, with purplish or yellowish stems, which carry a few scales, but no leaves. Flowers in slender spikes, the upper flowers sterile, the tube long and curved, the lower closed (Cleistogamic) but fertile. Calyx 5-toothed, oblique. Corolla 4-lobed, the upper larger than the 3 lower.

E. virginiana, (L.) Raf. (Fig. 3, pl. 148.) BEECH DROPS. Plant $\frac{1}{2}$ to 2 ft. high, with several flowering branches, flowers whitish and purplish, about $\frac{1}{2}$ in. long. Growing from the roots of beech trees. Our area. Aug.-Oct.

FAMILY VII.—**BIGONIACEAE.** TRUMPET VINE FAMILY

Woody plants; vines, shrubs, trees with, in our naturalized species, opposite leaves and large showy trumpet-shaped flowers in large clusters. Calyx 2-lipped, 5-toothed or not toothed. Corolla of a long tube expanding toward the throat and with a 5-lobed, somewhat 2-lipped border. Stamens, inserted in the corolla tube, 4 or 2 fertile. Ovary bearing a long style.

Woody vine	Tecoma
Large tree	Catalpa

1. **TECOMA**, Juss.

Climbing vines, with compound leaves and aerial rootlets. Calyx 5-toothed, bell-shaped; corolla tube long, lobes 5, nearly equal. Stamens 4, unequal. Capsule 2-celled.

T. radicans, DC. (Fig. 5, pl. 148.) TRUMPET FLOWER. The ordinary Trumpet Flower of lawns which in places has been naturalized.

2. **CATALPA**, Scop.

Trees, with large, opposite, ovate leaves and large clusters of white or mottled flowers. Calyx deeply 2-lipped. Corolla decidedly 2-lipped, in general form trumpet-shaped, the 5 lobes quite unequal. Fertile stamens 2. Fruit capsule a long and slender pod; seeds winged on each side, the wings fringed.

C. speciosa, Warder. **CATALPA**. Tree, with thick flaky bark. Leaves large, egg-shaped, heart-shaped at base. Flowers numerous, white; corolla 1 to 1½ in. long. Pod 4 or 5 in. long. Escaped from cultivation in some localities. June-July.

FAMILY VIII.—**ACANTHACEAE.** ACANTHIUS FAMILY

Chiefly herbs with opposite leaves and without stipules, and with rather large flowers, which are usually much bracted, more or less 2-lipped. Stamens 2 or 4, inserted in the tube of the 5-lobed corolla.

Lobes of the corolla sub-equal, star-shaped	Ruellia
Corolla conspicuously 2-lipped	Dianthera

1. **RUELLIA**, L.

Perennials. Leaves entire, opposite. Flowers large and showy, blue or purple, white or yellow, in loose clusters. Calyx 5-toothed. Corolla more or less trumpet-form, somewhat 2-lipped, the 5 lobes radiating. Stamens 4, unequal, extending beyond the throat of the corolla. Fruit an oblong capsule.

1. **R. ciliosa**, Pursh. (Fig. 7, pl. 148.) HAIRY RUELLIA. Stem 1 to 2½ ft. high, erect. Whole plant very hairy with soft whitish hairs. Leaves



PLATE 148

1. *Thalesia uniflora*. 2. *Orobancha minor*. 3. *Epifagus virginiana*. 4. *Conopholis americana*. 5. *Tecoma americana*. 6. *Ruellia strepens*. 7. *R. ciliosa*. 8. *Phryma leptostachya*. 9. *Dianthera americana*.

oblong, oval or egg-shaped, tapering at each end, without leaf-stalks or with short ones. Calyx lobes narrow, tapering into long bristle-like points, the whole calyx hairy. Corolla tube twice as long as the calyx, narrower; lobes spreading into a star-shaped flower an inch in diameter. Corolla blue. Dry ground, southern part of our area. June-Sept.

2. *R. strepens*, L. (Fig. 6, pl. 148.) SMOOTH RUELLIA. Similar to preceding species, but not downy or hairy. Penna., and southward. May-July.

2. DIANTHERA. L.

Mainly perennial herbs, our only species growing in shallow water at the edge of streams or ponds. Leaves opposite, entire. Calyx 5-parted. Corolla deeply 2-lipped, the tube slender, the upper lip erect, notched, the lower lip 3-parted, spreading. Stamens 2, *inserted in the throat* of the corolla, not extending beyond the upper lip. Capsule flattened, 4-seeded.

D. americana, L. (Fig. 9, pl. 148.) WATER WILLOW. Stem angled, grooved, 1 to 3 ft. high, scarcely branching. Leaves opposite, lance-shaped, 3 to 6 in. long by about $\frac{1}{2}$ in. wide. Flowers in dense terminal clusters on very long naked stems. Corolla about $\frac{1}{2}$ in. long, purple. Shallow water, not common. July-Sept.

FAMILY IX.—PHRYMACEAE. LOPSEED FAMILY

A perennial herb with branching stems, opposite egg-shaped leaves and narrow spikes of small, irregular, purplish flowers. Calyx cylindric, 2-lipped, the upper lip of 3 bristle-like teeth, the lower shorter, 2-parted. Stamens 4, unequal, not extending beyond the throat of the corolla. Ovary 1-celled with a single ovule. In fruit the capsule *lops* downward. Corolla purple.

PHRYMA, L.

Characters as above.

P. Leptostachya, L. (Fig. 8, pl. 148.) LOPSEED. Plant 2 to 3 ft. high, downy. stem somewhat 4-sided. Leaves broad, coarsely toothed, spikes of flowers very narrow, flowers mostly opposite, at first erect, then strongly reflexed against the stem. The narrow teeth of the calyx, in fruit, lock over the capsule. Woods, in most of our area. June-Aug.

Order VII.—PLANTAGINALES. The Plantain Order

Herbs with inconspicuous flowers with nerveless, dry, thin, membranaceous corollas, the flowers arranged in long slender dense greenish spikes or, in a head or solitary (the last two conditions rare and of these only one species with solitary flowers in our region). Calyx below the ovary, the segments equal or two of them longer. Corolla a spreading 4-pointed star on a short tube. Stamens 2 or 4. Fruit a capsule which opens by a lid.

FAMILY—PLANTAGINACEAE. PLANTAIN FAMILY

Characters as above.

I. PLANTAGO, L.

Herbs, with leaves all basal and with flowers on a leafless scape in a slender, dense flowered spike (exceptionally leaves on the stem and flowers in a head, but not in our species). Calyx 4-parted, corolla 4-lobed. Stamens usually 4. Fruit a capsule opening by a lid.

Leaves all basal, egg-shaped, tapering at each end.

Plant not hairy.

Flowers densely crowded in a narrow cylindric spike . . . *P. major*

Flowers not densely crowded, the spike more or less interrupted

P. Rugelii

Plant very hairy

P. media

Leaves heart-shaped at base

P. cordata

Leaves lance-shaped, not linear.

Plant very hairy

P. virginica

Plant not very hairy.

Margins of leaves more or less lobed *P. heterophylla*

Margins of leaves not lobed.

Bracts between flowers much longer than flowers . . . *P. aristata*

Bracts not exceeding flowers.

Flower scape usually much longer than the leaves

P. lanceolata

Flower scape usually about equalling the leaves

P. maritima

Leaves linear

P. elongata

1. *P. major*, L. (Fig. 3, pl. 149.) COMMON PLANTAIN. Leaves egg-shaped, tapering at each end, the margins smooth or wavy, not hairy or only slightly so, from 1 to 10 in. long. Scape 6 in. to 2 ft. high, spike very narrow and flowers densely crowded. Door yards and waste places, common. May-Sept.

2. *P. Rugelii*, Dec. (Fig. 7, pl. 149.) RUGEL'S PLANTAIN. Similar to *P. major*, but there are many interruptions in the spike of flowers. Fields, woods and waste places. June-Sept.

3. *P. lanceolata*, L. (Fig. 4, pl. 149.) RIBWORT. Leaves lance-shaped, pointed at each end, with 3 to 5 ribs, 2 to 12 in. long. Flower scape angular, longer than the leaves, from $\frac{1}{2}$ to 2 ft. high, the spike dense, rather short, blunt. Meadows and roadsides. Common. April-Nov.

4. *P. media*, L. (Fig. 10, pl. 149.) HOARY PLANTAIN. Leaves rather narrower than those of *P. major*, but somewhat similar in form. Leaves and scape covered with brown hairs. Scapes slender, 1 to 2 ft. high. Waste places. May-Sept.

5. *P. cordata*, Lam. (Fig. 6, pl. 149.) HEART-LEAVED PLANTAIN. Leaves broadly egg-shaped, heart-shaped at base, 4 to 10 in. long. Scape $\frac{1}{2}$ to 2 ft. high, the flower spike interrupted, from a few in. to a ft. long. Swamps and along streams, New York and southward. March-July.

6. *P. maritima*, L. (Fig. 5, pl. 149.) SEA-SIDE PLANTAIN. Leaves narrow, grass-like, *fleshy*. Scapes about as long as leaves. Spike of flowers loose. Salt marshes and along coast. June-Sept.

7. *P. aristata*, Michx. (Fig. 1, pl. 149.) LARGE-BRACTED PLANTAIN. Leaves grass-like, smooth, scape 6 to 18 in. tall, flower spike 1 to 6 in.

long. The bracts, linear, *extending much beyond the flowers*. Waste places, introduced from Western States. May-Oct.

8. *P. virginica*, L. (Fig. 2, pl. 149.) WHITE DWARF PLANTAIN. Leaves spatula-formed or pear-shaped, the whole plant covered with hairs. Scape 1 to 18 in. high; flowers in a dense cylindric spike or the lower flowers somewhat scattered. Dry soil, Connecticut and southward. March-July.

9. *P. elongata*, Pursh. (Fig. 8, pl. 149.) SLENDER PLANTAIN. Leaves thread-like. Spikes very slender. Stamens not extending beyond the flowers. Dry sandy soil, New York and southward. April-Aug.

10. *P. heterophylla*, Nutt. (Fig. 9, pl. 149.) MANY-SEEDED PLANTAIN. Leaves lance-shaped, grass-like, but borders more or less lobed (like those of dandelion) or with low teeth. Spike of flowers more or less interrupted. Capsule 10- to 24-seeded. Wet places, New Jersey and southward. April-July.

2. LITTORELLA, L.

A low, succulent herb, with linear leaves, all from the base and solitary, membranous flowers terminal to scapes shorter than the leaves. Flowers of 2 kinds, those bearing stamens and those with pistils. In the former the stamens extend conspicuously beyond the throat of the flower. Calyx 4-toothed; corolla 4-lobed.

L. uniflora, L. (Fig. 13, pl. 149.) SHORE GRASS. Growing in tufts, leaves linear 1 to 3 in. long. Scape half as long as leaves. Borders of lakes and ponds, Maine and Vermont. July-Aug.

Order VIII.—RUBIALES. The Madder Order

Corolla of united petals; leaves opposite. Calyx adherent to the ovary, the calyx borders of lobes or teeth partly or completely above the ovary. Stamens fixed upon the corolla, as many as its lobes and alternate with them (in *Linnea* 1 less than the lobes) or stamens double the number of the lobes. Anthers separate; ovary more than one-celled with usually more than one seed in each cell. The order includes 2 families in our area. They are, *Rubiaceae* and *Caprifoliaceae*.

FAMILY I.—RUBIACEAE. Madder Family

Herbs, shrubs, trees; but in our area, with the exception of a single shrub, all small and slender herbs. All have opposite leaves which are said to be stipulate, yet in many cases the stipules are not easy to detect. Flowers perfect and nearly symmetrical. Calyx tube adherent to the ovary, its teeth or lobes varying. Corolla of united petals of various shapes. Stamens as many as the lobes of the corolla and alternate with them. Anthers free from

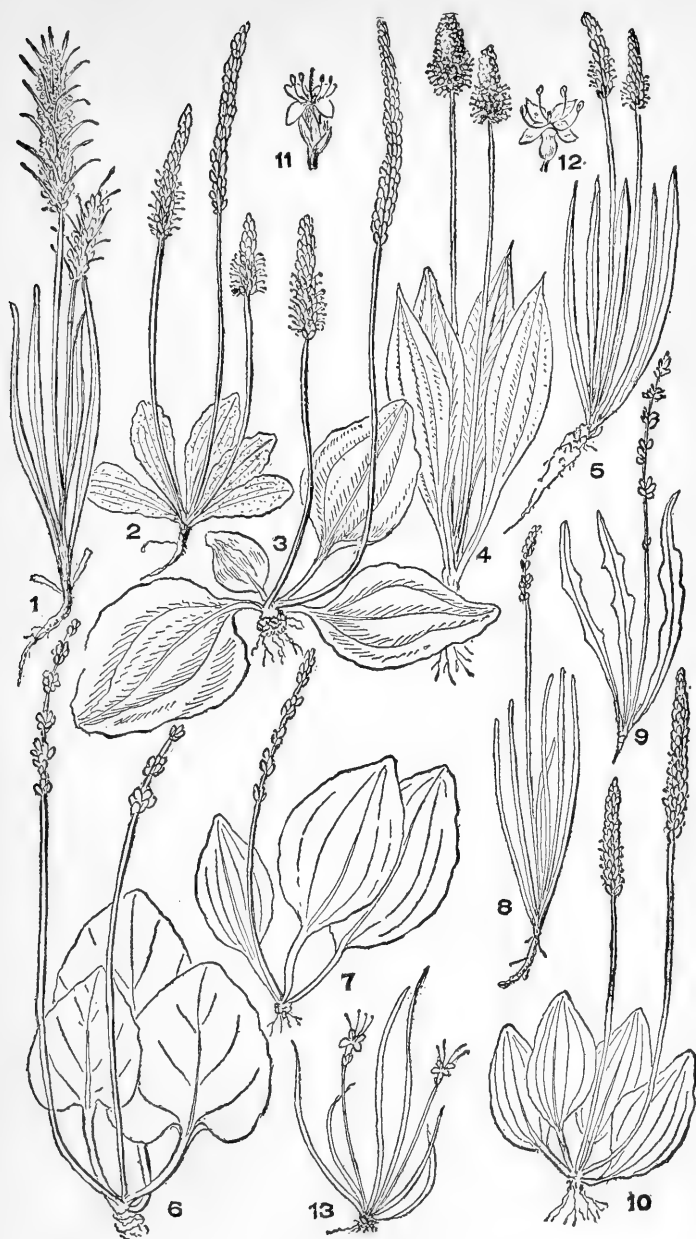


PLATE 149

1. *Plantago aristata*. 2. *P. virginica*. 3. *P. major*. 4. *P. lanceolata*. 5. *P. maritima*. 6. *P. cordata*. 7. *P. Rugelii*. 8. *P. elongata*. 9. *P. heterophylla*. 10. *P. media*. 11. Flower of *P. major*. 12. Flower of *P. lanceolata*, deprived of its calyx. 13. *Littorella uniflora*.

each other. Ovary 1- to 10-celled, the cells containing from 1 to several seeds. Fruit a capsule, a berry or a drupe.

Shrub with flowers in a dense round head . . . **Cephalanthus**

Herbs, with opposite leaves or leaves in whorls of 3.

Flowers in pairs, fruit a red berry **Mitchella**

Flowers separate.

2 carpels each one-seeded **Diodia**

2 carpels each many seeded.

Corolla funnel-form **Houstonia**

Corolla wheel-shaped **Oldenlandia**

Herbs with leaves in whorls of 4 or more.

Corolla commonly 4-lobed, flat, round . . . **Galium**

Corolla funnel-form.

Flowers in heads surrounded by involucre leaves

or bracts **Sherardia**

Flowers in loose clusters **Asperula**

1. HOUSTONIA, L.

Small, delicate herbs (with us), with opposite leaves and often with a rosette of leaves at the base. Stipules *united with the leaf-stem*. Calyx tube egg-shaped, 4-parted. Corolla tube slender, the 4 lobes spreading. Stamens 4, equal, inserted in the tube of the corolla. Ovary 2-celled, seeds numerous.

1. *H. coerulea*, L. (Fig. 4, pl. 150.) **BLUETS. INNOCENCE.** Small herb, growing in tufts; stem 3 to 6 in. high, sparingly branched. Leaves oblong, spatula-form, opposite, forming a rosette at base, about 1/3 in. long. Corolla light blue, lilac or nearly white with a yellowish center. Tube longer than the lobes. Grassy places, our area. April-July.

Var. *Toxonorum*. Pease and Moore. Corolla white with yellowish center, tube shorter. White Mountains.

2. *H. longifolia*, Gaertn. (Fig. 5, pl. 150.) **LONG-LEAVED HOUSTONIA.** Tufted, stems 5 to 10 in. high. Basal leaves spatula-form, *stem leaves linear*. Flowers pale blue, purple to nearly white. Open dry places, throughout our region. May-Sept.

3. *H. ciliolata*, Torr. (Fig. 6, pl. 150.) **FRINGED HOUSTONIA.** Plant 4 to 7 in. high. Stem leaves spatula-formed, lower leaves in a rosette, oval or pear-shaped, their margins fringed with hairs. Western New York, and southward. May-Sept.

2. OLDENLANDIA, L.

Slender herbs, erect or diffuse with opposite leaves, the small stipules united to the leaf stems and (in our area) small axillary flowers, white or pink. Calyx and corolla, each 4-parted. Stamens 4, equal, inserted in the throat of the corolla. Ovary 2-celled, ovules numerous in each cavity.

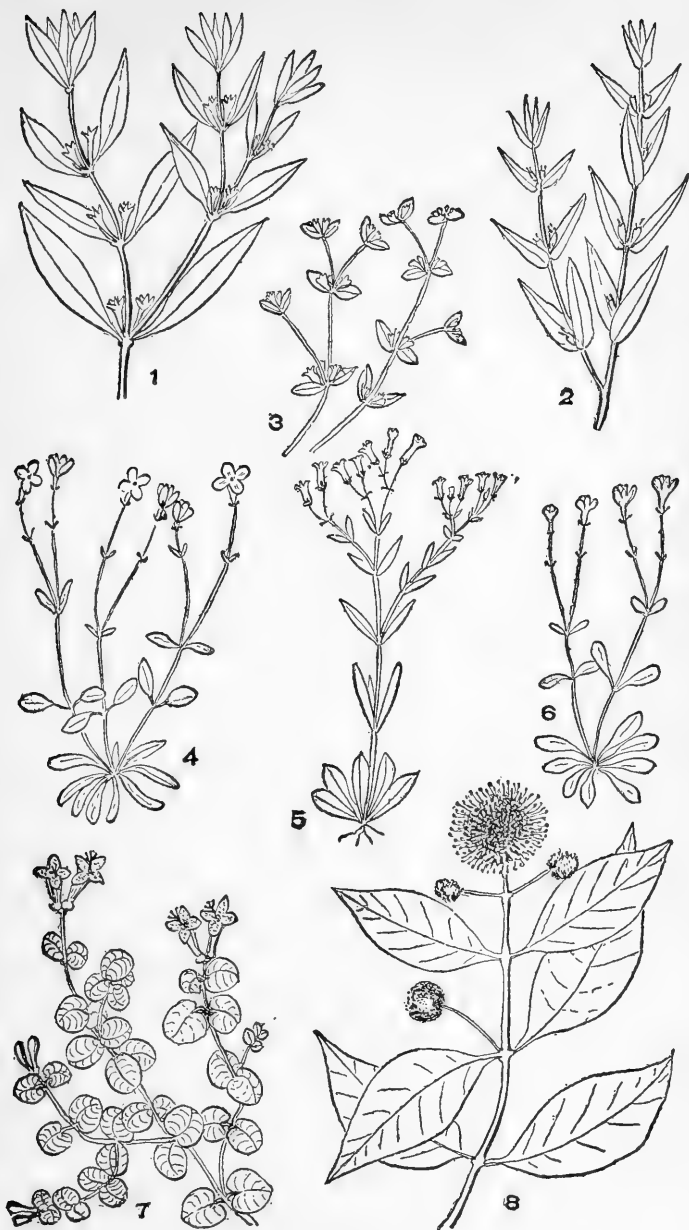


PLATE 150

1. *Diodia virginiana*. 2. *D. teres*. 3. *Oldenlandia uniflora*. 4. *Houstonia coerulea*. 5. *H. longifolia*. 6. *H. ciliolata*. 7. *Mitchella repens*. 8. *Cephalanthus occidentalis*.

O. uniflora, L. (Fig. 3, pl. 150.) CLUSTERED BLUETS. Stem weak, half prostrate, branched, spreading, 1 to 15 in. long. Leaves egg-shaped to oblong. Corolla inconspicuous, white, shorter than the calyx. Wet places, southern New York, and southward. June-Sept.

3. CEPHALANTHUS, L.

Shrub, with the white flowers in a dense round head, hanging by a long flower stem. Calyx tube 4-toothed; corolla tubular, wider at top and 4-lobed. Style 1, long, slender; stamens 4, inserted in the throat of the corolla. Fruit small, dry and hard.

C. occidentalis, L. (Fig. 8, pl. 150.) BUTTON BUSH. Shrub, 3 to 10 ft. high, with large opposite or whorled egg-shaped leaves on long leaf-stems and with ball-like clusters of white flowers. Wet grounds, borders of streams. June-Sept.

4. MITCHELLA, L.

Small, trailing herb, with opposite, dark shining evergreen leaves and white flowers in pairs. Stipules minute. Calyx 3- to 6-lobed. Corolla of a long slender tube and 4 or more recurring lobes, bearded in the throat. Stamens 4 or more. Pistil in some flowers extending much beyond the throat of the corolla, while the stamens are included within the corolla. In other flowers the exact opposite condition prevails, namely, the stamens extend beyond the corolla and the pistil is hidden in the tube. Fruit a red berry.

M. repens, L. (Fig. 7, pl. 150.) PARTRIDGE BERRY. Stems 3 to 12 in. long. Leaves nearly round. Flowers growing as twins from the single flower stem and both sometimes appearing as if enclosed at the base by the same calyx. Fruit red, rarely white, edible but rather tasteless. Rich woods, our area. April-June.

5. DIODIA, L.

Herbs, with opposite, stipulate leaves and small flowers in the leaf-axils. Stems more or less decumbent or quite erect. Calyx ovoid, in our species 4-parted. Corolla tubular, spreading toward the border, which is usually 4-lobed. Stamens 4, inserted in the throat of the corolla and extending beyond the corolla. Ovary 2-celled with a single ovule in each cell.

1. **D. virginiana**, L. (Fig. 1, pl. 150.) LARGER BUTTON-WEED. Plant decumbent or nearly erect, hairy or smooth, bearded. Leaves lance-shaped to linear, without leaf-stems. Flowers white, 1 to 3 in the leaf-axils, tube of corolla slender, expanding suddenly into a 4-lobed, wheel-like border. Style 2-parted. Fruit at first fleshy, becoming dry. Low grounds, New Jersey, and southward. June-Aug.

2. **D. teres**, Walt. (Fig. 2, pl. 150.) ROUGH BUTTON-WEED. Usually rough hairy, spreading, stems more or less prostrate or nearly erect. Leaves opposite, without leaf-stems, narrow lance-shape or linear. Corolla does not suddenly expand, as in No. 1, lilac, light purple or white. Style not divided as in No. 1. Fruit pear-shaped, hairy. Dry soil, southern New York, Connecticut, and southward. July-Sept.

6. GALIUM, L.

Slender herbs, with 4-angled stems, generally branching and often leaning on other herbs, with leaves in whorls and with small flowers mostly in terminal or axillary more or less umbel-like clusters. Calyx teeth absent. Corolla mostly 4-parted, star-shaped, with a short tube. Stamens usually 4, exceptionally 3, short. Styles 2. Fruit double from the same pedicel.

Flowers yellow	<i>G. verum</i>
Flowers purple.	
Plant hairy	<i>G. pilosum</i>
Plant smooth	<i>G. latifolium</i>
Flowers white or greenish,	
Leaves in 4s.	
Fruit a dry, smooth, double berry	<i>G. tinctorium</i>
Fruit a smooth, double berry, fleshy	<i>G. hispidulum</i>
Fruit covered with hooked hairs.	
Leaves lance-shaped.	
Flowers few	<i>G. lanceolatum</i>
Flowers very numerous	<i>G. boreale</i>
Leaves oval or nearly round.	
Corolla hairy	<i>G. circaezans</i>
Corolla not hairy	<i>G. kamtschaticum</i>
Leaves in 4s or 6s.	
Fruit covered with hooked hairs	<i>G. asprellum</i>
Fruit smooth.	
Corolla 3-parted.	
Leaves mostly in 4s	<i>G. trifidum</i>
Leaves mostly more than 4 in a whorl.	
Stem armed with hooks	<i>G. Claytoni</i>
Stem smooth	<i>G. concinnum</i>
Leaves in 2s to 6s	<i>G. palustre</i>
Leaves always in 6s	<i>G. triflorum</i>
Leaves in 6s to 8s.	
Fruit smooth.	
Branches and pedicels widely spreading	<i>G. Mollugo</i>
Branches and pedicels ascending	<i>G. erectum</i>
Fruit with strong hooked hairs	<i>G. Aparine</i>
Fruit granular	<i>G. tricornae</i>

1. *G. verum*, L. (Fig. 1, pl. 151.) YELLOW BEDSTRAW. Erect, stem $\frac{1}{2}$ to 2 $\frac{1}{2}$ ft. high, smooth. Leaves in 6s or 8s, narrow linear. Flowers yellow in dense clusters at upper part of stem. Naturalized. In waste places and fields. May-Sept.

2. *G. Mollugo*, L. (Fig. 2, pl. 151.) WILD MADDER. Plant without hairs or nearly so. Stem 1 to 3 ft. long. Leaves in 6s or 8s, narrow, linear, with a bristle point at apex. Flowers white, small, numerous. Fruit smooth. Fields and waste places. Naturalized. May-Sept.

3. *G. erectum*, Huds. ERECT BEDSTRAW. Similar to No. 2, but more generally erect, the stems numerous. Flowers fewer and generally larger than those of the preceding species, the branches ascending. Connecticut, Vermont, and northward.

4. *G. tricornae*, Stokes. (Fig. 4, pl. 151.) ROUGH-FRUITED CORN BEDSTRAW. Stout, partly prostrate or erect, whole plant rough with hooked hairs. Leaves linear lance-shaped, in 6s or 8s, rough on the margins. Flower stems arising in the leaf axils and shorter than the leaves and usually about 1- to 3-flowered. Fruit rather rough from granular elevations. Waste places. Naturalized. May-Aug.

5. *G. Aparine*, L. (Fig. 3, pl. 151.) CLEAVERS. Plant armed with strong, hooked hairs, stem 2 to 5 ft. long, weak, procumbent. Leaves in 6s, 7s or 8s, linear or obversely lance-shaped. Flower stems from the

axils, each 1- to 3-flowered, the fruit covered with hooked hairs. Wet thickets and various localities. Our area. May-Sept.

6. *G. pilosum*, Ait. (Fig. 5, pl. 151.) HAIRY BEDSTRAW. Stem 1 to 2½ ft. long, whole plant hairy. Leaves in 4s, oval, about 1 in. long. Flowers axillary and terminal, dull purple to yellowish purple. Dry sandy soil, eastern Mass., and southward and westward. June-Aug.

7. *G. lanceolatum*, Torr. (Fig. 9, pl. 151.) TORRY'S WILD LIQUORICE. Plant smooth or nearly so, 1 to 2 ft. high. Leaves in 4s, lance-shaped, tapering to the apex, 2 in. long, 1/4 to 1/3 as wide. Flowers not hairy, yellowish to dull purple. Flower stems rather long with few flowers. Dry woods. Our region. June-Aug.

8. *G. circaeazans*, Michx. (Fig. 11, pl. 151.) CROSS CLEAVERS. Stem 1 to 2 ft. high, smooth or slightly downy. Leaves in 4s, broadly oval to lance-shaped, 1 to 1½ in. long, usually obtuse at apex, 3-nerved. Flowers in axillary and terminal diffuse clusters, the common flower stem much longer than the leaves, dividing into 2 or 3 lesser stems, each bearing usually, 2 flowers which are greenish white, the corolla *hairy outside*. Woods, our region. May-July.

9. *G. kamtschaticum*, Steller. (Fig. 3, pl. 152.) NORTHERN WILD LIQUORICE. Stem weak, 4 to 15 in. long. Leaves in 4s, nearly round or broadly oval, the lower 1½ in. long, smooth or slightly downy. Flowers on long slender common flower stems which divide into 3 branches, each of which is usually once forked. Corolla yellowish white, not hairy. Mountains, New England and New York. June-Sept.

10. *G. boreale*, L. (Fig. 6, pl. 151.) NORTHERN BEDSTRAW. Erect, smooth, 1 to 2 ft. high, scarcely branching. Leaves in 4s, smooth, linear, lance-shaped, 3-nerved, obtuse at apex, or less frequently acute, 1 to 1½ in. long. Flowers in dense, many-flowered terminal pyramidal clusters, white. Fruit covered with hooked hairs. Along streams, rocky places. May-Aug.

11. *G. triflorum*, Michx. (Fig. 7, pl. 151.) FRAGRANT BEDSTRAW. Stem 1 to 3 ft. high, weak, smooth or bristly on angles. Leaves in 6s, narrowly oval or elliptic-lanceolate, bristle-pointed, 1 to 2 in. long, 1-veined. Flowers not numerous, on long common leaf-stems, each 3-flowered. Fruit covered with hooked hairs. Rich woods. Our area. June-Aug.

12. *G. latifolium*, Michx. (Fig. 8, pl. 151.) PURPLE BEDSTRAW. Stem smooth, 1 to 2 ft. high, erect, branched. Leaves in 4s, lance-shaped, 3-nerved, very sharp pointed at apex, rounded at base, 1 to 2 in. long, common flower stems usually shorter than the leaves, usually more than once forked. Flowers purple. Dry woods in southern part of our area. May-Aug.

13. *G. tinctorium*, L. (Fig. 10, pl. 151.) WILD MADDER. Stem erect, stiff, 6 to 15 in. high, branching, several times forked. Leaves in 4s, linear, ½ to 1 in. long, 1-nerved. Flowers terminal in diffuse clusters, 2 or 3 in a lesser group. Corolla rather large, white. Fruit smooth. Damp shady places, throughout our area. May-July.

14. *G. trifidum*, L. (Fig. 1, pl. 152.) SMALL BEDSTRAW. Stems weak, ½ to 1½ ft. high, branching, mostly rough on the angles. Leaves in whorls of 4s, rarely in 6s, linear, ¼ in. long. Flowers in terminal very



PLATE 151

1. *Galium verum*. 2. *G. Mollugo*. 3. *G. Aparine*. 4. *G. tricornes*. 5. *G. pilosum*. 6. *G. boreale*. 7. *G. trillorum*. 8. *G. latifolium*. 9. *G. lanceolatum*. 10. *G. tinctorium*. 11. *G. circaezans*. 12. *G. asprellum*. 13. *G. palustre*. 14. *G. Claytoni*.

diffuse clusters, each flower on a long, very slender pedicel. Corolla lobes usually 3; stamens 3. Fruit smooth. Sphagnum swamps and cold wet places, Maine to southern New York. All summer.

15. *G. Claytoni*, Michx. (Fig. 14, pl. 151.) CLAYTON'S BEDSTRAW. Stem $\frac{1}{2}$ to 2 ft. high, slender, 4-angled, the angles rough with hooked hairs, branching in 2s or 3s. Leaves commonly in 5s or 6s, spatula-form, with a stiff bristle point at apex, which otherwise is rounded, margin rather rough. Flowers in very diffuse clusters at top of plant, the ultimate groups being of 1 or 2 white flowers. Corolla very small, 3-lobed. Fruit smooth. Swamps and wet meadows, generally distributed. May-July.

16. *G. palustre*, L. (Fig. 13, pl. 151.) MARSH BEDSTRAW. Plant nearly or quite smooth, stem about 15 in. high, erect, slender, long between the nodes, branches quite short. Leaves small, in 2s to 6s, narrow linear, rounded at apex. Flowers in terminal scattered clusters, white. Fruit smooth. Moist shady places, roadsides, etc. May-July.

17. *G. concinnum*, Torr. and Gray. (Fig. 2, pl. 152.) SHINING BEDSTRAW. Stem weak, decumbent, diffusely branched. Whole plant shining. Leaves in 6s, linear, $\frac{1}{4}$ in. long. Flowers in 3-forked terminal clusters, white, minute. Fruit small, smooth. Dry woods, New Jersey and southward. June-Aug.

18. *G. asprellum*, Michx. (Fig. 12, pl. 151.) ROUGH BEDSTRAW. Stems decumbent, very branching, rough with stiff hooked hairs, 2 to 6 ft. long. Leaves in 6s or 5s, very rough at margins, narrowly oval $\frac{1}{3}$ to $\frac{2}{3}$ in. long, bristle-pointed. Flowers white, small, in terminal clusters. Fruit smooth. In wet places, ditches, etc., leaning on other plants. June-Aug.

19. *G. hispidulum*, Michx. (Fig. 4, pl. 152.) COAST BEDSTRAW. Stem branching, nearly smooth or hairy, 1 to 2 ft. high. Leaves in 4s. Flowers few. Fruit a double fleshy berry. Southern part of our area. May-Aug.

7. SHERARDIA, L.

Resembles *Galium*, but flowers are funnel-form with a decided tube and leaves are spiny pointed. Calyx tube 4- to 6-parted. Corolla 4- to 5-lobed. Stamens 4 or 5.

S. arvensis, L. (Fig. 6, pl. 152.) BLUE FIELD MADDER. Stems growing in tufts 3 to 10 in. long, weak. Leaves in 4s, 5s or 6s, lance-shaped, sharp at apex. Flowers in terminal clusters, each subtended by an involucre, which is as long as the flowers. Corolla pink or blue. Naturalized in many places. June-July.

8. ASPERULA, L.

Another *Galium*-like plant with white or pinkish flowers. Leaves 6 to 9 in a whorl, rough at the margins. Corolla funnel-shaped. Fruit in pairs. Flowers in terminal nearly flat clusters.

A. odorata, L. (Fig. 5, pl. 152.) SWEET WOODRUFF. Stem slender, erect, smooth. Leaves usually in 8s (less or more), lance-shaped, bristle-pointed. Flowers pink or white. Fruit hairy. Naturalized, in waste places. May-July.

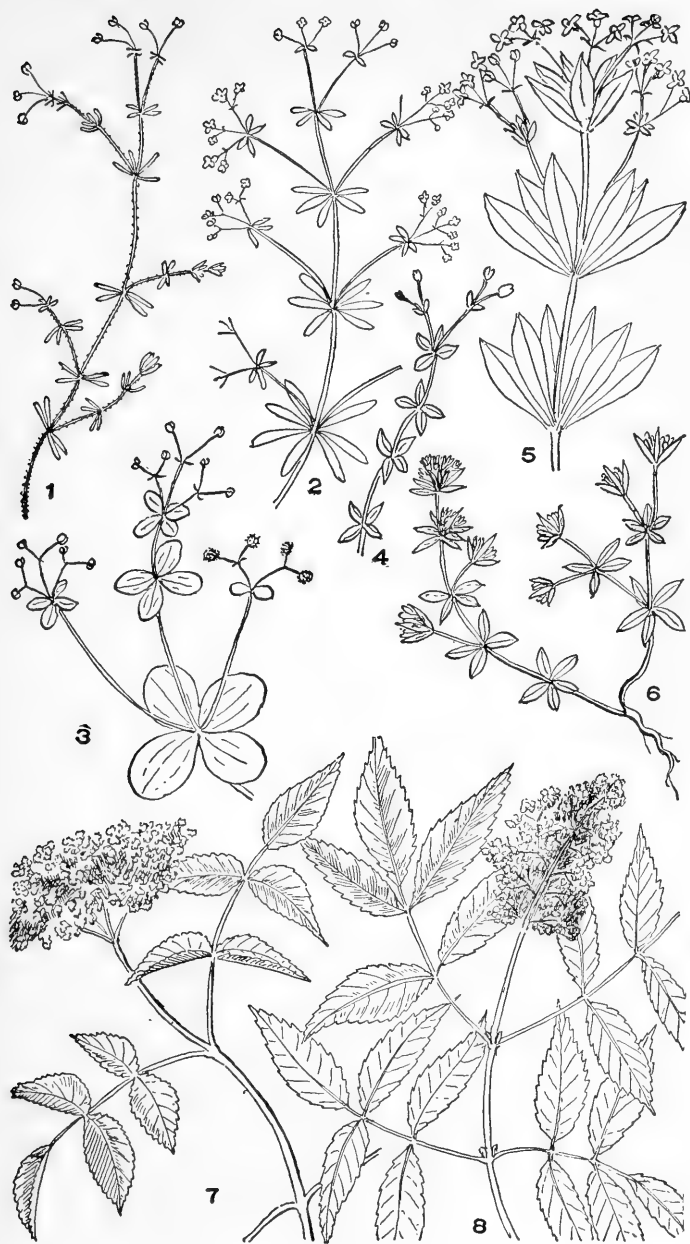


PLATE 152

1. *Galium trifidum*. 2. *G. concinnum*. 3. *G. kamtschaticum*. 4. *G. hispidulum*. 5. *Asperula odorata*. 6. *Sherardia arvensis*. 7. *Sambucus canadensis*. 8. *S. racemosa*.

