PLANTS OF ROCKY MOUNTAIN NATIONAL PARK

COLORADO BLUE COLUMBINE

(Colored from a photograph by Paul F. Shope)

UNITED STATES DEPARTMENT OF THE INTERIOR
RAY LYMAN WILBUR, *Secretary*
NATIONAL PARK SERVICE
HORACE M. ALBRIGHT, *Director*

PLANTS
of
ROCKY MOUNTAIN NATIONAL PARK

By
RUTH E. ASHTON

With Illustrations and Keys for Identification

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INTRODUCTION

The wild flowers of Rocky Mountain National Park are one of its main attractions. They paint its fields, meadows, hillsides, and rocky gorges in all the colors of the rainbow. There has been a constant demand for an illustrated guide to these flowers, and this publication has been prepared in response to that demand. It is the result of several years' study of the plants of the region. Emphasis has been put on the outstanding field characters of the plants described and on their habitats. Keys for identification and an illustrated glossary are included. The chapter on Mountain Plants at Home deals with the relations between the plants and their severe mountain environment and their adaptations to that environment.

The keys have been made as practical and simple as possible. They have been previously published, tested, and revised, and the writer feels that they will be useful to all persons who are seriously interested in the identification of our common wild flowers, whether or not they have had training in botany. In order to keep the keys from being long and unwieldy, some of the inconspicuous plants are not included. However, the names of all seed plants and ferns known to grow in the park are given in the text. Technical terms have been avoided as much as possible, but because it is impossible to differentiate between related plants by using only every-day English, a few technical terms have been employed to assure accuracy. These are adequately explained by drawings and definitions in the glossary.

Approximately 700 species are included. Specimens of most of these have been collected by the writer and are in the herbarium of the Rocky Mountain National Park. Most of the collecting has been done on the eastern side of the Continental Divide, and it is probable that some plants not included herein will be found on the western slope. A thorough study of the grass and sedge families has not been attempted, but lists of those species known to occur have been included. The region that has been intensively studied is that of the Rocky Mountain National Park and the territory surrounding Estes Park, but this book will be found useful above 7,000 feet throughout the mountains of northern Colorado and southern Wyoming.

The scientific nomenclature is, in most cases, according to the International Code. The writer's purpose has been to use the simpler and more familiar names and to retain the larger and most practical concept of genus and species. This purpose is the excuse offered for any apparent inconsistencies in nomenclature. Because of the present

state of confusion existing in our botanical nomenclature, it has seemed advisable to include a large number of synonyms.

A bibliography of publications on various phases of plant life in this region is appended.

To all the many teachers and friends who have aided in one way or another in the preparation of this publication, the writer wishes to express appreciation and indebtedness. To name them all is impossible. Much of the research work was done at the botany department of the Colorado Agricultural College under the direction of Dr. H. C. Hanson and Dr. L. W. Durrell, both of whom gave valuable suggestions and encouragement. Much valuable assistance has been given by members of the National Park Service.

Special appreciation is due Dr. Aven Nelson, professor of botany at the University of Wyoming, for his valuable service in the identification of many difficult species and for his reading of the entire manuscript. His generosity in allowing access to his excellent library and to the Rocky Mountain Herbarium has been of great help.

Others who have given freely of their time in reading the manuscript or in identifying plants are Dr. J. M. Greenman, Dr. A. S. Hitchcock, Dr. W. S. Cooper, Mr. E. C. Smith, and Miss Anna Maude Lute.

Whatever value this publication may have for the general public will be in large measure due to the very excellent illustrations which have been generously furnished by the photographers to whom credit is given.

If flower-loving visitors to the Rocky Mountain National Park find herein some information of value my purpose will have been accomplished.

SCIENTIFIC NAMES

In spite of popular opinion to the contrary, scientific names do mean something. They are usually descriptive of the plant to which they are applied, as for instance: *Chenopodium*, the goosefoot or lambs quarters. This Latin name is from two Greek words—*chen*, goose, and *podion*, little foot—and is descriptive of the shape of the leaves. This name applies to all of the goosefoots, as the name Smith applies to all members of the Smith family. If we wish to speak of one particular kind of goosefoot, we apply a specific name which is a Latin descriptive adjective.

The name *album*, meaning white, is given to our common lambs quarter, *Chenopodium album*, the white goosefoot, because of the white, powdery substance which covers the leaves of this plant. Sometimes the botanist who named the plant wanted to honor one of his friends, so he named a plant for him. Fremonts goosefoot (*Chenopodium Fremontii* Wats.) is an example. In such a case the specific name is capitalized to indicate its origin. A botanist is not satisfied with knowing only the name of a plant. He also wants to know the author-

ity for that name. The name or abbreviation following the scientific name indicates the person who first described the plant.

These scientific names have the advantage of being the same in all countries, so that they mean the same to every botanist no matter what language he speaks. The main trouble with common names is that as soon as a person knows more than a hundred plants, he runs out of names. Moreover, the same common names are used for very different plants in different parts of the country. For instance, daisy, mayflower, and windflower. The mayflower may be any flower that blooms in May in different parts of the country and the daisy may be any one of a dozen field flowers. The writer has known half a dozen different windflowers representing two distinct plant families, and as many mayflowers. A person with a wide knowledge of plants is never sure just what plant is being referred to when a common name is used. Consequently, students of plants prefer the scientific names.

MOUNTAIN PLANTS AT HOME

On all mountains of great height there exist climatic belts or zones. (Plate II.) Zones of altitude on a mountain can be roughly compared to zones of latitude on the surface of the earth. A mountain situated at the Equator in a humid climate and reaching an altitude of 18,000 feet will carry approximately all the variations in environment that would be encountered on a trip from the Equator to the Arctic Circle. The altitude of timber line decreases with an increase in the latitude north. Timber line is at approximately 11,500 feet in north central Colorado, although it may vary as much as 500 feet up or down due to local conditions, while in Montana it is at 9,000 feet and in Alberta at about 7,000 feet.

Each belt of both latitude and altitude carries its own type of plant and animal life, and these are called by the biologist *life zones*. Of course these associations merge into each other as their boundaries are approached. Some individuals have a much wider range than others, some range through several zones, and others are confined strictly to one. Those which are strictly limited in distribution become what are called *zone indicators*. By noting their distribution the ecologist can determine his elevation to within a few hundred feet. Life zones are recognized for the entire continent and for animals as well as plants. Several different systems of zonation have been used by different authors but the following arrangement seems the most practical for this region. Three life zones are represented in the Rocky Mountain National Park—the *montane*, from 6,000 feet to 9,000 feet; the *subalpine*, from 9,000 feet to timber line (approximately 11,500 feet); and the *alpine*, above timber line.[1]

[1] This zonation agrees with that given in Plant Ecology, by John L. Weaver and Frederic E. Clements, published by the McGraw Hill Book Company, 1929.

a

b

PLATE II.—Scenery of montane, subalpine, and alpine zones compared. (*a*) Engelmann spruce forest, subalpine zone, 10,000 to 11,000 feet, and alpine grassland, above 11,000 feet. (Photograph by National Park Service.) (*b*) Yellow pine forest, montane zone, 7,500 feet. (Photograph by F. J. Francis)

a

b

PLATE III.—Montane zone. (See also Plates II, *a*, and VIII.) (*a*) Dwarf sagebrush and Rocky Mountain juniper in foreground and western yellow pine in background, on southern slopes. (Photograph by National Park Service.) (*b*) Stream-side growth. Willows, alder, and birch bordering the water, Colorado blue spruce in the next rank, and western yellow pine with the Douglas tree in background. (Photograph by National Park Service)

Some writers use a zone arrangement based on corresponding geographical belts, calling the zones Sonoran, Transition, Canadian, Hudsonian, and Arctic-alpine, but in this region the preceding names have become familiar and they are also more commonly used in botanical literature. Consequently, it has seemed advisable to use them here rather than to use the geographical names. The Sonoran zone, typified by the arid region of the Southwest, is not represented at all in the park. There seems to the writer no definite line of distinction in this part of the Rockies between the Transition and Canadian zones. Therefore, in this publication they are both included under montane zone, that region characterized by yellow pine, aspen, and the Douglas tree. The Hudsonian zone corresponds to the subalpine zone; the Arctic-alpine, to the alpine.

Life zones are much influenced by local conditions of available moisture, prevailing winds, exposure, and topography. Timber line will be found much higher on the south exposure of a sheltered ravine than on a windswept ridge exposed to the north. For instance, as one travels westward toward the head of Hidden Valley on the Trail Ridge Road, the irregularity of timber line is quite noticeable. At the very head of the valley where the exposure is due east it dips down in a distinct V formation. This is apparently on account of a very large snow bank which remains in this location well into the summer and is so deep that it smothers seedling trees, allowing them no chance to get started. On each side of this valley trees extend higher than they do at its head, but on the right-hand side where the exposure is toward the southeast they extend considerably higher than they do on the left-hand side where it is toward the northeast. The same condition may be noted at the head of Fall River Valley.

LIFE ZONES IN ROCKY MOUNTAIN NATIONAL PARK

All the lower slopes of the park are included in the montane zone. (Plate II, *b*, Plate III, and Plate VIII.) It is characteristically a region of open yellow pine forest with the Douglas tree intermixed. It includes moist and dry aspen groves, lodgepole-Douglas forest on north slopes, open meadows, and barren, rocky ridges. The yellow pine may be mixed with Rocky Mountain juniper (also called western red cedar), and usually is so found on warm south slopes. (Plate III, *a*.) On the high rocky points there is some limber pine. Along the streams are found groves of the magnificent Colorado blue spruce associated with willows, alder, and the Rocky Mountain birch. (Plate III, *b*.) Many of the shrubs from the foothills are found here where they reach their highest elevation. Antelope-brush with its small fragrant pale-yellow blossoms early in June, flowering raspberry with large roselike white blooms growing in the rockiest places, squaw-currant almost everywhere, with pungent, aromatic foliage, and little

red currants—all are typical. There are also many characteristic flowering herbs here. The tall penstemon, the wild geranium (fig. 48), kinnikinnic (fig. 60), shooting-star (fig. 66), and Porters aster (fig. 91) are most numerous and reach their greatest development in this zone, but occasionally they will be found at both higher and lower altitudes.

Above the montane zone is the region of heavy Engelmann spruce-alpine fir forest, the subalpine zone. (Plate II, *a*.) This region receives the heaviest snowfall of any in the mountains. Because of the heavy forest the snow remains late into the spring and sometimes well into the summer, insuring plentiful moisture throughout the short season. The abundance of moisture makes this zone the most luxuriant of all in vegetation. The forest is interrupted here and there by lakes and marshes, and contains pure lodgepole stands on the places burned by forest fires, and limber pine on the more exposed slopes. Between approximately 10,500 and 11,500 feet we find the typical subalpine or Hudsonian region. Timber line itself varies between these two extremes according to the exposure and topography. This area contains luxuriant subalpine meadows (fig. 1), many lakes (Plate IV, *b*), considerable elfin or dwarf forest, and many exposed rocky ridges. Typical plants of the spruce forest are pipsissewa (fig. 58), star-flowered pyrola (fig. 57), one-sided pyrola, twinflower (fig. 86), and fairy slipper (fig. 15). Characteristic shrubs are mountain ash (fig. 46), and the involucred honeysuckle or twinberry, both found along streams. Some subalpine flowers of the meadows and wet banks are pearly everlasting, fringed parnassia, ladies tresses, brook-cress (fig. 35), and rose crown (fig. 36).

FIGURE 1.—Subalpine meadow near Dream Lake. Photograph by author

Timber line itself, with its gnarled and twisted trees, is one of the most interesting regions of the park. (Plate X.) Here the wind and snow have combined to produce an elfin forest of fantastic appearance. Twisted trunks bearing branches only on their lee sides indicate the

a

b

PLATE IV.—(*a*) Prostrate timber-line trees shaped by the icy winds. (*b*) Poudre Lake at the Continental Divide, 10,659 feet. (Photographs by National Park Service)

a

b

PLATE V.—On the heights. (*a*) Alpine zone on Longs Peak. Numerous brilliant flowers bloom among these rocks and at the edges of the snow banks. (Photograph by Frank Wolff.) (*b*) The forest frontier. (Photograph by National Park Service)

direction of the prevailing wind; trains of little trees, each one younger and shorter than the last, run out from the shelter of a big bowlder or an old deformed tree. (Plate V, *b*.) Often gnarled old individuals stand isolated, but sometimes the trees are crowded and their tops intermingle to such an extent as to be indistinguishable from one another. In many places snowdrifts cover the dwarf trees, protecting them from the icy winds. Every little twig that sends a shoot above the snow line is promptly killed by the combined effect of the extreme cold and the desiccating wind. By this killing of the terminal shoot the lateral buds below the snow line are stimulated to vigorous growth. This accounts in part for the denseness of these timber line thickets. In addition, the weight of the snow probably plays some part in their development along horizontal lines. Shelter from sudden mountain storms is often found under the dense, matted canopy of these tree tops. Their trunks are sometimes as high as a man's head; in other places they are prostrate on the ground, their branches forming low, rounded "windrows" a foot or two high, parallel to the direction of the prevailing winds and as neatly trimmed by the winds as though clipped by a hedge-trimmer's shears. Many an old dead snag, and often the windward side of a living tree, has been stripped of its bark and etched and carved by the tools of ice and sand carried by fierce alpine gales. (Plate IV, *a*.)

The trees which form the forest frontier in Rocky Mountain National Park are Engelmann spruce, alpine fir, limber pine, and, rarely, lodgepole pine. Clumps of dwarf willow and birch are seen high above the tree line, dotting the open slopes with their low, rounded masses.

Above timber line we find the alpine zone. (Plate V, *a*.) Here we have grassland, meadows, and rock fields with the environment growing steadily more severe, culminating in the arctic conditions found on the highest peaks. Here are snow banks the year around and freezing temperatures nearly every night. As the snow recedes the flowers burst into bloom. The yellow snow buttercup (fig. 29), a large almost poppylike flower with much dissected leaves, and the white marsh-marigold (fig. 27) may be found breaking through the snow to bloom. The little bright blue alpine forget-me-not (fig. 75), the moss campion (fig. 26) with its cushionlike growth starred with pink blossoms, the Rydbergia (fig. 97) with its big golden head and its covering of shaggy white hair, the mountain dryad (fig. 43) with its eight creamy petals and its long plumed seeds, the tiny but gay rose-colored fairy primrose (fig. 63), the fragrant rock jasmine (fig. 65), and many more are all at home on these heights.

In June and July the high rock fields, which appear at a little distance to be barren wastes, will be found on closer examination to be gay with the bright colors of the cushionlike plants which fill the

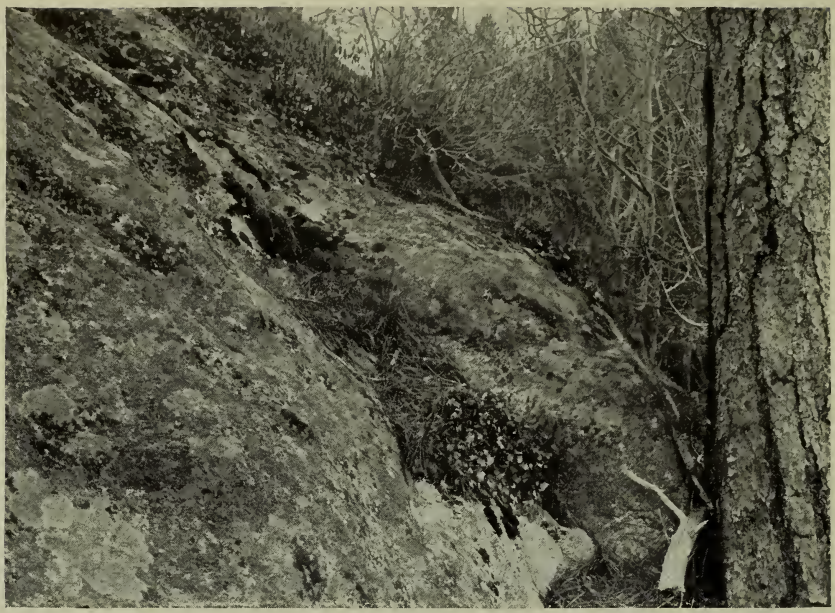
spaces between them. (Plate V, *a*.) The effect is that of a brilliant crazyquilt spread out over the mountainside. One of the best examples of this may be seen in June on the north slope of Twin Sisters just before the summit is reached. A little later these plants are in their prime on Fall River Pass, Trail Ridge, Flattop Mountain, Longs Peak, and the other high peaks.

HOW PLANTS PROTECT THEMSELVES

The mountain climate is severe because of the strong winds, dry atmosphere, low soil moisture in many places, and the exceptionally strong sunlight. Consequently, many mountain plants have special provisions to protect them from excessive evaporation.

The little alpine forget-me-not is protected by a cloak of soft silky hairs which forms a dead air space around it, thus retarding evaporation from the surface of the leaves. Many other plants are covered with similar protecting hairs or wool; for instance, the scorpion weed, the miners candle (fig. 78), the Rydbergia, and the sulphur flower. In other plants this protection is secured by the presence of a hard outer cuticle over the epidermis of the leaf. On certain leaves there is a layer of wax in addition to the cuticle. Cuticle and waxy layer are both present on the leaves of many evergreens that grow in a temperate climate. During the winter the plant must not lose the moisture that is in its cells because no more will be available until spring. Many plants, especially those with large soft leaves, shed their leaves at the approach of the dry season. The plants (kinnikinnic, fig. 60, and mountain lover) that keep their leaves throughout the winter, or dry season, have tough, thick leaves with a hard surface, and the deep-set stomata are well protected. In the case of the pine family the danger from too much evaporation is further lessened by the reduction in area of leaf surface. In some members the stomata are set in grooves and the needles covered with a waxy coating. This wax is what gives the blue spruce its characteristic color. It is often noticeable on other conifers, giving them a bluish tinge.

Many of the grasses and some other plants have the margins of the leaves in-rolled. This device reduces the leaf surface exposed to the dry air and is a very effective means of preventing loss of moisture. Storage of water for future use in thick leaves and stems is another form of adaptation, more common with plants of desert regions than with mountain plants, but noticeable in our stonecrops and some of our saxifrages. In these cases the leaves are usually smooth, though not always so, and are often covered with a *glaucous bloom* (the waxy covering already described). The thickening of the leaf also results in a decreased surface area in relation to the volume, an added advantage.



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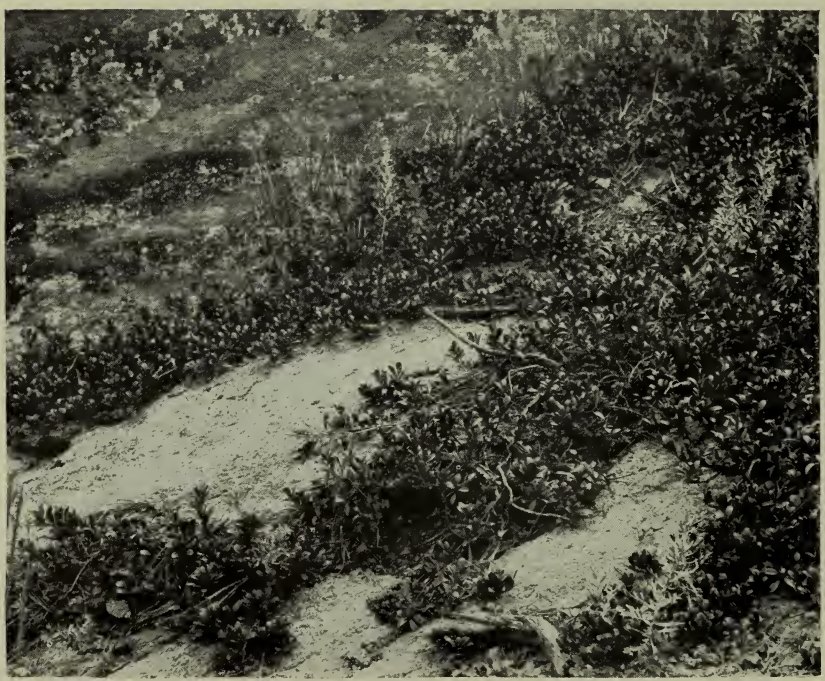

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PLATE VI.—Showing plant succession on granite rock. (*a*) Early stage, crustaceous and leafy lichens inhabiting bare rock. The black patches are pioneer mosses. Along the crevice alum root and other plants have taken hold and are gathering around them pine needles and débris which gradually become soil. (Photograph by the author.) (*b*) A later stage, kinnikinnic and other pioneer seed plants spreading over the rock. In the upper left corner may be seen the earlier stage of lichens and mosses. (Photograph by National Park Service)

PLATE VII.—Lodgepole pine. Left: Typical young growth. These trees are scarcely higher than a person's head. There are from 30 to 50 individuals here on a square yard of ground. (Photograph by National Park Service.) Right: Older lodgepole forest recently killed by forest fire. The charred logs lying on the ground are relics of earlier fires. (Photograph by National Park Service)

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PARK OFFERS OPPORTUNITY TO STUDY PLANT SUCCESSION

Succession of plant life from the first inhabitant of the bare rock to the climax type of vegetation for the region follows a definite course. In a mountainous region, such as the Rocky Mountain National Park, succession is particularly interesting and easy to study because all stages may usually be found within a very short distance. On dry rocks it begins with the crustaceous lichens. (Plate VI.) These occur in different shades of gray and green, and some are bright orange. All lichens become more brightly colored as soon as wet. These crustaceous lichens are the earliest pioneers, sticking tightly to the rocks and often spreading over them in circular patterns. They live, die, and are succeeded by their descendants for many years until a thin layer of humus has collected which will hold a little moisture and collect a little dust. Soil begins to form and then come the foliose or leafy lichens which make the layer a little thicker, so that mosses and a few grasses can get a foothold. Following these come some or all of the following plants: fire-weed (fig. 54), bilberry, kinnikinnic (fig. 60 and plate VI, *b*), golden banner, and wild geranium (fig. 48). In the crevices of the rocks alum-root and seedlings of pine or some of the pioneer shrubs, such as juniper (fig. 2), Jamesia and flowering raspberry (fig. 45), will begin to grow. Their leaves drop down and decay and gradually the crevice is filled with soil. Underneath all this the rock is slowly crumbling, a process due partly to the slightly acid action of the ground water and the root excretions, but mostly to alternating heat and cold and to frost action. By this time the seeds of other trees and shrubs will have lodged here, and be able to germinate and grow in the protection afforded by this pioneer nursery. Finally, after hundreds of years, we find in the montane zone open grassy slopes dotted with giant yellow pines and Douglas trees, and in the subalpine zone close forests of spruce and fir.

FIGURE 2.—Dwarf juniper growing in rock crevice. Photograph by National Park Service

Succession will occur much faster on wet rocks and along stream banks. Water-loving plants rather than drought-resisting ones will occupy the area. Much more growth will take place each season so that humus and soil will accumulate more rapidly. In this case algae and mosses are the pioneers, followed by swamp grasses and

sedges, next by willows, and then by aspens or lodgepole pines, and these eventually by spruce forest. (Plates III, *b*, and IX.)

Where man or fire interferes, the succession progresses somewhat differently. In such cases there is usually some soil left, and a few living plants to reseed the area. After a forest fire in an open yellow-pine forest, this same forest usually reestablishes itself without any intervening forest of a different kind, but when fire wipes out a close stand of mixed pine and Douglas tree or of Engelmann spruce a different story follows: Here, after the fire, we find elder, aspen, fireweed, lupine, golden banner, bilberry, and kinnikinnic beginning to cover the ground. Normally, the following year we find lodgepole seedlings coming up in abundance, with willows and aspens in the areas of greatest moisture. The young lodgepoles and aspens require abundant sun, and a place where fire has made a clean sweep affords them an ideal home. Under favorable conditions as many as 50 lodgepole seedlings to a square yard will come up. (Plate VII.) As they grow taller, of course, they crowd each other, and some die because of lack of light. This closeness of habit results in the dense stands found in many places in the park. Three lodgepole forests of different ages, each the result of a fire, may be seen between Baldpate Inn and Longs Peak Inn, a distance of about 3 miles, along the South St. Vrain Road. Much of that region has been burned several times. A lodgepole forest constitutes a much greater fire hazard than any other forest we have because of the closeness of the trees, their pitchiness, and comparative dryness. Fires in lodgepole forests are sometimes caused by lightning, but usually by the carelessness of man.

The lodgepole and aspen forests are also merely a phase, and, if the succession is not interrupted by fire or logging, will give way eventually to other species. Given a chance to reach an age of 50 to 70 years, lodgepole forests will be invaded by Engelmann spruce. This is beginning to happen in the forest on Twin Sisters Mountain. A few spruces may now be seen here and there among the lodgepoles. Seedling spruces do not thrive in sunlight, and must get their start where they have some protection. In the Bear Lake region after the fire of 1900 many dead trees were left standing and many more were strewn on the ground, so that the ground itself was quite shaded. In addition, it is probable that this ground is a little too moist for the best development of lodgepole. Here many Engelmann spruce seedlings and some alpine firs have started to grow, and have managed to survive, along with the lodgepoles which occupy the sunnier places. In 40 or 50 years, barring fire, we may expect to see the barren hills around Bear Lake and along Mill Creek covered with a mixed forest of lodgepole, Engelmann spruce, and alpine fir. The former will eventually be crowded out by the others, and the forest will then be what is termed the *climax* forest for this region—Engel-

PLATE VIII.—Aspen grove in the montane zone. (Photograph by National Park Service)

PLATE IX.—Subalpine forest of Engelmann spruce and alpine fir. (Photograph by National Park Service)

PLATE X.—Timber-line trees showing effect of prevailing wind. (Upper photograph by Frank Wolff; lower, by F. J. Francis)

mann spruce mixed with alpine fir (Plate IX) and will perpetuate itself indefinitely unless destroyed by some outside agency.

Plants resemble people in some of their habits. Some are extremely aggressive; others are shy and retiring. The aggressive ones are often the ones which man calls weeds. They are the ones that will stand being much trampled upon, or that thrive on freshly turned ground, or for some unknown reason flourish around buildings and along roadways. Man's activities of plowing, building, and road making disturb the native plants of the retiring habit, and by their disappearance the ground is left open for the aggressive invaders. Many of these are not natives but their seed is carried in various ways, sometimes in hay, or in the fur of animals, or in the seed that the farmer buys. Twenty-five years ago the common dandelion did not exist in Estes Park, but now we have not only the dandelion and the Russian thistle but many more weeds introduced from all over this country and Europe.

Some of the natives are aggressive also. Fields which have at one time been plowed and then abandoned can be distinguished for many years by the vegetation on them, which is entirely different from that on the natural grassland. The native species most common on these fields are stickseed, arctic wormwood, gumweed, and tansy aster. Grama grass, the characteristic native grass of open fields and slopes, will not begin to reestablish itself for five or six years.

FAMILIES OF PLANTS

FERN FAMILY (POLYPODIACEAE)

Ferns are not very numerous in this region because of the dry climate, and with the exception of two or three species are rarely seen. They should be looked for mainly in the subalpine zone, although a few will be found in the montane and alpine zones. Ferns are a lower order of plant life than the flowering plants and do not produce seeds. Instead, they reproduce by minute bodies called *spores* which are borne in little cases called *sporangia*. These *sporangia* (singular *sporangium*) occur in small clusters called "fruit dots" or *sori* (singular *sorus*), on the backs of the fronds. In some species the sorus is covered with a thin scalelike structure called the *indusium*.[2]

A. Frond very little dissected, apparently more grasslike than fernlike_____ **Grass-leaved fern** (p. 24).

AA. Frond dissected and very evidently fernlike.

B. Fronds of one kind, all alike.

a. Fronds once pinnate, plants rare, mostly evergreen.

b. Pinnae thin and fragile, narrowed at the base and attached at a point_____ **Maidenhair spleenwort** (p. 24).

bb. Pinnae tough, evergreen, attached by their whole width.

c. Frond 3 to 6 inches long; sori with no indusium; growing mostly in rock crevices_____ **Western polypody** (p. 23).

cc. Fronds usually 10 inches long or longer; indusium kidney shaped, conspicuous; plants very rare_____ **Holly fern** (p. 23).

aa. Fronds more than once pinnate, not evergreen.

b. Fronds long and tapering.

c. Fronds 10 inches to 3 feet long.

d. Sori long or crescent-shaped; indusium conspicuous_____ **Common lady fern** (p. 22).

dd. Sori round.

e. Indusium evident_____ **Shield fern** (p. 24).

ee. Indusium not evident_____ **Alpine lady fern** (p. 22).

cc. Fronds 3 to 8 inches long.

d. Plants tufted, old brown leaf bases persistent.

e. Rachis and underside of fronds hairy; divisions long-triangular_____ **Rocky Mountain woodsia** (p. 24).

ee. Rachis and underside of fronds mostly smooth; divisions short-triangular_____ **Oregon woodsia** (p. 23).

dd. Plants not tufted; old leave bases not present___ **Brittle fern** (p. 22).

bb. Fronds nearly as broad as long; often 3-parted.

c. Fronds soft and thin, a foot high or less_____ **Beech fern** (p. 24).

cc. Fronds firm and leathery, 1 to 4 feet high_____ **Bracken or eagle brake** (p. 22).

BB. Fronds of two kinds, the fertile ones taller_____ **Parsley fern** (p. 23).

[2] For technical terms used and not explained in the text see Glossary, page 139.

Brittle fern (*Cystopteris fragilis* L.).—A small fern with very fragile fronds, as its scientific name implies. The frond is tapering, usually twice-pinnate, and rarely over 8 inches in length. This is the most common and widely distributed fern in the park as well as one of the most widely distributed ferns in the world. It will be found in moist places on banks and cliffs, under ledges and in rock crevices at all altitudes. It has been found on the summit of both Specimen Mountain and Trail Ridge above 12,000 feet. (*Filix fragilis* (L.) Underw. is another name for this fern.)

FIGURE 3.—Bracken, fronds 1 to 4 feet high. Photograph by F. J. Francis

Bracken or eagle brake (*Pteridium aquilinum* (L.) Kuhn), fig. 3.—A stout plant 1 to 4 feet high, with a tough, leathery frond, which has usually 3 to 7 triangular divisions. It is also one of the most widely distributed ferns in the world but in the park is confined to the montane zone. It may be found in either sun or shade usually in sandy or rocky soil, and is abundant on the Fern Lake trail below the Pool. The young shoots of this plant were used by some of the western Indians for food. (It is also called *Pteris aquilina* L.).

Alpine lady fern (*Athyrium americanum* (Butters) Maxon, also called *Phegopteris alpestris* Mett). A rather large fern with very delicate and lacy, tapering light-green fronds 10 inches to 3 feet long, found in the upper subalpine and alpine zones often in full sun and usually in very wet places. It is conspicuous along the streams and in the meadows between Dream and Emerald Lakes, and has been found at Lake of Glass and in Wild Basin. It also grows in the Sierra, in Quebec, Alaska, and the mountains of Europe and Asia. The **common lady fern** (*Athyrium filix-femina* (L.)

Roth), with large dark-green, tapering fronds and elongated sori, is found occasionally in wet places of the lower subalpine and montane zones. (Also called *Asplenium filix-femina* (L.) Bernh.)

Western polypody (*Polypodium hesperium* Maxon), with once-pinnate fronds and large yellowish sori, is occasionally found in rock crevices throughout this region but is nowhere common. It resembles the common polypody of the East (*P. vulgare* L.).

Holly fern (*Polystichum lonchitis* (L.) Roth) is a rare evergreen fern of the subalpine zone, with long, narrow, once-pinnate fronds. The pinnae are serrate and have lobes on the lower margins next the rachis. It resembles the eastern Christmas fern (*P. acrostichoides* (Michx.) Schott).

Parsley fern or **rock brake** (*Cryptogramma acrostichoides* R. Br.) is the only species of fern within the park having two kinds of fronds. The short parsley-like fronds carry on the functions of the leaves and the taller, narrower fronds are specialized for spore bearing. These fronds are more yellowish in color and each segment is slightly pod-like and contains many spores. This is a rock-loving fern of the subalpine zone and is often found in full sun. It grows on the rocks around Bear and Dream Lakes and elsewhere in the park. This fern is mainly confined to western North America and is abundant in the Sierra as well as in the Rocky Mountains.

FIGURE 4.—Shield fern, fronds 10 inches to 2 feet high. Photograph by author

The **woodsias** are small tufted ferns of dry and often exposed rocky situations. The stipes of last year's fronds are usually present and of a reddish-brown color. There are two species similar in appearance and difficult to distinguish. The **Oregon woodsia** (*Woodsia oregana* D. C. Eat.) has the back of the frond smooth and

is most commonly found in the montane zone, especially under shelving rocks, while the **Rocky Mountain woodsia** (*Woodsia scopulina* D. C. Eat.) has white jointed hairs on the back of the frond and is more commonly found in the subalpine and alpine zones. Both are exclusively North American ferns and mainly western in distribution.

Other ferns which may be found are: **beech fern** (*Phegopteris Dryopteris* (L.) Fee), a delicate fern of wet shady places, with triangular, 3-parted fronds, which has been found in Glacier Gorge and on the Cub Lake trail; the **shield fern** (*Aspidium spinulosum* (O. F. Miller) Sw., also called *Dryopteris spinulosa* (L.) Kuntze), (fig. 4), which has been found in the subalpine zone; **maidenhair spleenwort** (*Asplenium Trichomanes* L.), a fern of rock crevices, very rare in this region; and the **grass-leaved fern** (*Asplenium septentrionale* (L.) Hoffm., also called *Acrapteris septentrionale* (L.) Link., and *Belvisia septentrionalis* (L.) Mirb.), a curious plant appearing to the casual observer more like a grass than a fern but bearing sori on the tips of the narrow leaves. The rachis is black and shiny toward the base. It grows in tufts in rock crevices in rather dry places. The **lip fern** (*Cheilanthes Fendleri* Hook.) grows on hillsides near Estes Park, and the **rock brake** (*Pellaea Breweri* D. C. Eat.) has been reported for this region.

HORSETAIL FAMILY (EQUISETACEAE)

The **horsetail rushes** and **scouring rushes** are plants with hollow, jointed green stems and apparently no leaves. The leaves are reduced to very small toothlike scales around the joints of the stem and to scales which make up a conelike fruiting structure called a *strobilus* (plural *strobili*). These strobili grow on the tips of the stems. The stems contain the green coloring matter and perform the functions of leaves. They also contain minute particles of silica which give them their scouring quality. These plants are more closely related to the ferns than to the seed plants and reproduce by means of spores which are borne on the scales of the strobili.

Horsetail rush (*Equisetum arvense* L.).—A plant 4 to 18 inches high frequently found in the park. It has two kinds of stems, the fertile unbranched stems, pale brownish in color, bearing the strobili, and sterile green stems with whorls of slender branches which give it its horsetail-like appearance. The fertile stems disappear early in the season, so that often only the sterile ones are found. This plant is widely distributed throughout this country and Europe and is often found along railroad embankments. In the park it occurs along roads and trails on moist soil.

Smooth scouring rush (*Equisetum laevigatum* A. Br.).—This evergreen plant is much less common than the former and much larger.

The stem may be 1 to 3 feet high and one-half inch in diameter and is usually unbranched. Both the fertile and sterile stems are green. It is found on sandy soil.

CLUB MOSS FAMILY (LYCOPODIACEAE)

Ground pine (*Lycopodium annotinum* L.).—Occasionally found in moist situations in the subalpine zone. A creeping evergreen plant, with flattened, awl-shaped leaves arranged in several ranks, and twice-forking branches. *Lycopodium Selago* L., smaller than the preceding, is also found.

