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Plants
of

Yellowstone
National Park



ROCKY MOUNTAIN FRINGED GENTIAN.
(Colored from a copyrighted photograph by J. E. Haynes.)

UNITED STATES DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, Secretary
NATIONAL PARK SERVICE
ARNO B. CAMMERER, Director



PLANTS

OF

YELLOWSTONE NATIONAL PARK


By
W. B. McDOUGALL and HERMA A. BAGGLEY



With Illustrations and Keys for Identification



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PLANTS OF YELLOWSTONE NATIONAL PARK

INTRODUCTION

The Yellowstone National Park contains a great variety of scenic phenomena. There are the incomparably beautiful hot spring terraces, the spectacular geysers, the unrivaled Yellowstone Lake, the Grand Canyon of the Yellowstone, of almost unbelievable charm, and there is the wildlife, both animal and plant. But it is the latter, the plant life, that furnishes most of the color and beauty in the park. This is no more, and no less, true in the park than elsewhere. The whole surface of the earth is made beautiful by the vegetation that clothes it. Indeed, it is difficult to imagine what a drab place this world would be, were it not beautified by the infinite variety of forms of plant life. In view of these facts, it is not surprising that for a very large percentage of park visitors the wild flowers constitute one of the chief attractions, and that there is a constant demand for an illustrated book to aid in identifying the various kinds.

It is for the purpose of supplying this demand that the present publication has been prepared. It is the result of several years of study in the park by both authors. An effort has been made throughout the book to avoid technical language, so far as possible, and to make use of characters that are readily observed in the field even without the use of a lens. We advise anyone who has had no botanical training to read all of the introductory matter (pp. 1-8) before attempting to use the book. We believe that having done this he will be able, by using the keys, descriptions, and illustrations, to determine accurately the name of any wild flower or tree that he may find in the park.

The common names used agree, insofar as possible, with "Standardized Plant Names" prepared by the American Joint Committee on Horticultural Nomenclature, supplemented by the personal suggestions of Dr. Frederick V. Coville, of that Committee. When names could not be found in that list, however, some have been taken from the "New Manual of Rocky Mountain Botany" by Coulter and Nelson, the "Flora of the Rocky Mountains and Adjacent Plains" by Rydberg, or the "Standardized Plant Names" of the United States Forest Service. At best, however, the common names of plants are very local in their application. The same plant

is often known by entirely different names in different localities, or the same name may be applied to wholly unrelated plants in different parts of the country. For this reason, it is necessary to use scientific names in addition to the common names in order to make clear the plants with which we are dealing.

Except where authorities in special fields have been consulted, the scientific nomenclature follows for the most part the "New Manual of Rocky Mountain Botany" by Coulter and Nelson. For the plants not included in this manual, with the exception of the grasses and trees, we have followed the nomenclature of Rydberg's "Flora of the Rocky Mountains and Adjacent Plains." For the grasses Hitchcock's "Manual of the Grasses of the United States" has been consulted, and for the trees Sudworth's "Check List of the Forest Trees of the United States, Their Names and Ranges."

We have omitted the authorities for the scientific names, because we believe they would be confusing rather than helpful to the great majority of those who will use the book and of little value to anyone unless verified by more intensive research.

We have endeavored to include all plants that seem to have been authentically reported as occurring in the park, but those that are somewhat doubtful are merely listed without descriptions.

We hereby solicit corrections and criticisms from users of the book, for the improvement of any future editions must depend largely upon such help.

It would be impossible to mention everyone who has contributed to the preparation of this publication. The authors feel especially indebted to Dr. Henry S. Conard, without whose preliminary work on the flora of the park this book would scarcely have been possible, and to Dr. Aven Nelson, Dr. Frederick V. Coville, Dr. A. S. Hitchcock, Mrs. Agnes Chase, Dr. S. F. Blake, and Dr. William R. Maxon for many identifications, verifications of identifications, and helpful suggestions. They are also deeply grateful to Dr. H. C. Bryant for his interest and encouragement and to other members of the personnel of the National Park Service and of Yellowstone Park in particular who have contributed in any manner. The line drawings have been made by Mrs. Marguerite L. Arnold, and the cover design by R. J. Cheesman, to whom the authors are under deep obligation. All contributions of photographs are acknowledged in the legends of the figures. To each and everyone who has aided in any way, directly or indirectly, in the preparation or publication of the book sincere appreciation is hereby expressed. If the work, in any measure, serves to aid park visitors in enjoying the natural beauty of Yellowstone National Park the purpose of the authors will have been accomplished.

DEVELOPMENT OF THE PARK VEGETATION

The area now occupied by Yellowstone National Park has not always been as we see it today. Geologists tell us that millions of years ago, before there were any Rocky Mountains or any birds or mammals, this entire region was an inland sea, an arm of the ocean. That sea existed here for a very long time, but finally there came a period of great earthquake activity during which the whole area was gradually pushed upward, far above sea level, and the Rocky Mountain system was formed. But throughout the entire history of the world, whenever there has been a period of mountain building, such a time has been followed by a period of volcanic activity, and the Yellowstone region was no exception. Great quantities of molten lava were poured from volcanoes or from fissures in the earth's surface and spread out over the area burying the former bottom of the sea to a depth of hundreds of feet. Following this activity there must have been a time when the whole region had a surface of dry, bare rock with absolutely no soil and no plants of any kind. There would, of course, be depressions filled with water but otherwise nothing but hard, lava rock.

How would nature go about it to develop the beautiful vegetation that we have in the park today on such a rock surface as we have assumed? The only plants that can grow on dry, bare rock, without any soil at all, are certain lichens. A lichen is not a single plant, but is a combination of algae and fungi growing together, and it is an interesting fact that, while practically all common algae grow in water and most of the common fungi grow in places that are at least moist, when the two are together in the sort of structure that is called a lichen they can grow in drier places than any other plants.

They are always the pioneer plants on dry, bare rock and many of the brilliant colors that we see on rocks and boulders throughout the country are due to the lichens that are growing on them, for lichens occur in a variety of colors such as red, yellow, orange, green, black, brown, or gray.

There are three general types of lichens. The first type that appears on the naked rock is very thin and crustlike, appearing much like a smear of paint, and for this reason it is called a crustose lichen. The crustose lichen grows very slowly, but it gradually brings about a slight disintegration of the rock surface, thus initiating the process of soil formation. As soon as a thin layer of dustlike soil has been formed the second type of lichen may appear. This second type is more or less leaflike, like foliage, and so is called a foliose form. It also grows very slowly, but it continues the process of rock disintegration, and it has body enough to catch some wind-blown dust. Thus after a long period of time soil enough will have accumulated

for the third type of lichen. This type has upright, fruiting branches and is called a fruticose form. Along with fruticose lichens there usually come the mosses and with the upright lichens and mosses growing on the rock the development of a soil will proceed somewhat more rapidly, although it will still be pretty slow. These plants continue the disintegration of the rock surface, they catch wind-blown materials, some of the plants die and their dead bodies are added to the soil as humus, and so in time there is soil enough for certain grasses and flowering plants. The building of a soil will now proceed still more rapidly until, finally, there will be soil and water enough in the soil to support woody plants, first the smaller shrubs, but eventually trees.

Thus it comes to pass that we have a forest where at first there was nothing but bare rock. To be sure the development is usually not so orderly as we have briefly outlined it, for there are practically always destructive agencies to interfere. There is abundant evidence that this has been true in Yellowstone Park. In the northeastern part of the park entire forests were completely buried by volcanic ash and later became petrified. There were glaciers that completely destroyed the existing vegetation over considerable areas. There have been fires and other agencies that have practically destroyed the plant life in more limited areas. In general, however, the vegetation of Yellowstone Park must have developed much as we have described it, and it is still developing. Under present climatic conditions the climax of vegetation development in the park is a spruce-fir forest. Theoretically, therefore, as the leveling forces of nature continue their work, thus bringing about more nearly medium conditions with respect to the water supply throughout the park, there should come a time, in the far distant future, when most of the park would be occupied by a spruce-fir forest.

PRESENT TYPES OF VEGETATION IN THE PARK

As a result of the developmental processes that have been described, we find several more or less distinct types of vegetation in the park at the present time. All of the developmental stages mentioned are represented in the park. In some places all may be found within an area of a few square feet. Also there is a comparable series of stages in the development from a free water surface to a forest, and all of these may be found to a limited extent in the park. However, disregarding the minor units and subdivisions, a general birdseye view of the park shows us seven outstanding types of plant communities. These may be briefly characterized as follows:

1. *Aquatic communities*.—These are found in the streams and lakes and are made up of plants that grow in flowing or standing water.

2. *Sagebrush deserts*.—The great central plateau of the park varies in elevation between 7,000 and 8,500 feet, but some of the northern end extends somewhat below 6,000 feet. The sagebrush deserts are typical of the lower portions, 6,000 to 7,500 feet. Between Mammoth and the North Entrance two other typical desert plants, **Grease-wood** (*Sarcobatus vermiculatus*) and **Pricklypear** (*Opuntia polyacantha*), are found with the sagebrush. The climate of the park, however, is not a desert climate and these deserts are very slowly and gradually being replaced by forests.

3. *Alpine and subalpine meadows*.—Characterized by grasses, sedges, and many kinds of flowers. Timberline in the park is at approximately 10,000 feet. The alpine meadows are those above timberline, while the subalpine meadows are those below timberline. The chief difference in appearance of the two is due to the dwarf condition of all alpine plants. Both display a riot of color throughout most of the park season. The only place in the park where most visitors ever get above timberline, however, is on Mount Washburn.

4. *Douglas-fir forest*.—This type of forest occurs below 7,000 feet and is very limited in the park. It is best seen at Tower Falls.

5. *Lodgepole pine forest*.—This is the most extensive type of plant community in the park covering nearly three-fourths of its area, mostly between 7,000 and 8,500 feet altitude. Lodgepole pine trees often grow in very dense stands, but they are adapted to a shallow soil. Their roots are very superficial, so that they are not well anchored, and the forest floor is usually covered with fallen trees. For this reason the fire hazard in this type of forest is very great during a dry season. Although this is the most extensive type of vegetation in the park, it is a temporary one so far as the development of the vegetation is concerned and will normally be replaced, sooner or later, by spruce and fir.

6. *Aspen forest*.—The aspen is the only common broad-leaved tree in the park. Aspen forests are not extensive in area, but because of the white bark and bright green foliage which becomes brilliantly yellow in autumn they are conspicuous. This type of vegetation often succeeds a forest fire and may also develop in moist depressions or ravines.

7. *Spruce-fir forest*.—Engelmann spruce and alpine fir have already replaced the lodgepole pine in the more favorable situations, especially in the higher elevations, since this forest extends to timberline. A convenient place to observe at close range an example of this type of forest is along the Savage Trail from Canyon Lodge to the Upper Fall of the Yellowstone. Here the constant spray from the Upper Fall has made the water relation sufficiently favorable to enable the spruce and fir to replace the pine forest.

PLANT STRUCTURES

Although we have attempted to make this book as nontechnical as possible, it is necessary to recognize the fact that anyone who wishes to identify wild flowers efficiently must first know something of the language of the botanist; the language that the botanist uses in describing plants. The glossary which begins on page 140 will be found very helpful in becoming acquainted with many of the terms, but some of the more frequently used terms are explained more fully in the following paragraphs.

Leaves.—A typical, complete leaf (pl. II, fig. A) consists of three parts: the more or less expanded portion which is called the blade, the stemlike portion which is called the petiole, and two little appendages at the base of the petiole which are called stipules. In a very large number of cases the stipules are lacking and in many cases the petiole is also lacking. When the petiole is lacking and the blade is thus attached directly to the stem the leaf is said to be sessile. When the blade is all in one piece and undivided the leaf is a simple leaf, but if it is divided so that the leaf appears to have several blades instead of only one it is compound. These several parts of a compound leaf are called leaflets. Leaflets or the blades of simple leaves may be variously lobed or toothed, or their margins may be completely without teeth or lobes, in which case they are said to be entire. Some compound leaves, such as those of the rose or the elder, have a central axis like a feather, and the leaflets are attached along two sides of this axis. Such a leaf is said to be pinnate or pinnately compound (pl. II, fig. C). Others, such as the lupine, have the leaflets all attached to the end of the petiole and such a leaf is said to be palmate or palmately compound (pl. II, fig. B). These same terms, pinnate and palmate, are sometimes used to describe the arrangement of the veins of a leaf.

There are several terms that are used to describe the general shape of a leaf, and it will be necessary for us to understand the more frequently encountered of these (pl. III). One of them is lanceolate, or lance-shaped, which refers to a leaf that is rather long, widest near the base and gradually tapering to a rather long tip, like a spearhead. Another much-used term is linear, which refers to a leaf that is uniformly narrow and with parallel edges like a grass leaf. Only a little less frequently used are the terms ovate, oval, and elliptical. Ovate is like a longitudinal section through an egg with the larger end downward, while oval and elliptical have exactly the same meaning that they have in geometry or in common language. Frequently the prefix *ob-* is used with lanceolate and ovate and means inversely. Thus oblanceolate means lance-shaped, but with the narrower part toward the base and obovate means inversely ovate.

There are numerous terms that are used to describe the apexes and bases of leaves, but we can dispense with most of these and the few that we find it necessary to use will be readily understood as we come to them.

Flowers.—A complete flower consists of four sets of parts (pl. IV). Beginning at the outside, the first set consists of leaflike parts which are usually green and are called sepals. The sepals may be entirely separate or more or less grown together and all of the sepals collectively, whether united or not, make up the calyx. The parts of the second set of organs are also more or less leaflike, but usually some other color than green and are called petals. These, like the sepals, may or may not be united, and they collectively make up the corolla. The parts of the third set are called stamens. In most cases they are not at all leaflike. Each one consists, as a general rule, of a stalk-like portion called the filament and a headlike portion called the anther. Within the anther are found the numerous, minute pollen grains that contain the male elements of the plant. The number of stamens, varying from one to many in the different kinds of plants, is very important in the identification of plants. Finally, the fourth set of parts consists of one or more pistils, each pistil consisting, ordinarily, of three parts: a more or less slender portion called the style; an enlarged basal portion called the ovary within which are the ovules that contain the female elements and that later may develop into seeds; and a somewhat enlarged upper end to which pollen grains readily adhere and which is called the stigma.

Any one or more of these sets of parts may be missing, in which case the flower is said to be incomplete. More important to us, however, than the terms complete and incomplete are the terms perfect and imperfect. Any flower that has both stamens and pistils is perfect regardless of whether it has a calyx or a corolla or not, while if either stamens or pistils are lacking the flower is imperfect. This is due to the fact that the stamens and pistils are the organs that are directly concerned in reproduction.

Regular and irregular are also terms that are quite important. These refer especially to the corolla. If the petals or parts of the corolla are all the same size and shape the flower is said to be regular, while if they differ in either size or shape, or both, the flower is irregular.

The stem of a flower is called a pedicel, and a stem bearing a cluster of flowers is called a peduncle. The end of the pedicel to which the parts of the flower are attached is called the receptacle. Plate V illustrates the various arrangements of flowers on the stem.

HOW TO USE THE KEY

Approximately 1,050 species of plants are included in this book. Obviously, if it were necessary to search through the entire 1,050

every time we wished to learn the name of a plant, identification would be difficult. Therefore, a key has been prepared to aid us in finding the correct names of the plants in which we are interested. With a little practice in the use of this key, we should be able to name correctly any wild flower or tree that we find in the park. We shall find that at each step in the key we shall have two or more alternatives to choose from, and we must decide which alternative fits the plant that we have in hand. If we make the correct decision in each case, we shall find the correct name of the plant, and the correctness of our decisions will depend upon the accuracy of our observations. Therefore, we must learn to make accurate observations.

In order to see just how the key is to be used, let us take an example. Let us suppose that on one of our walks in the park we find some plants about 10 inches high with opposite, entire leaves and blue flowers. We stoop down to examine one of the flowers more closely, and we find that the corolla consists of a regular, 4-lobed tube, and that there are 4 stamens and 1 pistil with the stigma or upper end of the style divided into 2 parts. We are now ready to use the key.

Turning to the beginning of the key on page 12 we find we are confronted at once with two alternatives, both numbered 1. These are: "Plants without seeds or true flowers. Spore producing" and, "Seed-producing plants." Our plant has flowers and so is obviously a seed-producing plant. Therefore, we will choose the second alternative. This is followed by the figure 5, which means that 5 is our next step in the key and we can skip 2, 3, and 4. At 5 we again have two alternatives: "Woody plants (trees and shrubs)" and, "Non-woody plants." Since our plant is not at all woody, we again choose the second alternative and our next indicated step is 44. At 44 we choose the second alternative, "Plants with green leaves", and pass on to 50. In a similar manner we pass successively to 61, 62, 67, 69, 72, 80, 88, 89, 90, 91 (where we find three alternatives), and 92, choosing, in each case, the alternative that fits the plant in which we are interested. At 92 we find that the alternatives are: "Style branches 2" and "Style branches 3." We have already observed that the style of our plant has two branches, so we will choose the first alternative. This we find is not followed by another key number but by the name "**Gentian** (*Gentiana*)" and "p. 100." This means that if we have not made any mistake our plant is a gentian and is described on page 100. We will, therefore, turn to page 100. Here we will find several species of gentian described, and by reading these descriptions we will readily conclude that our plant is the **Rocky Mountain fringed gentian** (*Gentiana elegans*).

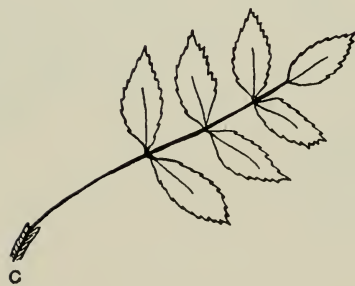
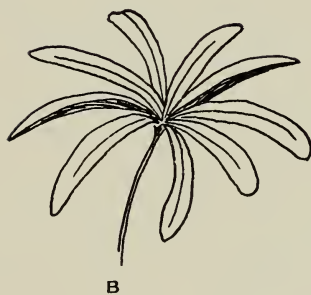
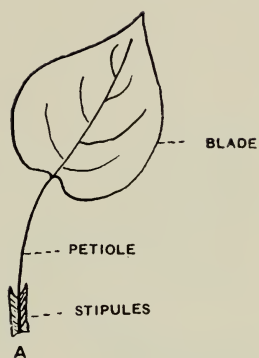
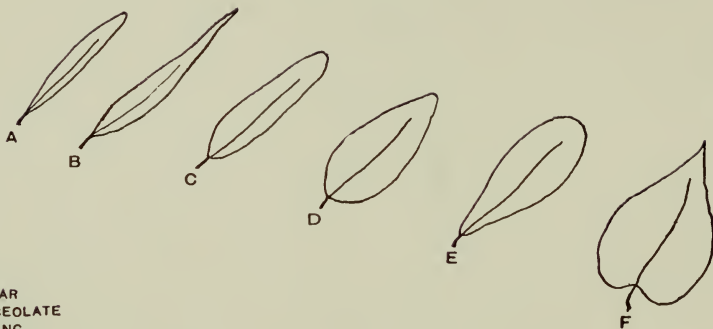


PLATE II.—Fig. A, simple leaf showing parts; fig. B, palmately compound leaf; fig. C, pinnately compound leaf.



- A—LINEAR
 B—LANCEOLATE
 C—OBLONG
 D—OVATE
 E—OBOVATE
 F—CORDATE

PLATE III.—Simple leaves.

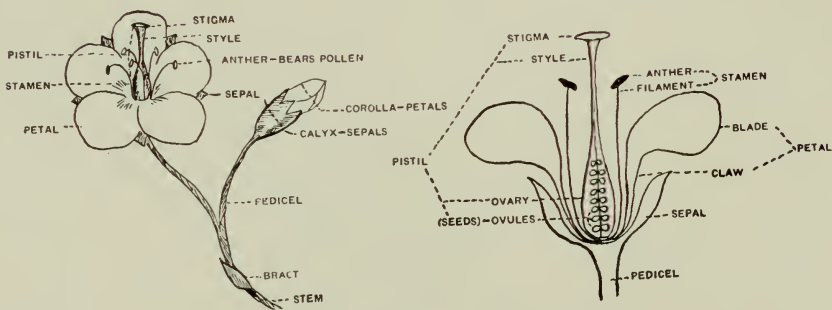


PLATE IV.—Parts of a typical flower.

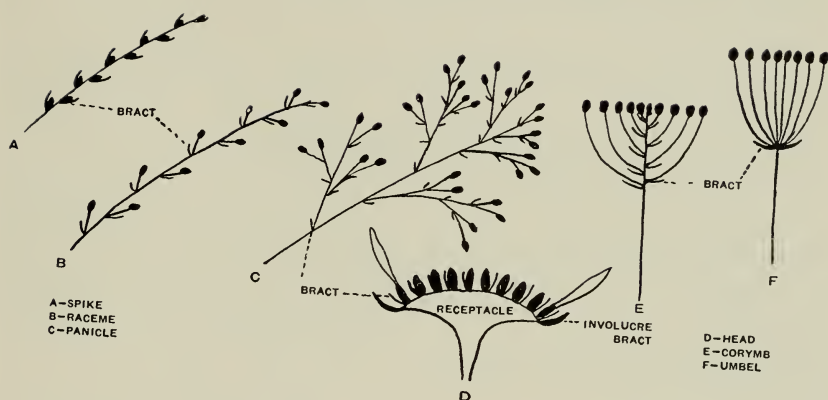


PLATE V.—Types of inflorescence.

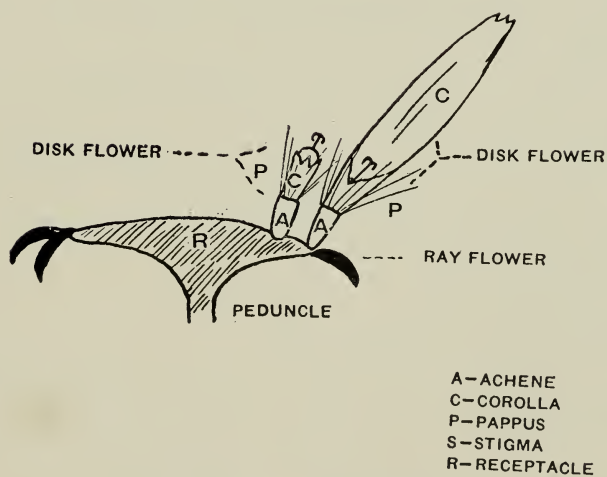


PLATE VI.—Composite flower head.