FAMILY II.—CAPRIFOLIACEAE. HONEYSUCKLE FAMILY

Plants very closely related to the Family Rubiaceae, the leaves in this last being usually accompanied by minute stipules or by leaf-like stipules, the Honeysuckle family nearly always destitute of stipules. These plants are nearly always woody. In our area there are but two exceptions, one of which is the extremely interesting creeper, the *Linnaea*, the other, *Triosteum*. The leaves are opposite. Flowers have both stamens and pistils and are regular or quite irregular in form. The corolla is composed of united petals and takes different forms, but the border is always 5-lobed. The stamens are 5, or rarely 4, inserted in the tube of the corolla. The ovary is, in part at least, enveloped in the calyx, which is adherent to it, and has from 1 to 5 cells, each with 1 or more ovules suspended from the central column. The fruit is a berry, a drupe, a nutty fruit or rarely a capsule.

Leaves composed of leaflets ranged each side of the leaf-stalk
with an odd leaflet **Sambucus**

Leaves not compound.

Flowers regular or only slightly irregular.

Shrubs or trees.

Corolla flat, circular; fruit a one-seeded
drupe **Viburnum**

Corolla tubular or bell-shaped; fruit a one-
seeded berry **Symphoricarpos**

Herbs with regular or slightly 2-lipped corollas.

Erect plant, leaves without leaf-stalks
. **Triosteum**

Creeping vine, somewhat woody, leaves with
leaf-stalks **Linnaea**

Flowers irregular.

Woody vines **Lonicera**

Small shrub **Diervilla**

1: **SAMBUCUS, L.**

Shrubs, with opposite compound leaves, the leaflets arranged on each side of the leaf stem in pairs, with an odd one at each end and with compound clusters of small white flowers. Calyx ovoid, the lobes small or absent. Corolla round, flat, 3- to 5-lobed. Stamens 5, inserted at the base of the corolla. Drupe, berry-like, juicy, containing 3 to 5 one-seeded nutlets.

Flower cluster flat, umbel-like *S. canadensis*
Flower cluster pyramidal *S. racemosa*

1. *S. canadensis*, L. (Fig. 7, pl. 152.) COMMON ELDER. Shrub. 5 to 10 ft. high. Leaflets 5 to 11, margins sharply toothed. Flower clusters flat. Berries black-purple. Rich moist or wet soil, throughout our range. June-July.

2. *S. racemosa*, L. (Fig. 8, pl. 152.) RED-BERRIED ELDER. Shrub, 5 to 10 ft. high. Leaflets 5 to 7, margins sharply toothed. Flower clusters pyramidal. Berries bright red. Rocky woods, in all of our area.

2. VIBURNUM, L.

Shrubs or trees, with entire, toothed or lobed leaves, sometimes with stipules, and with white flowers in flat clusters. Calyx 5-toothed, corolla deeply 5-lobed. Stamens 5, inserted in the tube of the corolla or, in the outer flowers of some species, stamenes none. Fruit a one-seeded drupe.

Flower cluster flat, the marginal flowers neutral, flat, showy, much larger than the more central fertile flowers.

Leaves round or nearly so *V. alnifolium*
Leaves 3-lobed *V. Opulus*

Flower clusters with all the flowers of the same kind.

Leaves with 3 prominent radiating ribs and 3 conspicuous lobes.

Berries (drupes) light red *V. pauciflorum*

Berries (drupes) nearly black *V. acerifolium*

Leaves not 3-lobed.

Margins very coarsely toothed.

Leaves with few or no hairs *V. dentatum*

Leaves decidedly downy on the under side.

Not pubescent above *V. venosum*

Somewhat pubescent above *V. pubescens*

Margins with fine teeth or none.

Flower cluster from a single elongated stem.

Leaves more or less toothed *V. cassinoides*

Leaves not toothed *V. nudum*

Flower cluster not from an elongated single stem.

Leaves egg-shaped, with very acute points *V. Lentago*

Leaves oval, with rounded points *V. prunifolium*

1. *V. alnifolium*, Marsh. (Fig. 4, pl. 154.) HOBBLE BUSH. (*V. lantanoides*, Michx.) A straggling shrub, rarely more than 5 or 6 ft. high, with broad, round, heart-shaped leaves, which are from 4 to 8 in. across, finely toothed at margins, somewhat downy; youngest branches rusty. Row of marginal flowers large, white, showy. In moist woods, throughout our range. May-June.

2. *V. opulus*, L. (Fig. 4, pl. 153.) HIGH BUSH CRANBERRY. Shrub, 4 to 12 ft. high, with erect, smooth branches. Leaves 3-lobed, 3-ribbed, with large teeth, the lobes sharp-pointed. Leaf broader than long. Cluster of white flowers borne on a single lengthened stem. Fruit bright red, rather pleasantly acid. Low grounds, throughout our range except in the most southern part. June-July.

3. *V. pauciflorum*, Pylaie. (Fig. 6, pl. 154.) FEW-FLOWERED CRANBERRY-TREE. Straggling shrub, 2 to 6 ft. high, with 3-lobed, 3-radiating ribs, lobes acutely angled, teeth large. Flowers few; drupe light red. Dry rocky woods, mostly on New York, New England and Pennsylvania mountains. May-June.

4. *V. acerifolium*, L. (Fig. 1, pl. 153.) MAPLE-LEAVED VIBURNUM. Slender shrub, 3 to 5 ft. high. Leaves broad, 3-lobed, the lobes sharp, 3-ribbed, marginal teeth coarse. Flowers in a flat cluster; drupes nearly black. Dry woods, throughout our area. May-June.

5. *V. pubescens*, (Ait.) Pursh. (Fig. 1, pl. 154.) DOUBLE-LEAVED ARROW-WOOD. A small shrub, much resembling the last, but the leaves are egg-shaped, not 3-lobed, with very short leaf-stalks if any, and the under surface of the leaf densely velvety. Rocky woods. May-June.

6. *V. dentatum*, L. (Fig. 2, pl. 153.) ARROW-WOOD. Shrub, 5 to 15 ft. high, with smooth, slender gray branches. Leaves egg-shaped, with very coarse teeth, not hairy. Flowers numerous in a flat cluster. Fruit dark blue. Wet places, throughout our area. May-June.

7. *V. venosum*, Britton. (Fig. 7, pl. 154.) COAST ARROW-WOOD. Similar to *V. dentatum*. The twigs and lower surfaces of the leaves densely downy. Eastern Massachusetts to New Jersey.

8. *V. cassinoides*, L. (Fig. 3, pl. 154.) WITHE-ROD. Shrub, 2 to 12 ft. high. Leaves oval or egg-shaped, with *very small teeth*. Flowers numerous in a broad, flat or convex cluster, which spreads from an elongated, slender flower-stem which is, however, *shorter than the breadth of the cluster*. Fruit becoming dark blue. Swamps, wet places, Maine to New Jersey. June-July.

9. *V. nudum*, L. (Fig. 5, pl. 154.) LARGER WITHE-ROD. Similar to the last, but borders of leaves nearly or quite without teeth and leaves smaller. *The flower stem is as long as or longer than the breadth of the cluster*. Swamps, Long Island and southward. June-July.

10. *V. Lentago*, L. (Fig. 2, pl. 154.) SWEET VIBURNUM. Shrub or small tree. Leaves oval or egg-shaped, tapering to a long slender point, 2 to 4 in. long, smooth, with fine teeth at the margins. Flowers in a large convex cluster, the cluster branching from the base without the single flower stem. Rich soil, Maine to New Jersey. May.

11. *V. prunifolium*, L. (Fig. 3, pl. 153.) BLACK HAW. Shrub or small tree. Leaves shining, oval or egg-shaped, with finely serrate margins, blunt at apex. Flowers in a convex cluster without a common flower stem or with a short one. Dry soil, Connecticut and westward and southward. April-June.

3. TRIOSTEUM, L.

Coarse herbs, with opposite leaves which unite about the stem or which, at least, have no leaf-stalks. Flowers from the axils of the leaves. The 5 calyx lobes linear or lance-shaped. Corolla tubular, enlarging toward the throat, 5-lobed. Stamens 5. Ovary 3- to 5-celled with a single ovule in each cell, forming a drupe containing 3 to 5 hard seeds or nutlets.

1. *T. angustifolium*, L. (Fig. 1, pl. 155.) YELLOW HORSE GENTIAN. Stem 1 to 3 ft. high, leafy toward the top. Leaves lance-shaped, tapering to the base into an apparent leaf-stalk. Flowers clustered in the axils or single, greenish-cream-color. Rich soil, Long Island, Conn., and southward. May-Aug.

2. *T. perfoliatum*, L. HORSE GENTIAN. FIGWORT. Plant 2 to 4 ft. high. Leaves broadly oval or egg-shaped, 4 to 9 in. long, the borders extending along the leaf-stalk as a broad wing on each side, which partly or wholly clasp the stem. Flowers at the axils, the bracts linear. Corolla purplish brown. Not common, found in rich woods, Mass., and westward. Aug.-Sept.



PLATE 153

1. *Viburnum acerifolium*. 2. *V. dentatum*. 3. *V. prunifolium*. 4. *V. opulus*.

4. LINNAEA, L.

A slender creeper, somewhat woody, with opposite rounded leaves on short leaf-stalks, evergreen. Flowers on thread-like flower-stems, which rise from the horizontal stem and fork into 2 secondary stems, each supporting 1 nodding, fragrant purple flower. Calyx teeth 5, slender. Corolla bell-shaped or funnel-formed, 5-lobed, the lobes equal or nearly so. Stamens 4, unequal. Ovary 3-celled, the fruit a dry pod with a single seed. Rarely there may be 4 or more secondary stems, with as many flowers.

L. borealis, L. (See *Frontispiece*.) TWIN FLOWER. Found in moist woods, or under pine trees. June-Aug.

This little plant was a favorite with the great Linnaeus and it was dedicated to and named after him by Gronovius, a distinguished Dutch botanist and friend of Linnaeus. The flower of the European form of this little plant is more bell-shaped than that of the American form and the calyx of the former is longer. Hence the American form is regarded as a variety; var. *Americana*.

5. SYMPHORICARPOS, Juss.

Low shrubs, branching, with opposite oval leaves on short leaf-stalks, downy on under surface. Flowers small, white tinged with pink, in clusters in the leaf-axils or terminal. Calyx tube nearly globular. Border of 5 teeth. Corolla tubular, expanding toward the throat, with 4 or 5 more or less spreading lobes. Throat hairy or smooth. Ovary of 4 cells, two of which have single ovules, the other undeveloped. Fruit a globose fleshy berry.

Fruit white.

Leaves 1 to 2 in. long *S. racemosus*

Leaves $\frac{1}{2}$ to 1 in. long *S. pauciflorus*

Fruit red *S. orbiculatus*

1. **S. racemosus**, Michx. (Fig. 4, pl. 155.) SNOWBERRY. Erect shrub, about 4 ft. high, with smooth slender branches. Leaves oval, blunt at each end. Flower clusters in the axils, few flowered. Corolla hairy in the throat. Berry white. Rocky places, river banks, etc. Northern New England and Penna. June-Sept.

2. **S. pauciflorus**, (Robbins) Britton. (Fig. 2, pl. 155.) LOW SNOWBERRY. Plant diffusely branched, 6 to 10 in. high. Leaves small, $\frac{1}{2}$ to 1 in. long, oval. Flowers usually 1 in the axils and 2 or 3 in the terminal cluster. Corolla hairy within. Fruit white. Rocky places, Vermont, Western New York and Penna. June-July.

3. **S. orbiculatus**, Moench. (Fig. 3, pl. 155.) INDIAN CURRANT. CORAL BERRY. (*S. vulgaris*, Michx.) Shrub, 2 to 5 ft. high, purplish. Flowers in the axils of nearly all the leaves. Leaves 1 to $1\frac{1}{2}$ in. long. Fruit purplish red. Rocky places, along rivers. Southern part of our area. July.

6. LONICERA, L.

Climbing or erect shrubs, with opposite leaves, mostly with entire margins and with flowers in clusters of several or of two only. Calyx tube ovoid, teeth very short. Corolla tubular or funnel-form, irregularly

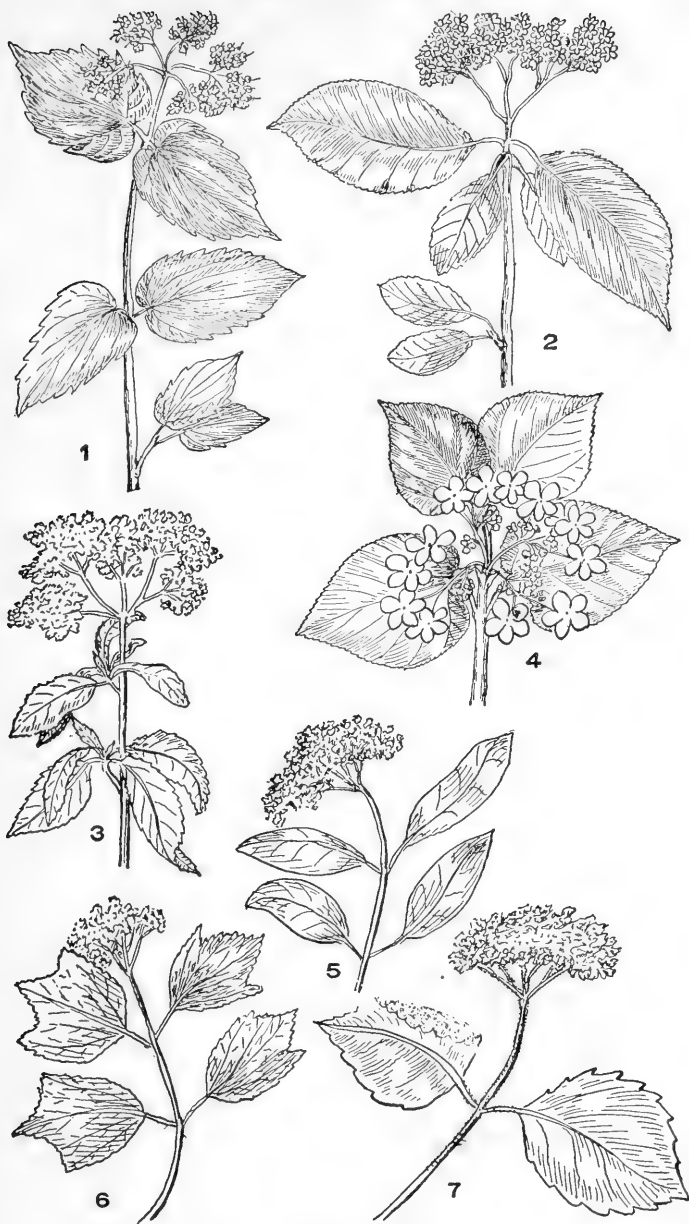


PLATE 154

1. *Viburnum pubescens*. 2. *V. Lentago*. 3. *V. cassinoides*. 4. *V. alni-folium*. 5. *V. nudum*. 6. *V. pauciflorum*. 7. *V. venosum*.

5-lobed or almost regularly so. Stamens 5, inserted in the tube of the corolla. Ovary 2 to 3 cells. Berry several seeded.

Climbers. Flowers in clusters of several

Corolla decidedly 2-lipped.

Corolla without hairs in the tube *L. Caprifolium*

Corolla with hairs in the tube.

Leaves downy, both sides *L. hirsuta*

Leaves downy on lower side only *L. glaucescens*

Leaves not downy, either side *L. dioica*

Corolla not 2-lipped *L. sempervirens*

Shrubs. Flowers in pairs only.

Flowers subtended by slender bracts.

Berries blue *L. coerulca*

Berries red.

Leaves with a bluish or whitish bloom *L. oblongifolia*

Leaves without a bluish bloom.

Base not heart-shaped *L. canadensis*

Base heart-shaped *L. tartarica*

Flowers subtended by broad leaf-like bracts *L. involucrata*

Climbing Vines

1. *L. caprifolium*, L. (Fig. 5, pl. 155.) AMERICAN WOODBINE. (*L. grata*, Ait.) A smooth climber, the upper 1 to 3 pairs of leaves united around the stem so as to form apparently a single leaf. Flowers in a terminal cluster without a common flower-stem. Corolla markedly 2-lipped, the upper lip of 4 narrow lobes, the lower of 1. The tube is not hairy. Flowers purple fading into yellowish without, white within. Thickets, southern part of our area. May-June.

2. *L. hirsuta*, Eaton. (Fig. 6, pl. 155.) HAIRY HONEYSUCKLE. Similar to above, but leaves decidedly downy below and somewhat so above. Corolla tube hairy within. Woods, Maine to Penna. June-July.

3. *L. glaucescens*, Rydb. (Fig. 3, pl. 156.) DOUGLASS'S HONEYSUCKLE. Similar to No. 1, but leaves downy on lower side, at least along the veins. Corolla hairy within, yellow, changing to reddish. Thickets, most of our area. May-June.

4. *L. dioica*, L. (Fig. 2, pl. 156.) SMOOTH-LEAVED HONEYSUCKLE. Similar to No. 1, but tube of corolla hairy inside, and leaves smooth on both sides. Corolla greenish-yellow or purplish. Rocky grounds, especially on mountains, our range.

5. *L. sempervirens*, L. (Fig. 1, pl. 156.) CORAL HONEYSUCKLE. High climbing, all the leaves smooth or somewhat downy beneath. Flowers on a common flower stem. Corolla 5-lobed, the lobes nearly or quite equal. Flowers scarlet, fading to yellow, the tube usually an inch or more long. Low grounds, Connecticut and southward. April-Sept.

Erect Shrubs

6. *L. coerulea*, L. (Fig. 4, pl. 156.) MOUNTAIN FLY-HONEYSUCKLE. Erect, 1 to 2 ft. high. Leaves oval, downy when young, very blunt at apex, pale beneath. Flowers in pairs, yellow, on very short flower stems, from the leaf-axils. Flowers 2-lipped. Berries blue. Rocky woods. May-June.

7. *L. oblongifolia*, (Goldie) Hook. (Fig. 5, pl. 156.) SWAMP FLY-HONEYSUCKLE. Flowers on long flower stems. Corolla hairy, 2-lipped, yellow. Berries red. Northern New England and New York.

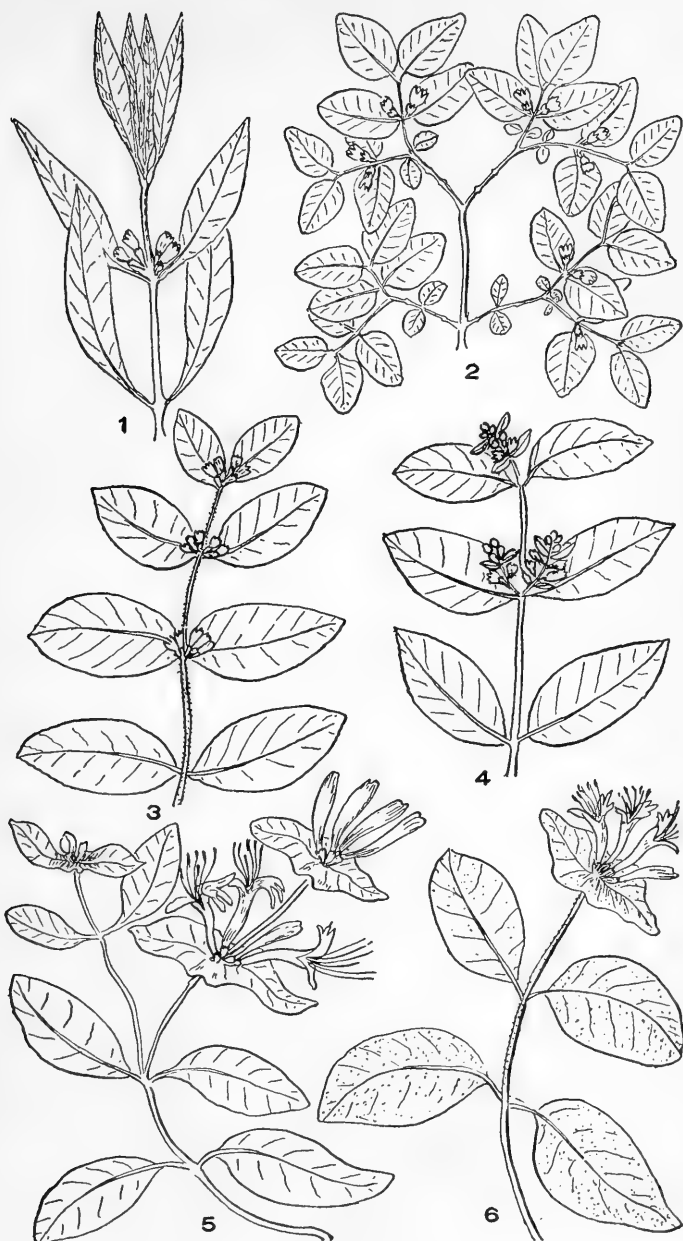


PLATE 155

1. *Triosteum angustifolium*. 2. *Symphoricarpos pauciflorus*. 3. *S. orbiculatus*. 4. *S. racemosus*. 5. *Lonicera caprifolium*. 6. *L. hirsuta*.

8. **L. canadensis**, Marsh. (Fig. 1, pl. 157.) AMERICAN FLY-HONEY-SUCKLE. (*L. ciliata*, Muhl.) Shrub, 2 to 3 ft. high. Leaves oval or egg-shaped, sharp pointed at apex, somewhat downy on under side, when young. Flowers in pairs, greenish yellow, *not 2-lipped*, the 5 rounded lobes nearly or quite equal. Moist woods, most of our range. May.

9. **L. tartarica**, L. (Fig. 6, pl. 156.) TARTARIAN BUSH-HONEY-SUCKLE. Is larger shrub than *L. canadensis*; 5 to 10 ft. high, the leaves egg-shaped, but more heart-shaped at base than the former, 1 to 3 in. long. Margins of leaves not hairy. Flowers pink or white, 5-lobed, somewhat 2-lipped. Escaped from cultivation locally. May.

10. **L. involucrata**, (Richards) Banks. INVOLUCRED FLY-HONEY-SUCKLE. Shrub, 3 to 10 ft. high. Leaves oval or egg-shaped, sharp pointed at apex. Flowers in pairs, yellow, tube cylindric, lobes 5, equal, spreading, the whole corolla somewhat downy. Berries nearly black. Below the flower are leaf-like, oval or ovate bracts. Woods, northern part of our range. June-July.

A few other species, introduced from Asia or Europe, have escaped from cultivation and are found locally growing wild.

7. DIERVILLA, Moench.

Our species a small shrub, resembling the *Loniceras*, with opposite leaves, 2 to 4 ft. high. Flowers yellow, in groups of 3 or more. Calyx slender, elongated, contracted toward the throat, border of 5 linear lobes. Corolla 5-lobed, regular or nearly so. Stamens 5.

D. Lonicera, Mill. (Fig. 2, pl. 157.) BUSH HONEYSUCKLE. (*D. Diervilla*, (L.) Mas M.) Flowers yellow. Capsule long, slender and terminated by the persistent calyx-lobes. Dry rocks and rocky woods, throughout our range. May-June.

Order IX—VALERIANALES. The Valerian Order

Differs from the preceding order in that while among the *Rubiales* the stamens are mostly as many as the lobes of the corolla, or twice as many, in *Valerianales* the stamens are most *fewer* than the corolla lobes. The ovary is 1-celled with a single pendulous ovule, or 3-celled, but still with only 1 ovule. The order contains herbs mostly with opposite leaves and perfect flowers, *the anthers being separate* as in the preceding order, and the *calyx above and more or less adherent to the ovary*.

Ovary of 1 cell only **DIPSACACEAE**

Ovary of 3 cells, 2 of which are empty . **VALERIANACEAE**

FAMILY I.—VALERIANACEAE. VALERIAN FAMILY

Usually tall, strong smelling herbs. Stem leaves always opposite, the principal leaves being basal, usually more or less lobed.

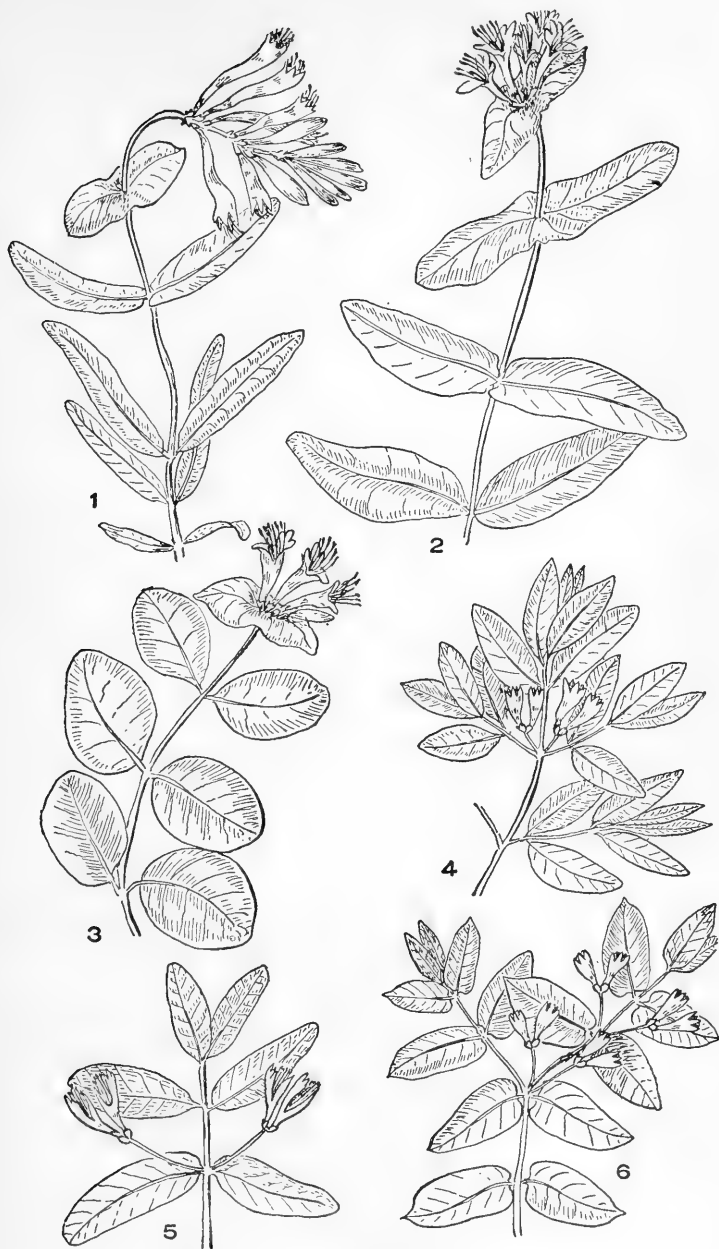


PLATE 156

1. *Lonicera sempervirens*. 2. *L. dioica*. 3. *L. glaucescens*. 4. *L. coerulea*.
5. *L. oblongifolia*. 6. *L. tartarica*.

Flowers in terminal spreading clusters or contracted into rather dense heads. Calyx tube adherent to the ovary, its divisions being superior to it, these divisions consisting of 5 to 15 bristle-like teeth which, inconspicuous in the flower, in fruit are rolled outward. Corolla tubular or funnel-form, usually gibbous at base, the border consisting of 5 equal teeth. Stamens 1 to 4, mostly 3, inserted in the corolla and alternate with its lobes, usually extending beyond the corolla. Ovary of 1 to 3 cells, only one cell containing a developed ovule. Fruit dry, one-seeded.

1. VALERIANA, L.

Characters those of the Family, the fruit being only one-celled.

1. **V. uliginosa**, (T. & B.) Rydb. (Fig. 5, pl. 157.) SWAMP VALERIAN. (*V. sylvatica*, Banks.) Plant smooth, erect, $\frac{1}{2}$ to $2\frac{1}{2}$ ft. high. Basal leaves on long leaf-stalks, spatula-formed, often with one or more pairs of opposite narrow lobes at the base of the blade. Stem leaves of 3 to 13 leaflets arranged on each side of the long leaf-stalk, 2 to 6 pairs and an odd leaflet. Flower cluster loosely pyramidal. Flowers pink or nearly white; the corolla tube short. Vermont, New York and westward.

2. **B. officinalis**, L. (Fig. 4, pl. 157.) GARDEN VALERIAN. A larger plant than No. 1, and all the leaves are divided like the stem leaves of *V. uliginosa*. Escaped from gardens, occasional.

3. **V. pauciflora**, Michx. (Fig. 3, pl. 157.) LARGE-FLOWERED VALERIAN. Stem smooth, erect or ascending, slender, 1 to 3 ft. high. Root leaves egg-shaped, heart-shaped at base, toothed at borders. Stem leaves compound feather-formed, of 3 to 7 leaflets. Flower cluster terminal; flowers fewer than in the other species, the tube of the corolla from $\frac{1}{2}$ to nearly 1 in. long. Penna., and southward. May-June.

2. VALERIANELLA, Poll.

Characters as above, but the ovary is 3-celled, with only 1 cell ovule bearing. Flowers in dense terminal clusters.

Flowers pale blue *V. Locusta*
Flowers white.

Fruit triangular *V. chenopodifolia*
Fruit 4-angled *V. radiata*
Fruit round *V. Woodsiana*

1. **V. Locusta**, (L.) Bettke. (Fig. 1, pl. 158.) EUROPEAN CORN SALAD. Plant 6 to 12 in. high, smooth, repeatedly forked. Basal leaves spatula-form, rounded at apex, 1 to 2 in. long. Flower clusters dense, rounded, about $\frac{1}{2}$ in. diameter. Corolla blue. Fruit somewhat orbicular in general outline. Waste places. Naturalized in places. April-July.

2. **V. chenopodifolia**, (Pursh.) DC. (Fig. 2, pl. 158.) GOOSE-FOOT CORN SALAD. Stem 1 to 2 ft. high, smooth. Leaves all spatula-formed, without teeth at margins. Flowers white. Fruit 3-angled, pyramidal, $\frac{1}{4}$ of an inch high. Moist soil, New York and southward. May-July.

3. **V. radiata**, (L.) Dufr. (Fig. 3, pl. 158.) BEAKED CORN SALAD. Plant, $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high, smooth or with few hairs. Lower leaves spatula-

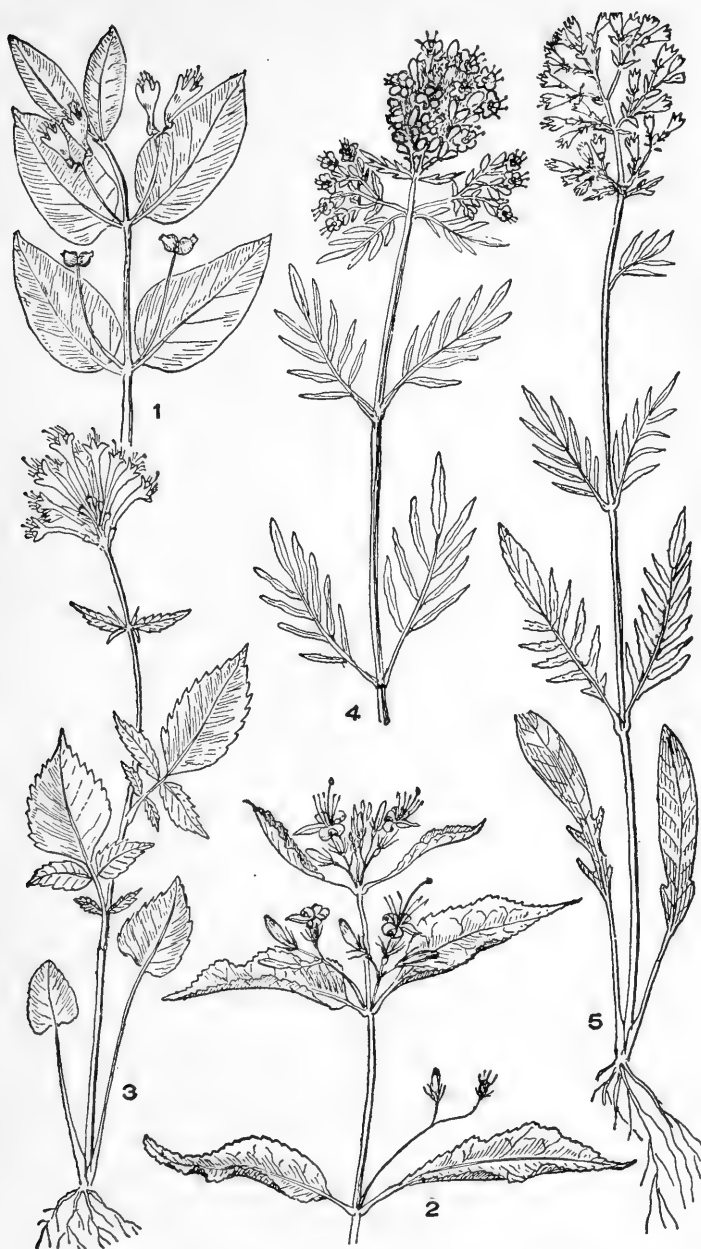


PLATE 157

1. *Lonicera canadensis*. 2. *Diervilla Lonicera*. 3. *Valeriana pauciflora*.
4. *V. officinalis*. 5. *V. uliginosa*.

form, upper lance-shaped, toothed at margins, the pairs of leaves on upper part of stem often joined around it. Flower clusters small, $\frac{1}{2}$ to $\frac{1}{4}$ in. in diameter. Flowers white. Fruit narrowly ovate with 4 angles. Moist soil, New York, southward and westward. May-July.

4. *V. Woodsiana*, (T. and G.) Walp. (Fig. 4, pl. 158.) Wood's CORN SALAD. Plant sometimes 3 ft. high, smooth. Lower leaves spatula-formed, upper lance-shaped or narrowly oblong, usually toothed at margins. Flower heads $\frac{1}{2}$ in. broad. Fruit nearly globular. Moist soil. Southern part of our area. May-July.

FAMILY II.—DIPSACACEAE. TEASEL FAMILY.

Herbs with opposite or sometimes whorled leaves, without stipules. Flowers in dense elongated heads from an elongated receptacle, the heads subtended by bracts, very conspicuous in *Dipsacus*, but resembling calyx segments in *Scabiosa*. Calyx adherent to the ovary, its border cup-shaped or divided into spreading bristles. Corolla tube enlarged at throat, the border 2 to 5 lobed. Stamens 4, alternate with the corolla lobes. Ovary below the calyx border, 1-celled, 1-ovuled. Fruit a dry hard shell including 1 seed.

Bracts below the flower head as long as or longer than the flower head *Dipsacus*

Bracts below the flower head shorter than the flower head.

Receptacle not chaffy *Knautia*

Receptacle chaffy *Succisa*

I. DIPSACUS, L.

Herbs, stout, tall, prickly. Leaves opposite, large, dentate or lobed. Flowers in heads about the size and shape of a hen's egg, the head arising above an involucre of long linear prickly bracts which rise around the head nearly to the level of its summit. Flowers lilac, each surrounded at its base by a prickly scale (an involucl). Stamens 4. The two species found in our area have been introduced from Europe, largely originating about woolen mills. The ripe teasel heads are, in Europe, used in the process of "carding" wool.

1. *D. sylvestris*, Huds. (Fig. 7, pl. 158.) WILD TEASEL. Stem erect, stiff, 3 to 6 ft. high, with many prickles. Leaves without leaf-stalks, the lower oblong, sometimes lobed, 8 to 12 in. long, the upper lance-shaped, united about the stem. Bracts longer than the flower heads. Waste places. July-Sept.

2. *D. laciniatus*, L. CUT-LEAVED TEASEL. Leaves once or twice feather-compound. Established at Albany, N. Y. (C. H. Peck.)

2. KNAUTIA, L.

Herbs with opposite leaves and flowers in dense heads, subtended by a several-bracted involucre, the flowers arising from a flattened receptacle



PLATE 158

1. *Valerianella Locusta*. 2. *V. chenopodiifolia*. 3. *V. radiata*. 4. *V. Woodsiana*. 5. *Knautia arvensis*. 6. *Succisa australis*. 7. *Dipsacus sylvestris*.

without chaff. Calyx border consisting of 8 bristle points. Corolla 4- or 5-lobed. Stamens 4 (rarely 2). Naturalized from Europe.

K. arvensis, (L.) T. Coulter. (Fig. 5, pl. 158.) **FIELD SCABIOUS**. Stem 1 to 3 ft. high, erect, slender, little branched. Lower leaves lance-shaped, on long leaf-stalks, often lobed on each side. Upper leaves without leaf-stalks, deeply lobed on each side. Flowers lilac purple.

3. **SUCCISA**, (Rupp.) Neck.

Rather tall herbs, resembling *Knautia*, but the flattened receptacle is decidedly chaffy, the chaff about equalling the flowers.