LITTLE CLUB MOSS FAMILY (SELAGINELLACEAE)

Little club mosses are rarely noticed because of their small size, but they play an important part in the building up of fertile soil on dry barren ground and sometimes on rock surfaces. Where other vegetation is scanty, these little plants fill in many vacancies with mats of their creeping stems. Ordinarily gray, they become beautifully green in wet weather. The so-called "resurrection plant" of Mexico belongs to this family. *Selaginella densa* Rydb. is the most common species here. Tiny orange bodies in the axils of the leaves are the *megaspores*, from which new plants will grow. *Selaginella mutica* D. C. Eat. is also found.

PINE FAMILY (PINACEAE)

The nine species of coniferous trees included in the following key occur in the park.[3]

A. Leaves needlelike, 1 inch long or longer; seeds in cones.
  B. Leaves occurring in bundles of 2 to 5, 3-cornered or crescent-shaped in cross section.
    a. Leaves 2 in each bundle; cones remaining on the trees for many years---------- **Lodgepole pine**, Plate VII.
    aa. Leaves 3 (rarely 2), or 5 in each bundle.
      b. Leaves 3 (rarely 2) in each bundle; bark of mature trees reddish-yellow---------- **Western yellow pine**, Plate II, b.
      bb. Leaves 5 in each bundle; bark of mature trees grayish-black---------- **Limber pine.**
  BB. Leaves occurring singly.
    a. Leaves flattened, not sharp-pointed.
      b. Cones numerous, pendent; 3-parted bracts conspicuous between the cone scales; leaves narrowed to a tiny stem **Douglas tree.**
      bb. Cones few, erect, in the top of the tree; no conspicuous bracts present; leaves sessile---------- **Alpine fir.**
    aa. Leaves 4-angled, sharp-pointed; cones pendent.
      b. Cones about 2 inches long; leaves acute---------- **Engelmann spruce**, Plate IX.
      bb. Cones 3 to 5 inches long, leaves spine-tipped---------- **Colorado blue spruce**, Plate III, b.

[3] For detailed description of these trees see Smoll, P. A., "Evergreens of the Rocky Mountain National Park," or Longyear, B. O., "Evergreens of Colorado."

AA. Leaves scalelike or awl-shaped, less than 1 inch long, seeds in berrylike cones.

B. Leaves scalelike; an erect shrub or small, much-branched tree_____ **Rocky Mountain juniper.**

BB. Leaves awl-shaped, spine-tipped; a prostrate shrub_____ **Dwarf juniper** (fig. 2).

CAT-TAIL FAMILY (TYPHACEAE)

Everyone is familiar with the tall **cat-tail** (*Typha latifolia* L.) of marshes and pond borders. This is found around a few ponds below 8,000 feet.

BUR-REED FAMILY (SPARGANIACEAE)

Least bur-reed (*Sparganium minimum* Fries) is found in Bear Lake and some other lakes in the park. It has long, narrow floating leaves and dense bur-like clusters of achenes. The **narrow-leaved bur-reed** (*Sparganium angustifolium* Michx.) and the **many-stemmed bur-reed** (*Sparganium multipedunculatum* (Morong) Rydb.) have been reported for this region.

POND-WEED FAMILY (NAIADACEAE)

The **pond weeds** are aquatic plants growing in ponds and slow-moving streams, with 2-ranked leaves, the upper firm and floating, the lower submersed and very fragile. *Potamogeton* is the commonest genus. The following species have been identified: *Potamogeton natans* L., *Potamogeton alpinus* Balbis, and *Potamogetan americanus* Cham. and Schlecht.

WATER PLANTAIN FAMILY (ALISMACEAE)

Plants growing in shallow water or marshy ground with basal, sheathing leaves and small 3-petaled flowers. **Water plantain** (*Alisma Plantago-aquatica* L.) occurs in marshes and ponds of the park, and **arrowhead** (*Sagittaria arifolia* (Nutt.) J. G. Smith), a water plant with small white flowers and arrowhead-shaped leaves, is found in Bear, Bierstadt, Sheep, and other lakes.

ARROW GRASS FAMILY (JUNCAGINACEAE)

Rushlike plants of marshy ground. **Swamp arrow grass** (*Triglochin palustris* L.) has been found in swamps of the montane zone.

WATER WEED FAMILY (HYDROCHARITACEAE)

A group of water plants which grow submersed in ponds or lakes, represented in the park by *Elodea canadensis* Michx., a plant with oblong or linear, transparent, 1-nerved leaves in whorls of 3 or, on the lower part of the stems, opposite. (This plant is also called *Philotria Planchonii* (Casp.) Rydb.)

GRASS FAMILY (GRAMINEAE)

This is one of the largest and most important plant families. Primarily, it furnishes all of our bread and cereal foods. Without it, we would have no meats and dairy products, as livestock are dependent upon it. It is important in our clothing and our buildings. However, most of its members are inconspicuous and of little interest to the majority of people. The grasses do not need conspicuous flowers because they have developed long filaments on which their anthers are hung, so that pollination is accomplished by the wind.

FIGURE 5.—Grama grass, stems 4 to 16 inches high, spikes purplish. Photograph by Colorado Agricultural College

Grama grass or **blue grama** (*Bouteloua gracilis* (H. B. K.) Lag., erroneously called buffalo grass, (fig. 5).—A small grass easily recognized by its purplish flag-like inflorescence and curling leaves. It is one of the commonest grasses of the montane zone, where it forms large mats on the open fields and hillsides, and is a valuable pasture grass. (This is also called *B. oligostachya* (Nutt.) Torr.)

Mountain timothy (*Phleum alpinum* L.).—A plant with shorter, broader, and more purplish heads than the common timothy is frequent on the mountain meadows.

Many grasses common in the arctic regions, especially species of **blue grass** (*Poa*) and **fescue** (*Festuca*), are found in the alpine zone. Species of grasses which have been identified in the park are given in the following list:

Agropyron Bakeri E. Nels.	Baker wheatgrass.
Agropyron pseudorepens Scribn. & Smith	False quackgrass.
Agropyron Scribneri Vasey	Scribner wheatgrass.

Agropyron spicatum (Pursh) Rydb---------- Bunch wheatgrass.
(*A. divergens* Nees.)
Agropyron tenerum Vasey---------- Slender wheatgrass.
Agropyron Vaseyi Scribn. & Smith---------- Vasey wheatgrass.
(*A. spicatum* Vaseyi (Scribn. & Smith) E. Nels.)
Agropyron violaceum (Hornem.) Lange---------- Violet wheatgrass.
(*A. biflorum* (Brign.) R. & S.)
Agropyron Richardsonii (Trin.) Schrad---------- Richardson wheatgrass.
(*A. caninum* (L.) Beauv.)
Agropyron Smithii Rydb---------- Western wheatgrass, bluejoint.
(*A. occidentale* Scrib.)
Agrostis alba L---------- Redtop.
Agrostis hiemalis (Walt.) B. S. P---------- Winter redtop.
(*A. scabra* Willd.)
Avena Mortoniana Scribn---------- Alpine wild oats.
Beckmannia erucaeformis (L.) Host---------- Slough grass.
Bouteloua gracilis (H. B. K.) Lag---------- Grama grass.
(*B. oligostachya* (Nutt.) Torr.)
Bromus ciliatus L---------- Mountain brome grass.
Bromus inermis Leyss---------- Smooth brome grass.
Bromus Porteri (Coult.) Nash---------- Porter brome grass.
Bromus polyanthus Scribn---------- Many-flowered brome grass.
Bromus Pumpellianus Scribn---------- Pumpelly brome grass.
Bromus Richardsonii Link---------- Richardson brome grass.
Bromus tectorum L---------- Downy brome grass.
Calamagrostis canadensis (Michx.) Beauv---------- Bluejoint reed grass.
Calamagrostis Langsdorfii (Link) Trin---------- Langsdorf reed grass.
Calamagrostis purpurascens R. Br---------- Purple reed grass.
Danthonia intermedia Vasey---------- Timber oat grass.
Danthonia Parryi Scribn---------- Parry oat grass.
Deschampsia alpicola Rydb---------- Alpine hair grass.
(*D. ceaspitosa alpina* Vasey)
Deschampsia caespitosa (L.) Beauv---------- Tufted hair grass.
Deschampsia curtifolia Scribn---------- Sheep hair grass.
(*D. brevifolia* R. Br. & *D. brachyphylla* Nash)
Deschampsia atropurpurea (Wahl.) Scheele---------- Mountain hair grass.
(*D. Latifolia* (Hook) Vasey & *D. Hookeriana* Scribn.)
Elymus condensatus Prest---------- Giant rye grass.
Eriocoma cuspidata Nutt---------- Indian millet.
Festuca arizonica Vasey---------- Arizona fescue.
(*F. Vaseyana* Hack.)
Festuca brachyphylla Schultes---------- Alpine fescue.
(*F. minutiflora* Rydb. & *F. brevifolia* R. Br.)
Festuca elatior L---------- Meadow fescue.
Festuca ovina L---------- Sheep fescue.
Festuca saximontana Rydb---------- Rocky Mountain fescue.
(*F. pseudovina* (Beal) Rydb.)
Festuca scabrella Torr---------- Rare fescue.
(*F. Thurberi* Vasey, *F. campestris* Rydb. & *F. Hallii* (Vasey) Piper)

Hilaria Jamesii (Torr.) Benth---------- Galleta grass.
Hordeum jubatum L---------- Squirrel-tail grass.
Hordeum pusillum Nutt---------- Little barley.
Koeleria cristata (L.) Pers---------- June grass.
Melica parviflora (Porter) Scribn---------- Small-flowered melic grass.
(*M. Porteri* Scribn.)
Melica spectabilis Scribn---------- Showy onion grass.
(*M. bulbosa* & *M. scabrata* Piper & Beattie)
Muhlenbergia gracilis Trin---------- Slender muhlenbergia.
(*M. trifida* Woot. & Standl. & *M. gracilis breviaristata* Vasey)
Muhlenbergia subalpina Vasey---------- Subalpine muhlenbergia.
Muhlenbergia racemosa (Michx.) B. S. P---------- Marsh muhlenbergia.
Oryzopsis micrantha (Trin. & Rupr.) Thurb---- Mountain rice.
Phleum alpinum L---------- Mountain timothy
Phleum pratense L---------- Timothy.
Panicularia grandis (S. Wats.) Nash---------- American manna grass.
(*P. americana* (Torr.) McMill. & *Glyceria grandis* Wats.)
Panicularia Holmii Beall---------- Holm manna grass.
Panicularia pauciflora (Presl.) Kuntze-------- Few-flowered manna grass.
(*Glyceria pauciflora* Presl.)
Poa alpicola Nash (*P. laxa* Thurber)---------- Mountain bluegrass.
Poa alpina L---------- Alpine bluegrass.
Poa arctica R. Br---------- Arctic bluegrass.
Poa brevipaniculata Scribn. & Williams-------- Short-panicled bluegrass.
Poa crocata Michx---------- Purple bluegrass.
(*P. nemoralis strictior* A. Gray.)
Poa interior Rydb---------- Wood bluegrass.
(*P. nemoralis* Scribn. & *P. caesia strictior*)
Poa Lettermannii Vasey---------- Lettermann bluegrass.
(*P. Brandegei* Scribn.)
Poa Pattersonii Vasey---------- Patterson bluegrass.
(*P. Grayana* Rydb.)
Poa pratensis L---------- Kentucky bluegrass.
Poa Wheeleri Vasey---------- Wheeler bluegrass.
Sitanion elymoides Raf---------- Squirrel-tail.
Stipa comata Trin. & Rupr---------- Needle grass.
(*S. Tweedyi* Scribn.)
Stipa Vaseyi Scribn---------- Sleepy grass.
Torresia odorata (L.) Hitch---------- Vanilla grass.
(*Savastana odorata* L., *Heirochloe odorata* Wahl. & *H. borealis* R. & S.)
Trisetum majus (Vasey) Rydb---------- Tall-spiked trisetum.
Trisetum montanum Vasey---------- Mountain trisetum.
Trisetum subspicatum (L.) Beauv---------- Spiked trisetum.
(*T. spicatum* (L.) Richter.)

SEDGE FAMILY (CYPERACEAE)

Many members of this family are found within the park. The casual observer often includes them with the grasses, but most sedges may be distinguished from grasses by the shape of their stems,

usually triangular, and by the absence of nodes or joints in the stems. Sedges are very abundant in the subalpine meadows and the alpine grassland. Several of the high-altitude sedges are conspicuous for their black, spikelike heads.

Cotton grasses (*Eriophorum gracile* Koch, *Eriophorum polystachyon* L., and *Eriophorum ocreatum* A. Nels.) are found in wet meadows and cold bogs of the park, where they may be recognized by their white, cottony heads.

Bulrush (*Scirpus campestris* Brit.) grows around some of the lakes.

Most of the **sedges** belong to the genus *Carex* and have no common names. The species occurring in the park are listed below: [4]

Carex acutina Bailey
Carex alpina Swartz
Carex aquatilis Wahl.
Carex atrata L.
Carex aurea Nutt.
Carex canescens L.
Carex capillaris L.
Carex paupercula Michx. (*C. magellanica* Lam.).
Carex monile Tuckm. (*C. vesicaria* L.).
Carex nigricans C. A. Meyer
Carex obtusata Lily
Carex occidentalis Bailey
Carex oreocharis Holm.
Carex praticola Rydb. (*C. pratensis* Drej.).
Carex chalciolepis Holm.
Carex chimaphila Holm.
Carex Douglasii Boott (*C. irrasa* Bailey).
Carex ebenea Rydb.
Carex festiva Dewey
Carex Geyeri Boott
Carex Hoodii Boott (*C. muricata confixa* Bailey).
Carex lanuginosa Michx. (*C. Watsoni* Olney, and *C. filiformis latifolius*).
Carex pyrenaica Wahl.
Carex Reynoldsii Dewey (*C. aboriginum* M. E. Jones).
Carex rostrata Stokes
Carex rupestris All.
Carex scopulorum Holm. (*C. Tolmii*).
Carex siccata Dewey
Carex straminiformis Bailey
Carex tenella Schk. (*C. disperma* Dewey)

DUCKWEED FAMILY (LEMNACEAE)

Tiny, floating plants, each consisting of a flat, oval or roundish plant body about one-eighth inch long or less, from one edge of which a slender threadlike root extends into the water. These plants multiply vegetatively, sometimes forming large floating mats. Rarely they produce very simple flowers. **Star duckweed** (*Lemna trisulca* L.) has been found in the park.

RUSH FAMILY (JUNCACEAE)

The **rushes** have a 6-parted perianth and their flowers are similar in structure to the lilies to which they are related, but their perianths

[4] Very little work has been done by the author on the sedges and most of the species of *Carex* given here are included on the authority of Dr. P. A. Rydberg (Flora of Colorado), or on that of Prof. E. C. Smith, of the Colorado Agricultural College.

are always small and inconspicuous, usually made up of brownish scales. These plants are grasslike in appearance. The following species are found in the park:

Juncus balticus Willd---------- Baltic rush.
Juncus Drummondii E. Meyer---------- Drummond rush.
(*J. subtriflorus* (E. Meyer) Coville)
Juncus longistylis Torr---------- Short-styled rush
Juncus parous Rydb---------- Mountain rush.
Juncus Parryi Engelm---------- Parrys rush.
Juncus saximontanus A. Nels---------- Rocky Mountain rush.
(*J. xiphioides montanus* Engelm.)
Luzula spicata (L.) DC.---------- Arctic wood-rush.
(*Juncoides spicatum* (L.) Kuntze)
Luzula parviflora (Ehrh.) Desv---------- Small-flowered wood-rush.
(*Juncoides parviflorum* (Ehrh.) Coville)

LILY FAMILY (LILIACEAE, MELANTHACEAE, CONVALLARIACEAE)

This family is characterized by undivided and parallel-veined leaves and flower parts in 3's or 6's. The perianth is made up of segments. These may be all alike or of two kinds corresponding to sepals and petals.

A. Inflorescence a slender, erect, spikelike raceme, flowers cream---------- **Wand lily** (p. 34).
AA. Inflorescence not as above.
B. Inflorescence unbellate; flowers pink or whitish----**Wild onion** (p. 32).
BB. Inflorescence not umbellate.
a. Flowers solitary or few, erect, or if bright yellow, nodding; stems not branched.
b. Flowers white or lavender-tinged.
c. Plant stemless; flower pure white; growing on open fields at low altitudes; blooming in early spring----- **Sand lily** (p. 33).
cc. Plant with slender stem.
d. Flower 1 inch long or less; alpine zone; petals purple-veined----------**Alpine lily** (p. 33).
dd. Flower usually 2 inches long or more; petals with dark splotches at base-------**Mariposa** (p. 32).
bb. Flowers red or yellow.
c. Flowers bright yellow, nodding------**Snow lily** (p. 33).
cc. Flowers red, erect----------**Wood lily** (p. 33).
aa. Flowers few or many; plant leafy-stemmed.
b. Stem branched.
c. Flowers few, terminal, ripening into red berries------ **Fairy bells** (p. 34).
cc. Flowers axillary, pendent, ripening into red berries- **Twisted stalk** (p. 35).
bb. Stem unbranched; flowers in a terminal raceme---------- **Solomon seal** (p. 35).

Wild onion (*Allium*).—Plants from bulbs with slender basal leaves and leafless stems bearing terminal umbels of white or rose-colored flowers. Perianth segments all alike. Foliage with a distinct onion smell when bruised. The different species may be distinguished by the following key:

Umbels nodding, flowers pink or whitish, bulb coat not netted---**Nodding onion.**
Umbels not nodding; bulb coat netted or fibrous.
Flowers rose-purple; plants of montane and subalpine meadows---------- **Purple onion.**
Flowers pinkish or whitish; rare, alpine plant----------**Pikes Peak onion.**

FIGURE 6.—Mariposa lily. Flowers white or pale lavender, 2 to 3 inches across. Photograph by Kenneth Hartley

FIGURE 7.—Snow lily. Flowers bright yellow, 1 to 2 inches across. Photograph by Paul F. Shope

Nodding onion (*Allium cernuum* Roth) is common on fields and hillsides of the montane and subalpine zones and the **purple onions** (*Allium Geyeri* Wats. and *Allium brevistylum* Wats.) in meadows of the same zone. The **Pikes Peak onion** (*Allium Pikeanum* Rydb.) is a rare alpine plant and has been found in the Rocky Mountain National Park only on Twin Sisters Mountain.

Mariposa lily or **butterfly lily** (*Calochortus Gunnisonii* Wats.) (fig. 6).—One of the most beautiful plants of the park blooming in early summer. The large tuliplike white or lavender flowers are

borne on a slender stem. Perianth segments are of two kinds, 3 broad petals, with dark splotches at their bases, and 3 narrow sepals. The leaves are narrow and tapering. These plants are most commonly found near the edges of moist aspen thickets and in meadows.

Snow lily (*Erythronium parviflorum* (Wats.) L. N. Good.) (fig. 7).—A striking plant with bright yellow flowers, blooming as the snow melts in the subalpine zone. The six pointed petals are recurved. Leaves, only two and basal. This plant is frequent in Wild Basin, on Specimen Mountain, and on the western slope. It follows the snow up the slopes, and all stages, from ripened seed to pointed shoots just breaking the ground, may be found in a climb of from 9,000 to 11,000 feet.

Sand lily (*Leucocrinum montanum* Nutt.) (fig. 8).—A snow-white lily blooming close to the ground in early spring. The leaves are

FIGURE 8.—Sand lily. Plant stemless, flowers white, 1 inch or more across. Photograph by Kenneth Hartley

FIGURE 9.—Wood lily. Flowers red. Plant 10 to 18 inches high. Photograph by Joseph Dixon

long and narrow and the flowers without stems. This plant is abundant on the plains and eastern foothills, where it blooms in April. It is found in May around Estes Park, but is seldom found at a higher altitude.

Wood lily or **red lily** (*Lilium montanum* A. Nels.) (fig. 9).—A rare and beautiful plant of the montane meadows and moist thickets with erect goblet-shaped red blossoms 3 or 4 inches deep. The upper leaves are in whorls. This is similar to and closely related to the wood lily (*Lilium philadelphicum* L.) of the East.

Alpine lily (*Lloydia serotina* (L.) Sweet) (fig. 10).—A slender plant of the alpine zone usually blooming rather early in the season. The petals and sepals are creamy-white, veined with purple, sometimes tinged with pink on the outside. Stem 2 to 6 inches high. It is most abundant on exposed rocky slopes.

Wand lily or poison camas (*Zygadenus elegans* Pursh) (fig. 11).—Flowers several in a spikelike raceme, cream-colored; petals and sepals alike, each with a greenish or yellowish spot. Plants growing in meadows at all altitudes. In the alpine zone a dwarf form is common. This plant is somewhat poisonous but less so than are the other species of the genus which are found at lower altitudes and sometimes cause the death of sheep and cattle.

Fairy bells (*Disporum trachycarpum* (Wats.) B. & H.).—Flowers greenish or yellowish, inconspicuous; fruit a bright red, 3-lobed

FIGURE 10.—Alpine lily. Stem 2 to 6 inches high. Flowers white or cream. Photograph by Kenneth Hartley

FIGURE 11.—Wand lily. Stems 6 to 24 inches high. Flowers white with green or yellowish spots. Photograph by Kenneth Hartley

berry, at the tips of the branches. This has been found around the Brinwood and along the Cub Lake Trail.

Star-flowered Solomon seal (*Smilacina stellata* (L.) Desf., also called *Vagnera stellata* (L.) Morong).—A frequent plant of the montane and subalpine zones with a terminal raceme of small, star-shaped white flowers ripening into mottled berries. The leaves are opposite and sessile. Two forms of this plant occur—a slender dark green type with flat leaves in shady moist situations, and a more

stout and dwarf form, yellowish-green and with leaves more or less folded, in dry and sunny situations. The stems of the Solomon seal are never branched. Two other kinds of Solomon seal are sometimes found: **False Solomon seal** (*Smilacina racemosa* (L.) Desf., also called *Vagnera racemosa* (L.) Morong), and **clasping Solomon seal** (*Smilacina amplexicaulis* Nutt., also called *Vagnera amplexicaulis* (L.) Morong).

Twisted stalk (*Streptopus amplexifolius* (L.) DC.) (fig. 12).—A plant 2 to 4 feet high, frequent in the upper montane and subalpine forests. It may be distinguished from the Solomon seal by the branching stem and axillary, pendent blossoms which ripen into red berries.

FIGURE 12.—Twisted stalk, 2 to 4 feet high. Flowers cream colored, berries red. Photograph by author

IRIS FAMILY (IRIDACEAE)

This family is related to the lily family and has parallel-veined leaves; sepals, petals, stamens, and divisions of the seed pod 3 each. The seed pod is inferior; that is, the corolla and other flower parts are on top of it.

Blue flag or **wild iris** (*Iris missouriensis* Nutt.) (fig. 13).—Common in meadows and moist situations of the montane zone. The flower is light blue and may be easily recognized by its similarity to the garden irises. The meadows in Moraine Park, Horseshoe Park, and along the Devils Gulch and Longs Peak roads are often blue with these charming flowers in June.

Blue-eyed grass (*Sisyrinchium occidentalis* Bickn.) (fig. 14).—A plant with grasslike leaves and small, bright blue flowers found in wet meadows. The flowers open only when the sun is shining.

ORCHID FAMILY (ORCHIDACEAE)

This is one of the most highly specialized families of plants. The stamens and pistil are grown together and the flower is irregular. The lower petal is usually developed into a sac or spur and is called the *lip*. All flowers in the orchid family are so constructed that in order to produce good seed they must be pollinated by insects.

Flowers conspicuous; lip inflated.
Flowers yellow; plant 8 inches high or over------**Yellow ladyslipper** (p. 37).
Flowers not yellow.
Flowers rose-purple, solitary----------**Fairy slipper** (p. 36).
Flowers dull purplish or brownish, usually 2 or more on each stem------
Knights ladyslipper (p. 37).
Flowers usually inconspicuous, white or greenish.
Plant brown except for the flowers, no green leaves present----------
Coralroot (p. 37).
Plant always with green leaves.
Leaves dark green mottled with white----**Rattlesnake plantain** (p. 38).
Leaves bright, even green.
Leaves only 1 or 2.
Leaf 1, near base of stem----------**One-leaved orchis** (p. 38).
Leaves 2, opposite, half way up stem------**Twayblade** (p. 38).
Leaves several, flowers in spikes.
Spike spirally twisted----------**Ladies-tresses** (p. 37).
Spike not spirally twisted----------**Bog orchis** (p. 38).

FIGURE 13.—Blue flag. Flowers bright blue, plants 8 to 16 inches high. Photograph by Kenneth Hartley

FIGURE 14.—Blue-eyed grass. Plant 6 to 12 inches high. Flowers small, blue. Photograph by Kenneth Hartley

Fairy slipper (*Calypso bulbosa* (L.) Oakes) (fig. 15).—A dainty little orchid with rose-colored, slipperlike flower found in June in moist pine and spruce woods and along shady streams. (Also called *C. borealis* and *Cytharea bulbosa* (L.) House.)

Yellow ladyslipper (*Cypripedium veganum* Cockerell) (fig. 16).—One of the rarest and most beautiful plants in the Rocky Mountains. On no account should any blossoms be picked, as the plant is in danger of extermination. This is a leafy-stemmed, 1-flowered plant about 1 foot in height. The flower has a large yellow lip, 1 to 2 inches in length, and reddish-brown, more or less twisted sepals.

Knights ladyslipper (*Cypripedium Knightae* A. Nels.).—A small plant with only 2 leaves on each stem and several inconspicuous dark-reddish flowers is frequently found in the spruce forests of the subalpine zone. It grows singly or in clumps.

Coralroot (*Corallorhiza multiflora* Nutt.).—A saprophytic plant without green leaves growing in coniferous forests of the montane and subalpine zones. The brownish stem bears several dainty flowers with purplish spotted petals. Another species of **coralroot** (*Corallorhiza Corallorhiza* (L.) Karst, also called *C. innata* R. Br.) has been reported.

FIGURE 15.—Fairy slipper. Plant 4 to 6 inches high. Flower rose-purple. Photograph by Kenneth Hartley

Ladies-tresses (*Spiranthes stricta* (Rydb.) A. Nels.).—A small plant rarely over 6 inches high with light green foliage and a twisted, crowded spike of pure white, fragrant blossoms. It is frequent in the subalpine zone, where it is often found growing in moss, especially around Nymph Lake and in bogs along the Loch Vale trail. (This plant is sometimes called by the following names: *S. Romanzoffiana*, *Gyrostachys stricta* Rydb., and *Ibidium strictum* (Rydb.) House.)

Rattlesnake plantain (*Peramium Menziesii* (Lindl.) Morong).—A plant of moist coniferous forests with mottled leaves, all basal, and a spike of inconspicuous greenish flowers. Flower stem 4 to 8 inches high. (This plant is also called by the following names: *P. decipiens* (Hook.) Piper, and *Goodyera Menziesii* Lindl.)

White bog orchis (*Limnorchis borealis* (Cham.) Rydb., also called *Habenaria dilatata*).—A slender plant 1 to 2 feet high bearing aspike of white flowers with narrow petals, the lower produced backward into a slender spur. The **green bog orchis** (*Limnorchis viridiflora* (Cham.) Rydb., also called *Habenaria hyperborea* R. Br.), a stout plant with green blossoms, and the **bracted bog orchis** (*Coeloglossum bracteatum* (Willd.) Parl., also called *Habenaria bracteata* (Willd.) R. Br.), with toothed lip, are also found. All three grow in the bogs and meadows of the subalpine zone and are especially abundant around Bear Lake.

FIGURE 16.—Yellow ladyslipper. Stems 10 to 16 inches high, flowers yellow. Photograph by Kenneth Hartley

Heart-leaved twayblade (*Listera cordata* (L.) R. Br., also called *L. nephrophylla* Rydb., and *Ophrys nephrophylla* Rydb.) and **northern twayblade** (*Listera convallarioides* (Sw.) Torr., also called *Ophrys convallarioides* (Sw.) Wight).—Occasionally found in wet, coniferous woods. They are easily recognized by the two broad, opposite leaves placed about the middle of the stem. The flowers are rather inconspicuous. The shape of the lip petal distinguishes the two species. In the former it is divided half-way to the base into 2 narrow pointed lobes. In the latter it is wedge shaped, with 2 short rounded lobes. The **One-leaved orchis** (*Lysiella obtusata* (Pursh) Rydb., also called *Habenaria obtusata* Richards) is frequently found with the twayblades or in similar situations. It may be recognized by its one obtuse leaf.

WILLOW FAMILY (SALICACEAE)

Nearly all of the nonevergreen trees and many of the shrubs of the park belong to this family. The leaves of these are never compound, lobed, or cut.

Narrow-leaf cottonwood (*Populus angustifolia* James).—Very abundant along the streams in the montane zone and below. This

tree is striking in the autumn, when the leaves turn a brilliant orange-yellow.

Balsam poplar (*Populus balsamifera* L.).—A rare tree in the park. A few are found along the lower part of the Fern Lake trail and some have been seen in Wild Basin. It may be distinguished from the above by its fragrant, sticky buds and broader, ovate leaf.

Aspen (*Populus tremuloides* Michx.) (Plate VIII).—The most common broad-leaved tree in the park. It is found throughout the montane and subalpine zones. In moist, sheltered situations and on good soil it develops beautiful groves of tall, straight white-barked trees. On rocky slopes or on poor soil it forms scrubby thickets. The petiole is flattened at right angles to the blade of the leaf, which enables the leaves to move with the slightest breeze, and this habit gives the trees their name of **trembling aspen.** Some of these trees will be found along nearly all water courses and ravines in the park. When they put on their autumn coloring every big and little ravine stands out, a stream of flame or gold color, in vivid contrast to the dark green of the surrounding coniferous forest.

Willow (*Salix*).—Many species of willow grow in the park at all altitudes. They are very similar and difficult to distinguish, consequently only a few of the more distinctive ones are described here.

Silver pussy willow (*Salix irrorata* Anders.).—A medium-sized shrub found along streams. It is one of the best of the pussy willows. The straight twigs are usually covered with a striking bluish or silvery bloom. The "pussies" appear sometimes as early as March.

Scoulers willow (*Salix Scouleriana* Barr.).—A shrub or small tree found along streams with exceptionally large oval, or roundish, staminate catkins, from ¾ to 1¾ inches long and ¾ inch wide, blooming before the leaves appear. It is conspicuous in May and early June when the whole shrub becomes a mass of pale yellow from the pollen-laden anthers of the catkins. (This willow is sometimes called *S. flavescens*, or *S. Nuttallii* Sarg.).

Creeping willow (*Salix petrophila* Rydb.).—A dwarf alpine plant, only 2 to 4 inches high, creeping among the rocks at high altitudes, with catkins from ½ to 1½ inches long, and dark green leaves on yellow petioles. (It is also called *S. arctica petraea* Anders.)

In addition, the following willows have been identified in this region by Prof. E. C. Smith, of the Colorado Agricultural College:

Salix Bebbiana Sarg	Bebb willow.
Salix chlorophylla Anders	Green-leaved willow.
Salix glaucops Anders	Glaucous willow.
Salix monticola Bebb	Mountain willow.
Salix saximontana Rydb	Rocky Mountain willow.
Salix Watsonii (Bebb) Rydb	Watson willow.
Salix Wolfii Bebb	Wolf willow.

BIRCH FAMILY (BETULACEAE)

Shrubs or small trees found along streams or on wet ground. Their flowers are in catkins and their leaves have toothed margins.

Mountain birch (*Betula fontinalis* Sarg.) (fig. 17).—A large graceful shrub with smooth reddish-brown bark and drooping branches, frequent along streams in the montane zone. The leaves are thin, ovate, and serrate. In some seasons these birches turn a beautiful clear yellow in the autumn.

Bog birch (*Betula glandulosa* Michx.).—Abundant in the lower alpine and the subalpine zones and occasionally found lower. A

FIGURE 17.—Mountain birch. Shrub 4 to 12 feet high with shining reddish brown bark. Photograph by National Park Service

FIGURE 18.—Alder. Small tree or shrub, 6 to 20 feet high. Photograph by National Park Service

dwarf, much-branched shrub with small, roundish toothed leaves; very common in meadows and along streams in the timber-line region.

Alder (*Alnus tenuifolia* Nutt.) (fig. 18).—A small tree of shrublike growth with gray bark and rather large distinctly veined and double-toothed leaves. Abundant along streams. The trunks are often 4 to 8 inches in diameter.

MISTLETOE FAMILY (LORANTHACEAE)

The members of this family are all parasites. Those growing in the park are inconspicuous and belong to the group called the **lesser mistletoe.**

Pine mistletoe.—Yellowish-brown, woody plants with scalelike leaves, inconspicuous flowers, and sticky berries, growing as parasites on pine trees. *Razoumofskia americana* (Nutt.) Kuntze, called in some books *Arceuthobium americanum* (Nutt.), is found on limber pine and lodgepole pine; *Razoumofskia cryptopoda* (Engelm.) Coville, also called *Arceuthobium cryptopodum* Engelm., on western yellow pine (rock pine). The mistletoe results in the development of "witches brooms" on the trees which it attacks and finally may cause the death of the tree. (Fig. 19.) The sticky seeds are carried by birds to other trees, where they germinate and produce new plants. The only way to exterminate the mistletoe is to cut off all the infected parts of a tree and burn them, being careful that no particles drop off and escape. In many cases it is necessary to destroy the whole tree.

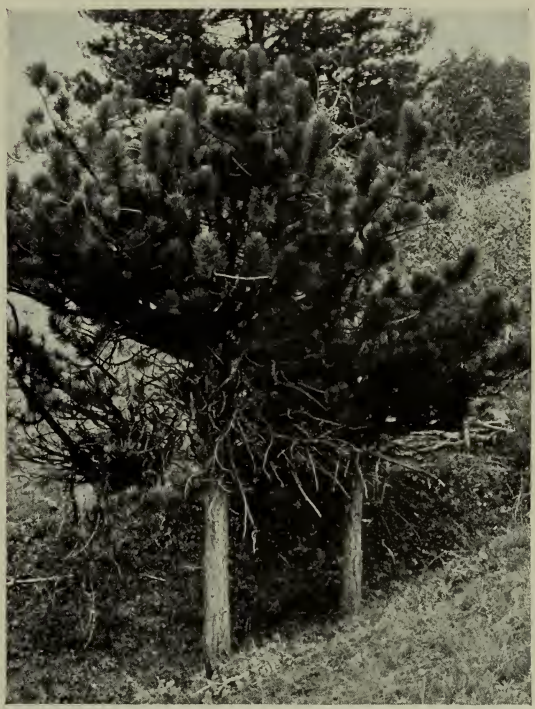

FIGURE 19.—Yellow pines deformed by parasitic growth of mistletoe. Photograph by National Park Service

BUCKWHEAT FAMILY (POLYGONACEAE)

This family is characterized either by having the flowers in umbels subtended by involucres (as in the sulphur flowers), or by having the stipules membranous and sheathing the stem (as in the docks and knotweeds). Most plants of this family have triangular achenes.