KEY TO THE COMMON SEED PLANTS, FERNS, AND FERN ALLIES OF YELLOWSTONE NATIONAL PARK

1. Plants without seeds or true flowers. Spore producing. 2.
1. Seed producing plants. 5.
2. Plants with jointed stems and no evident leaves. **Horsetail family**--- (p. 19)
2. Leafy plants. 3.
3. Mosslike plants with small leaves; spores of one kind. **Clubmoss family**--- (p. 20)
3. Mosslike plants with small leaves; spores of two kinds. **Selaginella family**----- (p. 21)
3. Water plants with grasslike leaves. **Quillwort family**----- (p. 20)
3. Land plants with branched or lobed leaves. 4.
4. Fruit bodies (sporangia) borne on specialized branches. **Adder's tongue family**----- (p. 17)
4. Fruit bodies borne on the lower surfaces or margins of the leaves. **Fern family**----- (p. 17)
4. Fruit bodies borne at base of leaves on short stalks. **Pepperwort family**----- (p. 19)
5. Woody plants (trees and shrubs). 6.
5. Non-woody plants. 44.
6. Trees. 7.
6. Shrubs. 13.
7. Evergreen trees with needlelike or scalelike leaves. **Pine family**---- (p. 21)
7. Broad-leaved plants; not evergreen. 8.
8. Leaves opposite. **Dwarf maple** (*Acer glabrum*)----- (p. 85)
8. Leaves alternate. 9.
9. Bark pale or light colored. 10.
9. Bark dark. 12.
10. Bark rough. **Narrowleaf cottonwood** (*Populus angustifolia*)----- (p. 46)
10. Bark smooth. 11.
11. Petiole flattened. **Quaking aspen** (*Populus tremuloides*)----- (p. 46)
11. Petiole not flattened. **Balsam poplar** (*Populus balsamifera*)----- (p. 46)
12. Buds with several overlapping scales. Bark of branches marked by horizontal slits. **Birch** (*Betula*)----- (p. 47)
12. Buds with only 1 or 2 scales. Bark of branches not marked by horizontal slits. **Mountain alder** (*Alnus tenuifolia*)----- (p. 47)
13. Parasitic on pine trees. **Mistletoe** (*Arceuthobium americanum*)----- (p. 47)
13. Not parasitic on pine trees. 14.
14. Leaves evergreen. 15.
14. Leaves not evergreen. 19.
15. Leaves awl-shaped, or scalelike. **Juniper** (*Juniperus*)----- (p. 26)
15. Leaves not awl-shaped or scalelike. 16.
16. Leaves small, linear, crowded; fruit a dry capsule. **Red mountainheath** (*Phyllodoce empetriformis*)----- (p. 97)
16. Leaves small, oval; fruit berrylike. **Western wintergreen** (*Gaultheria humifusa*)----- (p. 97)
16. Leaves broad and not crowded. 17.
17. Leaves opposite. **Rocky Mountain kalmia** (*Kalmia polifolia*)----- (p. 97)
17. Leaves alternate. 18.
18. Leaves toothed, hollylike. **Creeping hollygrape** (*Berberis repens*)----- (p. 63)
18. Leaves entire, not hollylike. **Bearberry** (*Arctostaphylos uva-ursi*)----- (p. 98)
19. Leaves opposite. 20.
19. Leaves alternate. 23.
20. Leaves compound. **Elder** (*Sambucus*)----- (p. 115)

20. Leaves not compound. 21.
21. Lower surface of leaves silvery. **Russet buffaloberry** (*Shepherdia canadensis*)----- (p. 90)
21. Leaves green on both sides. 22.
22. Corolla attached below the ovary. **Dogwood** (*Cornus*)----- (p. 95)
22. Corolla attached above the ovary. **Honeysuckle family**----- (p. 114)
23. Flowers in catkins. 24.
23. Flowers not in catkins. 25.
24. Leaves toothed. **Birch** (*Betula*)----- (p. 47)
24. Leaves entire. **Willow** (*Salix*)----- (p. 46)
25. Foliage with distinct odor of sage. **Sagebrush** (*Artemisia*)----- (p. 133)
25. Foliage without odor of sage. 26.
26. Stems spiny or prickly. 27.
26. Stems not spiny or prickly. 29.
27. Leaves entire, fleshy. **Greasewood** (*Sarcobatus vermiculatus*)----- (p. 53)
27. Leaves lobed, not fleshy. **Gooseberry** (*Grossularia*)----- (p. 72)
27. Leaves compound, not fleshy. 28.
28. Flowers white. **Raspberry** (*Rubus*)----- (p. 74)
28. Flowers rose color. **Rose** (*Rosa*)----- (p. 77)
29. Leaves compound. 30.
29. Leaves not compound. 33.
30. Leaflets 3. 31.
30. Leaflets more than 3. 32.
31. Leaflets up to 4 inches long. Wavy-toothed. **Poisonous. Western poison-ivy** (*Rhus rydbergii*)----- (p. 85)
31. Leaflets smaller, with rounded teeth or lobes. **Lemonade sumac** (*Rhus trilobata*)----- (p. 85)
32. Flowers white. **Greene mountain-ash** (*Sorbus scopulina*)----- (p. 78)
32. Flowers yellow. **Shrubby cinquefoil** (*Dasiphora fruticosa*)----- (p. 74)
33. Leaves silvery-scaly. **Silverberry** (*Eleagnus argentea*)----- (p. 90)
33. Leaves not silvery-scaly. 34.
34. Flowers bright yellow. 35.
34. Flowers rose color. *Spiraea densiflora*----- (p. 74)
34. Flowers white. 36.
35. Leaves sticky. *Macronema*----- (p. 139)
35. Leaves woolly. *Tetradymia inermis*----- (p. 134)
35. Leaves smooth or white-hairy. **Rabbitbrush** (*Chrysothamnus*)----- (p. 121)
36. Stamens 5. 37.
36. Stamens 8; fruit a berry. **Western bog blueberry** (*Vaccinium occidentale*)----- (p. 99)
36. Stamens 8; fruit a dry capsule. **Rusty menziesia** (*Menziesia ferruginea*)----- (p. 97)
36. Stamens 10. 39.
36. Stamens more than 10. 41.
37. Petals united. **Prickly gilia** (*Gilia pungens*)----- (p. 103)
37. Petals distinct. 38.
38. Leaves entire. **Snowbrush** (*Ceanothus velutinus*)----- (p. 85)
38. Leaves lobed. **Currant** (*Ribes*)----- (p. 72)
39. Petals distinct. **Smooth Labrador-tea** (*Ledum glandulosum*)----- (p. 97)
39. Petals united. 40.
40. Berries red. **Grouse whortleberry** (*Vaccinium scoparium*)----- (p. 98)
40. Berries black. **Big whortleberry** (*Vaccinium membranaceum*)----- (p. 98)
41. Leaves 3-lobed. **Mallow ninebark** (*Physocarpus malvaceus*)----- (p. 74)
41. Leaves 5-lobed. **Whiteflowering raspberry** (*Rubus parviflorus*)----- (p. 74)

41. Leaves toothed but not lobed. 42.
42. Pistils 5. *Spiraea lucida*----- (p. 74)
42. Pistil only 1. 43.
43. Corolla attached above the ovary. **Serviceberry** (*Amelanchier*)----- (p. 78)
43. Corolla attached below the ovary. **Black chokecherry** (*Prunus melanocarpa*)----- (p. 78)
44. Plants without green leaves. 45.
44. Plants with green leaves. 50.
45. Stem flat, fleshy, and prickly. **Pricklypear** (*Opuntia polyacantha*)--- (p. 88)
45. Stem not flat, fleshy, and prickly. 46.
46. Plants parasitic on pine trees. **Mistletoe** (*Arceuthobium americanum*)_ (p. 47)
46. Plants not parasitic on pine trees. 47.
47. Plants not at all hairy. **Coralroot** (*Corallorhiza*)----- (p. 44)
47. Plants somewhat hairy. 48.
48. Plants 10 to 60 inches high. **Pinedrops** (*Pterospora andromedea*)---- (p. 96)
48. Plants less than 10 inches high. 49.
49. Petals united. **Western ghostpipe** (*Thalesia fasciculata*)----- (p. 113)
49. Petals distinct. **Pinesap** (*Hypopitys multiflora*)----- (p. 96)
50. Aquatic plants. 51.
50. Plants not strictly aquatic though some may grow in very wet places. 61.
51. Plant body a minute, floating thallus without true stems or leaves. **Duckweed** (*Lemna*)----- (p. 36)
51. Plants with stems and leaves. 52.
52. Flowers conspicuous. 53.
52. Flowers very small and inconspicuous. 57.
53. Flowers pink. **Water ladysthumb** (*Polygonum amphibium*)----- (p. 52)
53. Flowers white. 54.
53. Flowers yellow. 55.
54. Leaves arrow-shaped. **Arrowhead** (*Sagittaria cuneata*)--- (p. 33)
54. Leaves much dissected. **Water crowfoot** (*Batrachium*)----- (p. 61)
55. Leaves large and entire. **Wokas** (*Nymphaea polysepala*)----- (p. 56)
55. Leaves lobed or dissected. 56.
56. Leaves bearing small bladders. **Bladderwort** (*Utricularia*)----- (p. 113)
56. Leaves without bladders. *Ranunculus purshii*----- (p. 62)
57. Leaves in whorls. 58.
57. Leaves alternate. 60.
57. Leaves opposite. **Waterstar** (*Callitriche palustris*)----- (p. 85)
58. Flowers wholly under water. **Hornwort** (*Ceratophyllum demersum*)--- (p. 57)
58. Flowers, or some of them, on stalks above the water. 59.
59. Leaves entire, in whorls of 6 to 12. **Marestail** (*Hippuris vulgaris*)---- (p. 93)
59. Leaves dissected, in whorls of 3 to 5. **Parrotfeather** (*Myriophyllum*)-- (p. 94)
60. Flowers perfect. **Pondweed** (*Potamogeton*)----- (p. 31)
60. Flowers imperfect. Leaves long and narrow. **Bur-reed** (*Sparganium*) (p. 29)
61. Stems flat, fleshy, and prickly. **Pricklypear** (*Opuntia polyacantha*)--- (p. 88)
61. Stems not flat, fleshy, and prickly. 62.
62. Plants grasslike or rushlike. Flowers not conspicuously colored. 63.
62. Plants not grasslike or rushlike or if so the flowers colored and conspicuous. 67.
63. Plants 3 to 6 feet tall. Flower clusters about 1 inch thick and 4 to 12 inches long. **Cattail** (*Typha*)----- (p. 26)
63. Plants smaller. Flowers in much smaller clusters. 64.
64. Flowers enclosed by chafflike bracts. 65.
64. Flowers not enclosed by chafflike bracts. 66.

65. Stems hollow, usually round. Leaf bases merely wrapped about the stem. **Grass family**----- (p. 33)
65. Stems solid, usually triangular. Leaf bases forming tubes about the stem. **Sedge family**----- (p. 35)
66. Flowers in a long, slender spike; resembling a plantain. **Arrow grass** (*Triglochin*)----- (p. 31)
66. Flowers in smaller clusters; not resembling plantain. **Rush family**--- (p. 36)
67. Flowers in dense heads surrounded by bracts. 68.
67. Flowers not in dense heads surrounded by bracts. 69.
67. Flowers not in dense heads, but included in 4- to 5-lobed involucre. **Spurge** (*Euphorbia*)----- (p. 84)
68. Leaves with stipules. **Clover** (*Trifolium*)----- (p. 79)
68. Leaves without stipules. **Composite family**----- (p. 117)
69. Leaves parallel-veined. Flower parts in 3's or multiples of 3. 70.
69. Leaves netted-veined. Flower parts mostly in 4's or 5's. 72.
70. Flower parts attached below the ovary. **Lily family**----- (p. 37)
70. Flower parts attached above the ovary. 71.
71. Flowers regular; blue or purple. **Iris family**----- (p. 41)
71. Flowers irregular; not blue or purple. **Orchid family**----- (p. 42)
72. Flower parts attached above the ovary. 73.
72. Flower parts attached below the ovary. 80.
73. Petals distinct. 74.
73. Petals united. 76.
74. Flowers very small; in flat-topped clusters (umbels). **Parsnip family**-- (p. 94)
74. Flowers larger; not in flat-topped clusters. 75.
75. Petals 4. **Evening-primrose family**----- (p. 91)
75. Petals 5 or 10. **Stickleaf** (*Mentzelia*)----- (p. 88)
76. Flowers blue. **Bellflower** (*Campanula*)----- (p. 116)
76. Flowers not blue. 77.
77. Stems trailing. Flowers in pairs. **American twinflower** (*Linnaea americana*)----- (p. 115)
77. Stems not trailing. Flowers very small, not in pairs. 78.
78. Stems square. Leaves in whorls. **Bedstraw** (*Galium*)----- (p. 114)
78. Stems round. Leaves not in whorls. 79.
79. Stamens 3. **Valerian** (*Valeriana*)----- (p. 117)
79. Stamens 8 to 12. **Moschatel** (*Adoxa moschatellina*)----- (p. 117)
80. Flowers irregular. 81.
80. Flowers regular. 88.
81. Petals united. 82.
81. Petals distinct or nearly so. 84.
82. Ovary 4-lobed. **Mint family**----- (p. 107)
82. Ovary not lobed. 83.
83. Fruit of 4 one-seeded nutlets. **Ground vervain** (*Verbena bracteosa*)-- (p. 107)
83. Fruit a many-seeded capsule. **Figwort family**----- (p. 109)
84. Stamens 5. **Violet family**----- (p. 87)
84. Stamens 10. **Pea family**----- (p. 79)
84. Stamens more than 10. 85.
85. Pistils more than 1. 86.
85. Pistil 1. 87.
86. Upper sepal spurred. **Larkspur** (*Delphinium*)----- (p. 57)
86. Upper sepal hooded. **Monkshood** (*Aconitum columbianum*)----- (p. 58)
87. Flowers flesh color. **Steerhead** (*Dicentra uniflora*)----- (p. 64)
87. Flowers yellow. **Golden corydalis** (*Corydalis aurea*)----- (p. 64)

88. Petals united. 89.
 88. Petals distinct or lacking. 95.
 89. Plants with milky juice. **Dogbane** (*Apocynum*)----- (p. 101)
 89. Plants without milky juice. 90.
 90. Ovary deeply 4-lobed. **Borage family**----- (p. 105)
 90. Ovary not lobed. 91.
 91. Leaves whorled. **Greengentian** (*Frasera speciosa*)----- (p. 101)
 91. Leaves opposite. 92.
 91. Leaves alternate. 93.
 92. Style branches 2. **Gentian** (*Gentiana*)----- (p. 100)
 92. Style branches 3. **Phlox** (*Phlox*)----- (p. 102)
 93. Style not lobed. 94.
 93. Style 2-lobed. **Waterleaf family**----- (p. 104)
 93. Style 3-lobed. **Phlox family**----- (p. 101)
 94. Leaves deeply lobed. *Solanum triflorum*----- (p. 109)
 94. Leaves entire or irregularly toothed. **Primrose family**----- (p. 99)
 95. Leaves opposite. 96.
 95. Leaves not opposite. 99.
 96. Flowers small, green, inconspicuous. **Narrowleaf nettle** (*Urtica gracilis*)----- (p. 45)
 96. Flowers larger, conspicuously colored. 97.
 97. Flowers in umbels. **Yellow sandverbena** (*Abronia ammophila*)----- (p. 53)
 97. Flowers not in umbels. 98.
 98. Sepals 2. **Purslane family**----- (p. 54)
 98. Sepals 4 or 5. **Pink family**----- (p. 55)
 99. Leaf bases forming a sheath at each joint of the stem. **Buckwheat family**----- (p. 48)
 99. Leaf bases not forming sheaths on the stem. 100.
 100. Stamens 2 or 4. **Plantain** (*Plantago*)----- (p. 114)
 100. Stamens 5. 101.
 100. Stamens 6. 106.
 100. Stamens 9. *Eriogonum*----- (p. 48)
 100. Stamens 8 or 10. 107.
 100. Stamens more than 10. 111.
 101. Flowers white or whitish. 102.
 101. Flowers blue. **Prairie flax** (*Linum lewisii*)----- (p. 84)
 101. Flowers yellow. *Horkelia gordonii*----- (p. 76)
 101. Flowers greenish or purplish. 104.
 101. Flowers rose color. **Alfileria** (*Erodium cicutarium*)----- (p. 83)
 102. Leaves mostly basal, not sessile. 103.
 102. Leaves not basal, sessile on the stem. *Comandra pallida*----- (p. 47)
 103. Leaf blades clothed with reddish, gland-bearing hairs. **Narrowleaf sundew** (*Drosera longifolia*)----- (p. 69)
 103. Leaf blades not clothed with gland-bearing hairs. **Saxifrage family**----- (p. 69)
 104. Leaves mostly basal. **Alumroot** (*Heuchera*)----- (p. 71)
 104. Leaves not basal. 105.
 105. Petals pinnately lobed. *Mitella pentandra*----- (p. 71)
 105. Petals lacking. **Goosefoot family**----- (p. 52)
 106. Leaves not compound. **Mustard family**----- (p. 64)
 106. Leaves compound with 3 leaflets. **Bee-flower** (*Cleome serrulata*)----- (p. 69)
 107. Leaves fleshy. **Stonecrop** (*Sedum*)----- (p. 69)
 107. Leaves not fleshy. 108.
 108. Pistils 2. *Floerkia*----- (p. 85)
 108. Pistil 1. 109.

109. Styles 2. **Saxifrage** (*Saxifraga*)----- (p. 71)
 109. Style 1, or 5 united to form 1. 110.
 110. Leaves deeply lobed. **Cranesbill** (*Geranium*)----- (p. 82)
 110. Leaves entire or merely toothed. **Wintergreen family**----- (p. 95)
 111. Stamens united around the styles. **Mallow family**----- (p. 86)
 111. Stamens distinct. 112.
 112. Leaves all basal. *Lewisia*----- (p. 54)
 112. Leaves not basal. 113.
 113. Calyx 5-lobed and with 5 alternating bractlets, making it appear to be 10-lobed. **Rose family**----- (p. 73)
 113. Calyx without alternating bractlets. **Buttercup family**----- (p. 57)

FAMILIES OF PLANTS

ADDER'S TONGUE FAMILY (OPHIOGLOSSACEAE)

A small family of plants closely related to the true ferns. They reproduce by spores as the ferns do and are technically separated from the ferns by the manner in which the leaves and the spore cases develop.

Botrychium coulteri.—The stem is only about an inch long and bears a single, much-branched leaf, one division of which is developed into a branched spore-bearing organ and bears numerous yellow spore cases.

Botrychium simplex has also been reported in the park.

The genus *Botrychium* is commonly known as **moonwort** or **grapefern**.

FERN FAMILY (POLYPODIACEAE)

Ferns reproduce by spores which are borne in spore cases (sporangia) clustered in little dots (sori), and often covered by a scale (indusium), on the lower surface or margins of the leaf (frond). Because of the dry climate ferns are not common in the park except in a few places near streams or in shaded ravines. The stem (rhizome or rootstock) is underground and the plants as we commonly see them consist of the fronds only. The frond has a flat or expanded portion (blade), which is more or less pinnate, and the leaf-stalk (stipe).

1. Leaves of two kinds; the spore-bearing leaves much narrower and longer than the fertile ones. **American rockbrake** (*Cryptogramma acrostichoides*)----- (p. 18)
1. Leaves all much alike. 2.
2. Leafstalks purplish brown and polished. **American maidenhair** (*Adiantum pedatum*)----- (p. 18)
2. Leafstalks not purplish brown and polished. 3.
3. Plants usually more than a foot high. 4.
3. Plants usually less than a foot high. 5.
4. Spore cases marginal. **Western bracken** (*Pteridium aquilinum* var. *pubescens*)----- (p. 18)

4. Spore cases not marginal. **Lady-fern** (*Athyrium filix-femina*)----- (p. 19)
5. Rootstocks slender, creeping; fronds delicate, lax, the stipes very slender; blades membranous, the segments smooth. **Brittle fern** (*Filix fragilis*)----- (p. 19)
5. Rootstocks massive; fronds firm, erect, the stipes stout, appearing inflated; blades herbaceous, glandular, hairy beneath. **Rocky Mountain woodsia** (*Woodsia scopulina*)----- (p. 19)

American rockbrake (*Cryptogramma acrostichoides*).—A small, alpine fern of rocky situations. Rootstocks in massive tufts. Fronds numerous, closely clustered, of two kinds, the fertile ones 4 to 7 inches long, long-stalked and much surpassing the spreading sterile ones. Blades of sterile fronds ovate, 2 to 3 times pinnate; fertile blades simpler, with linear-oblong segments.

American maidenhair (*Adiantum pedatum*).—A delicate, graceful fern of moist, rocky woods and ravines. The rootstock is short-



FIGURE 1.—Bracken. Photograph by A. R. Sweetser.



FIGURE 2.—Brittle fern. Photograph by A. R. Sweetser.

creeping. The erect fronds are 9 to 40 inches long with purplish-brown, polished stipes. The blade is roundish in outline, the numerous linear divisions arising from the upper side of 2 equal branches; segments close, oblong, deeply cleft on the upper side. Rare in the park.

Western bracken (*Pteridium aquilinum* var. *pubescens*).—A coarse fern of open or partially shaded, acid-soil situations, usually geyserite in the park. The slender, woody, freely-branched rhizome is

wide-creeping. The stout, erect to reclining fronds are borne singly on stout stipes, and are often 3 or more feet high. The blades are usually 3 times pinnate.

Lady-fern (*Athyrium filix-femina*).—A medium-sized to large fern usually growing in moist shaded situations. Rhizome erect or ascending. Fronds 3 to 6 feet long, suberect; stipes short; blades lanceolate, 2 to 3 times pinnate, the segments membranous, rounded or variously toothed.

Brittle fern (*Filix fragilis*).—A small, delicate fern of shaded, rocky or moist situations; very common. The slender, fragile stipes are about as long as the blades, which are delicately membranous, oblong-lanceolate, commonly 3 to 9 inches long, and nearly or quite 2 times pinnate.

Rocky Mountain woodsia (*Woodsia scopulina*).—A densely tufted fern of rocky places. Rootstocks densely tufted. Fronds very numerous, 4 to 15 inches long, the stout stipes usually golden brown. Blades 1 to 2 times pinnate, the lower surface glandular-puberulent and invariably bearing jointed, spreading, whitish hairs.

PEPPERWORT FAMILY (MARSILEACEAE)

A small family of plants related to the ferns. They grow in shallow water or very wet mud and have creeping stems and small, palmately compound leaves with four leaflets. The **Waterclover** (*Marsilea oligospora*) is probably the only member of the family that occurs in the park and it is rarely found.

HORSETAIL FAMILY (EQUISETACEAE)

The horsetails are interesting because they are relics of the coal age. During the coal age there were many different kinds of horsetails, some of which grew to the size of small trees. Now, however, there are only a few kinds left. The stems are hollow and jointed and the leaves are reduced to two kinds of structures: toothed sheaths at the joints of the stem and little, shield-shaped scales on which the spore cases are borne. The stems contain particles of silica.

Field horsetail (*Equisetum arvense*).—This plant produces two the spore cases are borne. The stems contains particules of silica. They are brown in color, 6 or 8 inches in height, and usually unbranched. These shoots soon disappear and later the green sterile shoots develop. These are very much branched, the branches in whorls, and may become a foot or more high.

Scouring-rush (*Equisetum hiemale*).—The stems of this species are usually unbranched and 1 to 3 or more feet high. They are quite rough from rows of little tubercles.

Equisetum laevigatum is very similar but the tubercles are so minute that the stem is practically smooth.

Equisetum robustum and *E. variegatum* have also been reported as occurring in the park.

QUILLWORT FAMILY (ISOETACEAE)

The quillworts are submerged water plants with grasslike leaves, but they are related to the ferns and reproduce by spores. The spore cases are produced on the infolded margins of the leaf bases. The



FIGURE 3.—Rocky Mountain woodsia.
Photograph by A. R. Sweetser.



FIGURE 4.—Field horsetail. Brown.
Photograph A. R. Sweetser.

two quillworts (*Isoetes lacustris* and *I. bolanderi*) have both been reported in the park. They occur in certain places in Yellowstone Lake.

CLUBMOSS FAMILY (LYCOPODIACEAE)

This small family of mosslike plants is represented by one member in the park. The prostrate creeping stems bearing upright two-forked branches tipped by spores. *Lycopodium annotinum* has a solitary spike of yellowish, ovate or heart-shaped leaves concealing the spores which are of one kind. The spike is more or less rounded and oblong. The stems and branches are covered with equal, spreading, rigid leaves in several rows. Lycopodiums are sometimes called groundpine.

SELAGINELLA FAMILY (SELAGINELLACEAE)

These slender, branching, mosslike plants closely resemble the clubmosses, but the small leaves of the spike are arranged in 4 rows making it somewhat quadrangular. The spores at the top of the spike differ in size and function from those near the base of the spike. *Selaginella densa* is the most common species in this region. The stems are very short and densely tufted.

PINE FAMILY (PINACEAE)

Cone-bearing evergreen trees and shrubs. This is the most important lumber-producing family. It is represented in the park by the following eight species:

1. Leaves needlelike. Fruit a dry cone. 2.
1. Leaves scalelike or awl-shaped. Fruit berrylike. 7.
2. Leaves in bundles of 2 or 5. 3.
2. Leaves single. 5.
3. Leaves 2 in each bundle. **Lodgepole pine** (*Pinus contorta*)----- (p. 21)
3. Leaves 5 in each bundle. 4.
4. Cones 3 to 6 inches long and narrow; greenish in color. **Limber pine** (*Pinus flexilis*)----- (p. 21)
4. Cones short and thick; dark purplish in color. **Whitebark pine** (*Pinus albicaulis*)----- (p. 21)
5. Leaves 4-angled. **Engelmann spruce** (*Picea engelmannii*)----- (p. 23)
5. Leaves flat. 6.
6. Cones erect, the bracts between the scales inconspicuous. **Alpine fir**. (*Abies lasiocarpa*)----- (p. 23)
6. Cones pendulous, the bracts between the scales 3-toothed and conspicuous. **Douglas-fir** (*Pseudotsuga taxifolia*)----- (p. 23)
7. Leaves scalelike. A shrub or small tree. **Rocky Mountain red cedar** (*Juniperus scopulorum*)----- (p. 26)
7. Leaves awl-shaped, in 3's. A low shrub. **Dwarf juniper** (*Juniperus sibirica*)----- (p. 26)

Limber pine (*Pinus flexilis*).—The limber pine belongs to the white pine group and has five leaves in each bundle. The leaves are usually 2 or 3 inches long. The greenish cones are 3 to 6 inches long and nearly cylindrical. This tree is common at Mammoth but is not commonly found in the higher parts of the park.

Whitebark pine (*Pinus albicaulis*).—Very similar to the limber pine in general appearance, but the cones are shorter and thicker and dark purple in color. It is a timberline tree and is found from timberline down to an elevation of about 7,000 feet.