S. australis, (Wulf.) Reichenb. (Fig. 6, pl. 158.) **SOUTHERN SCABIOUS**. Stem usually dividing into 3s, 1 to 3 ft. high, rather hairy with short or stiff reflexed hairs. Leaves lance-shaped, borders not lobed or notched. Heads of flowers about $\frac{1}{2}$ in. in diameter. Calyx with 5 teeth, not bristled. Corolla light blue. Meadows and cultivated fields. Introduced. Occasional.

Order X.—**CAMPANULALES**. Order of Aggregated Flowers

The calyx or the plumous hairs representing it, always above the ovary. Stamens usually 5. When a corolla is present (as it is in the non-aggregated flowers) it is 5-lobed and the calyx is 5-lobed, the 5 stamens alternating with the 5 lobes of the corolla. The stamens are not, as in the former order, attached to the tube of the corolla, but arise from the summit of the ovary. In the *Campanulaceae* and *Cucurbitaceae* the corolla and calyx are each fully developed, in the other families one or both may be reduced to an aigrette of hairs or scales.

Flowers not aggregate on a common receptacle.

Vines **CUCURBITACEAE**

Erect herbs **CAMPANULACEAE**

Flowers aggregate on a common receptacle subtended by an involucre.

Flowers all *ray flowers* **CICHORIACEAE**

Flowers all tubular or the outer row *ray flowers*.

Stamens distinct or nearly so . . . **AMBROSIACEAE**

Stamens united by their anthers (except in *Kuhnia*) **COMPOSITAE**

FAMILY I.—**CUCURBITACEAE**. Gourd Family

Herbaceous climbing vines, usually climbing by tendrils. Leaves

alternate, radiately lobed or dissected. Flowers solitary or in lengthened clusters, the stamens and pistils occupying separate flowers of the same plant (monoecious) or separate flowers on different plants (dioecious). Calyx cohering with the 1- to 3-celled ovary, the 5 to 3 stamens united by their anthers. In certain cases there is but a single stamen. Ovary 1- to 3-celled. Fruit fleshy or sometimes membranous. (In cultivation we have the cucumber, the squash, muskmelon and pumpkin as representatives of this family.)

1. MICRAMPELIS, Raf. (*Echinocystis*, T. & G.)

Climbing herbs with branched tendrils, lobed or angled leaves and small flowers, the staminate and the pistillate separate on the same plant. Calyx and corolla each 5- or 6-lobed. Stamens 3 in the staminate flowers. Fruit fleshy, dry later, spiny, usually with 2 seeds.

M. lobata, (Michx.) Greene. (Fig. 7, pl. 159.) WILD BALSAM APPLE. Stem climbing, 15 to 25 ft. long. Leaves 5- to 7-lobed on leaf stems 1 to 3 in. long. The pistillate flower solitary or occasionally 2 together. Fruit 2 in. long. Along river banks in our area. July-Sept.

2. SICYOS, L.

Climbing vine with branched tendrils and small green flowers of 2 kinds, the staminate and pistillate on the same plant. Calyx and corolla, each 5-parted. Stamens 3, the filaments united into a column. Pistillate flowers several in a group. Fruit prickly.

S. angulatus, L. (Fig. 6, pl. 159.) BUR CUCUMBER. Stem angled, 15 to 25 ft. long. Leaves nearly round, with 5 angles and heart-shaped base. Fruit 1-seeded. River banks, throughout our range. June-Sept.

FAMILY II.—**CAMPANULACEAE.** BELLFLOWER FAMILY

Herbs with alternate or basal leaves, without stipules. Flowers with stamens and pistils and with the corolla of one petal composed of the union of several; regularly 5-lobed or irregular; inserted between the calyx and ovary, the ovary being inferior to the calyx. Stamens 5, inserted into the summit of the ovary. Anthers separate or united into a ring or tube. Style simple. Fruit usually a capsule, sometimes a berry.

Flowers regular.

Corolla bell-shaped **Campanula**

Corolla wheel-shaped **Specularia**

Flowers 2-lipped **Lobelia**

1. CAMPANULA, L.

Herbs with alternate or basal leaves. Flowers scattered. Calyx adherent to the ovary, of 5 slender divisions (or rarely 3 or 4). Corolla

regular, bell-shaped, 5-lobed. Stamens 5, not combined. Style 1. Capsule 2 to several cells, usually crowned with the persistent calyx-lobes. Flowers usually showy, blue.

Stems smooth or without stiff hooked hairs.

Flowers in a loose cluster, basal leaves round *C. rotundifolia*

Flowers in one-sided spikes, not leafy *C. rapunculoides*

Flowers in a leafy spike *C. americana*

Flowers mostly in a glomerate cluster at summit of stem *C. glomerata*

Stems rough with stiff hooked hairs *C. aparinoides*

1. *C. rotundifolia*, L. (Fig. 2, pl. 159.) HARE BELL. BLUE BELLS OF SCOTLAND. Stem very slender, $\frac{1}{2}$ to 2 ft. high. Lower leaves round, with rounded teeth at the margins. These leaves are usually absent at flowering time. Stem leaves linear or oblong, more or less indented. Flowers generally several, nodding, bell-shaped, blue. Moist rocky places, throughout our range. June-Sept.

2. *C. rapunculoides*, L. (Fig. 1, pl. 159.) CREEPING BELLFLOWER. Stem 1 to 3 ft. high, branching or simple. Leaves egg-shaped, hairy. Flowers bell-shaped, blue, in a one-sided spike, the flowers crowded. Roadsides. Naturalized in many places. July-Sept.

3. *C. glomerata*, L. CLUSTERED BELLFLOWER. Stem 1 to 2 ft. high, usually simple. Leaves and stem hairy, the lower oblong, elliptic or less frequently egg-shaped, generally on long, sometimes on very long (3 to 5 in.) leaf-stalks. The upper leaves lance-shaped. Flowers mostly in a terminal rather dense flattened cluster, blue. Naturalized, found along roadsides, eastern Mass. June-Aug.

4. *C. aparinoides*, Pursh. (Fig. 3, pl. 159.) MARSH BELLFLOWER. Stem very weak, almost vine-like, $\frac{1}{2}$ to 2 ft. high, clinging by its hooked hairs to grasses and weeds, branching above, triangular. Leaves lance-shaped or linear. Flowers in a diffuse terminal cluster, small, bell-shaped, blue or nearly white. In wet meadows, leaning on grasses or water plants. June-Aug.

5. *C. americana*, L. (Fig. 4, pl. 159.) TALL BELLFLOWER. Erect, tall, 2 to 6 ft. high. Leaves broad lance-shaped, 3 to 6 in. long. Flowers in a leafy spike. Copses or woods. July-Sept.

SPECULARIA, Heister. (*Legouzia*, Durand)

Annual herbs, with slender stem and branches, alternate leaves and blue or purplish flowers arising from the leaf-axils. In some species the earlier flowers are fertilized without the opening of the flower, the later ones are wheel-shaped. Calyx 5- (or 3- or 4-) lobed, the tube narrow. From a short, narrow tube the 5 conspicuous lobes of the corolla spread wheel-shaped. Stamens 5, not united at the top; the style bearing 3 stigmas. Capsule 3-celled, prismatic or oblong.

S. perfoliata, DC. (Fig. 5, pl. 159.) VENUS'S LOOKING-GLASS. Plant hairy, 3 to 20 in. high, densely leafy. Leaves round or broadly egg-shaped, notched at margins, *clasping the stem* by the heart-shaped base, or the lowest not clasping. Flowers arising in the leaf-axils and partly enclosed by the leaves, 1 to 3 in a group, the blue star-shaped corolla $\frac{1}{2}$ to $\frac{3}{4}$ in. broad. Dry open ground or in woods. May-Aug.



PLATE 159

1. *Campanula rapunculoides*. 2. *C. rotundifolia*. 3. *C. aparinoides*. 4. *C. americana*. 5. *Specularia perfoliata*. 6. *Sicyos angulatus*. 7. *Micrampelis lobata*.

3. LOBELIA, L.

Herbs, with alternate or basal leaves and scattered flowers. Corolla irregular, 5-lobed, 2-lipped. Calyx tube adhering to the ovary. Stamens not attached to the corolla, the anthers of 2 of them (or all of them) bearded at the top.

Leaves all basal, hollow tubes	<i>L. Dortmanna</i>
Leaves flat, alternate along the stem.	
Flowers bright scarlet	<i>L. cardinalis</i>
Flowers blue to white.	
Stem leaves pear-shaped or oval blunt at the apex.	
Flowers less than $\frac{1}{2}$ in. long	<i>L. puberula</i>
Flowers more than $\frac{1}{2}$ in. long	<i>L. spicata</i>
Stem leaves egg-shaped, ends acute.	
Calyx lobes downy	<i>L. syphilitica</i>
Calyx lobes not downy	<i>L. inflata</i>
Stem leaves narrow lance-shaped or linear.	
Flower stem longer than the flower	<i>L. Kalmii</i>
Flower stem shorter than the flower.	
Stem usually reclining	<i>L. Nuttallii</i>
Stem erect	<i>L. Canbyi</i>
Stem leaves nearly absent	<i>L. paludosa</i>

1. *L. Dortmanna*, L. (Fig. 4, pl. 160.) WATER LOBELIA. Leaves all basal, linear, fleshy, tufted. Flower scape 6 to 18 in. high, smooth or with a few scales. Flowers scattered along the upper $\frac{1}{3}$, blue, on slender flower stems. Borders of ponds, sometimes wholly under water.

2. *L. cardinalis*, L. (Fig. 1, pl. 160.) CARDINAL FLOWER. Stem leafy, tall, 2 to 4 ft. high. Leaves broad lance-shaped or oval, 2 to 6 in. long, slightly toothed. Flowers in an elongated terminal cluster, bright scarlet. Low grounds, throughout our range. July-Sept.

3. *L. syphilitica*, L. (Fig. 3, pl. 160.) BLUE CARDINAL FLOWER. Stem rather stout, somewhat hairy. Leaves lance-shaped, slightly toothed. Flowers in a dense narrow spike, somewhat leafy. Corolla blue. In moist soil, throughout our range. July-Oct.

4. *L. puberula*, Michx. (Fig. 8, pl. 166.) DOWNY LOBELIA. Plant somewhat downy throughout. Stem slender, rarely branched, 1 to 3 ft. high. Leaves oval 1 to 2 in. long, with small teeth. Flower spike rather one-sided, flowers blue. Moist grounds, southern New Jersey and southward. Aug.-Oct.

5. *L. spicata*, Lam. (Fig. 10, pl. 160.) PALE SPIKED LOBELIA. Stem slender, not branched, leafy, 1 to 4 ft. high. Leaves broadly oblong, oval or inversely egg-shaped, the margins barely notched, apex blunt, the upper ones narrower and less rounded at apex. Flowers pale blue in a dense or somewhat loose spike. Dry soil, throughout our area. June-Aug.

6. *L. inflata*, L. (Fig. 5, pl. 160.) INDIAN TOBACCO. Stem much branched, downy, 1 to 2 ft. high. Leaves egg-shaped, oval to lance-shaped, finely dentate at margins, gradually becoming smaller until among the flowers they become bracts. Flowers blue, scattered along the stem. The fruit is round and much inflated. In dry fields, a poisonous weed, throughout our area. July-Nov.

7. *L. Kalmii*, L. (Fig. 7, pl. 160.) BROOK LOBELIA. Stem 4 to 18 in. high, leafy, erect, smooth, branching above. Lower leaves spatula-formed, rounded at apex, upper leaves linear. Flowers blue in somewhat



PLATE 160

1. *Lobelia cardinalis*. 2. *L. Canbyi*. 3. *L. syphilitica*. 4. *L. Dortmanna*.
 5. *L. inflata*. 6. *L. paludosa*. 7. *L. Kalmii*. 8. *L. puberula*. 9. *L. Nuttallii*.
 10. *L. spicata*.

diffuse clusters, following the slender branches, on very slender flower stems, which are not as long as the linear leaf-bract at the base of the flower-stem but as long as the flower. Wet places, Maine to New Jersey and westward. July-Sept.

8. *L. Nuttallii*, Roem and Schult. (Fig. 9, pl. 160.) **NUTTALL'S LOBELIA**. Stem 1 to 2 ft. high, weak, often reclining. Leaves spatula-formed to oval, blunt at apex, the upper linear. Flowers blue, in diffuse clusters, on flower-stems *shorter than the flowers*. Swamps, New Jersey and westward. June-Sept.

9. *L. Canbyi*, Gray. (Fig. 2, pl. 160.) **CANBY'S LOBELIA**. Stem slender, simple or branched above, 2 to 3 ft. high. Leaves all linear. Flowers in slender spikes on flower-stems shorter than the flowers. Corolla blue, $\frac{1}{2}$ in. long, bearded in the throat. Wet places, New Jersey and southward. July-Sept.

10. *L. paludosa*, Nutt. (Fig. 6, pl. 160.) **SWAMP LOBELIA**. Aquatic, with few leaves on the stem. Root leaves spatula-form, stem leaves linear. Stem 1 to 4 ft. high. Flowers pale blue. Delaware and south. May-July.

FAMILY III.—CICHORIACEAE. CHICORY FAMILY

This family includes a part of that large group of plants whose flowers are known as *Composite*. They are grouped in heads upon a *receptacle*, which is the expanded end of the stem, upon which they are more or less densely crowded. The individual flowers are never possessed of all the details which we are accustomed to associate with a typical flower, yet each of the elements of the flower may in fact be present. In the case of the present family the receptacle is flat or nearly so, its surface naked or scaly or studded with stiff hairs or marked with small pits. The separate flowers are *always perfect*, i. e., each has stamens and pistils, and further, each has a corolla consisting of a tube and a ray upon one side only, the ray being 5-toothed. Owing to the shape of this ray it is said to be *ligulate* or strap-like. *All the flowers in the head are ligulate*. The calyx for the individual flowers is less uniform. It may consist of an aigrette of stiff hairs, which may be plumed or not, it may consist of low scales or even these scales may be absent. The plants are herbs (in our country) usually with a milky or acrid juice, with leaves all basal or scattered on the stem. Underlying and partly surrounding the head of flowers is a circle of leafy bracts, in a single row or in more than one row, called the *involucre*. In this family the rows of bracts are usually several, but there may be but one. The fruit is a small, dry 1-celled, *achene*, from the apex of which arise the hairy or scale-like calyx and the corolla as well as the stamens and pistil. Example, the seed and plume of the dandelion.

Calyx formed by a little crown of scales.

Receptacle not chaffy.

Flowers blue **Cichorium**

Flowers yellow **Krigia**

Calyx none or a simple inconspicuous ring.

Receptacle not chaffy.

Flowers yellow.

Flower scape enlarging toward (below) the
flower head, leaves basal **Arnoseris**

Flower scape not thickening or enlarging below
the flower head, leaves mostly on the stem.

Fruit 20 to 30 ribbed **Lapsana**

Calyx of 1 row of plumose bristles.

Leaves all basal.

Receptacle chaffy **Hypochaeris**

Receptacle not chaffy **Leontodon**

Leaves, at least some of them, growing from the stem.

Plant hairy, flowers yellow **Picris**

Plant not hairy, flowers purple or yellow **Tragopogon**

Calyx of an aigrette of hairs which are *not plumose, but
toothed.*

Fruit (achene) surmounted by a column from the summit
of which the hairs radiate, the achene hairy or with
many little spines **Taraxacum**

Fruit similar to above, but achene not spiny or hairy,
though possibly rough.

Fruit (achene) flattened **Lactuca**

Fruit blunt at top, without a column.

Fruit flattened and roughened **Sonchus**

Fruit cylindric.

Flowers yellow.

Involucre of 1 long and 1 short row of bracts **Crepis**

Involucre of several rows of bracts of irregular

length **Hieracium**

Flowers cream, white or purple **Prenanthes**

1. CICHORIUM, L.

Branching perennial herbs, with stem leaves grass-like, clasping and
with a rosette of basal leaves. Flowers blue, purple or pink, the heads
among the branches with short pedicels or none, usually 2 or more in a

group. The involucre is double, the internal row of 8 bracts, the external of 5, much shorter. Flower rays 5-toothed, all the teeth in the same plane. Calyx represented by 2 or 3 series of short blunt scales.

C. Intybus, L. (Fig. 1, pl. 161.) CHICORY. Stems stiff, branched, 1 to 3 ft. high. Basal leaves incised, or lobed, 3 to 6 in. long; upper leaves lance-shaped. Flowers in clusters on very short stems or none, blue, rarely white. Roadsides and waste places. July-Oct.

KRIGIA, Schreb. (Adopogon, Neck.)

Herbs, nearly smooth, the stem bearing a single head or more than one head. Leaves mostly basal, in our species one or more stem leaves or none. Leaves entire, wavy or lobed. Involucre of 6 to 15 bracts in 1 or 2 series, all of about the same length. Receptacle flat, without scales. Rays 5-toothed, abrupt at apex. Calyx represented by 1 or 2 series of bristles (*pappus*).

1. **K. virginica**, (L.) Willd. (Fig. 6, pl. 161.) VIRGINIA GOATS-BEARD. Smooth. Lower leaves tufted on long leaf-stalks, which broaden into lance-shaped or rounded leaf-blades, which at the margins are wavy, or more or less incised, 2 to 7 in. long. Toward the summit of the scape is a single oblong leaf which clasps the stem. Above this leaf one or more branches may arise each of which, as well as the main stem, may be terminated by a flower head. Flowers yellow. Scape about 1 ft. high. Dry sandy soil, Maine to Mass. May-Oct.

2. **K. caroliniana**, Britton. (Fig. 2, pl. 161.) CAROLINA DWARF DANDELION. Basal leaves more lobed than those of No. 1, and the stem leaf is rarely present. Calyx represented by a series of fine bristles outside of which is a series of scales. Sandy soil, Maine to Southern Penna. April-Aug.

3. ARNOSERIS, Gaertn.

A low herb, smooth or nearly so, with tufted basal leaves and no stem leaves. The flower scape is branched and from the forks each stem enlarges gradually toward the head being, just below the head, quite thickened. The involucre is composed of a number of bracts in one series, which turn inward enveloping the head after the flowering period. Fruit without pappus, the only representative of a calyx being a narrow low band.

A. minima, (L.) Dumort. (Fig. 4, pl. 161.) LAMB SUCCORY. Leaves lance-shaped, 1 to 3 in. long. Scape branching, 3 to 12 in. high. Flowers yellow. Mt. Desert Island, Maine. Summer.

4. HYPOCHAERIS, L.

Herbs, with basal leaves and naked flower scapes more or less branching. Involucre of many bracts in several series. Receptacle chaffy. Fruit contracted into a short or long column from which arises the aigrette of plumose bristles.

H. radicata, L. GOSMORE. Basal leaves lobed, the lobes turned backward, hairy. Scape branched or simple. Flower head large, 1 in. in diameter, flowers yellow. Waste places, southern New Jersey. May-Oct.



PLATE 161

1. *Cichorium Intybus*. 2. *Krigia caroliniana*. 3. *Leontodon nudicaule*. 4. *Arnoseris minima*. 5. *Tragopogon pratensis*. 6. *Krigia virginica*. 7. *Lapsana communis*. 8. *Leontodon autumnale*.

5. **LAPSANA, L.**

Annual herb, with alternate leaves which are long, egg-shaped and thinly hairy. Margins with large angular or rounded teeth, the lower leaves somewhat feather-formed and the leaf-stalks of the larger leaves with large angular teeth near the leaf. Heads of flowers yellow in a loose irregular cluster. Involucre nearly cylindric, its bracts in a single series.

L. communis, L. (Fig. 7, pl. 161.) **SUCCORY DOCK-CRESS.** Stem 1 to 3½ ft. high, somewhat hairy below, smooth above. Apex of leaves obtuse, the upper leaves without leaf-stalks, lance-shaped. Heads numerous, about 1 in. broad. Waste places in most of our area. June-Sept.

6. **LEONTODON, L.**

Herbs, with deeply lobed basal leaves and flower scapes naked except for a few small scales. Involucre of a number of bracts, the principal being in 1 or 2 series with a few or no short ones in an outer series. Fruit contracting into a short column or none. Pappus plumose, arising directly from the fruit in our species.

1. L. autumnale, L. (Fig. 8, pl. 161.) **AUTUMN HAWKBIT. TALL DANDELION.** Plant smooth. Leaves lance-shaped, lobed. Involucre nearly cylindric. Scape 6 to 24 in. high. Heads one or several from the same scape. Flowers yellow. Fields and roadsides, our area. June-Nov.

2. L. nudicaule, (L.) Porter. (Fig. 3, pl. 161.) **ROUGH HAWKBIT.** Leaves not deeply lobed, often nearly entire, quite hairy. One head only on the scape. Flowers yellow. Waste places, eastern seaports and occasional in Penna. June-Oct.

7. **PICRIS, L.**

Coarse, leafy branching herbs, covered with stiff hairs. Leaves on the stem alternate with a cluster of leaves at base. Flowers in diffuse clusters at top of stem, yellow. Involucre of a row of bracts and one or two outer rows which may be shorter than the inner row or much larger and longer. Fruit cylindric with plumose pappus.

1. P. hieracioides, L. (Fig. 7, pl. 164.) **HAWKWEED PICRIS.** Branched, 1 to 3 ft. high, with many rather large yellow flowers. Leaves lance-shaped or broad, the upper clasping the stem, margins wavy or irregularly toothed. Outer bracts of the involucre linear. Fruit oblong cylindric with the aigrette arising directly or nearly so from the summit. Waste places, southern section of our area. June-Sept.

2. P. echinoides, L. (Fig. 8, pl. 164.) **BRISTLY OX-TONGUE.** Stem and leaves very hairy with stiff hairs. Plant about 2½ ft. high. Lower leaves spatula-formed, irregularly toothed. Heads numerous. Inner bracts of the involucre linear, the outer 4 or 5, broad, leaf-like, hairy. Aigrette arising from a column above the fruit. Waste places, eastern seaports. July-Sept.

8. **TRAGOPOGON, L.**

Herbs, biennial or perennial, branching *herbs*, with alternate linear, entire, leaves which clasp the stem at the base. Heads of purple or yellow

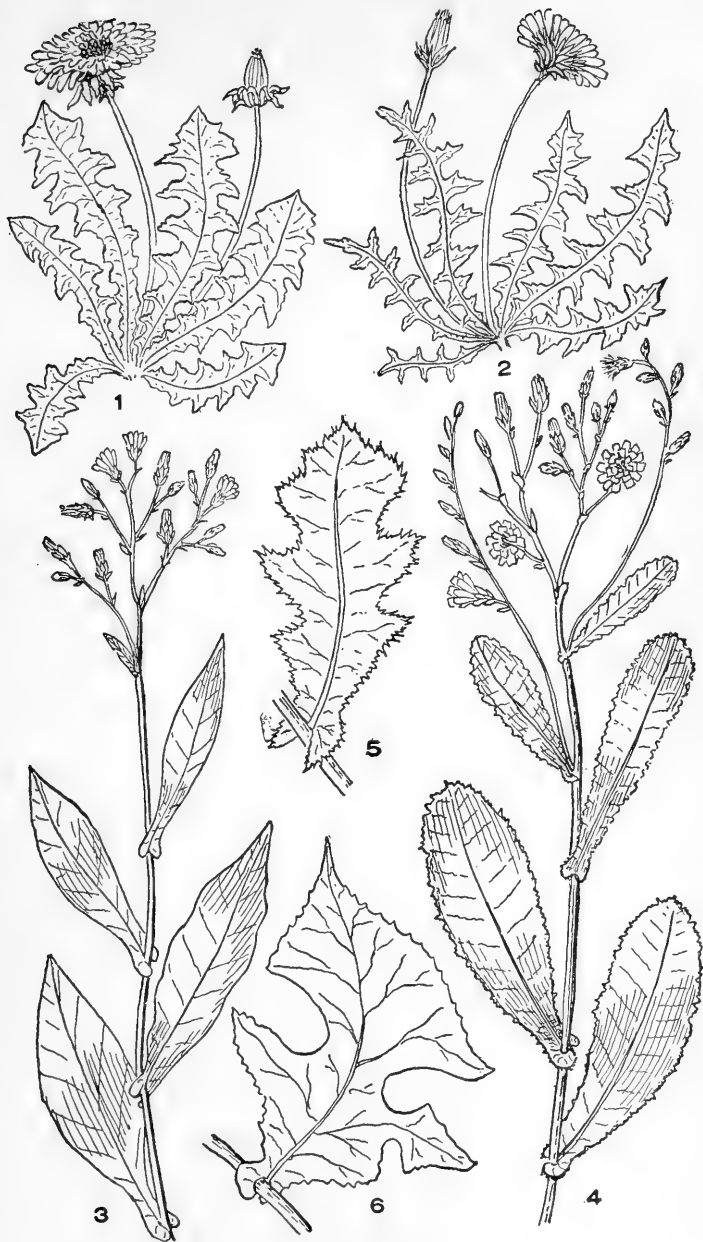


PLATE 162

1. *Taraxacum officinale*. 2. *T. erythrospermum*. 3. *Lactuca sagittifolia*.
4. *L. virosa*. 5. *L. Scariola*. 6. *L. floridana*.

flowers on long flower-stems. Involucre a single row of bracts which open in the morning and close toward noon. Plumose aigrette radiating from a "beak" or column.

1. **T. pratensis**, L. (Fig. 5, pl. 161.) YELLOW GOATS-BEARD. MEADOW SALSIFY. Outer rays longer than the bracts of the involucre. Stem 1½ to 3 ft. high. Fields and meadows, New Jersey and northward. June-Oct.

2. **T. porrifolius**, L. OYSTER PLANT. PURPLE SALSIFY. Rays of the purple flowers much shorter than the slender, tapering bracts of the involucre. Leaves linear, broader toward base. Stem 2 to 4 ft. high. Fields and meadows, escaped from gardens. June-Oct.

9. TARAXACUM, Hall.

Perennial herb, the leaves all basal, lance-shaped, deeply lobed. Flower scape hollow, bearing a single head of many yellow flowers. Involucre double, an inner series nearly equal and an outer of many unequal but shorter bracts. Receptacle flat, naked. Fruit nearly linear, rough, suddenly terminating in a long beak or column from which radiates the aigrette of thread-like bristles.

1. **T. officinale**, Weber. (Fig. 1, pl. 162.) DANDELION. (*T. Taraxacum*, (L.) Karst.) Found in fields, lawns and waste places. After the blooming the greenish-brown fruits with their aigrettes of pappus expand into a delicate white globe, which is broken and distributed by the wind when not eaten by birds. Blooms from early spring to late autumn.

2. **T. erythrospermum**, Andr. (Fig. 2, pl. 162.) RED-SEEDED DANDELION. Resembles the last, but leaves narrower and lobes extend to midrib. *Fruit bright red or red brown.* Locations similar to those of No. 1.

10. SONCHUS, L.

Coarse weeds with leafy stems and diffuse clusters of yellow flowers. Leaves alternate, mostly clasping the stem by broad ear-like appendages at base, lobed, margins prickly. Involucre egg-shaped or bell-shaped, its bracts of several overlapping series. Receptacle, flat, naked. Fruit oblong, oval or linear, ribbed, rough. The aigrette of soft white silky threads without a beak or column.

1. **S. arvensis**, L. (Fig. 4, pl. 163.) CORN SOW-THISTLE. Plant 2 to 4 ft. high. Lower leaves often a ft. long, narrowed into short leaf-stalks. *Flower stems and involucre hairy.* Low grounds, roadsides, etc. July-Oct.

2. **S. oleraceus**, L. (Figs. 1 and 2, pl. 163.) ANNUAL SOW-THISTLE. Stem 1 to 10 ft. high. Basal leaves on long leaf-stalks, expanding into a deeply-lobed blade terminated by a broad triangular segment. The ear-like appendages with sharp angles. *Involucre not hairy.* Fields and waste places. May-Nov.

3. **S. asper**, (L.) All. (Fig. 3, pl. 163.) SHARP-FRINGED SOW-THISTLE. Leaves spiny toothed; ear-like appendages at base of leaves rounded. *Involucre not hairy.* Waste places, most of our area. May-Nov.



PLATE 163

1. *Sonchus oleraceus*. 2. Another form of the same. 3. *S. asper*. 4. *S. arvensis*.

II. LACTUCA, L.

Leafy herbs, with diffuse clusters of yellow, blue or white flowers, and alternate narrow leaves, which are lobed or not, the margins spiny, wavy or toothed. Heads several or many flowered, the involucre cylindric, of overlapping scales in 2 or more series. Receptacle flat, naked. *Fruit flattened*, oval to linear, with 1 to 5 ribs on each face, contracted into a column from the somewhat expanded summit of which spring the nearly simple soft hairs of the white or brown pappus.

Flowers Yellow

Margins of leaves spiny.

Lobed *L. Scariola*

Not lobed *L. virosa*

Margins not spiny.

Whole plant hairy.

Rays reddish yellow *L. hirsuta*

Rays blue *L. Morssii*

Plant not hairy or only the stem below hairy.

Lower leaves not lobed or only moderately so *L. sagittifolia*

Lower leaves conspicuously lobed *L. canadensis*

Flowers Blue

Leaves egg-shaped to broad lance-shaped.

Not deeply lobed *L. villosa*

Deeply lobed.

Margins with low teeth *L. floridana*

Margins with high pointed teeth *L. spicata*

1. *L. Scariola*, L. (Fig. 5, pl. 162.) PRICKLY LETTUCE. Biennial. Stem stiff, 2 to 7 ft. high, smooth above and smooth or hairy below. Leaves oblong or lance-shaped, the lower deeply lobed, the margins spiny, the base with an angular auricle each side of stem; upper leaves entire, clasping the stem. Heads numerous, 6- to 12-flowered. Waste grounds, New York, Penna. Aug.-Sept.

2. *L. virosa*, L. (Fig. 4, pl. 162.) STRONG-SCENTED LETTUCE. (*L. scariola*, var. *integrata*, Gren. and Gedr.) Plant erect, 2 to 7 ft. high, smooth. Leaves long pear-shaped, 2 to 10 in. long, $\frac{1}{2}$ to 3 in. broad, clasping the stem, margins finely and irregularly toothed, the longer teeth somewhat prickly. Under surface of mid-vein prickly, the prickles turning backward. Heads of flowers pale yellow, several on a single slender stem, the whole forming a loose pyramidal cluster. Fruit black, ribbed. Juice foetid, said to be an acrid narcotic. Waste places, our area and westward.

3. *L. canadensis*, L. (Fig. 1, pl. 165.) WILD LETTUCE. Stem 3 to 10 ft. high, leafy, branching above into the diffuse flower cluster. Whole plant smooth. Leaves, the lower on leaf stems, 6 to 12 in. long, deeply lobed, margins wavy or with low teeth, covered with a whitish bloom. Heads about 20-flowered. Damp soil, in most of our area. June-Nov.

4. *L. hirsuta*, Muhl. (Fig. 2, pl. 164.) HAIRY WOOD LETTUCE. Plant hairy, 2 to 3 ft. high. Leaves lobed. Heads numerous. Flowers yellow-purple to whitish. Dry soil, most of our area. July-Sept.

5. *L. Morssii*, Robinson. MORSE'S WILD LETTUCE. Similar to No. 3; involucre shorter and rays blue. Along salt meadows, Maine and eastern Mass. to New York.



PLATE 164

1. *Lactuca villosa*. 2. *L. hirsuta*. 3. *L. spicata*. 4. *Crepis virens*. 5. *C. biennis*. 6. *C. tectorum*. 7. *Pieris hieracioides*. 8. *P. echioides*.

6. *L. sagittifolia*, Ell. (Fig. 3, pl. 162.) **ARROW-LEAVED LETTUCE.** Biennial. Plant smooth throughout, 3 to 5 ft. high, not very leafy. Leaves not divided into lobes, oblong lance-shaped, the upper lance-shaped, the lower clasping with angular projections each side of the stem. Flowers yellow or purplish. Dry soil, our area. July-Sept.

7. *L. villosa*, Jacq. (Fig. 1, pl. 164.) **HAIKY-VEINED BLUE LETTUCE.** Stem 2 to 6 ft. high, the whole plant smooth. Leaves egg-shaped to oblong-lance-shaped, 4 to 6 in. long, not lobed, the margins irregularly toothed, the lower on leaf-stalks. Flowers numerous in a diffuse cluster, rays blue. Borders of woods, New York, westward and southward. July-Sept.

8. *L. floridana*, (L.) Gaertn. (Fig. 6, pl. 162.) **FLORIDA LETTUCE.** Stem 3 to 7 ft. high; plant smooth. Lower leaves triangular, deeply lobed, the margins toothed, 4 to 12 in. long. Heads numerous, with blue flowers. Moist places. July-Sept.

9. *L. spicata*, (Lam.) Hitchc. (Fig. 3, pl. 164.) **TALL BLUE LETTUCE.** Plant smooth, 3 to 12 ft. high. Lower leaves 5 to 12 in. long, deeply lobed, sharply toothed, with or without leaf-stalks. Flower heads numerous, rays blue. Moist places, throughout our range. July-Oct.

12. CREPIS, L.

Herbs, annual or perennial, the leaves mostly basal. Heads of yellow or orange flowers, small or medium in diffuse, more or less flattened clusters. Involucre cylindric or bell-shaped, the principal series of bracts equal, the exterior bracts small and irregular. Receptacle naked. Aigrette of many soft white bristles.

1. *C. tectorum*, L. (Fig. 6, pl. 164.) **NARROW-LEAVED HAWKSBEARD.** Annual herbs, with basal and stem leaves, the former narrow, lance-shaped, 4 to 6 in. long, indented or deeply lobed, *the lobes or margins rolled backward*, the upper leaves narrow with plane margins which, in case of the larger are rolled back at the margins. Stem 1 to 2 ft. high, the whole plant somewhat downy. Flower heads numerous, $\frac{1}{2}$ to 1 in. broad, the involucre about $\frac{1}{4}$ in. high. Fruit spindle-shaped, the ribs rough, the aigrette arising directly from the apex. Waste places, southern part of our area. June-July.

2. *C. virens*, L. (Fig. 4, pl. 164.) **SMOOTH HAWKSBEARD.** (*C. capillaris*, Wallr.) Plant smooth, not downy. Stem 1 to 2½ ft. high. Leaves mostly basal, lance-shaped or spatula-shaped, clasping at base, 5 to 8 in. long, deeply lobed or indented, *not rolled back at the margins*. Upper leaves linear. Flower heads numerous, involucre $\frac{1}{4}$ in. high, cylindric. Rays yellow. Fruit *smooth, 10-ribbed*. Waste places, southern section. July-Sept.

3. *C. biennis*, L. (Fig. 5, pl. 164.) **ROUGH HAWKSBEARD.** Whole plant usually rough hairy. Stem 2 to 3 ft. high. Basal leaves about 6 in. long, spatula-formed or oblong on leaf-stalks, lobed or prominently toothed, the margins not rolled back. Heads numerous, 1 to 1½ in. broad, the involucre $\frac{1}{2}$ in. high. Fruit somewhat conical with 13 ribs. Bristles very slender. Waste places, New York, New Jersey and Penna. June-Aug.

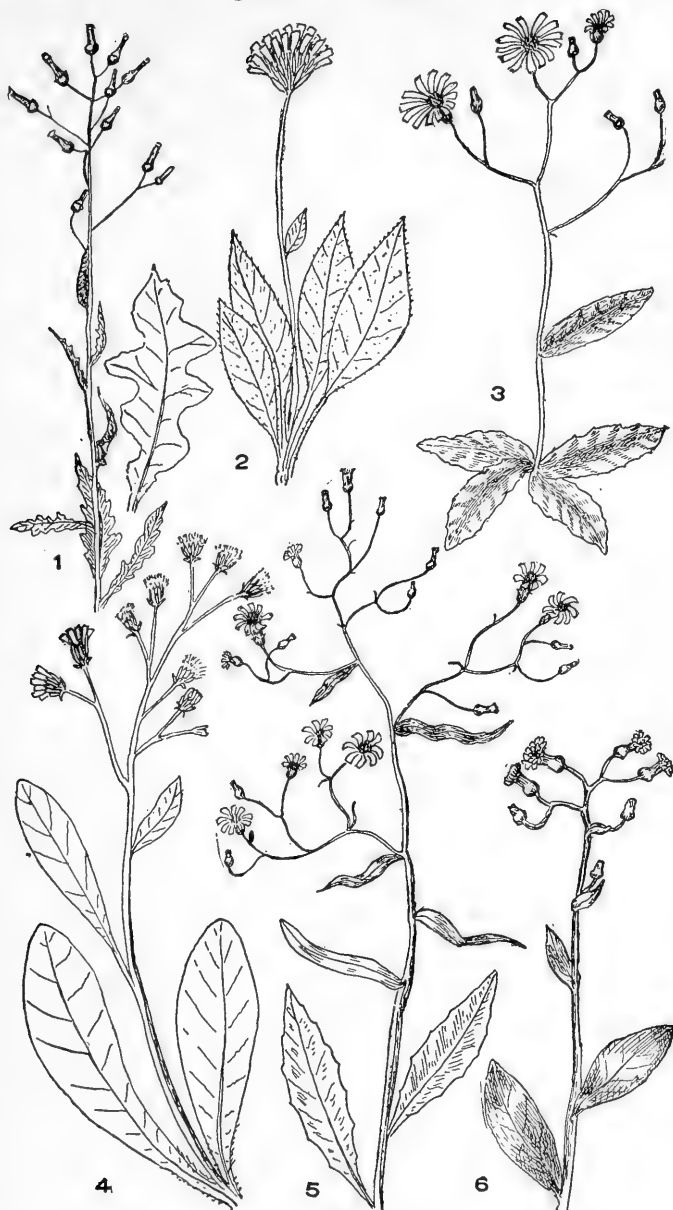


PLATE 165

1. *Lactuca canadensis*. 2. *Hieracium Pilosella*. 3. *H. venosum*. 4. *H. marianum*. 5. *H. paniculatum*. 6. *H. scabrum*.