Plant 1 to 2 feet tall; inflorescence much branched; leaves all basal, seeds triangular-winged---------- **Winged buckwheat** (p. 42).
Plant usually less than 1 foot tall.
Flowers in umbels with subtending involucres.
Plants dwarf and matted; leaves white, woolly; alpine zone---------- **Alpine sulphur flower** (p. 42).
Plants erect, flower stems over 3 inches high.
Flowers deep yellow, turning reddish in drying.
Perianth smooth, plant very abundant on montane fields----- **Sulphur flower** (p. 42).
Perianth hairy, plant rare---------- **Golden buckwheat** (p. 42).
Flowers cream-colored, sometimes with reddish tinge; subalpine and alpine zones---------- **Subalpine buckwheat** (p. 42).

Plant usually less than 1 foot tall—Continued.
Flowers not in umbels.
Flowers in the axils; leaves with papery, sheathing bases.
Plant climbing by means of a twining stem; leaves heart-shaped—
Black bindweed (p. 42).
Plants not climbing.
Plant flat and matlike; leaves oblong; dooryards and roadsides—**Sidewalk weed** (p. 42).
Plant with erect or ascending stems; leaves long and narrow
Knotweed (p. 42).
Flowers in dense panicles, spikes, or heads.
Flowers never white nor brilliant rose color.
Plants less than 1 foot high; leaves acid flavored.
Leaves roundish or heart-shaped; subalpine or alpine among rocks—**Alpine sorrel** (p. 43).
Leaves halberd-shaped; plants of roadsides and waste ground—**Sheep sorrel** (p. 43).
Plants 1 to 3 feet high with stout stems and large leaves—
Dock (p. 43).
Flowers white, pinkish, or rose.
Plant aquatic; flowers brilliant rose—**Water buckwheat** (p. 43).
Plants not aquatic; flowers white or tinged pinkish—
Bistort (p. 44)

Winged buckwheat (*Eriogonum alatum* Torr.).—A silky-hairy plant 1 to 3 feet high, branched above, with long, narrow, mostly basal leaves, rounded at the tips; frequently found on the montane fields. The triangular seeds are winged.

Sulphur flower (*Eriogonum umbellatum* Torr.).—Very abundant on montane fields and hillsides, easily recognized by its umbrella-like clusters of small, smooth yellow flowers and its woolly, entire leaves. Late in the season these flowers often turn reddish. The **alpine sulphur flower** (*Eriogonum xanthum* Small), a very rare matted dwarf plant, with smaller flower heads, is found in a few places above timber line.

Golden buckwheat (*Eriogonum flavum* Nutt.).—This resembles the sulphur flower in appearance but is much less frequent. It may be distinguished by the hairy perianth.

Subalpine buckwheat (*Eriogonum subalpinum* Greene).—A flower very similar to the sulphur flower but cream-colored instead of yellow; occasionally it also has a reddish tinge. Found abundantly in the subalpine and alpine zones.

Black bindweed (*Polygonum convolvulus* L.).—A climbing plant with heart-shaped leaves and inconspicuous flowers occasionally found on waste ground.

Sidewalk weed or **dooryard weed** (*Polygonum aviculare* L.).—A common weed introduced from Europe; found around dwellings. It is a low spreading plant with pinkish green blossoms and black, shiny 3-angled seeds. The following species of **knotweed,** with blossoms

and seeds similar to the last, are found in the park: *Polygonum Douglasii* Greene, *Polygonum Engelmannii* Greene, *Polygonum emaciatum* A. Nels., and *Polygonum minimum* S. Wats. The latter is a small plant with crowded leaves and is apparently quite rare.

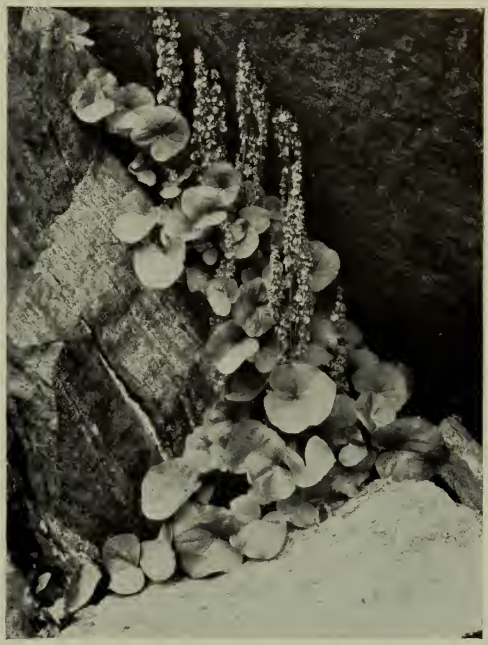

FIGURE 20.—Alpine sorrel. Leaves 1 to 2 inches across, flowers reddish green. Photograph by Joseph Dixon

Alpine sorrel (*Oxyria digyna* (L.) Camptdera) (fig. 20).—A smooth, rather fleshy plant with roundish leaves, found in the wet places among rocks of the alpine and subalpine zones. Many greenish flowers, the sepals tinged with red. The leaves of this plant are pleasantly acid and may be used to flavor the hiker's lunch.

Sheep sorrel (*Rumex Acetosella* L.).—A weed introduced from Europe, having leaves with two sharp lobes at the base, like a spearhead, and dense panicles of small reddish flowers; grows around dwellings and along roadsides. It is the "sour grass" of the East.

FIGURE 21.—Water buckwheat. Spike ½ to 1½ inches long, bright rose. Photograph by Kenneth Hartley

Curled dock (*Rumex crispus* L.) and **Mexican dock** (*Rumex mexicanus* Meisn.). Both stout weeds with dense panicles of greenish blossoms. *Rumex densiflorus* Osterh. has also been found.

Water buckwheat (*Polygonum amphibium* L., sometimes called *Persicaria coccinea* (Muhl.) Greene) (fig. 21).—Growing in water, sometimes in mud, with bright rose-colored blossom spikes. This has been found in some of the lakes.

Bistort (*Polygonum bistortoides* Pursh, also called *Bistorta bistortoides* (Pursh) Small) (fig. 22).—A plant of wet ground 8 inches to 2 feet high with a short, oblong, dense spike of white flowers sometimes tinged pinkish. Leaves narrow, entire, and mostly basal. **Slender bistort** (*Polygonum viviparum* L., also called *Bistorta vivipara* (L.) S. F. Gray), a much smaller plant with elongated, slender spike, in which the blossoms, or some of them, are often replaced by bulblets, is frequent in moist places of the subalpine and alpine zones. This plant also occurs in arctic America, Europe, and Asia.

FIGURE 22.—Bistort. White, heads 1 to 2 inches high. Photograph by Joseph Dixon

FIGURE 23.—Strawberry blite. Flower clusters deep red; plant about 1 foot tall or less. Photograph by Kenneth Hartley

GOOSEFOOT FAMILY (CHENOPODIACEAE)

A family of weeds and vegetables. Most of the wild species are considered weeds, but the family includes many garden vegetables, such as spinach, beets, and chard.

Strawberry blite or **squaw paint** (*Blitum capitatum* L., also called *Chenopodium capitatum* Wats.) (fig. 23).—A plant with conspicuous deep-red, berrylike clusters of small flowers, and leaves with spear-shaped or heart-shaped bases. It is occasionally seen along roadsides and on poor soil.

The other members of this family found in the park are weedy plants growing along roadsides and on waste ground. The following

species occur; **Lambs quarters** (*Chenopodium album* L.), **monolepis** (*Monolepis chenopodioides*, also called *M. Nuttalliana* (R. & S.) Engelm.), and **Russian thistle** (*Salsola pestifer* A. Nels.).

AMARANTH FAMILY (AMARANTHACEAE)

A family containing many troublesome weeds, most of which are introduced into this country.

Rough pigweed (*Amaranthus retroflexus* L.).—A stout weed with crowded spikes of small, inconspicuous greenish flowers interspersed with spine-tipped bracts, growing along roadsides and on waste ground.

FOUR O'CLOCK FAMILY (NYCTAGINACEAE)

The plants of this family derive their name from the habit of their flowers of opening late in the afternoon.

Wild four o'clock (*Allionia lanceolata* Rydb.).—A purplish hairy plant with clusters of small flowers, surrounded by an involucre. Perianth pink or purplish. Found around Estes Park Village and in rocky places of the montane zone.

PURSLANE FAMILY (PORTULACACEAE)

This family may be recognized by the very thin and delicate petals, either white, pink, or purple, and the two sepals, together with smooth and entire leaves.

Spring beauty (*Claytonia rosea* Rydb.).—In some books called *C. caroliniana sessilifolia*. An early spring plant with delicate pale pink blossoms often with darker veins, and a pair of smooth, entire leaves on the stem. The flowers open only in the sun and last but one day. Frequent on moist ground. The **lance-leaved spring beauty** (*Claytonia lanceolata* Pursh), very similar to the above but with notched petals, has been found in the subalpine zone. It is quite abundant in Wild Basin, blooming around the snow banks.

FIGURE 24.—Big-rooted spring beauty. White or pinkish, about one-half inch across. Photograph by Paul F. Shope

Big-rooted spring beauty (*Claytonia megarrhiza* (Gray) Parry) (fig. 24).—A high alpine plant growing in rock crevices with a very large purple taproot, which often reaches to a great depth, and many white flowers with pinkish veins.

Tiny lewisia (*Lewisia pygmaea* (Gray) Robins, also called *Oreobroma pygmaea* (Gray) Howell).—A small plant of the alpine and subalpine zones with linear leaves and delicate rose-red or pale pinkish flowers. The two sepals have gland-tipped teeth which give them a minutely beaded appearance. The genus to which this plant belongs was named in honor of Capt. Meriwether Lewis, of the Lewis and Clark Expedition.

Water spring beauty (*Montia chamissonis* (Eschs.) Greene).—A weak-stemmed plant with fragile white flowers and opposite leaves, found along streams and in wet places.

PINK FAMILY (CARYOPHYLLACEAE)

Opposite leaves and enlarged nodes are characteristics of this family. The petals are usually notched or split part way to the base. Most species are white-flowered; a few are pink or reddish.

Sepals united, forming a tubular or ovoid, 10-ribbed calyx.
- Styles 3---**Silene** (p. 47).
- Styles 5---**Lychnis** (p. 47).

Sepals distinct or nearly so.
- Petals deeply notched or 2-cleft.
  - Styles usually 3; plants usually smooth, never sticky---**Chickweed** (p. 48).
  - Styles usually 5; plants soft pubescent, often sticky above---**Mouse-ear chickweed** (p. 47).
- Petals entire or very slightly notched, often lacking.
  - Stipules present, thin, silvery; densely matted alpine plant---**Whitlow-wort** (p. 48).
  - Stipules absent.
    - Styles 5---**Pearlwort** (p. 48).
    - Styles 3.
      - Leaves narrow, rigid, sharp-pointed---**Sandwort** (p. 46).
      - Leaves oblong, blunt at tip---**Blunt-leaved chickweed** (p. 48).

Fendlers sandwort (*Arenaria Fendleri* Gray).—A tufted plant with narrow, rigid grasslike leaves and few to many white flowers with red or dark-colored anthers. Abundant in the montane and subalpine zones on hillsides and under pine trees. A dwarf form is sometimes found above timber line. The plant is sticky in the inflorescence.

Equal-stemmed sandwort (*Arenaria aequicaulis* A. Nels.).—A small tufted plant apparently rather rare, with threadlike stems of nearly equal height, bearing small white flowers. The sepals are strongly 3-nerved and longer than the petals. The leaves are crowded at the base, narrowly awl-shaped and semicylindric.

Alpine sandwort (*Arenaria sajanensis* Willd., also called *A. biflora obtusa*, and *Alsinopsis obtusiloba* Rydb.) (fig. 25).—A mosslike plant starred with comparatively large white blossoms, found in the alpine zone among rocks and on sandy ground, where it is very abundant.

Mouse-ear chickweed (*Cerastium*).—The scientific name of this genus is from the Greek and means "little horn," in reference to the shape of the seed pod which suggests a powder horn. The small downy leaves give it its name of "mouse ear." This hairiness and the larger blossoms distinguish these plants from the true chickweeds of the genus *Stellaria*. Our species of *Cerastium* are difficult to distinguish and are found in all zones. The common white flower, one-half inch broad or less, with hairy-sticky stem, cleft petals, and narrow, pointed leaves, found frequently on moist hillsides of the montane zone in May and June, is *Cerastium arvense* L.; *Cerastium oreophilum* Greene is also occasionally found. In the alpine zone *Cerastium beeringianum* Cham. & Schlect. is frequent.

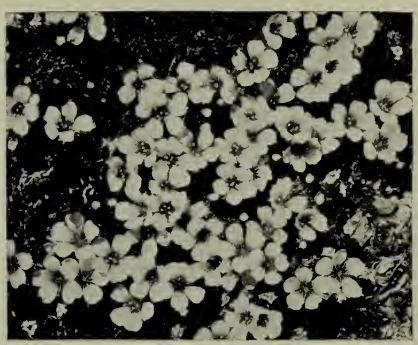

FIGURE 25.—Alpine sandwort. White; plant mosslike. Photograph by Joseph Dixon

FIGURE 26.—Moss campion. Pink, not over 1 inch across; plant mosslike. Photograph by Joseph Dixon

Mountain pink (*Lychnis montana* Wats., also called *Wahlbergella montana* (Wats.) Rydb.).—A dwarf, densely matted plant of the alpine zone with 1-flowered stems 4 inches or less in height; calyx somewhat inflated and petals short, nearly or completely included in the calyx. It is not frequent.

White cockle (*Lychnis alba* Mill.).—A stout hairy weed with conspicuous white flowers, introduced around buildings and ranches. The flowers open at night. These plants are polygamo-dioecious.

Drummonds cockle (*Lychnis Drummondii* Wats., also called *Wahlbergella striata* Rydb.).—A slender plant of moist places, usually in the subalpine zone, with flowers 1 to 5, petals reddish (rarely whitish), and calyx with 10 dark stripes. At least the upper part of the stem is sticky.

Moss campion (*Silene acaulis* L.) (fig. 26).—A mossy, cushionlike plant with conspicuous pink flowers, abundant among rocks in the

alpine zone. It is found in alpine-arctic situations from New Hampshire to New Mexico and to Alaska; also in Greenland and Eurasia.

Halls catchfly (*Silene Hallii* S. Wats.).—A sticky, weedy-looking plant with dirty-white or cream-colored blossoms, frequently found in the aspen groves of the montane zone.

The **chickweeds**, slender, smooth little plants with small white starlike blossoms and pointed leaves and sepals, are frequently found in moist situations in all zones. The following species occur: *Stellaria crassifolia* Ehrh., also called *Alsine crassifolia* (Ehrh.) Brit., *Stellaria longifolia* Muhl., sometimes called *Alsine longifolia* (Ehrh.) Brit., *Stellaria umbellata* Turcz., sometimes called *Alsine baicalensis* Coville.

Blunt-leaved chickweed (*Moehringia lateriflora* (L.) Fenzl.).—Found in similar places, may be distinguished from species of *Stellaria* by its oblong, obtuse leaves and its usually obtuse sepals.

Whitlow-wort (*Paronychia pulvinata* A. Gray).—A tiny cushion-like plant of exposed mountain tops with very inconspicuous flowers, having awn-tipped sepals and no petals; occasionally found in the alpine zone.

Pearlwort (*Sagina saginoides* (L.) Brit.).—A tiny inconspicuous plant with narrow leaves and small flowers on very slender stems, found above 12,000 feet on Trail Ridge; probably elsewhere.

WATERLILY FAMILY (NYMPHACEAE)

A family of aquatic plants with showy blossoms and large floating leaves. Only one species is found in the park. These plants are not true lilies. They are more nearly related to the buttercups, as their flower arrangement indicates.

Yellow pond lily (*Nymphaea polysepala* (Engelm.) Greene).—A plant with yellow flowers 2 to 3 inches across, blooming in July and August. Common in lakes between 9,000 and 10,000 feet.

BUTTERCUP FAMILY (RANUNCULACEAE)

This family is a very large one and contains many of our most beautiful wild flowers. It is characterized by having an indefinite number, usually several, stamens and pistils, and by having the stamens, sepals, and petals, when present, inserted below the pistils. It includes a great many plants of widely differing appearance. The buttercup order is believed to include the most primitive of seed plants now living, and is considered by many botanists to be the trunk of the family tree of the seed plants from which the more highly specialized groups have branched off at different times through the ages. Many of our most showy garden plants belong to this group, including the *Ranunculus*, *Anemone*, *Delphinium*, *Paonia* (peony), and *Aquilegia* (columbine).

Plants climbing or trailing, stems woody ..... **Clematis** (p. 51).
Plants erect, never climbing or trailing; stems herbaceous.
Leaves compound, made up of numerous, roundish, usually lobed leaflets.
Flowers conspicuous, petals spurred ..... **Columbine** (p. 54).
Flowers inconspicuous; stamens numerous, long ... **Meadow rue** (p. 52).
Leaves simple, divided or compound but never composed of roundish leaflets.
Flowers regular.
Flowers in spikelike racemes, ripening into white or red berries ... **Baneberry** (p. 55).
Flowers never in spikelike racemes; fruit not berrylike.
Flowers with only 1 cycle of perianth segments present, these usually petallike.
Plants with silky or hairy foliage and stems ..... **Anemone** (p. 53).
Plants with smooth foliage and stems.
Leaves entire, all basal ..... **Marsh marigold** (p. 49).
Leaves much divided; stem leafy ..... **Globe flower** (p. 50).
Flowers with 2 cycles in the perianth, both sepals and petals **Buttercup** (p. 50).
Flowers irregular, mostly dark blue, rarely pale or whitish.
Upper sepal spurred ..... **Larkspur** (p. 54).
Upper sepal helmet-shaped ..... **Monkshood** (p. 55).

Mousetail (*Myosurus aristatus* Benth.).—A diminutive plant growing in mud, with a tuft of narrow leaves and small white blossoms, with numerous pistils which form a cylindric spike of achenes when mature. It has been found on wet ground in the vicinity of Longs Peak.

FIGURE 27.—Marsh marigold. White, 1 to 2 inches across. Photograph by Joseph Dixon

White marsh marigold (*Caltha rotundifolia* (Huth.) Greene), also sometimes called *C. leptosepala*) (fig. 27).—Abundant in swampy places of the subalpine and alpine zones. Its oblong or narrowly oval sepals vary from 5 to 15 in number. They are white inside, sometimes tinged with bluish outside. The anthers of the numerous stamens give the flower a conspicuous yellow center. It has several pistils which develop into a cluster of small green pods. The leaves,

all basal, are 1 to 4 inches long, entire and usually oval, with a somewhat heart-shaped base.

Globe flower (*Trollius albiflorus* (Gray) Rydb.) (fig. 28).—Abundant in meadows of the subalpine zone and occasionally above timber line. The flowers are cream-colored or white, cup-shaped, and from ¾ to 1¾ inches broad. This plant resembles the alpine anemone in general appearance, from which it may be distinguished by the smoothness of its foliage and by the fact that the numerous pistils develop into a cluster of small pods, each containing several seeds. The leaves are palmately 5 to 7 parted, the divisions toothed.

FIGURE 28.—Globe flower. Cream colored, 1 to 2 inches across. Photograph by Paul F. Shope

Buttercups are usually easy to recognize because of their shiny yellow petals that often appear as though varnished, and their usually much-dissected leaves. They are sometimes confused with the cinquefoils (p. 67), a group of the rose family having 5-petaled yellow flowers. These two groups may be distinguished by a glance at the calyx. The calyx of the buttercups is made up of five separate green or yellowish sepals, while the sepals of the cinquefoils are united into a saucer-shaped calyx having five main divisions and five alternating bractlets. The name of this genus, *Ranunculus*, is from an old Greek word meaning "little frog," in reference, probably, to the marshy places in which buttercups are usually found. There are several species of buttercups growing at all altitudes in the park.

Alkali buttercup (*Ranunculus cymbalaria* Pursh, also called *Halerpestes cymbalaria* (Pursh) Greene).—A plant with simple crenate leaves, spreading by means of stolens similar to strawberry runners that eventually root and start new plants. It grows in moist meadows, especially on alkali or salty soil, and has been found in Horseshoe Park and along Cow Creek (foot of Twin Sisters).

Trailing buttercup (*Ranunculus reptans strigulosus* Freyn.).—Found in very wet places around lakes and beaver ponds. Its leaves are entire and very narrow, one-eighth inch or less in width, its stems slender and rooting at the nodes. Our variety is more or less hairy.

Nuttall buttercup (*Ranunculus Nuttallii* A. Gray, also called *Cyrtorhyncha ranunculina* Nutt.).—A plant with thrice compound leaves, each of the divisions petioled and much dissected. The sepals

are yellow and petallike, the petals very small and sometimes lacking. It is frequently found in spring and early summer on moist, partially shaded hillsides.

Caltha-flowered buttercup (*Ranunculus alismaefolius* Geyer, also called *R. calthaeflorus* Greene).—This plant has entire leaves which are from 1 inch to 2½ inches long and from ¼ to ¾ inch wide, and each flower has five or more oblong petals. This is the only one of our buttercups, besides the trailing buttercup, which has all of the leaves undivided. It is found along streams and lakes and in other moist places of the subalpine and alpine zones.

Snow buttercup (*Ranunculus adoneus* Gray) (fig. 29).—The most conspicuous and showy of our buttercups. Its large flowers are from ½ to 1¼ inches broad and brilliant yellow, almost poppylike in appearance; its leaves are finely dissected into narrow divisions. It is found in the upper subalpine and alpine zones, beginning to bloom as soon as the snow melts. The beautiful flowers are often found right at the edge of the snow and sometimes they even come up through it.

FIGURE 29.—Snow buttercup. Yellow, about 1 inch across; leaves finely divided. Photograph by Kenneth Hartley

Pygmy buttercup (*Ranunculus pygmaeus* Wahl.).—A tiny plant with slender, weak stems, sometimes found in moist rock crevices and on ledges in the alpine zone.

Several other buttercups, all rather similar, are found in meadows and on stream banks of the park: *Ranunculus alpeophilus* A. Nels., *Ranunculus cardiophyllus* Hook., *Ranunculus glaberrimus* Greene, *Ranunculus pedatifidus* J. E. Smith, *Ranunculus acriformis* Gray, *Ranunculus eremogenes* Greene, and *Ranunculus inamoenus* Greene.

Water crowfoot (*Ranunculus aquatilis* L., also called *Batrachium flaccidum* (Pers.) Rupe.).—An aquatic plant with white, buttercup-like flowers and finely dissected, floating leaves; found in ponds of the montane zone, where it forms large floating masses of brownish green, and is quite conspicuous when starred with the white flowers. A different form, called *Batrachium confervoides* Fries, has been found at Grand Lake.

Clematis.—Mostly trailing, somewhat woody plants with opposite, compound leaves and conspicuous clusters of plumed achenes. The **virgins bower** or **white clematis** (*Clematis ligusticifolia* Nutt.), with small white flowers in panicles and very conspicuous clusters of feathery fruits, is a common vine of the foothills and has been found near Estes Park Village. This seems to be the upper limit of its range.

Western clematis (*Clematis columbiana* (Nutt.) T. and G., also called *C. occidentalis* Hornem. and *Atragene columbiana* Nutt.).—Frequently found in moist woods of the montane and subalpine zones where it blooms in June. The solitary flower has four long-pointed blue or purplish sepals which are from 1 to 2 inches long. Later the plumed seed clusters make it conspicuous. **Hairy clematis** (*Clematis hirsutissima* Pursh., also called *Viorna Bakeri* (Greene) Rydb.), an erect plant with woolly joints and dark purple flowers, and the **alpine clematis** (*Clematis pseudoalpina* (Kuntze) A. Nels., also called *Atragene repens* (Kuntze) Rydb.,) a trailing plant having 3 to 7 toothed or parted leaflets, have been reported.

Meadow rue (*Thalictrum*) is often mistaken for maidenhair fern as the leaves are rather similar and the rue does not have conspicuous flowers. But these plants are not ferns at all, for they bear true seeds, which ferns do not (p. 21). On many of these plants the flowers consist of tassels of long slender stamens. The **alpine meadow rue** (*Thalictrum alpinum* L.), a dwarf plant with perfect flowers, is found in the subalpine and alpine zones. The **few-flowered meadow rue** (*Thalictrum sparsiflorum* Turcz.), with perfect flowers, and **Fendlers meadow rue** (*Thalictrum Fendleri* Engelm.), with dioecious flowers (the pistillate and staminate flowers on different plants), are both found in moist aspen groves of the montane zone. The last two may be distinguished if found together, because Fendlers meadow rue is a bluish green and the few-flowered rue is more yellowish green in color. **Veined meadow rue** (*Thalictrum venulosum* Trelease) and **western meadow rue** (*Thalictrum occidentale* Gray) have also been found.

FIGURE 30.—Pasque flower. Lavender, about 2 inches across. Plant covered with silky hairs. Photograph by Kenneth Hartley

Pasque flower (*Anemone patens* L., sometimes called *Pulsatilla hirsutissima* Brit., and *P. ludoviciana* (Nutt.) Heller.) (fig. 30).—This plant comes through the ground sometimes as early as March, well protected by its fur-covered sepals and involucre. It is one of the most beautiful and conspicuous of the early spring flowers. The large lavender blossoms with their gold centers resemble the garden crocus, to which this plant is in no way related. With the advancing spring it follows the disappearance of the snow up the

mountain slopes all the way from the foothills to the alpine zone, blooming in clumps among the rocks or on the open grassland. Each of the many achenes has a long plumed style. As they ripen, these styles lengthen, giving the seed cluster a feathery appearance and providing a sail for each individual seed so that it can be carried long distances by the wind.

Alpine anemone (*Anemone zephyra* A. Nels.) (fig. 31).—A hairy plant of the subalpine and alpine meadows with three or more (rarely one) white flowers subtended by a sessile involucre. When the sepals fall a broad head of smooth black achenes is left. (This plant has been called *A. narcissiflora,* but that name belongs to a European species.)

FIGURE 31.—Alpine anemone. White, plant 4 to 16 inches high. Photograph by Kenneth Hartley

FIGURE 32.—Colorado blue columbine. Blue and white, 2 to 3 inches across. Photograph by Joseph Dixon

Northern anemone (*Anemone canadensis* L.).—A hairy plant of moist aspen groves and stream banks found in the montane zone and lower, with forking stems each bearing a single white flower subtended by a sessile involucre. The white sepals are satiny-hairy on the outside.

Wind flower (*Anemone globosa* Nutt.).—A slender plant with solitary long-peduncled red, white, or yellow flowers. Stem, leaves, and sepals hairy; achenes densely woolly. Found occasionally on hillsides of the montane and subalpine zones. *Anemone cylindrica* Gray is also reported to grow in the park.

Colorado blue columbine (*Aquilegia caerulea* James) (fig. 32, Plate I).—The State flower of Colorado. A beautiful plant with flowers 2 to 3 inches across of blue and white with very long slender spurs is found in all zones of the park. Originally abundant throughout the Rocky Mountains, this plant has become scarce through thoughtless picking and digging. This vandalism is now prohibited by law in the State of Colorado. In the park, where these plants have been protected for several years, they may be found abundantly in the subalpine zone, especially on rock slides, where they seem to thrive particularly well. The color of the blossoms on the plants found at high altitudes is often pale and sometimes even white. In shady, moist situations, such as aspen groves and ravines of the montane zone, flowers of rich deep blue will be found. A spurless variety of this plant, the **star-flowered columbine** (*A. caerulea Daileyae* Eastw.), has been named from plants found in this region.

FIGURE 33.—Subalpine larkspur. Deep blue, plant 2 to 4 feet high, in dense clumps. Photograph by Joseph Dixon

Dwarf blue columbine (*Aquilegia saximontana* Rydb.).—A rare dwarf plant only a few inches high, with dark blue, short-spurred flowers, grows among rocks of the alpine zone.

Red columbine (*Aquilegia elegantula* Greene).—A plant with red and yellow flowers found in moist places on the western slope, mainly in the montane zone.

Larkspur (*Delphinium*).—Plants with lobed or dissected leaves and spikes of irregular flowers, usually dark blue. The upper sepal is produced into a spur from which the plants take their common name.

Nelsons larkspur (*Delphinium Nelsonii* Greene).—An early blooming plant from 4 inches to a foot high, with very rich, dark purplish-blue flowers, found on sandy hillsides of the montane zone and in the foothills. It blooms in May and early June.

Mountain larkspur (*Delphinium scopulorum* Gray).—A tall plant 3 to 7 feet high, found in aspen groves of the montane zone, blooming in August. Spike becomes much elongated in fruit, sometimes with a few slender branches. Pods pubescent.

Subalpine larkspur (*Delphinium subalpina* (Gray) A. Nels.) (fig. 33).—A tall plant 3 to 8 feet high, growing in dense clumps in

moist situations of the subalpine zone, with short, crowded spikes of very deep blue (rarely pink) flowers. Inflorescence often branched. (This plant is sometimes called *D. Barbeyi* Huth.)

Monkshood (*Aconitum*).—Tall plants similar to the larkspur but with upper sepal forming a helmet instead of a spur and either blue or white flowers. These plants are said to be somewhat poisonous if eaten. **American monkshood** (*Aconitum columbianum* Nutt.), with a long loose raceme of blue or whitish flowers, occurs in moist ground of the montane and subalpine zones. *Aconitum Bakeri* Greene has been found.

Baneberry (*Actaea*).—Plants of moist thickets with compound leaves and spikes of showy red or white berries. *Actaea arguta* Nutt. is found in moist aspen thickets, especially along the lower part of the Fern Lake trail.

BARBERRY FAMILY (BERBERIDACEAE)

Our plants of this family are shrubs with yellow blossoms and spiny-toothed leaves. Only one species is native in the park.

FIGURE 34.—Oregon hollygrape. Yellow, plant 6 to 10 inches high; berries blue. Photograph by Kenneth Hartley

Oregon hollygrape (*Berberis aquifolium* Pursh) (fig. 34).—A dwarf shrub, 6 to 10 inches high, with hollylike leaves, blooming in May and June, with clusters of pale yellow blossoms. The blue berries are found in late summer and fall. They are said to make delicious jelly when combined with apple or some other fruit and are much prized in the Northwest, where these plants are more abundant and grow much larger. The leaves often turn red, dark purple, or yellow in the fall. (This plant is sometimes called *Odostemon repens* (Lindl.) Cockerell.)

FUMITORY FAMILY (FUMARIACEAE)

Plants with irregular flowers having two sepals, and finely dissected, usually smooth leaves. The bleedingheart and Dutchmans breeches belong to this family. Only one species has been found in the park.

Golden smoke or **Corydalis** (*Corydalis aurea* Willd.).—A very attractive plant forming clumps of pale or bluish-green feathery

foliage. In May and June short racemes of yellow flowers appear close to the ground. This plant thrives in disturbed soil and is seen most frequently along roadsides. It appeared abundantly on the burned area following the Twin Sisters fire. (*Capnoides aureum* (Willd.) Kuntze is another name for this plant.)

MUSTARD FAMILY (CRUCIFERAE)

This family receives its scientific name from the characteristic crosslike appearance of its 4-petaled flowers. The ovary is above the other flower parts and the 2-valved pod is termed a *silique*. It may vary in shape from almost circular, as in the penny cress, to linear, as in the wallflowers. Most of the plants have a peppery taste. Many of our garden vegetables, such as radishes, turnips, cabbage, and cress, belong to this family.

(There are very many inconspicuous and weedy plants in this family, most of which are very difficult to identify. Only the commonest and attractively flowered ones are included in this key.)

Flowers white or lavender tinged.
- Plant abundant along edges of subalpine streams, blooming in summer; leaves bright green and sharply toothed; flowers large, white---- **Brook-cress** (p. 56).
- Plants of open fields blooming in early spring (or of alpine fields in summer).
  - Plant very slender, usually solitary; leaves bluish, flowers white or lavender---- **Arabis** (p. 56).
  - Plant low, usually in tufts; flowers white---- **Candytuft** (p. 57).

Flowers yellow or dark orange red.
- Plant gray, hairy, rough, often spreading on the ground, pods inflated---- **Lesquerella** (p. 57).
- Plant erect, the alpine ones often very tiny and dwarf; pod not inflated.
  - Pod linear, much more than twice as long as wide, square in cross section.
    - Flowers yellow, large.
      - Plant rough, abundant and conspicuous on fields and hillsides in early summer---- **Western wallflower** (p. 58).
      - Plant smooth, abundant and conspicuous on alpine fields and meadows---- **Alpine wallflower** (p. 58).
    - Flowers dark orange or reddish, rare--- **Wheelers wallflower** (p. 58).
  - Pod rarely more than twice as long as broad, flattened in cross section, often twisted---- **Draba** (p. 58).

Brook cress (*Cardamine cordifolia* Gray) (fig. 35).—A handsome plant frequently found along subalpine streams. It is a foot or more tall with a terminal raceme of white flowers somewhat resembling those of the garden candytuft, and heart-shaped leaves with toothed margins.

Arabis (*Arabis*).—Slender, rather inconspicuous plants with small white or lavender flowers and linear pods are very abundant on the montane fields and hillsides, blooming in April, May, and June. They are named for Arabia. *Arabis exilis* A. Nels. with hairy leaves and

stem and pendent pods is the earliest to bloom. *Arabis Drummondii* Gray, with smooth, glaucous foliage, auriculate-clasping stem leaves, and erect pods, and *Arabis hirsuta* Scop., with erect pods and hairy, auriculate stem leaves, are both found in early summer. *Arabis divaricarpa* A. Nels., and *Arabis oxylobula* Greene, are also reported for this region. Early in the spring many of these plants are attacked by a yellow rust, a fungus parasite which grows in the tissue of the Arabis plant and gives the leaves a yellow color. These little rosettes of yellow leaves, very flowerlike in appearance, are quite conspicuous on the fields and hillsides in April.

FIGURE 35.—Brook cress. White; about a foot tall, growing by streams. Photograph by Joseph Dixon

Wild candytuft (*Thlaspi*).—Tufted plants with wavy-margined, glaucous leaves, headlike racemes of white 4-petaled flowers, and triangular or obcordate pods. **Fendlers candytuft** (*Thlaspi Fendleri* Gray, also called *T. purpurascens* Rydb.), common on fields and open slopes of the montane zone and foothills in early spring, blooming in Estes Park in April and May. The **glaucous candytuft** (*Thlaspi glaucum* A. Nels.) is common in moist places above timber line in summer, and the **Colorado candytuft** (*Thlaspi coloradense* Rydb.), a rare alpine plant, has also been found. **Pennycress** or **Frenchweed** (*Thlaspi arvense* L.), an introduced weed, is occasionally seen around dwellings.

Lesquerella (*Lesquerella montana* (Gray) Wats.).—A rough, grayish plant with stems spreading on the ground and turned up at the tips, bearing terminal racemes of pale yellow flowers. Pods more or less inflated. Frequent on dry, sandy, or stony soil of the montane zone.

Wallflower (*Erysimum*).—Conspicuous plants found throughout the park with yellow, orange, or brown (rarely purplish), 4-petaled flowers. The petals are broad above and narrowed into a slender "claw" at the base. The scientific name is from a Greek word meaning to draw

blisters and probably refers to the early use of the acrid juice of these plants for that purpose. Even to-day the name "blister cress" is sometimes used for them. (Plants of this genus are also called *Cheirinia* and *Cheiranthus*.)

Western wallflower (*Erysimum asperum* DC.).—Very common on fields and open slopes of the montane zone and lower. The flowers are orange-yellow, conspicuous in June and early July. **Alpine wallflower** (*Erysimum nivale* (Greene) Rydb.), with fragrant lemon-yellow flowers, is found above timber line, and **Wheelers wallflower** (*Erysimum Wheeleri* Wats.), with orange, brownish, or rose-purple flowers, is sometimes found in the subalpine and alpine zones.