Lodgepole pine (*Pinus contorta*).—This is the only kind of tree in the park with two needles in each bundle. It is the most common tree in the park and forms dense and extensive forests on the greater part of the plateau. The leaves are about 2 inches long, and the



FIGURE 5.—Limber pine. Copyright, J. E. Haynes

cones are small and often remain on the tree for many years. Formerly extensively used by the Indians for tepee poles and now often utilized for fence posts, telephone poles, and railroad ties.

Engelmann spruce (*Picea engelmannii*).—This is the only kind of spruce in the park and is readily recognized by the harsh, sharp-pointed leaves which are scattered, one in a place, and are four-angled, almost square in cross section. The cones are more or less oval in shape and about 2 inches long.

Alpine fir (*Abies lasiocarpa*).—This is the only kind of tree in the park that bears its cones upright like so many candles. The leaves

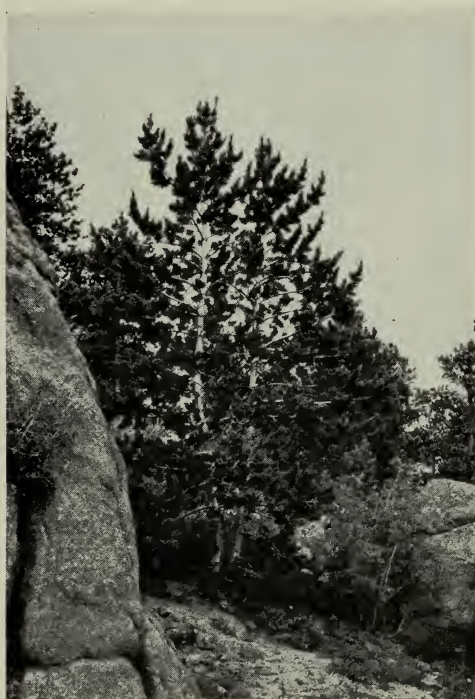


FIGURE 5a.—Limber pine. Photograph by George Grant, National Park Service.

are scattered like those of the spruce, but they are soft and flat. This is a timberline tree and is found in many places in the higher parts of the park. It extends down to about 7,000 feet.

Douglas-fir (*Pseudotsuga taxifolia*).—This is one of the most valuable lumber trees in the world. The leaves are similar to those of the alpine fir, but the cones are pendulous and very distinctive. Three-toothed bracts protrude from between the scales and give the cones a fringed appearance. This tree is common at Mammoth and Tower Falls, but is not commonly found in the higher parts of the park.



FIGURE 6.—Whitebark pine. Copyright, J. E. Haynes.



FIGURE 7.—Lodgepole pine. Copyright, J. E. Haynes.



FIGURE 7a.—Lodgepole pine. Photograph by George Grant, National Park Service.

Rocky Mountain red cedar (*Juniperus scopulorum*).—Readily recognized by its scalelike leaves. It is sometimes seen as a shrub and sometimes as a small tree and is very similar to the “Red cedar” of the eastern United States. Some of the gnarled and twisted specimens on the Hot Springs formations at Mammoth are believed to be the oldest living things in the park. The little cones are so fleshy that they appear to be berries. Also known as **Colorado juniper**.



FIGURE 8.—Engelmann spruce. Copyright, J. E. Haynes.

Dwarf juniper (*Juniperus sibirica*).—A low spreading shrub, often forming dense patches. The leaves are awl-shaped and are arranged in threes. Also known as **Mountain juniper**.

CATTAIL FAMILY (TYPHACEAE)

A small family represented in our flora by the **Common cattail** (*Typha latifolia*), which is widely distributed in marshy places throughout North America. It produces a cluster of basal leaves, which are an inch or less in width but several feet long and stand



FIGURE 8a.—Engelmann spruce. Photograph by George Grant, National Park Service.



FIGURE 8b.—Engelmann spruce near timberline, Mount Washburn. Copyright, J. E. Haynes.



FIGURE 9.—Alpine fir. Photograph by Thos. R. Ashlee.



FIGURE 10.—Douglas-fir. Copyright, J. E. Haynes.

nearly vertical. The upright, unbranched stem bears a long, dense spike of inconspicuous flowers at the upper end. The upper part of this spike is covered with stamens intermixed with long hairs, each stamen constituting a flower, while the lower part of the spike supports the pistillate flowers, each consisting simply of an ovary bearing an abundance of dark hairs at the base. The abundant down of the very small fruits was formerly used for stuffing pillows.

Narrowleaf cattail (*Typha angustifolia*) has also been reported in the park.

BUR-REED FAMILY (SPARGANIACEAE)

A family of water plants with grasslike leaves and greenish flowers clustered in dense, spherical, leafy-bracted heads scattered along the



FIGURE 11.—Rocky Mountain red cedar. Copyright, J. E. Haynes.

upper portion of the stem. *Sparganium angustifolium* is a plant with slender stems and long, narrow leaves that float on the water, while *Sparganium simplex* is more erect, projecting above the water, and has leaves that are more or less 3-angled.



FIGURE 12.—Rocky Mountain red cedar. Photograph by Fred T. Johnston, National Park Service.

PONDWEED FAMILY (NAIDACEAE)

Water plants found either floating or immersed in ponds and streams. The flowers are inconspicuous and not often seen. The following ten species of the genus *Potamogeton* have been identified in the park: *P. alpinus*, *P. filiformis*, *P. heterophyllus*, *P. lonchites*, *P. obtusifolius*, *P. pectinatus*, *P. praelongus*, *P. natans*, *P. perfoliatus*, and *P. robbinsii*. Wigeongrass (*Ruppia pectinata*), another member of the family, has also been reported in the park.



FIGURE 13.—Dwarf juniper. Copyright, J. E. Haynes.

ARROW GRASS FAMILY (JUNCAGINACEAE)

The plants of this family grow in wet places and remind one of plantain. They have rushlike, fleshy leaves which are all basal and a spike of greenish flowers. *Triglochin palustris*, which varies from 5 to 15 inches high, is frequently seen in the park.

Triglochin maritima, a somewhat larger plant, has also been reported.



FIGURE 14.—Dwarf juniper. Photograph by Dr. Harvey E. Stork.



FIGURE 15.—Narrowleaf cattail. Brown. Photograph by A. R. Sweetser.



FIGURE 16.—Bur-reed. Green. Photograph by A. R. Sweetser.

WATER PLANTAIN FAMILY (ALISMACEAE)

A small family of water plants with scapelike stem and sheathing leaves. The **Arrowhead** (*Sagittaria cuneata*) grows in shallow water and gets its name from the arrowhead-shaped leaves which are all basal and form sheaths around the base of the flowering stem. Each flower has 3 green sepals, 3 white petals, many stamens and many pistils.



FIGURE 17.—Arrowhead. White. Photograph by A. R. Sweetser.

GRASS FAMILY (POACEAE OR GRAMINEAE)

This is the most important of all plant families from the standpoint of food both for man and for grazing animals. It contains all of the cereals, such as wheat, oats, rye, corn, and rice, without which we would scarcely know how to live. Grass flowers, however, are wind-pollinated and, therefore, they are not conspicuous and are not of any great interest to most people. For that reason the family will not be treated here in detail.

The grass that is most frequently asked about by park visitors is **Giant wild-rye** (*Elymus condensatus*). This is a large grass usually

between 2 and 6 feet tall but sometimes still taller, and the heads resemble those of cultivated rye. In addition to the wild-rye the following species of grasses have been reported in the park:

<i>Agropyron dasystachyum</i>	<i>Elymus glaucus</i>
<i>Agropyron pauciflorum</i>	<i>Elymus macounii</i>
<i>Agropyron pseudorepens</i>	<i>Festuca idahoensis</i>
<i>Agropyron saxicola</i>	<i>Festuca kingii</i>
<i>Agropyron scribneri</i>	<i>Festuca occidentalis</i>
<i>Agropyron smithii</i>	<i>Festuca ovina</i>
<i>Agropyron spicatum</i>	<i>Festuca ovina</i> var. <i>brachyphylla</i>
<i>Agropyron subsecundum</i>	<i>Festuca rubra</i>
<i>Agropyron subsecundum</i> var. <i>andinum</i>	<i>Glyceria borealis</i>
<i>Agrostis alba</i>	<i>Glyceria elata</i>
<i>Agrostis bakeri</i>	<i>Glyceria grandis</i>
<i>Agrostis exarata</i>	<i>Glyceria pauciflora</i>
<i>Agrostis exarata</i> var. <i>ampla</i>	<i>Glyceria striata</i>
<i>Agrostis hiemalis</i>	<i>Hierochloa odorata</i>
<i>Agrostis hiemalis</i> var. <i>geminata</i>	<i>Hordeum jubatum</i>
<i>Agrostis humilis</i>	<i>Hordeum jubatum</i> var. <i>caespitosum</i>
<i>Agrostis idahoensis</i>	<i>Hordeum nodosum</i>
<i>Agrostis rossae</i>	<i>Koeleria cristata</i>
<i>Agrostis thurberiana</i>	<i>Lolium perenne</i>
<i>Alopecurus aequalis</i>	<i>Melica bulbosa</i>
<i>Alopecurus alpinus</i>	<i>Melica geyeri</i>
<i>Andropogon hallii</i>	<i>Melica spectabilis</i>
<i>Avena fatua</i>	<i>Melica subulata</i>
<i>Beckmannia sysigachne</i>	<i>Muhlenbergia andina</i>
<i>Bromus anomalus</i>	<i>Muhlenbergia asperifolia</i>
<i>Bromus ciliatus</i>	<i>Muhlenbergia cuspidata</i>
<i>Bromus marginatus</i>	<i>Muhlenbergia filiformis</i>
<i>Bromus pumpellianus</i>	<i>Muhlenbergia squarrosa</i>
<i>Bromus pumpellianus</i> var. <i>twcedyi</i>	<i>Oryzopsis asperifolia</i>
<i>Bromus tectorum</i>	<i>Oryzopsis exigua</i>
<i>Calamagrostis canadensis</i>	<i>Oryzopsis hymenoides</i>
<i>Calamagrostis canadensis</i> var. <i>macouniana</i>	<i>Panicum capillare</i> var. <i>occidentale</i>
<i>Calamagrostis inexpansa</i>	<i>Panicum thermale</i>
<i>Calamagrostis neglecta</i>	<i>Phalaris arundinacea</i>
<i>Calamagrostis purpurascens</i>	<i>Phalaris canariensis</i>
<i>Calamagrostis rubescens</i>	<i>Phleum alpinum</i>
<i>Calamagrostis scribneri</i>	<i>Phleum pratense</i>
<i>Catabrosa aquatica</i>	<i>Poa alpina</i>
<i>Cinna latifolia</i>	<i>Poa ampla</i>
<i>Danthonia californica</i> var. <i>americana</i>	<i>Poa arctica</i>
<i>Danthonia intermedia</i>	<i>Poa arida</i>
<i>Danthonia parryi</i>	<i>Poa canbyi</i>
<i>Danthonia spicata</i>	<i>Poa compressa</i>
<i>Danthonia unispicata</i>	<i>Poa cusickii</i>
<i>Deschampsia caespitosa</i>	<i>Poa epilis</i>
<i>Deschampsia elongata</i>	<i>Poa fendleriana</i>
<i>Distichlis stricta</i>	<i>Poa gracillima</i>
<i>Elymus canadensis</i>	<i>Poa interior</i>
<i>Elymus condensatus</i>	<i>Poa leptocoma</i>
	<i>Poa longiligula</i>

Poa nervosa
Poa nevadensis
Poa palustris
Poa pattersonii
Poa pratensis
Poa reflexa
Poa rupicola
Poa secunda
Puccinellia nuttalliana
Schedonnardus paniculatus
Schizachne purpurascens
Sitanion hystrix
Spartina gracilis

Stipa columbiana
Stipa columbiana var. *nelsonii*
Stipa comata
Stipa comata var. *intermedia*
Stipa lettermanii
Stipa occidentalis
Stipa richardsonii
Stipa viridula
Stipa williamsii
Trisetum spicatum
Trisetum wolffii
Triticum aestivum



FIGURE 18.—Giant wild-rye. Photograph by Dr. Harvey E. Stork.

SEDGE FAMILY (CYPERACEAE)

This is a large family and there are undoubtedly many more representatives in the park than have been identified. Much of the grass-like vegetation above timberline is composed largely of sedges, and there are also many species that occur below timberline. Most of the park visitors include these plants with the grasses and pay no particular attention to them. They can usually be distinguished from the grasses, however, by the three-angled stems, the absence of joints on the stems, and by the fact that the leaf bases form tubes about the

stem. The most conspicuous member of the family is a **cotton-sedge** (*Eriophorum ocreatum*). It grows in cold, boggy places and is readily recognized by its large, cottony head when in fruit. Following are the names of other members of the family that have been identified in the park:

Sedge (*Carex*)

Carex ablata
Carex acutina
Carex alpina
Carex athrostachya
Carex atrata
Carex aurea
Carex canescens
Carex concinna
Carex deflexa
Carex diandra
Carex disperma
Carex douglasii
Carex festiva
Carex geyeri
Carex hoodii
Carex jonesii
Carex lanuginosa
Carex liddonii
Carex longirostris
Carex marcida
Carex petasata

Carex piperi
Carex praticola
Carex preslii
Carex pseudoscirpoidea
Carex raynoldsii
Carex rostrata
Carex saxatilis
Carex siccata
Carex tenuirostris
Carex utriculata
Carex vallicola
Carex vesicaria
Carex viridula
Carex xerantica
Spikerush (*Eleocharis*)
Eleocharis acicularis
Eleocharis palustris
Eleocharis thermalis
Bulrush (*Scirpus*)
Scirpus americanus
Scirpus occidentalis

DUCKWEED FAMILY (LEMNACEAE)

The plants of this family are very small and float on the surface of ponds and slow-flowing streams. They have neither stems nor leaves. The plant body consists of one or more small, flat, disklike bodies, each with a single rootlet hanging down into the water. The flowers are very small and are seldom seen. It is the smallest of flowering plants.

Fairypaddle (*Lemna trisulca*).—This species has an elongated plant body which is narrowed at the base into a stalk. It sometimes becomes so abundant that it forms a thick mat over the entire surface of a pond.

Lemna minor with a rather thick and nearly circular plant body and *Lemna gibba* with an obovate but unsymmetrical body have also been reported in the park.

RUSH FAMILY (JUNCACEAE)

This is another family of grasslike plants. Although the flowers are lilylike in structure, they are very small and inconspicuous. The

members of the family are of no particular interest to the average park visitor. The following species have been identified in the park:

Rush (<i>Juncus</i>)	<i>Juncus regelii</i>
<i>Juncus balticus</i>	<i>Juncus saximontanus</i>
<i>Juncus brunnescens</i>	<i>Juncus subtriflorus</i>
<i>Juncus bufonius</i>	<i>Juncus twcedyi</i>
<i>Juncus confusus</i>	Woodrush (<i>Luzula</i>)
<i>Juncus ensifolius</i>	<i>Luzula campestris</i>
<i>Juncus longistylis</i>	<i>Luzula intermedia</i>
<i>Juncus mertensianus</i>	<i>Luzula parviflora</i>
<i>Juncus nevadensis</i>	<i>Luzula spicata</i>
<i>Juncus parryi</i>	

LILY FAMILY (LILIACEAE)

The lily family is a rather large and important family. It contains some edible plants, the most notable of which is the onion, and many ornamental flowers. The flowers, which are perfect, consist of a perianth (calyx and corolla combined) of six more or less similar parts, six stamens, and one pistil.

1. Flowers in umbels. **Onion (*Allium*)**----- (p. 37)
1. Flowers in racemes or panicles. 2.
1. Flowers neither in racemes, panicles, nor umbels. 5.
2. Flowers blue. **Camas (*Camassia esculenta*)**----- (p. 38)
2. Flowers yellow. ***Tofieldia intermedia***----- (p. 39)
2. Flowers white or whitish. 3.
3. Plant usually more than 2 feet tall. **Beargrass (*Xerophyllum tenax*)**----- (p. 39)
3. Plant usually less than 2 feet tall. 4.
4. Styles 3. ***Zygadenus***----- (p. 40)
4. Style 1. **Solomonplume (*Smilacina*)**----- (p. 40)
5. Leaves only 2. **Glacierlily (*Erythronium grandiflorum*)**----- (p. 39)
5. Leaves more than 2. 6.
6. Flowers axillary. **Twistedstalk (*Streptopus amplexifolius*)**----- (p. 40)
6. Flowers terminal. 7.
7. Flowers yellow. **Yellow fritillary (*Fritillaria pudica*)**----- (p. 39)
7. Flowers purple. **Purple fritillary (*Fritillaria atropurpurea*)**----- (p. 39)

Onion (*Allium*).—The wild onions can readily be recognized by their odor, which is the same as that of cultivated onions. The following key will aid in distinguishing the different species:

1. Leaves round. **Siberian onion (*Allium sibiricum*)**.
1. Leaves flat. 2.
2. Umbel nodding. **Nodding onion (*Allium cernuum*)**.
2. Umbel not nodding. 3.
3. Bulb-coat membranous, like that of a cultivated onion. 4.
3. Bulb-coat fibrous. 5.
4. Leaves 2. ***Allium brandegei***.
4. Leaves several. ***Allium brevistylum***.
5. Most of the flowers replaced by bulblets. ***Allium rubrum***.
5. Flowers seldom replaced by bulblets. ***Allium nuttallii***.

Siberian onion (*Allium sibiricum*) is the only wild onion in the park that has cylindrical, hollow leaves like a cultivated onion. The others all have flat leaves. The flowers of this species are lavender-colored and rather crowded in the umbel.

Allium rubrum is most easily recognized by the fact that most of the flowers of the umbel are replaced by small, spherical bulblets, red in color. The few flowers are white, the three outer parts of the perianth often with a dark green midnerve.

Allium nuttallii is very similar to the preceding species, except that it produces few if any bulblets. The flowers vary from rose to white.



FIGURE 19.—Camas. Blue. Photograph by Geoffrey Cooper.

Nodding onion (*Allium cernuum*) is easily recognized by the fact that the upper end of the flowering shoot is curved over, so that the umbel is nodding and the flowers hang downward. The flowers are rose color or white, and the stamens are longer than the parts of the perianth.

Allium brevistylum is most readily distinguished from *A. nuttallii* by the bulb which is stout and has an elongated base like an underground stem, and is covered by a thin membrane like a cultivated onion instead of a fibrous covering.

The umbel is erect and few-flowered, the flowers being deep rose color. The parts of the perianth are about twice as long as the stamens and pistil and are rather narrow.

Allium brandegei.—The flowers of this species are very similar to those of the preceding one, except that the parts of the perianth are broadly lance-shaped. There are only two leaves, but these are longer than the flowering shoot. The bulb is very small and has a membranous coat.

In addition to the above *Allium tolmiei* has been reported as occurring in the park.

Camas (*Camassia esculenta*) grows from a bulb which was formerly much used by the Indians as food. The leaves are basal and somewhat grasslike. The flowering stalk is quite stout, 1 to 2 feet high, and bears a raceme of blue flowers.

Yellow fritillary (*Fritillaria pudica*) grows from 5 to 10 inches high and often there is only one flower, though there may be as many as six. The nodding flowers are yellow or orange and tinged with purple. It is also called "Yellowbell."

Purple fritillary (*Fritillaria atropurpurea*) is similar, but is a somewhat larger plant, and the flowers are dull purple more or less spotted with yellowish green.

Glacierlily (*Erythronium grandiflorum*).—This plant has a deep-set bulb and only two smooth, flat, shining leaves which are 5 to 7 inches long and sheathe the base of the naked stem. The stem is 5 to 15 inches high and bears one or more bright yellow nodding flowers. The parts of the perianth are curved back at the end. The flowers bloom very early while the snow is still melting. Often called Dogtooth violet.



FIGURE 21.—Glacierlily. Yellow. Photograph by Geoffrey Coope.

hairy and somewhat sticky toward the upper end, and the leaves are narrow and grasslike.

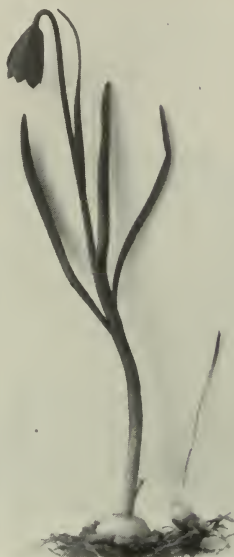


FIGURE 20.—Yellow fritillary or Yellowbell. Yellow. Photograph by A. R. Sweetser.

Beargrass (*Xerophyllum tenax*).—This interesting plant, which of course, is not a grass but a lily, has been found only in limited areas in the southern part of the park. It grows 2 to 4 feet high and bears a large compact cluster of showy white flowers. The stem is thickly beset with needlelike leaves, the lower of which are often 2 or 3 feet long while the upper are reduced to bristlelike bracts.

Tofieldia intermedia.—A plant with fibrous roots and a tuft of slender, unbranched stems, each bearing a small cluster of yellow flowers. The stem is somewhat

The genus *Tofieldia* is commonly known as lamb-lily.

Mountain deathcamas (*Zygadenus elegans*).—This plant grows from a bulb and varies from a few inches to 2 or 3 feet high. The grasslike leaves are largely basal, but there are a few on the stem. The greenish white flowers are arranged in a simple raceme, and there is a conspicuous gland or spot near the base of each of the six parts of the perianth.



FIGURE 22.—Mountain deathcamas. White.
Photograph by A. R. Sweetser.

Meadow deathcamas (*Zygadenus venenosus*) is very similar, but is a smaller plant with flowers only about half as large. This species is very poisonous when eaten by animals.



FIGURE 23.—Twistedstalk. Greenish white. Photograph by A. R. Sweetser.

Twistedstalk (*Streptopus amplexifolius*) gets its name from the fact that the stalk or pedicel of each flower is bent or twisted near the middle. The rather stout and branching stem is 2 to 4 feet high and the ovate, clasping leaves are arranged alternately. The greenish white or purplish flowers are borne in the axils of the leaves.

Smilacina stellata has an unbranched, smooth stem which is 5 to 20 inches high and sessile leaves which are usually folded along the midrib. The white, starlike flowers are borne in a simple raceme. The fruits when ripe are red berries. Found in moist

woods and meadows throughout the United States, except in the extreme west.

Smilacina sessilifolia is very similar, except that the leaves are not folded and the fruits are usually black when ripe.

Smilacina amplexicaulis differs from the other two species by having the flowers in a compound raceme; also it is a somewhat larger plant.

The genus *Smilacina* is commonly known as **solomonplume**.

Other members of the lily family that have been reported in the park are: **Alplily** (*Lloydia serotina*), **Purple-eye mariposa** (*Calochortus eurycarpus*), and *Calochortus pavonaceus*. **Purple-eye mariposa** is fairly abundant near West Yellowstone.



FIGURE 24.—Solomonplume. White. Photograph by A. R. Sweetser.



FIGURE 25.—Solomonplume. White. Photograph by Thos. R. Ashlee.

IRIS FAMILY (IRIDACEAE)

A small family of plants with grasslike leaves and showy flowers constructed strictly on a numerical plan of three. They differ from the lilies in having the parts of the flower attached above the ovary. Many varieties of iris are cultivated as ornamental plants.

Rocky Mountain iris (*Iris missouriensis*).—The slender shoot grows from a stout underground stem and bears one or two large, light

blue flowers. The leaves are mostly basal and shorter than the stem. The 6 divisions of the perianth are 2 or 3 inches long and petallike, as are the three branches of the style. The fruit is a three-angled capsule about an inch long. Found on wet lands or sometimes on sandy hillsides.

Sisyrinchium angustifolium produces a cluster of very narrow, basal, grasslike leaves and two-edged stem that grows from 5 to 15 inches high. The small, purple flowers are produced in a cluster with two sheathing, leaflike bracts, the outer of which is about twice as long as the inner and much longer than the flower cluster. The structure of the flower is much like that of the iris, except that the style branches are not petallike. The fruit is a nearly spherical capsule.



FIGURE 26.—Rocky Mountain iris. Light blue. Photograph by Geoffrey Coope.

Sisyrinchium occidentale differs primarily in that the outer bract is not much longer than the inner one and only slightly longer than the inflorescence.

The genus *Sisyrinchium* is commonly called "blue-eyed-grass."

ORCHID FAMILY (ORCHIDACEAE)

The orchid flower consists of 3 sepals, 3 petals, 1 of which is very is a rather recent family in point of origin and has developed remarkable adaptations for cross pollination by means of insects. It cannot be said, however, to have developed along lines of greatest efficiency. In the first place the orchids have become so dependent upon insects that in most cases they cannot produce any seeds at all unless they are visited by certain of these small animals. In the second place, the seeds are extremely small and in most cases they will not germinate unless they are stimulated by the presence of certain kinds of fungi or by some artificial means such as a sugar solution. The result is that many kinds of orchids are exceedingly rare, except as they are cultivated and cared for by man.