13. *HIERACIUM*, L.

Herbs, mostly hairy but exceptionally without hairs, with basal or alternate leaves and small or not very large heads of flowers, mostly yellow or orange. Leaves entire or less frequently toothed. Involucre with the bracts more or less overlapping, the outer gradually diminishing. Receptacle flat, naked. Fruit not prolonged to a column or beak, aigrette one row of fine rough bristles.

Flower stems leafless or with one (rarely more) leaf and possibly a few bracts

- Stem leafless, bearing a single head *H. Pilosella*
 Stem bearing several heads.
 Leaves with very prominent teeth.
 Rounded or heart-shaped at base *H. murorum*
 Tapering at each end *H. vulgatum*
 Leaves with entire margins, or with low, inconspicuous teeth.
 Flowers orange-red *H. aurantiacum*
 Flowers yellow.
 Stem smooth or only slightly downy.
 Leaves purple veined *H. venosum*
 Leaves not purple veined.
 Leaves lance-shaped *H. florentinum*
 Leaves oblong or inversely egg-shaped.
 The flower stem not hairy *H. marianum*
 The flower stem hairy *H. Greenii*
 Stem very hairy *H. pratense*

Flower stem decidedly leafy

- Leaves conspicuously toothed *H. canadense*
 Leaves with low teeth or none.
 Plant not hairy or only slightly downy below *H. paniculatum*
 Plant decidedly hairy.
 Plant with tuft of lower leaves *H. Gronovii*
 Plant without a tuft of lower leaves *H. scabrum*

1. *H. Pilosella*, L. (Fig. 2, pl. 165.) MOUSE-EAR HAWKWEED. Plant propagated largely by runners which are leafy. Flowering scape slender, naked, not hairy, 4 to 10 in. high, bearing a single head of yellow flowers 1 in. broad. Leaves oblong or lance-shaped, very hairy, often whitish silky beneath. Dooryards and fields, an European plant. Naturalized in places. May-Sept.

2. *H. murorum*, L. WALL HAWKWEED. Basal leaves egg-shaped, apex obtuse or sharp, base heart-shaped or nearly so, margins *deeply toothed toward the base*, veins purple. Flower stem 1 to 2½ ft. high, with 2 or more flower heads, downy or smooth. On the flower branches are found a few linear bracts. Naturalized in a few places. European. June-Aug.

3. *H. vulgatum*, Fries. (Fig. 4, pl. 166.) HAWKWEED. Basal leaves broad lance-shaped with sharp, remote teeth at margins, tapering at each end, 2 to 5 in. long. Stem smooth or downy, 1 to 3 ft. high, with numerous flower heads. Naturalized. July-Sept.

4. *H. aurantiacum*, L. (Fig. 1, pl. 166.) ORANGE HAWKWEED. PAINT BRUSH. Rosette of basal leaves, each spatula-formed or oblong, obtuse at apex, the whole plant very hairy; height of flowering stem 6 to 20 in. high. On the stem a small leaf or two leaves is sometimes found. Flower heads several in a rather compact cluster, the individual flower stems being short, the head about 1 in. broad. Flowers dark orange. Along roadsides, in fields and woods, most of our range. June-Sept.



PLATE 166

1. *Hieracium aurantiacum*. 2. *H. canadense*. 3. *H. Gronovii*. 4. *H. vulgatum*. 5. *H. florentinum*. 6. *H. Greenii*.

5. *H. florentinum*, All. (Fig. 5, pl. 166.) KING DEVIL. (*H. praealtum*, Vill.) Flowering stem $1\frac{1}{2}$ to 3 ft. high, not hairy, 1 to 3 small stem leaves at base. Basal leaves tufted, narrowly oblong or lance-shaped, very hairy, 2 to 4 in. long. Heads several, each about $\frac{1}{2}$ in. broad. Flowers yellow. Fields, roadsides, a weed, north central New York. June-Sept.

6. *H. pratense*, Tausch. FIELD HAWKWEED. Stem 1 to 2 ft. high, with 1 or 2 spatula-formed leaves toward base. Tuft of basal leaves of numerous spatula-formed leaves 2 to 5 in. long, the whole plant very hairy. Flowers yellow, in heads $\frac{3}{4}$ in. broad. Naturalized on Staten Island.

7. *H. venosum*, L. (Fig. 3, pl. 165.) RATTLESNAKE-WEED. Stem 1 to 3 ft. high, slender, not hairy, generally without leaves, but occasionally with 1 or more small leaves. The basal leaves nearly always conspicuously marked with purple borders to the veins. Cluster many-flowered, heads $\frac{1}{2}$ in. broad. Dry woods and old fields. Common.

8. *H. marianum*, Willd. (Fig. 4, pl. 165.) MARYLAND HAWKWEED. Flowering stem 2 to 3 ft. high, with several leaves. Basal leaves oblong, 2 to 8 in. long, with purple at the veins. Heads numerous, flower-stem moderately long. Dry woods, southern section of our area. May-July.

9. *H. canadense*, Michx. (Fig. 2, pl. 166.) CANADIAN HAWKWEED. Stem firm, erect, 1 to 5 ft. high, leafy, the leaves on the upper part of the stem clasping at base, all leaves conspicuously and remotely toothed at margins. Basal tuft not present. Flowers yellow. Woods and thickets. July-Sept.

10. *H. paniculatum*, L. (Fig. 5, pl. 165.) PANICLED HAWKWEED. Whole plant smooth, basal tuft not present. Stem 1 to 3 ft. high, leafy, the leaves narrow lance-shaped, *not* prominently toothed, the small teeth may appear at margins. Flower heads numerous in a loose cluster, the flower stems standing nearly at right angles to the main stem. Flowers yellow. Dry woods. July-Sept.

11. *H. scabrum*, Michx. (Fig. 6, pl. 165.) ROUGH HAWKWEED. Leaves all on the flowering stem, which is slender, 1 to 4 ft. high. Whole plant rough hairy, inversely egg-shaped or spatula-shaped, 2 to 4 in. long. Heads numerous, $\frac{1}{2}$ in. broad. Flowers yellow. Dry woods. July-Sept.

12. *H. Gronovii*, L. (Fig. 3, pl. 166.) HAIRY HAWKWEED. Stem with or without stem leaves. Basal leaves spatula-formed, 2 to 6 in. long, quite hairy. Heads numerous. Flowers yellow. Dry soil. July-Sept.

13. *H. Greenii*, Porter and Britton. (Fig. 6, pl. 166.) GREEN'S HAWKWEED. Stem $1\frac{1}{2}$ to 2 ft. high, without hairs up to the branchings. Leaves in a tuft at base, spatula-formed or pear-shaped, with low teeth at borders or none, hairy. Heads in a spreading cluster on slender flower-stems. Bracts of the involucre in 1 series. Mountains of Penna. May-June.

19. PRENANTHES, Vaill. (*Nabalus*, Cass.)

Perennial herbs, with upright stems with many leaves, variable in form, with margins toothed or deeply lobed and with diffuse terminal clusters of greenish or yellowish, generally drooping, bell-shaped heads of flowers, each head composed of from 5 to 30 flowers. Involucre cylindric of linear bracts, generally in a single row with a few short ones at



PLATE 167

1. *Prenanthes altissima*. 2. *P. alba*. 3. *P. trifoliolata*. 4. *P. nana*. 5. *P. virgata*. 6. *P. Boottii*. 7. *P. racemosa*.

the base. Rays terminated by a nearly straight edge with 5 rather low teeth. Fruit striated with an aigrette (pappus) of simple bristles varying from deep brown to nearly white.

Plants more than 1½ ft. high.

Flower clusters diffuse.

Heads with 5 to 6 flowers *P. altissima*

Heads with 8 to 12 flowers.

Aigrette deep brown *P. alba*

Aigrette straw-color.

Involucre bracts with stiff hairs *P. serpentaria*

Involucre bracts not hairy *P. trifoliolata*

Flower cluster spicate.

Leaves lobed nearly to midvein *P. virgata*

Leaves not deeply lobed *P. racemosa*

Heads with 20 to 25 flowers *P. crepidinea*

Plants not exceeding 1½ ft. high.

Leaves 3-divided *P. nana*

Leaves arrow-shaped *P. Boottii*

1. *P. altissima*, L. (Fig. 1, pl. 167.) TALL WHITE LETTUCE. Stem straight, rigid, 3 to 7 ft. high, smooth, green or purplish, lower part quite leafy, upper with remote leaves. Leaves of various shapes, the lower broad, usually deeply lobed, on long leaf-stalks. Heads numerous in a terminal diffuse, rather narrow cluster, of subordinate clusters, each containing about half a dozen heads which are pendulous. Involucre cylindric, ½ in. long, smooth, green. Flowers greenish or yellowish white, about 5 to 7 flowers in each head. Aigrette light straw color. Rich woods, New England and southward and westward. July-Aug.

2. *P. alba*, L. (Fig. 2, pl. 167.) RATTLESNAKE ROOT. WHITE LETTUCE. Stem 2 to 5 ft. high, smooth, purple. Leaves on lower part of stem broad halberd-shaped, or varying, 3 to 8 in. long, nearly or quite as wide at base. Heads pendulous, each 8- to 15-flowered, in broad diffuse cluster of subordinate clusters of 2 to 5 heads. Involucre smooth, of about 8 purplish bracts and a few smaller ones at the base. Flowers greenish or yellowish white. Aigrette deep brown. Woods, common. Aug.-Sept.

3. *P. serpentaria*, Pursh. LION'S FOOT. Less tall than No. 2; leaves similar, but the involucre quite hairy with stiff hairs. Fields and woods, New England and southward. July-Oct.

4. *P. trifoliolata*, (Cass.) Fernald. (Fig. 3, pl. 167.) TALL RATTLESNAKE ROOT. Whole plant smooth. Stem 3 to 9 ft. high. Leaves usually 3-divided with the divisions stalked. Heads 8- to 12-flowered. Flowers white to yellowish. Woods, Maine, Vermont, New York, Penna., and southward. Aug.-Oct.

5. *P. nana*, DC. (Fig. 4, pl. 167.) LION'S FOOT. Plant smooth throughout, stem erect, from 4 to 15 in. high. Lower leaves 3-parted, the divisions generally 3-lobed. Flower heads numerous. Summits of White and Adirondack Mountains. Aug.-Sept.

6. *P. virgata*, DC. (Fig. 5, pl. 167.) SLENDER RATTLESNAKE ROOT. Smooth. stem simple, straight, 2 to 4 ft. high. Leaves in general outline lance-shaped, often 10 in. long, lobed nearly to the mid-vein on each side. Flower heads in a slender spike often all on one side. Flowers white. Sandy soil. New Jersey, southward. Sept.-Oct.

7. *P. Boottii*, (DC.) Gray. (Fig. 6, pl. 167.) BOOTT'S RATTLE-

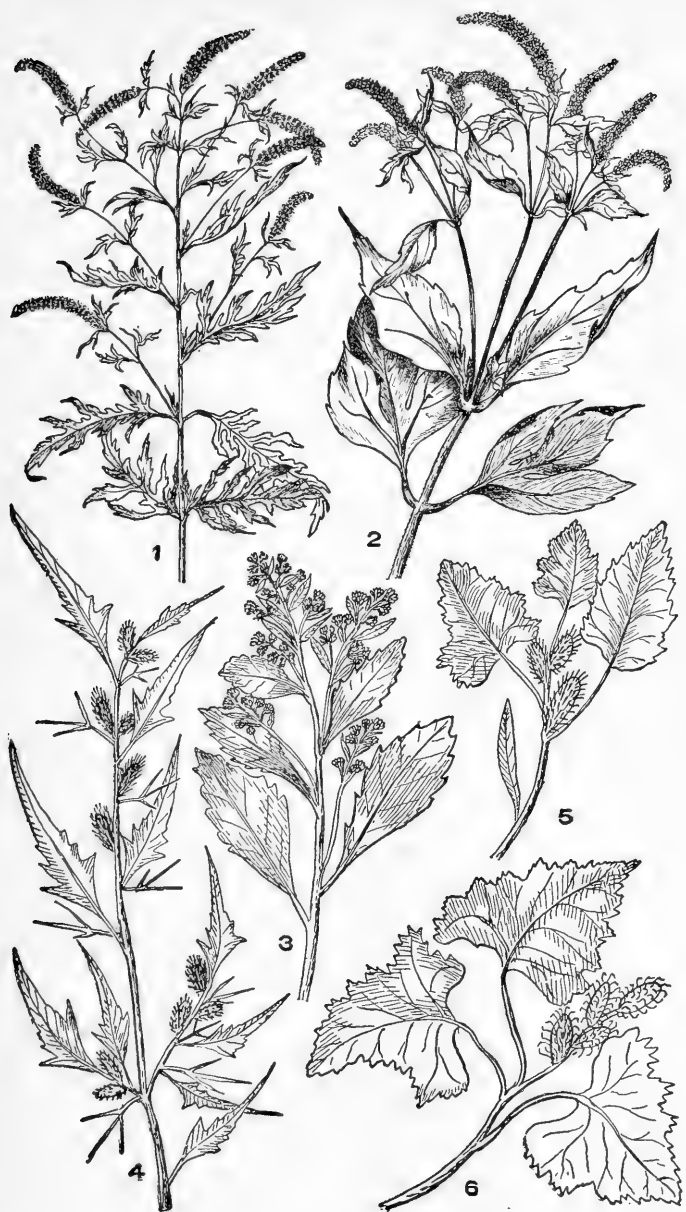


PLATE 168

1. *Ambrosia artemisiaefolia*. 2. *A. trifida*. 3. *Iva ovata*. 4. *Xanthium spinosum*. 5. *X. strumarium*. 6. *X. canadense*.

SNAKE ROOT. A dwarf species, $\frac{1}{2}$ to 1 ft. high, the leaves halberd-shaped, upper ones lance-shaped. Summits of Adirondacks and White Mountains. July-Aug.

8. **P. racemosa**, Michx. (Fig. 7, pl. 167.) **WHITE LETTUCE.** Smooth, stem often with a whitish bloom, 2 to 6 ft. high. Leaves lance-shaped to oval or egg-shaped, with low teeth at margins. Flower heads in a dense spike, *mostly erect*, 1- to 16-flowered. Moist soil, Maine and southward to New York and New Jersey. Aug.-Sept.

9. **P. crepidinea**, Michx. **CORYMBED RATTLESNAKE ROOT.** Stem smooth, 5 to 9 ft. high. Leaves halberd-shaped. Flower heads numerous, the *involucre hairy*, each head containing 20 to 25 flowers. Fields, woods, Penna. and New York. Aug.-Oct.

FAMILY IV.—AMBROSIACEAE. RAGWEED FAMILY

Herbs, mostly weeds, with alternate leaves or the lower leaves sometimes opposite. Flowers in small heads of greenish or white flowers subtended by an involucre of a few bracts; usually the staminate and pistillate flowers are in different heads on the same plant or in the same head—but often the two kinds are on different plants. The aigrette or pappus representing the calyx is absent or reduced to a little rim at the summit of the fruit. The staminate flowers have a narrow tubular corolla which is small and membranous. The anthers are free from each other or only slightly coherent.

Staminate and pistillate flowers in the same heads . . . **Iva**

Staminate and pistillate flowers in separate heads, the heads with stamens mostly above.

Involucre of the pistillate heads bur-like . . . **Xanthium**

Involucre not bur-like **Ambrosia**

1. IVA, L.

Large coarse herbs, with fleshy leaves, opposite or alternate, and with small heads of greenish flowers arranged in spikes, in the axils or solitary. There are within the head, about half a dozen or less pistillate flowers which occupy the outer circle, while within are several flowers with both pistils and stamens. Involucre of a few rounded bracts. Receptacle small, chaffy. Aigrette none.

I. ovaria, Bartlett. (Fig. 3, pl. 168.) **MARSH ELDER.** (*I. frutescens*, Man.) A coarse plant, apparently shrubby, with stems from 3 to 12 ft. high, growing in salt marshes. Leaves somewhat fleshy, oval to lance-shaped, the lower with coarse teeth. Heads in the upper axils. Receptacle small, with chaff among the flowers. Sea-side, Mass., New York and southward. July-Sept.

2. AMBROSIA, L.

Coarse weeds, branching, with alternate or opposite leaves, which are

usually lobed or deeply divided and with inconspicuous greenish heads of flowers, the stamens and pistils occupying different heads. The staminate heads have an involucre of several scales, united to form a cup in which are from 5 to 20 staminate flowers on a chaffy receptacle. The pistillate heads have each a single flower, consisting only of a pistil, surrounded by an involucre of one piece. There is no aigrette or other indication of a calyx.

1. *A. trifida*, L. (Fig. 2, pl. 168.) GREAT RAGWEED. Tall herb, 3 to 17 ft. high, hairy or nearly smooth. Leaves opposite, 3-lobed, the lobes oval-lance-shaped. Moist soil. July-Oct.

2. *A. artemisiaefolia*, L. (Fig. 1, pl. 168.) RAGWEED. Leaves lobed on each side of the midvein (pinnate). Stem 1 to 6 ft. high. A common and troublesome weed in waste places. July-Oct.

3. XANTHIUM, L.

Coarse, rough and spiny herbs, with alternate, lobed or conspicuously dentate leaves and small flowers, the pistillate in bur-like heads with hooked prickles, the staminate in rounded heads with a short involucre.

1. *X. spinosum*, L. (Fig. 4, pl. 168.) SPINY CLOTWEED. Leaves lance-shaped, deeply lobed on each side of the midvein, under surface and veins above white, at the base of the leaf about three long stiff prickles. Staminate heads above at extremity of branches, fertile heads prickly, in the axils below. Waste grounds. Aug.-Nov.

2. *X. strumarium*, L. (Fig. 5, pl. 168.) BURWEED. Branching, 1 to 6 ft. high, not armed with prickles at the leaves. Leaves in general outline rounded and somewhat triangular, with deep lobes, the borders toothed, heart-shaped at base. Fruit elliptic, armed with stiff prickles and ending with two straight or slightly curved horns. Waste places. (Is perhaps only a variety of *X. canadense*.) Aug.-Oct.

3. *X. canadense*, Mill. (Fig. 6, pl. 168.) HEDGEHOG BURWEED. Resembles above, but bur much longer and the two horns are *curved in and the extremity is not divided*. Waste places, river banks, etc. Aug.-Oct.

4. *X. commune*, Britton. COMMON CLOTWEED. Leaves broadly egg-shaped, more or less lobed. Burs commonly solitary in the axils; prickles slender, hooked at tip and hispid. Northern New York, and westward.

FAMILY V.—COMPOSITAE. THISTLE FAMILY

This is by far the largest family of flowering plants. In the North Eastern United States the plants are nearly all herbs; but in tropical climates some members of the family are trees. The flowers are associated in heads which have the appearance of a single flower, as, for example, the daisy or the aster, in which many small yellowish flowers—florets—are gathered at the center of a group while in nearly all cases a single row of white or colored flowers of a different kind are arranged in a single row about the margin. The groups are subtended by an *involucre* of bracts which

resemble a calyx and the florets rest upon a base, the *receptacle*, which may be flat, convex or concave, and which, when the florets are removed may present a naked surface or may be occupied by bristles or scales or filled with small pits. The individual florets are of two kinds, those which occupy the center of the group and which in some tribes constitute the whole group, are tubular like little blue-bells, the corolla of one piece, with 5 lobes enclosing a style in the center and usually 5 stamens in a ring about it. Below the corolla and stamens is the ovary of a single cell, which produces a single seed. The calyx is not always present, but when present is represented not by the green sepals common in many flowers, but by an aigrette of hairs or bristles, by teeth, awns or scales. The flowers of the periphery, in most of the genera, differ from the central florets in that the corolla is prolonged on one side forming a *ray* or strap-like organ which is conspicuously white or colored. Of this important family not less than 10,000 species are known.

SYNOPSIS OF TRIBES

Receptacle not chaffy

- Florets all of one kind, tubular, the corolla of one piece, regular, 5-pointed. Flowers purple, heads in spreading clusters. Branches of the style long, slender, bristly all over **TRIBE 1, VERNONIEAE**
- Florets all of one kind, with stamens and pistils, the style thickened above, blunt, not bristly . . . **TRIBE 2, EUPATORIEAE**
- Heads without ray florets (except *Inula*, which has large ray flowers) Anthers arrow-formed, the *basal lobes extended into tails* **TRIBE 4, INULEAE**
- Florets mostly of *two kinds*, but in some species all alike, when not all alike the outer, ray, flowers are pistillate. Anthers not tailed, obtuse at base; receptacle naked. Branches of the style flat, prolonged into a lance-shaped appendage. Bracts of the involucre decidedly overlapping **TRIBE 3, ASTEREAE**
- Florets as in Tribe 4, but branches of style either with hairy tips or the tips terminate bluntly. Bracts of involucre overlapping **TRIBE 6, HELENIEAE**
- Florets of the disk with style the branches of which are provided with a tuft of hairs. Aigrette of soft bristles. Bracts of the involucre only slightly, if at all, overlapping **TRIBE 8, SENECEONEAE**

Receptacle usually chaffy

Branches of the style provided with a fascicle of soft bristles.

Bracts of the involucre herbaceous or leaf-like

. **TRIBE 5, HELIANTHEAE**

Similar to last, but bracts of the involucre dry, scaly and overlapping, in several ranks. Heads with white rays

. **TRIBE 7, ANTHEMIDEAE**

Florets all tubular and perfect (i. e. with both stamens and pistils). Anthers prolonged above into long appendages at the tips and below into tails **TRIBE 9, CYNAREAE**

ARTIFICIAL TABLE OF GENERA ACCORDING TO TRIBES

TRIBE 1, Vernoniæ

Leaves alternate. Flowers all alike, purple; style with long hairy branches; aigrette double.

Flower heads not surrounded by a sub-involucre . . **Vernonia**

Flower heads surrounded by a sub-involucre . . **Elephantopus**

TRIBE 2, Eupatoriæ

Leaves opposite or alternate. Branches of style obtuse, fruit 3- to 5-angled.

Leaves opposite.

Erect plants **Eupatorium**

Climbing vine **Mikania**

Leaves alternate.

Flowers in diffuse clusters **Kuhnia**

Flowers in narrow spikes **Liatris**

Leaves in whorls of 4 **Sclerolepis**

TRIBE 3, Astereæ

Florets all of one kind **Chondrophora**

Flowers all of one kind in individual heads, but pistillate heads on

one plant and staminate on another, shrub **Baccharis**

Ray flowers yellow (in *Solidago* bicolor, white).

Heads large, many flowered; aigrette double . . . **Chrysopsis**

Heads small, few flowered; aigrette simple **Solidago**

Rays not usually more numerous than the disk flowers.

Rays more numerous than the disk flowers . . **Erethamia**

Ray flowers white, blue, purple, never yellow, leaves on the stem.

Pappus (aigrette) a single series of bristles (sometimes a few short ones outside the series).

- Bracts of the involucre in 2 to several series.
 Rays white, about 5 **Sericocarpus**
 Rays many (6 to 100) **Aster**
- Bracts of the involucre in 1 or 2 series only.
 Rays longer than the diameter of the disk . . . **Erigeron**
 Rays not as long as the disk **Leptilon**
- Pappus (aigrette) distinctly double, one series of long bristles,
 another, outer, of short ones.
 Rays white, leaves lance-shaped **Doellingeria**
 Rays violet, leaves linear **Ionactis**
- Pappus a few scales and about 4 hairs, fruit flattened and
 winged **Boltonia**

TRIBE 4, *Inuleae*

- Heads without ray florets except *Inula*. Anthers arrow-formed, the
 basal lobes prolonged into tails.
- Heads of flowers large with yellow rays **Inula**
- Heads of flowers rayless.
 Receptacle chaffy **Gifola**
 Receptacle not chaffy.
 Plant not woolly **Pluchea**
 Plants woolly.
 Staminate flowers on one plant, pistillate on another
 (dioecious).
 Bristles of the aigrette of staminate flowers 'en-
 larged and thickened above, leaves in a cluster
 at base, stem leaves inconspicuous . . . **Antennaria**
 Bristles of the staminate flowers not thickened
 above, leaves of stem linear **Anaphalis**
- Stamens and pistils in same flower, leaves of stem not linear
 **Gnaphalium**

TRIBE 5, *Heliantheae*

- Flower heads with ray flowers. Involucre leaf-like or herbaceous.
Receptacle chaffy. Aigrette not hair-like, sometimes none. Anther
 not tailed at base.
- Ray flowers with pistils only, but producing fruit. Disk flowers with
 stamens and pistils, but with no fruit.
 Ray flowers in a single series **Polymnia**
 Ray flowers in 2 or more series **Silphium**
- Both ray and disk flowers with fruit.
 Ray flowers remaining on the fruit when mature . . . **Heliopsis**
 Ray flowers falling when mature.
Aigrette represented by a number of scales.
 Aigrette absent or of one or two scales. Rays very short **Eclipta**
- Ray flowers not fruit producing, receptacle high, conical or
 columnar.

- Fruit of disk flowers 4-sided, without margins . . . **Rudbeckia**
- Fruit of disk flowers flat, with margins **Ratibida**
- Ray flowers not fruit-producing, receptacle flat or convex, not high.*
- Leaves opposite **Helianthus**
- Leaves (in our species) alternate **Verbesina**
- Aigrette of 2 or more scales, barbed upward . . . **Coreopsis**
- Aigrette of 2 or more scales, or teeth barbed downward **Bidens**

TRIBE 6, **Helenieae**

- Similar to Tribe 5, but *receptacle is not chaffy* **Helenium**

TRIBE 7, **Anthemideae**

- The scales of the involucre more or less dry, membranous.
- Heads with ray flowers which are white, or without ray flowers.
- Leaves alternate.
- Heads with white ray flowers.
- Receptacle chaffy.
- Heads bell-shaped, small **Achillea**
- Heads half-round, rather large **Anthemis**
- Receptacle not chaffy.
- Receptacle flat or nearly so **Chrysanthemum**
- Receptacle conical **Matricaria**
- Heads without ray flowers.
- Heads in broad diffuse flattened clusters . . . **Tanacetum**
- Heads in narrow elongated clusters **Artemisia**

TRIBE 8, **Senecioneae**

- Heads with or without ray flowers. Bracts of the involucre scarcely overlapping. Aigrette of soft bristles. Receptacle naked. Anthers without tails.
- Leaves all basal.
- Heads solitary **Tussilago**
- Heads in clusters **Petasites**
- Leaves opposite.
- Margins of leaves wavy **Arnica**
- Margins of leaves with prominent teeth **Erechtites**
- Leaves alternate,
- Leaves broad, rounded or kidney-shaped **Mesadenia**
- Leaves triangular **Synosma**
- Leaves spatula-formed, with or without deep lobes, or egg-shaped **Senecio**

TRIBE 9, **Cynareae**

- Flower heads large, showy, but without ray flowers; bracts of involucre overlapping. Anthers with long appendages both at tip and base. Leaved alternate. Aigrette bristly.

Leaves very large, broad with smooth margins . . .	Arctium
Leaves armed with prickles.	
Receptacle not bristly nor chaffy	Onopordum
Receptacle bristly.	
Flowers purple	Carduus
Flowers yellow	Cnicus
Leaves lance-shaped or deeply lobed, not armed with prickles	Centaurea

1. VERNONIA, Schreb.

Coarse erect herbs, with leafy stems and flower heads in diffuse clusters. Leaves alternate. Heads with tubular flowers only (no rays); purple, pink or white. Bracts of the involucre overlapping in several series. Receptacle naked, flat. Corolla tubular, 5-lobed, regular. Anthers narrow-formed at the base, *without tails*. Aigrette of 2 series, the inner series of soft hairy bristles, the outer of scales or stout bristles.

Some or all of the involucre bracts with bristle-like tips . . . *V. noveboracensis*
None of the bracts with bristle-like tips.

Lower leaves egg- or pear-shaped *V. glauca*
Lower leaves lance-shaped *V. altissima*

1. *V. noveboracensis*, (L.) Willd. (Fig. 1, pl. 169.) IRON WEED. Plant rather rough, tall (3 to 9 ft. high), with alternate lance-shaped leaves with quite low teeth at margins, tapering to a short leaf-stalk. Heads numerous, on stems, with overlapping scales and 20 to 30 purple tubular (rarely white) flowers. Low grounds, Mass., westward and southward. July-Sept.

2. *V. glauca*, (L.) Britton. (Fig. 2, pl. 169.) BROAD-LEAVED IRON-WEED. Plant slender, 2 to 5 ft. high, not hairy or only slightly so. Leaves thin, the lower broadly egg-shaped, sharply toothed, acute at apex, 4 to 7 in. long; the upper leaves narrower and finely toothed. Flower heads in a broad loose cluster. Woods, Pennsylvania and southward. Aug-Sept.

3. *V. altissima*, Nutt. (Fig. 3, pl. 169.) TALL IRON-WEED. (*V. gigantea*, (Walt.) Britton.) Plant slender, 5 to 10 ft. high, not hairy or only slightly so. Leaves thin, lance-shaped, 4 to 12 in. long, *finely toothed*. Flower heads in a broad nearly flat cluster. Moist soil, Pennsylvania and southward. July-Sept.

2. ELEPHANTOPUS, L.

Rough herbs, with alternate or basal leaves and heads of flowers subtended by large leaf-like bracts. The heads containing few (2 to 5) flowers, which are tubular, 5-cleft, with no ray flowers. Aigrette of stout bristles.

1. *E. carolinianus*, Willd. (Fig. 4, pl. 169.) ELEPHANT'S FOOT. Erect, 1 to 3 ft. high, somewhat hairy. Stem leafy. Leaves oval to inversely egg-shaped, thin, narrowing to a leaf-stalk. Flowers purple, bracts large. Southern part of our area. Aug-Sept.

2. *E. nudatus*, A. Gray. (Fig. 5, pl. 169.) SMOOTHISH ELEPHANT'S-FOOT. Stem with one or two small leaves or more. Basal leaves oblong or inversely lance-shaped. Delaware and southward. Aug-Sept.



PLATE 169

1. *Vernonia noveboracensis*. 2. *V. glauca*. 3. *V. altissima*. 4. *Elephantopus carolinianus*. 5. *E. nudatus*. 6. *Sclerolepis uniflora*.

3. SCLEROLEPIS, Cass.

Slender herbs, growing in water with linear leaves in whorls of 4 to 6 and with terminal heads of small purplish flowers, all tubular.

S. uniflora, (Walt.) Porter. (Fig. 6, pl. 169.) SCLEROLEPIS. Stem simple, 1 to 2 ft. long, reclining at base. Leaves linear, $\frac{1}{3}$ to 1 in. long, in whorls of 4s or 6s. Growing in shallow pools in southern part of our area. July-Sept.

4. EUPATORIUM, L.

Erect branching herbs, sometimes sprinkled with resinous dots, with opposite or whorled leaves (rarely alternate) and with flower heads in diffuse clusters. Flowers of the head all tubular, white, blue or purple. Involucre of overlapping bracts in several series. Beyond the tube of the corolla the style extends generally to a considerable extent, equal to the length of the tube or more or less. Aigrette of many soft bristles in a single row.

Leaves in whorls of 3 to 6.

Plant rough hairy *E. maculatum*
Plant smooth, scarcely hairy *E. purpureum*

Leaves opposite.

The opposite leaves clasping the stem.

Stem apparently passing through the united leaves . . . *E. perfoliatum*

The leaves not completely united at base *E. resinosum*

The opposite leaves, not clasping the stem.

Leaves on distinct leaf-stalks.

Flowers white.

Leaves 3 to 6 in. long *E. ageratoides*

Leaves 1 to 2½ in. long *E. aromaticum*

Flowers blue *E. coelestinum*

Leaves without distinct leaf-stalks (sessile); flowers all white.

Leaves lance-shaped, borders toothed.

Tapering at base *E. leucolepis*

Rounded or heart-shaped at base *E. sessilifolium*

Leaves lance-shaped, toothed at the apex *E. altissimum*

Leaves egg-shaped.

Twice as long as wide *E. pubescens*

Not twice as long as wide.

Plant somewhat downy *E. album*

Plant densely hairy *E. verbenacfolium*

Leaves linear *E. hyssopifolium*

Leaves nearly round, about as broad as long . . . *E. rotundifolium*

1. **E. maculatum**, L. (Fig. 12, pl. 171.) SPOTTED JOE-PYE WEED. Stem simple or branched, 2 to 6 ft. high, often spotted with purple, rough. Leaves in whorls of 4 to 6, egg-shaped to lance-shaped with coarse teeth at margins. Flowers pink or purple. Moist places, New York and southward. Aug.-Sept.

2. **E. purpureum**, L. (Fig. 2, pl. 170.) JOE-PYE WEED. TRUMPET WEED. Stem 3 to 10 ft. high, green or purple, usually smooth. Leaves in whorls, resembling No. 1, but teeth coarser. Flowers purple, pink or occasionally nearly white. Moist soil, throughout our range. Aug.-Sept.

3. **E. leucolepis**, Torrey and Gray. (Fig. 2, pl. 171.) WHITE-BRACTED THOROUGHWORT. Stem little or not at all branched, 1 to 2 ft. high. Leaves opposite, narrow lance-shaped, tapering at each end, margins entire or with quite low teeth, without leaf-stalks. Flower heads in a broad umbel-like cluster; flowers white. Moist places in southern part of our area. Sept.-Nov.



PLATE 170

1. *Eupatorium perfoliatum*. 2. *E. purpureum*. 3. *E. ageratoides*. 4. *E. hyssopifolium*.

4. *E. album*, L. (Fig. 1, pl. 171.) WHITE THOROUGHWORT. Stem simple below, branched above, 1 to 3 ft. high. Leaves opposite, egg-shaped or oblong, without leaf-stalks, coarsely toothed. Whole plant somewhat rough hairy. Flowers white. Southern part of our area. Aug.-Sept.

5. *E. hyssopifolium*, L. (Fig. 4, pl. 170.) HYSSOP-LEAVED THOROUGHWORT. Stem simple below, branched above. Leaves narrowly linear, opposite, the upper perhaps alternate, other leafy branches starting at the axils give appearance of whorls of leaves. Plant rather rough hairy. Flowers white. Dry fields, Mass., and southward. Aug.-Sept.

6. *E. altissimum*, L. (Fig. 4, pl. 171.) TALL THOROUGHWORT. Stem 3 to 6 ft. high, with fine down, much branched above. Leaves lance-shaped, *tapering at each end*, conspicuously 3-nerved, the borders toothed above the middle, or the upper leaves without teeth, 2 to 5 in. long, $\frac{1}{2}$ in. or more broad. Flowers in a broad umbel-like cluster, white. Pennsylvania and southward. Sept.-Oct.

7. *E. sessilifolium*, L. (Fig. 5, pl. 171.) UPLAND BONESET. Plant smooth, 2 to 6 ft. high, nearly smooth. Leaves opposite, lance-shaped, sharply toothed at borders, rounded or heart-shaped at base, nearly clasping the stem, 3 to 6 in. long. Flower heads numerous in a broad umbel-like cluster, flowers white. Dry woods, eastern part of our area. Aug.-Oct.

8. *E. verbernaefolium*, Michx. (Fig. 6, pl. 171.) ROUGH THOROUGHWORT. Stem 3 to 8 ft. high, branched above. Leaves opposite, without leaf-stalks, egg-shaped, margins toothed; the whole plant very rough hairy. Flower heads in a broad nearly flat cluster, flowers white. Moist soil, Mass., and southward. July-Sept.

9. *E. rotundifolium*, L. (Fig. 11, pl. 171.) ROUND-LEAVED THOROUGHWORT. Stem 1 to 3 ft. high; leaves opposite without leaf-stalks, roundish, about as broad as long; margins toothed; the whole plant rough hairy. Flowers white. Southern part of our area. July-Sept.

10. *E. pubescens*, Muhl. (Fig. 7, pl. 171.) HAIRY THOROUGHWORT. Plant about 2 ft. high, downy or hairy. Leaves opposite, without leaf-stalks, egg-shaped or lance-shaped, rounded at base and tapering to a slender point at apex. Teeth prominent. Flowers white. Dry soil, New England and southward. July-Sept.