Draba, rock cress, or **whitlow grass.**—Small plants with yellow or white, 4-petaled flowers, and flattened, ovate to lanceolate pods. Several species are found in the park but most are small and inconspicuous. Some are diminutive plants growing at very high altitudes and some are inconspicuous weeds. The **twisted pod draba** (*Draba streptocarpa* Gray) is the most conspicuous and is frequently found in the park. It blooms in May and June in the montane zone, where it is often found in colonies under yellow pine trees. Later in the season it will be found at high altitudes. Dwarf plants are sometimes seen among rocks on the highest summits. The flower is golden yellow and the pods distinctly twisted, as the specific name implies. Other species of Draba found in the park are: **Golden Draba** (*Draba aurea* Vahl.), **thick-leaved Draba** (*Draba crassifolia* Graham), **shining Draba** (*Draba nitida* Greene, also called *D. stenoloba* S. Wats.), **yellow Draba** (*Draba chrysantha* Wats.), **showy Draba** (*Draba spectabilis* Greene), and also *Draba nemerosa* L., and *Draba lutea* Gilib.

The following additional species belonging to this family, most of which are inconspicuous weeds, are found here: **Peppergrass** (*Lepidium apetalum* Willd.), **hedge mustard** (*Sisymbrium altissimum* L., also called *Norta altissima* (L.) Brit.), **tansy mustard** (*Sophia Hartwegiana* (Fourn.) Greene, and *Sophia Sophia* (L.) Brit.), **cress** (*Roripa hispida* (Desv.) Brit. and *Roripa sinuata* (Nutt.) A. S. Hitch.), **thelypodium** (*Thelypodium paniculatum* A. Nels.), and **shepherd purse** (*Capsella bursa-pastoris* Medik., also called *Bursa bursa-pastoris* (L.) Brit.).

CAPER FAMILY (CAPPARIDACEAE)

This family is characterized by having 4 petals, as is the mustard family, but in the caper family the pod is 1-celled and elevated on a slender stem, and in the one species found in the park the leaves are palmately compound of 3 entire leaflets.

Rocky Mountain bee plant (*Cleome serrulata* Pursh).—A tall plant with conspicuous racemes of reddish-purple flowers, the raceme

becoming very long in fruit. Occasionally found along roadsides of the montane zone, and lower. (Also called *Peritonia serrulatum* (Pursh) DC.)

STONECROP FAMILY (CRASSULACEAE)

Rock-loving plants with smooth fleshy leaves adapted for water storage, and 4 or 5 petals. Our plants take their generic name from the Latin verb *sedere*, "to sit," because of their habit of growing on rocks.

Yellow stonecrop (*Sedum stenopetalum* Pursh).—A very common plant of stony ground, found from the plains to the alpine zone.

FIGURE 36.—Rose crown. Rose-colored; 6 to 10 inches high. Photograph by Joseph Dixon

FIGURE 37.—Kings crown. Very dark red; 2 to 8 inches high. Photograph by Kenneth Hartley

The little rosettes of fleshy leaves appear very early, but the yellow flowers do not open until the middle of June in the montane zone. In August this plant is found in bloom in the higher altitudes. It is frequently found on rocks or in rock crevices, where it thrives with a minimum amount of water.

Rose crown (*Sedum rhodanthum* Gray) (fig. 36).—A beautiful plant with a cluster of rose-pink blossoms found frequently along subalpine streams and occasionally in wet places of all zones. (Also called *Clementsia rhodantha* (Gray) Rose.)

Kings crown (*Sedum integrifolium* (Raf.) A. Nels.) (fig. 37).—A fleshy plant from 2 to 8 inches high with a crowded terminal cluster of very dark red or purplish dioecious blossoms. It is found in

July and later, in the alpine zone and occasionally lower. Late in summer the entire plant often turns a brilliant red. (Also called *S. Rhodiola Coult.* and *Rhodiola integrifolia* Raf.)

SAXIFRAGE FAMILY (SAXIFRAGACEAE)

A family including many rock plants and taking its name, that means in the Latin "rock breaker," from the habit of many of its members of growing on or among rocks. Many of the species are arctic or alpine in their distribution.

Flowers not white or greenish.
Flowers yellow, plants of alpine zone.
Plant with runners; leaves hairy or at least ciliate on the margins—— **Whiplash saxifrage** (p. 60).
Plant without runners; leaves smooth—**Yellow alpine saxifrage** (p. 60).
Flowers purple; plants growing in rock crevices, not alpine—— **Purple saxifrage** (p. 62).
Flowers white or greenish.
Flowers white, in heads, open panicles, or solitary, never in spikes or racemes.
Stems leafy.
Petals with small colored dots, basal leaves in rosettes—— **Dotted saxifrage** (p. 61).
Petals without colored dots; alpine plants of moist shaded crevices.
Plant with bulblets in the axils of the leaves—— **Nodding saxifrage** (p. 61).
Plant without such bulblets, very small and delicate, weak-stemmed—**Weak-stemmed saxifrage** (p. 61).
Stems not truly leafy, sometimes bearing one leaflike bract.
Stem with one leaflike bract about the middle; petals fringed. **Fringed parnassia** (p. 62).
Stems entirely leafless.
Spring blooming plant of fields and woods; flowers at first in a dense cluster which later elongates—— **Early saxifrage** (p. 61).
Summer blooming plant of subalpine and alpine brooksides and wet ground—**Brook saxifrage** (p. 62).
Flowers greenish, in spikelike racemes.
Racemes many-flowered, crowded; plants often growing in rock crevices **Alumroot** (p. 63).
Racemes with a few cap-shaped flowers widely spaced, plants growing in moist, shady places—**Mitrewort** (p. 63).

Whiplash saxifrage (*Saxifraga flagellaris* Willd.).—A small infrequent alpine plant with brilliant yellow flowers and glandular-hairy stem and leaves. It spreads by means of runners, which accounts for its specific and common names. This is strictly an alpine plant and should be looked for among rocks on the high ridges and rocky summits above timber line. (Also called *Leptasea flagellaris* (Willd.) Small.)

Yellow alpine saxifrage (*Saxifraga chrysantha* Gray) (fig. 38).—A dainty plant of the alpine rock fields with golden yellow flowers.

The petals have orange spots and the yellow seed pod turns red in ripening. This is a smaller plant than the last and has none of the hairs or runners of its relative. It often grows in clumps sheltered by a protruding rock, and has been found in bloom on the summit of Mount Evans, more than 14,000 feet above the sea. (Also called *Leptasea chrysantha* (Gray) Small.)

Dotted saxifrage (*Saxifraga austromontana* Weigand) (fig. 39).—A dainty rock plant with a cushionlike habit of growth. Each rosette of pointed leaves sends up a slender stem bearing several flowers. The petals are white and dotted with orange and dark red. Found in dry pine and spruce forests of the montane and subalpine zones, and occasionally above timber line. In the lower altitudes it begins to bloom about the middle of June. (Also called *S. bronchialis* L. and *Leptasia austromontana* (Weigand) Small.)

FIGURE 38.—Yellow alpine saxifrage; 2 to 4 inches high, sometimes growing singly or few together. Photograph by Paul F. Shope

FIGURE 39.—Dotted saxifrage. White with colored dots, 2 to 4 inches high. Photograph by Joseph Dixon

Nodding saxifrage (*Saxifraga cernua* L.).—A diminutive plant with slender stem and 5 to 7 lobed leaves found under rock ledges and in crevices in moist, shady situations of the alpine zone. The white flowers are nodding and clusters of bulblets are borne in some of the leaf axils. A very similar plant with no bulblets, sometimes found in moss in very shady situations, is the **weak-stemmed saxifrage** (*Saxifraga debilis* Engelm.).

Early or **snowball saxifrage** (*Saxifraga rhomboidea* Greene) (fig. 40).—A spring blooming plant of the foothills and montane zone, occurring in summer in the alpine and subalpine zones. In April or May, at the lower altitudes in the park, on moist hillsides and among aspens, you may find depressed rosettes of pale green oval or pointed leaves. Soon a stout stem is sent up from the center of this rosette, bearing a dense headlike cluster of small white flowers. As the flowers mature, the cluster elongates until a long inflorescence with scattered clusters of flowers or seed pods results. (Also called *Micranthes rhomboidea* (Greene) Small.)

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Brook saxifrage (*Saxifraga arguta* Don).—A beautiful plant of subalpine brooks, lakesides, and very wet places. It seems to thrive best among rocks in shallow running water, where it is easily recognized by its shining, nearly round, coarsely toothed basal leaves which are from 1 to 2½ inches broad. The tall, slender-branched flower stem bears many dainty small white flowers. (Also called *Micranthes arguta* (Don) Small.)

Purple saxifrage (*Boykinia Jamesii* (Torr.) Engler) (fig. 41).—A plant of rock crevices in the montane zone with kidney-shaped,

FIGURE 40.—Early saxifrage. White; 3 to 8 inches high. Photograph by Kenneth Hartley

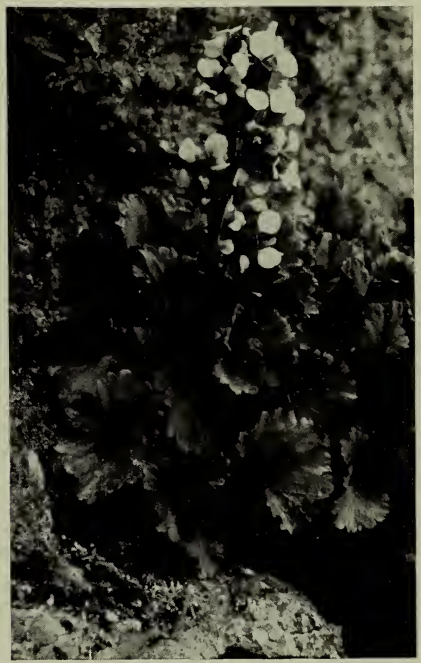


FIGURE 41.—Purple saxifrage. 4 to 8 inches high, rock crevices. Photograph by Kenneth Hartley

toothed leaves and spikes of purple flowers. The petals have a round blade and long claw. (Also called *Saxifraga Jamesii* (Torr.) and *Telesonix Jamesii* (Torr.) Raf.)

Fringed parnassia (*Parnassia fimbriata* Banks).—In the subalpine bogs and wet meadows one may find an attractive plant growing in clumps with many smooth, kidney-shaped or heart-shaped leaves at the base and slender flower stems. Each stem bears a heart-shaped leaf at about its middle and a dainty white 5-petaled flower about one-half inch across. Each petal is fringed toward the base. **Grass of parnassus** (*Parnassia parviflora* DC), a similar plant but lacking the fringe, has also been found.

Alumroot (*Heuchera bracteata* (Torr.) Ser.) (fig. 42).—Found in dense mats on rocky ledges, in crevices, and among stones. The dead leaves are more or less persistent and with the prostrate stems form brown mats against which the bright new leaves show up in sharp contrast in spring. The flowers are small, bell-shaped, and greenish, and borne in short, dense spikes. The leaves are sharply toothed. In autumn some of the leaves turn rose-color or red. The **small-leaved alumroot** (*Heuchera parvifolia* Nutt.) is frequent on shaded rocky slopes. In this species the spike elongates and the flowering stems are often nearly a foot high. The leaves have rounded lobes. **Halls alumroot** (*Heuchera Hallii* Gray) has also been reported.

FIGURE 42.—Alumroot. Greenish; flowering stems 4 to 6 inches high. Photograph by Kenneth Hartley

Mitrewort or **Bishops cap.**—Inconspicuous little plants of moist, rich ground in shaded pine and spruce forests, with basal leaves and slender stems bearing caplike flowers. The **common mitrewort** (*Mitella pentandra* Hook, also called *Pectianthia pentandra* (Hook), Rydb.) is frequently seen and both *Mitella Parryi* (Piper) A. Nels. (*Ozomelis Parryi* (Piper) Rydb.), and *Mitella violaceae* Rydb. (*Ozomelis violaceae* Rydb.) have been found.

Golden saxifrage (*Chrysosplenium tetrandum* Th. Fries).—A low smooth plant with alternate tender succulent leaves, reniform in shape with rounded lobes. The inconspicuous flowers have no petals, the 4 or 5 blunt calyx lobes are yellow inside; the stamens are 4, or rarely 5 to 8. This very rare arctic plant has been found in the park on a cliff in dense shade in the subalpine zone, and is known to have been collected only once before in Colorado.

Tellima tenella (Nutt.) Walp. (also called *Lithophragma tenella* Nutt.), grows near Fern Lake.

GOOSEBERRY FAMILY (GROSSULARIACEAE)

Shrubs with or without spines, leaves palmately lobed with radiating veins, flowers tubular, and fruit a berry usually crowned with the withered remains of the flower.

Mountain gooseberry (*Ribes saximontanum* E. Nels.).—A shrub with sharp spines, usually 2 or 3 together, and reddish-purple berries of good quality for jelly and preserves. Found on moist ground of the montane zone and lower.

Small gooseberry (*Ribes lacustre* (Pers.) Poir).—A low shrub with bristly branches and black insipid berries covered with gland-tipped bristles. Found in the upper montane and subalpine zones. (Also called *Limnobotrya parvula* (Gray) Rydb.) *Ribes saxosum* Hook. and *Ribes montigenum* McClatchie are also found.

Squaw currant (*Ribes cereum* Dougl.).—One of the most common shrubs of the yellow-pine belt and found sometimes up to timber line. Usually forming rounded shrubs or clumps 1 to 3 feet high, the stems rigid and much branched, the leaves roundish, 1½ inches broad or less, crenately lobed, and with a distinctive odor when crushed. The red, insipid berries ripen in summer and are eaten by birds and small animals. (This is also called *Ribes inebrians* Lindl.)

Subalpine black currant (*Ribes coloradense* Coville).—A rambling shrub of the subalpine zone with lobed, heart-shaped or kidney-shaped leaves and racemes of pinkish or purplish flowers which develop into black currants. **Wolfs currant** (*Ribes Wolfii* Rothrock) has been found also.

Golden currant (*Ribes longiflorum* Nutt.).—This yellow-flowered currant, which bears very highly prized fruit, has been found near Estes Park. (Also called *Chrysobotrya odorata* (Wendl.) Rydb.)

HYDRANGEA FAMILY (HYDRANGEACEAE)

A family of shrubby plants with opposite leaves and flowers much resembling the saxifrages. **Jamesia** or **wax-flower** (*Jamesia americana* T. & G., also called *Edwinia americana* (T. & G.) Heller), is our only representative. This is a shrub with opposite, distinctly ribbed leaves and clusters of waxy white blossoms. In autumn the leaves turn beautiful shades of red. This plant is closely related to the saxifrages and has the same habit of growing on rocks and in rock crevices. It is common in rocky places from the foothills to timber line, but will be found most abundantly in the montane zone.

ROSE FAMILY (ROSACEAE)

This is a very large family. Many of its members differ widely in appearance. Typically, its flowers have 5 sepals, 5 petals, and

many pistils and stamens. The sepals are united at least at the base, and often there are 5 bractlets usually smaller than the sepals and alternating with them. These flowers may have as many as 8 petals and as few as 5 stamens and one pistil. The petals and stamens are inserted on the edge of the calyx. The leaves are alternate and all have stipules, at least when young The three following subfamilies are represented in our range; *Rosaceae* (p. 65), *Pomaceae* (Apples, etc.) (p. 69), and *Prunaceae* (plums, cherries, etc.) (p. 70).

1. Subfamily, *Rosaceae.*

(For the shrubs of this group see Key to Woody Plants, p. 20)

Flowers white or cream-colored, conspicuous.
  Flowers having 8 petals; seeds plumed; alpine plants---- **Mountain dryad** (p. 65).
  Flowers having 5 petals---- **Strawberry** (p. 66).
Flowers yellow or rose-colored; petals 5, sometimes inconspicuous.
  Flowers yellow.
    Foliage glaucous, leaflets 3, each 3-toothed at apex; plant and flower inconspicuous; high altitudes---- **Sibbaldia** (p. 66).
    Foliage green or silvery with silky hairs, rarely glaucous, if so the flowers conspicuous.
      Plants rough to touch, 1 to 3 feet tall, growing on moist ground.
        Inflorescence a spike; fruit burlike---- **Agrimony** (p. 66).
        Inflorescence widely branched; fruit a bur covered with hooked prickles---- **Bur avens** (p. 66).
      Plants not rough to touch; flowers bright yellow.
        Plant with runners; underside of leaves silvery---- **Silverweed** (p. 67).
        Plant without runners.
          Foliage, or at least upper part of stem and calyx, dark green or purple-tinged; leaves finely dissected; plant abundant on alpine fields---- **Alpine avens** (p. 66).
          Foliage light green, silvery or glaucous; leaves compound but rarely finely dissected---- **Cinquefoil** (p. 67).
  Flowers rose-colored; seeds plumed.
    Basal leaves finely dissected; stem, upper leaves, and calyx often rose-tinged---- **Pink plumes** (p. 67).
    Basal leaves irregularly divided, terminal lobe the largest, but not finely dissected; petals and calyx rose or purple---- **Brook avens** (p. 66).

Mountain dryad (*Dryas octopetala* L.) (fig. 43).—A charming dwarf creeping shrub of high altitudes that the uninitiated would never guess was a shrub. It often forms large dark green mats on the stony ground above timber line. Its specific name *octopetala* means 8 petals, a rather unusual number among flowers. The cream-colored blossoms, 1 inch or more across, are followed by heads of plumed achenes which make the plants conspicuous even after the petals have fallen. This is a typically alpine and arctic plant. It is also found in the White Mountains, Greenland, Alaska, and in arctic and alpine Europe and Asia.

Wild strawberry.—Small plants with 5-petaled white flowers and palmately compound leaves of 3 leaflets, spreading by runners which root and start new plants. Common up to timber line. *Fragaria ovalis glauca* (Wats.) A. Nels. and *Fragaria americana* (Porter) Brit. are both found here.

Sibbaldia (*Sibbaldia procumbens* L.).—A plant with glaucous compound leaves of 3 leaflets and very small and inconspicuous yellow flowers. It resembles a strawberry plant in general appearance. Abundant in the region of timber line and sometimes higher, in places covering the ground with its bluish foliage.

FIGURE 43.—Mountain dryad. Cream colored, about 1 inch across; plant prostrate. Photograph by Kenneth Hartley

Agrimony (*Agrimonia striata* Michx.).—A stout, hairy plant 1½ to 2½ feet high with a slender spike of small yellow 5-petaled flowers separated by 3-parted bracts. The calyx is 10-ribbed, and together with the inclosed seed develops into a top-shaped, rather hard fruit, crowned with numerous prickles which catch in one's clothing. It has been found along streams near Estes Park. This has been called *A. Brittoniana* Bickn.

Bur avens (*Geum macrophyllum* Willd.).—A tall plant 1 to 3 feet high, with large lyre-shaped, pinnately divided leaves, the terminal lobe the largest, and a branching inflorescence. The 5-petaled yellow flowers develop into round or oval burs covered with hooked prickles. This plant is frequently noticed along streams and on moist ground of the montane and lower subalpine zones. *Geum strictum* Ait., a similar but more slender plant, occurs also.

Brook avens (*Geum rivale* L.).—A rather rare plant of the montane zone sometimes found along streams and on marshy ground. Its leaves are similar to the last but the plant is somewhat smaller and the 5 petals are reddish or purple.

Alpine avens (*Sieversia turbinata* (Rydb.) Greene, also called *Geum Rossii* and *Acomastylis turbinata* Rydb.) Greene (fig. 44).—This is probably the most abundant flower found above timber line. It grows in dense tufts or mats and blooms profusely with bright yellow 5-petaled flowers. The stamens are inserted at the

mouth of the more or less top-shaped calyx tube. The very dark green or purplish leaves are mostly basal, pinnately divided, and the divisions deeply toothed.

Pink plumes (*Sieversia ciliata* G. Don, also called *Geum triflorum*).—A rare plant with compound leaves, leaflets deeply incised, having leafy-bracted stems, each stem usually bearing three purplish flowers; styles very long, becoming conspicuously plumose in fruit.

Cinquefoil (*Potentilla*).—A large group containing many similar plants. The flowers are yellow with 5 petals and are sometimes mistaken for buttercups. The leaves are either pinnately or palmately compound of from 3 to 21 leaflets. The generic name *Potentilla* is from the Latin word *potens*, meaning powerful. The common name cinquefoil is from the French, meaning "five finger," referring to the leaves of some of the most common species which have 5 fingerlike leaflets. **Silvery cinquefoil** (*Potentilla effusa* Dougl.), a pretty plant with almost white foliage (covered with white hairs) and many lemon-yellow flowers, is common on dry fields and hillsides of the montane zone. Its leaves are pinnately compound with usually 5 to 7 irregularly toothed leaflets. It sometimes grows in large colonies covering the ground. The **glaucous cinquefoil** (*Potentilla glaucophylla* Lehm.) is very common in the subalpine and alpine zones. Its leaves are mostly smooth but bluish and palmately 5-foliate, flowers bright yellow, and petals usually notched. **Gold cup** (*Potentilla gracilis* Dougl.), with bright yellow flowers, each petal having an orange spot at base, is frequent in meadows and fields below 9,000 feet. It has a palmately 5-foliate leaf. The leaflets are dark green on their upper sides but white with cottony hairs on the lower side. **Beautiful cinquefoil** (*Potentilla pulcherrima* Wats.), similar to the last but with pinnate leaves, is frequently found on moist soil of the montane zone. The **one-flowered cinquefoil** (*Potentilla uniflora* Ledeb.), a small alpine plant with bright yellow flowers and 3-foliate, grayish woolly leaves, is sometimes found among the rocks above timber line. **Silverweed** (*Potentilla anserina* L., also called *Argentina*

FIGURE 44.—Alpine avens. Bright yellow, 1 inch or less across; alpine regions. Photograph by Kenneth Hartley

anserina (L). Rydb.), is a low plant with solitary yellow flowers on long stems and with stems and underside of leaves silvery white. This plant spreads by runners similar to those of the strawberry plant. It is found in the Horseshoe Park meadow and in other wet places of the montane zone. **Leafy cinquefoil** (*Potentilla fissa* Nutt., also called *Drymocallis fissa* (Nutt.) Rydb.).—A common plant with large creamy yellow blossoms, about 1 inch across, erect stems, and hairy, pinnate, green leaves. It often grows in rock crevices or among rocks and on burned-over land. It blooms abundantly in June and occasionally later.

Shrubby cinquefoil (*Potentilla fruticosa* L., also called *Dasiphora fruticosa* (L.) Rydb.).—A rounded shrub of moist ground, bearing many yellow, roselike blossoms and leaves of 3 to 7 leaflets. It is common from the foothills to the alpine zone but is most beautiful at timber line and just above. Many other species of cinquefoil grow in the park. The following have been identified: *Potentilla coloradensis* Rydb., *Potentilla Hippiana* Lehm., *Potentilla minutifolia* Rydb., *Potentilla monspeliensis* L., *Potentilla nivea* L., *Potentilla pennsylvanica strigosa* Pursh, *Potentilla pinnatifida* Dougl., *Potentilla pinnatisecta* (Wats.) A. Nels., *Potentilla quinquefolia* Rydb., *Potentilla rubricaulis* Lehm., *Potentilla saximontana* Rydb., and *Potentilla rupicola* Osterh.

Mountain spray or **false meadowsweet** (*Holodiscus dumosus* (Nutt.) Heller, also called *Sericotheca dumosa* (Nutt.) Rydb.).—A shrub with pyramidal clusters of small white flowers and toothed leaves which are silky and light-colored underneath, found in rocky canyons of the montane zone.

Ninebark (*Physocarpus monogynus* (Torr.) A. Nels., also called *Opulaster monogynus* (Torr.) Kuntze).—A small shrub with rather flat-topped clusters of white flowers in June or July; common on hillsides of the montane zone. The sepals turn reddish after the petals have dropped and the pods are densely covered with starlike hairs.

Antelope brush (*Purshia tridentata* DC., also called *Kunzia tridentata*).—A low much-branched shrub of the fields and hillsides and open yellow pine forests of the montane zone having numerous fragrant dainty pale-yellow blossoms in May and June. The leaves are usually less than 1 inch in length, wedge-shaped, and 3-toothed at the apex. This bush often grows close to rocks and the first branches to bloom in the spring are the ones which are against rock. One may often find bushes with one or two such branches in full bloom while the buds on the others are still tightly closed. That is because the rock reflects heat and also holds heat, thus lengthening the warm period of each day.

Wild rose (*Rosa*).—These are easily recognized, for wild roses are much the same the country over. The 5-petaled, pink to red blossoms are exquisitely fragrant. The red fruits, called "hips," are conspicuous in late summer and fall, and the pinnately compound leaves often turn lovely shades of red as cold weather approaches. The different species of rose are very difficult to distinguish. *Rosa Sayi* Schwein and *Rosa Woodsii* Lindl. are found in the park.

Flowering raspberry or **thimbleberry** (*Rubus deliciosus* Torr.) (fig. 45).—A common shrub, bearing in May and June many large white blossoms 1 to 3 inches across. The blossoms resemble single white roses. It lacks the spines characteristic of other raspberries, grows most abundantly and profusely among rocks, and is common in the foothills and montane zone. (This plant is also called *Bossekia deliciosa* (Torr.) A. Nels. and *Oreobatus deliciosus* (Torr.) Rydb.)

FIGURE 45.—Flowering raspberry. A shrub with white blossoms 1 to 3 inches across. Photograph by Joseph Dixon

Wild raspberry (*Rubus strigosus* Michx.).—Especially at home among rock slides of the subalpine zone, where it is most difficult to gather the delicious fruit, but sometimes found in rocky places at lower altitudes. It has prickly stems, compound leaves with usually 3 or 5 leaflets, 5-petaled white flowers, and juicy red fruit.

2. SUBFAMILY *Pomaceae*.

This is a group of trees and shrubs characterized by having a fleshy fruit formed by the thickening of the calyx tube which incloses the seeds in their carpels, of which the common apple is the best example.

Service berry or **shadbush** (*Amelanchier*).—A small tree or low shrub found occasionally on hillsides and along streams below 9,000

feet, with clusters of white flowers in June, and roundish, toothed leaves. The petals are oblong and the blue or purplish berries are very good to eat, but the birds and the worms usually find them first. Both *Amelanchier alnifolia* Nutt. (also called *Amelanchier spicata*) and *Amelanchier elliptica* A. Nels. are found.

Mountain hawthorn (*Crataegus chrysocarpus* Ashe).—A shrub or dwarf tree with stout spines 1 to 2 inches long, toothed leaves and clusters of white flowers in May or June. The fruit called "haws" are dark red when ripe. Not very frequent in the park, but has been found on the rocky hills west of Moraine Park and along Mill Creek.

Mountain ash (*Sorbus scopulina* Greene, also called *Pyrus sambucifolia*) (fig. 46).—A beautiful shrub or tree, with handsome leaves and large flat-topped or rounded clusters of white flowers, replaced later in the season by brilliant orange-red berries. Its pinnately compound leaves are composed of from 11 to 15 sharply serrate, feather-veined leaflets. At lower altitudes this plant grows into a small tree, and is often planted ornamentally. Its bark resembles that of an apple tree. In the park it is found occasionally as a shrub in the subalpine zone. There are a few bushes around Bear Lake and some in Prospect Canyon and along Cub Creek.

FIGURE 46.—Mountain ash. Flowers white, in large clusters; berries orange-red; leaves distinctive, made up of toothed leaflets. Photograph by National Park Service

3. SUBFAMILY *Prunaceae.*

This group is characterized by having simple, serrate leaves, bitter bark, leaves and seeds, and a fruit called a drupe, consisting of a fleshy or juicy covering over a single hard-shelled seed. The cherries, peaches, plums, almonds, and others belong to it.

Chokecherry (*Prunus melanocarpa* (A. Nels.) Rydb.).—Racemes of fragrant white flowers, later replaced by dark red or black cherries (*melanocarpa* means "black-fruited"). Common along streams and on hillsides, where it makes masses of red coloring in autumn. The **bird cherry** (*Prunus pennsylvanica* L.), a smaller shrub with a few white flowers in umbel-like corymbs and acid red fruit, is occasionally found on stony hillsides.

PEA FAMILY (LEGUMINOSAE)

This is one of the largest and most distinctive of plant families. It is easily recognized by its *papilionaceous* (butterflylike) flowers and beanlike fruits called legumes. All our plants whose flowers resemble the sweet pea belong to it. The two lower petals of these flowers are grown together and form what is called the *keel.* Leaves of all leguminous plants native in this region are compound. In economic importance this family ranks next to the grass family, for many food materials for both men and cattle are derived from it. It also is a soil enricher because the roots of many of its members harbor nitrogen-fixing bacteria, tiny organisms which are able to take free nitrogen from the air and combine it with other substances, thus making it available for plant food.

Leaves palmately compound.
- Flowers in a close head.
  - Plants native, growing at high altitudes.
    - Flowers 1 to 3---**Dwarf clover** (p. 72).
    - Flowers more than 3.
      - Flowers rose-colored, fragrant, margins of leaves minutely toothed---**Rose clover** (p. 71).
      - Flowers yellowish with purple spot; margins of leaves entire **Alpine clover** (p. 71).
  - Plants introduced, escaped from cultivation.
    - Flowers rose-red---**Red clover** (p. 72).
    - Flowers white or pinkish---**White clover** (p. 72).
- Flowers not in close heads but in spikelike racemes.
  - Flowers one-half inch long or less; pods 1 or 2 seeded; leaflets 3.
    - Flowers white---**White sweet clover** (p. 72).
    - Flowers yellow---**Yellow sweet clover** (p. 72).
  - Flowers larger, conspicuous; pods several seeded.
    - Flowers yellow; leaflets 3---**Golden banner** (p. 72).
    - Flowers blue or whitish; leaflets 5 or more.
      - Flowers definitely blue---**Mountain lupine** (p. 72).
      - Flowers dingy white or pale blue---**Small-flowered lupine** (p. 72).

Leaves pinnately compound
- Pod green-netted veined with spine-tipped margins; plant introduced around ranches---**Sain-foin** (p. 74).
- Pod not as above, plants native.
  - Foliage covered with silky hairs; keel of corolla sharp-pointed.
    - Flowers bright reddish-purple---**Colorado loco** (p. 72).
    - Flowers white, cream-colored or lavender---**Rocky Mountain loco** (p. 72).
  - Foliage not silky; keel of corolla blunt---**Vetch** (p. 73).

Clover (*Trifolium*).—The native clovers are small plants of the alpine and subalpine zones with 3-foliate, compound leaves, and small flowers in heads. **Rose clover** or **Parrys clover** (*Trifolium Parryi* Gray), with very fragrant flowers, grows as a ground cover in open spruce forests and sometimes above timber line. **Alpine clover** (*Tri-*

folium dasyphyllum T. & G.) is very common among the rocks above timber line, where it often forms mats. It is occasionally found in the subalpine zone also. Its leaflets are narrow and sharp-pointed, almost spine-tipped. The flowers are yellowish, each with a purple spot. **Dwarf clover** (*Trifolium nanum* Torr.), a caespitose plant of high mountain summits, with heads containing only 1 to 3 rose-colored flowers, and toothed leaflets, has also been found. **Rydbergs clover** (*Trifolium Rydbergii* Greene) with pale flowers grows under trees and in meadows on the western slope. It may be recognized by the deflexed flowers on the old heads. The common **red clover** (*Trifolium pratense* L.), **white clover** (*Trifolium repens* L.), and the white and yellow **sweet clover** (*Melilotus alba* Desv. and *Melilotus officinalis* (L.) Lam.) have been introduced into this region and are found along roadsides and around buildings.

Golden banner, buffalo pea or **wild yellow pea** (*Thermopsis divaricarpa* A. Nels.).—A very common plant a foot or more high, of open woods, meadows, and hillsides, with erect racemes of bright yellow flowers and 3-foliate leaves. It is a conspicuous feature of the landscape, providing masses of color throughout the foothills and montane zone in June and July.

Mountain lupine (*Lupinus alpestris* A. Nels.).—A plant very similar to the Texas blue-bonnet with racemes of blue flowers and palmately compound leaves of 5 to 9 leaflets is frequent in the upper montane and subalpine zones. It is common along the lower part of the Twin Sisters trail, on edges of lodgepole forest in the Longs Peak region, and elsewhere. The **small-flowered lupine** (*Lupinus parviflorus* Nutt.), a similar plant with long racemes of dingy-white or bluish flowers, is common on fields around Estes Park, and especially around the National Park Administration Building. **Dwarf lupine** (*Lupinus caespitosa* Nutt.)—Stem very short, flowering spike exceeded by the leaves, flowers small, pale blue. Grows around Grand Lake and perhaps elsewhere.

Colorado loco (*Oxytropis bilocularis* A. Nels., also called *Aragallus Lambertii*).—A showy plant 6 to 10 inches high with racemes of bright reddish-purple flowers and silvery-hairy foliage, common on the fields and open hillsides of the montane zone. The leaves are pinnately compound of several narrow leaflets. It begins to bloom about the middle of June and is very conspicuous through July. It blooms again, though not so profusely, starting in late August and lasting until hard freezes set in. It has bloomed around the administration building as late as the middle of November.

Rocky Mountain loco (*Oxytropis saximontana* A. Nels.) (fig. 47).—A plant similar to the last but usually taller, 10 to 18 inches high, with many-flowered racemes of whitish or lavender flowers, each

with a purple spot on the keel. (This plant is also called *Aragallus albiflorus* A. Nels.)

Few-flowered loco (*Oxytropis multiceps* Nutt.), also called *Aragallus multiceps* (Nutt.) Heller), is a rare, dwarf, gray-hairy plant, with 2 or 3 purple flowers in each cluster, sometimes found in the montane zone. The calyx becomes inflated after flowering and wholly incloses the short pod. *Oxytropis sericea* Nutt., and *Oxytropis splendens* Nutt., have also been found in the park.

FIGURE 47.—Rocky mountain loco. Plants 10 to 18 inches high. Flowers white or lavender. Photograph by Joseph Dixon

Vetch or milk vetch.—A large group of plants with several representatives in the park. Many of them are rather similar and difficult to distinguish. They are separated from the loco plants (*Oxytropis*) by the shape of the keel, which in this group is blunt at the end. The leaves are all pinnately compound. **Limber vetch** (*Astragalus flexuosus* Dougl., also called *Homalobus flexuosus* (Dougl.) Rydb.), is a very common plant of the montane fields and hillsides, with spreading stems 6 to 20 inches long, racemes of small pink blossoms, and cylindrical, sometimes curved, pods 1 inch long or less. **Parrys vetch** (*Astragalus Parryi* Gray) is a dwarf, very hairy plant of sandy or rocky soil, appearing early in spring, and it may be recognized by its small mats of pinnately compound gray leaves with oblong or roundish leaflets. In June it bears clusters of white blossoms close to the ground and, later, curved pods. Other species found here are **alpine vetch** (*Astragalus alpinus* (L.) Rydb., also called *Tium alpinum* (L.) Rydb.); **field vetch** (*Astragalus campestris* (Nutt.) Gray, also called *Homalobus decurrens* Rydb.); **sulphur vetch** (*Astragalus sulphurescens* Rydb.); and **racemose vetch** (*Astragalus racemosus* Pursh., also called *Tium racemosum* (Pursh) Rydb.). Another mem-

ber of the legume family which has been introduced into this region and may occasionally be found is **sain-foin** (*Onobrychis sativa* Lam.) with pink blossoms and prickly pods with green veins. **Licorice** (*Glycyrrhiza lepidota* Pursh) occurs at lower altitudes and has been collected once.