The orchid flower consists of 3 sepals, 3 petals, 1 of which is very different from the others and is called the lip, and a central column

made up of a single stamen and a style united together. The ovary is below the other parts of the flower. The pollen is in the form of two pear-shaped masses which are attached by stalks to a sticky disk and the whole structure usually adheres to the head or body of an insect when the flower is visited for nectar.

1. Plants without green leaves. **Coralroot** (*Corallorhiza*)----- (p. 44)
1. Plants with 1 green leaf. 2.
1. Plants with more than 1 green leaf. 3.
2. Flowers rose color. **Calypso** (*Calypso bulbosa*)----- (p. 43)
2. Flowers greenish yellow. **One-leaf-bog orchid** (*Lysichiton obtusata*)-- (p. 44)
3. Leaves opposite. **Ophrys** (*Listera*)----- (p. 44)
3. Leaves alternate. 4.
4. Spike of flowers spirally twisted. **Ladiestresses** (*Spiranthes stricta*)_ (p. 44)
4. Spike of flowers not spirally twisted. **Limnorchis**----- (p. 43)



FIGURE 27.—Calypso. Rose. Photograph by A. R. Sweetser.

Calypso (*Calypso bulbosa*) is a low plant with a single, broad, thin leaf at the base of a stem that is 2 to 5 inches high and bears 2 or 3 brownish-green sheaths and a fragrant, showy, drooping flower. The sepals and petals are light rose color except the lip, which is a little longer and brownish pink spotted with purple. Usually found in moist or boggy woods.

Limnorchis.—Plants with fleshy roots, alternate leaves and small greenish or white flowers in spikes. The three species are rather difficult to distinguish but can usually be separated by means of the following key:

1. Flowers white. **White bog-orchid**. (*Limnorchis borealis*.)
1. Flowers greenish. 2.
2. Spur equal to the lip. **Northern green orchid**. (*Limnorchis viridiflora*).
2. Spur longer than the lip. *Limnorchis sparsiflora*.

Ladiestresses (*Spiranthes stricta*) resembles an orchid, but the white flowers are borne on the spike in three spirally arranged rows, giving the spike the appearance of being twisted.



FIGURE 28.—White bog-orchid. White. Photograph by Dr. Harvey E. Stork.

Ophrys (*Listera convallarioides*) has a slender stem 5 to 10 inches high, somewhat hairy but naked, except that there is a pair of opposite, rounded, or kidney-shaped leaves just below the flower cluster. The small greenish flowers are borne in a loose raceme.

Listera nephrophylla is similar, but the stem is smooth.

One-leaf bog orchid (*Lysiella obtusata*) is a small plant with a single, more or less oblong, leaf at the base and greenish-yellow flowers. The outer sepals are turned back as is also the lip.



FIGURE 29.—Ophrys. Greenish. Photograph by A. R. Sweetser.



FIGURE 30.—Coralroot. Brownish purple. Photograph by A. R. Sweetser.

Coralroot (*Corallorhiza*).—The name, coralroot, is a misnomer, for the plant has no root at all but only an underground stem. It also has no "leaf green" or chlorophyll. Therefore, it cannot

manufacture food like a green plant. The underground stem is always infested by a fungus, and apparently the coralroot is a parasite on the fungus. The three species are quite similar but can be distinguished in the following manner:

Lip deeply 3-lobed. *Corallorhiza multiflora*.

Lip with a small tooth or lobe on either side. *Corallorhiza innata*.

Lip entire. *Corallorhiza striata*.



FIGURE 31.—Coralroot. Brownish purple. Photograph by A. R. Sweetser.

NETTLE FAMILY (URTICACEAE)

A family of varying characteristics, some members being thickly beset with stinging hairs. Quite a large family but represented here only by the **Narrowleaf nettle** (*Urtica gracilis*). This is a tall, slender plant sparingly beset with stinging hairs and bearing loosely clustered spikes of small, greenish, imperfect flowers. The leaves are opposite, ovate or lance-shaped, petioled, toothed, and 3- to 5-veined. The staminate flowers have 4 stamens while the pistillate have a single pistil. The fruit is an akene.

WILLOW FAMILY (SALICACEAE)

A family of trees and shrubs with simple, alternate leaves. The most common of our broad-leaved trees belong to this family.

Quaking aspen (*Populus tremuloides*).—This is the most common broad-leaved tree in the park. It often develops abundantly after a forest fire and forms dense groves, especially in moist places. The leaves are rather small and roundish heart-shaped with a short, sharp point and small regular teeth. The petiole is flattened laterally and this causes the leaf to tremble with the slightest breeze. The bark of this tree is the favorite food of the beaver.

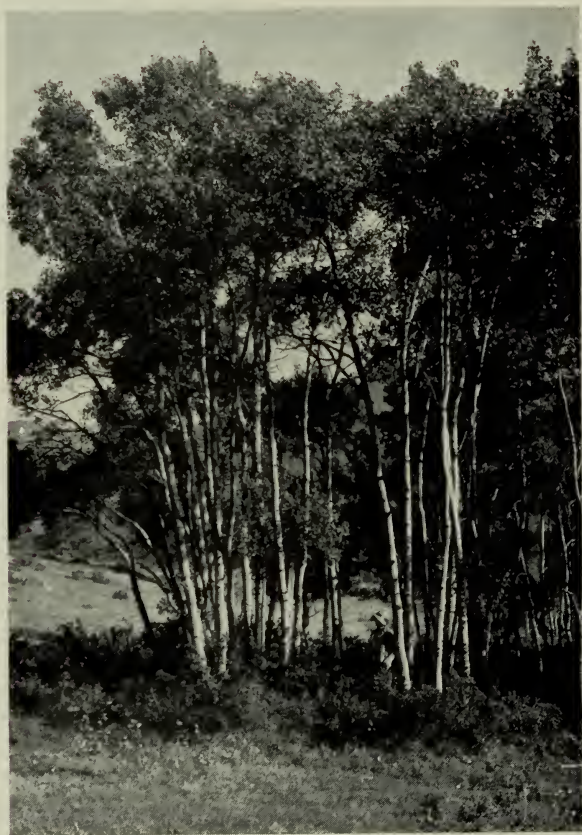


FIGURE 32.—Quaking aspen. Photograph by George Grant, National Park Service.

Balsam poplar (*Populus balsamifera*).—Leaves ovate with heart-shaped base, dark green above and pale beneath, and with small, rounded teeth. The buds are fragrant and sticky.

Narrowleaf cottonwood (*Populus angustifolia*) has narrowly lance-shaped leaves which are rounded at the base and have fine rounded teeth along the entire margin.

Sargent cottonwood (*Populus sargentii*) has also been reported as occurring in the park.

Willow (*Salix*).—There are several kinds in the park but they are rather difficult to distinguish, and most park visitors are not

interested in distinguishing the different kinds. Therefore, those that have been identified in the park are merely listed below:

<i>Salix anglorum</i>	<i>Salix mackenziana</i>
<i>Salix barclayi</i>	<i>Salix nivalis</i>
<i>Salix bebbiana</i> var. <i>perrostrata</i>	<i>Salix petrophila</i>
<i>Salix chlorophylla</i>	<i>Salix pseudomonticola</i>
<i>Salix cordata</i>	<i>Salix pseudomyrsinites</i>
<i>Salix dodgeana</i>	<i>Salix saximontana</i>
<i>Salix exigua</i>	<i>Salix scouleriana</i>
<i>Salix fendleriana</i>	<i>Salix stricta</i>
<i>Salix fluvialis</i>	<i>Salix subcaerulea</i>
<i>Salix geyeriana</i>	<i>Salix tenera</i>
<i>Salix glauca</i> var. <i>glabrescens</i>	<i>Salix wolffi</i>
<i>Salix lasiandra</i>	

BIRCH FAMILY (BETULACEAE)

A small family of trees and shrubs with alternate, toothed leaves and flowers in catkins. It is found mostly along streams. The edible hazelnuts belong to this family.

Red birch (*Betula fontinalis*) is a large shrub or small tree with smooth, dark bark and ovate, toothed leaves. The bracts of the fruit cluster are three-lobed, and the cluster falls apart easily at maturity.

Mountain bog birch (*Betula glandulosa*), a low shrub 6 or 8 feet high, also occurs in the park. Also known as **Resin birch**.

Mountain alder (*Alnus tenuifolia*) is often found in the same situation as the birch. The leaves have larger teeth, which are often double. The bracts of the fruit cluster are not lobed, and the cluster does not fall apart even at maturity.

MISTLETOE FAMILY (LORANTHACEAE)

A small family of evergreen plants that are parasitic on trees or shrubs. They contain some chlorophyll and manufacture their own carbohydrates, but obtain water and mineral salts from the plants on which they grow. The family is represented in the park only by the **Mistletoe** (*Arceuthobium americanum*) which is parasitic on lodge-pole pine and sometimes on limber pine. This little mistletoe is the cause of the malformations on the pine trees that are called "witches brooms."

SANDLEWOOD FAMILY (SANTALACEAE)

A small family of plants with relatively inconspicuous flowers of which our only representative is the *Comandra pallida*. This is a low, smooth, perennial herb with small, alternate, sessile leaves and greenish-white or purplish flowers. The stems are 4 to 8 inches high and grow at more or less regular intervals from an under-

ground stem. The leaves are entire and vary from oblong to nearly linear in shape.

BUCKWHEAT FAMILY (POLYGONACEAE)

This is a large family containing trees, shrubs, and herbs, but only herbs are represented in the park. The flowers, for the most part, are rather small and inconspicuous, and the family contains relatively few ornamental plants. It contains some pernicious weeds and the cultivated buckwheat is a valuable food plant.

1. Flowers subtended by an involucre. Sheaths lacking on stem. 2.
1. Flowers not subtended by an involucre. Sheaths present on stem. 8.
2. Bracts several, leaflike. 3.
2. Bracts in 3's, not leaflike. 7.
3. Flower stalk with a whorl of leaves near the middle. **Wyeth eriogonum** (*Eriogonum heracleoides*)----- (p. 49)
3. Leaves all basal. 4.
4. Flowers smooth. 5.
4. Flowers hairy. 6.
5. Flowers bright yellow. **Sulphur eriogonum** (*Eriogonum umbellatum*)_ (p. 49)
5. Flowers pale yellow. *Eriogonum subalpinum*----- (p. 49)
6. Leaves thick. *Eriogonum flavum*----- (p. 50)
6. Leaves thin. **Piper eriogonum** (*Eriogonum piperi*)----- (p. 50)
7. Flowers white. **Cushion eriogonum** (*Eriogonum ovalifolium*)----- (p. 50)
7. Flowers bright yellow. *Eriogonum andinum*----- (p. 50)
7. Flowers pale yellow. *Eriogonum ochroleucum*----- (p. 50)
8. Perianth parts 4. **Mountain-sorrel** (*Oxyria digyna*)----- (p. 50)
8. Perianth parts 5. 9.
8. Perianth parts 6. **Dock and Sorrel** (*Rumex*)----- (p. 50)
9. Plants climbing. **Cornbind** (*Polygonum convolvulus*)----- (p. 52)
9. Plants not climbing. 10.
10. Plants prostrate. **Knotweed** (*Polygonum aviculare*)----- (p. 52)
10. Plants erect. 11.
11. Flowers axillary. 12.
11. Flowers in spikes or spikelike clusters. 13.
12. Stamens 5 or 6. *Polygonum erectum*----- (p. 52)
12. Stamens 8. *Polygonum douglasii*----- (p. 52)
13. Aquatic plants. **Water ladysthumb** (*Polygonum amphibium*)----- (p. 52)
13. Not strictly aquatic though some may grow in very wet places. 14.
14. Some of the flowers replaced by bulblets. *Polygonum viviparum*---- (p. 52)
14. None of the flowers replaced by bulblets. 15.
15. Flowers bright rose color. *Polygonum hartwrightii*----- (p. 52)
15. Flowers white or whitish. 16.
16. Stamens longer than the corolla. **American bistort** (*Polygonum bistortoides*)----- (p. 52)
16. Stamens shorter than the corolla. *Polygonum polygaloides*----- (p. 52)

Eriogonum.—The plants all have flowers with a 6-parted perianth, no petals, 9 stamens, and 1 pistil with 3 styles. They are found mostly in dry places.

Wyeth eriogonum (*Eriogonum heracleoides*).—This species has slender, more or less tufted stems, which grow 8 to 20 inches high and are short-hairy. The oblong or lance-shaped leaves are mostly basal. Each stem bears at the end a cluster of pale yellow flowers subtended by a 6- to 8-cleft involucre of leaflike bracts, and usually, there is also, a whorl of small leaves or bracts near the middle of the stem.

Sulphur eriogonum (*Eriogonum umbellatum*).—The stems are somewhat woody near the base and much branched. The oblong

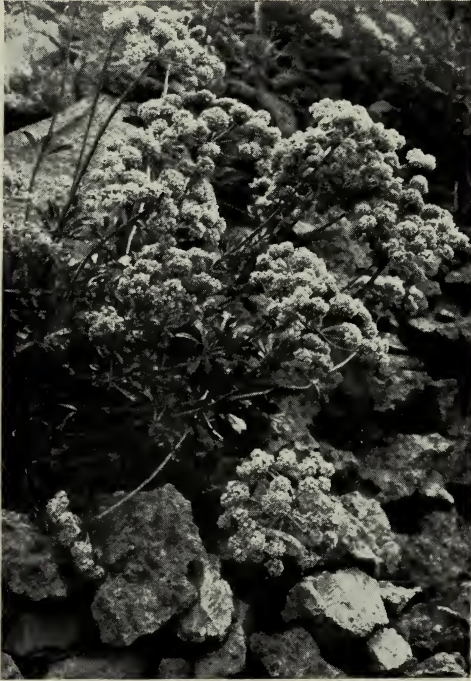


FIGURE 33.—Sulphur eriogonum. Yellow. Photograph by Joseph S. Dixon, National Park Service

or spatula-shaped leaves are 1 or 2 inches long and petioled. They are white-hairy below but smooth and green above. The yellow flowers are arranged in a simple umbel. The involucres of the individual flowers are deeply lobed and are usually turned back. This is one of our most common species.

Eriogonum subalpinum is very similar to the preceding species but is more woody at the base, and the flowering stems are stouter and often 12 to 16 inches long. The flowers are pale yellow and become tinged with pink in drying. Found from middle elevations to timberline.

Eriogonum rydbergii is another closely similar species, except that it has the leaves densely white-hairy on both sides.

Eriogonum flavum has yellow flowers and is white-hairy throughout including the flowers.

Piper eriogonum (*Eriogonum piperi*) is soft-hairy throughout except on the lower surface of the leaves. The stems are 4 to 8 inches high and the flowers are greenish yellow.

Cushion eriogonum (*Eriogonum ovalifolium*) is low and densely soft-hairy. The flowers are yellow or white in a headlike cluster at the end of a slender stem which may be 1 to 6 inches long.



FIGURE 33a.—Sulphur eriogonum. Yellow. Copyright, J. E. Haynes.

Eriogonum andinum is a small, matted, woolly plant with the leaves clustered on prostrate branches and with short, weak stems bearing few flowers which are yellow or tinged with purple.

Eriogonum ochroleucum.—This is a low, densely hairy plant, with the leaves narrowed into slender and often twisted petioles. The stems are slender and 4 to 10 inches high and the flowers are creamy white.

Eriogonum caespitosum is another species that has been reported as occurring in the park.

Mountain-sorrel (*Oxyria digyna*) is found at high altitudes in wet places among rocks. The stout and somewhat fleshy stem grows from 4 to 16 inches high and is smooth.

The round or kidney-shaped leaves are mostly basal and have long petioles. The flowers are small and greenish or sometimes reddish.

Sheep sorrel (*Rumex acetosella*) is a European plant which has been introduced into this country and has become a rather common weed. The leaves have a pleasantly sour taste due to the presence of acetic acid. The branching stems are 4 to 12 inches high, and the leaves are small, usually less than 2 inches long, the lower ones arrow-shaped. The flowers are imperfect, some plants producing staminate flowers and other plants pistillate. The small, reddish flowers are produced in a sort of compound panicle. *Rumex paucifolius* is similar but the leaves are linear to lance-shaped.

Willow dock (*Rumex mexicanus*).—The tufted stems of this species are 1 to 2 or more feet high and the lance-shaped leaves, which are seldom over 6 inches long, are pointed at both ends and more or less folded. The small flowers are perfect and greenish, each having 6 petals, 6 stamens, and 1 pistil like all members of this genus.



FIGURE 34.—Willow dock. Greenish Photograph by Dr. Harvey E. Stork.

Rumex brittanica is a much larger plant than the preceding species. The stems are 2 to 4 feet high, and the leaves are large. The leaves are rounded or pointed at the base and decurrent on the stem, and they gradually taper to the apex at the other end.

Rumex persicarioides is a low, annual plant with linear or lance-shaped leaves which are 2 to 4 inches long, more or less heart-shaped at the base, somewhat wavy margined and mostly on short

petioles. The greenish flowers are produced in numerous dense whorls along the slender branches.

Rumex occidentalis is a large plant, usually 2 to 4 feet tall and rather stout. The leaves are somewhat fleshy, smooth, and glossy, bluish green in color, wavy-margined, ovate or oblong in shape, somewhat heart-shaped at the base, and rounded or pointed at the apex. The whorls of greenish flowers are arranged in dense panicles which become rosy as the fruits mature.

Wild-begonia (*Rumex venosus*).—This species can be recognized by the inner segments of the perianth, which are about an inch broad and bright rose color.

Polygonum.—The polygonums are herbaceous plants with alternate, entire leaves and with the swollen nodes of the stems encased in sheaths which are more or less fringed or lobed. The flowers are borne in terminal spikes with dry bracts. The calyx is usually 5-parted and more or less petallike. The stamens vary from 4 to 9 and the styles or stigmas from 2 to 3. There are no petals.

American bistort (*Polygonum bistortoides*).—This species grows from 1 to 2 or more feet high. There are relatively few leaves, and they vary from oblong to linear or lance-shaped. The basal leaves are on long petioles, while the upper ones are sessile and smaller. The plant is most easily recognized by the short dense spike of white flowers which are sometimes tinged rose color.

Polygonum viviparum has smaller flowers and the lower ones on the spike are replaced by little bulblets.

Water ladysthumb (*Polygonum amphibium*) grows in water with the thick, smooth, long-petioled, elliptical or lance-shaped leaves floating. The bright, rose-colored flowers are borne in a terminal spike, which is dense but only about an inch long.

Polygonum hartwrightii is quite similar but usually grows in mud. It is very leafy and more or less hairy.

Knotweed (*Polygonum aviculare*), **Cornbind** (*P. convolvulus*), *P. erectum*, *P. douglasii*, and *P. polygaloides* are somewhat weedy plants and not very important in the park flora. They may be distinguished by means of the key. In addition to the species included in the key *Polygonum engelmannii*, *P. spargulariaeforme*, *P. watsonii*, and *P. kelloggii* have been reported as occurring in the park.

GOOSEFOOT FAMILY (CHENOPODIACEAE)

The goosefoot family is a large family of weedlike herbs and shrubs with simple, alternate leaves and small, greenish flowers. Many of them are adapted to growing in deserts or in sandy or saline soils. Most of them are wind-pollinated and produce pollen

rather abundantly. For this reason they are listed prominently among plants that cause hay fever.

Greasewood (*Sarcobatus vermiculatus*).—This is a somewhat spiny, rigidly branched shrub with linear, fleshy leaves and it grows mostly in moist, saline flats. It is quite common in the vicinity of the Gardiner River north of Mammoth Hot Springs. It grows 2 to 5 feet high and has smooth, white bark. The leaves are pale green, somewhat three-angled, and 1 to 2 inches long. The flowers are imperfect, the staminate borne in close terminal spikes and the pistillate solitary in the leaf axils.

Spiny hop-sage (*Grayia spinosa*) is a smaller shrub, 1 to 2 feet high, with small, somewhat fleshy leaves, and is found in the same locality as the greasewood.

Strawberry-blight (*Blitum capitatum*) is a fleshy, branched, annual herb that is found in moist mountain valleys. It grows 8 to 20 inches high and is smooth throughout. The alternate leaves are more or less arrowhead-shaped and usually sharply toothed. The small flowers are produced in axillary, headlike clusters which are often half an inch in diameter and become bright red, somewhat resembling berries.

Monolepis nuttalliana reminds one of strawberry-blight but it grows only 4 to 8 inches high and is not fleshy. Also the leaves are usually entire or nearly so.

Other members of the family that have been identified in the park are **Lambsquarters** (*Chenopodium album*), *C. aridum*, *C. atrovirens*, *C. conardii*, *C. fremontii*, *C. glaucum*, *C. hians*, *C. humile*, *C. leptophyllum*, *C. murale*, *C. salinum*, **Molly** (*Kochia americana*) and **Russian thistle** (*Salsola pestifer*). These are all weedy plants and not very important.

FOUR O'CLOCK FAMILY (NYCTAGINACEAE)

This family contains many plants with beautiful flowers and some of them are extensively cultivated as ornamental plants. The beauty of the flowers in this case, however, is due largely to the calyx which is colored like a corolla since the flowers have no corolla. It is sometimes due also to an involucre that surrounds the flowers. Some members of the family open their flowers late in the afternoon and close them the next morning, and the family gets its name from this habit. **Yellow sandverbena** (*Abronia ammophila*), which is found on the sandy shores of Yellowstone Lake, is probably our only representative. It is a prostrate plant with stems 8 to 16 inches long and is more or less glandular and sticky throughout. The oblong or elliptic leaves are opposite and the two leaves of each pair are somewhat unequal in size. The greenish or creamy-yellow flowers are quite numerous, both axillary and terminal, and usually quite fra-

grant. The involucre is composed of distinct bracts, and the calyx is tubular but five-lobed.

PURSLANE FAMILY (PORTULACACEAE)

The plants of this family have simple, entire leaves and are more or less fleshy. The family contains some rather pernicious weeds, but also some very beautiful flowers. The flowers open only in sunlight or on very bright days.

Springbeauty (*Claytonia lanceolata*).—This plant usually has one basal leaf, which is petioled, and a single pair of opposite leaves on the stem. The leaves are oblong or elliptic in shape. The white or pinkish flowers are produced in a raceme between the paired leaves.



FIGURE 35.—Bitterroot. Rose. Photograph by Dr. Frank R. Oastler.

Each flower has 2 persistent sepals, 5 petals, 5 stamens, and 1 pistil with a 3-cleft style.

Claytonia multicaulis is similar but usually has several leaves.

Montia chamissonis is usually found in cold, springy, or boggy places. The stems are 4 to 12 inches long and rather weak. They often root at the nodes and frequently

produce bulblets on the ends of short branches or in the axils of the lower leaves. The small, white flowers are produced in axillary or terminal racemes. The leaves are oblong, about half an inch long, and somewhat fleshy.

Pussypaws (*Spraguea multiceps*) is a low, branching herb with stems 1 to 5 inches long, small leaves with short, thick petioles, and flowers in dense, headlike clusters.

Bitterroot (*Lewisia rediviva*).—The State flower of Montana. It produces a basal cluster of linear or oblong, smooth, and slightly fleshy leaves and a short, one-flowered stem. The flower is large and varies from rose-pink to white. It has 6 or 8 sepals, about the same number of petals, 5 to 40 stamens, and 3 to 8 style branches.

The other two species that are found in the park have very much smaller flowers with only 2 sepals. *Lewisia minima* has narrowly linear leaves and white flowers while *Lewisia pygmaea* has broader leaves and rose-red flowers.

PINK FAMILY (CARYOPHYLLACEAE)

The plants of this family have opposite leaves and often very brilliantly colored flowers. Some, such as cockle, are very troublesome weeds while others, as carnations and pinks, are highly prized as ornamental plants.

1. Sepals united. 2.
1. Sepals distinct or nearly so. 3.
2. Styles 3. **Catchfly or Campion** (*Silene*)----- (p. 55)
2. Styles 5. *Lychnis drummondii*----- (p. 55)
3. Petals deeply 2-lobed. 4.
3. Petals entire or nearly so. 5.
4. Styles 3. **Starwort** (*Stellaria*)----- (p. 55)
4. Styles 5. **Cerastium** (*Cerastium*)----- (p. 55)
5. Stipules present. *Spergularia*----- (p. 56)
5. Stipules lacking. 6.
6. Styles 5. **Pearlwort** (*Sagina saginoides*)----- (p. 56)
6. Styles 3. 7.
7. Leaves linear, sharp-pointed. **Sandwort** (*Arenaria*)----- (p. 56)
7. Leaves ovate or oblong, blunt-pointed. *Moechringia lateriflora*----- (p. 56)

Sleepy catchfly (*Silene antirrhina*).—This is a smooth, annual herb. It is called sleepy because its flowers are usually closed while the sun is shining, and it is called catchfly because one or more portions of the upper part of the stem are covered with a sticky substance which prevents insects from creeping up the stem. It grows 1 or 2 feet high and has lance-shaped or linear leaves and pink flowers borne on long stalks in a panicle.