11. *E. perfoliatum*, L. (Fig. 1, pl. 170.) BONESET. THOROUGHWORT. Stem simple below, branched above, 2 to 5 ft. high, downy. Leaves opposite and seemingly continuous, the stem appearing to penetrate the double-pointed leaf (perfoliate). Flower heads in a broad flat cluster, the whole plant usually with a whitish appearance. Flowers white. In wet places, throughout our area. July-Sept.

12. *E. resinosum*, Torrey. (Fig. 8, pl. 171.) RESIN BONESET. Slender, 2 to 3 ft. high, velvety downy. Leaves opposite, narrow lance-shaped, tapering at each end, without leaf-stalks. Flowers white. Wet places. Southern part of our area. Aug.-Sept.

13. *E. ageratoides*, L. (Fig. 3, pl. 170.) WHITE SANICLE. Stem

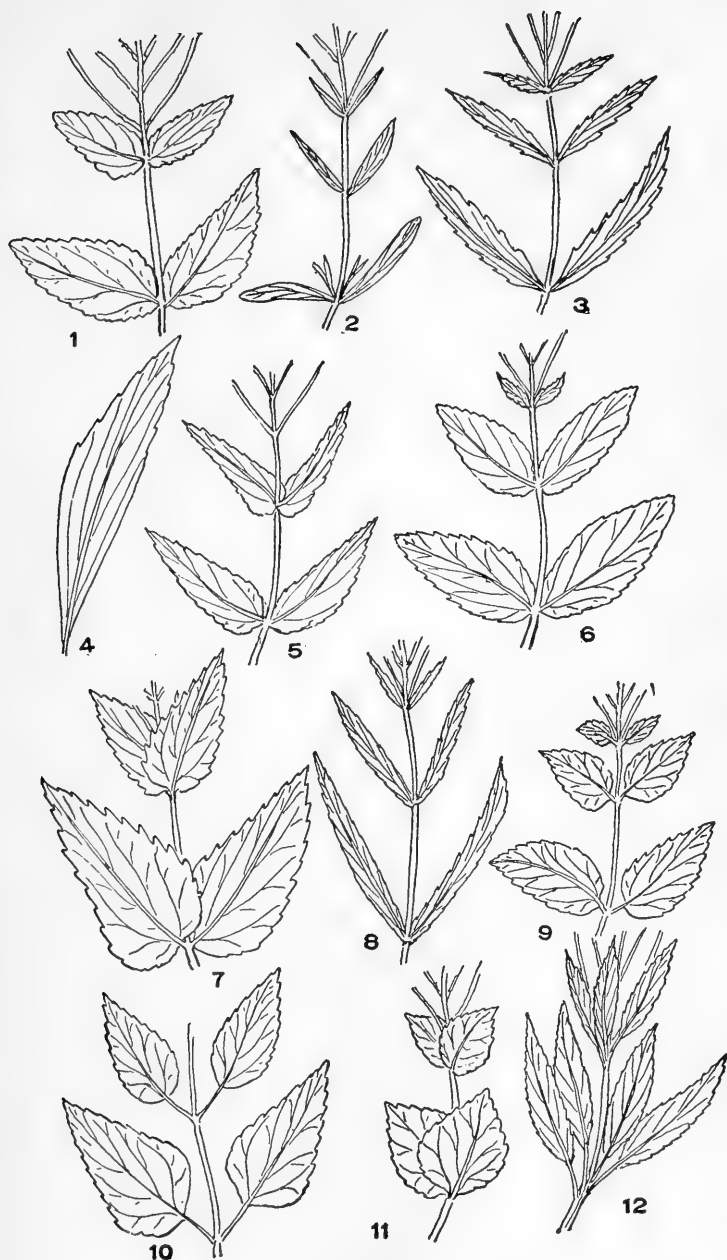


PLATE 171

Leaf forms of *Eupatorium*. 1. *E. album*. 2. *E. leucolepis*. 3. *E. Torreyanum*. 4. *E. altissimum*. 5. *E. sessilifolium*. 6. *E. verbenaeifolium*. 7. *E. pubescens*. 8. *E. resinsum*. 9. *E. aromaticum*. 10. *E. coelestinum*. 11. *E. rotundifolium*. 12. *E. maculatum*.

1 to 4 ft. high, smooth, branched. Leaves opposite on long, slender leaf-stalks, egg-shaped, toothed. Flowers conspicuously white. Rich woods, throughout our range. July-Nov.

14. *E. aromaticum*, L. (Fig. 9, pl. 171.) WHITE SNAKE-ROOT. Stem simple below, branched above, 1 to 2 ft. high. Leaves opposite, on very short leaf-stalks, egg-shaped, toothed at margins. Flowers white. Plant not aromatic. Dry soil, Mass., and southward. Aug.-Oct.

15. *E. coelestinum*, L. (Fig. 10, pl. 171.) MIST FLOWER. Stem 1 to 3 ft. high, branched above, downy. Leaves opposite, egg-shaped to nearly triangular on short leaf-stalks. Flowers blue. Moist soil, southern part of our area. Aug.-Oct.

5. MIKANIA, Willd. (Willughbaeya, Neck.)

Our only species a twining vine with opposite leaves and flowers in heads, all tubular, resembling *Eupatorium*. Heads 4-flowered, flowers white. Receptacle naked. Anthers not tailed. Involucre of 4 narrow bracts. Style branches about as long as the tubular flower. Aigrette of numerous hair-like bristles.

M. scandens, Willd. (Fig. 1, pl. 172.) CLIMBING BONESET. Smooth, twining over bushes, 5 to 15 ft. long. Leaves opposite, broad heart-shaped at base, tapering to slender point at apex, on leaf-stem half as long as the blade. Swamps, moist soil. July-Sept.

6. KUHNIA, L.

Resembles *Eupatorium*, but leaves are alternate. Heads of flowers with out ray flowers, all flowers being tubular, white or purplish, the heads in diffuse clusters. Involucre of several series of bracts, overlapping. Anthers not tailed; style branches slender, not hairy. Aigrette a single row of plumose bristles.

K. eupatorioides, L. (Fig. 2, pl. 172.) FALSE BONESET. Stem erect, branching above, 1 to 3 ft. high. Leaves narrowly lance-shaped with low notches at margins. Heads of flowers numerous, cylindric, the flowers white. Dry soil, southern section of our area. Aug.-Sept.

7. LIATRIS, Schreb. (Lacinaria, Hill.)

Perennial herbs, arising from a rounded tuber, with narrow, lance-shaped, alternate leaves and with heads of flowers (in our species) in narrow spikes. Flowers all tubular, purple, in rounded heads. Scales of the involucre overlapping, in several series. Receptacle flat or concave, naked. Aigrette of numerous bristles which are feathery or simple.

1. *L. scariosa*, (L.) Hill. (Fig. 4, pl. 172.) BUTTON SNAKE-ROOT. Resembles No. 1, but scales of involucre are rounded at apex in several overlapping series. Flower heads with many purple flowers. Dry soil, throughout our area. Aug.-Sept.

2. *L. spicata*, (L.) Kuntze. (Fig. 3, pl. 172.) DENSE BUTTON SNAKE-ROOT. Stem 2 to 6 ft. high, simple. Leaves narrow, linear. Flowers densely crowded on the spike, each head having from 5 to 15 blue-purple flowers. Moist soil, Mass., westward and southward. Aug.-Oct.



PLATE 172

1. *Mikania scandens*. 2. *Kuhnia eupatorioides*. 3. *Liatris spicata*. 4. *L. scariosa*. 5. *Chrysopsis graminifolia*. 6. *C. falcata*. 7. *C. Mariana*.

8. CHRYSOPSIS, Nutt.

Perennial herbs, with alternate leaves and clusters of heads with yellow *tubular* and *ray* flowers. Involucre of several overlapping series of scales. Receptacle flat. Ray flowers with pistils, no stamens; the flowers of the disk generally with both stamens and pistils. Aigrette double, the inner series of rough bristles, the outer of scales or short bristles.

Leaves linear, smooth, or hairy	<i>C. falcata</i>
Upper leaves thread-like	<i>C. graminifolia</i>
Leaves oval, hairy	<i>C. Mariana</i>

1. *C. falcata*, Ell. (Fig. 6, pl. 172.) SICKLE-LEAVED GOLDEN ASTER. Stem branched above, 4 to 12 in. high, when young woolly above. Leaves narrowly linear with entire margins. Flower heads nearly $\frac{1}{2}$ in. broad, in a diffuse cluster. Sandy soil, eastern section of our area. July-Aug.

2. *C. graminifolia*, (Michx.) Nutt. (Fig. 5, pl. 172.) GRASS-LEAVED GOLDEN ASTER. Resembles *C. falcata*, but the down (pubescence) of this species is silvery, while that of *C. falcata* is woolly. Stem 1 to 3 ft. high, slender, branching; leaves linear, the basal ones 3 to 4 in. long. Heads several or many. Delaware, and south. Aug.-Oct.

3. *C. Mariana*, Nutt. (Fig. 7, pl. 172.) MARYLAND GOLDEN ASTER. Stem branched above, 4 to 12 in. high, when young woolly above. Leaves oval, without leaf-stalks, 1 to 2 in. long. Dry soil, southern part of our area. Aug.-Sept.

9. CHONDROPHORA, Raf. (Bigelowia, DC.)

Stiff herbs, mostly western, with alternate leaves without lobes or teeth and with yellow tubular flowers in heads of 3 or 4, in diffuse terminal clusters. Bracts of the involucre yellowish, in closely overlapping series. Receptacle small, flat, naked. Anthers obtuse at the base. Aigrette of a single row of hair-like unequal bristles.

C. nudata, (Michx.) Britton. RAYLESS GOLDENROD. Stem 1 to 2½ ft. high, simple below, branching above. Lower leaves clustered, lance- or spatula-shaped; upper leaves remote, small, leaving the stem nearly naked. Heads of flowers small in a flat-topped cluster. Southern part of our area. Aug.-Oct.

10. SOLIDAGO, L.

Perennial herbs, with mostly slender simple stems and alternate leaves and with numerous or few small heads of flowers, both ray and tubular, mostly yellow, rarely white, in terminal clusters of various forms. Ray flowers 1 to many, all pistillate. Disk flowers tubular, nearly all with both stamens and pistils. Involucre of several series of overlapping bracts. Receptacle small, not chaffy. Aigrette of numerous rough bristles, in 1 or 2 series.

Flower heads not in one-sided (secund) clusters, but in narrow, spike-like terminal groups.

Heads in compact axillary clusters.

Ray flowers white *S. bicolor*

Rays yellow.

Tips of involucre scales turned outward or backward . . . *S. squarrosa*

Tips not turned outward or backward.

Leaves lance-shaped *S. caesia*

Leaves egg-shaped *S. latifolia*



PLATE 173

1. *Solidago squarrosa*. 2. *S. hispida*. 3. *S. erecta*. 4. *S. macrophylla*,
Var. *thyrsoides*. 5. *S. puberula*. 6. *S. stricta*. 7. *S. Purshii*. 8. *S. alpes-*
tris. 9. *S. Virgaurea*.

- Heads in more or less dense spike-like clusters, but not compact groups in the axils.
- Whole plant densely hairy *S. hispida*
 - Plant smooth or slightly downy.
 - Basal leaves spatula-formed, stem leaves lance-shaped.
 - Heads numerous, crowded.
 - Stem leaves sharply toothed *S. puberula*
 - Stem leaves lance-shaped, nearly entire *S. erecta*
 - Heads few, not crowded *S. Purshii*
 - Basal leaves oblong, stem leaves very small, linear *S. stricta*
 - Leaves all egg-shaped *S. macrophylla*
 - Leaves all lance-shaped.
 - Clusters of heads crowded, numerous.
 - The branches of the cluster pressed toward the main axis stem *S. uliginosa*
 - The branches of the cluster spreading *S. speciosa*
 - Clusters of few heads.
 - Plant 1 to 2 ft. high *S. Virgaurea*
 - Plant $\frac{1}{2}$ to 1 ft. high *S. alpestris*
 - Heads in one-sided (second), usually large clusters.
 - Plant with thick fleshy leaves, growing at sea-side *S. sempervirens*
 - Leaves not fleshy.
 - Leaves not 3-veined.
 - Leaf margins entire *S. odora*
 - Leaf margins toothed.
 - Leaves broad or narrow, lance-shaped, the lower tapering to a long leaf-stalk. Whole plant rough hairy *S. rugosa*
 - Leaves lance-shaped, rounded at base, no leaf-stalk.
 - Stem hairy *S. fistulosa*
 - Stem smooth *S. Elliottii*
 - Basal leaves oval to elliptic, tapering to a long leaf-stalk.
 - Leaves rough above *S. patula*
 - Leaves smooth.
 - Coarsely dentate *S. ulmifolia*
 - Finely dentate *S. neglecta*
 - Leaves all lance-shaped, clusters of few heads, and heads with about 3 rays *S. uniligulata*
 - Leaves all lance-shaped, heads many, rays numerous, lower leaves toothed, upper entire *S. juncea*
 - As above, but all leaves toothed *S. arguta*
 - Leaves 3-veined.
 - Leaves lance-shaped.
 - Stem smooth above *S. serotina*
 - Stem rough above, smooth below *S. canadensis*
 - Leaves spatula-shaped *S. nemoralis*
- Heads in large nearly flat clusters.
 - Lower leaves broad lance-shaped, upper egg-shaped, without leaf stalks *S. rigida*
 - Leaves all narrow lance-shaped or linear *S. Houghtonii*

1. *S. squarrosa*, Muhl. (Fig. 1, pl. 173.) **STOUT RAGGED GOLDEN-ROD.** Stem simple, 2 to 5 ft. high. Leaves large, the upper oblong, coarsely toothed, tapering to moderately long leaf-stalks; the leaves inversely egg-shaped to oval, narrowed to a marginal leaf-stalk. Heads numerous, in compact axillary clusters, each head 15- to 25-flowered, scales of the involucre recurved. Rocky soil, our whole range. Aug-Oct.

2. *S. caesia*, L. (Fig. 5, pl. 174.) **BLUE-STEMMED GOLDEN-ROD. WREATH GOLDEN-ROD.** Stem 1 to 3 ft. high, smooth, round, usually bluish or purple, branching above. Leaves narrow lance-shaped, sharply toothed, tapering at each end, without leaf-stalks. Heads in short axillary clusters. Woods and thickets, throughout our range. Aug-Oct.

3. *S. latifolia*, L. (Fig. 4, pl. 174.) **BROAD-LEAVES GOLDEN-ROD.** Stem 1 to 3 ft. high, usually more or less zig-zag. Leaves egg-shaped on leaf-stalks, tapering to a slender point at apex, sharply toothed. Heads in axillary clusters; rays bright yellow. Rich woods, throughout our area. July-Sept.

4. *S. bicolor*, L. (Fig. 3, pl. 174.) WHITE GOLDENROD. Stem $\frac{1}{2}$ to 4 ft. high, usually gray with soft hairs as are the leaves. Basal leaves elliptic to inversely egg-shaped on long leaf-stalks, with low teeth at margins, upper elliptic, small. Flowers axillary in crowded clusters, *white*. Dry soil, common. July-Sept.

5. *S. hispida*, Muhl. (Fig. 2, pl. 173.) HAIRY GOLDENROD. Resembles No. 4, but rays are yellow. Dry soil, somewhat common. Aug.-Oct.

6. *S. erecta*, Pursh. (Fig. 3, pl. 173.) SLENDER GOLDENROD. Closely resembles the two preceding species, but is nearly destitute of hairs, while the others are very hairy. Rays yellow. Dry soil, southern part of our area.

7. *S. macrophylla*, Pursh. (Fig. 4, pl. 173.) LARGE-LEAVED GOLDENROD. Stem $\frac{1}{2}$ to 4 ft. high, striped, with few or no hairs. Leaves egg-shaped, tapering at each end, 3 to 5 in. long, on rather long leaf-stalks, margins sharply toothed; the upper leaves smaller and changing to lance-shaped. Flower heads large ($\frac{1}{2}$ in. high) in a loose spike. Rays yellow, conspicuous. Woods, Catskill Mountains, and northward. July-Sept.

8. *S. puberula*, Nutt. (Fig. 5, pl. 173.) DOWNY GOLDENROD. Stem slender, 1 to 3 ft. high, with a thin down or none. Lower leaves spatula-formed, tapering to a long leaf-stalk, sharply toothed. Heads many in a narrow spike-like cluster; rays yellow. Sandy soil, northern New York, and southward. Aug.-Sept.

9. *S. stricta*, Ait. (Fig. 6, pl. 173.) WAND-LIKE GOLDENROD. Stem slender, erect, 2 to 8 ft. high; the whole plant smooth. Stem leaves are reduced almost to scales, which are lance-shaped to oval, applied close to the stem. Lower leaves oblong or elliptic, without teeth or notches at margins, 3 to 8 in. long and on long leaf-stalks. Flower heads crowded in a narrow spike-like terminal cluster. Pine barrens, New Jersey, and southward. Aug.-Oct.

10. *S. uliginosa*, Nutt. (Fig. 1, pl. 175.) BOG GOLDENROD. Stem simple, erect, smooth, 2 to 3 ft. high. Lower leaves broad lance-shaped on long leaf-stalks, upper narrow lance-shaped without leaf-stalks, margins with low teeth. Flower heads in a dense narrow cluster, the short stems of the heads tending in toward the stem. Swamps, throughout most of our area. Aug.-Sept.

11. *S. speciosa*, Nutt. (Fig. 3, pl. 175.) SHOWY GOLDENROD. Stem stout, 3 to 7 ft. high, smooth. Leaves smooth with low toothed margins, oval or egg-shaped, the lower tapering to long leaf-stalks, the blade 4 to 10 in. long. Upper leaves lance-shaped, without leaf-stalks. Flower heads in a broad pyramidal cluster, the branches bearing the heads diverging from the stem. Rays yellow. A tall and conspicuous species. Rich soil, throughout our range. Aug.-Oct.

12. *S. Purshii*, Porter. (Fig. 7, pl. 173.) RIVER-BANK GOLDENROD. Stem $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high, simple, smooth. Leaves lance-shaped, the lower toothed, 2 to 6 in. long, the upper entire. Heads few in a simple rather elongated cluster. River banks, most of our area. July-Sept.

13. *S. alpestris*, Wald. and Kit. (Fig. 8, pl. 173.) ALPINE GOLDENROD. Stems simple, often in tufts; 3 to 12 in. high. Basal leaves spatula-

formed, sparingly toothed, a principal tooth on each side at the upper fourth, on leaf-stalks, the upper lance-shaped toothed, without leaf-stalks, remote. Heads rather large, few in a terminal cluster or one or more in the upper axils. Summits of White and Adirondack Mountains. Aug-Sept.

14. *S. Virgaurea*, L. (Fig. 9, pl. 173.) EUROPEAN GOLDENROD. Similar to No. 13, but taller, stouter and with more heads. Leaves less sparingly toothed. On high mountains of the Adirondack and White Mountain groups. Aug-Sept.

15. *S. sempervirens*, L. (Fig. 2, pl. 176.) SEA-SIDE GOLDENROD. Stem stout, usually simple, 2 to 8 ft. high. Leaves thick, lance-shaped, without teeth at margins, 3-veined, crowded along the stem. Heads in a dense, somewhat one-sided, elongated cluster, each head containing from 25 to 30 flowers, about $\frac{1}{3}$ of which are ray flowers. Found along sea beaches. Aug-Nov.

16. *S. odora*, Ait. (Fig. 5, pl. 175.) SWEET GOLDENROD. Stem round, not ridged, slender, smooth or nearly so, 2 to 4 ft. high. Leaves very narrowly lance-shaped, without teeth somewhat abrupt at base, slender tapering at apex, sweet scented when bruised. Heads numerous, small, in a one-sided cluster. Dry soil, Mass., New York, and south. July-Sept.

17. *S. rugosa*, Mill. (Fig. 1, pl. 176.) TALL HAIRY GOLDENROD. Stem very leafy, rough hairy, 1 to 7 ft. high. Leaves oblong lance-shaped to oval or elliptic, very rough, 1 to 4 in. long. Heads in a rather dense one-sided cluster. Dry soil, western part of our area. July-Nov.

18. *S. fistulosa*, Mill. PINE-BARREN GOLDENROD. Stem 3 to 7 ft. high, branched or simple, rough hairy. Leaves without leaf-stalks, oblong-egg-shaped to lance-shaped, rough on margins, which are rather remotely toothed. Upper leaves blunt at apex, without teeth at margins. Cluster of heads one-sided, the heads about $\frac{1}{6}$ in. high, with 5 to 10 yellow rays. Pine barrens, New Jersey and southward. Aug-Oct.

19. *S. patula*, Muhl. (Fig. 9, pl. 175.) ROUGH-LEAVED GOLDENROD. Stem strongly angled, smooth, 2 to 7 ft. high. Leaves egg-shaped, the lower on long leaf-stalks, 3 to 16 in. long, smooth and veiny beneath and very rough above. Heads rather large, numerous in one-sided cluster. Swamps. Aug-Oct.

20. *S. ulmifolia*, Muhl. (Fig. 5, pl. 177.) ELM-LEAVED GOLDENROD. Stem smooth, its upper branches hairy, 2 to 4 ft. high. Leaves thin, egg-shaped, elliptic, sharply pointed at apex, coarsely toothed, the lower on long leaf-stalks. Heads on rather long branches of the cluster of few branches; rays bright yellow, about 4 in each head. Woods and copses, common. July-Sept.

21. *S. Elliottii*, Torr. and Gray. (Fig. 7, pl. 175.) ELLIOTT'S GOLDENROD. Stem stout, smooth, very leafy, 3 to 6 ft. high. Leaves elliptic, oblong or lance-shaped, firm, 1 to 5 in long, the margins with very low teeth, shining above. Heads densely crowded on short recurving branches of the one-sided cluster, which is more or less pyramidal in form. Rays 8 to 12. Swamps near the coast. July-Sept.

22. *S. neglecta*, T. and G. (Fig. 6, pl. 175.) SWAMP GOLDENROD.



PLATE 174

1. *Solidago juncea*. 2. *S. canadensis*. 3. *S. bicolor*. 4. *S. latifolia*. 5. *S. caesia*.

Stem rather stout, 2 to 4 ft. high, smooth or somewhat rough above. Basal leaves long, sometimes 12 in., lance-shaped, tapering to a margined leaf-stalk. Upper leaves smaller, lance-shaped, without leaf-stalks. Heads $\frac{1}{2}$ to $\frac{1}{4}$ in. high, somewhat in one-sided clusters, rays small, 3 to 8 to a head. Swamps, much of our area. Aug.-Sept.

23. *S. uniligulata*, (DC.) Porter. (Fig. 4, pl. 175.) FEW-RAYED GOLDENROD. Stem stout, smooth, not as leafy as the last three, 2 to 3 ft. high. Leaves lance-shaped or oblong-lance-shaped, finely and sharply toothed, the lower tapering to a long leaf-stalk, the upper quite small and narrowly linear or lance-shaped. Cluster of heads short, densely crowded in an elongated somewhat pyramidal but one-sided group. Rays in each head few, 1 to 4. Swamps, Maine to New York, and New Jersey. Aug.-Sept.

24. *S. juncea*, Ait. (Fig. 1, pl. 174.) EARLY GOLDENROD. Stem smooth, 1 to 4 ft. high. Leaves smooth, the lower lance-shaped to oval, sharply toothed on long leaf-stalks, the blade 4 to 12 in. long. Upper leaves lance-shaped, the uppermost without teeth. Clusters of heads large, one-sided, becoming flattened or drooping. Rays small, 7 to 12 to each head. Dry soil, our area. June-Nov.

25. *S. arguta*, Ait. (Fig. 8, pl. 175.) CUT-LEAVED GOLDENROD. Stem angled, smooth, 2 to 4 ft. high. Leaves large, thin, coarsely toothed, the basal ones broadly egg-shaped, tapering to long leaf-stalks, the upper lance-shaped, the very highest not toothed. Heads in a spreading one-sided cluster. Rays large, 5 to 7 to a head. Rich woods. July-Oct.

26. *S. nemoralis*, Ait. (Fig. 2, pl. 175.) GRAY GOLDENROD. Slender, $\frac{1}{2}$ to 2 ft. high. Leaves and stem finely and densely downy, giving to the plant an ashy-gray color. Basal and lower leaves spatula-formed or inversely lance-shaped. Upper leaves gradually smaller of similar shape or more lance-shaped. Heads $\frac{1}{6}$ to $\frac{1}{4}$ in. high, rays 5 to 9. Dry soil, our area. July-Nov.

27. *S. serotina*, Ait. (Fig. 3, pl. 176.) LATE GOLDENROD. Stem 3 to 8 ft. high, stout. Leaves lance-shaped, three-nerved, sharply toothed, without leaf-stalks, taper pointed at apex, narrowed to base. Heads in a more or less one-sided cluster, $\frac{1}{2}$ to $\frac{1}{4}$ in. high, rays 7 to 15. Our area. Aug.-Oct.

28. *S. canadensis*, L. (Fig. 2, pl. 174.) CANADA GOLDENROD. Stem rough hairy, stout, 2 to 8 ft. high. Leaves lance-shaped, tapering to a sharp point at apex, and less sharply at base, coarsely toothed at margins, distinctly 3-veined, 3 to 6 in. long. Heads small, rays very short in one-sided cluster of recurved branches. Borders of woods and thickets and in fields, very common, known as Yellow Weed. Aug.-Nov.

29. *S. rigida*, L. (Fig. 4, pl. 177.) HARD-LEAVED GOLDENROD. Stem rough and somewhat whitish hoary, 1 to 5 ft. high. Leaves thick, rigid, oval or oblong, the lower tapering to a long leaf-stalk, the upper attached to stem by a broad base. Heads very numerous in a flattened cluster sometimes slightly one-sided or often spreading on all sides about alike. Heads large, over 30-flowered; rays 6 to 10, showy. Dry sandy soil. Aug.-Oct.

30. *S. ohioensis*, Riddell. (Fig. 6, pl. 177.) OHIO GOLDENROD.



PLATE 175

1. *Solidago uliginosa*. 2. *S. nemoralis*. 3. *S. speciosa*. 4. *S. uniligulata*.
 5. *S. odora*. 6. *S. neglecta*. 7. *S. Elliottii*. 8. *S. arguta*. 9. *S. patula*.

Whole plant very smooth. Stem slender, wand-like, 2 to 3 ft. high. Lower leaves oblong lance-shaped, often 1 ft. long, tapering to a long slender leaf-stalk, apex rounded, margins nearly smooth nearly to the apex, then somewhat dentate. Heads in a broad flat densely crowded cluster, not one-sided. Flowers 15 to 25 to the head; rays 6 to 9. Moist soil, Western New York. Aug.-Sept.

31. **S. Houghtonii**, Torrey and Gray. (Fig. 3, pl. 177.) HOUGHTON'S GOLDENROD. Stem smooth, slender, 1 to 2 ft. high, simple. Leaves linear, the upper small and remote. Flower heads in a small, terminal, flat cluster of very few heads; rays 7 to 9. Swamps. Genesee Co., N. Y. Autumn.

11. EUTHAMIA, Nutt. (*Solidago*, L.)

Erect herbs, with spreading branches above and with linear or lance-shaped leaves, without teeth and with great numbers of small flower heads in broad flat clusters. Receptacle nearly flat. Involucre bracts in 2 or 3 series; ray flowers with pistils only, numerous, yellow.

1. **E. graminifolia**, Nutt. (Fig. 1, pl. 177.) BUSHY GOLDENROD. Stem much branched, branches slender, 2 to 4 ft. high. Leaves numerous, linear lance-shaped, 3- to 5-nerved. Flower heads yellow, in broad flat clusters. Heads small, with 12 to 20 rays and half as many disk flowers. Fields and roadsides. Common. July-Sept.

2. **E. caroliniana**, (L.) Greene. (Fig. 2, pl. 177.) SLENDER FRAGRANT GOLDENROD. Resembles No. 1, but leaves are very narrowly linear and plant is usually smaller. Heads small, very numerous. Dry soil, Mass., and southward. Aug.-Oct.

12. BOLTONIA, L'Her.

Smooth branching herbs, with alternate lance-shaped leaves and with numerous rather large heads of flowers in loosely spreading clusters. Heads at the ends of the branches, with tubular and ray flowers, the latter purplish white, the disk flowers yellow. Receptacle conic or convex, with small pits in the surface. Involucre of 2 or more series of bracts the margins of which are dry and membranous. Fruit very flat inversely egg-shaped or heart-shaped, its margins winged. Aigrette of several minute scales, or one or two elongated to bristles.

B. asteroides, L'Her. (Fig. 1, pl. 178.) ASTER-LIKE BOLTONIA. Stem stout, branching above, 2 to 8 ft. high. Leaves lance-shaped, 2 to 5 in. long. Heads, including the disk and rays, about 1 in. in diameter; rays pink, purple or white. Strongly resembles the asters. Moist soil, southern part of our area. July-Sept.

13. SERICOCARPUS, Nees.

Tufted herbs, with alternate 3-nerved leaves and heads of flowers with both tubular and ray florets. Involucre nearly cylindric, its bracts membranous, in several series, often with green tips. Receptacle small. Fruit inversely pyramidal. Aigrette of numerous fine bristles. Ray flowers white with pistils only; disk flowers yellow with both stamens and pistils.

1. **S. linifolius**, (L.) BSP. (Fig. 2, pl. 178.) NARROW-LEAVED WHITE-TOPPED ASTER. Smooth, 1 to 2½ ft. high, slender. Leaves linear,



PLATE 176

1. *Solidago rugosa*. 2. *S. sempervirens*. 3. *S. serotina*.

faintly 3-nerved. Heads with about 4 white rays and few tubular disk flowers, the heads in a spreading flat cluster. Dry soil, northern part of our range. June-Sept.

2. *S. asteroides*, (L.) BSP. (Fig. 3, pl. 178.) TOOTHED WHITE-TOPPED ASTER. Stem 1 to 2 ft. high, angled. Basal and lower leaves inversely egg-shaped, toothed at margins, narrowed to long leaf-stalks, the upper leaves lance-shaped, scarcely toothed. Ray flowers about 4, white. Dry woods, throughout our range. July-Sept.

14. ASTER, L.

Herbs, with alternate leaves and with flower heads in broad, flat or more or less elongated clusters, the heads including both tubular (disk) and ray flowers, the latter in a single row. Involucre scales more or less overlapping, usually with green tips. Receptacle flat or convex, with circular depressions (alveolate). Disk flowers tubular, with stamens and pistils, usually yellow. Ray flowers with pistils only, white, purple, blue, never yellow. Fruit mostly flattened with an aigrette of hair-like bristles, rarely double.

A genus of very numerous species, more abundant in this country than in Europe. Professor Edward S. Burgess, who has for many years made special study of the asters of our region, has added many new species and many sub-species. It has not been thought necessary to include the latter nor even all of the former in this work.

1. Inflorescence not Unilateral

Lower leaves broad, egg-shaped, heart-shaped at base, on slender leaf-stalks

a. None of the leaf-stalks clasping the stem

Ray Flowers White or nearly White

Leaves thin, smooth or nearly so.

Flower stem not as long as the head *A. carmesinus*

Flower stem as long as or longer than the head.

Leaves of the branches egg-shaped *A. divaricatus*

Leaves of the branches lance-shaped *A. tenebrosus*

Leaves thick and rough.

Inflorescence round or dome topped.

Upper stem leaves egg-shaped *A. glomeratus*

Upper stem leaves lance-shaped *A. curvescens*

Inflorescence nearly flat, spreading *A. Schreberi*

Inflorescence irregularly diffuse *A. Claytoni*

Ray Flowers Violet

Middle stem leaves not sharply and conspicuously toothed.

Upper and middle leaves nearly round *A. roscidus*

Upper and middle leaves egg-shaped *A. tanthinus*

Middle stem leaves very sharply and conspicuously toothed.

Inflorescence nearly flat; broader leaves kidney-shaped *A. violaris*

Broader leaves egg-shaped *A. multiflorus*

Inflorescence quite irregular *A. nobilis*

Ray Flowers Blue

Leaf-stalks without winged margins, or with very narrow margins.

Scales of the conical involucre lying close and flat, with green tips

Scales of the conical involucre spreading, not lying flat *A. cordifolius*

Scales of the oblong involucre spreading, not lying flat *A. sagittifolius*

Leaf-stalks conspicuously margined.

Inflorescence conical *A. Lowricanus*

Inflorescence pyramidal *A. Lindleyanus*

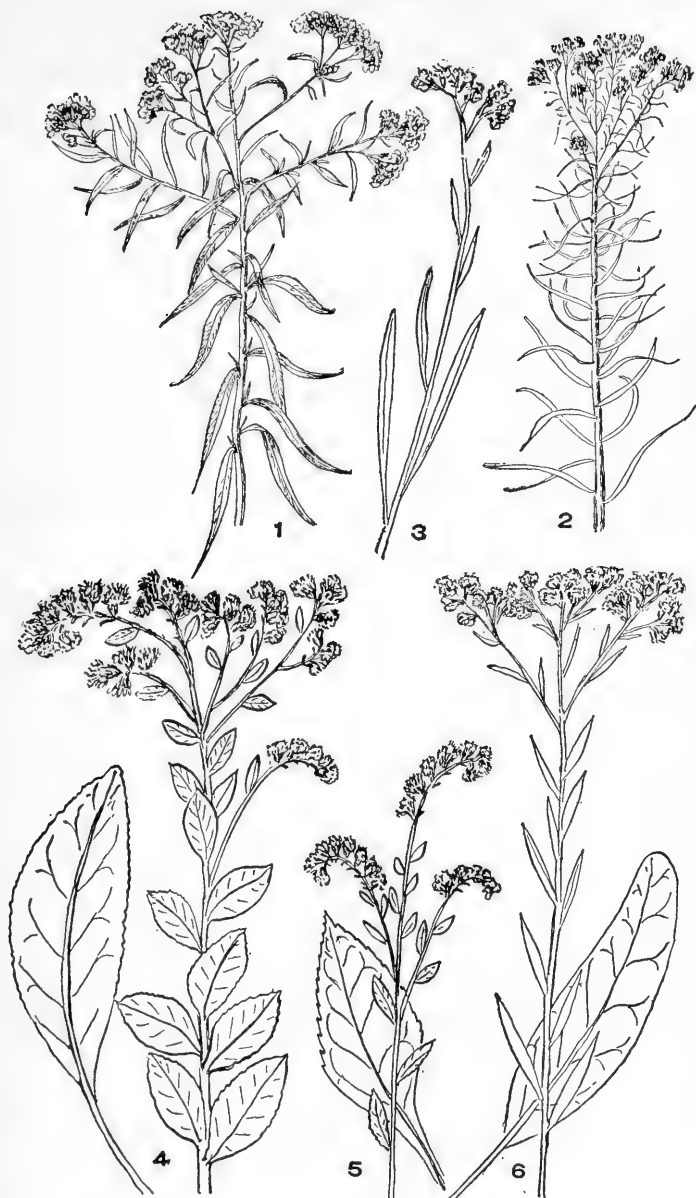


PLATE 177

1. *Euthamia graminifolia*. 2. *E. caroliniana*. 3. *Solidago Houghtonii*. 4. *S. rigida*. 5. *S. ulmifolia*. 6. *S. ohioensis*.

b. Lower Leaves Heart-shaped with Notched or Entire Margins, the Leaf-stalks, at least some of them, Clasping the Stem

All the leaves clasping the stem. Margins of the leaves entire

(Nos. 22 and 23 sometimes notched.)

- Leaves broadly egg-shaped.
 With margined leaf-stalks *A. undulatus*
 Without leaf-stalks *A. patens*
- Leaves lance-shaped, linear or narrow spatula-shaped.
 Plant smooth, not downy or hairy.
 Heads usually about 2 in. broad *A. phlogifolius*
 Heads 1 in. broad or less.
 Leaves almost or quite linear.
 Lower leaves spatula-formed *A. concinnus*
 Lower leaves linear *A. junceus*
- Plant somewhat downy.
 Leaves linear-lance-shaped *A. longifolius*
 Leaves rather broad lance-shaped *A. laevis*
- Plant not smooth, decidedly hairy or downy.
 Heads 1 to 2 in. broad, violet-purple *A. Novae-Angliae*
 Heads 1 in. broad or less, blue-purple *A. amethystinus*

Leaves Clasping the Stem. Margins Conspicuously Toothed

- Leaves clasping by a very broad base *A. prenanthoides*
 Leaves clasping by a narrow base.
 Plant very hairy.
 Leaves lance-shaped *A. puniceus*
 Leaves egg-shaped *A. patulus*
 Plant smooth or nearly so *A. tardiflorus*

c. Leaves not Clasping the Stem, not Heart-shaped at Base and with Entire Margins, or with very Remote Teeth

Plants not Fleshy

- Leaves broad egg-shaped, rather blunt; flowers in a long narrow cluster *A. concolor*
 Leaves lance-shaped or linear.
 Flower heads in a spreading, almost flat cluster *A. ptarmicoides*
 Flower heads in a pyramidal cluster *A. dumosus*
 Flower heads in an irregular spreading cluster *A. polyphyllus*

Plants Fleshy

- Heads $\frac{1}{2}$ in. to 1 in. broad *A. tenuifolius*
 Heads less than $\frac{1}{2}$ in. broad *A. subulatus*

d. Leaves not Clasping the Stem, not Heart-shaped; though in Nos. 37 and 38 there is slight clasping. Leaf Margins Toothed or Entire

Flowers violet.