GERANIUM FAMILY (GERANIACEAE)

This family has contributed many ornamental plants to cultivation, and is represented in the park by two native species. These plants have flowers with 5 petals, usually veined, 5 pistils united except at their tips, and lobed and toothed leaves.

FIGURE 48.—Wild pink geranium. Pink or purplish, about 1 inch across. Photograph by Joseph Dixon

FIGURE 49.—Wild white geranium; 8 to 15 inches high. Photograph by Joseph Dixon

Wild pink geranium or **Fremont geranium** (*Geranium Fremontii* Torr.) (fig. 48).—A plant of dry fields and open pine forests, often around rocks, with pink or purplish flowers, the petals usually with darker veins.

Wild white geranium or **Richardson geranium** (*Geranium Richardsonii* F. & M.) (fig. 49).—A taller, more slender plant with white flowers found frequently in meadows and aspen groves and on other moist ground.

FLAX FAMILY (LINACEAE)

A family of great economic importance in the textile and paint industries. The flowers are regular and symmetrical with 5 parts in each cycle.

Blue flax (*Linum Lewisii* Pursh) (fig. 50).—A plant with delicate sky-blue flowers about an inch across, borne on the ends of slender stems; common in fields and on hillsides of the montane zone. This plant was named in honor of Capt. Meriwether Lewis, of the Lewis and Clark Expedition. (It is also called *L. perenne*.)

POLYGALA FAMILY (POLYGALACEAE)

This family is characterized by "seemingly papilionaceous" flowers and stamens which are grown together and are also grown to the petals.

White milkwort (*Polygala alba* Nutt.), an introduced plant, is our only representative of this family. Sometimes found along roadsides; spike of small irregular white flowers.

FIGURE 50.—Blue flax. Light blue, about 1 inch across; stems 1 to 2 feet high. Photograph by Joseph Dixon

SPURGE FAMILY (EUPHORBIACEAE)

A family of rather curious plants including several showy ornamental species such as the poinsettia, and some species of *Euphorbia*, in which the very small and inconspicuous flowers are surrounded by brightly colored bracts. Most of these plants have a thick milky juice.

Spurge (*Euphorbia robusta* (Engelm.) Small).—A much-branched plant having several stout stems, 1 foot or less in height from a strong root, with milky juice and inconspicuous flowers. It is frequently found on rocky sunny slopes and fields of the montane zone. The leaves, which early wither and dry up, are alternate and oblong, but there are numerous opposite, sessile, heart-shaped, or rhomboid bracts. The much reduced flowers are surrounded by an involucre of green bracts, each involucre containing 4 crescent-shaped glands.

WATER STARWORT FAMILY (CALLITRICHACEAE)

A family of small aquatic plants with opposite, entire leaves and monoecius flowers reduced to one pistil or one stamen sometimes accompanied by two bracts. Only one species has been collected in the park. **Water starwort** (*Callitriche palustris* L.) is frequently seen

growing in shallow ponds or in mud in marshy places. When growing in water it develops two kinds of leaves, broad floating ones and very narrow submersed ones. The little round or obcordate pods are found in the leaf axils.

SUMAC FAMILY (ANACARDIACEAE)

A family of shrubs mostly confined to lower altitudes. The **three-leaved sumac** or **squaw bush** (*Rhus trilobata* Nutt., also called *R. aromatica trilobata*), with shiny compound leaves of 3 crenately lobed leaflets, and a very distinctive odor, is occasionally found at the eastern edge of the park, below 8,000 feet. This plant also grows in California, where the long slender shoots are much used by Indian women in their basket making. They use the sticky red berries that occur in small clusters and have an acid flavor in making a drink similar to lemonade. This plant is not at all poisonous, but its relative, the **western poison ivy** (*Rhus Rydbergia* Small), sometimes called *R. Toxicodendron*, with leaves of 3 entire leaflets, each 1 to 4 inches long, occurs very rarely on shady moist slopes in the montane zone and more abundantly at lower altitudes.

MAPLE FAMILY (ACERACEAE)

A family of beautiful and valuable trees with lobed and toothed (or rarely compound leaves) and sugary sap. The only representative in the park is the **mountain maple** (*Acer glabrum* Torr.), a several-stemmed shrub, sometimes of large size, usually found growing in rocks in the montane and lower subalpine zones, with gray bark and typical maple leaves. It turns a pale yellow in autumn.

STAFF TREE FAMILY (CELASTRACEAE)

A family of shrubs of which the bittersweet is the best known representative. The only species found in the park is **mountain lover** (*Pachystima myrsinites* Raf.), a small evergreen shrub with opposite, slightly toothed leaves. It grows abundantly in forests of the montane zone on the western slope and possibly may be found in Wild Basin.

BUCKTHORN FAMILY (RHAMNACEAE)

A family of shrubs or trees most of which are thorny. The small flowers are in clusters and each petal has a narrow claw.

Mountain balm (*Ceanothus velutinus* Dougl.).—A low spreading shrub without thorns, with roundish or shiny (as if varnished) oval leaves and feathery panicles of small white flowers. This bush often makes large patches a foot or two high in open woods of the upper montane zone. It blooms in spring or in early summer, and frequently a second time in late summer.

Fendlers buckthorn (*Ceanothus Fendleri* Gray).—A dwarf spiny shrub with entire leaves, silky beneath, and simple terminal racemes of small white flowers; found in the vicinity of Beaver Point and probably elsewhere at lowest altitudes. It usually winter-kills nearly to the ground and so always looks untidy because of the dead branches.

MALLOW FAMILY (MALVACEAE)

Most members of this family are herbs and have gummy juice. The marshmallow of the candy makers was originally the juice of one species of mallow. The stamens are united into a column around the pistil.

Modest mallow (*Sidalcea candida* Gray).—A plant bearing a spike of white thin-petaled flowers, and deeply lobed stem leaves is occasionally found in moist shady places and along streams.

Wild hollyhock (*Sidalcea neo-mexicana* Gray).—A plant with slender racemes of rose-purple flowers resembling miniature hollyhocks. The basal leaves are roundish with rounded lobes and teeth. This grows on the western slope at lowest altitudes in the park.

ST. JOHNS-WORT FAMILY (HYPERICACEAE)

A family of herbs (in this region) with opposite leaves, the leaves and petals with dark or translucent dots. **Western St. Johns-wort** (*Hypericum formosum* H. B. K., also called *H. Scouleri* Hook). A smooth plant which is found in wet meadows of the montane zone, readily recognized by holding the leaves to the light so that the translucent dots appear. The yellow petals show small black dots.

VIOLET FAMILY (VIOLACEAE)

A family of small herbs, mostly with irregular flowers, which are easily recognized because of general familiarity with garden violets.

Subalpine blue violet (*Viola bellidifolia* Greene).—Very common on moist ground of the subalpine zone, where it blooms in July with light blue flowers. This is a leafy-stemmed violet, but the stems are often very short. Another blue violet is *Viola adunca* Smith, growing in moist shady situations of the montane zone, especially under aspens.

Alpine yellow violet (*Viola biflora* L.).—A slender, usually very small, violet found in sheltered nooks among rocks of the alpine zone, where it blooms in June and July. The stems usually have about two leaves and 1 or 2 flowers. One of its most frequent companions is the alpine sorrel (*Oxyria digyna*).

Sweet white violet (*Viola pallens* (Banks) Brainerd).—The common white violet of the montane zone with heart-shaped obtuse, or

sometimes acute, leaves, and creeping stems or stolons. (This has been erroneously called *Viola blanda*.) *Viola renifolia* Gray, with kidney-shaped leaves, otherwise very similar to the above except that it has no stolons, grows in dense woods, while *Viola pallens* grows along stream banks or in boggy ground. Both bloom in June and early July.

Canada violet (*Viola rugulosa* Greene) (fig. 51).—A plant with leafy stems 8 to 15 inches long and heart-shaped leaves with long acuminate tips is abundant in rich moist soil of the upper montane and subalpine zones. It spreads by underground stolons. The flowers are white with dark veinings or tinged pinkish or lavender. This is closely related to the eastern *V. canadensis* L.

FIGURE 51.—Canada violet. White or lavender; plant about 6 inches high. Photograph by Joseph Dixon

Meadow violet (*Viola nephrophylla* Greene).—A stemless violet with thickish leaves often reddish underneath, and light purple, or rarely white, blossoms. The leaves are all basal and the petals broad and blunt. Grows in wet meadows of the montane zone, blooming in June.

Nuttall yellow violet (*Viola Nuttallii* Pursh).—A yellow violet with elongated leaves and short stems, common on open slopes in the foothills, has been reported for the park, and should be looked for in spring along its eastern edge.

LOASA FAMILY (LOASACEAE)

The plants of this family are covered with rough hairs. They like to grow along roadsides and on disturbed soil. The flowers have many stamens and 5 or 10 petals.

Many-flowered evening star (*Mentzelia multiflora* (Nutt.) Gray) (fig. 52).—A plant with showy yellow flowers opening in late afternoon and shiny, white stems is very common along our roadsides. The seed pod is cylindrical, an inch or more in length, crowned with the 5 narrow calyx divisions. **White evening star** (*Mentzelia nuda* (Pursh) T. & G.) and **showy evening star** (*Mentzelia speciosa* Osterh.) have both been collected in this region. (These plants have been called by the following generic names by different botanists: *Hesperaster*, *Touterea*, *Bartonia*, and *Nuttallia*.)

CACTUS FAMILY (CACTACEAE)

A family easily recognized by its thickened fleshy stems, covered with tufts of spines. The flowers have many petals and are usually very showy. These plants are well adapted to life in arid regions, where most of them grow. They are very abundant in the Southwest.

FIGURE 52.—Many-flowered evening star. Yellow, 1 to 2 inches across. Photograph by Kenneth Hartley

Pincushion or **ball cactus** (*Mamillaria vivipara* Nutt.).—The most common cactus in this region most aptly described by the name "pincushion." It is globular in shape, somewhat depressed, and covered with stout, radiating spines. In May and early June it is crowned with brilliant rose-colored flowers. It is frequently found on dry open slopes below 9,000 feet. (Also called *Coryphantha vivipara* (Nutt.) Britton and Rose.)

Prickly pear (*Opuntia polyacantha* Haw.) (fig. 53).—Occasionally found in dry, sunny situations at lowest altitudes in the park, and more abundant lower. The joints of the stem are flattened. The satiny-petaled flowers which appear in June are pale yellow and often 2 or 3 inches broad.

FIGURE 53.—Prickly pear. Light yellow, 2 to 3 inches across. Photograph by Kenneth Hartley

OLEASTER FAMILY (ELAEAGNACEAE)

A family of shrubs characterized by berrylike fruits and entire leaves covered, especially on the under side, with scales or starlike hairs. **Buffalo berry** (*Sherpherdia canadensis* (L.) Nutt.) is the only representative native to the park. It is a low shrub occasionally found on moist, shaded slopes of the montane zone. The

dark green leaves are silvery-scurfy underneath and the twigs and buds are covered with rust-colored scales. The plant is conspicuous in winter and early spring by the clusters of little, round, rusty flower buds. The pale-yellow flowers open before the leaves appear and are followed in late summer by orange or red berries.

EVENING PRIMROSE FAMILY (ONAGRACEAE)

A large family of plants characterized by having 4 petals and an inferior seed pod; that is, the seed pod is placed below the other flower parts instead of being surrounded by them. This should not be confused with the true primrose family (p. 88), which is distinctly different in all respects.

A. Seeds tipped with a bunch of white hairs.
  B. Flowers bright purple or magenta, 1 to 2 inches across.
    a. Inflorescence a spikelike raceme; plant very common along roads and burned-over regions---------- **Fireweed** (p. 80).
    aa. Inflorescence axillary; plant rare--- **Broadleaved fireweed** (p. 81).
  BB. Flowers white, pink or bluish, small; plants growing on wet ground **Willow herb** (p. 81).
AA. Seeds without a bunch of white hairs.
  B. Flowers tiny, white fading reddish---------- **Babysbreath** (p. 81).
  BB. Flowers usually 1 inch broad or more.
    a. Flowers yellow when fresh, opening in the evening---------- **Yellow evening primrose** (p. 82).
    aa. Flowers white when fresh, turning pink with age.
      b. Flowers 2 inches across or more, fragrant; plant stemless **Stemless primrose** (p. 82).
      bb. Flowers less than 2 inches across, opening in the morning; plant branched.
        c. Leaves finely pinnately dissected---------- **Common morning primrose** (p. 82).
        cc. Leaves not dissected; stem white and shining-------- **Nuttall morning primrose** (p. 82)

Fireweed (*Epilobium angustifolium* (L.), also called *Chamaenerion. angustifolium* (L.) Scop.) (fig. 54).—One of our conspicuous and most interesting plants throughout its long blooming season from early July into September. The brilliant purplish-red or magenta-colored flowers borne in long graceful spikes are 4-petaled and grow on the tip of the long seed pod. From this characteristic the genus takes its name *Epilobium*, which comes from the Greek words meaning "upon the pod." The leaves of the more common form are narrow and pointed, giving the plant its specific name, *angustifolium*, narrow-leaved.

It may be seen anywhere along roadsides, along streams, in meadows, and in aspen groves; but it is most striking and abundant on the burned-over lands, where it is one of the first of the plant pioneers

to invade those desolate regions. From that habit it receives its common name of "fireweed." During the summer the burned hillsides around Bear Lake, on Twin Sisters Mountain, and along the Lawn Lake trail, as well as many other localities, are brilliant with the blooms of this plant. In the fall its reddening leaves often add a distinct color note to the scenery. As the pods open, the numerous seeds, each on its tuft of white silky hairs, are carried far and wide by the wind.

Broadleaved fireweed (*Epilobium latifolium* L.).—Has been found along streams on the western slope. This plant is not as tall as the first one, and has fewer but larger and more brilliant flowers and broader leaves. It is a widely distributed species of northern and mountainous regions, known from Greenland, Alaska, and the Himalayas, as well as from all the high ranges of North America. (It is also called *Chamaenerion latifolium* (L.) Sweet.)

FIGURE 54.—Fireweed. Bright reddish purple; plant 2 to 4 feet high. Photograph by M. F. Boos

The **willow herbs** are mostly slender, inconspicuous plants found growing around springs and in moist places. The group as a whole is easily recognized because of the tiny (one-third inch across) 4-petaled flowers of blue, pink, or white, placed just as those of the fireweed are, on the tip of the long slender pod. But even the experts have trouble distinguishing the species. The leaves are entire or slightly denticulate, the lower usually opposite, the upper ones sometimes alternate. When ripe the 4-sided seed pods split open at the top, the sides curling backward, revealing rows of tiny seeds, each with a tuft (*coma*) of white hairs at the tip. The plant owes its common name, "willow herb," to the appearance of these tufted seeds. Hybrids are frequent in this group, so that accurate determination is difficult. The following species have been identified in the park:

Epilobium adenocaulon Haussk., *E. anagallidifolium* Lam., *E. brevistylum* Barbey, *E. lactiflorum* Haussk., *E. Drummondii* Haussk., *E. paniculatum* Nutt.

Babysbreath.—A much-branched plant with narrow leaves, tiny white flowers which turn to red as they wither, and slightly curved, knobby pods; found around buildings and on open fields. Our two species are *Gayophytum ramosissimum* T. & G. and *Gayophytum Nuttallii* T. & G.

Evening primrose (*Oenothera* including *Onagra Anogra* and *Pachylophus*).—A group of plants with showy yellow or white flowers, opening either in morning or evening, lasting only a few hours, and turning pink or reddish in age.

Yellow evening primrose (*Oenothera strigosa* (Rydb.).—A coarse, unattractive plant with rather delicate, pale-yellow flowers opening in late afternoon. It grows along roadsides, around buildings, and on old plowed fields. It has also been called *O. muricata* L. and *O. biennis*).

Stemless primrose or **fragrant morning primrose** (*Oenothera caespitosa* Nutt.) (fig. 55).—Occasionally found on sunny, rocky slopes of the montane zone and lower. This plant grows in tufts among the rocks

FIGURE 55.—Stemless primrose. Flowers white, 2 to 3 inches broad. Photograph by Joseph Dixon

and bears large white flowers, 2 to 3 inches across, that turn pink with age. The flower has a very long, slender calyx-tube at the lower end of which will be found the tapering, ridged pod directly on the crown of the plant.

Common morning primrose (*Oenothera coronopifolia* T. & G.).—A low plant with pinnately cut leaves, somewhat fernlike in appearance, and white flowers 1 inch or less across. It grows along roadsides and on disturbed ground, blooming in June and July.

Nuttalls morning primrose (*Oenothera Nuttallii* Sweet).—Flowers similar to the last, but the plant is a foot or more high with shining white stems, undivided leaves, and larger flowers. It grows along roadsides about Estes Park.

WATER MILFOIL FAMILY (HALORAGIDACEAE)

Water plants with inconspicuous flowers and narrow, usually whorled, leaves, found growing in ponds or on marshy ground. **Mares tail** or **bottle brush** (*Hippuris vulgaris* L.) and **water milfoil** (*Myriophyllum spicatum* L.), both occur in the park.

GINSENG FAMILY (ARALIACEAE)

This is represented in our region by only one species, the **wild sarsaparilla** (*Aralia nudicaulis* L.), found in moist woods of the montane zone. The underground stem sends up one or more long petioled compound leaves and one peduncle bearing 2 to 7 umbels of small flowers. Each division of the leaf has, normally, five leaflets.

PARSNIP FAMILY (UMBELLIFERAE)

This family is easily recognized but to distinguish the different individual species is a difficult matter. Some of them, the more common and conspicuous, can be learned quite easily. The family is characterized, as its Latin name implies, by having the flowers in umbels which are usually compound. It also has hollow stems and the leaves are mostly compound, or at least very much divided. Flowers are usually white or yellow. Economically, it is an important family, for many of our vegetables and spices, such as celery, parsley, carrot, parsnip, dill, and caraway, belong to it.

Cow parsnip or **Hercules parsnip** (*Heracleum lanatum* Michx.) (fig. 56).—A stout plant 3 to 6 feet high with thick stem, large compound leaves with 3 broad, lobed leaflets, and enormous umbels, 8 inches or more across, of small white flowers. It is commonly seen along stream banks in the montane and subalpine zones. Its name, *Heracleum*, refers to Hercules because of the great size of the plant.

Mountain parsley (*Harbouria trachypleura* (Gray) C. & R.).—A plant with umbels of small yellow flowers and leaves several times ternately compound with linear segments. It is very abundant on fields and open slopes, beginning to bloom when barely out of the ground in May and continuing through June when it becomes 8 to 12 inches high.

Alpine parsley (*Oreoxis alpina* (Gray) C. & R., also called *Cymopterus alpinus*).—A dwarf, caespitose plant with yellow flowers, pinnate leaves with narrow segments and very short stem; found among rocks of the alpine zone.

Angelica (*Angelica ampla* A. Nels.).—A stout plant of stream banks with white flowers in large umbels, often growing with the cow parsnip and distinguished from it by having the compound

leaves 3-branched and then twice pinnate with ovate or obovate, finely toothed leaflets. **Grays angelica** (*Angelica Grayi* C. & R.), a stout plant 6 inches to 2 feet high, similar to the last but growing in the subalpine and alpine zones; stems very thick and petioles much enlarged and sheathing the stems. It is frequent among rocks at very high altitudes and in thickets at about 10,000 feet.

FIGURE 56.—Cow parsnip. White clusters, 6 to 12 inches across; plant 3 to 6 feet high. Photograph by Joseph Dixon

Other species in this family which are found in the park are: **Lovage** (*Ligusticum simulans* C. & R.), **hemlock parsley** (*Coniose-linum scopulorum* (Gray) C. & R.), **sweet cicely** (*Washingtonia obtusa* C. & R.), **wild yellow parsley** (*Pseudocymopterus montanus* (Gray) C. & R., and *Pseudocymopterus sylvaticus* A. Nels.), **sanicle** or **snake-root** (*Sanicula marylandica* L.), and *Oxypolis Fendleri* (Gray) Heller.

DOGWOOD FAMILY (CORNACEAE)

A family mostly made up of shrubs, some with very beautiful blooms. Flowers small, in clusters or heads, surrounded by petal-like bracts; leaves opposite. Our only representative is the **western red-stemmed dogwood** (*Cornus instoloneus* A. Nels.), a shrub with dark-red bark occasionally found in the park in moist thickets and along streams, but much more abundant along streams at lower altitudes. It is closely related to the red osier dogwood of the East.

HEATH FAMILY (ERICACEAE)

A very large family to which many beautiful ornamental shrubs belong. The corolla is united, or in subfamily, *Pyrolaceae*, of separate petals; the stamens are of the same number or twice as many as the corolla lobes and inserted on the receptacle with the other flower parts, not on the corolla; the leaves are often evergreen, and usually rather thick, never lobed or dissected. The following subfamilies are represented in our range:

FIGURE 57.—Star-flowered pyrola. White and fragrant; 2 to 4 inches high. Photograph by Kenneth Hartley

1. SUBFAMILY *Pyrolaceae*.

A group of small herbs with tough, shiny, evergreen leaves, and white or pink flowers with 5 thick petals, 10 stamens, and 1 conspicuous pistil. They are confined to moist coniferous forests and shady bogs. These species are found which may be distinguished by the following key: **Star-flowered** or **one-flowered pyrola** (*Moneses uniflora* (L.) Gray) (fig. 57), **pipsissewa** or **princes pine** (*Chimaphila umbellata* Nutt.) (fig. 58), **bog pyrola** (*Pyrola asarifolia* Michx., also called *P. uliginosa* Torr.) (fig. 59), **one-sided pyrola** (*Pyrola secunda* L., also called *Rameschia secunda* (L.) Garche.), **green-flowered pyrola** (*Pyrola chlorantha* Sw.), and **least pyrola** (*Pyrola minor* L., also called *Erxlebenia minor* (L.) Rydb.). The pyrolas are often called by the common name of "wintergreen," but they should not be confused with the aromatic wintergreen of the genus *Gaultheria*.

A. Flower solitary ..... Star-flowered wintergreen.
AA. Flowers several.
B. Flowers in an umbel ..... Pipsissewa or princes pine.
BB. Flowers in a simple raceme.
a. Flowers pink ..... Bog wintergreen.
aa. Flowers white or greenish.
b. Racemes one-sided ..... One-sided wintergreen.
bb. Raceme not one-sided.
c. Style long and declined .. Green-flowered wintergreen.
cc. Style short, stigma 5-rayed ..... Least wintergreen.

FIGURE 58.—Pipsissewa. Pink or rose colored; 6 to 8 inches high. Photograph by Kenneth Hartley

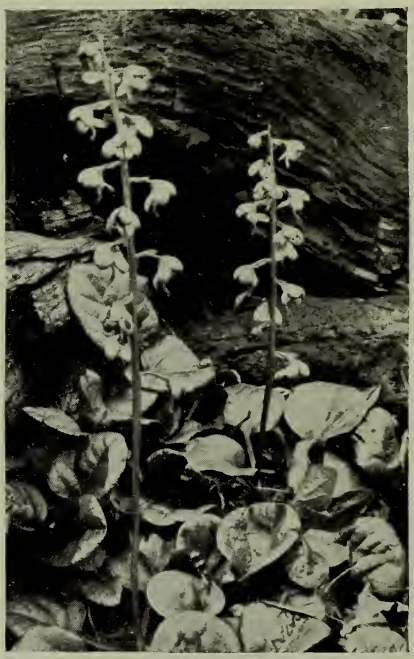


FIGURE 59.—Bog pyrola. Pink, 6 to 12 inches high. Photograph by Kenneth Hartley

2. SUBFAMILY *Ericineae.*

Petals united into an urn-shaped or cup-shaped corolla, stems woody (in *Gaultheria* very slender and creeping); leaves evergreen.

Kinnikinnic or bearberry (*Arctostaphylos uva ursi* (L.) Spreng.) (fig. 60).—A charming little evergreen prostrate shrub. It rarely grows more than 6 inches high but spreads out in a green carpet of glossy leaves. The shreddy, reddish bark of its trailing stems, as well as its dainty flowers and berries, suggest its relationship to the manzanita of the Pacific coast, which belongs to the same genus. In May and June kinnikinnic is covered with waxy, pinkish bells, followed by shiny green berries, which turn scarlet in autumn. These are much relished by the small animals and are called "chipmunks

apples" by the children. This plant is one of nature's pioneers, ever advancing on the frontier of poor and rocky ground (Plate VI, b), or following the devastating forest fires.

FIGURE 60.—Kinnikinnic. Flowers white or pink, berries red, stems trailing. Photograph by Kenneth Hartley

Aromatic wintergreen (*Gaultheria humifusa* (Graham) Rydb.).—A creeping evergreen plant growing pressed close to the ground, often in moss, and very inconspicuous except when dotted with its scarlet berries, which have a pleasant flavor. It is found in damp places in the subalpine zone.

Dwarf laurel or **bog laurel** (*Kalmia polifolia* Wang., also called *K. microphylla* (Hook.) Heller) (fig. 61).—This little shrub is one of the loveliest plants of the sub-alpine zone, where it grows only a few inches high, but blooms profusely in July with clusters of rose-purple flowers similar in shape to those of the mountain laurel of the East. The margins of the opposite leaves are in-rolled. It is found along streams, often growing in moss, and around lake shores.

FIGURE 61.—Dwarf laurel. Rose-purple; plant 2 to 6 inches high. Photograph by Kenneth Hartley

3. SUBFAMILY *Monotropaceae*

A group of degenerate saprophytic plants without green coloring. **Pinedrops** (*Pterospora andromedea* Nutt.) (fig. 62).—A tall plant with brown, hairy stem, no leaves, and roundish blossoms hanging like bells is sometimes found in the coniferous forests.

HUCKLEBERRY FAMILY (VACCINIACEAE)

A family of shrubs with blossoms similar in appearance to the last family, represented in the park by three species, abundant on the burned-over region of the subalpine zone.

FIGURE 62.—Pinedrops. Whole plant brownish; 1 to 3 feet high. Photograph by Kenneth Hartley

Black bilberry (*Vaccinium oreophilum* Rydb.).—A small shrub with ovate leaves, brownish stems, usually less than a foot high, and large, sweet, blue-black berries is the most common. **Red bilberry** (*Vaccinium scoparium* Leiberg.), with green, angled stems, smaller leaves, and small red berries is found with it. **Dwarf bilberry**

FIGURE 63.—Fairy primrose. Rose with yellow eye; plants 2 to 4 inches high. Photograph by Kenneth Hartley

(*Vaccinium caespitosum* Michx.) may be distinguished from the above by its round, rather than angled branches and its more spreading habit. The berries are blue. It is found on the western slope.

PRIMROSE FAMILY (PRIMULACEAE)

Plants having simple (undivided) leaves and united, 5-lobed, regular corollas. The fruit is a capsule and the seeds are attached to a central placenta.

A. Flower solitary, rose-colored; plant usually only 2 or 3 inches high; alpine zone---------- **Fairy primrose** (p. 89).
AA. Flowers several in umbels or clusters.
B. Flowers in terminal umbels.
a. Umbel compound, made up of small umbels.
b. Plant common on montane fields, inconspicuous---------- **Mountain androsace** (p. 90).
bb. Plant of alpine fields with numerous starlike, white flowers **Alpine androsace** (p. 90).
aa. Umbel not compound.
b. Flowers white with yellow eye, fading pink, fragrant; small alpine plant---------- **Rock jasmine** (p. 90).
bb. Flowers pink or rose-purple.
c. Petals bent backwards; plant of montane meadows and stream sides---------- **Shooting star** (p. 90).
cc. Petals spreading; very conspicuous plant of subalpine and alpine stream sides and wet ground---------- **Parry primrose** (p. 89).
BB. Flowers in axillary clusters, yellow---------- **Tufted loosestrife** (p. 90).

Fairy primrose (*Primula angustifolia* Torr.) (fig. 63).—An alpine plant only 2 or 3 inches high with bright rose-purple flowers, only one on each stem but the stems sometimes clustered. It blooms in July.

Parry primrose (*Primula Parryi* Gray) (fig. 64).—One of the most striking plants of the subalpine and lower alpine regions, growing nearly a foot tall and bearing dense clusters of brilliant rose-purple flowers. The thick, smooth, light-green leaves are spatulate oblong or oblanceolate, and all grow in a rosette at the base of the stem. These plants love water and are usually found along the edge of

FIGURE 64.—Parry primrose. Rose purple; 6 to 12 inches high. Photograph by Kenneth Hartley

the alpine streams or on wet banks from which the snow has recently melted. They bloom in July and August. The odor of the flowers is heavily sweet at first but soon becomes rank.

Alpine androsace (*Androsace septentrionalis subumbellata* (A. Nels.) Small).—A small alpine plant with flower stems about 2 inches long from rosettes of basal leaves; inflorescence a compact and compound umbel with numerous tiny starlike, white blossoms. It is frequently seen among rocks near Fall River Pass, along the summit of Trail Ridge, and on the high peaks. **Mountain androsace** (*Androsace diffusa* Small) is abundant on montane fields and hillsides but is inconspicuous. The rays of the umbel are longer than the peduncles and the petals are shorter than the calyx lobes.

FIGURE 65.—Rock jasmine. White or cream colored; one-half to 2 inches high. Photograph by Kenneth Hartley

Rock jasmine (*Drosace chamaejasme* (Willd.) A. Nels.) (fig. 65).—A diminutive, caespitose plant with rosettes of small hairy leaves from each of which a stem about an inch long is sent up. This bears a headlike umbel of fragrant white or cream-colored flowers. The eye of each flower is at first yellow but turns pink with age. This plant is abundant on rocky alpine slopes, blooming in July and sometimes later.

Shooting star (*Dodecatheon pauciflorum* (Durand) Greene) (fig. 66).—This plant is easily recognized by the shape of its flower; the dark-colored, pointed anthers form the apex, and the turned-back corolla lobes give the effect of the "shooting star." It is most abundant in wet meadows of the montane zone, but has also been seen growing in rock crevices above Chasm Falls, where it was constantly wet with the spray from the falls.

Tufted loosestrife (*Naumbergia thrysiflora* (L.) Duby).—A marsh plant with opposite leaves and short, headlike spikes of yellowish, purple-dotted flowers, growing from the axils of the middle pairs of leaves. The lower leaves are reduced to scales, the stem not branched. It grows in meadows around Estes Park and is widely distributed across our continent and in Europe and Asia

GENTIAN FAMILY (GENTIANACEAE)

All the members of this family have smooth and opposite or whorled leaves. The corolla lobes in our members are 4 or 5, the stamens inserted on the corolla tube. Many of them close the flower except in bright sunshine. These plants bloom mostly in late summer.

A. Corolla saucer-shaped, 4 or 5 lobed.
  B. Plant 2 to 4 feet high, stout, light green----**Monument plant** (p. 91).
  BB. Plant 18 inches tall or less, slender.
    a. Flowers white----**Marsh felwort** (p. 92).
    aa. Flowers dark blue, sometimes purplish----**Star gentian** (p. 92).
AA. Corolla tubular or funnel-form, its lobes closed or spreading.
  B. Flowers bright blue.
    a. Plants very small, usually less than 4 inches high; alpine zone **Moss gentian** (p. 92).
    aa. Plants taller, usually 6 inches tall or more.
      b. Corolla 4-lobed, more or less fringed.
        c. Flower fragrant; plant perennial---- **Fragrant gentian** (p. 92).
        cc. Flower not fragrant; plant annual---- **Rocky Mountain fringed gentian** (p. 92).
      bb. Corolla usually 5-lobed, never fringed.
        c. Plants tufted, low and spreading, growing on open, dry fields; flowers usually closed---- **Bigelow gentian** (p. 93).
        cc. Plants taller and erect, usually growing in moist meadows----**Blue marsh gentian** (p. 93).
  BB. Flowers never bright blue, either pale blue, rose-tinged, whitish, or greenish.
    a. Flowers several, white or greenish with dark markings; alpine zone----**Arctic gentian** (p. 93).
    aa. Flowers not as above; usually with a fringed crown in corolla throat.
      b. Flowers solitary.
        c. Flower pale blue or whitish, borne on a slender terminal peduncle; small alpine plant, rare---- **One-flowered gentian** (p. 94).
        cc. Flower lavender or rose-tinged---- **Dwarf rose gentian** (p. 94).
      bb. Flowers several to many.
        c. Flowers lavender or rose-tinged; plant slender---- **Rose gentian** (p. 94).
        cc. Flowers dingy-white or bluish, very numerous in a dense, thick, spikelike inflorescence---- **Marsh gentian** (p. 94).

Monument plant or **green gentian** (*Frasera speciosa* Griseb.) (fig. 67).—A tall stout plant found on open slopes at all altitudes in the park. The leafy stem is 1 to 4 feet high, the upper part of it densely flowered with saucer-shaped flowers. The 4-lobed corolla is greenish with dark spots and bears some fringed appendages.

Marsh felwort (*Pleurogyne fontana* A. Nels.).—A slender, rather rare plant of marshy ground with white, saucer-shaped, 5-lobed corolla, each lobe with 2 scales at base. It is also called *P. rotata.*

Star gentian (*Swertia palustris* A. Nels.).—Slender plants of subalpine and alpine marshes with dark bluish or purplish flowers. Corolla saucer-shaped, either 4 or 5 lobed.

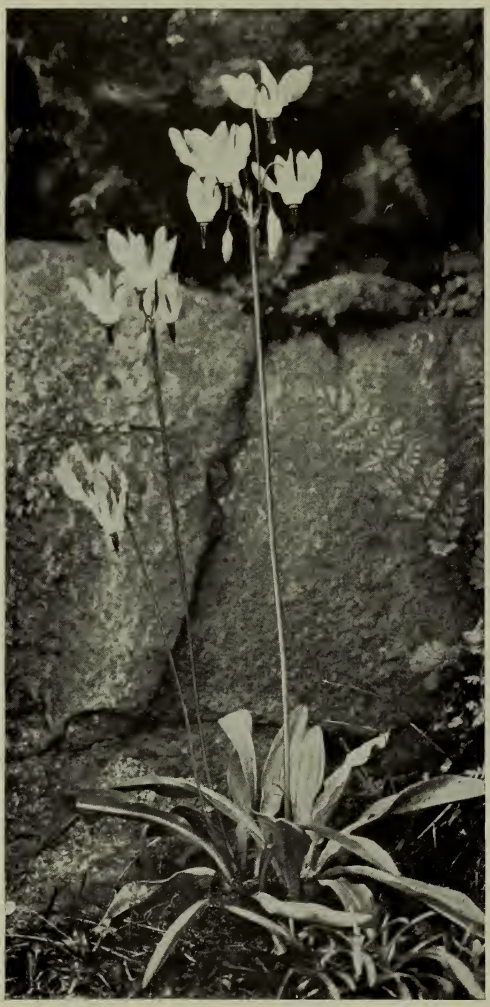


FIGURE 66.—Shooting star. Rose pink; 6 to 10 inches high. Photograph by Kenneth Hartley

Moss gentian (*Chondrophylla americana* (Engelm.) A. Nels., also called *Gentiana prostrata*).—A diminutive plant of the alpine grassland, also found in moss. Its stem is from 1 to a few inches long, very slender, bearing pairs of tiny, white-margined leaves and a tiny, deep blue, 4 or 5 lobed flower which closes immediately on being picked or even touched. *Chondrophylla Fremontii* (Torr.) A. Nels.) has been seen near Longs Peak.