Silene multicaulis is usually less than a foot high and quite hairy. As a rule its pale red flowers are produced in short, three-flowered clusters.

Moss campion (*Silene acaulis*) is a dwarf, mosslike plant which is found at high elevations. It has crowded, linear leaves and the purplish flowers are solitary and terminal on very short stalks.

Silene oregana has also been reported in the park.

Lychnis drummondii is a somewhat hairy and sticky plant, 1 or 2 feet high, with lance-shaped or linear leaves, and a few flowers that vary from whitish to purplish red.

Lychnis vespertina has also been reported in the park.

Starwort (*Stellaria*).—The starworts are low plants with small, starlike, white flowers. There are usually 5 two-cleft petals, 10 stamens and 3 styles. The following species have been identified in the park: *Stellaria alpestris*, *S. borealis*, *S. crassifolia*, *S. edwardsii*, *S. longifolia*, *S. longipes*, *S. obtusa*, and *S. umbellata*.

Mouse-ear (*Cerastium arvense*).—This is a low, hairy plant with white flowers and can be distinguished from the starworts by the fact that there are five styles in the flowers.

Big mouse-ear (*Cerastium vulgatum*) has also been reported in the park.

Spergularia sparsiflora.—A freely branched, low plant with small, lilac flowers, usually one to each pair of leaves. It is found in wet, saline places.



FIGURE 36.—Mouse-ear. White. Photograph by Dr. Harvey E. Stork.

Spergularia rubra has also been found in the park.

Pearlwort (*Sagina saginoides*).—A dwarf, inconspicuous plant of high elevations with linear leaves and small, white flowers.

Arenaria sajanensis.—A low, densely hairy plant

with small, white flowers which is common in alpine regions.

Arenaria congesta, which is smooth or nearly so, is also common in the mountains.

Other species of sandwort that have been reported in the park are *Arenaria aequicaulis*, *A. nuttallii*, *A. rossii*, and *A. tenella*.

Moehringia lateriflora resembles the starworts but has broader leaves and unlobed petals.

WATERLILY FAMILY (NYPHAEACEAE)

A family of water plants with many members having very large and beautiful flowers but represented here only by **Wokas** (*Nymphaea polysepala*) which produces floating leaves that are 4 inches to a foot long and yellow flowers which when fully open are 3 to 5 inches across.

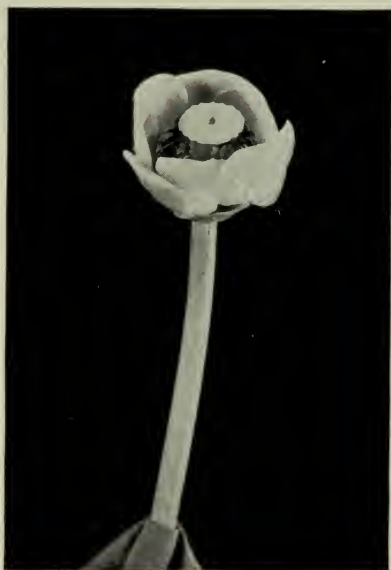


FIGURE 37.—Wokas. Yellow. Copyright, J. E. Haynes.

HORNWORT FAMILY (CERATOPHYLLACEAE)

A family of water plants with whorled, finely dissected leaves and flowers which, unlike those of the waterlilies, are very small and in-

conspicuous, without either calyx or corolla but with an 8- to 12-cleft involucre in place of a calyx.

Hornwort (*Ceratophyllum demersum*) grows in ponds or slow-flowing streams and has sessile leaves that are cut into thrice-forked, thread-like divisions and occur in whorls of 6 or 8. The flowers are imperfect. A staminate flower consists of 12 to 24 stamens and a pistillate flower consists of a single ovary only.

BUTTERCUP FAMILY (RANUNCULACEAE)

The buttercup family is a large family of plants with varying characteristics. None of them is of great economic importance except as ornamental plants, but many of them have beautiful and interesting flowers, and a few are poisonous when eaten by animals. They all agree in having all parts of the flowers distinct, however much they may differ in other ways.

1. Flowers irregular. 2.
1. Flowers regular. 3.
2. Upper sepal spurred. **Larkspur** (*Delphinium*)----- (p. 57)
2. Upper sepal hooded, helmetlike. **Monkshood** (*Aconitum columbianum*)---- (p. 58)
3. Sepals spurred. Leaves linear. **Mousetail** (*Myosurus*)----- (p. 58)
3. Sepals not spurred. Leaves not linear. 4.
4. Petals spurred. **Columbine** (*Aquilegia*)----- (p. 59)
4. Petals not spurred. 5.
5. Flowers subtended by an involucre. 6.
5. Flowers not subtended by an involucre. 7.
6. Flowers red. Styles short. **Anemone** (*Anemone*)----- (p. 59)
6. Flowers purple or white. Styles long and feathery. **American pasque flower**
(*Pulsatilla hirsutissima*)----- (p. 60)
7. Leaves opposite. **Clematis** (*Clematis*)----- (p. 60)
7. Leaves not opposite. 8.
8. Flowers white. 9.
8. Flowers yellow. 12.
8. Flowers greenish. **Meadowrue** (*Thalictrum*)----- (p. 61)
9. Plants strictly aquatic. **Water crowfoot** (*Batrachium*)----- (p. 61)
9. Plants not strictly aquatic though some may grow in very wet places. 10.
10. Leaves compound. **Baneberry** (*Actaea*)----- (p. 61)
10. Leaves simple. 11.
11. Leaves undivided. **Marshmarigold** (*Caltha rotundifolia*)----- (p. 62)
11. Leaves deeply lobed or divided. **Globeflower** (*Trollius albiflorus*)---- (p. 62)
12. Petals broad. **Buttercup** (*Ranunculus*)----- (p. 62)
12. Petals narrow. **Trailing buttercup** (*Halerpestes cymbalaria*)----- (p. 62)

Larkspur (*Delphinium*).—The uppermost of the 5 sepals is developed backward into a spur, and the 2 upper of the 4 petals are prolonged backward into a spur which is enclosed within the spur of the sepal. In some species there are only 2 petals, an upper and a lower. The stamens are numerous, but the pistils are few. Certain species are poisonous when eaten by cattle.

Low larkspur (*Delphinium nelsonii*) blooms early in the season. It grows only 4 to 12 inches high and produces several blue flowers. The sepals are shorter than the spur, and the lower petal is two-cleft and has a tuft of hair near the middle. The leaves are rather firm and palmately divided into narrow segments.

Delphinium bicolor is similar but the two upper petals are yellowish with prominent dark blue veins.

Duncecap larkspur (*Delphinium cucullatum*) grows from 3 to 6 feet tall and blooms later in the season.

Delphinium glaucescens, *D. nuttallianum*, *D. simplex*, and *D. scopulorum* have also been reported in the park.

Monkshood (*Aconitum columbianum*).—The flowers of the monkshood are irregular, but quite different from those of the larkspur.



FIGURE 38.—Low larkspur. Blue. Photograph by Geoffrey Coope.



FIGURE 39.—Monkshood. Blue. Photograph by Dr. Frank R. Oastler.

The upper sepal, instead of being spurred, is helmet-shaped or hood-shaped, while the two upper petals are spurred, but the spurs are concealed within the hood of the sepal. The three lower petals are very small or sometimes absent. The stem is stout and 3 to 7 feet tall. The leaves are palmately lobed or cleft to near the middle. The flowers vary from deep blue to nearly white.

Myosurus apetalus.—A small plant with a tuft of narrow basal leaves and whitish flowers on stems that are only one or two inches high. The flowers have 5 sepals that are spurred at the base and sometimes 5 petals though more often the petals are lacking. There are 5 to 20 stamens and many pistils which mature into a little cylindrical spike of akenes. This gives the plant its common name and also makes it look like a very small plantain.

Lemon columbine (*Aquilegia flavescens*).—The name columbine comes from a Latin word meaning dove and is used because of the fancied resemblance of the flower to five doves huddled together. The common columbine found in the park is yellow, turning pinkish when old.



FIGURE 40.—Lemon columbine. Lemon-yellow. Photograph by Dr. Frank R. Oastler.

Another species with beautiful blue flowers, **Colorado columbine** (*Aquilegia caerulea*), is the State flower of Colorado. This is found to a limited extent in the southern part of the park.

The columbine is easily recognized by its five-spurred, regular flowers.

Anemone globosa is a silky-hairy plant from 4 to 12 inches high.



FIGURE 41.—American pasque flower. Purplish. Photograph by Dr. Frank R. Oastler.

The basal leaves are long-petioled and deeply cleft into narrow lobes, while the stem leaves are short-petioled and form an involucre below the several red or sometimes yellow flowers. The fruits are akenes which at maturity form a cylindrical head.

Anemone cylindrica with greenish-white flowers and a cylindrical head of fruits has also been reported in the park.

American pasque flower (*Pulsatilla hirsutissima*).—This is the State flower of South Dakota. The general characteristics are the same as those of the anemone except that the styles become long feathery



FIGURE 42.—Sugarbowl. Seeded. Purple. Photograph by Dr. Harvey E. Stork

tails on the fruits, and the purplish flower is somewhat more cup-shaped.

Columbia clematis (*Clematis columbianum*).—This is the plant that gives the name to Clematis Gulch at Mammoth Hot Springs. The four sepals are violet or purple and 1 to 2 inches long. There are no



FIGURE 43.—Water crowfoot. White. Photograph by Dr. Harvey E. Stork

petals, but often some of the outer stamens are more or less petal-like. The leaves are compound with three leaflets, and the stems climb by means of the twisted petioles.

Western virginsbower (*Clematis ligusticifolia*), which climbs over bushes and produces an abundance of small, white flowers, and **Sugarbowl** (*Clematis douglasii*) which is an erect plant and has flowers with four very thick, deep purple sepals, also occur in the park.

Batrachium flaccidum.—Wholly submersed in the water of ponds and streams except that the flowers are at the surface. The leaves are alternate and very finely dissected, and they are so delicate that they collapse when they are withdrawn from the water. The flowers are solitary on long stalks opposite the leaves. The petals are white but yellowish at the base, and the stamens and pistils are numerous.

Batrachium confervoides differs in having a very slender, hairlike stem and much smaller flowers, each with only 5 to 12 stamens.



FIGURE 44.—Meadowrue. Greenish. Photograph by A. R. Sweetser.



FIGURE 45.—Marshmarigold. Creamy white. Photograph by Joseph S. Dixon, National Park Service.

Batrachium grayanum is another species that has been reported as occurring in the park.

The genus is commonly called **water crowfoot**.

Thalictrum occidentale.—From 2 to 4 feet high and with only 2 or 3 leaves which are 2 to 4 times compound and have numerous, small, rounded leaflets. The greenish flowers are imperfect with the staminate flowers on different plants from the pistillate. The stamens are numerous while the pistils are several, but usually only a few of them mature.

Thalictrum sparsiflorum differs in having perfect flowers.

Thalictrum megacarpum and *T. dioicum* have also been reported in the park.

Actaea arguta.—This plant has a single, large, basal compound leaf which is long-petioled and each of its three divisions is long-stalked and pinnate. The leaflets are ovate and 2 to 5 inches

long. The white flowers are small, but numerous, and are arranged in a simple raceme. Each flower has 4 to 6 small, petallike sepals, 4 to 10 small petals, and numerous stamens, but only 1 pistil. The fruits are red or white berries which are poisonous if eaten. The genus is commonly called **baneberry**.

Marshmarigold (*Caltha rotundifolia*).—A smooth, perennial herb which grows in wet places and blooms early in the season. The leaves are all basal, entire or nearly so, broadly ovate to oblong and 1 to 3 inches long. The flowering stems are 1 to 6 inches high and one-flowered. The flowers are creamy white and have 5 to 15 sepals, no petals, many stamens and several pistils.

Globeflower (*Trollius albiflorus*).—This is a perennial herb with palmately 5- to 7-parted leaves and large, solitary, terminal, white flowers. The flowers resemble those of the marshmarigold.



FIGURE 46.—Globeflower. White. Photograph by Dr. Frank R. Oastler.

Buttercup (*Ranunculus*).—The buttercups are low plants with yellow flowers. There are usually 5 sepals, 3 to 15 shiny yellow petals, which are nearly always broad and conspicuous, and each of which has a little scale-covered pit at the base inside. The different species can be distinguished in the following manner:

- | | | |
|---|-------|--------------------------------|
| 1. Water plants. | 2. | |
| 1. Land plants. | 3. | |
| 2. Leaves 3-lobed | ----- | <i>Ranunculus natans.</i> |
| 2. Leaves many-lobed and toothed | ----- | <i>Ranunculus purshii.</i> |
| 3. Stems creeping and rooting at the nodes | ----- | <i>Ranunculus reptans.</i> |
| 3. Stems not creeping and rooting at the nodes. | 4. | |
| 4. Plant smooth throughout. | 5. | |
| 4. Plants more or less hairy, at least on the leaves. | 6. | |
| 5. Stems 1 or 2 inches high. Alpine | ----- | <i>Ranunculus joris.</i> |
| 5. Stems 3 to 6 inches high | ----- | <i>Ranunculus alpeophilus.</i> |
| 5. Stems 8 to 20 inches high | ----- | <i>Ranunculus eremogenes.</i> |
| 6. All of the leaves lobed or cleft. | 7. | |
| 6. Some of the leaves merely toothed | ----- | <i>Ranunculus inamoenus.</i> |

7. Stems smooth or nearly so----- *Ranunculus douglasii*.
 7. Stems hairy. 8.
 8. Flowers about an inch across----- *Ranunculus montanensis*.
 8. Flowers about half an inch across----- *Ranunculus macounii*.

In addition to the above *Ranunculus alismellus*, *R. glabberimus*, *R. maximus*, *R. saxicola*, and *R. suksdorfii* have been reported as occurring in the park.

Trailing buttercup (*Halerpestes cymbalaria*).—Very similar to the true buttercups, except that the petals are narrow. The leaves are simple and toothed.

BARBERRY FAMILY (BERBERIDACEAE)

A small family of woody plants. The Japanese barberry is a valuable and extensively used ornamental shrub, while the common



FIGURE 47.—Creeping hollygrape. Yellow. Photograph by Geoffrey Coope.

American barberry has been condemned by the Government in all the wheat-growing States because it harbors the destructive wheat-rust fungus. Our only representative of the family is the **Creeping hollygrape** (*Berberis repens*), a low shrub, 4 to 12 inches high, with hollylike leaves and clusters of yellow flowers which are followed later by blue or purple berries.

POPPY FAMILY (PAPAVERACEAE)

The poppy family is a rather large family of herbs and shrubs with watery, milky, red, or yellow juice and usually showy flowers. The California poppy, State flower of California, and the famous poppies of France, as well as numerous kinds of cultivated poppies, belong here. The dutchman's breeches and squirrel corn of the eastern forests and the bleeding heart of gardens are other familiar examples.

Golden corydalis (*Corydalis aurea*), a low herb with watery juice, dissected leaves and racemes of yellow, irregular flowers, is not uncommon in the park. Each flower has 2 small sepals, 4 petals, 1 of them spurred at the base, 6 stamens and 1 pistil.

Steerhead (*Dicentra uniflora*), a little alpine plant with pinnately compound leaves and usually a single, flesh-colored flower, shaped like those of the bleeding heart, has also been reported in the park.



FIGURE 48.—Golden corydalis. Yellow. Photograph by A. R. Sweetser.

MUSTARD FAMILY (BRASSICACEAE OR CRUCIFERAE)

The members of the mustard family can usually be recognized by the flowers and fruits. The flowers usually have 4 sepals, 4 petals, arranged in the form of a cross, 6 stamens, 2 of them shorter than the other 4, and 1 pistil. The fruit is a pod which may be long or short, round or flat, but at maturity, in most cases, the two sides fall away from a central partition. The seeds are attached on both sides of the partition. The family contains a number of valuable, edible plants, such as cabbage, cauliflower, turnip, radish, and cress. It also contains a number of rather troublesome weeds. It is usually necessary to have mature fruits as well as flowers in order to distinguish the various members of the family.

1. Pods at least twice as long as broad. 2.
1. Pods less than twice as long as broad. 10.
2. Pods an inch or more long. 3.
2. Pods less than an inch long. 5.
3. Flowers yellow or orange. **Blistercress** (*Erysimum*)----- (p. 65)
3. Flowers not yellow or orange. 4.
4. Pods flattened. **Rockcress** (*Arabis*)----- (p. 65)
4. Pods not flattened. *Thelypodium*----- (p. 66)
5. Flowers not yellow. 6.
5. Flowers yellow. 7.
6. Plants smooth. **Bittercress** (*Cardamine*)----- (p. 66)
6. Plants hairy. *Smelowskia americana*----- (p. 66)
7. Leaves dissected. **Tansymustard** (*Sophia*)----- (p. 66)
7. Leaves lobed but not dissected. 8.
8. Pods short, about twice as long as broad. *Roripa*----- (p. 67)
8. Pods long, several times as long as broad. 9.
9. Plants smooth. **Wintercress** (*Barbarea americana*)----- (p. 67)
9. Plants rough with scattered hairs. **Mustard** (*Brassica*)----- (p. 67)
10. Pods inflated. **Twinpod** (*Physaria didymocarpa*)----- (p. 67)
10. Pods not inflated. 11.
11. Pods flattened. 12.
11. Pods not flattened. **False-flax** (*Camelina microcarpa*)----- (p. 67)
12. Pods deeply notched at the end. 13.
12. Pods not notched at the end. 14.
13. Basal leaves deeply lobed. **Shepherds-purse** (*Capsella bursa-pastoris*)----- (p. 67)
13. Basal leaves entire or merely toothed. *Thlaspi*----- (p. 67)
14. Pods only 1- or 2-seeded. **Peppergrass** (*Lepidium*)----- (p. 67)
14. Pods several-seeded. 15.
15. Plants growing in shallow water or mud. **Awlwort** (*Subularia aquatica*)----- (p. 68)
15. Plants not growing in shallow water or mud. 16.
16. Flowers minute, white. *Hutchinsia procumbens*----- (p. 67)
16. Flowers not minute, yellow or white. **Whitlowgrass** (*Draba*)----- (p. 68)

Rough blistercress (*Erysimum asperum*).—This is one of the most conspicuous members of the mustard family with its large, orange-yellow flowers.

Erysimum inconspicuum has much smaller, yellow flowers. Both of these species have stems and leaves that are pale from the appressed, whitish hairs.

The **Wormseed mustard** (*Erysimum cheiranthoides*) is similar to the latter of the preceding species but is slightly rough-hairy and is not made pale thereby.

Rockcress (*Arabis*).—The various species occurring in the park may be distinguished in the following manner:

1. Flowers rose color. 2.
1. Flowers purple. 4.
1. Flowers white or whitish. 5.
2. Plants usually more than 8 inches high. Leaves narrow. 3.
2. Plants less than 8 inches high. Leaves broader and rather thick----- *Arabis lemmonii*.
3. Leaves linear. Pods about 2 inches long----- *Arabis microphylla*.

3. Leaves narrowly lanceolate or oblanceolate. Pods
about 1½ inches long.----- *Arabis lyallii*.
4. Plants more than 2 feet high.----- *Arabis perelegans*.
4. Plants less than a foot high.----- *Arabis oxylobula*.
5. Upper leaves smooth. 6.
5. Upper leaves hairy. 8.
6. Stems hairy at the base.----- *Arabis glabra*.
6. Stems smooth at the base or nearly so. 7.
7. Leaves entire.----- *Arabis drummondii*.
7. Leaves more or less toothed.----- *Arabis fruticosa*.
8. Stems not woody at the base. 9.
8. Stems somewhat woody at the base. 12.
9. Pods widely spreading. 10.
9. Pods erect or nearly so. 11.
10. Leaves all linear. Plant white-hairy.----- *Arabis canescens*.
10. Lower leaves oblong to lance-shaped. Plant not
white-hairy.----- *Arabis exilis*.
11. Pods less than an inch long.----- *Arabis nuttallii*.
11. Pods more than an inch long.----- *Arabis hirsuta*.
12. Stems solitary.----- *Arabis lignipes*.
12. Stems several.----- *Arabis lignifera*.

In addition to the above species *Arabis columbiana*, *A. furcata*, and *A. retrofracta* have been reported as occurring in the park.

Thelypodium sagittatum is an erect but rather weak herb with lilac-colored flowers. The leaves are sessile and clasping with ear-like lobes at the base, the lower ones lance-shaped and the upper ones linear.

Thelypodium integrifolium has pale rose-colored flowers and the leaves are not clasping.

Thelypodium lilacinum var. *subumbellatum* has also been found in the park.

Mountain bittercress (*Cardamine cordifolia*).—The plant is smooth throughout, 1 to 3 feet high, and leafy to the top. The leaves are heart-shaped and the flowers are white.

Cardamine uni-juga is only 4 to 8 inches high, and some of the leaves are somewhat pinnate with 1 or 2 pairs of oblong leaflets; and **Brewer bittercress** (*Cardamine breweri*) is 8 to 16 inches high, and its leaves are distinctly pinnate with 5 to 7 leaflets.

Smelowskia americana is a low, perennial, alpine herb with densely clustered stems, the lower parts of which are densely covered by the bases of the dead leaves. The leaves are 1 to 2 inches long and pinnately divided into linear lobes. The flowers are white or pinkish.

Sophia incisa grows 8 to 16 inches high and is often densely short-hairy. The leaves are pinnately lobed or evenly dissected and the small yellow flowers are produced in racemes which become much elongated as the fruits mature.

Sophia gracilis has also been reported in the park.

Wintercress (*Barbarea americana*).—A smooth perennial 8 to 16 inches high. The basal leaves are elliptic with wavy margins. They may be simple or may have 1 or 2 pairs of small lobes on the petiole. The lower stem leaves are similar except that the petiole clasps the stem at the base, while the upper stem leaves are more or less toothed or lobed. The flowers are yellow.

Roripa.—Plants of wet places with pinnately-lobed leaves, yellow flowers and short, nearly cylindrical pods. The five species found in the park may be distinguished as follows:

1. Plants more or less hairy. 2.
1. Plants smooth. 3.
2. Pods shorter than the pedicels..... *Roripa hispida*.
2. Pods longer than the pedicels..... *Roripa curvisiliqua*.
3. Plants spreading by underground stems..... *Roripa sinuata*.
3. Plants not spreading by underground stems. 4.
4. Pods about as long as the pedicels..... **Marshcress** (*Roripa palustris*).
4. Pods twice as long as the pedicels..... *Roripa lyrata*.

Charlock (*Brassica arvensis*).—This is an introduced weed with more or less lobed or toothed leaves and yellow flowers.

Twinpod (*Physaria didymocarpa*).—Most easily recognized by its fruits which consist of two inflated, papery-walled parts joined together by the narrow partition and with the persistent style between them. The flowers are yellow and quite showy. The plant is 4 to 8 inches high and densely white-hairy.

False-flax (*Camelina microcarpa*).—An introduced weed with small yellow flowers and lance-shaped or arrow-shaped leaves.

Shepherds-purse (*Capsella bursa-pastoris*) is most easily recognized by its fruits which are wedge-shaped and deeply notched at the apex. It gets its name from the shape of the fruit. A very common weed throughout the country.

Hutchinsia procumbens, which is closely related to the shepherds-purse, has also been found in the park. It is a very low, spreading plant with elliptic-oblong fruits.

Pennycress (*Thlaspi arvense*) is a smooth, annual herb, 8 to 12 inches high, with sessile, more or less oblong and irregularly toothed leaves. The flowers are small and white. The fruits are very flat, nearly circular, broadly winged and deeply notched. Also known as **Frenchweed**.

Thlaspi parviflorum differs primarily in the pods which are spatula-shaped or oblong.

Thlaspi coloradense has also been reported as occurring in the park.

Lepidium apetalum is a smooth, more or less branched annual, 4 to 8 inches high, with rather pale leaves. The lower leaves are toothed or more or less deeply cut while the upper ones are nearly entire. The greenish flowers have no petals and only two stamens. The pods are nearly round with a notch at the end.

Lepidium inconspicuum has also been reported from the park.

Awlgort (*Subularia aquatica*) is a dwarf, stemless plant found growing in tufts in the shallow water or muddy shores of cold lakes, especially at the head of Yellowstone Lake. The small white flowers are usually submerged.