- Lower leaves spatula-formed *A. spectabilis*
 Lower leaves egg-shaped *A. Herveyi*
 Lower leaves oval.
 Upper leaves linear *A. gracilis*
 Upper leaves oblong to broad lance-shaped *A. Radula*
 Lower leaves lance-shaped.
 Plant somewhat hairy *A. nemoralis*
 Plant smooth or with few hairs.
 Flower clusters very leafy *A. salicifolius*
 Flower clusters with few small leaves *A. novi-belgii*

Flowers white.

- Lower leaves oval *A. acuminatus*
 Lower leaves spatula-shaped *A. ericoides*
 Lower leaves lance-shaped.
 Stem quite hairy *A. hirsuticaulis*
 Stem smooth or nearly so.
 Flower cluster with few small leaves *A. Pringlei*
 Flower cluster leafy.
 Leaves of the cluster short, bract-like *A. Tradescanti*
 Leaves of the cluster long *A. paniculatus*

2. Inflorescence largely Unilateral (secund)

Lower leaves egg-shaped, upper leaves lance-shaped *A. lateriflorus*
 All leaves linear.
 Plant smooth *A. vimineus*
 Plant rough *A. multiflorus*

1. Inflorescence not unilateral

Lower leaves broad, egg-shaped, heart-shaped at base, on slender leaf-stalks. None of the leaves clasping the stem

1. *A. divaricatus*, L. (Fig. 1, pl. 179.) WHITE WOOD ASTER. (*A. corymbosus*, Ait.) Stem slender, somewhat zig-zag, tufted, round, 1 to 2 ft. high. Leaves thin, scarcely hairy, the lower egg-shaped to somewhat lance-shaped, the base heart-shaped; borders coarsely toothed, teeth sharp; leaf-stem slender, not hairy; apex of leaf narrow tapering. Heads of flowers in an irregular, broad, flattish, repeatedly forked cluster. Heads about an inch broad, including the rays. Bracts of the involucre broad, rounded at the tip, regularly overlapping, closely hugging each other, the tips scantily herbaceous. Central disk yellow, turning brown. Rays white, linear, about 6 to 9 to a head. Found in the open borders of woods and thickets, very common. Sept.-Oct.

The following 4 are among the forms strongly resembling *A. divaricatus* which Prof. Burgess regards as separate species

2. *A. carmesinus*, Burgess. CRIMSON-DISK ASTER. Resembles *A. divaricatus*, but the disk turns purplish crimson, the rays rather shorter, the stem for the head shorter and the heads on somewhat short stems, in about 5 rounded groups. Near Yonkers, N. Y.

3. *A. tenebrosus*, Burgess. LONG-LEAVED WOOD ASTER. Similar to No. 1, but stems usually not tufted, about 3 ft. high, the upper stem leaves more lance-shaped, the disk becoming purplish brown, rays from 9 to 12, narrower than those of No. 1. New York and southward.

4. *A. Claytoni*, Burgess. (Fig. 4, pl. 180.) CLAYTON'S ASTER. Similar to No. 1. Stem red, main cluster of heads on longer stems and the subordinate clusters distinct. Rays about 6; disk turning brown. New York and southward.

5. *A. curvescens*, Burgess. DOME-TOPPED ASTER. Stem green; basal leaves tufted, heads of flowers in a rather loose somewhat cylindric cluster. Disk becoming purple-brown. New England, New York and southward.

6. *A. glomeratus*, Bernh. (Fig. 4, pl. 179.) BERNHARDI'S ASTER. The cluster of heads rounded, the whole plant hairy, the bracts of the involucre green. Otherwise similar to No. 1. In ravines, thickets or swamps, New York and Penna.

7. *A. Schreberi*, Nees. SCHREBER'S ASTER. Stem stouter than No. 1; 2 to 3 ft. high. Lower leaves many, broad heart-shaped at base, tapering at apex, rough above with stiff hairs; leaf-stalks conspicuously hairy with soft hairs when young. Upper leaves lance-shaped. Heads in broad flat clusters. Bracts obtuse, greenish. Rays about 10. New York and westward.

8. *A. macrophyllus*, L. (Fig. 5, pl. 179.) LARGE-LEAVED ASTER. Plant rough with long root-stocks and stout, rigid, reddish stems, which are angular, 2 to 3 ft. high. Lower leaves numerous, rather thick, closely and sharply toothed, on long and slender leaf-stalks; blade 4 to 10 in. long, more than $\frac{1}{2}$ as wide, heart-shaped at base, abruptly pointed at apex; the upper leaves oblong on short margined leaf-stalks, the uppermost without leaf-stalks. Heads in large diffuse rigid flattened clusters. Rays white

or more frequently bluish-lavender to violet, 10 to 16½ in. long. Scales of the involucre conspicuously green tipped. Disk turning from yellow to reddish brown. Dry soil. Common. August.

The following 5 forms, regarded as varieties of A. macrophyllus by Robinson and Fernald, are considered species by Burgess

9. *A. roscidus*, Burgess. DEWY-LEAVED ASTER. In general appearance similar to No. 8. Leaves and stem clammy, with glandular hairs, which are odorless. Rays 14 to 16, violet. Disk golden yellow, turning red. Maine to Pennsylvania.

10. *A. ianthinus*, Burgess. VIOLET WOOD ASTER. Rays 12 to 15, deep violet or pale. Lower leaves broader than those of No. 8, and leaves in the inflorescence cluster and below less conspicuous. Maine and westward.

11. *A. violaris*, Burgess. VIOLET-LEAF ASTER. Lower leaves kidney-shaped, teeth large and sharp, sinus at base shallow, leaf-stalk sometimes 6 or 8 in. long. Leaves conspicuous in the inflorescence. Flower cluster nearly flat-topped. Shady places, New York. Sept.-Oct.

12. *A. multiformis*, Burgess. VARIOUS-LEAVED ASTER. Basal leaves usually 2, large, heart-shaped. Stem leaves rough above. Rays 13, type of No. 8. Maine to Western New York, Pennsylvania and southward.

13. *A. nobilis*, Burgess. STATELY ASTER. Stem bright green, shining, 4 to 5 ft. high. Leaves as in No. 8, smooth above, minutely downy beneath. Basal leaves sometimes as much as 9 in. long, 2/3 as wide. Rays 13 to 15, violet blue. Lake Champlain and westward.

14. *A. cordifolius*, L. (Fig. 2, pl. 179.) COMMON BLUE WOOD ASTER. Stem 1 to 5 ft. high, much branched above, the spreading branches bearing very numerous heads in pyramidal sub-clusters, the main cluster occupying the whole of the upper part of the plant. Lower leaves all egg-shaped, heart-shaped at base, on long leaf-stalks, tapering to a slender point at apex, conspicuously and sharply toothed at margins. Upper leaves on short leaf-stalks or none, egg-shaped or lance-shaped. Flower heads rather small, ⅔ in. broad, the rays (10 to 20) violet or blue, rarely white. Bracts of the involucre green tipped, not spreading, oblong-linear, obtuse, the ranks closely appressed. Woodlands, very common. Sept.-Dec.

15. *A. Lowrieanus*, Porter. (Fig. 5, pl. 178.) LOWRIE'S ASTER. Resembles No. 14, leaves rather thicker, and somewhat succulent; leaf-stalks winged. Heads not very numerous. Rays light blue. Conn., southern New York, and southward.

16. *A. Lindleyanus*, Torr. and Gray. (Fig. 6, pl. 178.) LINDLEY'S ASTER. Stout, 1 to 2 ft. high, smooth or slightly downy. Lower leaves egg-shaped, somewhat heart-shaped, on slender leaf-stalks, the upper leaves without leaf-stalks, tapering at each end. Flower heads larger than *A. cordifolius*, usually not very numerous. Bracts of involucre linear, rather loosely overlapping, tips green. Rays pale violet. Open places, northern part of our area. Aug.-Oct.

17. *A. sagittifolius*, Willd. (Fig. 4, pl. 178.) ARROW-LEAVED ASTER. Stem slender, erect, rigid, smooth, 2 to 5 ft. high. Lower leaves egg-shaped or lance-shaped, with heart- or arrow-shaped base on winged leaf-stalks; upper leaves lance-shaped or linear without leaf-stalks, tapering at each end; nearly all leaves with toothed margins. Heads in an elongated cluster; rays 10 to 15, light blue; white in var. *urophyllus*, involucre bracts linear tapering into awl-shaped loose tips. Open grounds, most of our range. Aug.-Oct.



PLATE 178

1. *Boltonia asteroides*. 2. *Sericocarpus linifolius*. 3. *S. asteroides*. 4. *Aster sagittifolius*. 5. *A. Lowrieanus*. 6. *A. Lindleyanus*. 7. *A. puniceus*. 8. *A. amethystinus*.

Lower leaves heart-shaped, the leaf-stalks clasping the stem

18. *A. undulatus*, L. (Fig. 3, pl. 179.) WAVY-LEAVED ASTER. Stem stiff, rough, somewhat hoary, branched above, with numerous heads in loose, rather elongated clusters. Leaves egg-shaped or broad lance-shaped, *with wavy or slightly toothed margins*, the lower leaves heart-shaped at base, the winged leaf-stalks *clasping* the stem, the upper stem leaves broadened at base, nearly or quite heart-shaped attached directly to stem, nearly clasping. Dry soil. Common. Sept.-Oct.

All the leaves clasping the stem, margins of the leaves entire. (Nos. 23 and 24 sometimes toothed)

19. *A. patens*, Ait. (Fig. 1, pl. 180.) LATE PURPLE ASTER. Stem 1 to 3 ft. high, slender, rough, loosely branched above. Leaves oblong egg-shaped, to oblong lance-shaped, not toothed at margins, often contracted below the middle, strongly heart-shaped at base, clasping the stem, none with leaf-stalks; thick, rigid, *rough*. Heads mostly solitary on the branches; rays 20 to 30, purplish blue to deep violet. Scales of the involucre with spreading pointed tips. Dry open places, northern New York, Mass., and southward. Aug.-Oct.

20. *A. phlogifolius*, Muhl. THIN-LEAVED PURPLE ASTER. (*A. patens*, var. *phlogifolius*, Nees.) Leaves larger than No. 19, thin, *not rough*, much contracted below the middle. Otherwise similar to *A. patens*; rays deep purple. Woods and thickets, New York and westward. Aug.-Sept.

21. *A. novae-angliae*, L. (Fig. 3, pl. 180.) NEW ENGLAND ASTER. Stem hairy, stout, 2 to 8 ft. high, with broad irregularly flat or elongated clusters of heads with pink, red or whitish rays. Leaves lance-shaped, without leaf-stalks, clasping the stem, very numerous, covered with a soft down, 2 to 5 in. long. Rays 40 to 50, linear; heads large. Moist grounds. Common. Aug.-Oct.

22. *A. amethystinus*, Nutt. (Fig. 8, pl. 178.) AMETHYST ASTER. Stem 2 to 5 ft. tall, much branched. Leaves of the stem small, linear, without teeth at margin, hairy on both sides, *partly clasping* by the scarcely-contracted base. Heads numerous, small, in broad diffuse clusters. Bracts of the involucre linear, hairy, green at the tips, which are spreading. Rays 20 to 30, clear blue. Moist grounds, Mass., southern New York, Penn. Sept.-Oct.

23. *A. laevis*, L. (Fig. 2, pl. 180.) SMOOTH ASTER. Whole plant very smooth. Stem 2 to 4 ft. high, the branchlets usually quite short, terminated by a showy flower head. Leaves shining, oblong, rounded at apex, clasping at base, *the lowest sometimes with a few teeth* at the margins, 1 to 4 in. long, about $\frac{1}{3}$ as wide. Heads large; rays 15 to 30, rich blue or violet. Dry soil, Maine to Penna. Sept.-Oct.

24. *A. concinnus*, Willd. (Fig. 3, pl. 181.) NARROW-LEAVED SMOOTH ASTER. Stem branched above, 1 to 3 ft. high, smooth or slightly downy. Leaves narrow lance-shaped, 1 to 3 in. long, about $\frac{1}{3}$ in. wide, *sometimes toothed* at the margins. Heads numerous, rather large; rays rich blue or violet. Southern part of our area.

25. *A. junceus*, Ait. (Fig. 5, pl. 181.) RUSH ASTER. Stem very

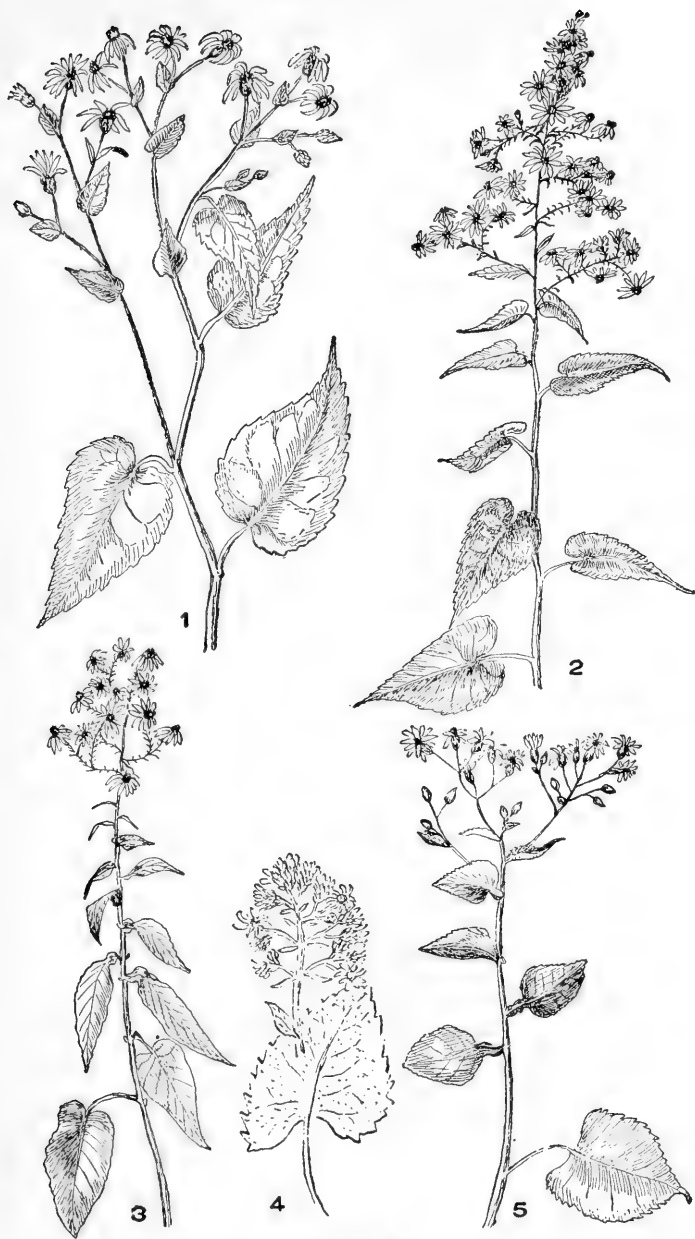


PLATE 179

1. *Aster divaricatus*. 2. *A. cordifolius*. 3. *A. undulatus*. 4. *A. glomeratus*. 5. *A. macrophyllus*.

slender, 1 to 3 ft. high, loosely branching above. Leaves linear, 3 to 5 in. long, without teeth or with a few remote teeth at margins, *slightly clasping* or only attached to stem by broad base. Heads not numerous, small (1 in. broad); rays light purple. Bracts in several series, linear, acute, the outer shortest. Swamps and bogs, Maine to New Jersey. July-Sept.

26. *A. longifolius*, Lam. (Fig. 6, pl. 181.) LONG-LEAVED ASTER. Stem smooth or somewhat downy, slender, 1 to 3 ft. high. Leaves linear to narrow lance-shaped, 3 to 8 in. long, the base clasping the stem, tapering to the margin. Heads about 1 in. broad, numerous. Rays numerous, violet or pale purple, rarely nearly white. Scales not much overlapping, spreading. Swamps and wet grounds, in most of New England. July-Oct.

Leaves clasping the stem, margins conspicuously toothed

27. *A. puniceus*, L. (Fig. 7, pl. 178.) PURPLE-STEM ASTER. Stem stout, 3 to 8 ft. high, reddish, covered with rigid hairs. Leaves lance-shaped, 3 to 6 in. long, not narrowed at base, which clasps the stem, margins somewhat remotely toothed, rough above, downy on the midvein below, sharp pointed. Heads rather large in a diffuse elongated cluster. Scales of involucre narrowly linear in about 2 rows, loosely overlapping. Rays 20 to 40, dark purple or blue. Swamps, most of our area. July-Nov.

28. *A. tardiflorus*, L. (Fig. 1, pl. 181.) NORTHEASTERN ASTER. Stem smooth or somewhat downy above, 1 to 4 ft. high, branched near the summit. Leaves lance-shaped to egg-shaped, sharply toothed, tapering to a slender point at apex and to a rather narrow clasping base 3 to 6 in. long. Heads usually not numerous; rays 20 to 30, violet; bracts of the involucre nearly equal in length, the outer leaf-like. Eastern part of our area. Aug.-Oct.

29. *A. patulus*, Lam. SPREADING ASTER. Closely related to *A. tardiflorus*. Smooth or downy; stem 1 to 4 ft. high. Leaves oblong lance-shaped to egg-shaped, the lower 3 to 6 in. long, sharply toothed, apex somewhat blunt, the base tapering to rather long winged leaf-stalks, which *partly clasp* the stem. Upper leaves without leaf-stalks, tapering at each end. Heads numerous in a loose broad cluster; rays 12 to 15, violet to white; bracts of the involucre linear, acute, green and spreading. Moist soil, Maine to New Hampshire. Aug.-Oct.

30. *A. prenanthoides*, Muhl. (Fig. 2, pl. 181.) CROOKED-STEM ASTER. Hairy or downy, stem 1 to 3 ft. high, bending zig-zag. Leaves rough above, smooth below, egg-shaped to lance-shaped, with sharp teeth at margins, slender taper-pointed at apex, abruptly dilated at the base which clasps the stem. Heads numerous, 1 in. broad; rays 20 to 30, violet; scales of the involucre linear, spreading, green. Moist soil, Mass., and westward and southward. Aug.-Oct.

Leaves not clasping the stem, not heart-shaped at base and with entire margins or with very few remote teeth

Plants not fleshy

31. *A. concolor*, L. (Fig. 7, pl. 181.) EASTERN SILVERY ASTER. Stem slender, straight, scarcely branched, smooth or slightly downy above.



PLATE 180

1. *Aster patens*. 2. *A. laevis*. 3. *A. novae-angliae*. 4. *A. Claytoni*.

Leaves crowded, oblong or broad lance-shaped, the upper reduced to bracts, the lower $1\frac{1}{2}$ to 2 in. long, half as broad, the apex rather blunt, both sides of the leaf covered with a dense whitish silky bloom. Heads arranged in a narrow spike-like cluster; rays 10 to 15, lilac. Scales of the involucre overlapping in several rows, lance-shaped or linear, silky, the tips acute, green. Dry sandy soil near the sea coast. One of our most pleasing asters. Aug.-Oct.

32. *A. ptarmicoides*, T. and G. (Fig. 4, pl. 186.) UPLAND WHITE ASTER. Stems 6 to 20 in. high, growing in clusters or tufts, smooth or roughish. Leaves linear lance-shaped, rigid, acute at apex tapering to the base, somewhat 3-nerved, the margins rough with, in some cases, a few remote teeth. Heads small, in a broad flat cluster. Rays white, about $\frac{1}{4}$ in. long; scales of the involucre in several overlapping series. Dry rocky soil, Mass., Vermont, and Eastern New York. July-Sept.

33. *A. dumosus*, L. (Fig. 2, pl. 183.) BUSHY ASTER. Stems smooth, branched above, 1 to 3 ft. high. Leaves of the stem linear, the upper ones quite small, the lower stem-leaves 1 to 3 in. long, $\frac{1}{6}$ to $\frac{1}{4}$ in. broad. Basal leaves spatula-formed, with a few teeth at margins. Rays, pale purple to white; scales linear in about 4 series. Sandy soil, southern half of our area and southward. Aug.-Oct.

34. *A. polyphyllus*, Willd. (Fig. 3, pl. 184.) FAXON'S ASTER. (*A. Faxoni*, Porter.) Smooth in all parts. Stem 2 to 5 ft. high, branched above. Stem leaves linear-lance-shaped, 2 to 5 in. long, about $\frac{1}{4}$ in. wide, margins entire. Basal leaves oblong, much shorter than the others, with a few remote teeth. Heads in a diffuse cluster; rays bright white, $\frac{1}{4}$ in. long. Scales linear, acute, green tipped. Moist rocky places, Vermont, Mass., and southward. Aug.-Sept.

Leaves not clasping or heart-shaped; margins not toothed

Plants fleshy

35. *A. tenuifolius*, L. (Fig. 6, pl. 184.) PERENNIAL SALT-MARSH ASTER. Whole plant fleshy; perennial; stem zig-zag, branched, 1 to 2 ft. high; stem leaves grass-like, 2 to 6 in. long, the lowest lance-shaped. Heads few, terminating the branches. Rays white or pale purple. Scales numerous, spreading. Salt marshes, Mass., and southward. Aug.-Oct.

36. *A. subulatus*, Michx. (Fig. 7, pl. 184.) ANNUAL SALT-MARSH ASTER. Annual; fleshy; stem zig-zag, 1 to 6 ft. high. Stem leaves linear, 2 to 10 in. long; lower leaves lance-shaped. Heads in a loose branching cluster, small; rays short, purple or purplish. Scales of the involucre overlapping in 3 or 4 series. Salt marshes, New Hampshire, and southward. Aug.-Nov.

Leaves not clasping the stem, and not heart-shaped, though in Nos. 38 and 39 there is slight clasping. Margins of some or all the leaves toothed

37. *A. spectabilis*, Ait. (Fig. 1, pl. 182.) SEA-SIDE PURPLE ASTER. Stem 1 to 2 ft. high, simple, but branched above. Leaves of the stem linear, entire at margins; basal leaves oval on long leaf-stalks, remotely toothed. Heads not very numerous, $1\frac{1}{2}$ in. broad, showy; rays 15 to 30, bright violet. Sandy soil, mostly near the coast. Aug.-Oct.



PLATE 181

1. *Aster tardiflorus*. 2. *A. prenanthoides*. 3. *A. concinnus*. 4. *A. novi-belgii*. 5. *A. junceus*. 6. *A. longifolius*. 7. *A. concolor*. 8. *A. nemoralis*. 9. *A. gracilis*,

38. *A. novi-belgii*, L. (Fig. 4, pl. 181.) NEW YORK ASTER. Stem usually much branched, slender, smooth or slightly downy above. Leaves oblong to linear lance-shaped; margins entire or *more generally toothed*, at least remotely, tapering at each end, to a slender point at apex and base, or at base slightly clasping, 2 to 5 in. long, the lowest on leaf stems. Heads in a spreading flattish cluster, numerous, 1 to $1\frac{1}{2}$ in. broad; rays 15 to 25, violet; bracts linear, acute, green, spreading, in 3 to 5 series. Swamps. Common. Aug.-Oct.

39. *A. gracilis*, Nutt. (Fig. 9, pl. 181.) SLENDER ASTER. From the occasional thickening of the root-stock sometimes known as Tuber Aster. Stem slender, about 1 ft. high. Leaves somewhat rough, oblong lance-shaped, the lower broad lance-shaped on long leaf-stalks. Heads numerous, $\frac{3}{4}$ in. broad; rays 9 to 15, violet. Scales of the involucre leathery, whitish, with green tips, in several series. Dry sandy soil, New Jersey, and southward. July-Sept.

40. *A. radula*, Ait. (Fig. 3, pl. 182.) LOW ROUGH ASTER. FILE-BLADE ASTER. Stem simple, branching above, 1 to 2 ft. high; leaves somewhat crowded, oblong lance-shaped, tapering to a slender point at apex, the upper rather broad, rounded at base, the lower tapering at each end; both sides of the leaf rough. Heads about $1\frac{1}{2}$ in. broad; rays 20 to 30, violet. Scales leathery, oblong with green obtuse tips. Swamps and low grounds, most of our area. July-Sept.

41. *A. Herveyi*, A. Gray. (Fig. 2, pl. 184.) HERVEY'S ASTER. Stem rough, 1 to 2 ft. high, above downy. Leaves rather rough, margins dentate with low teeth, the upper ones narrowly egg-shaped without leaf-stalks, the lower broadly egg-shaped on long leaf-stalks. Heads not numerous, an inch or more broad; rays 15 to 25, violet. Involucre scales oblong, closely overlapping. Dry soil, Eastern Mass., and Rhode Island. Aug.-Oct.

42. *A. nemoralis*, Ait. (Fig. 8, pl. 181.) BAG ASTER. Stem downy, $\frac{1}{2}$ to 2 ft. high. Leaves lance-shaped, acute at each end, the lower tapering to a short leaf-stalk, toothed at margins. Heads several usually rather more than an inch broad; rays light purple to pink; involucre saucer-shaped, the scales linear, acute. Sandy bogs, northern half of our area. Aug.-Sept.

43. *A. acuminatus*, Michx. (Fig. 6, pl. 182.) WHORLED ASTER. Plant somewhat hairy. Stem zig-zag, not branching, 1 to $2\frac{1}{2}$ ft. high. Leaves broad lance-shaped conspicuously slender pointed, the borders toothed, the leaves often crowded near the top so as to appear whorled. Heads several, rays purplish to white. Woods, northern and western New York, and southward. July-Oct.

44. *A. salicifolius*, Lam. (Fig. 2, pl. 182.) WILLOW ASTER. Stem 2 to 4 ft. high, much branched, very leafy, leaves lance linear, 2 to 4 in. long, $\frac{1}{6}$ to $\frac{1}{2}$ in. wide, toothed at margins, the apex slender pointed, tapering from a rather wide base. Heads about an inch broad, rather numerous; rays violet or purple, rarely white. Scales linear, in 4 or 5 series. Low grounds, most of our area. Aug.-Oct.

45. *A. paniculatus*, Lam. (Fig. 5, pl. 182.) TALL WHITE ASTER. Stem and leaves similar to No. 43, but leaves somewhat longer. Rays



PLATE 182

1. *Aster spectabilis*. 2. *A. salicifolius*. 3. *A. radula*. 4. *Ionaetis linarii-folius*. 5. *Aster paniculatus*. 6. *A. acuminatus*.

white or tinged with violet. Low grounds, throughout most of our range. Aug.-Oct.

46. *A. Tradescanti*, L. (Fig. 1, pl. 184.) MICHAELMAS DAISY. Stem branched, 2 to 5 ft. high. Leaves linear or narrow lance-shaped, the lower toothed at margins, the upper nearly or quite entire. Heads very numerous; rays white or purplish, short, the head being about $\frac{3}{4}$ in. broad. Scales linear, acute. Fields and swamps, throughout our range. Aug.-Oct.

47. *A. ericoides*, L. (Fig. 5, pl. 183.) WHITE HEATH ASTER. FROST-WEED ASTER. Smooth, stem 1 to 3 ft. high, branched above. Upper leaves linear or awl-shaped, firm, rigid, $\frac{1}{4}$ to $\frac{3}{4}$ in. long. Heads very numerous, small, $\frac{1}{2}$ in. broad. Rays white. Dry soil, in all our area. Sept.-Dec.

48. *A. Pringlei*, (A. Gray) Britton. (Fig. 4, pl. 184.) PRINGLE'S ASTER. Stem higher than the last. Basal leaves long lance-shaped to spatula-form. Heads usually smaller than No. 47. Rocky places, Mass., Vermont, and westward. Aug.-Oct. Regarded as variety of *A. ericoides* by Dr. Gray.

49. *A. hirsuticaulis*, Lindl. (Fig. 5, pl. 184.) HAIRY-STEMMED ASTER. Stem erect, slender, $1\frac{1}{2}$ to 3 ft. high, notably downy, branches short. Leaves linear lance-shaped, the lower about 6 in. long by $\frac{1}{4}$ in. wide, the margins toothed, the upper, smaller leaves with entire margins. Heads somewhat but usually not notably one-sided, clustered along the stem; rays white. Woods, New York, Penna., and southward. Aug.-Oct.

2. Inflorescence largely Unilateral (Secund)

50. *A. lateriflorus*, (L.) Britton. (Fig. 4, pl. 183.) STARVED ASTER. Much branched, more or less downy; stem 1 to 5 ft. high. Leaves broad lance-shaped, tapering at each end, the margins toothed, 2 to 5 in. long. Heads numerous, forming short dense clusters along the branches; rays white or purplish; disk flowers purple; scales of the involucre linear, overlapping in 3 or 4 rows. Thickets and fields, in all our range. Aug.-Oct.

51. *A. vimineus*, Lam. (Fig. 3, pl. 183.) SMALL WHITE ASTER. Much branching, 2 to 5 ft. high, smooth. Leaves linear, the lower somewhat dentate with low teeth. Heads very numerous, crowded upon the spreading branches, largely unilateral. Rays numerous, white; scales linear, acute. Moist soil. Common. Aug.-Sept.

52. *A. multiflorus*, Ait. (Fig. 1, pl. 183.) WHITE WREATH ASTER. DENSE-FLOWERED ASTER. Stem erect, but freely branching, bushy, covered with a whitish down. Leaves rigid, linear, not toothed, somewhat clasping at base. Heads densely crowded along the spreading, more or less one-sided, branches; rays 10 to 20, white or bluish. Dry fields, in all our area. Aug.-Nov.

15. ERIGERON, L.

Herbs with alternate or basal leaves, with 1 to many heads, with disk and ray florets, the latter white or colored, never yellow (rarely the heads are without ray florets). Involucre of nearly equal, narrow bracts nearly in one row; receptacle flat or convex, naked. Anthers without tails at the base, obtuse at apex. Aigrette of a single row of fragile bristles.



PLATE 183

1. *Aster multiflorus*. 2. *A. dumosus*. 3. *A. vimineus*. 4. *A. lateriflorus*.
5. *A. ericoides*.



PLATE 184

1. *Aster Tradescanti*. 2. *A. Herveyi*. 3. *A. polyphyllus*. 4. *A. Pringlei*.
5. *A. hirsuticaulis*. 6. *A. tenuifolius*. 7. *A. subulatus*.



PLATE 185

1. *Erigeron philadelphicus*. 2. *E. annuus*. 3. *E. pulchellus*. 4. *E. hysopifolius*. 5. *E. ramosus*. 6. *Leptilon canadense*.

Plant without hairs	<i>E. hyssopifolius</i>
Plant more or less hairy.	
Heads with 100 to 150 rays	<i>E. Philadelphicus</i>
Heads with less than 70 rays.	
Stem leaves conspicuously toothed	<i>E. annuus</i>
Stem leaves mostly without teeth.	
Leaves very hairy	<i>E. pulchellus</i>
Leaves not very hairy	<i>E. ramosus</i>

1. *E. hyssopifolius*, Michx. (Fig. 4, pl. 185.) HYSSOP-LEAVED ERIGERON. Stem slender, 6 to 15 in. high, from slender rootstocks. Leaves numerous, the upper linear, acute at apex, tapering to base, the lower slightly broader and less acute. Heads solitary or several, usually 1 to a branch, the branch being prolonged to a slender naked flower stem, about $\frac{1}{2}$ to $\frac{3}{4}$ in. broad; rays 20 to 30, white or purplish. Northern part of New England. July-Aug.

2. *E. pulchellus*, Michx. (Fig. 3, pl. 185.) ROBIN'S PLANTAIN. (*E. bellidifolius*, Muhl.) Whole plant very hairy, stem slender, not branching, 1 to 2 ft. high, bearing a few remote, small leaves, the lower leaves tufted and larger; the upper without or with a few marginal teeth, the lower with low teeth. Heads 1 to 6 at and near the summit of the stem, on slender flower stems. Rays about 50, light bluish purple. Moist banks and hills, common. April-June.

3. *E. philadelphicus*, L. (Fig. 1, pl. 185.) COMMON FLEABANE. Stem 1 to 3 ft. high; plant hairy but less so than No. 2, especially the leaves. Leaves of the stem partly clasping, rather numerous, thin, with a thick midvein, oblong, the lower coarsely toothed. Heads rather numerous; rays 100 to 150, rose purple, very narrow. Fields and woods, common. April-Aug.

4. *E. annuus*, Pers. (Fig. 2, pl. 185.) SWEET SCABIOUS. DAISY FLEABANE. Stem 1 to 4 ft. high, branched above, with few hairs. Leaves all coarsely toothed, the lower egg-shaped, tapering to a long leaf-stalk, the upper lance-shaped, apex sharp pointed, the base narrow or rather broad at its attachment to the stem. Heads in a broad diffuse cluster, rays 40 to 70, narrow, white or tinged with purple. Fields and roadsides. Common. May-Nov.

5. *E. ramosus*, (Walt.) BSP. (Fig. 5, pl. 185.) DAISY FLEABANE. Stem branching, 1 to 3 ft. high. Resembles the last, the upper leaves without teeth or with very few. Rays white or purplish. Fields and roadsides. Common. May-Nov.

16. LEPTILON, Raf. (*Erigeron*, L.)

Annual herb, freely branching, with many flower heads, with inconspicuous rays which scarcely exceed the bristles of the aigrettes. Involucre scales in 2 or 3 series; ray flowers pistillate. Bristles of the aigrette in a single series.

L. canadense, (L.) Britton. (Fig. 6, pl. 185.) HORSE WEED. CANADA FLEABANE. (*Erigeron canadensis*, L.) A common weed in dry fields; stem erect, wand-like, 3 in. to 6 ft. or more high, the whole plant covered with bristly hairs. Leaves linear, the upper very narrow, the lower becoming lance-shaped with a few remote teeth, the upper with rough margins. Heads very numerous, of no beauty, the rays (which are not very noticeable), white. Roadsides, abandoned fields, etc. Aug-Nov.



PLATE 186

1. *Doellingeria umbellata*. 2. *D. infirma*. 3. *Baccharis halimifolia* 4. *Aster ptarmicoides*. 5. *Gifola germanica*. 6. *Pluchea foetida*. 7. *P. camphorata*.

17. DOELLINGERIA, Nees.

Perennial herbs resembling the Asters. Basal leaves none, and those of lower part of stem reduced to scales. Upper leaves in our species broad- or narrow-lance-shaped with margins entire. Heads in broad rather flat clusters, conspicuous, with white rays, which are pistillate. Florets of the disk white to greenish, with both stamens and pistils. Involucre cup- or saucer-shaped, of several series of closely laid overlapping bracts. Aigrette of 2 rows of bristles

1. *D. umbellata*, (Mill.) Nees. (Fig. 1, pl. 186.) FLAT-TOP WHITE ASTER. (*Aster umbellatus*, Mill.) Stem smooth or somewhat downy at top, 2 to 7 ft. high, leafy to the branching summit. Leaves lance-shaped, narrow, taper-pointed, 3 to 6 in. long. Heads numerous in a flat cluster. Rays 10 to 15. Moist thickets. Common. July-Oct.

2. *D. humilis*, (Willd.) Britton. BROAD-LEAVED WHITE ASTER. (*Aster umbellatus*, Var. *latifolius*, Gray.) Leaves broader than those of the preceding species, egg-shaped to broad lance-shaped, 1 to 3 in. long. Moist thickets, southern New Jersey and Penna. July-Sept.

3. *D. infirma*, (Michx.) Greene. (Fig. 2, pl. 186.) CORNEL-LEAVED ASTER. (*Aster informis*, Michx.) Stem often more or less zig-zag, 1 to 3 ft. high. Leaves inversely egg-shaped or oblong. Heads few or several. Open woods, Mass., New York and southward. Aug-Sept.

18. IONACTIS, Greene

Aigrette of fruit not distinctly double; scales of involucre without herbaceous tips. Otherwise mostly resembling the Asters; rays violet, bearing pistils only.

I. linariifolius, (L.) Greene. (Fig. 4, pl. 182.) STIFF-LEAVED ASTER. (*Aster linariifolius*, L.) Stems tufted, several springing from a common root, 3 to 20 in. high. Leaves linear, rigid, about 1 in. long, rough above, passing to stiff scales. Heads solitary at the ends of the branches, about 1 in. broad. Rays 10 to 15, violet. A handsome plant with rich violet ray flowers. Dry soil, throughout our range. July-Oct.

19. BACCHARIS, L.

Shrubs with smooth stems and leaves and with white or yellow flowers, our species found in salt marshes. Flowers dioecious, i. e., with pistillate flowers on one plant and staminate on another. Flowers all tubular.