Fragrant gentian or **perennial fringed gentian** (*Gentiana barbellata* Engelm.).—A rare plant with brilliant blue, 4-lobed corolla and exquisite fragrance, found in damp woods and sometimes above timber line. The corolla lobes are slightly fringed.

Rocky Mountain fringed gentian (*Gentiana elegans* A. Nels.) (fig. 68).—A plant from a few inches to a foot or more in height, usually with a few erect branches, bearing exquisitely brilliant deep-blue flowers; the 4 corolla lobes are fringed on their margins. These plants are found in sunny places on wet ground of the subalpine zone. It is related to the eastern fringed gentian, *G. serrata.* A dwarf, 1-flowered form of this plant called *G. elegans unicaulis* A. Nels. is found at higher altitudes.

Bigelow gentian or **closed field gentian** (*Gentiana Bigelovii* Gray).—A tufted plant with clusters of nearly closed blue flowers is found on fields of the montane zone, blooming in August.

Blue marsh gentian (*Gentiana affinis* Griseb.).—A plant with erect stem usually about a foot high, ovate or oblong leaves in pairs, and clusters of several or many deep blue, funnel-shaped flowers. Found on wet ground in the montane zone.

FIGURE 67.—Monument plant. Greenish; plant 1 to 3 feet high. Photograph by Joseph Dixon

FIGURE 68.—Rocky Mountain fringed gentian. Bright blue; flower 1½ to 2½ inches long. Photograph by Paul F. Shope

Parry gentian (*Gentiana Parryi* Engelm.) (fig. 69).—Similar to the last but usually larger; flowers 1 to 5, bright, deep blue when open, blackish when closed. Found in meadows, and in a reduced form on stony slopes in the subalpine and alpine zones. If the sun disappears under a cloud, these flowers immediately close up tightly.

Arctic gentian (*Gentiana Romanzovii* Ledeb., also called *G. frigida* and *Dasystephana Romanzovii* (Ledeb.) Rydb.) (fig. 70).—The clusters of greenish white flowers spotted or streaked with dark

purple identify this plant, which is abundant at and above timber line, blooming in August and September.

One-flowered gentian (*Gentiana monantha* A. Nels., also called *G. tenella* and *Amarella monantha* (A. Nels.) Rydb.).—A tiny, rare plant with white or pale bluish 4-lobed flowers borne on the end of a comparatively long, slender peduncle rising from a short leafy stem.

Amarella or **Rose gentian** (*Gentiana plebeja* Cham., also called *G. amarella* and *Amarella plebeja* (Cham.), Greene).—A plant with small, rose-lilac or lavender, 4 or 5 pointed flowers, each with a little crown of fringe around the throat. This is a common plant in moist and often shady situations throughout the park. **Dwarf rose gentian**

FIGURE 69.—Parry gentian. Bright blue; plant 6 to 15 inches high. Photograph by Kenneth Hartley

FIGURE 70.—Arctic gentian. Greenish or white with dark streaks; flowers 1 to 2 inches long. Photograph by Kenneth Hartley

(*Gentiana plebeja Holmii* Wettst.) is a reduced alpine form with one or only a few flowers.

Marsh gentian (*Gentiana strictiflora* (Rydb.) A. Nels., also called *G. Amarella stricta* and *Amarella strictiflora* (Rydb.) Greene).—Stem with many erect branches, the plant densely flowered with white or blue-tinged flowers; corolla lobes usually 4, sometimes 5. Leaves and stem pale green. This is abundant in marshes of the montane zone

BUCKBEAN FAMILY (MENYANTHACEAE)

Represented in the park by the **buckbean** or **marsh trefoil** (*Menyanthes trifoliata* L.), a plant of cold lakes and bogs, circumpolar in distribution. It is found in some of the subalpine lakes and may

be recognized by the cloverlike leaf of three oval leaflets. Its bloom is a headlike spike of small white or pinkish flowers.

DOGBANE FAMILY (APOCYNACEAE)

Dogbane or **Indian hemp** (*Apocynum androsaemifolium* L.).—The only member found in the park. It is a branching plant 6 inches to a foot high, in our region, with ovate or oblong leaves, dark green and shiny above but pale beneath, and clusters of small pink flowers. The margins of the corolla lobes turn back. The stem is usually light brown or straw-colored, sometimes reddish. This plant is found in sunny, often rocky, locations of the montane zone. It is conspicuous in autumn because of its yellow coloration.

PHLOX FAMILY (POLEMONIACEAE)

A large family, well represented in our region. It is characterized by its regular 5-merous flowers; that is, calyx, corolla lobes and stamens, 5 each. The stamens are attached to the corolla tube. The corolla varies from funnel-form to rotate (wheel-shaped), or salver-form (as in the phlox where there is a long, slender tube abruptly spreading at its apex into broad flat lobes). Stigmas 3 and pod 3-celled.

Flowers scarlet or pink, long exserted from the calyx ..... **Skyrocket** (p. 95).
Flowers blue, white, or pale yellow.
  Corolla with narrow cylindrical tube and spreading lobes.
    Plants of alpine zone, dwarf and cushionlike, never sticky; flowers pale blue or white ..... **Alpine phlox** (p. 96).
    Plants not as above.
      Leaves simple and entire; flowers inconspicuous; calyx papery ..... **Collomia** (p. 96).
      Leaves lobed or divided, divisions narrow.
        Flowers yellowish, some of the leaves with a few lobes, stem woolly ..... **Spicate gilia** (p. 96).
        Flowers bluish, leaves pinnatifid, stem sticky but not woolly **Pinnate-leaved gilia** (p. 96).
  Corolla funnel-form or wheel-shaped.
    Lobes of the corolla shorter than the corolla tube, mostly plants of high altitudes.
      Corolla bright blue, anthers orange ..... **Alpine polemonium** (p. 96).
      Corolla cream-colored ..... **Honey polemonium** (p. 97).
    Lobes of the corolla longer than the corolla tube; flowers blue.
      Stems decumbent, clustered plant found abundantly in spruce forests **Jacobs ladder** (p. 97).
      Stems erect.
        Slender plant of bogs and wet ground in submontane and montane zones ..... **Western Jacobs ladder** (p. 97).
        Stout plant usually much branched, growing on fields and meadows, montane ..... **Leafy Jacobs ladder** (p. 97).

Skyrocket (*Gilia aggregata* (Pursh) Spreng.).—A plant 1 to 2 feet high, usually with scarlet, sometimes pink, flowers. The corolla

trumpet-shaped, about an inch long with short, pointed spreading lobes; the leaves pinnately divided into linear divisions. This plant seems to be limited to the western slope as far as the park is concerned. Two inconspicuous gilias are found on the east side, *Gilia pinnatifida* Nutt., with pinnate leaves and bluish flowers, and *G. spicata* Nutt., with pale yellow flowers. Both grow on montane fields.

FIGURE 71.—Alpine phlox. Pale blue or white; one-half to 1 inch across; plant matted. Photograph by Kenneth Hartley

Alpine phlox (*Phlox caespitosa* Nutt.) (fig. 71).—An alpine cushion plant with short leafy stems, opposite leaves, and pale blue or almost white, stemless flowers. In July the plant is sometimes entirely covered with flowers The stamens are attached to the corolla tube. *Phlox multiflora* A. Nels. and *Phlox patula* A. Nels. occur in the Grand Lake region.

Collomia (*Collomia linearis* Nutt.).—A weedy plant with narrow, pointed leaves and small lavender flowers in calyces which are thin, dry, and papery at the angles and which enlarge after flowering

FIGURE 72.—Alpine polemonium. Brilliant blue, an inch or more in length. Photograph by Joseph Dixon

Alpine polemonium or **sky pilot** (*Polemonium viscosum* Nutt.) (fig. 72).—An alpine plant with large heads of funnel-shaped, brilliant purplish-blue flowers, with bright orange anthers. The long, narrow leaves are pinnately compound with tiny oval leaflets in clusters along the midrib. This plant is found throughout the alpine zone, blooming from late June through August. It is well named "sky pilot," for it has been found above 13,000 feet on

Longs Peak. *Polemonium confertum* A. Gray is similar to it and is found in similar locations.

Honey polemonium (*Polemonium mellitum* (Gray) A. Nels.) has cream-colored flowers but otherwise is very similar to the last two. All the polemoniums are strong-scented.

Jacobs ladder (*Polemonium pulcherrimum* Hook.) (fig. 73).—One of the most abundant plants found under the spruce forests of the subalpine zone, where it is seen in company with mountain figwort and bilberry. The flowers are light blue and the leaves are sometimes mistaken for ferns from the ladderlike arrangement of the numerous oblong or lanceolate leaflets. Its stem is weak and usually branched. The **western Jacobs ladder** (*Polemonium occidentale* Greene), with erect, slender stem and flowers similar to the last, is found in some meadows and swamps. **Leafy Jacobs ladder** (*Polemonium foliosissimum* Gray), with similar flowers but stout and much-branched stem, is found at lower altitudes in meadows.

FIGURE 73.—Jacobs ladder. Light blue, about one-half inch in length. Photograph by Paul F. Shope

WATERLEAF FAMILY (HYDROPHYLLACEAE)

Flowers similar in structure to those of the phlox family but seed pod usually 2-celled, and the stamens usually exserted, giving the inflorescence a fringed appearance.

Waterleaf (*Hydrophyllum Fendleri* (Gray) Heller, also called *H. occidentale Fendleri*).—A plant about a foot high, or less, of moist, shady thickets, with leaves pinnately divided into 7 to 15 ovate-lanceolate, serrate divisions; flowers white, stamens and pistil protruding.

Scorpion weed (*Phacelia heterophylla* Pursh).—Plant hairy with silky or stiff white hairs; stems 6 to 18 inches long, erect or spreading on the ground; leaves lanceolate or oblong, the lower ones sometimes with a few lobes; branches of the inflorescence curving, densely flowered, with white or pale-lavender blossoms.

Sticky scorpion weed (*Phacelia glandulosa* Nutt.), a stout, homely weed of roadsides, 6 inches to 2 feet high, with divided leaves and clusters of dense, slightly curved spikes of lavender flowers and ripening pods. This plant is usually very grimy because the dust of the road sticks to it.

Purple fringe (*Phacelia sericea* (Graham) Gray), includes *P. ciliosa* Rydb.) (fig. 74).—Usually sends up several stems bearing many dense clusters of dark purple flowers, forming a narrowly oblong spikelike inflorescence. The slender stamens protrude from the flowers, giving the spike its "fringed" appearance. The leaves are much dissected and covered with silky hairs, which give them a grayish look. This plant is found throughout the park. In the montane zone the flowering stems are often a foot high; in the alpine only a few inches.

FIGURE 74.—Purple fringe. Spikes 2 to 8 inches long. Photograph by Paul F. Shope

BORAGE FAMILY (BORAGINACEAE)

The flowers in this family are similar in structure to those in the phlox family, but the fruit instead of being a seed-filled pod, consists of 4 seedlike nutlets each in a hard or prickly shell. At the time of flowering the 4 young nutlets may be seen at the base of the pistil. The calyx often enlarges after flowering, inclosing them. Often they are edged or covered with prickles which catch in one's clothing or in the fur of animals. The plants thus become widely distributed, and are considered pests. The inflorescence of these plants is what is known as a "scorpioid cyme," an elongated cluster which uncurls as the flowers open, similar to that of heliotrope.

Flowers yellow; seed smooth, white, and shining.
- Flowers at least one-half inch broad and over 1 inch long---- **Narrow-leaved puccoon** (p. 99).
- Flowers about one-fourth inch broad and 1 inch long or less---- **Many-flowered puccoon** (p. 99).

Flowers blue or white.
- Plant very small, cushion-like; foliage covered with numerous white hairs; flowers intense blue; alpine zone---- **Alpine forget-me-not** (p. 99).
- Plants larger, not cushionlike.
  - Flowers blue; buds often pinkish.
    - Flowers "forget-me-not" like; seed a small bur---- **Tall stickseed** (p. 99).
    - Flowers bell-shaped or funnel-form---- **Chiming bells** (p. 99).
  - Flowers white or very pale blue.
    - Plant erect, stiff-hairy, usually unbranched; flowers white, numerous; seed without prickles---- **Miners candle** (p. 100).
    - Plants much branched and spreading; weeds growing on waste ground; flowers inconspicuous.
      - Nutlets burlike---- **Stickseed** (p. 99).
      - Nutlets smooth and shining---- **Cryptantha** (p. 101).

Narrow-leaved puccoon (*Lithospermum angustifolium* Michx.).—The flowers of this plant are light yellow, the corolla has a long, slender tube and spreading lobes; corolla tube about an inch long, spreading part one-half to three-fourths inch across; leaves linear and grayish with stiff hairs. A plant of the montane fields blooming in June. After the conspicuous flowers disappear the plant produces *cleistogamus* flowers; that is, "hidden" flowers, which produce good seed without the corolla opening. **Many-flowered puccoon** (*Lithospermum multiflorum* Torr.) is similar but has a slightly later blooming season; the flowers are smaller, darker yellow, and more numerous; the plants often form clumps of several wandlike stems; leaves narrowly lanceolate or oblong; fields and open hillsides of the montane zone.

FIGURE 75.—Alpine forget-me-not. Bright blue or sometimes white. Plants 1 to 2 inches tall. Photograph by Kenneth Hartley

Alpine forget-me-not or **silverhaired forget-me-not** (*Eritrichium argenteum* Wight.) (fig. 75).—One of the most charming of the high alpine cushion plants. Anyone who sees its patches of brilliant blue among the gray rocks of those bleak heights will never forget the thrill caused by their beauty.

Stickseed.—These plants have pale blue or whitish flowers, like forget-me-nots, and prickly seeds. Many of them are weeds, and ours are all found along roadsides or on waste ground. The following species grow in the park: **Tall stickseed** or **false forget-me-not** (*Lappula floribunda* (Lehm.) Greene), **Western stickseed** (*Lappula occidentalis* (Wats.) Greene), and *Lappula calycosa* Rydb.

Chiming bells or **mertensia.**—These plants are easily recognized by their numerous pendent, bell-shaped blue blossoms. The buds

are often pinkish or lavender. The species may be distinguished by the following key: **Tall chiming bells** (*Mertensia ciliata* (Torr.) Don, also called *M. sibirica*) (fig. 76), **alpine chiming bells** (*Mertensia Tweedyi* Rydb. and *Mertensia ovata* Rydb.), **thickleaved mertensia** (*Mertensia coriacea* A. Nels.), **lanceleaved mertensia** (*Mertensia lanceolate* (Pursh) DC.), and **Bakers mertensia** (*Mertensia Bakeri lateriflora* (Greene) A. Nels.) (fig. 77).

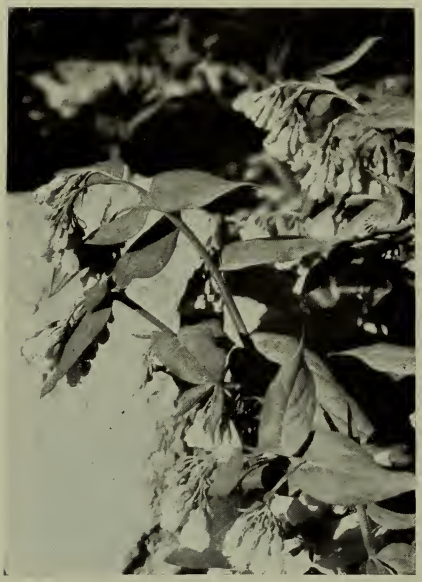


FIGURE 76.—Tall chiming bells. Flowers blue, plants 18 inches to 2 feet high. Photograph by Joseph Dixon

FIGURE 77.—Bakers mertensia. Flowers light blue, plants 6 to 10 inches high. Photograph by Kenneth Hartley

Plants 1 to 3 feet high, growing in dense clumps along stream banks, mainly subalpine----------**Tall chiming bells.**
Plants usually less than 1 foot high.
Plants of the alpine zone, usually among rocks.
Leaves bright green, thin and pointed----------**Alpine chiming bells.**
Leaves bluish, thick----------**Thickleaved mertensia.**
Plants of the montane zone and lower, found on dry fields and hillsides.
Plants bluish, smooth----------**Lanceleaved mertensia.**
Plants grayish-green, hairy----------**Bakers mertensia.**

Miners candle (*Oreocarya virgata* (Porter) Greene) (fig. 78).—A plant with very hairy, almost prickly, foliage and clusters of white flowers, like forget-me-nots, close to a stout, erect stem. It is conspicuous on the montane fields and open slopes, blooming in late June and July. If the terminal bud is destroyed, there may be several stems. *Oreocarya glomerata* (Nutt.) Greene is also found.

Cryptantha (*Cryptantha flexuosa* A. Nels., also called *C. calycosa* (Torr.) Rydb.).—A plant rather similar in appearance and habit to the stickseeds, but its nutlets are smooth; the whole plant, however, is prickly-hairy.

VERBENA FAMILY (VERBENACEAE)

A family with opposite or whorled leaves and usually square stems. Our representative is **vervain** (*Verbena bracteosa* Michx.), a weed found around buildings, with spreading, decumbent stems; foliage rough-hairy, leaves cut and toothed; flowers bluish, inconspicuous, in terminal, leafy-bracted spikes.

MINT FAMILY (LABIATAE)

This family has flowers with 4 nutlets clustered at the base of the pistil similar to the last two, and 2-lipped corollas; square stems; opposite leaves; whole plant usually aromatic.

FIGURE 78.—Miners candle. Flowers white, plant 8 to 18 inches high. Photograph by Kenneth Hartley

Inflorescence axillary.
- Plant aromatic; flowers in whorls in the axils, pale pink—**Wild mint** (p. 101).
- Plant not aromatic; flowers 2 at each node, bluish-purple—**Skullcap** (p. 102).

Inflorescence terminal.
- Flowers in a headlike cluster.
  - Flowers conspicuous, bright purplish-rose; plant strongly aromatic—**Horsemint** (p. 102).
  - Flowers small, blue or pink; plant not aromatic—**Dragonhead** (p. 102).
- Flowers in a spikelike inflorescence.
  - Stamens equal in length; plant introduced—**Spearmint** (p. 101).
  - Stamens unequal, one pair shorter; flowers often clustered; plant native—**Woundwort** (p. 102).

Wild mint or **Canada mint** (*Mentha canadensis* L.).—Easily recognized by its aromatic odor. The small pinkish flowers are borne in the axils of the leaves. **Spearmint** (*Mentha spicata* L.) has been

introduced from Europe into this country, and has been found on marshy ground near dwellings in the Longs Peak region.

Skullcap (*Scutellaria Brittonii* Porter) (fig. 79).—Plant approximately 6 inches high; flowers in the leaf axils, a pair at each node, erect, 2-lipped, purplish-blue (or rarely pink), about an inch long: calyx short, with 2 rounded lips, caplike; leaves oblong or ovate, margins entire; found on open slopes and meadows of the montane zone. *Scutellaria epilobifolia* Ham, also called *S. galericulata* L., a taller plant with finely toothed leaves and smaller blossoms grows along streams.

Horsemint (*Monarda menthaefolia* Graham, also called *M. fistulosa* L.) (fig. 80).—A pungent-smelling plant, 1 to 2 feet tall, growing

FIGURE 79.—Skullcap. Flowers rich, purplish blue, plant 6 to 8 inches high. Photograph by Kenneth Hartley

FIGURE 80.—Horsemint. Reddish purple, clusters 2 to 3 inches across. Photograph by Joseph Dixon

usually in colonies on moist soil, often in or near aspen groves. Flowers in headlike clusters, purplish-rose or bluish, from which the stamens and pistils are exserted. The leaves are pointed and finely toothed.

Dragonhead (*Dracocephalum parviflorum* Nutt.).—A weedy plant with small flowers in leafy-bracted, terminal spikes found around dwellings and on waste ground, and becoming very abundant on the burned area on Twin Sisters Mountain. Some plants have blue flowers, some pink.

Woundwort (*Stachys palustris* L.).—Flowers clustered in the axils of the leaves, lavender or purplish, often with darker markings;

leaves ovate or triangular, sessile, lower side pale; leaf-margins toothed; plant more or less hairy; found on moist soil.

Prunella (*Prunella vulgaris* L.).—A widely distributed weed found on damp soil around settlements.

POTATO FAMILY (SOLANACEAE)

This is a large family, widely distributed in warm regions and includes many plants of economic importance, such as potato, tomato, eggplant, peppers, tobacco, and others. Only two species are found in the park.

Wild tomato (*Solanum triflorum* Nutt.), a low, spreading plant of roadsides and waste ground, with pinnately lobed leaves and 5-pointed white flowers followed by nodding green berries resembling tiny tomatoes.

Black nightshade (*Solanum nigrum* L.).—Similar to the last in habit and flower but the leaves ovate, not lobed, and the berries black.

FIGWORT FAMILY (SCROPHULARIACEAE)

This is a very large family, which includes many of our most showy and beautiful flowers, though some are inconspicuous. It is characterized by having the parts of both the calyx and the corolla united and at least the corolla irregular, usually more or less 5-lobed, but the lobes arranged so as to form two lips. The leaves may be either opposite or alternate, entire, toothed, or pinnately divided. The united and irregular corolla is the best characteristic to rely upon in identifying members of this family. The only other group having this same character is the mint family (p. 101), and in addition to the irregular united corollas the mints are characterized in fruit by four tiny nutlets, while the fruit of the figworts is a 2-celled capsule. The fox gloves, snapdragons, and penstemons of the gardens and greenhouses belong to this group.

Leaves alternate or mostly basal.
- Stamens 5; flowers yellow; plant 2 to 6 feet tall, densely woolly---------- **Mullein** (p. 110).
- Stamens 4 or 2; plant usually not densely woolly.
  - Stamens 4; stems leafy.
    - Leaves fernlike; corolla usually with prolonged beak; bracts often present but never brightly colored --------**Lousewort** (p. 108).
    - Leaves never fernlike; flowers in dense spikes or heads often interspersed with bright-colored bracts.
      - Bracts brightly colored or white, more conspicuous than the flowers----------**Paintbrush** (p. 106).
      - Bracts green or greenish, less conspicuous than the bright yellow flowers----------**Gold tongue** (p. 108).
  - Stamens 2; leaves mostly basal----------**Kittentails** (p. 109).

Leaves mostly opposite, the lower ones always so.
Calyx 5-parted; anther bearing stamens 4, the fifth stamen sterile, often much reduced.
Sterile stamen as long as or longer than the others, either smooth or bearded; corolla blue or purple, rarely whitish--**Penstemon** (p. 104).
Sterile stamen shorter than the others, sometimes reduced to a small scale.
Plant a tall stout weed with inconspicuous greenish or brownish flowers----------**Western figwort** (p. 110).
Plant 8 inches tall, or less.
Flowers cream-colored, in a short, dense, one-sided spike; alpine zone----------**Snowlover** (p. 107).
Flowers not as above.
Flowers bright yellow----**Yellow monkey flower** (p. 107).
Flowers blue or blue and white--**Blue-eyed Mary** (p. 107).
Calyx and corolla 4-parted; stamens 2; flowers blue.
Flowers in a terminal cluster; stem erect-----**Alpine veronica** (p. 110).
Flowers axillary; stem trailing----------**American brooklime** (p. 110).

The **Penstemons** are easy to recognize by their showy, usually blue or purple flowers growing in spikelike racemes, or narrow panicles, on unbranched stems. The opposite leaves are usually sessile. The petals are joined into a lobed, somewhat 2-lipped funnel-form or bell-shaped corolla. The five stamens which give this group its name are inserted on the inside of the corolla tube. One of these stamens is sterile; that is, it bears no anther, but instead is usually flattened at the tip and often bearded. From the latter characteristic is derived the name "beardtongue," often applied to many members of this group.

Flowers blue or bluish purple.
Sterile stamen smooth; flowers blue with purple throats----------
Tall penstemon (p. 104).
Sterile stamen bearded.
Leaves pale, smooth and bluish, tapering; flowers purple----------
Purple beardtongue (p. 105).
Leaves decidedly green.
Blossoms large, three-fourths to 1 inch long and one-half inch or more across, bright blue--------**Mountain beardtongue** (p. 105).
Blossoms smaller, one-half inch or less in length, about one-fourth inch across, dark blue.
Plant tufted; flowers scattered or continuous along the stem--
Dwarf penstemon (p. 105).
Plant not usually tufted; flowers crowded in heads or in clusters along the stem----------**Clustered penstemon** (p. 105).
Flowers dark reddish-purple, or whitish; subalpine and alpine zones----------
Dark penstemon (p. 105).

Tall penstemon (*Penstemon unilateralis* Rydb.).—Abundant on fields and along roadsides between elevations of 7,000 and 8,500 feet; usually a foot or more tall, flowers purplish-blue; our most conspicuous species, blooming in July. So abundant some seasons that whole fields are blue with it.

Purple beardtongue (*Penstemon secundiflorus* Benth.).—On fields and hillsides of the montane zone in late June and early July, occurring with the above but not nearly so frequent; the purple color and pale glaucous foliage distinguish it.

Mountain beardtongue (*Penstemon alpinus* Torr.) (fig. 81).—On open slopes of the montane zone and along roadsides. The stems are stout, from 6 inches to 1 foot high, often several forming a clump. The brilliant azure-blue flowers occur in a crowded spike. This is closely related to *Penstemon glaber* Pursh.

Dwarf penstemon (*Penstemon humilis* Nutt.).—Abundant on rocks and in rocky places of the montane and subalpine zones; stems usually several to many, flowers dark blue, small; inflorescence hairy and sometimes slightly sticky. Blooms in June in the montane zone; a little later higher up.

FIGURE 81.—Mountain beardtongue. Flowers azure blue, about 1½ inches long. Photograph by Kenneth Hartley

Clustered penstemon (*Penstemon procerus* Dougl.).—Occasional in the subalpine zone, has been found around Bear Lake and in Glacier Gorge. The flowers are dark blue from one-half to three-fourths of an inch long, in compact heads or verticels; the lower lip as well as the sterile stamen bearded; plant smooth; blooms in August. **Rydbergs clustered penstemon** (*Penstemon Rydbergii* A. Nels.). Very similar to the last, but stem and inflorescence downy, and whole plant considerably larger. Flowers about one-half inch long; lower lip conspicuously bearded within. (Also called *P. aggregatus* Pennell.)

Dark penstemon (*Penstemon Whippleanus* Gray).—Frequent in the subalpine and timber-line region; the very dark reddish-purple color of the flowers distinguishes it. The corolla has some long dark hairs on the inside. One form of this has dingy white flowers. (This plant is also called *P. glaucus stenosepalus* Gray.)

Indian paintbrush (fig. 82).—A group of very showy and beautiful plants, abundant in this region. They do not depend on their flowers, which are rather inconspicuous, for their beauty, but on numerous brightly colored bracts or leaves, which are crowded at the ends of the stems and among which the flowers are found. Many of these plants are partly parasitic and grow attached to the roots of sagebrush or some other plant.

Floral bracts red, rose-colored, purple, or pink.
  Stem branched, flower-spike red.
    Plant of montane zone and lower on dry hillsides, often with sagebrush; leaves narrow; flower-spike scarlet---- **Narrow-leaved paintbrush** (p. 106).
    Plant of the upper montane and subalpine zones in moist situations; leaves broader; flower-spike rose-red---- **Broad-leaved paintbrush** (p. 106).
  Stem not branched; plant of subalpine and alpine meadows; bracts pink to rose-purple---- **Rosy paintbrush** (p. 106).
Floral bracts white, yellow, or brownish.
  Dwarf plant, 1 to 4 inches high, of exposed alpine fields; bracts brownish or yellowish---- **Short-flowered paintbrush** (p. 106).
  Taller plants; bracts white, greenish, or yellow.
    Bracts white or greenish; montane meadows; stem often branched---- **Northern paintbrush** (p. 106).
    Bracts yellow; subalpine and alpine meadows; stem never branched--- **Yellow paintbrush** (p. 106).

Two red-flowered species are found in the park. The most common one, on dry slopes of the montane zone often growing with sagebrush or mountain sage, is the **narrow-leaved paintbrush** (*Castilleja linariaefolia* Benth.). The corolla is usually green and protrudes from the red calyx and bracts; leaves, narrow. Another species with broader leaves, found on moist ground of the subalpine zone, is the **broad-leaved paintbrush** (*Castilleja rhexifolia* Rydb.).

Yellow paintbrush (*Castilleja occidentalis* Torr.) (fig. 83).—The common yellow-flowered species of the subalpine and alpine zones. The stems are unbranched 6 to 12 inches high and often grow in large clumps.

Rosy paintbrush (*Castilleja lauta* A. Nels.).—Similar in growth and habit to the last and considered by some botanists as a variety of it. The bracts and calyces vary in color through all shades of rose to bright purple. It is well named *lauta*, meaning gaudy. This plant is abundant in the upper subalpine and alpine zones.

Northern paintbrush (*Castilleja septentrionalis* Lindl.).—This is the common white or yellowish species found in meadows and on moist ground of the montane zone. The stems are often branched.

Short-flowered paintbrush (*Castilleja brachyantha* Rydb.).—A very small plant with stems only a few inches long, and brownish or yellowish bracts found in stony, exposed situations of the alpine

zone. The bracts and calyx are covered with long hairs; the stems and leaves are often curved.

Snowlover (*Chionophila Jamesii* Benth.).—A small alpine plant with a short dense, more or less one-sided spike of cream-colored 2-lipped flowers and a tuft of basal leaves. It blooms in July and early August on the high alpine ridges.

Blue-eyed Mary (*Collinsia tenella* (Pursh) Piper).—A small plant, with opposite leaves and small blue flowers in the axils. Its dark purplish or reddish stems and leaves may be seen on open slopes and

FIGURE 82.—Indian paintbrush. Bracts scarlet, plants 1 foot or more in height. Photograph by Joseph Dixon

FIGURE 83.—Yellow paintbrush. From cream to sulphur yellow, 6 to 12 inches tall. Photograph by Kenneth Hartley

fields of the montane zone early in spring. The plants begin blooming in May and continue into June.

Yellow monkey flower (*Mimulus guttatus* DC.).—Occasionally found on wet ground and along streams of the subalpine zone. The yellow flowers, about 1 inch long, are borne on slender pedicels; the distinctly 2-lipped corolla sometimes has dark spots. The leaves are opposite; the stems weak and often rooting at the nodes. This plant has also been called *M. Langsdorfii* Sims.

Many-flowered monkey flower (*Mimulus floribundus* Dougl.).—A sticky, spreading plant; has been found along banks in the montane zone.

Gold-tongue or **yellow owls-clover** (*Orthocarpus luteus* Nutt.).—An erect plant, 6 to 12 inches tall, with a dense spike of yellow flowers interspersed with green bracts; very common on fields in the montane zone, blooming in middle and late July. The typical form is unbranched, but due to grazing or some other cause which destroys the terminal bud, much-branched plants are common.

Lousewort.—This genus is well represented in the park by seven species. It is easily recognized by the alternate or mostly basal fernlike leaves of the majority of its members, and by its spikes of irregular flowers. The corolla is 2-lipped, the upper lip hooded and sometimes extended into a beak.

Leaves undivided.
Flowers purple; plant of montane meadows_____**Purple lousewort** (p. 108).
Flowers white; plant of montane and subalpine forests; foliage often reddish.
Mountain figwort (p. 108).
Leaves finely, pinnately divided, appearing fernlike.
Flowers rose-colored or purple.
Flowers with a long, slender, upcurved beak, resembling elephant heads; plants abundant in wet meadows_____**Elephantella** (p. 108).
Flowers without a slender, upcurved beak; very rare alpine plants_____
Rock-loving lousewort (p. 109).
Flowers greenish or yellowish.
Plants of montane and subalpine woods; leaves bright green.
Flowers greenish; plant 2 to 4 feet high_____ **Giant lousewort** (p. 109).
Flowers yellow; plant 8 inches to 2 feet high_____
Bracted lousewort (p. 108).
Plants of alpine grassland; flowers white or cream-colored_____
Parry lousewort (p. 109).

Purple lousewort (*Pedicularis crenulata* Benth.).—A plant of mountain meadows with short dense spikes of purple flowers and narrowly oblong, crenate leaves; not very abundant in our region.

Mountain figwort (*Pedicularis racemosa* Dougl.) (fig. 84).—A plant with one to several, more or less decumbent stems, each terminated by a spike of white or cream-colored flowers. The leaves are narrowly lanceolate and minutely toothed. The stems and leaves are often reddish in color. This plant is very frequently seen on moderately dry soil under pine and spruce forests in the subalpine zone.

Elephantella or **little red elephant** (*Pedicularis groenlandica* Retz.) (fig. 85).—The most conspicuous member of this group, with its reddish-purple flowers simulating elephant heads. It is abundant on marshy ground in the upper montane and subalpine zones, blooming in the lower parts of its range in early June and at higher altitudes in July and August. (It is also called *Elephantella groenlandica* (Retz.) Rydb.)

Bracted lousewort (*Pedicularis bracteosa* Benth.).—A tall, erect plant, usually with a single stem and a rosette of large, fernlike leaves at the base, also a few on the lower part of the stem; bears a

dense spike of yellowish flowers interspersed with bracts; grows in moist forests below 10,500 feet. The **giant lousewort** (*Pedicularis Grayi* A. Nels.), also called *P. procera* Gray, which resembles the last but is much larger and has greenish flowers, is sometimes seen.

Parry lousewort (*Pedicularis Parryi* Gray).—An alpine species with cream-colored flowers is sometimes found at 11,000 feet and above. It is usually less than a foot in height, often only a few inches, and has leaves with comb-like divisions. A very rare alpine species, the **rock-loving pedicularis** (*Pedicularis scopulorum* Gray), with purple flowers, has been found on Hagues Peak.

Kittentails (*Syntheris plantaginea* Benth., also called *Besseya plantaginea* (Benth.) Rydb.).—A plant

FIGURE 84.—Mountain figwort. Creamy white. Plants 8 to 12 inches tall. Photograph by Joseph Dixon

FIGURE 85.—Elephantella. Red. Plants 6 to 12 inches tall. Photograph by Kenneth Hartley

usually with several erect stems bearing dense spikes of lavender or pinkish flowers, and oblong or ovate, thick basal leaves. There are numerous sessile, oblong, or round bracts along the stem. These bracts and the leaves are at first woolly but become smooth with age. This plant is commonly seen in bloom on the hillsides around Estes Park in June.

Alpine kittentails (*Syntheris alpina* Gray, also called *Besseya alpina* (Gray) Rydb.).—Similar to the above but with bluish-purple

flowers from which the stamens protrude; frequently found among rocks in the alpine zone. (The last two plants are sometimes called by the generic name *Wulfenia* Jacq.)

Mullein (*Verbascum Thapsus* L.).—A tall plant, 2 to 5 feet high, of roadsides and waste ground, usually with unbranched stems but sometimes with a few erect branches. It has densely woolly leaves and long, dense spikes of yellow flowers. It is not native in this country but has been introduced.

Western figwort (*Scrophularia occidentalis* (Rydb.) Bickn.).—A stout weedy plant with opposite leaves and small greenish or chocolate-colored flowers; corolla 5-lobed, the lower lobe bent down; anther bearing stamens 4; occasionally found in the montane zone.

Alpine veronica (*Veronica alpina* L.).—A small plant with a terminal spike or cluster of small blue flowers, bluish-green pods notched at the top, and opposite leaves; found in wet places of the alpine and subalpine zones. The corolla is 4-lobed with nearly equal lobes.