Whitlowgrass (*Draba*).—The drabas may be recognized by the short, flat pods, which are not notched and are several-seeded. The five species most commonly found in the park may be distinguished in the following manner:

- | | |
|--|-----------------------------|
| 1. Flowers white..... | <i>Draba oligosperma</i> . |
| 1. Flowers yellow. 2. | |
| 2. Pods distinctly twisted. | <i>Draba streptocarpa</i> . |
| 2. Pods not twisted. 3. | |
| 3. Stems densely clustered, low..... | <i>Draba andina</i> . |
| 3. Stems not densely clustered, taller. 4. | |
| 4. Pods smooth..... | <i>Draba nitida</i> . |
| 4. Pods hairy..... | <i>Draba lapilutea</i> . |



FIGURE 49.—Bee-flower. Reddish purple. Photograph by Dr. Harvey E. Stork.

In addition to the above five species *Draba helleriana*, *D. crassifolia*, *D. densifolia*, *D. nelsonii*, and *D. nemorosa* have been reported as occurring in the park.

Hymenophyssa pubescens has been introduced in recent years.

CAPER FAMILY (CAPPARIDACEAE)

Most of the flowers of the caper family have 4 sepals, 4 petals, and 6 stamens like the mustard family, but the stamens are all of the

same length, and the fruit is a podlike capsule. Several members of the family are quite important as honey plants in some places. The family is represented here only by the **Bee-flower** (*Cleome serrulata*), a smooth herb with a freely branched stem 1 to 3 feet high. The leaves are compound with three leaflets and the numerous flowers vary from red to reddish purple or pink or almost white. The raceme becomes very long as the fruits mature. The plant is conspicuous and has a very long blooming season.

SUNDEW FAMILY (DROSERACEAE)

This is a small family of insectivorous plants. The leaves are beset with glandular hairs to which insects adhere and may be digested. One member of the family, **Narrowleaf sundew** (*Drosera longifolia*), is in the park.

ORPINE FAMILY (CRASSULACEAE)

A family of fleshy plants found growing in all sorts of situations from dry, stony banks to very wet places. Some are extensively used as ornamental plants, especially in rock gardens.

Sedum stenopetalum.—This is a smooth perennial, usually less than 4 inches high, with fleshy, linear, crowded leaves and yellow flowers in a compact cluster. Common on the travertine at Mammoth Hot Springs as well as elsewhere in the park.

Sedum douglasii is very similar but taller and not so common.

Sedum integrifolium, which is found at high elevations, grows 2 to 8 inches high and has dark purple flowers which are imperfect, some plants bearing staminate flowers and some pistillate.

Sedum rhodanthum is usually found along streams. The stems are 4 inches to a foot high and the flowers are perfect and rose color.

The genus *Sedum* is commonly known as **stonecrop**.

Tillaeastrum aquaticum has also been reported in the park.



FIGURE 50.—Stonecrop. Yellow. Copyright, J. E. Haynes.

SAXIFRAGE FAMILY (SAXIFRAGACEAE)

A rather large family with many of the characters of the orpine family but the plants not fleshy. In most cases there is a 5-lobed calyx, 5 petals, and either 5 or 10 stamens.

1. Stamens 5. 2.
1. Stamens 10. 4.
2. Flowers large, white. **Parnassia** (*Parnassia*)----- (p. 70)
2. Flowers small, greenish. 3.
3. Petals entire or lacking. **Alumroot** (*Heuchera*)----- (p. 71)
3. Petals pinnate. **Mitella** *pentandra*----- (p. 71)
4. Petals 3- to 5-cleft. **Fringecup** (*Tellima*)----- (p. 71)
4. Petals entire or lacking. **Saxifrage** (*Saxifraga*)----- (p. 71)

Parnassia fimbriata.—All species of *Parnassia* have clusters of sterile filaments alternating with the 5 stamens of the flower, also the leaves are mostly basal with not more than 1 on the stem. They are often called grass of Parnassus. In this species there are 5 to 9



FIGURE 51.—*Parnassia*. White. Photograph by Dr. Frank R. Oastler

sterile filaments in each cluster; there is a single clasping leaf at or a little above the middle of the stem, and the petals are fringed toward the base.

Parnassia palustris has 9 to 15 sterile filaments in each cluster, a single clasping leaf below the middle of the stem, and the petals are entire.

Parnassia kotzebuei has only 3 to 5 sterile filaments in each cluster, usually no leaves at all on the stem, and the petals are entire.

Alumroot (*Heuchera*).—The alumroot is a perennial herb with mostly basal leaves and small clusters of greenish flowers. The three species that have been found in the park may be distinguished as follows:

Petals lacking-----	<i>Heuchera ovalifolia</i>
Petals about as long as the calyx-----	<i>Heuchera parvifolia</i>
Petals 3 or 4 times as long as the calyx-----	<i>Heuchera williamsii</i>

Mitella pentandra.—Decidedly a northern plant, but found all the way from Alaska to the Colorado Rockies in wet places on the higher mountains. It is an inconspicuous little plant with



FIGURE 52.—Fringe cup. White. Photograph by Geoffrey Coope

kidney-shaped basal leaves and a slender raceme of small greenish flowers with pinnate petals.

The genus *Mitella* is commonly known as **bishopscap**.

Tellima parviflora.—This plant grows 4 to 12 inches high and is rough-hairy. The leaves are 3-lobed and the wedge-shaped divisions are once or twice 3-cleft. The petals are also 3-cleft.

Tellima bulbifera is less hairy and the leaves usually have bulb-lets in their axils. The leaves are divided to the base and the petals are 3- to 5-cleft.

The genus *Tellima* is commonly known as **fringe cup**.

Saxifrage (*Saxifraga*).—The saxifrage has small white or greenish flowers usually with 5 petals and 10 stamens. It is quite variable,

and the species that are most frequently found in the park may be distinguished in the following manner:

- | | |
|---|--------------------------------|
| 1. Stem leaves opposite----- | <i>Saxifraga oppositifolia</i> |
| 1. Stem leaves alternate or none. 2. | |
| 2. Petals lacking or very minute----- | <i>Saxifraga subapetala</i> |
| 2. Petals evident. 3. | |
| 3. Stems more or less leafy. 4. | |
| 3. Leaves all basal. 5. | |
| 4. Leaves all entire----- | <i>Saxifraga austromontana</i> |
| 4. Lower leaves 3- to 5-cleft----- | <i>Saxifraga caespitosa</i> |
| 5. Leaves kidney-shaped or heart-shaped----- | <i>Saxifraga arguta</i> |
| 5. Leaves ovate to oblong. 6. | |
| 6. Stems hairy with purple-tipped hairs----- | <i>Saxifraga saximontana</i> |
| 6. Stems smooth or hairs not purple-tipped----- | <i>Saxifraga rhomboidea</i> |

In addition to the above species *Saxifraga montanensis*, *S. rivularis*, *S. rydbergii*, and *S. debilis* have also been reported in the park.

GOOSEBERRY FAMILY (GROSSULARIACEAE)

This family contains the well-known gooseberries and currants. They are shrubs with alternate, palmately-lobed leaves, and flowers borne on short axillary shoots. The parts of the flower are attached above the ovary, which develops into the berry. The **Gooseberry** (*Grossularia*) can be distinguished by the stems, which are armed with spines and prickles and the pedicel, which is not jointed below the berry. The **Currant** (*Ribes*) is usually not armed with spines or prickles and the pedicel is jointed beneath the fruit.

Redshoot gooseberry (*Grossularia setosa*) has stout, usually triple spines below each leaf, the 1-year-old shoots have red-brown bark, the berries are smooth and dark purple, and the leaves have short, dense pubescence.

Whitestem gooseberry (*Grossularia inermis*) has usually single and short spines below each leaf, the spines often wanting, the bark of 1-year-old stems is white, the berries are smooth and wine-colored, and the leaves are usually smooth.

Sticky currant (*Ribes viscosissimum*) has black, seedy berries with short, gland-tipped hairs, the leaves are velvety pubescent and glandular, and the flowers are green or greenish white.

Prickly currant (*Ribes lacustre*).—This and the following species differ from the other American currants in having prickly stems. In both these species the berries bear weak gland-tipped bristles. The leaves of the prickly currant are smooth or nearly so, and the berries are black.

Gooseberry currant (*Ribes montigenum*).—This species is readily distinguished from the prickly currant by its glandular-pubescent leaves and its bright red berries.

Squaw currant (*Ribes inebrians*) has bright red berries, stems without spines or prickles, and tubular pink or white flowers more than three times as long as broad.

Western black currant (*Ribes petiolare*) has the leaves nearly smooth, with yellowish, waxy sessile glands scattered over the lower surface, long, many-flowered, erect racemes of small, short, white flowers, and black berries bearing glands like those on the leaves.

American black currant (*Ribes americanum*) has somewhat pubescent leaves, with yellowish, waxy, sessile glands on both surfaces, drooping racemes of a few greenish-yellow, tubular flowers, and black fruit devoid of waxy glands.

ROSE FAMILY (ROSACEAE)

A large and important family containing both herbs and shrubs, with alternate leaves and regular, perfect flowers. Besides the innumerable kinds of roses the family contains many other kinds of ornamental plants, as well as such fruits as strawberries, raspberries, and blackberries.

1. Shrubs. 2.
1. Herbs. 6.
2. Flowers white. 3.
2. Flowers red or pink. 5.
2. Flowers yellow. **Shrubby cinquefoil** (*Dasiphora fruticosa*)----- (p. 74)
3. Stems prickly. **American red raspberry** (*Rubus strigosus*)----- (p. 74)
3. Stems not prickly. 4.
4. Pistils many. **Whiteflowering raspberry** (*Rubus parviflorus*)----- (p. 74)
4. Pistils 5. *Spiraea lucida*----- (p. 74)
4. Pistils 2, partly united. **Mallow ninebark** (*Physocarpus malvaceus*)--- (p. 74)
5. Pistils many. Stems prickly. **Rose** (*Rosa*)----- (p. 77)
5. Pistils 5. Stems not prickly. *Spiraea densiflora*----- (p. 74)
6. Flowers purplish. **Prairie-smoke** (*Sieversia ciliata*)----- (p. 74)
6. Flowers white. 7.
6. Flowers yellow. 8.
7. Leaves simple. **Dryad** (*Dryas octopetala*)----- (p. 74)
7. Leaves with 3 leaflets. **Strawberry** (*Fragaria*)----- (p. 75)
7. Leaves pinnate. *Drymocallis*----- (p. 75)
8. Leaves mostly basal. 9.
8. Stems leafy. 11.
9. Leaflets 3. *Sibbaldia procumbens*----- (p. 76)
9. Leaflets more than 10. 10.
10. Plants with long runners. **Silverweed** (*Argentina*)----- (p. 76)
10. Plants without runners. *Horkelia gordonii*----- (p. 76)
11. Fruits smooth. 12.
11. Fruits hairy. 13.
12. Styles attached near the base of the ovary. *Drymocallis*----- (p. 75)
12. Styles attached at the upper end of the ovary. **Cinquefoil** (*Potentilla*)-. (p. 76)
13. Sepals reflexed (turned back). **Avens** (*Geum*)----- (p. 77)
13. Sepals not reflexed. *Sieversia*----- (p. 74)

Shrubby cinquefoil (*Dasiophora fruticosa*).—A freely branched shrub, 1 to 3 feet high, with pinnate leaves and showy, yellow flowers. It makes a very nice ornamental shrub, for if it has sufficient water supply, it blooms practically all summer. The whole plant is more or less whitened by short, silky hairs.

American red raspberry (*Rubus strigosus*).—A shrub with very prickly stems, alternate, pinnately-compound leaves and white flowers. The fruit is light red and of excellent flavor.

Whiteflowering raspberry (*Rubus parviflorus*).—This is a shrub with stems 3 to 6 feet high. The leaves are palmately and nearly equally five-lobed, heart-shaped at the base, unequally toothed and 4 to 10 inches broad. The flowers are white and 1 to 2 inches across. The fruits are salmon-red and resemble large raspberries.



FIGURE 53.—Shrubby cinquefoil. Yellow.
Copyright, J. E. Haynes.

Spiraea lucida is a shrub, 1 to 3 feet high, with simple, oval, or oblong leaves that are toothed around the apex. The small, white flowers are borne in flat, terminal clusters.

Spiraea densiflora is similar, but the flowers are rose color.

The genus is known as **spirea**.

Mallow ninebark (*Physocarpus malvaceus*) is a shrub and grows 3 to 6 feet high. The leaves are round or oval, five-veined, sometimes three-lobed above the middle and more or less toothed.

The white flowers are borne in flat, terminal clusters.

Dryad (*Dryas octopetala*) is not common in the park and is found only on very high mountains. It is a dwarf, matted, somewhat shrubby plant with simple, toothed leaves and white flowers with 8 or 9 petals each.

Prairie-smoke (*Sieversia ciliata*).—The leaves of this plant are mostly basal. They are compound and the leaflets are deeply cut, often nearly to the midrib. There are usually three flowers on each stem, and both the calyx and petals are rose-red to purplish. The styles remain attached to the fruits and become very long and feathery.

Sieversia turbinata grows at very high altitudes, and the stem is only 3 to 6 inches high. The leaves are similar to those of the pre-

ceding species but while the calyx is dark or purplish green the petals are yellow and the styles are not feathery.

American strawberry (*Fragaria americana*).—The plants resemble those of the cultivated strawberry. They are low plants that spread by runners and have no upright stems except those that bear the flowers.

Fragaria platypetala is similar, but the whole plant including the flowers and fruits is larger.



FIGURE 54.—Whiteflowering raspberry. White. Photograph by Joseph S. Dixon, National Park Service.

Fragaria ovalis is most readily distinguished from the other two species by the fact that the hairs are closely appressed to the stems and leaves instead of spreading.

Drymocallis convallaria is a perennial herb with pinnate leaves and white flowers. It is more or less covered with long hairs and is somewhat sticky on the upper portions. The stem is 15 to 30 inches high. The basal leaves have long petioles and 9 to 11 toothed leaflets.

Drymocallis pseudorupestris is similar, but the stems are only 8 to 15 inches high, and the basal leaves are short-petioled and have 7 to 9 leaflets. There are only a few stem leaves each with 3 to 5 leaflets.

Drymocallis fissa (with yellow flowers), *D. glandulosa*, and *D. rupestris* have also been reported in the park.

Sibbaldia procumbens is a dwarf, perennial herb with rather thick, compound leaves. The densely clustered, creeping stems are 2 to 8 inches long with the leaves mostly at the ends. The three leaflets are wedge-shaped and somewhat short-hairy. The yellow flowers are borne on leafless stalks.

Horkelia gordonii is a perennial herb with pinnate leaves and yellow flowers. The leaves are all basal and have 10 to 20 pairs of leaflets, which are pinnately divided into 3 to 5 narrow segments.



FIGURE 55.—Spirea. White. Photograph by Joseph S. Dixon, National Park Service.



FIGURE 56.—Cinquefoil. Yellow. Photograph by Joseph S. Dixon, National Park Service.

Silverweed (*Argentina anserina*) is a perennial herb with basal leaves and long runners. The yellow flowers are borne on long stalks in the axils of the leaves. The leaves are pinnate and have 7 to 21 leaflets, with smaller ones interposed between. The leaflets are sharply toothed, green and smooth above but silvery-silky below.

Silver cinquefoil (*Argentina argentea*) is similar but stouter, and the leaves are silvery-silky on both sides.

Cinquefoil (*Potentilla*).—The cinquefoil has alternate, compound leaves with stipules and mostly yellow flowers. It is sometimes confused with the buttercup but the flowers of the cinquefoil have 5 green sepals and 5 alternating bractlets, giving an appearance of 10 sepals, while the buttercup has only the 5 sepals. The 16 species

that have been identified in the park may be distinguished by means of the following key:

1. Leaflets 3. 2.
1. Leaflets more than 3. 4.
2. Stamens more than 10. *Potentilla monspeliensis*.
2. Stamens 10 or fewer. 3.
3. Sepals longer than the bracts. *Potentilla biennis*.
3. Sepals and bracts about equal. *Potentilla leucocarpa*.
4. Leaves palmately compound. 5.
4. Leaves pinnately compound. 10.
5. Leaves white-woolly beneath. *Potentilla gracilis*.
5. Leaves not white-woolly beneath. 6.
6. Petioles bearing an extra pair of small leaflets. *Potentilla subjuga*.
6. Petioles without an extra pair of small leaflets. 7.
7. Leaflets toothed or cleft more than halfway to the midrib. *Potentilla pectinisecta*.
7. Leaflets toothed or cleft halfway to the midrib or less. 8.
8. Plants less than a foot high. *Potentilla glaucophylla*.
8. Plants a foot or more high. 9.
9. Plants densely silky at least below. *Potentilla viridescens*.
9. Plants somewhat hairy but not densely silky. *Potentilla nuttallii*.
10. Leaflets pinnately divided. 11.
10. Leaflets toothed but not divided. 14.
11. Leaflets divided halfway to the midrib or less. 12.
11. Leaflets divided nearly to the midrib. 13.
12. Leaflets 5 to 7. *Potentilla diversifolia*.
12. Leaflets 7 to 15. *Potentilla pennsylvanica*.
13. Leaflets 5 to 7. *Potentilla rubricaulis*.
13. Leaflets 7 to 15. *Potentilla monidensis*.
13. Leaflets more than 15. *Potentilla pinnatisecta*.
14. Plants 8 to 16 inches high. *Potentilla hippiana*.
14. Plants less than 8 inches high. *Potentilla wyomingensis*.

Potentilla quinquefolia, which is much like *P. gracilis*, and *P. macounii* have been reported as found in the park.

Geum strictum is a perennial herb with mostly basal, pinnate leaves and yellow flowers on short stalks. The fruits are akenes, and the styles which remain on the fruits are hooked, and thus enable the fruits to cling to the fur of animals or to clothing.

Geum macrophyllum has also been reported in the park.

Prickly rose (*Rosa sayi*).—The wild rose is easily recognized although the different species are sometimes quite difficult to distinguish. This species has stems that are 1 to 3 feet high and thickly covered with prickles. The leaves have 3 to 7 leaflets which are doubly toothed.

Fendler rose (*Rosa fendleri*) is a larger plant, often becoming 5 to 7 feet high, and the leaves have 5 to 7 leaflets which are simply toothed. The flowers are rather small.

Woods rose (*Rosa woodsii*) is much like the preceding species but is only 1 to 3 feet high, and the flowers are about 2 inches across.

Bourgeau rose (*Rosa bourgeauiana*) has also been reported in the park.

APPLE FAMILY (POMACEAE)

The chief distinction between the apple family and the rose family is that in the rose family the simple pistils are distinct, while in the apple family they are united into a compound pistil the ovary of which is surrounded by, and united with, the receptacle, so that the parts of the flower are attached above the ovary. The members of the family are all trees or shrubs, and many of them have edible fruits, most notably the various kinds of apples and pears.



FIGURE 57.—Saskatoon. White. Photograph by Dr. Harvey E. Stork.

Saskatoon (*Amelanchier alnifolia*).—A shrub or small tree 6 to 12 feet high with simple, alternate leaves and dense clusters of white flowers. It is smooth throughout. The fruit is purple when ripe and is sweet and juicy. Also called **serviceberry**, **shadbush**, and **Juneberry**.

Amelanchier elliptica is distinguished by the fact that the twigs, leaves, and calyx are more or less

hairy. The flowers are fewer but larger.

Greene mountain-ash (*Sorbus scopulina*).—A stout shrub, 3 to 12 feet high, with alternate, pinnate leaves and white flowers borne in flat-topped clusters. The 11 to 15 leaflets are oblong or lance-shaped and sharply toothed. The fruits are red and bitter.

PLUM FAMILY (DRUPACEAE)

The plum family differs from the rose and apple families by having the parts of the flower attached to the edge of a cup-shaped receptable, around the ovary but entirely free from it, and the fruit is a drupe or stone-fruit. The family seems to be represented here only by the **Black chokecherry** (*Prunus melanocarpa*), a shrub or small tree, 3 to 15 feet high, with alternate, ovate or oblong and finely toothed leaflets and white flowers borne in dense racemes. The fruits when fully mature are black.

PEA FAMILY (FABACEAE OR LEGUMINOSAE)

The pea family is a large and important family. It contains not only all of the different kinds of peas, beans, clovers, and peanuts but many other flowering plants and some trees and shrubs. The members of the family can usually be recognized quite readily by the flowers which are of the sweetpea type. The corolla has 5 petals and is very irregular. The uppermost petal is larger than the others and is called the standard. The 2 lateral ones are called the wings, and the 2 lower ones are united along their edges to form the keel, which usually encloses the stamens and pistil. There are usually 10 stamens, 9 of them united and 1 separate. The fruit is a dry pod.

1. Stamens distinct. **Goldenpea** (*Thermopsis montana*)----- (p. 79)
1. Some of the stamens, usually 9, united. 2.
2. Leaflets 3. 3.
2. Leaflets more than 3. 4.
3. Flowers in racemes. **Sweetclover** (*Melilotus*)----- (p. 79)
3. Flowers in heads. **Clover** (*Trifolium*)----- (p. 79)
4. Leaves palmate. **Lupine** (*Lupinus*)----- (p. 80)
4. Leaves pinnate. 5.
5. Leaves with tendrils at the end. **Vetch** (*Vicia*)----- (p. 80)
5. Leaves without tendrils. 6.
6. Pods composed of separable, roundish joints united in the middle. **Sweet-vetch** (*Hedysarum*)----- (p. 80)
6. Pods not composed of separable joints. 7.
7. Pods covered with hooked prickles. *Glycyrrhiza lepidota*----- (p. 80)
7. Pods without prickles. 8.
8. Keel of corolla blunt. **Milkvetch** (*Astragalus*)----- (p. 80)
8. Keel of corolla pointed. **Pointvetch** (*Aragallus*)----- (p. 82)

Goldenpea (*Thermopsis montana*) is a stout herb with a cluster of nearly unbranched, erect stems which are more or less silky-hairy and 1 or 2 feet high. The alternate leaves are compound with 3 entire leaflets, and the yellow flowers are borne in a spike, 2 to 5 inches long, and are quite showy.

Yellow sweetclover (*Melilotus officinalis*) grows 3 to 6 feet high and has small yellow flowers and little wrinkled pods.

White sweetclover (*Melilotus alba*) is similar except that the flowers are white. Both plants came from Europe and both are valuable honey plants in some places. The white one, especially, is often grown as a forage crop.

Trifolium rydbergii.—This is perhaps the most common clover in the park. The stems grow 4 to 16 inches high, and the flowers are yellowish or nearly white and often tinged with purple.

White clover (*Trifolium repens*), **Red clover** (*Trifolium pratense*), and **Alsike clover** (*Trifolium hybridum*) are common clovers of the East which are occasionally found in the park. *Trifolium brandegei*, *T. haydenii*, and *T. montanense* have also been reported in the park.

Lupine (*Lupinus*).—The wild lupines are easily recognized, because they are the only members of the pea family in our flora with strictly palmate leaves and five or more leaflets. The different species, however, are often quite difficult to distinguish. The following species have been identified in the park: *Lupinus argenteus*, *L. burkei*, *L. caespitosus*, *L. candicans*, *L. decumbens*, *L. flexuosus*, *L. laxiflorus*, *L. leucophyllus*, *L. macounii*, *L. monticola*, *L. parviflorus*, and **Silky lupine** (*L. sericeus*).

Vicia linearis and **American vetch** (*Vicia americana*) are the only members of the pea family in our flora that climb by means of tendrils at the ends of the pinnate leaves. The purple flowers are quite large and are borne, 3 or 4 on a short stem, in the axils of the leaves. The former species has narrow linear or oblong leaves, while the latter has ovate or oval leaves.



FIGURE 58.—Lupine. Bluish purple.
Copyright, J. E. Haynes.

Hedysarum cinerascens grows 1 to 2 feet high and the stems are covered with short, ashy hairs. The leaves have 9 to 13 oblong leaflets and the flowers are borne on stems that are somewhat longer than the leaves. The flowers vary from rose color to lilac or purple. The pods are composed of several roundish, nearly smooth, separable joints connected in the middle.

Hedysarum sulphurescens has bright yellow flowers.

This genus is commonly known as **sweetvetch**.

Glycyrrhiza lepidota is an upright plant with a large and sweet root and with creamy-white flowers borne in dense axillary spikes. The stems are 1 to 3 feet tall, and the leaves have 11 to 19 oblong or lance-shaped leaflets. The brown pods are thickly covered with hooked prickles.

The genus is commonly called **licorice**.

Milkvetch (*Astragalus*).—The plants of this genus are all herbs with pinnate leaves and with flowers in spikes or racemes. The calyx is five-toothed. The corolla is long and narrow. The standard is as long or longer than the wings and keel and its sides are bent outward or backward. Nine of the stamens are united while the



FIGURE 59.—Lupine. Blue or pink. Photograph by Dr. Frank R. Oastler.