B. halmifolia, L. (Fig. 3, pl. 186.) GROUNDSEL BUSH. A branching, smooth shrub, 3 to 10 ft. high, found in salt marshes, with thick wedge-formed leaves very coarsely toothed or somewhat lobed or less frequently with entire margins. Heads in long, somewhat compact clusters, those with pistillate flowers conspicuous later in the season by the long white plumes. Sept.-Nov.

20. GIFOLA, Cass.

White, woolly herb, with alternate scale-like leaves and small woolly heads grouped in compact rounded clusters. Involucre small; receptacle elongated, top-shaped or cylindric. Outer florets pistillate, without aigrette; inner flowers crowned with an aigrette of stiff bristles.



PLATE 187

1. *Gnaphalium obtusifolium*. 2. *G. uliginosum*. 3. *Anaphalis margaritacea*. 4. *Gnaphalium supinum*. 5. *G. purpureum*. 6. *G. decurrens*. 7. *Antennaria neodioica*. 8. *A. neglecta*. 9. *A. plantaginifolia*.

G. germanica, (L.) Dumort. (Fig. 5, pl. 186.) **CUDWEED**. Stem erect, 4 to 18 in. high, very leafy, terminated by a rounded cluster of woolly heads from which rise one or more branches, each also terminated by a group of heads, 12 to 30 in each cluster. Dry fields, southern New York and Penna. July-Oct.

21. **PLUCHEA**, Cass.

Our species herbs emitting an odor of camphor; alternate leaves, coarsely toothed and with heads of purple flowers, all of which are tubular, in terminal clusters. The marginal florets are pistillate, those of the center with both stamens and pistils. Style undivided or 2-cleft; receptacle flat, naked; involucre of overlapping scales in several series.

Leaves without leaf-stalks, heart-shaped at base *P. foetida*
 Leaves with short leaf-stalks, not heart-shaped *P. camphorata*

1. **P. foetida**, (L.) DC. (Fig. 6, pl. 186.) **VISCID MARSH FLEABANE**. Perennial, 2 to 3 ft. high, with oblong coarsely toothed leaves which are broad, somewhat heart-shaped at base and directly attached to stem. Swamps and low grounds, southern New Jersey and southward. July-Sept.

2. **P. camphorata**, (L.) DC. (Fig. 7, pl. 186.) **SPICY MARSH FLEABANE**. Annual, 2 to 3 ft. high. Leaves egg-shaped on short leaf-stalks, margins coarsely toothed. Salt marshes, New Hampshire and southward. Aug.-Oct.

22. **ANTENNARIA**, Gaertn.

Perennial herbs, white woolly, with alternate and basal leaves and small heads with disk flowers only. Heads many flowered, the pistillate florets on one plant the staminate on another or with the staminate or pistillate flowers there may be those bearing both pistils and stamens. Bracts of the involucre overlapping in several series, *leathery and dry*, the outer scales usually shorter and woolly. Receptacle flat or convex, not chaffy. Anthers *tailed at base*. Aigrette of a single row of bristles, in the pistillate or the perfect flowers these bristles somewhat united at base. All of our species have *stolons* or suckers, which arise from beneath the ground and spread out horizontally or are more or less ascending.

Basal leaves not more than $1\frac{1}{2}$ in long.

Bracts of heads bearing pistils lance-shaped, acute.

Basal leaves spatula-formed *A. neodioica*

Basal leaves inversely egg-shaped *A. neglecta*

Basal leaves 3 to 5 in. long, stem leaves purplish *A. Parlinii*

Basal leaves mostly more than $1\frac{1}{2}$ long and $\frac{1}{2}$ in. wide, leaves silky white *A. plantaginifolia*

1. **A. Parlinii**, Fernald. **PURPLE EVERLASTING**. Basal leaves large, broadly egg-shaped, obtuse, 3-nerved. Stem 12 to 20 in. high, crowded with spatula-formed leaves. Stem, leaves and stolons purple or purplish with colored hairs. Involucre of about 3 rows of bracts, 4/12 to 5/12 in. high. Styles becoming crimson. Open woods, New England, and westward. May-July.

2. **A. neodioica**, Greene. (Fig. 7, pl. 187.) **SMALLER CATSFOOT**. Similar to No. 1, but the bracts of the involucre of the pistil bearing heads are *lance-shaped and acute*. In woods and shady places, Maine to Mass. and New York. April-July.

The form found in our area is, Var. *grandis*, Fernald.



PLATE 188

1. *Inula Helenium*. 2. *Polymnia uvedalia*. 3. *P. canadensis*. 4. *Eclipta alba*. 5. *Silphium perfoliatum*. 6. *Heliopsis scabra*. 7. *H. helianthoides*.

3. *A. neglecta*, Greene. (Fig. 8, pl. 187.) FIELD CATSFOOT. Similar to No. 2, but basal leaves are inversely egg-shaped. Abundant in old fields and pastures. April-June.

4. *A. plantaginifolia*, (L.) Richards. (Fig. 9, pl. 187.) PLANTAIN-LEAVED EVERLASTING. Larger than either of the preceding forms and leaves much broader. Open woods, in all of our area. April-June.

23. ANAPHALIS, DC.

Has the characters of *Antennaria* but in the pistillate flowers the bristles of the aigrette are not united and those of the staminate flowers, which are often club-shaped at the top are, in *Anaphalis*, not thickened or only slightly so. There are no stolons (runners).

A. margaritacea, (L.) Benth. and Hook. (Fig. 3, pl. 187.) LARGE-FLOWERED EVERLASTING. Plant usually rather more than a foot high, but sometimes reaches a height of 3 ft., the stem white woolly, branching at top into a broad rather flat cluster of rounded white heads. Leaves alternate, linear lance-shaped, light green but downy and woolly beneath. Heads many, about $\frac{1}{4}$ in. broad, round, the scales of the involucre pearly white. Dry hilly fields. Common. July-Sept.

24. GNAPHALIUM, L.

Woolly herbs with alternate leaves and clusters of many or few heads, branching diffusely or nearly erect. Heads of tubular flowers only, the outer bearing pistils the central all perfect, *i. e.*, with both stamens and pistils. Scales of the involucre dry, leathery, white or colored; receptacle flat, without chaff. Anthers tailed at base. Aigrette of a single row of bristles.

Low, tufted mountain herbs with heads in a rounded group or arranged in such groups one above the other, involucre bracts turning brown . . . *G. supinum*
 Low diffuse herbs with heads in dense leafy rounded groups, bracts turning brown . . . *G. uliginosum*
 Erect, somewhat tall herbs, with heads in spreading diffuse clusters.
 Leaves not decurrent on the stem; heads mostly conical or slender egg-shaped . . . *G. obtusifolium*
 Leaves decurrent on the stem, heads bell-shaped . . . *G. decurrens*
 Erect, the heads arranged in a spike or terminal cluster . . . *G. purpureum*

1. *G. obtusifolium*, L. (Fig. 1, pl. 187.) SWEET EVERLASTING. (*G. polyccephalum*, Mich.) Stem erect, 1 to 3 ft. high, somewhat woolly. Leaves lance-shaped to linear, without leaf stalks, white woolly beneath, usually dark green above. Heads very numerous in clusters of 1 to 5 which altogether form a large, spreading diffuse compound cluster. The individual heads conical then egg-shaped. Scales white, egg-shaped. Common in fields and woods. Aug-Sept.

2. *G. decurrens*, Ives. (Fig. 6, pl. 187.) CLAMMY EVERLASTING. Stem 2 to 3 ft. high; plant much resembling the preceding, but the lance-shaped leaves are decurrent on the stem. Heads less conical. Open places, most of our area. July-Sept.

3. *G. uliginosum*, L. (Fig. 2, pl. 187.) LOW CUDWEED. Mostly diffusely branched and spreading but stems may be more or less erect, 2 to 8 in. high. Plant woolly. Leaves linear or spatula-linear. Heads in rounded

clusters, terminal to the main stem or to short branches along the stem. Common in low grounds. July-Sept.

4. *G. supinum*, L. (Fig. 4, pl. 187.) DWARF CUDWEED. Tufted, about 2 in. high; leaves mostly basal, linear or lance-shaped, with 1 or 2 along the stem. Whole plant white woolly. Heads 1 or more, when several, a spike-like arrangement. Flowers yellowish. Rare, summits of the White Mountains. July-Aug.

5. *G. purpureum*, L. (Fig. 5, pl. 187.) PURPLE CUDWEED. Simple or branched from the base, stem from 2 in. to 2 ft. high, woolly or silvery with a silky coat. Leaves narrow, almost linear, or the lower spatula-formed, green above, silky below. Heads attached almost directly to the stem, forming groups at the upper leaf-axils and an interrupted spike above. Involucre bracts brown or purple. Dry sandy soil, throughout our area. May-Sept.

25. INULA, L.

Our only species a tall, coarse herb with large, alternate leaves and large yellow ray flowers. Plant not floccose-woolly, but decidedly downy or hairy. Involucre of overlapping scales; receptacle flat or convex, naked; ray flowers bearing pistils, disk flowers bearing both stamens and pistils. Anthers arrow-formed at base; aigrette simple.

I. *Helenium*, L. (Fig. 1, pl. 188.) ELECAMpane. Stems in tufts, 2 to 8 ft. high, downy above. Leaves large, the lower egg-shaped, those of the stem more or less heart-shaped at base and clasping the stem, woolly beneath. Rays very numerous, narrow, yellow. Head, including rays, 2 to 4 in. broad. Along roadsides and in fields. An introduced plant. July-Aug.

26. POLYMNIA, L.

Tall clammy herbs with opposite leaves and yellow flowers. Leaves broad, lobed or angled, the lowest sometimes alternate. Heads in terminal clusters; involucre of about 2 rows of bracts, the outer of about 5 rather broad ones, leaf-like, the inner narrower and more numerous. Ray flowers bearing pistils and producing seeds, the disk flowers with both stamens and pistils but producing no fruit. Receptacle flat, chaffy.

1. *P. uvedalia*, L. (Fig. 2, pl. 188.) YELLOW LEAF-CUP. Stout, rough, 3 to 10 ft. high. Leaves broadly egg-shaped, angled and somewhat lobed, the lower leaves sometimes a foot long, narrowed to a winged leaf-stalk. Rays 10 to 15, yellow, $\frac{1}{2}$ to 1 in. long, apex 3 toothed. Rich woods, southern part of our area, New York, and southward. July-Oct.

2. *P. canadensis*, L. (Fig. 3, pl. 188.) SMALL-FLOWERED LEAF-CUP. Less stout than the preceding, viscid downy, 2 to 5 ft. high. Upper leaves deeply 3- to 5-lobed with sharp angles, the lower large, the terminal lobe rounded. Heads small; rays 5, small, shorter than the involucre bracts, or minute or wanting, whitish yellow. Moist shaded places, southern part of our area, New York, and southward. June-Sept.

27. SILPHIUM, L.

Tall, rough, coarse perennial herbs with resinous juice, with opposite or alternate leaves and with clusters of yellow-flowered heads. Heads with numerous rays bearing pistils and producing fruit. Disk flowers with stamens and pistils producing no fruit. Scales of the broad involucre over-

lapping, in several series. Receptacle flat, chaffy, the chaff subtending the ray flowers.

1. *S. perfoliatum*, L. (Fig. 5, pl. 188.) CUP PLANT. Stem square, stout, branched above, 4 to 8 ft. high. Leaves opposite, the upper united by their bases, the lower contracted to margined leaf-stalks, egg-shaped, coarsely toothed, 6 to 15 in. long, 4 to 8 wide. Heads numerous, 2 to 3 in. broad, with 20 to 30 yellow rays. July-Sept.

2. *S. trifoliatum*, L. WHORLED ROSIN-WEED. Stem 4 to 7 ft. high, branched at the top. Leaves lance-shaped, toward the middle of the stem in whorls of 3 or 4, usually with quite short leaf-stalks. Heads several, often numerous, $1\frac{1}{2}$ to 2 in. broad. Rays 15 to 20. Woods, dry plains, Penna., westward and northward. July-Sept.

28. HELIOPSIS, Pers.

Perennial herbs with opposite leaves and large showy heads with yellow disk and ray flowers. Leaves on leaf-stalks, 3-ribbed. Heads on rather long flower stems, terminal or axillary; involucre of 2 or 3 series of scales, nearly equal, the outer leaf-like; receptacle convex or conic, chaffy. Ray flowers bearing pistils, and producing fruit, disk flowers with stamens and pistils.

1. *H. helianthoides*, (L.) BSP. (Fig. 7, pl. 188.) FALSE SUN-FLOWER. Stem 2 to 5 ft. high, nearly smooth. Leaves opposite or occasionally in 3s, lance-shaped to egg-shaped on moderately long or on short leaf-stalks, 3 to 6 in. long. Heads about 2 in. broad, on long flower stems; rays linear, showy. Involucre scales oblong, or linear. Open places, throughout our range. July-Sept.

2. *H. scabra*, Dunal. (Fig. 6, pl. 188.) ROUGH OX-EYE. Rough, at least above, especially the leaves. Otherwise similar to the preceding. Dry open places, through all but the southern third of our range. June-Sept.

29. ECLIPTA, L.

A rough branching herb, annual, with opposite leaves, hairy, with heads of flowers terminal or axillary and with small, nearly white, ray flowers. Leaves without leaf-stalks. Receptacle flat or convex, chaffy; ray flowers bearing pistils and producing fruit; disk flowers bearing both stamens and pistils, also fertile.

E. alba, (L.) Hassk. (Fig. 4, pl. 188.) ECLIPTA. A rough plant with a procumbent or erect branching stem $\frac{1}{2}$ to 3 ft. high, and lance-shaped leaves with low teeth at the margins, 1 to 5 in. long. Heads on very short flower stems, numerous, about $\frac{1}{2}$ in. broad, with short white rays. Along streams and in waste places. Naturalized. July-Oct.

30. RUDBECKIA, L.

Mostly rough herbs with rigid stems and leaves, the latter alternate and showy, terminal heads with conspicuous yellow rays. Leaves, lobed or not, the lower on leaf-stalks, the upper without leaf-stalks. Heads with many ray flowers; the disk flowers tubular, purple; receptacle conical or in form of a column, chaffy. Involucre scales leaf-like in about 2 or more series. Ray flowers producing no fruit, disk flowers with stamens and pistils, fruit producing.



PLATE 189

1. *Rudbeckia hirta*. 2. *R. triloba*. 3. *R. laciniata*. 4. *R. fulgida*. 5. *R. speciosa*.

Leaves deeply 3-lobed	<i>R. triloba</i>
Lower leaves deeply cut, forming a series of opposite lobes (pinnatifid)	
Lower leaves moderately cut, forming irregular sharp pointed lobes	<i>R. laciniata</i>
or only very sharply toothed	<i>R. speciosa</i>
Lower leaves spatula-formed, lance-shaped or egg-shaped with irregular, not very sharp teeth	<i>R. fulgida</i>
Leaves all lance-shaped, not deeply toothed or cut	<i>R. hirta</i>

1. *R. triloba*, L. (Fig. 2, pl. 189.) THIN-LEAVED CONE-FLOWER. Stem erect, somewhat branched, rather rough, 2 to 5 ft. high. Leaves thin, rough on both sides, the lower deeply cut into 3 lobes, on leaf-stalks, the upper lance-shaped to egg-shaped, 3-nerved, without leaf-stalks. Heads about 2 in. broad, each on a slender flower stem; rays 8 to 12, yellow, or at base purple. Involucre bracts linear. Moist soil, New Jersey and southward. June-Oct.

2. *R. hirta*, L. (Fig. 1, pl. 189.) BLACK-EYED SUSAN. YELLOW DAISY. Usually very hairy throughout. Stem simple or with few branches. Leaves all lance-shaped with remote low teeth at the margins or entire, 3-nerved, the lower narrowed at base to a leaf-stalk. Heads few, 2 to 4 in. broad; the disk globose or egg-shaped with dark purple or brownish tubular florets; rays 10 to 20, orange; bracts of the involucre very hairy. Very common in fields and meadows. May-Sept.

3. *R. fulgida*, Ait. (Fig. 4, pl. 189.) ORANGE CONE-FLOWER. Stem 1 to 3 ft. high, slender, somewhat branching, rough. Leaves, the upper broad lance-shaped with rather remote, not sharp teeth, mostly tapering to a leaf-stalk at base, or directly attached to the stem; the lower leaves broadly egg-shaped, spatula-formed, lance- or inversely-lance-shaped. Heads with rounded disks and dark brown-purple tubular flowers; rays 10 to 15, deep orange or bright yellow. Southern part of our area. Aug.-Oct.

4. *R. speciosa*, Wenderoth. (Fig. 5, pl. 189.) SHOWY CONE-FLOWER. Stem usually simple, 1 to 3 ft. high, more or less hairy. Lower leaves somewhat deeply slashed, forming shallow lobes with sharp points or without lobes, but with very sharp and conspicuous teeth; upper leaves lance-shaped with a few low and remote teeth or with none. Heads in a spreading cluster, the disk rounded, high, light brown; the rays nearly or quite an inch long, light yellow. Moist soil. Aug.-Oct.

5. *R. laciniata*, L. (Fig. 3, pl. 189.) TALL CONE-FLOWER. Stem 3 to 12 ft. high, branched, smooth or nearly so. Lower leaves 3 to 5 lobed, the lobes themselves deeply cut into 3 to 5 subordinate lobes. Upper leaves lance-shaped, rough. Heads usually numerous, the disk greenish yellow rounded or conical to almost cylindric; rays drooping 6 to 10, bright yellow. Moist thickets. July-Sept.

31. HELIANTHUS, L.

Tall branching herbs with (in all our species) the lower leaves opposite, the upper alternate; and with large heads of tubular and radiate flowers, the rays yellow. Heads with several or many rays which do not produce fruit; disk flowers yellow, brown or purple, producing fruit. Involucre of several series of overlapping bracts, which are more or less leaf-like. Receptacle flat or convex, chaffy. Style branches tipped with hairy appendages.



PLATE 190

1. *Helianthus giganteus*. 2. *H. tuberosus*. 3. *H. decapetalus*. 4. *H. divaricatus*. 5. *H. strumosus*. 6. *H. angustifolius*.

- Leaves with entire margins *H. angustifolius*
 Leaves toothed at margins.
 Leaves narrow lance-shaped tapering at base.
 Leaves on leaf-stalks *H. grosse-serratus*
 Leaves without leaf-stalks or on very short ones *H. giganteus*
 Leaves egg-shaped *H. tuberosus*
 Leaves rounded or very abrupt at base.
 Leaves at nearly right angles with the stem *H. divaricatus*
 Leaves at an acute angle with stem.
 On slender leaf-stalks *H. decapetalus*
 Without leaf-stalks or with very short ones *H. strumosus*

1. *H. angustifolius*, L. (Fig. 6, pl. 190.) SWAMP SUNFLOWER. Stem slender, 2 to 7 ft. high, rough above, hairy below. Leaves linear, without teeth and without leaf-stalk, 2 to 7 in. long, $\frac{1}{4}$ in. wide, upper alternate, lower opposite. Heads few or solitary, 2 to 3 in. broad; rays abruptly terminated, 3-toothed, disk purple; scales sharp pointed. Swamps, southern part of our area. Aug.-Oct.

2. *H. giganteus*, L. (Fig. 1, pl. 190.) GIANT SUNFLOWER. Stem rough, hairy, 3 to 12 ft. high, branching above, bearing many heads on long flower stems. Leaves lance-shaped, 2 to 6 in. long, sharp pointed at apex, tapering to the base which is attached directly or nearly so, to stem. Heads showy, $1\frac{1}{2}$ to $2\frac{1}{2}$ in. broad. Wet meadows, swamps. Aug.-Oct.

3. *H. divaricatus*, L. (Fig. 4, pl. 190.) ROUGH SUNFLOWER. Stem simple or branched above, 1 to 7 ft. high. Leaves usually *all opposite* and extending at right angles with the stem, abruptly terminated, at base attached to stem by a very short leaf-stalk. Heads about $2\frac{1}{2}$ in. broad. Dry thickets, common. July-Sept.

4. *H. decapetalus*, L. (Fig. 3, pl. 190.) THIN-LEAVED SUNFLOWER. Stem slender, scarcely hairy, 1 to 5 ft. high, branching. Leaves smooth or somewhat rough, egg-shaped, slender pointed at apex, base rounded to a marginal leaf-stalk. Rays about 10. Moist woods, borders of streams. Aug.-Sept.

5. *H. strumosus*, L. (Fig. 5, pl. 190.) PALE-LEAVED WOOD SUNFLOWER. Stem very smooth, 3 to 7 ft. high, branched above, the branches usually downy. Leaves lance-shaped, slender pointed, rounded at base, attached to stem without leaf-stalk or by a very short one. Heads $2\frac{1}{2}$ to 4 in. broad. Dry woods. July-Sept.

6. *H. tuberosus*, L. (Fig. 2, pl. 190.) JERUSALEM ARTICHOKE. Plant hairy, 5 to 12 ft. high, the root-stocks bearing edible tubers. Leaves egg-shaped to lance-shaped, pointed at each end, the base narrowed to a moderately long leaf-stalk. Rays 12 to 20. Roadsides, borders of old gardens. Moist places. Sept.-Oct.

7. *H. grosse-serratus*, Martens. SAW-TOOTHED SUNFLOWER. Stem 6 to 10 ft. high, somewhat hairy on the branches. Leaves long, narrow lance-shaped, 4 to 8 in. long, $\frac{1}{2}$ to 1 in. wide, teeth sharp, though the uppermost leaves may be without teeth, downy or with long soft hairs beneath. Heads $\frac{1}{2}$ to 3 in. broad. Involucre hemispheric. Disk yellowish; rays 10 to 20, deep yellow. Long Island, Penna., and southward. Aug.-Oct.

32. VERBESINA, L. (*Actinomeris*, Nutt.)

Herbs with alternate or opposite leaves and clustered or solitary heads of tubular and radiate flowers. Involucre scales few, lance-shaped, deflexed. Rays not fruitful, disk flowers fertile.



PLATE 191

1. *Verbesina alternifolia*. 2. *Coreopsis rosea*. 3. *C. lanceolata*. 4. *C. tripteris*. 5. *Bidens connata*. 6. *B. comosa*. 7. *B. trichosperma*.

V. alternifolia, (L.) DC. (Fig. 1, pl. 191.) ACTINOMERIS. (*Actinomeris squarrosa*, Nutt.) Stem smooth or somewhat downy, leafy, 4 to 9 ft. high. Leaves lance-shaped, sharply toothed, *alternate*, attached to stem by a narrowed base, 4 to 12 in. long. Heads numerous, 1 to 2 in. broad. Disk round, yellow; rays 2 to 10, yellow. Southern part of our area. Aug.-Sept.

33. COREOPSIS, L.

Herbs, usually with opposite leaves and with large heads on long flower stems, bearing both tubular and ray flowers. Involucre hemispherical, the bracts in 2 rows, each of about 8 scales, the outer rather leafy. Receptacle flat or convex with membranous chaff. Disk flowers fertile; rays not fertile, yellow, brown or pink, usually about 8.

Rays pink *C. rosea*
 Rays yellow.
 One to two feet high *C. lanceolata*
 Four to eight feet high *C. tripteris*

1. **C. rosea**, Nutt. (Fig. 2, pl. 191.) SMALL PINK TICKSEED. Branching, leafy, smooth, slender, 8 to 24 in. high. Leaves opposite, grass-like, without teeth, 1 to 2½ in. long. Heads on slender stems; rays rose or pink, 3-toothed. Open swamps. July-Aug.

2. **C. lanceolata**, L. (Fig. 3, pl. 191.) LANCE-LEAVED TICKSEED. Slender, smooth or slightly downy at base, 1 to 2 ft. high. Leaves opposite, lance-shaped, 2 to 6 in. long, tapering to long leaf-stalks, which partly clasp the stem. Heads on elongated stems, showy; rays 6 to 10, yellow, 5- to 7-lobed at end. Dry soil. May-Aug.

3. **C. tripteris**, L. (Fig. 4, pl. 191.) TALL COREOPSIS. Perennial plant, 4 to 8 ft. high. Upper leaves lance-shaped without leaf-stalks, the lower on leaf-stalks, compound, of several lance-shaped segments. Smooth or rough on the margins. Heads many; rays 6 to 10, yellow. Woods and thickets, Penna., and southward. July-Oct.

34. BIDENS, L.

Herbs, annual or perennial, with opposite leaves and, mostly, yellow rayed flower heads, the rays, however, in some species absent or rudimentary. Involucre bracts in 2 series, the outer leafy and larger than the inner; receptacle flat, chaffy, but the chaff falling with the fruit. Rays, when present, not fertile, in our species always yellow; disk flowers bearing stamens and pistils producing fruit. Fruit with 2 or more rigid awns which are bearded downward.

Rays developed, mostly conspicuous.

Leaves simple, lance-shaped.

Head with moderately rounded disk and conspicuous rays . . . *B. laevis*
 Head with disk almost a complete sphere, the 6 to 10 rays not

very conspicuous *B. cernua*

Leaves compound.

Heads nearly cylindric, the 4 or 5 rays not conspicuous . . . *B. bipinnata*

Heads spreading, the rays very conspicuous . . . *B. trichosperma*

Rays absent or rudimentary.

Leaves simple.

Involucre bracts, outer row somewhat exceeding the inner ones

B. connata

Involucre bracts, outer row 3 or 4 times as long as inner . . . *B. comosa*

Leaves compound.

Heads ½ in. high or less *B. discoidea*

Heads ½ in. high or more *B. frondosa*



PLATE 192

1. *Bidens frondosa*. 2. *B. discoidea*. 3. *B. bipinnata*. 4. *B. laevis*. 5. *B. cernua*.

‡ *Ray Flowers Conspicuous*

1. *B. laevis*, (L.) BSP. (Fig. 4, pl. 192.) LARGER BUR-MARIGOLD. BROOK SUNFLOWER. Stem branching, more or less erect, or partly reclining, smooth, as is the whole plant, 1 to 2 ft. high. Leaves lance-shaped with conspicuous teeth at margins, tapering to a slender point at apex and tapering or more or less abruptly rounded at base, 3 to 2 in. long, without leaf-stalks. Heads numerous on slender stems; rays 8 to 10, golden yellow, showy; inner bracts of the involucre usually shorter than the rays, the outer bracts often much longer. Fruit wedge-shaped, armed with 2 awl-like erect appendages with fine downward pointing barbs. In swamps, borders of pools and wet meadows. Aug.-Nov.

2. *B. cernua*, L. (Fig. 5, pl. 192.) SMALLER BUR-MARIGOLD. Usually erect, nearly smooth, $\frac{1}{2}$ to 3 ft. high. Leaves lance-shaped without leaf-stalk, broad and it is attached to stem, unequally toothed. Heads with or without rays, which, when present are light yellow; outer bracts of involucre exceeding the disk, which is globose, the head on a short stem. Fruit with 2 barbed points. Wet places, our whole range. July-Oct.

3. *B. trichosperma*, (Michx.) Britton. (Fig. 7, pl. 191.) TALL TICKSEED SUNFLOWER. (*Coreopsis trichosperma*, Michx.) Plant much branched, smooth, stem obscurely 4-sided, 2 to 5 ft. high. Leaves deeply incised, pinnately divided, the leaflets or lobes (3 to 7), lance-shaped, toothed, the whole leaf 3 to 8 in. long. Upper leaves may be undivided. Heads numerous, the involucre bracts not extending much beyond the disk; rays, 6 to 19, broad lance-shaped, obtuse at apex, about an in. long, bright yellow. Fruit crowned by 2 triangular sharp upright awl-shaped teeth. Swamps, wet places, Mass., and southward. Aug.-Oct.

‡‡ *Ray Flowers Inconspicuous or Wanting*

4. *B. bipinnata*, L. (Fig. 3, pl. 192.) SPANISH NEEDLES. Smooth, branched, stem 4-sided, 1 to 5 ft. high. Leaves deeply and doubly or tribly incised, the principle lobes lance-shaped, themselves deeply toothed or incised. Heads numerous, nearly cylindric, on slender stems. Outer involucre scales linear, equalling the short yellow rays, the latter 3 or 4 in number. Fruit 4-angled, with 3 or 4 awl-like barbed awns. Damp soil, Rhode Island and southward. July-Oct.

5. *B. connata*, Muhl. (Fig. 5, pl. 191.) PURPLE-STEMMED SWAMP BEGGAR-TICKS. Smooth, erect, branched, $\frac{1}{2}$ to 8 ft. high. Leaves lance-shaped deeply notched, on long leaf-stalks, 2 to 5 in. long; the lower sometimes 3 cleft. Heads numerous; rays 1 to 5, inconspicuous or wanting. Outer bracts of the involucre extending somewhat above the head, few, obtuse. Fruit wedge-shaped with 2 barbed awns. Swamps, wet places, common. Aug.-Oct.

6. *B. comosa*, Wiegand. (Fig. 6, pl. 191.) LEAFY-BRACTED TICKSEED. Leaves lance-shaped, toothed, tapering at each end. Outer bracts of involucre leaf-like, extending very much above the disk, conspicuously toothed. Fruit with 3 barbed awns. Wet places, Mass., southern New York and southward. Aug.-Oct.

7. *B. discoidea*, (T. and G.) Britton. (Fig. 2, pl. 192.) SMALL BEGGAR-TICKS. Lower leaves divided into 3 lance-shaped segments, 1 to



PLATE 193

1. *Helenium autumnale*. 2. *Anthemis Cotula*. 3. *Achillea millefolium*. 4. *Galinsoga parviflora*. 5. *Chrysanthemum Leucanthemum*.

3 in. long. Upper leaves lance-shaped, toothed. Heads small, rays none, bracts 3 or 4 times as high as the head, linear, scarcely toothed. Fruit 2 awned. Swamps, Connecticut and southward. July-Sept.

8. *B. frondosa*, L. (Fig. 1, pl. 192.) BEGGAR-TICKS. Smooth, branched, 2 to 6 ft. high. Leaves on slender leaf-stalks, 3- to 7-divided, the segments lance-shaped or often sub-divided. Rays none; bracts 2 or 3 times as high as the head, linear, scarcely toothed. Fruit ovate with 2 awns. Moist soil, throughout our range. July-Oct.

35. GALINSOGA, R. & P.

Herbs with opposite 3-nerved leaves and small heads with whitish rays and yellow disk. Heads with several tubular and radiate flowers, the latter 4 to 5, small, roundish, bearing pistils. Involucre of 4 or 5 rows of thin scales. Receptacle conical, chaffy.

G. parviflora, Cavannilles. (Fig. 4, pl. 193.) GALINSOGA. Nearly smooth, from 3 or 4 in. to more than a foot high. Leaves deltoid or egg-shaped, toothed, 3-nerved, the lower on slender leaf-stalks, the upper sessile. Abundant in neglected city door yards and other waste places. June-Nov.

36. HELENIUM, L.

Erect branching herb with alternate leaves and numerous heads. Disk globose; rays several, fan-shaped, the apex broad 3-toothed, reflexed as are the small bracts of the involucre. Fruit top-shaped, ribbed. Aigrette of a few scales with bristle points.

H. autumnale, L. (Fig. 1, pl. 193.) SWAMP SUNFLOWER. Stem smooth or slightly downy, rather stout, 1 to 6 ft. high. Leaves lance-shaped, tapering at each end, toothed, without leaf-stalks, 2 to 5 in. long. Head with a globular yellow disk, and reflexed, 3-toothed, bright yellow fan-shaped rays. Swamps and wet meadows. Aug.-Oct.

37. ACHILLEA, L.

Perennial herbs with flat clusters of small flower heads and with alternate leaves. Heads with numerous florets, tubular and ray, the latter few and producing fruit; involucre scales overlapping, leathery; receptacle flat, chaffy. Fruit oblong, aigrette none.

1. *A. millefolium*, L. (Fig. 3, pl. 193.) YARROW. Stem simple, 1 to 2 ft. high. Leaves in general outline, lance-shaped, very finely dissected into thread-like segments. Cluster of heads flat-topped; heads with 4 or 5 short white rays and numerous small yellow disk florets. The rays are sometimes pink and even dark purple, these mostly from old gardens. Common. June-Nov.

2. *A. Ptarmica*, L. SNEEZEWORT YARROW. Leaves linear, sharply toothed; cluster of heads loose; rays 8 to 12, longer than those of the common yarrow, white. Rare, but found in various parts of our range. July-Sept.

38. ANTHEMIS, L.

Branching herbs some with unpleasant scent, with alternate more or less dissected leaves, heads with tubular and ray florets. Involucre of several overlapping series, the edges dry. Ray florets bearing pistils, fer-

tile or not. Disk flowers with stamens and pistils, fertile. Anthers obtuse, without appendages at base. Aigrette none.

1. *A. Cotula*, L. (Fig. 2, pl. 193.) MAYWEED. Stems much branched, erect or semi-prostrate, 1 to 2 ft. high, the plant with an unpleasant odor. Leaves finely dissected into thread-like segments. Heads numerous, about 1 in. broad; rays 10 to 18, white, disk light yellow. Common in waste places. June-Nov.

2. *A. arvensis*, L. FIELD CAMOMILE. Leaves less finely dissected; rays 10 to 18, longer than those of the Mayweed. Introduced, in waste places. May-Aug.

3. *A. tinctoria*, L. YELLOW CAMOMILE. Leaves with feather-form divisions, the segments toothed. Heads 1 to 1½ in. broad; rays 20 to 30, yellow. Introduced, waste places. June-Sept.

39. CHRYSANTHEMUM, L.

Perennial herbs with more or less divided leaves and with solitary or clustered heads of tubular and ray flowers on long slender stems. Involucre bracts of several series; receptacle flat without chaff. Rays white, tubular florets yellow. Anthers obtuse without appendages.

C. Leucanthemum, L. (Fig. 5, pl. 193.) WHITE WEED. OX-EYE DAISY. Root perennial. Stem simple or branching, 1 to 3 ft. high. Leaves of the upper part of the stem without leaf-stalks, those below with long leaf-stalks, the blades deeply incised or conspicuously toothed. Heads solitary or few, 1 to 2 in. broad. Rays 20 to 30, white, disk yellow. The too-common daisy of meadows and pastures. May-Nov.

40. MATRICARIA, L.

Smooth branching herbs with alternate dissected leaves and heads on long stems with tubular and ray flowers, or rays sometimes wanting. Involucre scales overlapping, with dry borders; receptacle conical, free from chaff; rays white, bearing pistils and producing fruit; disk florets fertile. Anthers without appendages.

1. *M. inodora*, L. SCENTLESS CAMOMILE. Annual; leaves dissected into almost thread-like segments. Heads large, ½ to 1½ in. broad; rays 20 to 30, white. Aigrette a short border. Wild in northern part of our area. June-Sept.

2. *M. suaveolens*, (Pursh.) Buchenan. RAYLESS CAMOMILE. (*M. matricarioides*, (Lees.) Porter.) Smooth, ½ to 1½ ft high. Leaves dissected. Heads numerous; rays wanting; disk conic, yellow. Waste places, introduced from the Pacific Coast. May-Aug.

41. TANACETUM, L.

Strongly aromatic herbs with alternate, dissected leaves and many heads of tubular flowers or with, in exceptional cases, not fully developed, a few ray flowers. Involucre of small overlapping scales; receptacle convex, naked; florets at the margin of the disk bearing pistils only; those

not marginal with stamens and pistils, fertile. Fruit 5-angled, aigrette none, or a low border.

1. **T. vulgare**, L. (Fig. 1, pl. 194.) TANSY. Stem simple, 1 to 3 ft. high. Leaves divided pinnately, the lobes deeply toothed. Heads numerous, rounded, yellow. A strongly aromatic plant growing in patches. July-Sept.

2. **T. huronense**, Nutt. LAKE HURON TANSY. Plant silky with soft hairs; heads fewer. Otherwise similar to No. 1. Extreme northern part of our area. July-Sept.

42. ARTEMISIA, L.

Bitter odorous herbs or shrubs with alternate leaves and commonly with small nodding greenish or yellowish heads without rays, in narrow elongated clusters. Receptacles small, flat, naked. Involucre of overlapping dry scales. Marginal florets pistil-bearing or sometimes with pistils and stamens. Central florets perfect. Fruit inversely egg-shaped, without an aigrette.

Plants not white woolly

Receptacle Naked; Disk Flowers Sterile

1. **A. canadensis**, Michx. CANADA WORMWOOD. Heads $\frac{1}{6}$ in. broad, in a narrow interrupted spike-like cluster. Stem downy, straight, simple or branched. Leaves slashed into linear lobes, the lower ones on leaf-stalks. Rocky soil, mostly in the northern part of our area. July-Aug.

2. **A. caudata**, Michx. (Fig. 6, pl. 194.) WILD WORMWOOD. Heads $\frac{1}{12}$ in. broad, in a broad rather loose elongated or pyramidal cluster comprising large numbers of heads. Stem slender, smooth, 2 to 6 ft. high. Leaves deeply divided into linear segments, the lower on leaf-stalks. Heads nearly erect. Sandy soil, especially on sea beaches. July-Sept.