American brooklime (*Veronica americana* Schwein).—A plant with axillary racemes of small blue or whitish flowers, opposite leaves, and weak stems which are often somewhat trailing; grows along brooks and in shallow water of the montane zone. The **annual veronica** (*Veronica peregrina* L.), a small erect plant with tiny axillary, white flowers, followed by rounded, somewhat notched pods, is occasionally seen on wet ground.

BROOMRAPE FAMILY (OROBANCHACEAE)

A family of parasites growing on the roots of other plants. Our only representative is **broomrape** (*Thalesia fasciculata* (Nutt.) Brit., also called *Orobanche fasciculata* Nutt.), a hairy brown plant with no green leaves and with two to several parallel stems each bearing a brownish-pink flower with 2-lipped, 5-lobed corolla.

PLANTAIN FAMILY (PLANTAGINACEAE)

A family of inconspicuous plants, usually considered weeds, with ribbed, basal leaves and spikes of inconspicuous, 4-merous flowers. The seed pods of these flowers are small, pointed capsules which, when they are ripe and ready to shed their seeds, split in a ring around the middle or below, so that the top comes off like a little elf's cap. The most frequent species is the **common plantain** (*Plantago major* L.) with roundish or heart-shaped leaves, a cosmopolitan plant found around buildings and settlements. **Tweedy plantain** (*Plantago Tweedyi* Gray), with lanceolate, or long, narrow leaves, is native in the subalpine zone.

MADDER FAMILY (RUBIACEAE)

Our plants of this family are rough-hairy and have square stems, small white flowers, and whorled leaves. The fruit consists of a pair of hard nutlets which separate when ripe. The coffee tree is related to them. The family also includes plants which yield valuable dyes.

Bedstraw or **northern cleavers** (*Galium boreale* L.) is abundant nearly everywhere in the montane zone both on dry slopes and in meadows. It has numerous small white blossoms.

Three-flowered bedstraw (*Galium triflorum* Michx.) is much more rare. It has decumbent stems, few flowers, and grows in wet, shady places on rich soil.

HONEYSUCKLE FAMILY (CAPRIFOLIACEAE)

The plants of this family are mostly shrubs, all have opposite leaves; the fruit of each, except *Linnaea*, is a berry.

Twinflower (*Linnaea americana* Forbes, sometimes called *L. borealis*.) (fig. 86).—A dainty little trailing plant with opposite evergreen leaves and upright flower stems, each bearing a pair of pink, bell-shaped flowers. This plant is frequent on moist ground in evergreen forests, where it often covers the ground with a mat of green foliage. It was named in honor of Linnaeus, the famous Swedish botanist, who was one of the first to study plants scientifically.

FIGURE 86.—Twinflower. Flowers pinkish on stems 2 to 3 inches high. Photograph by Kenneth Hartley

Twinberry or **involucred honeysuckle** (*Lonicera involucrata* Banks, also called *Distegia involucrata* (Banks) Cockerell).—Our only true native honeysuckle. A shrub found on wet ground, especially in the subalpine zone, with large, ovate leaves 3 to 5 inches long, and pairs of yellow flowers, each pair surrounded by bracts which later enlarge, turn red, and inclose the two black, shiny berries.

Redberried elder (*Sambucus microbotrys* Rydb., sometimes called *S. racemosa*) (fig. 87).—A low shrub of the montane and subalpine zones, with large clusters of small white flowers in June and early July, followed in late August by numerous small scarlet berries. The opposite leaves of this plant are pinnately compound, of several toothed and pointed leaflets.

Snowberry or **buckbrush** (*Symphoricarpus racemosus* Michx.).—A low shrub along roadsides and on open slopes of the montane zone,

FIGURE 87.—Redberried elder. A shrub with clusters of white flowers followed by small red berries. Photograph by National Park Service

with grayish, round or oblong leaves, and small pinkish flowers, followed by conspicuous white berries.

Arrowwood or high bush cranberry (*Viburnum pauciflorum* Pylaie).—A rather rare shrub in this region, found in moist thickets of the montane zone. The opposite leaves are lobed and toothed, much resembling maple leaves; they also turn beautiful shades of red in autumn. The bush bears clusters of small white flowers in June, which are followed in August and September by red, acid berries. Usually only 2 to 3 berries to a cluster mature.

MOSCHATEL FAMILY (ADOXACEAE)

A family of small slender, smooth herbs with opposite thrice-compound leaves, and small yellowish-green flowers in headlike clusters. *Adoxa Moschatellina* L. has been found in a few places on moist ground.

BLUEBELL FAMILY (CAMPANULACEAE)

Plants with alternate leaves and attractive bell-shaped blue flowers.

Mountain harebell (*Campanula rotundifolia* L., also called *C. petiolata*) (fig. 88).—A charming plant with several slender stems, each bearing a num-

FIGURE 88.—Mountain harebell. Blue bells one-half to 1 inch broad. Photograph by Joseph Dixon

ber of drooping blue bells. It is common throughout the mountainous region, and is especially at home among rocks. It begins to bloom about the middle of summer and continues late into the fall; occasionally a blossom is found in November. This is the true Scottish bluebell. In the alpine zone it is replaced by the **alpine harebell** (*Campanula uniflora* L.), a plant with shorter stems but with similar or even larger and darker blue flowers.

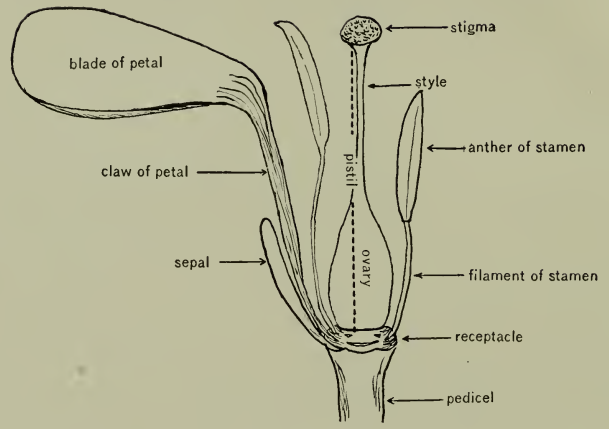
Parry harebell (*Campanula Parryi* Gray).—A slender, usually 1-stemmed plant, with an erect violet or purple, funnel-shaped flower; the points of the 5-lobed corolla are spreading. It is found in meadows of the montane zone.

VALERIAN FAMILY (VALERIANACEAE)

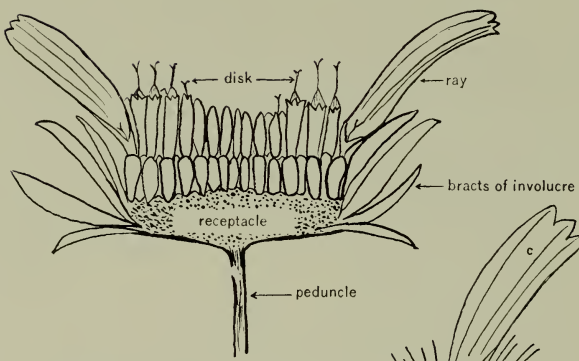
Tall plants with opposite leaves and small flowers. The characteristic thing about them is the arrangement of the corolla on top of the seed and the peculiar habit of the several long slender calyx lobes, which are tightly inrolled at the time of flowering and do not become evident until the seeds begin to ripen. Then they start to uncurl and become conspicuous, for their inner side is covered with white hairs. When ripe the seed is crowned with a ring of 5 to 15 spreading, feathery bristles. Two species are found in the park—*Valeriana furfurescens* A. Nels. (also called *V. trachycarpa* Rydb. and *V. edulis* in part), a plant 18 inches to 5 feet tall, usually half its height consisting of the open, spreading inflorescence which has opposite branching. Found on moist slopes and in meadows of the montane zone. Its leaves are thick, apparently parallel-veined and usually pinnately lobed. *V. acutiloba* Rydb. (also called *V. sylvatica*), a plant with a dense, umbellike cluster of white or pinkish flowers, is found in swamps of the subalpine zone. Its root has a very strong and disagreeable odor.

COMPOSITE FAMILY (COMPOSITAE)

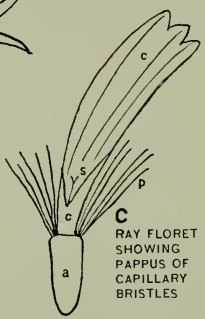
This is the largest of all the families of flowering plants and contains about one-fifth of all seed plants growing in the Rocky Mountain National Park. It is one of the groups in which the flower parts are most highly specialized and is also one of the most difficult families in which to distinguish the different individuals. On that account a short explanation of the structure of the flower-head is given here. This group includes many of our common weeds as well as many beautiful and showy wild flowers. While apparently very different, all of these plants have a similar arrangement of the flowers. What appears to be the "flower" of a sunflower is in reality an inflorescence made up of numerous small flowers closely packed together on the enlarged upper end of the stem, the *receptacle*, and



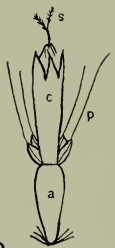
A PARTS OF A TYPICAL FLOWER



B TYPICAL HEAD OF RADIATE COMPOSITE



C RAY FLORET SHOWING PAPPUS OF CAPILLARY BRISTLES



D DISK FLORET SHOWING PAPPUS OF BRISTLE TIPPED SCALES

a, achene
c, corolla
p, pappus
s, stigma

PLATE XI

surrounded by several or many *bracts*. These bracts form the *involucre* around the *head* of flowers. Superficially, they resemble a calyx made up of sepals. (See Plate XI, B, C, and D.)

In plants of this family there are three different types of flower heads. On this basis the family is divided into three groups. The first group is made up of plants having two kinds of flowers. Around the margin of the head is a row of flowers with *ligulate* (i. e., strap-shaped) corollas. These are called *ray flowers* and such flower heads are said to be *radiate*. The center of the head, called the *disk*, is made up of flowers with short tubular, 5-toothed corollas, called *disk flowers*. The ray flowers are often spoken of as "petals" when the flower head is erroneously considered as one flower. The second group is composed of plants with flower heads, in which the flowers are all alike and are all disk flowers; all have tubular corollas. Such flower heads are said to be *discoid*. The third group, which is considered by some botanists to be a separate family and called the *Cichoriaceae*, is made up of plants having flower heads with flowers all alike but all ligulate, that is all with long flat corollas. This group is called the Chicory tribe.

Sunflowers and asters are examples of the first group, everlasting flowers of the second, and dandelions of the third group. It is very easy to take a sunflower head apart and see the parts of each individual flower, but many members of this family have such tiny flowers that even the botanist can not tell much about them without the use of a magnifying glass.

Composite plants have dry, 1-seeded fruits which are technically called *achenes*. The calyx of the flower is a much modified structure called the *pappus*. It consists of a tuft of long soft hairs or of scales or bristles attached to the apex of the achene. The pappus is often very conspicuous as the plant goes to seed. It is usually a device to insure the wide distribution of the seeds, as any one who has watched dandelion or thistle seeds sail away on the wind can testify.

A. HEADS WITH BOTH RAY FLOWERS AND DISK FLOWERS

(AA, heads with only disk-flowers, p. 118; AAA, heads with only ligulate flowers, p. 119).

B. Ray flowers white, blue, purple, or pinkish. (BB. Ray flowers yellow, p. 117).

a. Plants stemless, blooming in early spring; leaves linear, grayish---- **Easter daisy** (p. 120).

aa. Plants with evident stems, but sometimes dwarf.

b. Flower heads aggregated in dense clusters, disks and rays white, plant aromatic; leaves very finely divided---**Yarrow** (p. 120).

PLATE XII.—Comparison of involucres of typical composites. A, Daisy (*Erigeron*); B, Aster (*Aster*) C, Tansy aster (Machaeranthera). Drawings by L. W. Durrell

B. Ray flowers white, blue, purple, or pinkish—Continued.
aa. Plants with evident stems, but sometimes dwarf—Continued.
bb. Flower heads not in dense clusters, disks yellow or reddish.
c. Rays comparatively broad and few, involucral bracts of different lengths in several rows and overlapping. (Plate XII, B. C)
d. Involucral bracts with slender, recurved tips; rays reddish-purple---**Tansy aster** (p. 120).
dd. Involucral bracts flat; rays blue, violet or white, rarely reddish-purple---**Aster** (p. 121).
cc. Rays comparatively narrow, very numerous, bracts in one or two rows of equal length (Plate XII, A)---**Daisy** (p. 123).

BB. Ray flowers yellow.
a. Disk flowers dark red and base of rays sometimes reddish---**Gaillardia** (p. 126).
aa. Disk flowers yellow, brown, or nearly black.
b. Leaves opposite---**Arnica** (p. 126).
bb. Leaves alternate.
c. Disk flowers yellow or orange (cc. Disk flowers brown or blackish, p. 118).
d. Lower leaves 8 to 12 inches long; heads 1 to 2 inches across, solitary or few---**Pyrrocoma** (p. 135).
dd. Lower leaves much shorter, or the heads many and small.
e. Plant either rough-hairy or sticky in some part.
f. Leaves deeply divided; stems slightly sticky; rays nearly as wide as long---**Bahia** (p. 127).
ff. Leaves not deeply divided, their margins entire, or wavy-toothed; rays much longer than wide.
g. Plant smooth below but buds very sticky; tips of involucral bracts bent out---**Gumweed** (p. 127).
gg. Plants rough-hairy throughout; tips of involucral bracts not bent out, sometimes slightly leafy---**Golden aster** (p. 127).
ee. Plants neither very rough nor sticky, but sometimes woolly or hairy.
f. Plants of alpine situations; heads usually solitary on each flowering stem. (ff. Plants not confined to alpine regions p. 118.)
g. Plants densely white woolly at least at base; ligules 3-toothed at apex.
h. Flowers 2 to 3 inches across; leaves divided---**Rydbergia** (p. 128).
hh. Flowers smaller; leaves undivided **Woolly actinella** (p. 128).
gg. Plants not densely woolly; ligules entire at apex.
h. Plant woody at base---**Tonestus** (p. 128).
hh. Plant soft and herbaceous at base **Dwarf senecio** (p. 130).

BB. Ray flowers yellow—Continued.
aa. Disk flowers yellow, brown, or nearly black—Continued.
bb. Leaves alternate—Continued.
c. Disk flowers yellow or orange—Continued.
dd. Lower leaves much shorter, or the heads many and small—Continued.
ee. Plants neither very rough nor sticky, but sometimes woolly or hairy—Continued.
ff. Plants not confined to alpine regions; heads usually several to many.
g. Bracts of the involucre in one series often black-tipped---
Ragworts and groundsels (p. 128).
gg. Bracts of the involucre in two or more series, never black-tipped.
h. Bracts loose and leafy; flower pale yellow---
Parry goldenrod (p. 131).
hh. Bracts tightly appressed, never leafy, flowers orange-yellow---
Goldenrod (p. 132).
cc. Disk-flowers brown or blackish, at least darker than the rays.
d. Disk elevated, cone-shaped, or cylindrical.
e. Disk cylindrical, its height greater than its width-
Coneflower (p. 135).
ee. Disk cone-shaped, its width greater than its height.
f. Plant rough-hairy, of medium size; leaves undivided; disk very dark brown---
Brown-eyed Susan (p. 132).
ff. Plant smooth, 3 to 6 feet high; leaves often lobed or divided; disk greenish or yellowish brown---**Goldenglow** (p. 132).
dd. Disk flat or nearly so; at least some of the leaves opposite.
e. Plants perennial, native.
f. Plant bushy, many flowered; of sunny dry fields and hillsides ---
Dwarf sunflower (p. 132).
ff. Plant slender, mostly unbranched; of meadows and aspen thickets---
Helianthella (p. 133).
ee. Plant annual, escaped from cultivation around ranches and along roads---
Annual sunflower (p. 132).

AA. HEADS WITH ONLY DISK FLOWERS

(AAA. Heads with only ligulate flowers, p. 119)

B. Foliage spine-tipped; corollas deeply cleft.
a. Heads purple---**Purple thistle** (p. 133).
aa. Heads cream-colored or dingy white---**Drummond thistle** (p. 133).

BB. Foliage not spine-tipped.
a. Leaves opposite; plants 1 to 2 feet tall_____**Rayless arnica** (p. 127).
aa. Leaves alternate.
b. Heads erect, brightly colored or white.
c. Heads yellow.
d. Heads solitary, very compact; leaves 3-parted_____
Gold buttons (p. 125).
dd. Heads several to many.
e. Heads very small, numerous; a dwarf, fall-blooming shrub of open fields_____
Rabbit brush (p. 133).
ee. Heads larger; plants, never shrubs_____
Turnip-leaved senecio (p. 130).
cc. Heads not yellow.
d. Heads white, cream-colored, pink, or brownish; flowers "everlasting."
e. Plants blooming in spring, usually less than 10 inches high_____**Catspaw** (p. 133).
ee. Plants blooming in summer and fall, usually 1 foot or more high.
f. Heads pure white, papery_____
Pearly everlasting (p. 134).
ff. Heads cream-colored, satiny_____
Cudweed (p. 134).
dd. Heads bright purple, not "everlasting"; plant of open fields_____**Gayfeather** (p. 134).
bb. Heads drooping.
c. Plant silvery with silky hairs; foliage finely cut, aromatic__
Arctic sage (p. 134).
cc. Plant not silvery.
d. Leaves triangular and toothed; heads yellowish; bracts pale green_____**Sheathflower** (p. 135).
dd. Leaves not triangular; disk yellow or greenish.
e. Bracts thick and purplish_____
Bigelow groundsel (p. 130).
ee. Bracts normal, green; leaves entire_____
Nodding senecio (p. 130).

AAA. HEADS WITH ONLY LIGULATE FLOWERS, JUICE MILKY

(Chicory tribe)

B. Flower heads pink or purplish, never yellow.
a. Flowers pink, soon withering; heads solitary on the green, angled branches_____**Milk pink** (p. 135).
aa. Flowers purplish, in a long narrow raceme; stem unbranched_____
Rattlesnake-root (p. 135).
BB. Flower heads yellow or white.
a. Flower heads yellow. (aa. Flower heads white or cream colored p. 120).
b. Heads solitary, stems leafless. (bb. Heads several p. 120)
c. Involucre with black hairs____**Alpine hawksbeard** (p. 135)
cc. Involucre without black hairs.
d. Leaves entire margined, broadest near the apex and tapering to the base_____**False dandelion** (p. 135).

BB. Flower-heads yellow or white—Continued.
b. Heads solitary, stems leafless.—Continued.
cc. Involucre without black hairs.—Continued.
dd. Leaves wavy-toothed, tapering to both ends_____ **Common dandelion** (p. 135).
bb. Heads several.
c. Pappus of soft, pure white hairs; involucres covered with light-colored, glandular hairs; plants of wet meadows and river banks_____ **Hawksbeard** (p. 135).
cc. Pappus of soft, dingy hairs; involucre covered with black hairs; plants of hillsides and fields_____ **Slender hawkweed** (p. 135).
aa. Flowers white or cream-colored; basal leaves with long white hairs___ **White-flowered hawkweed** (p. 135).

Easter daisy (*Townsendia exscapa* (Rich.) Porter) (fig. 89).—Probably the earliest of all our flowers to bloom. It is found in late February on sunny sandy slopes in the foothills and may be expected in similar situations in April around Estes Park. In May it is at the height of its bloom. The blossoms, which are an inch or more across, are clustered on the crowns of the plant nestled among the narrow grayish leaves. The rays are pale pink or white. *Townsendia grandiflora* Nutt., a plant with larger blossoms and stems 2 to 8 inches high, occurs sparingly on open fields, blooming in June and July.

FIGURE 89.—Easter daisy. White or pinkish, 1 to 2 inches across. Photograph by Kenneth Hartley

Yarrow (*Achillea millefolium* L.).—A plant of roadsides and fields with flat-topped clusters of small white flower heads, and leaves very finely dissected into numerous threadlike divisions. From this leaf character it takes its specific name of *millefolium*, meaning thousand-leaves. The foliage is very aromatic.

Tansy aster (*Machaeranthera varians* Greene) (fig. 90 and Plate XII, C).—Probably the most conspicuous purple aster, blooming profusely in late summer and fall. It has many spreading branches and many flowers with brilliant reddish-purple rays and yellow centers. The leaves are irregularly toothed. It grows abundantly in old fields, along roads and around buildings, for it seems to thrive especially on disturbed soil. The plants are biennial, blooming the

second year and then dying. The flowers begin to appear as early as the middle of July and some plants are still blooming in October. *Machaeranthera asper* Greene has also been found.

Aster.—These plants are characterized by their imbricated involucre. (Plate XII, B.) The blue, purple, or white rays are comparatively few, often less than 30, and rather wide, usually one-eighth inch or more. The leaves are alternate and their margins entire.

A. Ray flowers white or whitish.
  B. Plants 2 to 5 feet tall; involucral bracts with prominent midribs; rays sometimes tinged pinkish or lavender; subalpine zone---- **Engelmann aster** (p. 121).
  BB. Plants less than 2 feet tall; involucral bracts without prominent midrib; montane zone.
    a. Foliage entirely smooth; stems tufted; freely branched---- **Porters aster** (p. 121).
    aa. Foliage minutely but entirely pubescent; stems usually single from a running rootstock, but forming colonies; branches few, erect---- **Rough white aster** (p. 122).
AA. Ray flowers blue, violet or purple.
  B. Ray flowers brilliant, reddish-purple.
    a. Heads usually solitary, large; stems only a few inches high---- **Sun-loving aster** (p. 122).
    aa. Heads several; stems 6 inches high or more---- **Fremont aster** (p. 122).
  BB. Ray flowers blue or violet.
    a. Inflorescence a broad panicle, more or less corymbiform.
      b. Lower leaves broad and petioled, upper leaves conspicuously reduced in size, sessile---- **Smooth aster** (p. 122).
      bb. All the leaves narrow and sessile---- **Common aster** (p. 122).
    aa. Inflorescence a constricted panicle.
      b. Leaves as broad, or nearly so at the base as at the middle; rays light blue; pappus white or cream-colored; stems often reddish---- **Sky-blue aster** (p. 122).
      bb. Leaves much broader in the middle and tapering to both ends, gradually reduced in size upwards; pappus tinged reddish; rays blue---- **Geyers aster** (p. 122).

Engelmann aster (*Aster Engelmannii* Gray, also called *Eucephalus Engelmannii* (DC. Eat.) Greene).—A coarse, stout plant 2 to 5 feet high, with leafy stems and clusters of white or lavender tinged flowers, found on wet ground in the subalpine zone, especially between Bear and Nymph Lakes. The **glaucous aster** (*Aster glaucus* (Nutt.) T. & G.), also called *Eucephalus glaucus* Nutt.), a smaller plant with oblong obtuse glaucous leaves, also occurs.

Porters aster or **low white aster** (*Aster Porteri* Gray) (fig. 91).—A branching plant 6 to 10 inches high, often growing in tufts, with smooth foliage and many flower heads with white rays and yellow centers which turn dark red in age. It is abundant on open, sunny slopes and fields of the montane zone, blooming in August and Sep-

tember. A plant with similar flower heads is the **rough white aster** (*Aster commutatus* T. & G.), found in similar situations but usually on more moist soil and coming into bloom two or three weeks later. Its foliage is roughened with small hairs. It grows from a running rootstock.

Sun-loving aster (*Aster apricus* (Gray) Rydb.).—A dwarf alpine plant with large, usually solitary, head and brilliant rose-purple or violet rays. It grows in exposed, stony situations of the alpine and subalpine zones.

Smooth aster (*Aster laevis* L.), with bright blue blossoms and smooth foliage, the lower leaves with winged petioles, the upper much smaller and with heart-shaped, clasping base, is found in meadows of the montane zone.

FIGURE 90.—Tansy aster. Purple with orange centers, about 1 inch across. Photograph by National Park Service

FIGURE 91.—Porters aster. White with yellow or dark reddish centers, about one-half inch across. Photograph by author

Common aster (*Aster adscendens* Lindl.), with lavender or blue flowers, much branched inflorescence, and small narrow leaves, is found on fields and hillsides and along roads.

Sky-blue aster (*Aster caerulescens* DC., also called *A. salicifolius* Lam.).—A tall plant with beautiful sky-blue rays and long-oblong, pointed, sessile leaves; is common in meadows and along streams in the montane zone.

In addition; the following asters have been found: **Geyers aster,** *Aster Geyeri* (Gray) Howell, *Aster laetevirens* Greene, *Aster campestris* Nutt., *Aster armeriaefolius* Greene, all with blue or violet flower heads; **Fremont aster** (*Aster Fremontii* T. G.), and *Aster Tweedyi* Rydb., with purple flower heads. *Aster junciformis* Rydb. with white rays, *Aster foliaceus* Lindl. and *Aster glaucodes* Blake have also been found. (Those for which common names are given are the most frequently seen and may be identified by the key on p. 121.)

Daisy or fleabane (*Erigeron*).—A group of plants often mistaken for asters, from which they may be distinguished by the shape of the involucral bracts (Plate XII, A), and by the numerous long and extremely narrow rays. The showy plants of this genus are usually few-flowered and little-branched and their stems are less rigid than those of the asters. The species may be distinguished by the following key:

A. Ray flowers conspicuous, numerous, fully as long as the width of the disk.
B. Plant much branched throughout, many flowered; rays blue---- **Branching daisy** (p. 124).
BB. Plants mostly unbranched except in the inflorescence; flowers one to several on each stem.
a. Plants 8 inches to 2 feet tall; leaves smooth.
b. Involucres densely woolly.
c. Involucres covered with dark purplish or black hairs; rays usually white---- **Black-headed daisy** (p. 125).
cc. Involucres with light-colored hairs; rays rose-colored; heads large---- **Beautiful daisy** (p. 124).
bb. Involucres not densely woolly.
c. Ligules nearly one-fourth inch wide; heads usually 1, sometimes 2 to 3---- **Subalpine daisy** (p. 124).
cc. Ligules very narrow and numerous (60 or more); heads usually several.
d. Plants of montane meadows and aspen groves; entirely smooth---- **Aspen daisy** (p. 124).
dd. Plants of the subalpine zone or higher, with some white hairs at the base of the involucre---- **Pale daisy** (p. 124).
aa. Plants less than 8 inches tall; if taller, leaves pubescent.
b. Medium-sized plants 6 to 10 inches tall, decidedly pubescent, montane zone.
c. Plants spreading by runners, these sometimes not evident early in the season; flower heads pink in the bud, when open, white; rays threadlike---- **Whiplash daisy** (p. 124).
cc. Plants without runners; rays wider, never pink in the bud.
d. Ray flowers white---- **Dwarf daisy** (p. 125).
dd. Ray flowers blue---- **Early blue daisy** (p. 125).
bb. Plants dwarf, usually less than 6 inches tall; if taller, growing in the alpine zone.
c. Leaves divided or lobed.
d. Leaves 3-parted; montane zone---- **Cut-leaved daisy** (p. 125).
dd. Leaves pinnately dissected; alpine zone---- **Pinnate-leaved daisy** (p. 125).
cc. Leaves entire; alpine zone.
d. Involucre black-hairy; rays usually white---- **Black-headed daisy** (p. 125).
dd. Involucre white-hairy; rays usually blue or violet **One-flowered daisy** (p. 125).

AA. Ray flowers inconspicuous, shorter than the width of the disk.
B. Plant widely branched; inflorescence in a corymb or panicle.
a. Stem and involucres greenish---------- **Bitter fleabane** (p. 126).
aa. Stem and involucres purplish---- **Yellowstone fleabane** (p. 126).
BB. Plant unbranched or with only a few, erect branches, inflorescence a raceme---------- **Long-leaved fleabane** (p. 126).

Branching daisy (*Erigeron divergens* T. & G.).—A densely hairy plant branched from the base, with many blue-rayed flower heads, blooming in August and September along roadsides and on open slopes below 9,000 feet.

FIGURE 92.—Subalpine daisy. Purple or lavender with orange-yellow disks, plants 6 to 12 inches tall. Photograph by Joseph Dixon

Beautiful daisy (*Erigeron elatior* (Gray) Greene).—A lovely flower abundant in meadows of the subalpine zone, with large rose-colored heads; involucral bracts reddish and embedded in dense woolly hairs; rays numerous and very narrow; heads solitary or few. Blooms in August and is common at Bear Lake, Willow Park, Poudre Lakes, and elsewhere.

Subalpine daisy (*Erigeron salsuginosus* Nutt.) (fig. 92).—An exception in this genus because of its wide rays but easily recognized by the typical *Erigeron* involucre. (Plate XII, A.) It is one of the most conspicuous flowers of the subalpine meadows, where its lavender or violet rays and orange-yellow disk are seen on every side in late July and August. It is usually 1 to 3 flowered. Occasionally the rays are white.

Aspen daisy (*Erigeron macranthus* Nutt.) (fig. 93).—The most common daisy of the montane zone; found in every moist aspen grove and in meadows. It has smooth foliage and lavender to violet narrow rays and yellow disk. The stems are usually several-flowered.

Pale daisy (*Erigeron superbus* Greene).—Commonly found in the subalpine zone with the beautiful and subalpine daisies, from which it may be distinguished by its paler color, its narrow rays, and lack of densely woolly involucre.

Whiplash daisy (*Erigeron flagellaris* Gray).—One of the most common small daisies found below 10,000 feet. The rays are very narrow, almost threadlike, pink or red on the outside, so that the buds are always pink, but white when opened. The stems are

slender and early in the season mostly leafless; the basal leaves are oblanceolate, acute, and entire. In June it blooms profusely and then starts to produce runners with leaves evenly spaced along their whole length, and tufts of leaves at the tips, where the runner takes root and starts a new plant. It continues to bloom sparingly all summer and through September.

Dwarf daisy (*Erigeron pumilus* Nutt.).—A white-flowered daisy with exceedingly hairy leaves and stems, growing from a stout woody root. The leaves are linear. It is occasionally found on dry slopes of the montane zone.

Early blue daisy (*Erigeron glandulosus* Porter).—Similar to the last, but with blue ray flowers and foliage slightly less hairy and often somewhat sticky. The branches are usually 1-flowered. It is frequently seen on open slopes around Estes Park, blooming in June.

Cut-leaved daisy (*Erigeron compositus* Pursh).—Growing in tufts throughout the montane zone and sometimes higher, with white ray flowers and hairy leaves 3-forked at the apex. It blooms throughout the summer but is most abundant in June. **Gold buttons** (*Erigeron compositus discoideus* Gray), a variety without any ray flowers, is occasionally found growing with the species.

FIGURE 93.—Aspen daisy. Lavender, plants 12 to 18 inches tall. Photograph by F. J. Francis

Pinnate-leaved daisy (*Erigeron pinnatisectus* (Gray) A. Nels.)—A beautiful blue or violet daisy with pinnately divided leaves found in the alpine and upper subalpine zones. The stems are often only an inch or so high but the flower heads are comparatively large, an inch or more across. Blooms in July and August.

Black-headed daisy (*Erigeron melanocephalus* A. Nels.).—A white-flowered daisy of the subalpine and alpine zones easily recognized because of the black or purplish woolly hairs which cover the involucre; the stems are 1-flowered, the leaves entire. It is frequently seen as an alpine plant with stems only a few inches high, and is also sometimes found in subalpine meadows with stems nearly a foot high.

One-flowered daisy (*Erigeron uniflorus* L.) (fig. 94).—An alpine daisy with stems only a few inches high, 1-flowered; rays violet and

leaves entire; the involucre is covered with light-colored hairs. It is found around most of the high lakes and on the mountain tops. A similar but much rarer alpine plant is *Erigeron leiomeris* Gray. Its foliage and involucre are not hairy.

Coulters daisy (*Erigeron Coulteri* Porter) with white rays and hairy white involucre is one of the rarer plants of the park, and *Erigeron speciosus* DC., and *Erigeron viscidis* Rydb. with blue or white rays, are sometimes seen in meadows.

Two other species have been found on the western slope and may occur elsewhere, *Erigeron subtrinervis* Rydb., with pale blue or pinkish rays and nodding buds growing in meadows, and *Erigeron ursinus* Eat, with bluish-purple rays growing in loose mats on dry hillsides.

The following **fleabane daisies** are also found but are less conspicuous because of the very short rays. They can be distinguished by the characters given in the key on page 124. **Bitter fleabane** (*Erigeron acris* L.), **Yellowstone fleabane** (*Erigeron yellowstonensis* A. Nels.), and the **long-leaved fleabane** (*Erigeron lonchophyllus* Hook.).

FIGURE 94.—One-flowered daisy. Lavender, plants 3 to 6 inches high. Photograph by Joseph Dixon

FIGURE 95.—Gaillardia. Yellow with dark red centers, 2 to 4 inches across. Photograph by Joseph Dixon

Gaillardia (*Gaillardia aristata* Pursh) (fig. 95).—This plant is one of the showy mountain flowers. The heads are 2 to 3 inches across with deep red or brownish disk and brilliant yellow rays. The rays are wide, tapering to the base, and 3-toothed at apex. The leaves and stems are rough-hairy. It begins to bloom in July and is found throughout the summer from the foothills to timber line.

Arnica.—Rays and disk both yellow, leaves opposite. The latter character distinguishes these plants from the other yellow-flowered composites. Several species are found, all of which vary so much that determination is difficult.

Heart-leaved arnica (*Arnica cordifolia* Hook.) (fig. 96).—Large blossoms 1½ to 3 inches across and large basal, heart-shaped leaves; is very common in moist pine and spruce forests, blooming in May and June. The **daffodil arnica** (*Arnica pumila* Nutt.), with similar flowers but smaller leaves, blooms abundantly in the subalpine zone in August and September. In addition, the following species have been found: **Rayless arnica** (*Arnica Parryi* Gray), *Arnica gracilis* Rydb., *Arnica fulgens* Pursh, *Arnica subplumosa* Greene, and *Arnica sylvatica* Greene.

Wild chrysanthemum (*Bahia dissecta* (Gray) Brit.).—Plants 1 to 2 feet tall, branching, with golden yellow heads, the disk darker than the short, broad rays; leaves dissected into narrow segments; upper part of stem hairy and somewhat sticky. This plant is also called *B. chrysanthemoides.*

FIGURE 96.—Heart-leaved arnica. Yellow, 1 to 3 inches across. Photograph by Joseph Dixon

Gumweed (*Grindelia squarrosa* (Pursh) Dunal).—A branching plant with numerous bright yellow flowers, easily recognized by the roundish buds which are covered on top with a sticky white substance. The involucral bracts have narrow tips which are bent out somewhat, as those of the tansy aster. (See Plate XII, C.) *Grindelia subalpina* Greene and *Grindelia erecta* A. Nels. are similar. These plants look very untidy as they go to seed, because of the numerous large sticky involucres and persistent withered rays.

Golden aster or **golden eye.**—Several species of this genus grow in the park, all rather similar. The flowers resemble asters but have yellow rays. The stems and leaves of most common kinds are covered with hairs, which give the plants a grayish color and make them rough to the touch. There are usually several stems from the root crown, each one more or less branched. These plants are abundant from the foothills to timber line, especially on dry, sunny fields and hillsides. The following species are found: *Chrysopsis arida* A. Nels., *Chrysopsis foliosa* Nutt., *Chrysopsis hirsutissima* Greene, *Chrysopsis pumila* Greene (called also *C. alpicala* Rydb.), and *Chrysopsis resinolens* A. Nels.

Rydbergia or **alpine sunflower** (*Rydbergia grandiflora* (Pursh) Greene) (fig. 97).—One of the most striking plants of the rocky alpine ridges. Its lovely yellow flower heads are 2 to 4 inches across on stems usually less than 6 inches high, and sometimes only 1 or 2 inches high. The stems and the dissected leaves are covered with soft, loose white hairs. The yellow rays are 3-toothed at apex.