FIGURE 60.—Licorice. White. Photograph by Dr. Harvey E. Stork.

tenth is free. The pods are several- or many-seeded. Some of the species are quite difficult to distinguish from one another and often it is necessary to have mature pods before identification can be made with certainty. The following 18 species have been identified in the park:

Astragalus aboriginorum
Astragalus aculeatus
Astragalus alpinus
Astragalus americanus
Astragalus campestris
Astragalus carolinianus
Astragalus cuspidatus
Astragalus diversifolius
Astragalus drummondii

Astragalus elegans
Astragalus flexuosus
Astragalus hylophilus
Astragalus hypoglottis
Astragalus mertonii
Astragalus pauciflorus
Astragalus purshii
Astragalus succulentus
Astragalus tenellus

Pointvetch (*Aragallus*).—The flowers of the pointvetch are like those of the milkvetches except that there is an awl-shaped beak at the tip of the keel. Some of the species are poisonous to cattle and sheep and produce a disease sometimes called “staggers.” The species that have been identified in the park may be distinguished in the following manner:

1. Stipules not grown fast to the petiole..... *Aragallus deflexus*.
1. Stipules grown fast to the petiole. 2.
2. Flowers white..... *Aragallus albiflorus*.
2. Flowers white or yellowish, the standard streaked
with purple..... *Aragallus collinus*.
2. Flowers bright violet..... *Aragallus lagopus*.
2. Flowers yellowish at the base and bluish purple
above..... *Aragallus viscidulus*.
2. Flowers sulphur, the keel purple-tipped..... *Aragallus alpicola*.
2. Flowers purple. 3.
3. Leaflets usually 6 or 8..... *Aragallus nanus*.
3. Leaflets 11 to 17. **Red pointvetch**..... (*Aragallus blankinshipii*).

GERANIUM FAMILY (GERANIACEAE)

The geranium family is a rather small family, but it contains some very beautiful flowering plants including both the wild and cultivated geraniums and the storksbill.

Sticky geranium (*Geranium viscosissimum*).—The stems of this geranium are 1 to 3 feet high and the leaves are large, thick, long-petioled, nearly circular, with a somewhat heart-shaped base and deeply 3-lobed, the 2 lateral lobes being again 2-lobed. The flowers have 5 sepals, 5 purple petals which are densely bearded at the base, 10 stamens of which 5 are a little longer than the others, and 1 pistil which consists of 5 parts united together, each part of the ovary containing 1 seed. At maturity the parts of the pistil separate at the

base and curl upward so suddenly that the seeds are thrown some distance.



FIGURE 61.—Sticky geranium. Purple. Copyright, J. E. Haynes.

Geranium richardsonii is similar but the flowers are white with roseate veins, and the leaves are thin.

The genus is commonly known as **cranesbill**.



FIGURE 62.—Cranesbill. White. Photograph by Joseph S. Dixon, National Park Service.

Alfileria (*Erodium cicutarium*).—The stems are hairy and much-branched from the base, and the leaves are pinnate with leaflets that are cut into narrow lobes. The flowers are rose color and much

smaller than those of the cranesbills. The 5 parts of the pistil separate entirely at maturity forming 5 one-seeded fruits with long tails. These fruits are interesting because of the method by which they plant themselves. The fruit is covered with stiff hairs which point upward, and its lower end is sharp-pointed. The tail, which is 1 or 2 inches long, becomes spirally twisted. Whenever it becomes moist it untwists, and then when it dries it twists again. This twisting and untwisting gradually push the pointed fruit into the ground.



FIGURE 63.—Prairie flax. Blue. Copy-right, J. E. Haynes.

FLAX FAMILY (LINACEAE)

A small family but very important. It furnishes the fibers from which linen thread is made, and also the seeds from which linseed oil is obtained. The family is represented here only by the **Prairie flax** (*Linum lewisii*). This is commonly found on dry soil. It occurs at various places in the park, including the travertine at Mammoth and the geyserite at Old Faithful. It is a slender plant, usually about a foot high, with linear leaves and beautiful blue flowers, about an inch in diameter, which open in the morning and usually close in the afternoon.

SPURGE FAMILY (EUPHORBIACEAE)

Plants with milky juice and flowers which in some cases are inconspicuous and in others very ornamental. In the African desert regions, many members of the family resemble American cacti in their habits of growth. *Euphorbia serpyllifolia* is the only member of the family that has with certainty been found in the park. It is a prostrate, spreading, smooth plant with oblong, toothed leaves and inconspicuous flowers.

Euphorbia albicaulis has also been reported and may occur here.

WATER STARWORT FAMILY (CALLITRICACEAE)

A family of small, slender, water plants with opposite, entire leaves and inconspicuous, axillary, imperfect flowers. A staminate

flower consists of a single stamen and a pistillate flower of a single pistil. Represented here by **Waterstar** (*Callitriche palustris*). The submerged leaves of this plant are linear, or nearly so, while the floating leaves are much broader.

FALSE MERMAID FAMILY (LIMNANTHACEAE)

Low, weak plants with alternate, pinnate leaves and tiny, inconspicuous flowers. *Floerkia occidentalis* and *F. proserpinacoides* have been reported in the park, but they are not common and are of little importance.

SUMAC FAMILY (ANACARDIACEAE)

The family consists of shrubs and small trees with alternate, compound leaves and small flowers. Usually the fruits are more conspicuous than the flowers. Some of the white-fruited species are very poisonous to the touch and one should be very cautious about handling any shrub whose leaves have three leaflets until one has become very familiar with poison-ivy. Whenever one suspects that he has been in contact with poison-ivy, he should wash his hands and face very thoroughly in strong soapsuds, or better still in a solution of ferric chloride, as soon as possible.

Western poison-ivy (*Rhus rydbergii*).—Usually less than 3 feet high. The leaves have three rather large leaflets which are somewhat toothed but not lobed. The berries are white when matured. The whole plant is very poisonous to the touch. It is known to occur only for a short distance along the Gardiner River between Mammoth and the North Entrance.

Lemonade sumac (*Rhus trilobata*).—This is a much-branched shrub, 2 to 5 feet high. The leaves have three rather small leaflets, which are toothed and somewhat lobed above the middle. The fruits are bright red, sticky, and very showy when mature. This plant is somewhat ill-smelling, but it is not poisonous to the touch.

MAPLE FAMILY (ACERACEAE)

A family of valuable trees and shrubs with opposite leaves and sweet sap. The only representative in the park is the **Dwarf or Rocky Mountain maple** (*Acer glabrum*), a large shrub or small tree with three-lobed and toothed leaves.

BUCKTHORN FAMILY (RHAMNACEAE)

A family of shrubs and trees of no very great importance. Represented in our flora by the **Snowbrush** (*Ceanothus velutinus*), a smooth shrub, 2 to 5 feet high, growing in dense clumps or patches.

The leaves are more or less elliptic in shape, and entire. The upper surface appears shiny as if varnished, while the lower surface is lighter and somewhat hairy. The leaves are strongly three-ribbed and 2 to 4 inches long. The flowers are white and small but are borne in large, showy, axillary clusters. When this plant grows on travertine it is a spreading and somewhat prostrate shrub.



FIGURE 64.—Snowbrush. White. Photograph by Joseph S. Dixon, National Park Service.

MALLOW FAMILY (MALVACEAE)

This family is extremely important, because it is the family to which the cotton plant belongs. It also contains many plants with beautiful flowers, and many of these are used as ornamental plants. The well-known hollyhock, the sharon rose, and the hibiscus are familiar examples. The members of the family can usually be recognized readily by the flowers which have a 5-parted calyx, 5 petals, and many stamens which are united to form a column around the style. The styles are united at the base but separate above.

Sphaeralcea rivularis is a stout plant with much-branched stems, 2 to 4 feet high, and heart-shaped leaves that are deeply 5- to 7-lobed and coarsely toothed. The flowers are clustered on short branches. The petals are pale purple or whitish and about an inch long.

Scarlet globemallow (*Sphaeralcea coccinea*).—A low, spreading, much-branched and somewhat silky-hairy plant. The leaves are 3- to 5-parted and the divisions 2- or 3-cleft. The flowers are copper-scarlet or brick-red.

VIOLET FAMILY (VIOLACEAE)

This family is important only because of its beautiful flowers, principally the various kinds of cultivated pansies and wild violets. Nearly everyone recognizes a violet when he sees it. The various



FIGURE 65.—Globemallow. Pale purple. Photograph by Dr. Frank R. Oastler.

species that are found in the park may be distinguished by means of the following key:

1. Flowers white. Sweet white violet..... (*Viola blanda*).
1. Flowers yellow. 2.
1. Flowers blue, violet or lilac. 5.
2. Leaves coarsely toothed or lobed..... *Viola atriplicifolia*.
2. Leaves entire or nearly so. 3.
3. Plants small and prostrate..... *Viola nuttallii*.
3. Plants larger and more or less erect. 4.
4. Leaves somewhat white-hairy..... *Viola linguacfolia*.
4. Leaves smooth or nearly so..... *Viola erectifolia*.
5. Leaves all basal. Flowers on leafless stems. 6.
5. Leaves not all basal. Flowers in the axils of stem leaves. 7.
6. Plants with stolons..... *Viola palustris*.
6. Plants without stolons..... *Viola nephrophylla*.

7. Leaves hairy----- *Viola subvestita*.
 7. Leaves smooth. 8.
 8. Plants dwarf, alpine----- *Viola bellidifolia*.
 8. Plants larger, not alpine----- *Viola adunca*.

In addition to the above species, **Canada violet** (*Viola canadensis*), *V. montanensis*, and *V. venosa* have been reported as having been found in the park.

LOASA FAMILY (LOASACEAE)

A rather small family of herbaceous and more or less rough-hairy plants. The flowers are perfect with the parts attached above the ovary, and the stamens are usually very numerous.

Mentzelia decapetala.—A stout, rough-hairy plant seldom over 2 feet high. The leaves vary from oval to oblong and are variously cut and lobed. The flowers are large, solitary, and terminal. There are 10 petals, which are white or yellowish and about twice as long as the calyx-lobes. The stamens are very numerous, 200 to 300.

Mentzelia nuda is more slender and less hairy and grows 1 to 5 feet tall. Its leaves are lance-shaped and sharply and deeply toothed. The seeds of this species are winged, while those of the preceding species are not.

Mentzelia laevicaulis is a stout plant, 2 to 3 feet tall, with very large, light yellow flowers.

Mentzelia albicaulis grows from 4 to 12 inches high. The stems are nearly smooth and become white and polished as they mature. The leaves are lance-shaped or linear and vary from entire to deeply lobed and toothed. The flowers are small and yellow with 5 petals and 20 to 40 stamens. The seeds are numerous and rough.

Mentzelia dispersa is similar except that the seeds are smooth.

Mentzelia compacta is more branched than the preceding species, and the leaves are all entire. The flowers have only 15 stamens and the fruits only 10 or 12 seeds.

The genus is commonly known as stickleaf.

CACTUS FAMILY (CACTACEAE)

This is a large, strictly American family and contains a great variety of unique and peculiar, mostly desert plants. The stems are thick, fleshy, green, and usually leafless. The parts of the flower are attached above the ovary, and there are numerous sepals, petals, and stamens and one pistil with several or many stigmas. The family is represented here only by the **Pricklypear** (*Opuntia polyacantha*) which is variable but easily recognized. It is found mostly in the region between Mammoth Hot Springs and the North Entrance. The stems consist of flat, very fleshy, more or less rounded joints



FIGURE 66.—Canada violet. Pale violet to white. Photograph by Joseph S. Dixon
National Park Service.



FIGURE 67.—Stickleaf. White. Photograph by Dr. Harvey E. Stork.

beset with numerous clusters of short, barbed bristles, and usually some stouter spines. It often branches profusely and forms large, spreading masses. The flowers are yellow or sometimes purplish on the outside and orange within.

OLEASTER FAMILY (ELEAGNACEAE)

A family composed of shrubs and small trees with entire leaves which are more or less covered with silver or brown scales or hairs. The family is quite important in some tropical countries but relatively unimportant in our latitude.



FIGURE 68.—Pricklypear. Yellow. Copyright, J. E. Haynes.

Silverberry (*Eleagnus argentea*).—A shrub, 3 to 9 feet high, with opposite, elliptic, entire leaves. The young branches are brownish, with scales, while the leaves and older stems are silvery. The numerous, fragrant flowers occur in the axils of the leaves, 1 to 3 in each axil. The flower consists of a 4-lobed calyx, 4 stamens, and 1 pistil. There are no petals. The flowers are silvery on the outside and yellowish within.

Russet buffaloberry (*Shepherdia canadensis*).—A shrub, 3 to 6 feet high, with opposite, elliptic or ovate, entire leaves and imperfect flowers; the staminate and pistillate flowers on separate plants. The leaves are dark green above and silvery below while the branches are brownish. The yellowish flowers have a four-lobed calyx and no petals. The staminate flowers have 8 stamens and the pistillate 1 pistil. The fruit is red or yellowish and very juicy, but exceedingly bitter.

EVENING-PRIMROSE FAMILY (ONAGRACEAE)

A rather large family which contains many plants with showy flowers. The ovary is entirely below the other parts of the flower, and there are usually 4 sepals, 4 petals, 8 stamens, and 1 style. In many members of the family the flowers open at about sundown and are pollinated by night-flying insects, principally moths. The fruit is a dry capsule.

1. Seeds with a tuft of hairs at the tip. 2.
1. Seeds without a tuft of hairs at the tip. 3.
2. Flowers large. **Fireweed** (*Chamaenerion*)----- (p. 91)
2. Flowers small. **Willow-weed** (*Epilobium*)----- (p. 91)
3. Leaves all basal. 4.
3. Leaves not all basal. 5.
4. Stigma deeply 4-lobed. **Moonrose** (*Pachylophus*)----- (p. 92)
4. Stigma entire or nearly so. *Taraxia*----- (p. 92)
5. Flowers very small. *Gayophytum*----- (p. 92)
5. Flowers nearly a half inch long or longer. 6.
6. Stigma entire or nearly so. *Gaura parviflora*----- (p. 92)
6. Stigma deeply 4-lobed. 7.
7. Flowers yellow. *Onagra strigosa*----- (p. 93)
7. Flowers white. **Sweet evening-primrose** (*Anogra nuttallii*)----- (p. 93)

Fireweed (*Chamaenerion angustifolium*).—A perennial herb growing 1 to 5 feet high and producing large numbers of scarlet to purple flowers. It is very common in the park and when in full bloom is one of the most beautiful and conspicuous of the park flowers. The leaves are lance-shaped and nearly entire. The young buds hang downward, but they straighten up as they mature. The corolla is slightly irregular, and the eight stamens mature successively, one at a time. The four-lobed stigma does not open up and become ready to receive pollen until all of the stamens have shed their pollen. By this means cross pollination is practically assured. The mature capsules are 2 or 3 inches long, and the seeds are provided with long, whitish hairs which make them well adapted to being blown about by the wind.

Chamaenerion latifolium is a smaller plant with fewer but somewhat larger flowers and broader leaves. It is not common.

Willow-weed (*Epilobium*).—The willow-weed is a slender plant closely related to the fireweed and resembling that plant, except that its flowers are very much smaller and so much less conspicuous. The flowers may be lilac, violet, pink, rose, white, or cream color. It is easily recognized, but the different species are often very difficult to distinguish. The following species have been identified in the park:

Epilobium adenocaulon

Epilobium alpinum

Epilobium anagallidifolium

Epilobium clavatum

Epilobium drummondii

Epilobium hornemannii

Epilobium ovatifolium

Epilobium paniculatum

Epilobium porplexans

Epilobium suffruticosum

Pachylophus caespitosus.—The leaves which are all basal, are lance-shaped, nearly entire or somewhat toothed and narrowed at



FIGURE 69.—Fireweed. Scarlet to purplish. Photograph by Joseph S. Dixon, National Park Service.

the base into long, winged petioles. The sweet-scented flowers are very large, 2 or 3 inches broad, and the petals are white with yellowish veins but become red or pink as they mature.

Taraxia breviflora differs from the above in having small flowers with only one stigma. The leaves are all basal and pinnately lobed, the lobes 1- or 2-toothed or entire. The

leaves are short-hairy. The flowers are white or yellowish, and the mature capsule is deeply four-grooved.

Taraxia subacaulis differs from the preceding species in not being hairy, in having the leaves entire or nearly so, and in the capsules being without grooves.

Gayophytum ramosissimum is a low, slender, much-branched plant with tiny white or pinkish flowers.

Gayophytum caesium is very similar, differing primarily in having the fruits sessile or on very short stalks.

Gayophytum diffusum has larger flowers, about a quarter of an inch broad.

Gayophytum pumilum has also been reported as occurring in the park.

Gaura parviflora is a perennial plant with much-branched stems, narrow, alternate leaves, and yellowish flowers in the axils of the leaves. The fruits differ from those of other members of the family in being nutlike, and they do not open at maturity as do the fruits of the others.



FIGURE 69a.—Fireweed. Scarlet to purplish. Copyright, J. E. Haynes.

Onagra strigosa.—This plant grows 1 to 3 feet high and is more or less hairy. The leaves are alternate and vary greatly as to size and shape, but are usually somewhat lance-shaped and 2 to 4 inches long. The yellow flowers are quite numerous but not many open at the same time. They open in the evening and close after the sun rises the next day.

Sweet evening-primrose (*Anogra nuttallii*) grows 2 to 4 feet tall and is very leafy. The leaves are linear and entire or nearly so. The



FIGURE 70.—Moonrose. White. Photograph by Dr. Harvey E. Stork.

large, white flowers are borne in the axils of the leaves and bloom in the daytime rather than at night.

WATER MILFOIL FAMILY (HALORAGIDACEAE)

A small family of water plants with whorled leaves and inconspicuous, greenish flowers.

Marestail (*Hippuris vulgaris*) is usually found in shallow ponds or on muddy banks. The stems are smooth, slender and 8 to 20 inches high and the leaves are linear and entire and occur in whorls of 8 to 12. The solitary flowers are inconspicuous.

Myriophyllum spicatum.—The leaves are produced in whorls of 4 or 5 and all except those that serve as bracts for flowers are pinnately divided into hairlike divisions.

Myriophyllum verticillatum is similar, but the leaves are mostly in threes or fours, and those that subtend the flowers are also pinnately divided.

The genus is commonly known as parrotfeather.

PARSNIP FAMILY (AMMIACEAE OR UMBELLIFERAE)

This is a large family and contains some valuable edible plants, such as the parsnip and the carrot, and others, such as the water hemlock, that are deadly poisonous if eaten. Most members of the



FIGURE 71.—Cow-parsnip. White. Photograph by Joseph S. Dixon, National Park Service.

family are herbs with hollow stems and alternate leaves. The leaves are usually compound and often 2 or 3 times compound. The ovary is below the other parts of the flower and there are usually 4 calyx teeth, 5 petals, 5 stamens and 2 styles. The fruits are dry and may be flat or cylindrical, but in any case consist of two one-seeded parts which are attached face to face and the backs of which are provided with five or more ribs and sometimes with wings. The flowers are so nearly alike in many members of the family that often it is necessary to have mature fruits in order to make identification certain. However, the few that are common in the park can be distinguished very largely on the basis of leaf characters.

1. Flowers yellow or purplish. 2.
1. Flowers white. 3.
2. Leaves ternate or twice ternate. Flowers yellow. *Cogswellia platycarpa*.
2. Leaves finely dissected. Flowers purple or yellow. **Indian-balsam** (*Leptotaenia multifida*).
2. Leaves 2 or 3 times pinnate. Flowers yellow. *Cymopterus fendleri*.
2. Leaves once pinnate. Flowers greenish yellow or dull purple. *Angelica pinnata*.
3. Fruits bristly on the ribs. **Aniseroot** (*Washingtonia divaricata*).
3. Fruits smooth. 4.
4. Leaves ternately compound, very large. **Cow-parsnip** (*Heracleum lanatum*).
4. Leaves once or twice ternate then twice pinnate. **Lovage** (*Ligusticum filicinum*).
4. Leaves twice pinnate. Poisonous. **Western waterhemlock** (*Cicuta occidentalis*).
4. Leaves once pinnate. 5.
5. Plant stout, growing in water or in very wet places. **American waterparsnip** (*Sium cicutaefolium*).
5. Plant slender, not growing in water or in very wet places. **Yampa** (*Carum gairdneri*).

In addition to the above species *Angelica lyallii* and *Phellopterus montanus* have been reported in the park.

DOGWOOD FAMILY (CORNACEAE)

A small family of herbs, shrubs, and small trees with simple, entire opposite leaves and clusters of relatively small flowers. The family is represented here only by **Red-osier dogwood** (*Cornus stolonifera*), a shrub, 3 to 6 feet high, with the young branches bright red-purple and smooth. The leaves are ovate, rounded at the base, short-pointed at the tip, whitish underneath and roughened on both sides by very short hairs.

WINTERGREEN FAMILY (PYROLACEAE)

A family of small plants, most of which remain green the year round. The flowers have a 4- or 5-lobed calyx, 5 petals, 10 stamens, and 1 pistil. The fruit is a capsule with many seeds. The seven species found in the park may be distinguished by means of the following key:

1. Stems leafy. Flowers white or pinkish. **Green Pipsissewa** (*Chimaphila umbellata*).
1. Leaves all or mostly basal. 2.
2. Flowers solitary. **Woodnymph** (*Moneses uniflora*).
2. Flowers several. 3.
3. Flowers pink or purple. *Pyrola uliginosa*.
3. Flowers white or greenish. 4.

4. Style turned down. 5.
4. Style straight. 6.
5. Leaves mottled with whitish spots. **Whitevein pyrola** (*Pyrola picta*).
5. Leaves not mottled. *Pyrola chlorantha*.
6. Flower cluster one-sided. Style long. **Sidebells pyrola** (*Pyrola secunda*).
6. Flower cluster not one-sided. *Pyrola minor*.

INDIAN PIPE FAMILY (MONOTROPACEAE)

A family of plants without green leaves and with flowers that resemble in structure those of the wintergreen family. Since these plants do not have green leaves, they cannot manufacture starches and sugars as a green plant can and must depend upon some other organism for these foods. In most cases they obtain these foods directly from fungi, as parasites.



FIGURE 72.—Whitevein pyrola. Greenish white. Copyright, J. E. Haynes.



FIGURE 73.—Pinedrops. Whitish. Photograph by A. R. Sweetser.

Pinedrops (*Pterospora andromedea*) produces an unbranched and rather stout, purplish-brown stem, usually from 1 to 3 feet high, and bearing numerous, narrow scales and many whitish flowers, each nearly half an inch long. The plant is found in rich coniferous woods.

Pinesap (*Hypopitys multiflora*) is usually less than 6 inches high but may become as much as a foot high. The whole plant is white

or sometimes yellowish or reddish. It is usually more or less hairy and commonly fragrant. The stem bears several flowers and the terminal one usually has a numerical plan of 5, that is, there are 5 sepals, 5 petals and 10 stamens, while the other flowers often have a numerical plan of 3 or 4. The fruit is a spherical or oval pod containing a large number of very small seeds.

HEATH FAMILY (ERICACEAE)

A fairly large family containing such well-known plants as the rhododendron and mountain laurel of both the East and the West and the heather of Scotland. The plants from which wintergreen essence is made also belong to this family rather than to the wintergreen family. The members of the heath family are mostly shrubs with simple leaves and small or medium-sized flowers that are regular or nearly so. Many members of the family seem to be limited to acid soils, and if they are transplanted to cultivated soil it is necessary to keep the soil acid in one way or another.

Red mountainheath (*Phyllodoce empetrifomis*).—A much-branched, evergreen shrub, 8 to 20 inches high, which often forms clumps as much as 3 feet in diameter. The leaves are linear and crowded and have thickened, rough and strongly enrolled margins. The little, rose-colored flowers are borne in small terminal umbels. The calyx is five-parted and the corolla is bell-shaped and five-toothed at the top. There are 10 stamens, a little shorter than the corolla, and 1 pistil. The fruit is a spherical or oblong capsule.

Rusty menziesia (*Menziesia ferruginea*) is an erect or straggling shrub, 3 to 6 feet high, with oblong or elliptic leaves which are more or less hairy and rusty above and paler below. The small, dull whitish flowers are borne on nodding stalks. The calyx and corolla are four-toothed or lobed, and there are eight stamens. Poisonous.

Rocky Mountain kalmia (*Kalmia polifolia*).—This shrub resembles the mountain heather in certain respects, but it is not so densely branched. The small branches are two-edged; the leaves are all opposite or occasionally in threes and not crowded, and the flowers are lilac-purple. The leaves are waxy white on the lower surface.

Smooth Labrador-tea (*Ledum glandulosum*).—A shrub, varying from 20 inches to 5 feet high, with alternate entire leaves and terminal or sometimes lateral clusters of white flowers. The leaves are oblong or oval or somewhat lance-shaped, 1 or 2 inches long and smooth on both sides. The lower surface is pale or whitish, but the margin is not enrolled. The flower structure is similar to that of the mountain heath.