Receptacle Naked or Hairy; Disk Flowers Fertile

3. **A. absinthium**, L. (Fig. 2, pl. 194.) ABSINTH. COMMON WORMWOOD. Leaves deeply divided into fan-like segments, downy. Heads yellow, drooping. Stem angular, branched. Waste places. Naturalized. July-Oct.

4. **A. Abrotanum**, L. SOUTHERNWOOD. Shrub. Stems woody, branched. Leaves in fine thready segments. Flowers numerous, nodding, yellow. Well known as an aromatic garden shrub. Escaped and naturalized in places.

5. **A. annua**, L. ANNUAL WORMWOOD. Annual herb. An introduced species, smooth, much branched, heads drooping. Leaves thrice divided. A weed in waste places.

Plants woolly white

6. **A. stelleriana**, Bess. (Fig. 3, pl. 194.) BEACH WORMWOOD. Perennial, densely white-silky. Stem 1 to 2 ft. high, bushy. Leaves egg-shaped or spatula-shaped, deeply lobed, 1 to 4 in. long. Heads inversely cone-shaped, $\frac{1}{4}$ in. broad, not drooping. Sandy sea beaches. July-Aug.

7. **A. vulgaris**, L. (Fig. 4, pl. 194.) COMMON MUGWORT. Perennial. Branches and under side of leaves white woolly. Leaves 1 to $4\frac{1}{2}$ in. long,

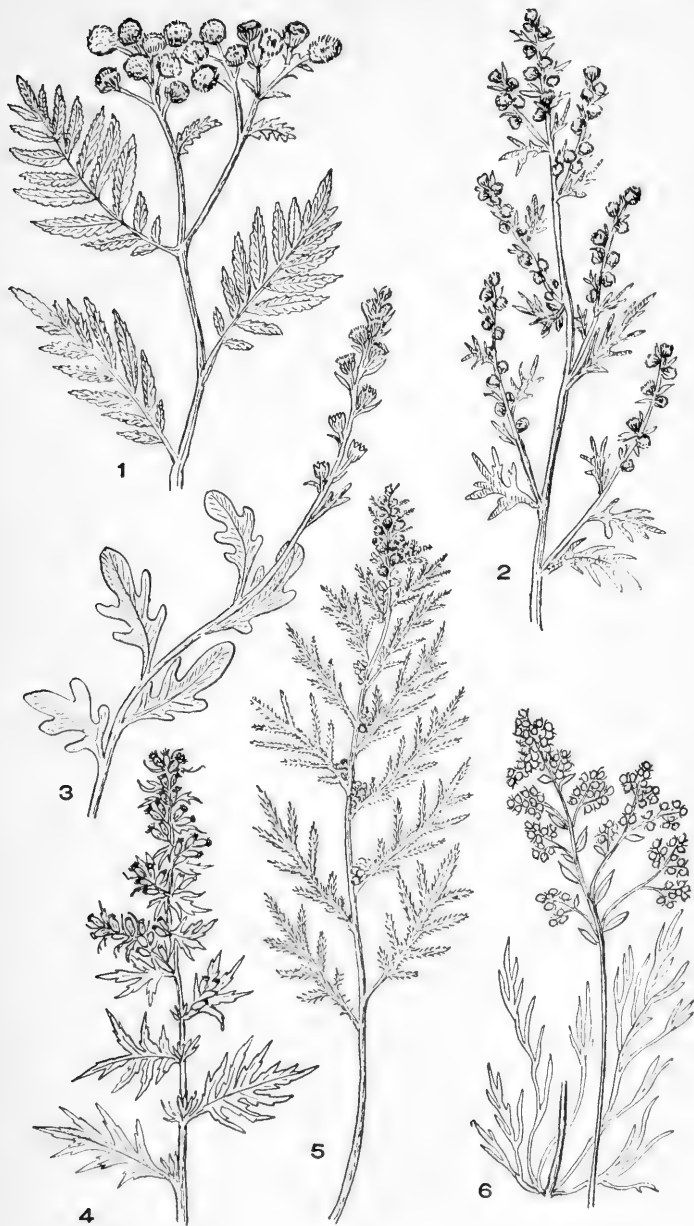


PLATE 194

1. *Tanacetum vulgare*. 2. *Artemisia absinthium*. 3. *A. stelleriana*. 4. *A. vulgaris*. 5. *A. biennis*. 6. *A. caudata*.

deeply lobed. Heads small in somewhat diffuse elongated clusters. Waste places, introduced. July-Oct.

Plants not woolly

8. **A. biennis**, L. (Fig. 5, pl. 194.) BIENNIAL WORMWOOD. Smooth, branching, 1 to 4 ft. high. Leaves doubly leathery-formed. Heads numerous, in the leaf-axils. Introduced from the Northwest Territory, in Penna., and westward. Aug.-Oct.

43. TUSSILAGO, L.

A low herb with perennial root-stock from which, in very early spring, March or April, a scape arises bearing at its summit a flower head including both ray and tubular florets, the stem bearing also alternate scales. Later, broad rounded heart-shaped, angular and toothed leaves which, when young are woolly, appear and replace the flower stem.

T. Farfara, L. (Fig. 1, pl. 195.) COLTSFOOT. Scape 4 to 6 in. high, flowers yellow. Grows in wet places, often on banks of streams. The flower and leaves are not generally seen together as the flowers are withered when the leaves appear.

44. PETASITES, Gaertn.

Herb from perennial rootstock resembling *Tussilago*, but heads are in a cluster. Scape bearing scales; leaves deeply lobed. Rays white or purple.

1. **P. palmata**, (Ait.) A. Gray. (Fig. 2, pl. 195.) PALMATE-LEAVED SWEET COLTSFOOT. Scape 6 to 24 in. high. Leaves densely white-silky. Flowers nearly white.

2. **P. vulgaris**, Hill. (Fig. 3, pl. 195.) BUTTER-BUR. Scape very stout, the bracts large. Leaves rounded, heart-shaped, with irregular, regular and toothed borders. Flower-heads in a dense cluster, purplish. In parks and, in a few localities, in waste grounds. Naturalized, from Europe. April-May.

45. ARNICA, L.

Erect, stem simple or slightly branched; leaves opposite. Heads on long stems; rays yellow; involucre bracts of equal lance-shaped scales in 1 or 2 series; receptacle flat, naked or with a few scattered hairs. Fruit linear, 5- to 10-ribbed. Aigrette of a single series of rigid but rough bristles.

1. **A. mollis**, Hook. (Fig. 4, pl. 195.) CHAMISSO'S ARNICA. Stem downy with long hairs, simple, 1 to 2½ ft. high. Leaves downy, becoming less so, 2 to 5 in. long, the upper without leaf-stalks. Heads 1 to 6 at the summit of the stem; involucre hairy; rays 10 to 15, yellow, 3-toothed. High places on the Adirondack and White Mountains. June-Aug.

2. **A. acaulis**, (Walt.) BSP. (Fig. 5, pl. 195.) LEOPARD'S-BANE. Stem hairy with few (1 to 3 pairs) of leaves, 1 to 3 ft. high. At summit several heads on rather long flower-stems. Basal leaves in a tuft or rosette, egg-shaped or oval, hairy, with about 5 longitudinal nerves. Delaware and Southern Penna. April-May.

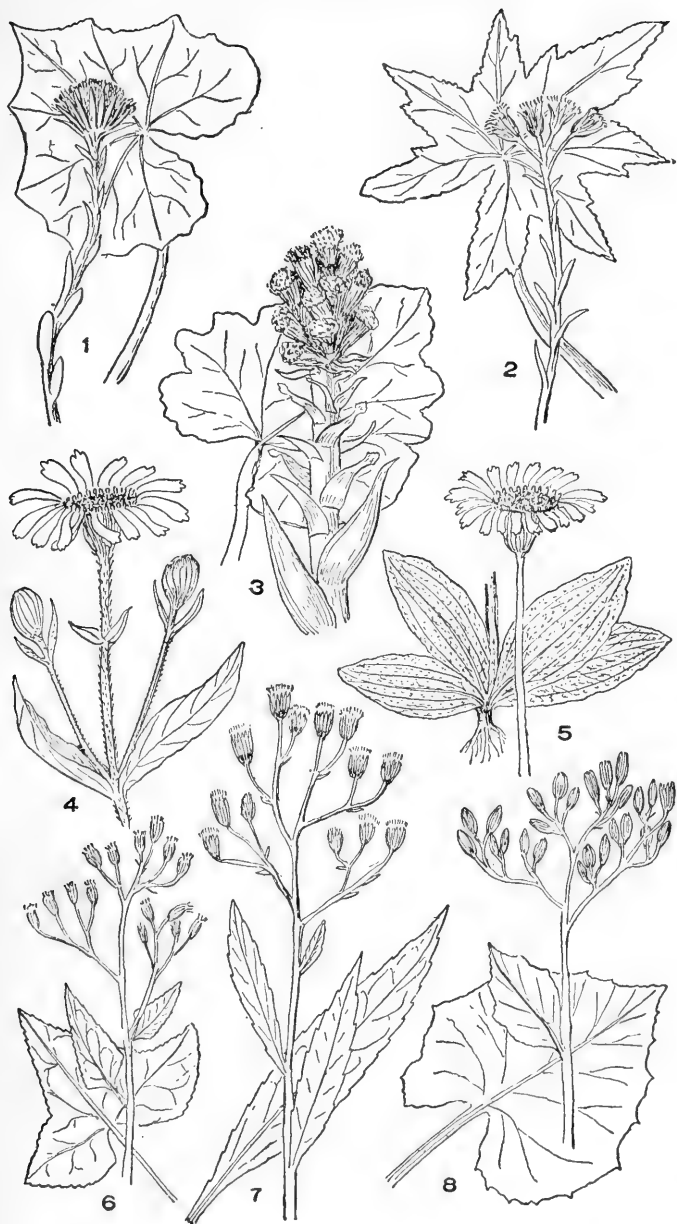


PLATE 195

1. *Tussilago Farfara*. 2. *Petasites palmata*. 3. *P. vulgaris* 4. *Arnica mollis*. 5. *A. acaulis*. 6. *Synosma suaveolens*. 7. *Erechtites hieracifolia*. 8. *Cacalia reniformis*.

46. *ERECHTITES*, Raf.

Coarse annual herbs with rank smell, with alternate undivided leaves and with many rather large heads of tubular, whitish, flowers. Heads many flowered, no rays; the central florets having stamens and pistils, fertile; the marginal florets pistillate but also fertile. Involucre cylindric, of a single row of sharp linear scales and with a few small spreading scales at base. Aigrette of an abundance of soft hairs; fruit oblong, tapering at base.

E. hieracifolia, Raf. (Fig. 7, pl. 195.) FIRE WEED. Annual, stem usually branched, striate, 1 to 8 ft. high, sometimes hairy. Leaves alternate, lance-shaped, 2 to 8 in. long, coarsely toothed at margins. Heads nearly an inch long, the abundant white hairs of the aigrette showing beyond the involucre. Abundant in spots which have been burned over in fields or in deserted yards and other waste places. July-Sept.

47. *CACALIA*, L. (*Mesadenia*, Raf.)

Tall, smooth, perennial herbs with alternate leaves on leaf-stalks and with many heads in flattened clusters; with milky sap and with yellowish or pink florets, all of which are tubular and all with stamens and pistil. Involucre cylindric of 5 bracts in a single row. Receptacle flat, naked. Fruit oblong, smooth; aigrette of copious white bristles.

1. *C. reniformis*, Raf. (Fig. 8, pl. 195.) GREAT INDIAN PLANTAIN. Stem smooth, angled and grooved, 4 to 9 ft. high. Leaves all green on both sides, on leaf-stalks the lower more or less rounded or kidney-formed in general outline, but several angled, often very large, 1 to 2 ft. broad, the upper fan-shaped, coarsely toothed. Heads in flat clusters. Woods, southern part of our area. July-Sept.

2. *C. atriplicifolia*, Raf. PALE INDIAN PLANTAIN. Stem smooth, not angled, 3 to 6 ft. high; leaves thin, whitish beneath, deeply lobed, in general outline triangular or kidney-shaped, on slender leaf-stalks. Rich woods. Aug.-Sept.

48. *SYNOSMA*, Raf.

Coarse perennial herb resembling *Cacalia*, with triangular or spear-shaped leaves and flat clusters of heads of tubular, pink or white flowers. Florets all with pistil and stamens.

S. suaveolens, (L.) Raf. (Fig. 6, pl. 195.) SWEET-SCENTED INDIAN PLANTAIN. (*Cuculia suaveolens*, L.) Smooth, stem 3 to 5 ft. high. Leaves triangular, the lower of 3 angular lobes, 4 to 10 in. long. Woods, Conn., and New Jersey, and southward. Aug.-Oct.

49. *SENECIO*, L.

Herbs with alternate and basal leaves and with heads of flowers having ray and tubular flowers or tubular only. In our species flowers yellow. Involucre of 1 series of bracts with a few shorter ones at the base. Receptacle flat or nearly so, naked. Ray flowers, when present, pistillate and fertile. Fruit cylindric, 5- to 10-ribbed; aigrette copious, of white hairs.



PLATE 196

1. *Senecio aureus*. 2. *S. obovatus*. 3. *S. vulgaris*. 4. *S. pseudo-arnica*. 5. *S. tomentosus*. 6. *S. Robbinsii*. 7. *S. balsamitae*.

Rays present, yellow.	
Flower heads solitary or very few	<i>S. pseudo-arnica</i>
Flower heads several or numerous.	
Basal leaves not heart-shaped.	
Plant densely woolly	<i>S. tomentosus</i>
Plant not woolly or only at base.	
Basal leaves inversely egg-shaped	<i>S. obovatus</i>
Basal leaves oblong, narrow	<i>S. balsamitae</i>
Basal leaves heart-shaped at base.	
Basal leaves lance-shaped	<i>S. Robbinsii</i>
Basal leaves broad, rounded	<i>S. aureus</i>
Rays absent or minute.	
Stem not hairy or only slightly so.	
Involucre naked or nearly so	<i>S. sylvaticus</i>
Involucre with a row of short bracts at base	<i>S. vulgaris</i>
Stem viscid downy	<i>S. viscosus</i>

1. *S. pseudo-arnica*, Less. (Fig. 4, pl. 196.) SEA BEACH SENEIO. Root perennial, stem 6 to 30 in. high, stout; whole plant white woolly, sometimes becoming smooth. Leaves oblong tapering to a narrow base, acute or obtuse at apex, margins sinuate, densely woolly beneath, 4 to 8 in. long. Heads solitary or occasionally 3 or 4 or even more, 1 to 2 in. in diameter; rays 12 to 15, broad, 3-toothed. Sea-beaches, Maine. July-Aug.

2. *S. tomentosus*, Michx. (Fig. 5, pl. 196.) WOOLLY RAGWEED. Root perennial; stem 1 to 2½ ft. high; plant covered with whitish wool. Root leaves oblong not heart-shaped at base, rounded at apex, toothed at margins, on long leaf-stalks, the upper without leaf-stalks, similar in form to the lower or deeply lobed on each side. Heads in a broad flat cluster, each on a long stem, ¾ in. broad; rays 10 to 15. Moist soil, southern part of our area. April-June.

3. *S. obovatus*, Muhl. (Fig. 2, pl. 196.) ROUND-LEAF SQUAW-WEED. Stem 1 to 2 ft. high, smooth or somewhat woolly toward the base. Basal leaves round or inversely egg-shaped, toothed in a circular tuft; stem leaves few and small. Heads several ½ in. broad on slender stems; rays 8 to 12. Wet soil, Maine to Penna., and southward. April-June.

4. *S. balsamitae*, Muhl. (Fig. 7, pl. 196.) BALSAM GROUNDSEL. Stem 10 to 20 in. high, somewhat woolly below and at the leaf-axils. Root leaves tufted, oblong or spatula-formed or lance-shaped, deeply lobed on each side of the mid-rib. Heads rather numerous, small; rays 8 to 12. Dry soil, throughout our area. May-July.

5. *S. Robbinsii*, Oakes. (Fig. 6, pl. 196.) ROBIN'S SQUAW-WEED. Smooth; 1 to 2½ ft. high, stem slender. Lower leaves lance-shaped, somewhat heart-shaped or simply rounded at base, acute or blunt at apex, toothed, on long leaf-stalks, upper leaves similar but often lobed, especially toward the base. Rays 6 to 12. Swamps and wet meadows, Maine, Vermont, New Hampshire and New York. June-Sept.

6. *S. aureus*, L. (Fig. 1, pl. 196.) GOLDEN RAGWORT. SQUAW-WEED. Root perennial; stem slender, 1 to 2½ ft. high. Basal leaves round or egg-shaped, heart-shaped at base, toothed at margins, on long leaf-stalks; upper leaves small, lance-shaped, toothed or deeply lobed. Rays 8 to 12, deep golden yellow. Swamps; wet meadows, throughout our area. May-July.

Heads without Ray-flowers or with very minute ones

7. *S. vulgaris*, L. (Fig. 3, pl. 196.) COMMON GROUNDSEL. Annual.



PLATE 197

1. *Carduus muticus*. 2. *C. spinosissimus*. 3. *C. altissimus*. 4. *Arctium tomentosum*. 5. *A. Lappa*. 6. *A. minus*.

Stem hollow, much branched, 6 to 15 in. high. Leaves lance-shaped but deeply lobed on each side of the mid-rib (pinnatifid), the lobes toothed. Scales of the involucre blackish, almost always a few short ones at the base of the involucre. A weed in cultivated grounds and waste places. April-Oct.

8. *S. sylvaticus*, L. WOOD GROUNDSEL. Resembles No. 7, but heads are higher and involucre without the short scales at the base. Waste places, introduced. April-Sept.

9. *S. viscosus*, L. FOETID GROUNDSEL. Resembles No. 7, but heads are much more slender, scales are not black-tipped and the whole plant is covered with a viscid ill-smelling covering of down. Introduced; waste places. July-Sept.

50. ARCTIUM, L.

Very coarse biennial weeds with large alternate leaves on leaf-stalks and with clustered heads of purple tubular flowers, the rounded involucre of many overlapping hooked scales, the heads forming a *bur*. Heads many flowered, all tubular. Receptacle bristly.

1. *A. Lappa*, L. (Fig. 5, pl. 197.) BURDOCK. Stout, 1 to 4 ft. high or occasionally much exceeding this height. Leaves egg-shaped, 8 to 18 in. long, often heart-shaped at base; margins not toothed. Bur often an in. in diameter, the bracts not cottony. A common large weed in waste places.

Var. *A. tomentosum*, (Lam.) Schk. (Fig. 4, pl. 197.) COTTONY BURDOCK. Resembles No. 1, but leaves more wavy at margins and the involucre densely cottony.

2. *A. minus*, Schk. (Fig. 6, pl. 197.) COMMON BURDOCK. Similar to No. 1, but generally smaller and leaves firm and somewhat tapering at base, though the lower are heart-shaped. Involucre bracts not cottony. Heads about $\frac{3}{4}$ in. in diameter.

51. CARDUUS, L.

Erect branching herbs or in some species without stem, mostly biennial, with alternate, usually lance-shaped leaves which are without leaf-stalks, generally deeply lobed and armed with stiff, sharp, prickles. Heads usually large, many-flowered, the flowers all tubular, purple, yellow or rarely white. Involucre egg-shaped of many overlapping bracts, which are in many cases prickly-tipped, but sometimes unarmed. Receptacle flat or convex, bristly. Aigrette of several series of plumose hairs.

Flowers yellow	<i>C. spinosissimus</i>
Flowers purple or white.	
Involucre bracts all prickly-tipped	<i>C. lanceolatus</i>
Outer bracts prickly-tipped, inner bracts unarmed.	
Leaves divided into narrow lance-shaped segments.	
Leaves woolly beneath	<i>C. discolor</i>
Leaves green, both sides	<i>C. odoratus</i>
Leaves not divided into lance-shaped lobes, though they may be lobed	<i>C. altissimus</i>
Involucre bracts not prickly.	
Leaves woolly beneath.	
Flower heads solitary	<i>C. nutans</i>
Flower heads in groups.	
Flower stems with few or no leaves or prickles	<i>C. muticus</i>
Flower stems short, leafy and prickly	<i>C. crispus</i>
Leaves not woolly	<i>C. arvensis</i>



PLATE 198

1. *Carduus arvensis*. 2. *C. lanceolatus*. 3. *C. odoratus*. 4. *Onopordon acanthium*.

Flowers yellow

1. **C. spinosissimus**, Walt. (Fig. 2, pl. 197.) **YELLOW THISTLE.** (*Cirsium spinosissimum*, (Walt.) Scop.) Stem quite stout, 1 to 5 ft. high, woolly when young. Leaves in general outline lance-shaped, the upper ones clasping the stem, margins deeply lobed and with strong prickles at angles of the lobes. Heads 2 to 4 in. broad, the involucre bracts long, lance-shaped, with prickles at the margins. Flowers yellow. Mostly in moist soil. May-Aug.

Flowers purple, pink or white

2. **C. lanceolatus**, L. (Fig. 2, pl. 198.) **COMMON SPEAR THISTLE.** (*Cirsium lanceolatum*, (L.) Hill.) Stem branched, 3 to 5 ft. high, more or less white woolly but not prickly or only moderately so. Leaves lance-shaped, divided into triangular lobes each side of mid-vein, the lobes with prickly margins, at base the leaf is decurrent on the stem. *All the bracts* of the egg-shaped involucre terminate as prickles. Common. Fields and waste places. June-Nov.

3. **C. altissimus**, L. (Fig. 3, pl. 197.) **TALL THISTLE.** (*Cirsium altissimum*, (L.) Spreng.) Stem not very stout, somewhat branched, the branches usually ascending, downy or woolly. Leaves lance-shaped, the margins toothed or rather deeply lobed but not divided into narrow segments, prickly at borders. Outer bracts of the involucre terminating as prickles, the inner bracts not prickly. Fields, thickets, along fences. Aug.-Sept.

4. **C. discolor**, (Muhl.) Nutt. **FIELD THISTLE.** (*Cirsium discolor*, (Muhl.) Spreng.) Tall and somewhat slender, 2 to 7 ft. high. Heads as in No. 3. Leaves white woolly beneath, deeply divided into lance-shaped segments, the borders of which are prickly. Fields and roadsides. July-Nov.

5. **C. odoratus**, (Muhl.) Porter. (Fig. 3, pl. 198.) **FRAGRANT THISTLE. PASTURE THISTLE.** (*Cirsium pumilum*, (Nutt.) Spreng.) Stem low, stout, 1 to 3 ft. high. Leaves green on both sides, lance-shaped, cut into angular lobes with stout prickles. Outer bracts prickly, inner unarmed. This fragrant thistle has much of the time during its season of flowering, a number of butterflies balancing on the purple flowers.

6. **C. muticus**, (Michx.) Pers. (Fig. 1, pl. 197.) **SWAMP THISTLE.** (*Cirsium muticum*, Michx.) Stem rather slender, 3 to 8 ft. high, angled, branching above. Branches with only a few small leaves and terminated by one or more heads. Leaves lance-shaped, entire or deeply lobed on each side (pinnatifid) and densely white woolly beneath, lower 4 to 8 in. long, borders prickly. Heads about 1½ in. broad. Bracts of the involucre not prickly. Swamps and moist soil. July-Oct.

7. **C. arvensis**, (L.) Robs. (Fig. 1, pl. 198.) **CANADA THISTLE.** (*Cirsium arvense*, (L.) Scop.) Perennial, slender, 1 to 3 ft. high. Stem striped, smooth. Leaves lance-shaped, deeply lobed, the margins of the lobes beset with strong prickles; green on both sides, the lower 5 to 8 in. long. Heads about 1 in. broad and about as high, flowers rose purple, bracts not prickly. Very common in cultivated fields, roadsides, etc. June-Sept.



PLATE 199

1. *Carduus nutans*. 2. *Centaurea Jacea*. 3. *C. nigra*. 4. *C. Cyanus*. 5. *Cnicus benedictus*.

8. *C. nutans*, L. (Fig. 1, pl. 199.) MUSK THISTLE. Biennial. Leaves lance-shaped, broad and often eared at base, extending down the stem. Lobed and very prickly; the stem also armed with strong prickles. Heads solitary, drooping. Occasional in our area, introduced from Europe. July-Oct.

9. *C. crispus*, L. CURLED THISTLE. Biennial. Plant somewhat woolly; stem densely prickly, 2 to 4 ft. high. Leaves with triangular lobes, margins prickly. Heads crowded on very short stems. Introduced. July-Sept.

52. ONOPORDON, L.

A stout thistle similar to *Carduus*, but the receptacle is honeycombed and not bristly. The hairs of the aigrette or pappus are not plumose.

O. acanthium, L. (Fig. 4, pl. 198.) SCOTCH THISTLE. Stout, 2 to 4 ft. high, the stem winged, the wings armed with stout prickles. Leaves white-woolly, oblong, lobed, armed with very strong prickles. Heads solitary, the involucre broad at base, constricted above, flowers spreading, light purple. Fields, most of our area. July-Sept.

53. CENTAUREA, L.

Herbs with alternate leaves which are entire or more or less cut. Heads usually solitary, terminal, with tubular flowers. Involucre globose, of overlapping bracts. Receptacle flat, bristly. Marginal flowers usually much larger than the central, sterile or fertile. Aigrette of several scales or bristles or absent.

Leaves linear	<i>C. Cyanus</i>
Leaves lance-shaped, spatula-shaped or oblong.	
Leaves not deeply lobed.	
Marginal flower much larger than central	<i>C. Jacea</i>
Marginal flowers not larger than central	<i>C. nigra</i>
Leaves deeply lobed	<i>C. calcitrapa</i>

1. *C. Cyanus*, L. (Fig. 4, pl. 199.) CORN FLOWER. An introduced plant from Europe where it is found in grain fields; here cultured in gardens from which it has escaped. Plant 1 to 2½ ft. high, somewhat woolly, leaves alternate, linear. Heads solitary at end of branches. Involucre globular, the scales fringed on the margin. Flowers blue varying to purplish, the marginal ones large thin lobes, assuming a star-like form. Waste places and grain fields. July-Sept.

2. *C. nigra*, L. (Fig. 3, pl. 199.) KNAPWEED. Perennial roots. Stem stiff, branched, 1 to 2 ft. high. Leaves lance- or spatula-shaped, the margins entire or the lower leaves slightly lobed. Heads about 1 in. broad; scales of the involucre with a black hairy fringe. Marginal and central flowers of the same size, purple. Naturalized, in waste places. July-Sept.

3. *C. Jacea*, L. (Fig. 2, pl. 199.) RAYED KNAPWEED. Like the last, but margins of leaves are toothed and outer flowers are large and showy. Naturalized to some extent. June-Sept.

4. *C. calcitrapa*, L. STAR THISTLE. *Leaves deeply* (pinnately) lobed often with somewhat prickly spines at margins. Heads immediately supported by leaves which assume somewhat the form of a sub-involucre.

Outer bracts of the real involuere often in form of spreading spines. Naturalized in some places. June-Oct.

54. **CNICUS**, L.

A thistle-like herb with alternate lance-shaped, lobed leaves with prickly margins and with large heads of yellow tubular flowers, the heads solitary and without stem. Receptacle flat, bristly. Aigrette of 2 rows of bristles.

C. benedictus, L. (Fig. 5, pl. 199.) **BLESSED THISTLE**. Much branched, stem hairy, $1\frac{1}{2}$ to $2\frac{1}{2}$ ft. high. Leaves lobed and with prickly margins, 3 to 6 in. long. Heads 2 in. broad, subtended by an involuere-like cluster of spiny leaves. Flowers yellow. Introduced. May-Aug.



EXPLANATIONS OF ABBREVIATIONS OF NAMES OF AUTHORITIES

A. Br.....Braun, Alexander.	Gaertn.....Gaertner, J.
Adans.....Adanson, M.	Gaud...Gaudichaud-Beaupré, Charles
A. DC.....De Candolle, Alphonse.	Gmel.....Gmelin, S. G.
Ait.....Aiton, Wm. T.	Godr.....Godron, D. A.
All.....Allioni, Carlo.	Gren.....Grenier, C.
Andr.....Andersson, Nils J.	Griseb.....Grisebach, H. R. A.
Andrz.....Andrzejowski, A. L.	
Arn.....Arnott, G. A. W.	Hausk.....Hausknecht, Carl.
Aust.....Austin, Coc Finch.	Haw.....Haworth, A. H.
	HBK....Humboldt, Bonpland and Kunth.
B. & H....Bentham, George, and Hooker, Joseph Dalton.	Hitchc.....Hitchcock, A. S.
Bab., Babingt....Babington, C. C.	Hoffmg.....Hoffmansegg, J. C.
Bart.....Bartram, J.	Hook.....Hooker, Wm. J.
Beauv....Beauvois, A. M. F. J. P.	Huds.....Hudson, Wm.
Benth.....Bentham, George.	
Bernh.....Bernhardi, J. J.	Jacq.....Jacquin, N. J.
Bess.....Besser, Wilhelm von.	Juss.....Jussieu, Antoine Laurent.
Bigel.....Bigelow, Jacob.	
BSP...Britton, Sterns and Poggen- berg.	Karst.....Karsten, H.
	Ktze.....Kuntze, Otto.
C. & S...Chamisso and Schlechten- dal.	
Carr.....Carrière, Elie Abel.	L...Linnaeus, Carolus, or Carl von Linné.
Casp.....Caspary, Robt.	L. f....Linné, Carl von (the son).
Cass.....Cassini, Henri.	Lag.....Lagasca, Mariano.
Celak.....Celakowsky, L.	Lam.....Lamarck, J. B.
Cham.....Chamisso, A. von.	Lamb.....Lambert, A. B.
Cham. & Sch.....Chamisso and Schlechtendal.	Ledeb.....Ledebour, C. F. von.
Cyrill.....Cyrillo, D.	Lehm.....Lehmann, J. G. C.
	L'Her.....L'Heritier de Brutelle.
Darl.....Darlington, Wm	Lindl.....Lindley, John.
DC.....De Candolle, A. P.	Lodd.....Loddiges, Conrad.
Dec.....Decaisne, Joseph	Lois.....Loiseleur-Deslongchamps, J. L. A.
Desf.....Desfontaines, R. L.	
Dietr.....Dietrich, D. N. F.	Mac M.....MacMillan, C.
Dougl.....Douglas, David	Marsh.....Marshall, Humphrey.
Dryand.....Dryander, Jonas.	Mart.....Martens, Martin.
Dufr.....Dufresne, P.	Maxim.....Maximowicz, C. J.
Dumort.....Dumortier, B. C.	Medic.....Medicus, F. C.
	Mert. & Koch...Mertens and Koch.
Ehrh.....Ehrhart, E.	Michx.....Michaux, A.
Ell.....Elliot, S	Mil.....Miller, B.
Engelm.....Engelmann, George.	Moq.....Moquin-Tandon, A.
	Muench.....Muenchhausen, Otto.
Forsk.....Forsk. B.	Muhl.....Mühlenberg, H. L.
Froel.....Froelich, J. A.	Murr.....Murray, J. A.

Neck.....	Necker, N. J.	Soland.....	Solander, D.
Nutt.....	Nuttall, Thomas.	Spreng.....	Sprengel, K.
		Sudw.....	Sudworth, G. B.
Pers.....	Persoon, C. H.	Sw.....	Swartz, Olaf.
Planch.....	Planchon, J. E.		
Poir.....	Poiret, J. L. M.	T. & G.....	Torrey and Gray.
		Thunb.....	Thunberg, C. R.
R. & P.....	Ruiz and Pavon.	Torr.....	Torrey, John.
Raf.....	Rafinesque-Schmaltz, C. S.	Tourn.....	Tournefort, J. B.
Reichenb....	Reichenbach, H. G. L.	Tratt.....	Trattinnick, L.
Retz.....	Retzius, A. J.	Trel.....	Trelease, Wm.
Roem.....	Roemer, J. J.	Tuckerm.....	Tuckerman, E.
Roem. & Schult.....	Roemer and Schultes.	Vent.....	Ventenat, E. R.
Rostk.....	Rostkovius, F. W. G.		
Rottb.....	Rottboell, C. F.	Waldst. & Kit.....	Waldstein and Kitalbal.
Rupp.....	Ruppius, H. B.	Wallr.....	Wallroth, K. F. W.
Rupr.....	Ruprecht, F. J.	Walp.....	Walpers, W. G.
Rydb.....	Rydborg, P.	Walt.....	Walter, Th.
		Wang.....	Wangenheim, F. A. J.
Salisb.....	Salisbury, R. A.	Wedd.....	Weddell, H. A.
Sarg.....	Sargent, Charles S.	Weinm.....	Weinmann.
Schleid.....	Schleiden, M. J.	Wetts.....	Wettstein, R.
Schreb.....	Schreber, J. C. D.	Wimm.....	Wimmer, F.
Schult.....	Schultes, J. A.	With.....	Withering, Wm.
Schum.....	Schumacher, C. F.	Wolg.....	Wolfgang.
Schwein.....	Schweinitz, L. D.	Wulf.....	Wulfen, F. X.
Scop.....	Scopoli, J. A.		
Sibth.....	Sibthorp, John.		

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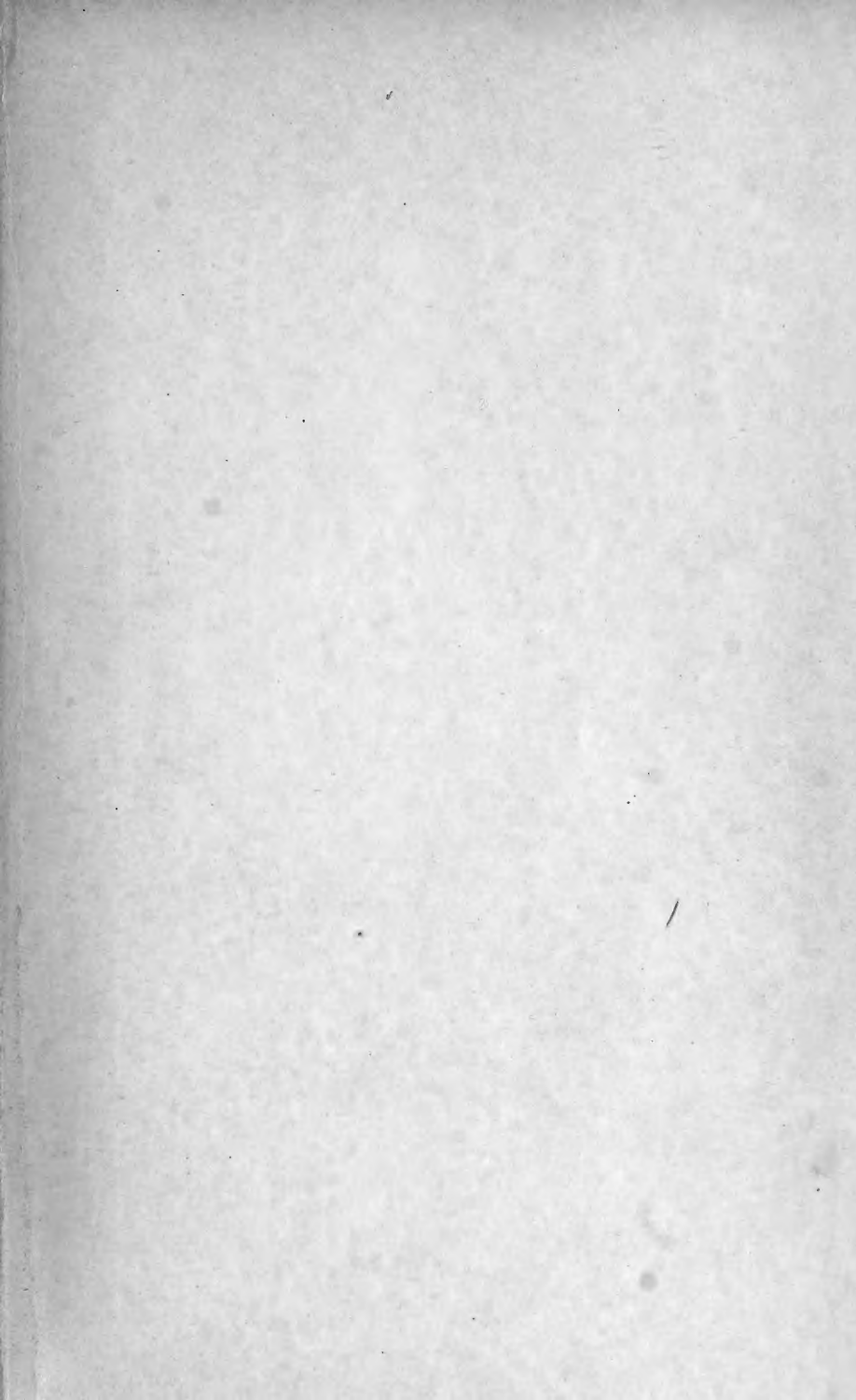
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