Woolly actinella (*Actinella lanata* Nutt., also called *Tetraneuris lanigera* Daniels and *Actinea lanata*) (fig. 98).—A smaller plant than the above with rather similar flower heads, the yellow ligules 3-toothed, but with entire leaves, growing among rocks in exposed situations of the alpine zone.

FIGURE 97.—Rydbergia. Yellow, 2 to 4 inches across. Photograph by Kenneth Hartley

FIGURE 98.—Woolly actinella. Yellow, 1 to 2 inches across. Photograph by Kenneth Hartley

Tonestus (*Tonestus pygmaeus* (T. & G.) A. Nels.).—Similar in appearance to *Actinella* but the rays entire at apex and the foliage not woolly. The stem is woody and the plant very dwarf, only a few inches high. Rays and disk yellow, and bracts of the involucre somewhat leafy.

Ragwort, groundsel, or **senecio.**—A large group of plants similar in appearance and difficult to distinguish. A few have no ray flowers; the remainder have yellow or orange rays. The involucre is made up of one row of equal bracts with sometimes a few shorter bractlets at the base. The bracts are often black-tipped. The following key should help to distinguish those species most frequently met with:

A. Flower heads without rays.
  B. Heads one-half inch broad or more, drooping---- **Bigelow groundsel** (p. 130).
  BB. Heads one-third inch broad or less.
    a. Heads somewhat drooping; leaves entire---- **Nodding senecio** (p. 130).
    aa. Heads erect; margins of leaves toothed---- **Turnip-leaved senecio** (p. 130).
AA. Flower heads with rays.
  B. Plants tall, 2 to 5 feet high; leaf margins finely but sharply toothed.
    a. Leaves long-triangular, broadest near the base---- **Triangle-leaved ragwort** (p. 130).
    aa. Leaves narrow, broadest in the middle, tapering to each end--- **Toothed ragwort** (p. 130).
  BB. Plants 2 feet or less in height.
    a. Foliage silvery white, plant mostly alpine-**Hoary senecio** (p. 130).
    aa. Foliage green.
      b. Plant alpine, usually not over 6 inches high; heads solitary or few, usually drooping--------**Dwarf senecio** (p. 130).
      bb. Plants subalpine or montane, usually over 6 inches tall; heads erect.
        c. Leaves with margins entire, or slightly wavy, or with a few small teeth.
          d. Plant with no woolly or cottony hairs.
            e. Flower heads few; plant of subalpine meadows--**Thick-bracted senecio** (p. 130).
            ee. Flower heads many; plant of montane roadsides and banks---- **Grass-leaved senecio** (p. 131).
          dd. Plant usually somewhat woolly; leaves not linear.
            e. Heads very numerous; involucres about one-eighth inch in diameter; bracts with conspicuous black tips---- **Black-tipped senecio** (p. 131).
            ee. Heads fewer; involucres about one-fourth inch in diameter or more; peduncle of central head short---- **Perplexing senecio** (p. 131).
        cc. Leaves, at least some of them, lobed or coarsely toothed.
          d. Leaves lobed half way to the midrib or deeper.
            e. Foliage and stem woolly; leaves with regular, comblike lobes, usually folded--- **Fendler senecio** (p. 131).
            ee. Foliage and stem not woolly, leaves flat.
              f. Leaves linear, sometimes with a few linear lobes---- **Grass-leaved senecio** (p. 131).
              ff. Leaves lanceolate in outline, pinnately dissected---- **Western golden ragwort** (p. 131).
          dd. Leaves irregularly toothed or shallowly lobed; plants of subalpine or alpine zones.
            e. Stems tufted, growing among rocks, rays yellow----------**Rock ragwort** (p. 131).
            ee. Stems usually single, growing in meadows; rays orange----**Orange ragwort** (p. 131).

Bigelow groundsel (*Senecio Bigelovii* Gray).—A plant of meadows and moist forests of the subalpine zone, rather rare, with a few large rayless, drooping heads; bracts purplish, disk yellow.

Nodding senecio (*Senecio cernuus* Gray).—A plant with numerous small, light-yellow, or greenish heads, and dark-green leaves and stems. The lower leaves are broad, on long petioles, the upper leaves narrow and becoming sessile.

Turnip-leaved senecio (*Senecio rapifolius* Nutt.).—Stems in groups, erect, each having a headlike, rounded cluster of small, erect, orange-yellow, discoid heads. The basal leaves are spatulate, or oblong, resembling turnip leaves, from which characteristic the plant takes its name. The middle and upper stem leaves are oblong, pointed, and sessile. All the leaves have sharply toothed margins.

FIGURE 99.—Dwarf senecio. Yellow with darker center, 3 to 6 inches high. Photograph by Joseph Dixon

Triangle-leaved ragwort (*Senecio triangularis* Hook.).—A tall plant often 3 feet or more high, usually growing in clumps in wet ground of the subalpine zone. The leaves are triangular and thickly toothed; the yellow, radiate heads are borne in corymblike clusters. This plant is often seen in August growing in dense clumps with the subalpine larkspur, the gold of the ragwort setting off the deep purple-blue of the larkspur. The **toothed ragwort** (*Senecio serra* Hook.) is similar, but its leaves are narrow and tapering.

Hoary ragwort (*Senecio werneriaefolius* Gray), a beautiful silvery plant with many golden yellow flower heads, grows on stony or gravelly ground at high altitudes. Its leaves are quite entire.

Dwarf or **alpine senecio** (*Senecio taraxacoides* (Gray) Greene) (fig. 99).—A plant about 6 inches high, rather fleshy; leaves ovate or spatulate; margins toothed; midribs, petioles, and younger leaves purplish, sometimes woolly; heads one or few, large, an inch or more across; involucres purplish; rays light yellow, nearly one-fourth inch wide. A similar species with solitary heads and smaller spatulate leaves is *Senecio Holmii* Greene. *Senecio soldanella* Gray is also found at very high altitudes. It has round or obovate leaves on long petioles and large solitary heads about 1 inch high.

Thick-bracted senecio (*Senecio crassulus* Gray).—Two to five orange-yellow flower heads; found in some subalpine meadows.

Its basal leaves, when present, are spatulate or oblong with rounded apex; the remaining leaves acute at apex, the leaf margins mostly entire but occasionally showing a few very tiny teeth.

Grass-leaved senecio (*Senecio spartioides* T. & G.).—This rather bushy plant covered with numerous yellow-rayed flower heads is common along roadsides, around buildings, and on fields of the montane zone. Its leaves are very narrow and some of them have a few narrow pinnate lobes projecting at right angles. It begins to bloom in late July and continues into September.

Black-tipped senecio (*Senecio atratus* Greene).—Foliage and stem grayish with woolly hairs, leaves entire (or margins sometimes with very small teeth), flower heads very numerous and small; involucral bracts with conspicuous black tips. Found on hillsides of the subalpine zone.

Perplexing senecio (*Senecio perplexus* A. Nels.).—A very variable plant, as its name implies. The most constant character is the very short peduncle of the central head. The plant is usually woolly with loose white hairs, the leaves entire or with a few small irregularities. It is an early blooming species found on montane hillsides in May and June.

Fendler senecio (*Senecio Fendleri* Gray).—Somewhat similar to the last and often found with it, but the central peduncle not conspicuously shorter than the others, and the leaves pinnately lobed, the lobes resembling the teeth of a comb. In addition, the leaves are usually folded. This also begins to bloom in June in the montane zone and continues throughout the summer. It is frequently seen growing from the foothills to timber line.

Western golden ragwort (*Senecio eremophilus* Rich.).—This plant is conspicuous along the banks of the Bear Lake Road and on other roadsides and around dwellings. It is bushy and covered in midsummer with bright yellow flower heads. When it goes to seed it is still conspicuous because of the white pappus of the achenes. The leaves are dark green, smooth, and deeply pinnately lobed. The **rock ragwort** (*Senecio carthamoides* Greene), a rather similar plant found in subalpine and alpine rock slides, has tufts of leafy stems, each bearing one or more large flower heads with light yellow rays.

Orange ragwort (*Senecio crocatus* Rydb.).—One of the most common plants in many wet subalpine meadows, where its orange rays make it conspicuous. The upper leaves clasp the stem by a broad base and are abruptly narrowed near the middle, with a tapering point. All the leaves are more or less lobed or toothed. A similar plant with yellow rays is *Senecio dimorphophyllus* Greene.

Parry goldenrod (*Oreochrysum Parryi* (Gray) Rydb.).—A plant of lodgepole forests, meadows, and aspen groves; foliage light green; rays pale yellow; heads about one-half inch high, outer bracts rather

loose and leafy; stems from a slender running rootstock; blooming season, August.

Goldenrod.—A group of similar plants, difficult to distinguish, the genus usually easily recognized by the dense sprays of small yellow flower heads blooming in late summer and autumn. The **dwarf goldenrod** (*Solidago decumbens* Greene) is our most common species. Its stems are from 1 or 2 inches high up to a foot or more. It is common on open fields at all altitudes. Its foliage is smooth, dark green sometimes tinged dark reddish, or with leaves red underneath; stems usually red; leaves tapering to the base, toothed around the upper half. A similar plant with narrow leaves, their petioles and the inner bracts fringed with fine hairs, is *Solidago ciliosa* Greene.

FIGURE 100.—Brown-eyed Susan. Yellow with very dark brown center, plant 10 to 18 inches high. Photograph by Joseph Dixon

Tall goldenrod (*Solidago serotina* Ait.).—Stems 2 to 4 feet high, long leaves tapering to both ends and finely toothed; found along banks of streams and in meadows of the montane zone. Other species growing in the park are: *Solidago missouriensis* Nutt., *Solidago pulcherrima* A. Nels., *Solidago concinna* A. Nels., and *Solidago elongata* Nutt.

Brown-eyed Susan (*Rudbeckia hirta* L., also called *R. flava* Moore) (fig. 100).—The well-known "Susan", with its large gold and chocolate flower heads and rough foliage is frequently seen in mountain meadows. It may be distinguished from gaillardia, which it is sometimes considered to resemble, by the shape of the rays which taper to the apex and the lack of the three distinct teeth of gaillardia, as well as the smooth cone-shaped disk.

Goldenglow (*Rudbeckia laciniata* L., also called *R. ampla* A. Nels.).—A very tall, smooth plant with large flower heads 2 to 4 inches across, drooping yellow rays, and greenish-yellow disk. It is frequent along streams of the montane zone.

Dwarf sunflower (*Helianthus pumilus* Nutt.).—A perennial bushy plant, very rough-hairy, bearing numerous "sunflowers" 1 to 2 inches across, with bright yellow rays and dull yellow or brownish disks. It is abundant on open rocky slopes below 9,000 feet. The **annual sunflower** (*Helianthus annuus* L.) adventive in the park, a taller plant with larger heads, is sometimes seen along roadsides and around ranches.

Aspen sunflower (*Helianthella quinquenervis* (Hook.) Gray).—A tall, slender plant with one or few large flower heads 3 to 4 inches across, pale-yellow rays, and brownish or greenish-yellow disk. The long, tapering leaves are mostly 5-nerved. This plant is most frequently seen on damp soil in aspen groves of the montane zone, though it is occasionally found in meadows or in open spruce forests.

Thistle (*Cirsium*, also called *Carduus* or *Cnicus*).—Nearly everyone is familiar with these plants, which are easily recognized by the lobed and spiny leaves and by the typical thistle flower heads. These heads are discoid but the tubular corollas are exceptionally long and split into narrow divisions, so that the head has a looser appearance than most discoid flower heads.

Purple thistle (*Cirsium filipendulum* Engelm.).—Frequently seen around buildings, along roadsides, and on open fields. Its foliage is whitened with woolly hairs, which disappear as the leaves get older, and the heads are a beautiful rose-purple.

Drummond thistle (*Cirsium Drummondii* T. & G.).—The several heads are whitish or cream-colored; found in meadows and along stream banks. Its variety, *Cirsium Drummondii acaulescens* (Gray) Coville, the **stemless thistle**, with the flower heads sessile in a basal rosette of leaves, is found in rock slides of the subalpine and alpine zones, and occasionally in lower meadows. *Cirsium bipinnatum* (Eastw.) Rydb. with purple heads has also been found.

Dwarf rabbit brush (*Chrysothamnus pumilus* Nutt.).—This bushy plant, usually not over a foot high, becomes conspicuous in late August and September on open fields of the montane zone. Its leaves are linear and often somewhat twisted; its numerous tiny yellow heads are held erect. *Chrysothamnus Parryi* is found at the edge of the park on the western side and *Chrysothamnus viscidiflorus* (Hook.) Nutt. grows near Eagle Cliff.

Catspaw.—Plants related to the everlasting flowers, with white or silvery foliage and oblong or oval flower heads, the inner bracts of which are papery, either white, pink, or brownish. They usually grow in mats and spread by leafy stolons.

Sun-loving catspaw (*Antennaria aprica* Greene).—One of the most abundant plants of the open fields. It forms large mats of whitish foliage, and in May sends up short stems 2 to 4 inches high, bearing several heads with white or rarely pinkish, papery bracts. The leaves are rounded, tapering to a broad petiole, or spatulate-shaped. The **brownish catspaw** (*Antennaria umbrinella* Rydb.), similar to the above but with brownish bracts, has also been found.

Beautiful catspaw (*Antennaria pulcherrima* (Hook.) Greene).—A plant 6 to 10 inches tall having long whitish leaves with distinct parallel nerves; sometimes found on partly shaded hillsides, blooming in July and August.

Pussytoes (*Antennaria rosea* (Eat.) Greene).—Stems 4 to 8 inches tall; heads oval, inner bracts bright rose, pink, or white. In our region this plant seems to be most common in the subalpine zone.

Pearly everlasting (*Anaphalus subalpina* (Gray) Rydb., also called *A. margaritacea*).—Very abundant on the burned-over lands of the subalpine zone, especially around Bear Lake and along the upper part of the Fall River Road. The stems are usually about a foot high, the leaves narrowly lanceolate or linear, green above; the stems and under side of leaves are white with soft, loose cottony hairs; heads numerous, corymbosely clustered; bracts pure white, papery.

Cudweed (*Gnaphalium decurrens* Ives).—Less abundant than the preceding, but rather similar in general appearance. The stem is yellowish-green and sticky, at least on the lower part, rather than white-cottony, and the bracts are cream-colored and satiny.

Gayfeather or **blazing star** (*Liatris punctata* Hook.).—This plant grows in tufts on the open fields where its spikes of brilliant purple, feathery flower heads make it conspicuous.

Mountain sage or **wormwood** (*Artemisia*).—A very large genus with many representatives in this region. Most of them are inconspicuous, as their flower heads are very small and never brightly colored. They are in no way related to the true sage (*Salvia*) of which there are no representatives in the park. Most of the wormwoods have a very bitter sap and many of them a pleasantly aromatic odor. The involucral bracts are often edged with dark brown or black. Many of these plants have very attractive silvery foliage.

Sagebrush (*Artemisia tridentata Nutt.*).—In a dwarf condition, this is found in colonies in a few places in the park on the eastern side of the Continental Divide, especially in Glacier Basin, on the south and west slopes of Deer Mountain, and around Horseshoe Park. It is a woody shrub rarely over a foot high in this vicinity, with wedge-shaped, 3-toothed, silvery leaves. On the western slope around Grand Lake it is more abundant and grows to a greater size, and another species with longer, entire leaves, *Artemisia cana* Pursh, is found with it.

Arctic or **mountain sage** (*Artemisia frigida* Willd.).—Tufts of silvery, fringed leaves and slender racemes of nodding yellow flower heads; abundant throughout the park, especially among rocks. The aromatic heads of this plant were used by the early mountaineers to make a very bitter tea which was considered an excellent tonic and a remedy for mountain fever.

In addition, the following species grow in the park: *Artemisia Pattersoni* Gray, *A. saxicola* Rydb., *A. scopulorum* Gray, *A. ludoviciana* Nutt., *A. gnaphalodes* Nutt., *A. coloradensis* Osterh., *A. canadensis*

Michx., *A. aromatica* A. Nels., *A. arbuscula* Nutt., *A. nova* A. Nels., and *A. silvicola* Osterh.

Alpine hawksbeard (*Crepis alpicola* (Rydb.) A. Nels.).—A plant of the alpine zone usually with only one flower head and no leaves on the stem. The yellow flowers are all ligulate, the involucre covered with black hairs. Another species of **hawksbeard** found in the park, usually in montane meadows, is *Crepis runcinata* T. & G.

Burnt-orange dandelion (*Agoseris aurantiaca* (Hook.) Greene, also called *Troximon aurantiacum* Hook.).—The flowers are dark orange, the leaves dark green and entire. The plant is found on moist soil of the subalpine zone.

Tall false dandelion (*Agoseris glauca* (Nutt.) Greene, also called *Troximon glaucum* Nutt.).—Large yellow heads resembling the common dandelion, but with leaves pale green and usually not much lobed; found around ranches and roadsides below 9,000 feet. *Agoseris laciniata* (Nutt.) Greene, resembling the last, but smaller and having the leaves distinctly toothed, also occurs. The **hairy false dandelion** (*Agoseris villosa* Rydb., also called *Troximon villosum* (Rydb.) A. Nels.), similar but more or less hairy and with involucral bracts spotted with black, is found in the subalpine zone.

Rock dandelion (*Taraxacum scopulorum* (Gray) Rydb.).—A diminutive plant, stem usually less than 2 inches high, with leaves resembling the common dandelion, and small yellow heads is sometimes found among rocks in the high alpine region.

Common dandelion (*Taraxacum officinale* Weber) has been introduced into this region, where it thrives well and is very abundant around dwellings and in meadows.

Slender hawkweed (*Hieracium gracile* Hook.).—A plant with a basal rosette of obovate or spatulate leaves from which rises a slender stem bearing 1 to 3 pale yellow flower heads with black-hairy involucres. **White-flowered hawkweed** (*Hieracium albiflorum* Hook.) is similar but has no black hairs. Its flowers are whitish and the basal leaves have long white hairs.

In addition, the following composite plants, either inconspicuous or rarely seen, have been identified in the park, and most of them may be recognized by characters given in the key: **Coneflower** (*Ratibida columnaris* (Sims) Don.); **sheathflower** (*Brickellia grandiflora* Nutt., also called *Coleosanthus grandiflora* (Hook.) Kuntze); **milkpink** or **skeleton weed** (*Lygodesmia juncea* Don.); **rattlesnakeroot** (*Prenanthes racemosa* Michx., also called *Nabalus racemosus* (Michx.) DC.); **careless weed** or **horse weed** (*Iva xanthifolia* Nutt.); and *Pyrrocoma crocea* (Gray) Greene. To date, the last has been found only on the western slope.

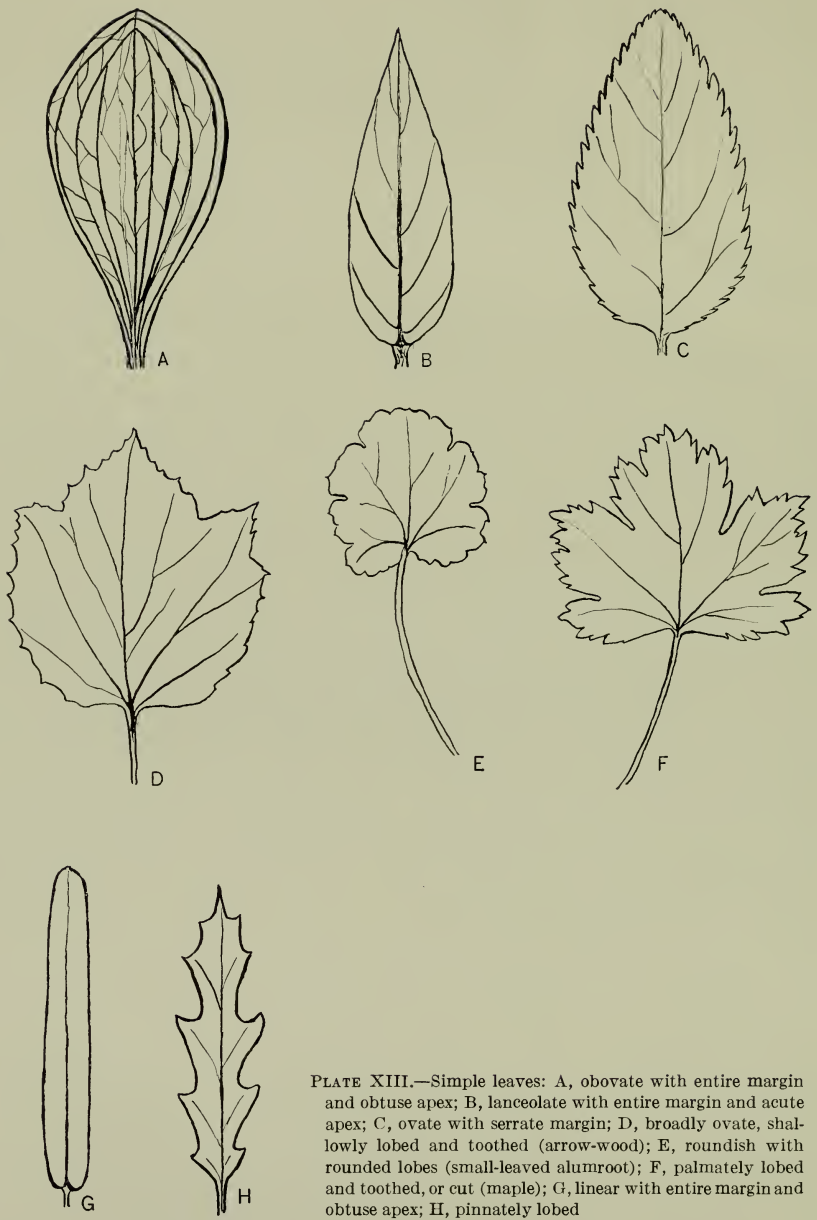


PLATE XIII.—Simple leaves: A, obovate with entire margin and obtuse apex; B, lanceolate with entire margin and acute apex; C, ovate with serrate margin; D, broadly ovate, shallowly lobed and toothed (arrow-wood); E, roundish with rounded lobes (small-leaved alumroot); F, palmately lobed and toothed, or cut (maple); G, linear with entire margin and obtuse apex; H, pinnately lobed

PLATE XIV.—A, B, and C, compound leaves: A, palmately compound leaf (lupine); B, trifoliate leaf (buckbean), showing sheathing base of petiole; C, pinnately compound leaf (rose), showing stipules at base of petiole. D and E, leaf arrangement: D, alternate; E, opposite. Drawings by L. W. Durrell

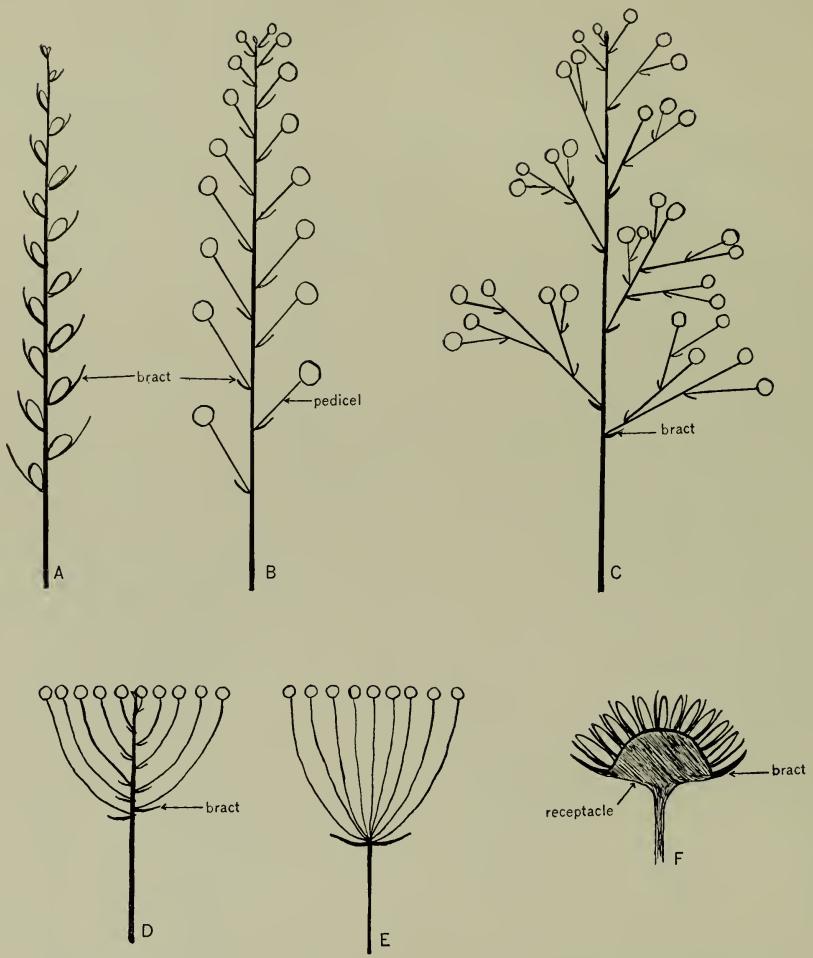


PLATE XV.—Diagrams of types of inflorescence. A, spike; B, raceme; C, panicle; D, corymb; E, umbel; F, head

GLOSSARY

Achene. A small, dry, hard, 1-celled, 1-seeded, nonsplitting fruit.

Acuminate. Taper-pointed.

Acute. Sharp-pointed or ending in a point less than a right angle.

Adnate. United in growth; the calyx is adnate to the seed pod in the bluebell family.

Adventive. Plants of foreign origin becoming naturalized in our region.

Alpine zone. That region above timber line, usually above 11,500 feet.

Alternate. (Used of leaves, branches, etc.) Occurring singly at the nodes. Plate XIV, d.

Ament. See catkin.

Annual. Of only one year's duration.

Anther. The essential part of the stamen, which contains the pollen.

Aquatic. Growing in water.

Awl-shaped. Sharp-pointed from a broader base.

Axillary. Occurring in the axils.

Axil. The upper angle between a leaf and the stem.

Axis. The central line of any body; the organ round which others are attached.

Bract. In general the leaves of an inflorescence, more or less different from ordinary leaves; always sessile; specially the small leaf or scale in the axil of which a flower or its pedicel stands.

Bulbeet. A small bulb, especially one borne upon the stem or in the inflorescence.

Caespitose. Growing in turflike patches or tufts.

Calyx. The outer circle of floral leaves, made up of the *sepals* which may be either distinct or joined together. If only one circle is present, it is called a calyx even though it is showy and appears like a corolla.

Carpel. The unit of structure of the pistil, which may consist of a single carpel or of several carpels.

Catkin. A scaly spike of small flowers of which the pussy willow is a typical example. Also called an ament.

Ciliate. Beset on the margin with a fringe of hairs.

Corolla. The inner circle of floral leaves, usually showy. It is made up of *petals*, which may be either united or separate. It is always surrounded by a calyx.

Corymb. A flat or convex flower cluster, with branches arising at different levels and flowers blooming at the outer edges first. Plate XV, d.

Cotyledons. The seed leaves, the first leaves of the embryo.

Crenate. (Of margins of leaves and petals.) With rounded teeth.

Deciduous. Falling off or subject to fall; applied to plants whose leaves fall in autumn.

Decumbent. Reclined on the ground, the summit tending to rise.

Dentate. Toothed.

Dicotyledonous. Used of plants which have a pair of cotyledons in the embryo.

Dioecious. Unisexual, with the two kinds of flowers on separate plants.

Disk. The face of any flat body; the central region of a head of flowers, like the sunflower, as opposed to the *ray* or margin; a fleshy expansion of the receptacle of a flower.

Dissected. Cut deeply into many lobes or divisions.

Ecology. The study of plants in relation to their surroundings.

Entire. The margin not at all toothed, notched or divided. Plate XIII, A, B, and C.

Evergreen. Holding the leaves over winter or longer, until new ones appear.

Exserted. Protruding out of, as the stamens out of the corolla.

Fertile. Fruit-bearing, or capable of producing fruit; also applied to anthers when they produce good pollen.

Filament. The stalk of a stamen; also any slender thread-shaped appendage.

Floret. A small flower, usually one of a dense cluster.

Frond. The leaf of ferns.

Genus, plural *Genera.* A group of plants made up of closely related species.

Glabrous. Smooth, having no hairs, bristles, or other pubesence.

Glaucous. Covered with a fine white powder that rubs off (bloom), like that on a fresh plum or a cabbage leaf. It often gives foliage a bluish appearance.

Habitat. The situation in which a plant grows in a wild state.

Herb. A plant with no persistent woody stem above ground.

Herbaceous. With the texture of common herbage; not woody. Applied to plants which are herbs as distinguished from those which are shrubs or trees.

Imbricate. Overlapping (as shingles on a roof), either vertically or spirally, where the lower piece covers the base of the next higher; or laterally as in the arrangement of a calyx or corolla, where at least one piece must be wholly external and one internal.

Imperfect flowers. Lacking either stamens or pistils.

Indusium. The shield or covering of the sorus ("fruit-dot") of a fern.

Inferior. Applied to the seed pod when the calyx and corolla are placed on top of it instead of being inserted at its base inclosing it.

Inflorescence. The flowering part of a plant and especially the mode of its arrangement. Plate XV.

Involucre. A whorl or set of bracts around a flower, umbel, or head.

Irregular. Used to describe a calyx or corolla in which all the parts are not alike. Violets and sweetpeas are examples of irregular flowers, while a wild rose is a regular flower.

Keel. Used to describe the two lower petals of flowers of the pea family; also any projecting ridge on a surface, like the keel of a boat.

Lanceolate. Lance-shaped. Plate XIII, B.

Leaflet. One of the divisions or blades of a compound leaf.

Linear. Narrow and flat, the margins parallel. Plate XIII, G.

Lobe. Any projection or division (especially a rounded one) of a leaf, etc.; used also of the divisions of a united corolla.

Merous. Referring to the number of parts of the flower.

Midrib. The middle or main rib of a leaf.

Monocotyledonous. Used of plants which only have one cotyledon in the embryo.

Montane zone. The region between 6,000 and 9,000 feet, which contains mostly a mixed forest of western yellow pine and Douglas tree, with lodgepole pine coming in on burned areas above 8,000 feet, also aspen groves and many open fields and hillsides.

Naturalized. Introduced from a foreign country, but growing wild and propagating freely by seed.

Needle-shaped. Long, slender and rigid, like the leaves of pines.

Node. A knot; the joints of a stem, from which the leaves arise.

Obovate. The broad end upward, inversely ovate. Plate XIII, A.

Opposite. Applied to leaves and branches when an opposing pair occurs at each node. Plate XIV, E.

Ovary. That part of the pistil which contains the ovules (young seeds).

Ovate. Shaped like the section of an egg, with the broader end downward. Plate XIII, C.

Palmate. Applied to a leaf whose leaflets, divisions, or main ribs all spread from the apex of the petiole, like a hand with outspread fingers. Plates XIII, F, and XIV, A.

Panicle. An open or dense cluster in which the secondary branches are branched again. Is usually used of an inflorescence. Plate XV, C.

Papilionaceous. Butterfly-shaped; applies to such a corolla as that of the pea or bean.

Pedicel. The stalk of each particular flower of a cluster.

Peduncle. A flowerstalk, whether of a single flower or of a flower cluster.

Pendent. Hanging.

Perennial. Lasting from year to year.

Perfect. A flower containing both pistil and stamens. The calyx and corolla are not necessarily present.

Perianth. The floral envelopes of the flower; especially when the sepals and petals can not be distinguished, as in many plants of the lily family.

Petal. A constituent member of the corolla. (See *corolla*).

Petaloid. Petallike; resembling or colored like petals.

Petiole. The leaf-stalk.

Pinna, plural *pinnae.* One of the divisions of a pinnately divided leaf, used especially of ferns.

Pinnate. (Leaf). Leaflets disposed along the main axis of the leaf; feather-veined (secondary veins arising from a midrib). Plate XIV, C.

Pinnately lobed, cleft, parted, divided, etc. The varying depths of division of a pinnate (feather-veined) leaf. Plate XIII, H.

Pistil. The seed-bearing organ of the flower. It is made up of the *ovary*, which becomes the seed pod, the *style*, and the *stigma.*

Plumose. Plumed or feathery.

Pollen. Pollen grains; the male element in flowering plants which must be deposited on the stigma of the pistil in order that the ovules may be fertilized and develop into seeds.

Polygamous. With both perfect and imperfect flowers on the same plant.

Produced. Extended or projecting, as the upper sepal of a larkspur is *produced* above into a spur.

Pubescence. Fine and soft hairs.

Pubescent. Covered with fine, soft hairs.

Raceme. A flower cluster with one-flowered pedicels along the axis of inflorescence. Plate XV, B.

Rachis. An axis bearing close-set organs; especially the midrib of a fern frond.

Radiate. Furnished with ray flowers.

Ray. The marginal flower of a head or cluster when different from the rest, especially when ligulate; the branch of an umbel.

Receptacle. The more or less expanded or produced end of an axis which bears the organs of a flower or the collected flowers of a head.

Reflexed. Bent outward or backward.

Regular. Used to describe a calyx or corolla in which all the parts are similar.

Rudimentary. Imperfectly developed, or in an early stage of developemnt.

Runner. A slender and prostrate branch rooting at the end or at the joints. Strawberries are examples of plants having such *runners.*

Sepal. A constituent member of the calyx.

Serrate. Serrated. With margin cut into teeth pointing forward. Plate XIII, C.

Sessile. Without any stalk, as a leaf destitute of petiole, a flower destitute of pedicel or an anther destitute of filament.

Shrub. A woody perennial, smaller than a tree, usually with several stems.

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Silky. Glossy with a coat of soft fine, close-appressed, straight hairs.

Silvery. Shining white or bluish-gray, usually from a silky pubescence.

Simple. Of one piece, opposed to compound.

Sorus, plural *sori.* The "fruit-dots" of ferns, a cluster of little sacs, each of which contains many spores. Sori usually occur in characteristic arrangement on the back of the fertile frond.

Spatulate. Gradually narrowed downward from a rounded summit.

Species. A group containing all the individuals of a particular kind of plant.

Spicate. Arranged in or resembling a spike.

Spike. A form of simple inflorescence with the flowers sessile or nearly so upon a more or less elongated common axis. Plate XV, A.

Stamen. The pollen-bearing organ, made up of the *filament* and the *anther* which contains the pollen.

Stigma. The region of the pistil which receives the pollen.

Stipules. The appendages on each side of the base of certain leaves. Plate XIV, C.

Style. The beaklike prolongation of the pistil above the ovary, which bears the stigma.

Subalpine zone. The region between 9,000 feet and timber line containing heavy Engelmann spruce-alpine fir forest, meadows, and bogs. On the exposed ridges will be found a stunted gowth of limber pine, and on the burned areas lodgepole pine. In general this zone supports the most luxuriant plant life of the mountains.

Superior. Used of the ovary when the other parts of the flower are inserted at its base or below it, as in the buttercup family.

Ternate. Arranged in threes.

Timber line. The line on mountains where tree growth stops due to severe climatic conditions, and above which only herbs and dwarf shrubs are found. The last trees are often much deformed by the high winds and quite frequently become prostrate.

Umbel. The umbrellalike form of inflorescence in which the peduncles or pedicels all arise from one point and are of different lengths, so that the top of the inflorescence is more or less flat. Plate XV, E.

Whorl. A group of three or more similar organs radiating from a node.

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