Western wintergreen (*Gaultheria humifusa*).—A low evergreen shrub with alternate leaves and small white or pink flowers that

are borne in the axils of leaves on branches that are 1 to 4 inches long. The leaves are rounded or oval and about half an inch long. The fruit is a scarlet berry.

Bearberry (*Arctostaphylos uva-ursi*), in the West called **Kinnikinnick**, is a trailing evergreen shrub which often completely covers the ground over a considerable area. The leaves are hard and firm, distinctly petioled, and about half an inch or more long. The flowers are white or pink, and the berries are red.



FIGURE 74.—Bearberry or Kinnikinnick. White or pink. Photograph by A. R. Sweetser.

HUCKLEBERRY FAMILY (VACCINIACEAE)

A small family of shrubs with alternate leaves and small flowers. It contains such well-known berry plants as huckleberries, blueberries, whortleberries, and cranberries. The parts of the flower are attached above the ovary, and the calyx and corolla are both 4- or 5-toothed or lobed. The number of stamens is twice that of the corolla lobes, and there is one style with a small stigma. The fruit is a many-seeded berry.

Grouse whortleberry (*Vaccinium scoparium*).—This plant is very common throughout the Rocky Mountains. It is usually only a few inches high and always less than a foot. The leaves are small, ovate or oval, thin, toothed, and quite veiny. The fruits are red when they are ripe. They are edible but not very good. The flowers are white or pink.

Big whortleberry (*Vaccinium membranaceum*) grows 1 to 3 feet high and the leaves are oblong or ovate. The corolla is yellowish

green or purplish in color and five-lobed, and the fruit is purplish black.

Western bog blueberry (*Vaccinium occidentale*) can readily be distinguished from the preceding species by the fact that the corolla is only four-lobed. Fruit small, blue, covered with bloom.

PRIMROSE FAMILY (PRIMULACEAE)

A family of herbs with simple leaves and many members with very beautiful flowers. The flowers have a numerical plan of five. The sepals are united to form a five-lobed calyx, and the petals are likewise united to form a tubular, five-lobed corolla. The five stamens are attached to the tube of the corolla, and there is a single pistil. The fruit is a capsule. In the members of the family described here the leaves are all basal.

Androsace septentrionalis has lance-shaped, irregularly toothed leaves. The flowering stems are 3 to 8 inches high, and the flowers are white or pink.

Androsace filiformis is similar, but the leaves are ovate and the capsule is much longer.

Androsace diffusa with the corolla shorter than the calyx has also been reported as occurring in the park.

Dodecatheon pauciflorum.—A smooth, perennial herb with entire, basal leaves and several flowers in an umbel at the end of a naked stem. The calyx and corolla are both five-lobed or parted, and both have the lobes turned back while the flower is in bloom. The five stamens are borne on the short corolla-tube and project well beyond it. They have short, flat filaments that are somewhat united. The style is slender and extends beyond the stamens. The corolla-lobes are lilac-purple, while the tube is yellow with a ring of dark purple near the top.

Southern shootingstar (*Dodecatheon radicans*) is similar except in the color of the flowers which are pinkish or bluish violet.

Dodecatheon conjugens and *D. cusickii* have also been reported as occurring in the park.

The genus is commonly known as shootingstar.



FIGURE 75.—Shootingstar. Lilac-purple.
Photograph by Dr. Frank R. Oastler.

Douglasia montana usually bears a single purple or lilac flower on each peduncle.

GENTIAN FAMILY (GENTIANACEAE)

The gentian family is made up of smooth herbs with opposite or whorled leaves and perfect, regular flowers, some of which are extremely beautiful. The calyx and corolla are both tubular and more or less toothed or lobed, and the stamens are on the tube of the corolla. There is one pistil with a single style and usually a two-lobed stigma.



FIGURE 76.—Rocky Mountain fringed gentian. Blue. Copyright, J. E. Haynes.



FIGURE 77.—Gentian. Blue. Copyright, J. E. Haynes.

Rocky Mountain fringed gentian (*Gentiana elegans*).—In 1926 the fringed gentian was chosen as the park flower. It was an excellent choice, not only because it is considered one of the most beautiful of all the park flowers, but because it blooms throughout the entire tourist season. It is found blooming at the beginning of the tourist season in June on the warm earth of the geyser basins, and it is still in bloom in some of the more protected places in the park when the last tourists leave in late September. It grows 8 to 12 inches high and each of the several unbranched stems is terminated by a single flower. Each stem also bears 3 to 6 pairs of leaves, the lower with petioles and the upper sessile. The corolla is about 2 inches long

and deep blue with lighter patches or streaks. The lobes of the corolla are toothed at the ends and fringed along the sides. It is also known as **Feather gentian**.

Gentiana plebeja has much smaller flowers, not much over half an inch long, and they are pale blue or lavender.

Gentiana affinis differs from the other two by having an appendage in each sinus between the regular lobes of the corolla. The appendages are more or less toothed or cleft and are almost as large as the corolla-lobes. The corolla is about an inch long.

Gentiana heterosepala and *G. forwoodii* have been reported in the park.

Greengentian (*Frasera speciosa*).—The stems of this plant are 2 to 5 feet high and very leafy. The leaves are whorled in fours and sixes. The lowermost leaves are more or less oblong while the middle ones are lance-shaped and the upper ones are linear. The structure of the flower is similar to that of the other gentians. The corolla is greenish white and dark spotted and bears a pair of densely long-fringed glands on the inner side of the tube at about the middle.

DOGBANE FAMILY (APOCYNACEAE)

A family of herbs most of which have a milky juice or latex which contains, among other things, some rubber. The flower structure is much like that of a gentian, except that there are two distinct pistils. The fruit consists of two pods with large numbers of seeds, and the seeds are usually provided with long hairs which aid in wind dissemination.

Spreading dogbane (*Apocynum androsaemifolium*) is a widely branching herb with simple, oval or oblong leaves and pink flowers with lighter stripes.

Hemp dogbane (*Apocynum cannabinum*) has smaller, greenish-white flowers.



FIGURE 78.—Greengentian. Greenish white. Photograph by Dr. Harvey E. Stork.

PHLOX FAMILY (POLEMONIACEAE)

The phlox family consists of small and medium-sized herbs, often with very showy flowers. The flowers have a numerical plan of 5

with a 5-lobed, persistent calyx, a 5-lobed, tubular corolla, 5 stamens and 1 pistil with a 3-lobed style. The fruit is a dry pod or capsule.

1. Leaves opposite. 2.
1. Leaves alternate. 3.
2. Leaves entire. **Phlox** (*Phlox*)----- (p. 102)
2. Leaves palmately divided into narrow segments. *Gilia harknessii*---- (p. 103)
3. Leaves pinnate. **Polemonium** (*Polemonium*)----- (p. 103)
3. Leaves simple. 4.
4. Stems woody. **Prickly gilia** (*Gilia pungens*)----- (p. 103)
4. Stems not woody. 5.
5. Leaves lobed. *Navarretia intertexta*----- (p. 102)
5. Leaves entire. 6.
6. Flowers lavender or lilac-purple. *Collomia linearis*----- (p. 103)
6. Flowers white or pinkish. **Threadflower gilia** (*Gilia micrantha*)----- (p. 103)

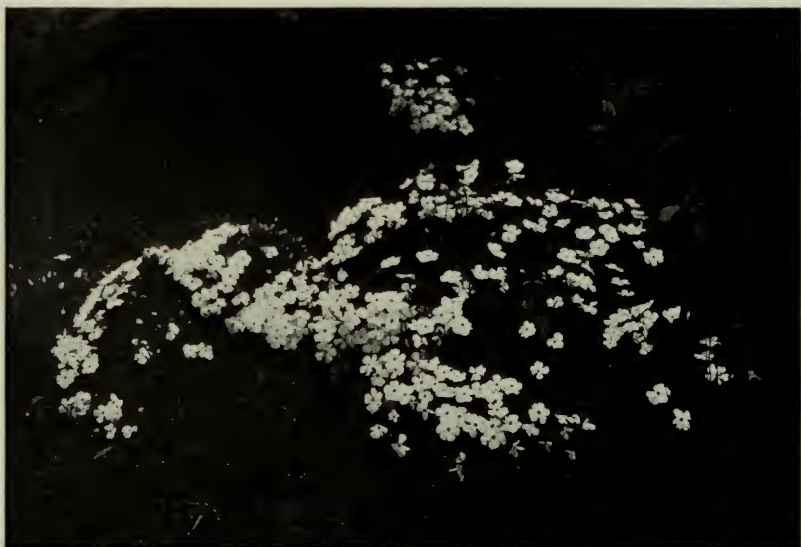


FIGURE 79.—Phlox. White. Copyright, J. E. Haynes.

Phlox (*Phlox*).—Plants with opposite, sessile, entire leaves and medium-sized flowers. The corolla has a long, narrow tube and broad, flat lobes. The six species that are found in the park may be distinguished in the following manner:

1. Flowers blue or bluish. 2.
1. Flowers white. 3.
2. Flowers bright blue or lilac. *Phlox kelseyi*.
2. Flowers pale blue or nearly white. *Phlox caespitosa*.
3. Leaves more than an inch long. *Phlox longifolia*.
3. Leaves less than an inch long. 4.
4. Leaves entirely smooth. *Phlox multiflora*.
4. Leaves more or less whitened by woolly, cobwebby hairs. 5.
5. Corolla-tube much longer than the calyx. *Phlox canescens*.
5. Corolla-tube about the same length as the calyx. **Carpet phlox** (*Phlox hoodii*.)

In addition to the above, *Phlox douglasii* and *P. sabina* have been reported as occurring in the park.

Polemonium or **Jacob's ladder** (*Polemonium*).—Plants with alternate, pinnate leaves and medium-sized, mostly blue flowers. Five species have been identified in the park and may be distinguished as follows:

1. Stamens hairy at the base. Leaflets mostly less than 25. 2.
1. Stamens not hairy at the base. Leaflets more than 25. 4.
2. Stems tall, leafy, and solitary. *Polemonium occidentale*.
2. Stems low, in tufts, sparsely leafy. 3.
3. Corolla blue with a white tube. *Polemonium pulcherrimum*.
3. Corolla entirely blue. *Polemonium haydenii*.
4. Corolla about an inch long. Leaflets 30 to 40. *Polemonium viscosum*.
4. Corolla about half an inch long. Leaflets small and very numerous. *Polemonium confertum*.

Polemonium foliosissimum has also been reported in the park.

Collomia linearis.—A plant 4 to 12 inches high with alternate, entire leaves and flowers crowded in a headlike cluster. The corolla varies from lilac-purple to nearly white and is very slender and funnellform with short lobes at the top.

Navarretia intertexta.—The somewhat hairy stems are low and rather stout and usually quite widely branched. The leaves are alternate and pinnately divided into spiny-tipped lobes. The flowers are white.

Prickly gilia (*Gilia pungens*) has stems that are woody, 4 to 12 inches high, and very leafy. The leaves, except the lowest, are alternate and palmately divided into narrow lobes making them appear like clusters of narrow leaves. The flowers vary from rosy to white or yellowish but are usually pale rose color.

Gilia harknessii has the leaves divided or lobed in much the same way but they are opposite, the stems are not woody, and the flowers are white.

Threadflower gilia (*Gilia micrantha*) has entire leaves which are alternate, and the flowers are white or pale pink or even violet. The petals are about as long as the calyx.



FIGURE 80.—*Polemonium*. Blue. Copy-right, J. E. Haynes.

Gilia tenerrima is similar, but the petals are white and twice as long as the calyx.

WATERLEAF FAMILY (HYDROPHYLLACEAE)

The waterleaf family is of little economic importance except for the ornamental flowering plants that it contains. Its members are mostly herbs with regular flowers having a numerical plan of five. Both the calyx and corolla are tubular and bell-shaped, and the five stamens are attached to the corolla-tube. There are two styles, but in some cases they are completely united into one. The fruit is a dry capsule.

Waterleaf (*Hydrophyllum capitatum*).—The plant has a cluster of stems 4 to 8 inches high and one to several leaves. The whole plant is more or less covered with white, stiff hairs. The leaves are pinnately divided into 3 to 5 divisions which may be entire or 2- or 3-lobed. The flowers are blue and are borne in a dense, headlike cluster.



FIGURE 81.—*Phacelia*. Blue-violet or whitish. Photograph by Joseph S. Dixon, National Park Service.

Nemophila breviflora is a slender annual herb with weak, almost trailing stems and mostly alternate leaves which are pinnately divided into 3 or 5 lobes. The flowers are white or whitish and solitary. The calyx is 5-lobed and has in each sinus a small appendage which is bent back. The corolla is also 5-lobed and has 10 small appendages at the base inside.

Phacelia and Fiddleneck (*Phacelia*).—Mostly hairy plants with alternate leaves and showy, usually lavender or purple flowers. The flowers are clustered in spikes or racemes, and the stamens usually project far out of the flower, giving a fringed appearance. The four species that have been identified in the park may be distinguished as follows:

1. Leaves mostly entire. 2.
1. Leaves pinnately divided. 3.
2. Leaves mostly sessile, linear to lance-shaped, green. Flowers violet or whitish. *Phacelia linearis*.

2. Leaves or some of them long-petioled, lance-shaped to oblong, pale and silky with soft, whitish hairs. Flowers pale blue or whitish. *Phacelia leucophylla*.

3. Plants annual or biennial. Flowers pale blue or whitish or purple; in a short cluster. Stamens not very long. *Phacelia franklinii*.

3. Plants perennial. Flowers blue-violet; in a long spikelike cluster. Stamens very long. *Phacelia sericea*.

Phacelia alpina and *P. lyallii* have also been reported in the park.

BORAGE FAMILY (BORAGINACEAE)

The flowers of this family can be recognized by the five-lobed calyx, regular, five-lobed corolla, five stamens attached to the corolla-tube, and the deeply four-lobed ovary with a single style. The members of the family are mostly rough-hairy herbs with alternate leaves.

The flowers are often on one-sided branches though not always. Perhaps the forget-me-not is the best known member of the family.

1. Fruits burlike. Stickseed (*Lappula*) (p. 105)

1. Fruits smooth, not burlike. 2.

2. Leaves opposite. *Allocarya scopulorum*----- (p. 105)

2. Leaves alternate. 3.

3. Flowers very small, white. *Cryptantha*----- (p. 106)

3. Flowers yellow. Gromwell (*Lithospermum*)----- (p. 107)

3. Flowers blue. 4.

4. Flowers pendant, bell-shaped. Bluebells (*Mertensia*)----- (p. 106)

4. Flowers not pendant. Plants low. Alpine forget-me-not (*Myosotis alpestris*)----- (p. 106)

Stickseed (*Lappula*).—The flowers resemble those of forget-me-not, but the fruits are burlike. Stickseed is found at all altitudes and different species vary from a few inches to three feet high. The following eight species, some of them not very easily distinguished, have been found in the park. Some of them are very common. *Lappula americana*, *L. caerulescens*, *L. diffusa*, *L. erecta*, *L. floribunda*, *L. leptophylla*, *L. occidentalis*, *L. subdecumbens*.

Allocarya scopulorum is a small, annual plant with opposite, linear leaves and small white flowers which are yellow in the throat of the



FIGURE 82.—Stickseed. Blue. Copyright, J. E. Haynes.

corolla. The slender stems are 3 to 6 inches long and somewhat creeping or spreading.

Cryptanthe flexuosa is a slender, hairy plant with alternate, entire leaves and small, white flowers. The stems are 6 to 12 inches long, and the leaves are narrowly oblong. Both stems and leaves are pale green.

Cryptanthe watsonii is similar but is dark green and the flowers are very small.

Cryptanthe ambigua, *C. calycosa*, *C. crassisepala*, and *C. leiocarpa* have also been reported as occurring in the park.

Bluebells (*Mertensia*).—

bell-shaped, blue flowers. The five species in the park may be distinguished in the following manner:

1. Leaves hairy on both sides. *Mertensia bakeri*.
1. Leaves somewhat hairy above but smooth below. 2.
1. Leaves smooth or nearly so on both sides. 3.
2. Plants less than 7 inches high. *Mertensia tweedyi*.
2. Plants more than 7 inches high. *Mertensia coronata*.
3. Plants about a foot high or less. Corolla-tube about twice as long as the calyx. *Mertensia foliosa*.
3. Plants usually more than a foot high. Corolla-tube more than twice as long as the calyx. **Mountain bluebells (*Mertensia ciliata*).**

Alpine forget-me-not (*Myosotis alpestris*).—This plant is usually found at rather high altitudes. It is a green, soft-hairy perennial with slender, clustered, nearly erect stems which are usually 4 to 6 inches high. The leaves vary from linear to lance-shaped and are rather small. The small, blue flowers are densely clustered. The corolla is wheel-shaped and blue but with a yellowish center. Occasionally, plants with white flowers are found.



FIGURE 83.—Mountain bluebells. Blue. Photograph by Dr. Frank R. Oastler.



FIGURE 83a.—Mountain bluebells. Blue. Photograph by Joseph S. Dixon, National Park Service.

Lithospermum pilosum.—The plant produces numerous, soft-hairy stems which grow about a foot high. The leaves vary from linear to lance-shaped and are sessile. The flowers are pale yellow or greenish yellow and the calyx and corolla-tube are about equal in length.

Lithospermum angustifolium is similar, but the corolla-tube is more than twice as long as the calyx. The earlier flowers are bright yellow while the later ones are pale.

Lithospermum gmelinii has orange-yellow flowers.

Lithospermum lanceolatum has also been reported in the park.

Lithospermum is commonly known as gromwell.

VERVAIN FAMILY (VERBENACEAE)

A small family of herbs with opposite or whorled leaves and somewhat irregular flowers. Represented here only by the Ground vervain (*Verbena bracteosa*), a hairy plant with pinnately cut or three-cleft and coarsely toothed leaves and purplish-blue flowers.

MINT FAMILY (MENTHACEAE, LAMIACEAE OR LABIATAE)

The plants of this family have quite well marked family characteristics by which they are usually quite readily recognized. The corolla is usually decidedly irregular, having two lips, the upper of which may be either entire or two-lobed, and the lower three-lobed. Furthermore, the stems are usually square, and the leaves are opposite and have a characteristic mint odor. Some members of the family are used in medicines and others are used for flavoring candies and chewing gums.

Skullcap (*Scutellaria galericulata*).—The plant gets its name from a helmetlike appendage on the back of the upper lip of the two-



FIGURE 84.—Alpine forget-me-not. Blue.
Copyright, J. E. Haynes.

lipped calyx. It is a slender, nearly smooth plant, usually 1 or 2 feet high. The leaves are ovate or lance-shaped, with a heart-shaped base, and are 1 or 2 inches long. All but the uppermost are toothed. The flowers are blue and have four stamens. The mint odor is lacking.

Beebalm (*Monarda menthaefolia*).—This plant grows 1 to 2 feet high, and the stems are usually tinged with red or purple. The leaves are ovate or lance-shaped, petioled and somewhat toothed.



FIGURE 85.—Selfheal. Blue or purple.
Photograph by A. R. Sweetser.

The purple or bluish flowers are in terminal heads surrounded by leaflike bracts. There are only two stamens to a flower.

American wild mint (*Mentha canadensis*).—This is a more or less hairy perennial with a strong mint odor. It usually grows along ditches or in wet places. The ovate or lance-shaped leaves are sharply toothed and the bluish or whitish flowers are in sessile whorls in nearly all the leaf-axils except the uppermost.

Spearmint (*Mentha spicata*) is smooth and has the flowers in terminal spikes.

Mentha rubella has also been reported as occurring in the park.

Dragonhead (*Dracocephalum parviflorum*).—A rather stout, coarse plant, 8 to 30 inches high, and somewhat hairy. The lance-shaped or oblong leaves are more or less

cut-toothed. The bluish flowers are numerous and are borne in a terminal spikelike cluster with leafy bracts.

Selfheal (*Prunella vulgaris*).—The slender stems are 4 to 12 inches high, and the leaves are oblong or ovate and toothed. The lower ones are petioled and the upper ones sessile. The blue, purple, or violet flowers are in dense, headlike spikes with conspicuous bracts. There are four stamens, and they are peculiar in having forked filaments, one point of the fork bearing the anther.

POTATO FAMILY (SOLANACEAE)

An extremely important family because it contains such important economic plants as the potato, tomato, and tobacco, as well as a

number of ornamental plants and some troublesome weeds. The flowers are regular and perfect with a 5-lobed calyx, a more or less 5-lobed corolla, 5 stamens, and 1 pistil with a single style and stigma. The family is represented here only by *Solanum triflorum*, a low, much-spreading herb with alternate leaves. The leaves are oblong but pinnately deeply lobed. The small, white flowers are produced singly or two or three together. The stamens have very short filaments, and the anthers are crowded around the style in such a way as to form a cone. The fruit is a green berry.

The genus *Solanum* is commonly known as nightshade.

FIGWORT FAMILY (SCROPHULARIACEAE)

This is a large family and contains many plants with ornamental flowers but no important food or other economic plants. The sepals are united to form a toothed or lobed calyx, and the petals are also united to form a more or less irregular, often distinctly two-lipped corolla. There are usually either 2 or 4 stamens, but in some cases there are 5, and the ovary of the single pistil is not lobed as it is in the mint and borage families. In many cases when there are 5 stamens, 1 of them is sterile.

1. Stamens with anthers 2. 2.
1. Stamens with anthers 4. 3.
2. Leaves alternate, mostly basal. **Kittentails** (*Synthyris wyomingensis*)—(p. 109)
2. Leaves mostly opposite. **Speedwell** (*Veronica*)----- (p. 109)
3. Corolla spurred at the base. **Butter-and-eggs** (*Linaria vulgaris*)----- (p. 112)
3. Corolla not spurred at the base. 4.
4. Flowers with a conspicuous sterile stamen. **Pentstemon** or **Beardtongue** (*Pentstemon*)----- (p. 110)
4. Flowers without a conspicuous sterile stamen. 5.
5. Leaves mostly opposite. 6.
5. Leaves mostly alternate. 7.
6. Flowers blue or blue and white. **Little bluelips** (*Collinsia tenella*)---- (p. 110)
6. Flowers yellow, red, or purple. **Monkeyflower** (*Mimulus*)----- (p. 111)
7. Leaves fernlike, toothed or lobed or both. **Fernleaf** (*Pedicularis*)---- (p. 111)
7. Leaves not fernlike; entire or with 3 or 5 entire lobes. 8.
8. Lips of corolla very unequal. Bracts more conspicuous than the flowers. **Paintbrush** (*Castilleja*)----- (p. 112)
8. Lips of corolla equal or nearly so. Bracts less conspicuous than the flowers. **Owlclover** (*Orthocarpus luteus*)----- (p. 113)

Kittentails (*Synthyris wyomingensis*) grows 4 to 10 inches high. The leaves are mostly basal, those on the stem being small and sessile. The flowers have no corolla and, therefore, are not colorful, but the stamens, being twice the length of the calyx, are conspicuous.

Speedwell (*Veronica*).—Low plants with mostly opposite leaves and small blue or whitish flowers. Five species are found in the park and may be distinguished as follows:

1. Flowers in terminal spikes. 2.
1. Flowers in axillary racemes. 3.
2. Flowers violet. Plants alpine. *Veronica wormskjoldii*.
2. Flowers pale blue with darker stripes. Plants of wet places. *Veronica serpyllifolia*.
3. Leaves linear or nearly so. *Veronica scutellata*.
3. Leaves oblong or oval. 4.
4. Fruits 2-lobed. Plants perennial. *Veronica americana*.
4. Fruits merely notched at the end. Plants annual. *Veronica peregrina*.

Pentstemon or Beardtongue (*Pentstemon*).—Herbs with opposite leaves and usually showy flowers. The corolla is irregular and two-lipped. There are five stamens, but one of them is sterile. It has no anther but is usually flattened and bearded at the end, hence the name beardtongue. Some species are rather difficult to distinguish; those that occur most commonly in the park may be identified by means of the following key.



FIGURE 86.—*Pentstemon* or Beardtongue.
Blue. Copyright, J. E. Haynes.

1. Flowers dull white or yellowish. *Pentstemon decustus*.
1. Flowers some shade of blue or purple. 2.
2. Plants smooth throughout. 3.
2. Plants more or less hairy. 6.
3. Flowers in dense panicles. 4.
3. Flowers in headlike whorls. 5.
4. Flowers large, 1 inch or more long. *Pentstemon cyaneus*.
4. Flowers smaller, one-half inch or less long. *Pentstemon cyanthus*.
5. Leaves lance-shaped. *Pentstemon procerus*.
5. Leaves ovate. *Pentstemon rydbergii*.
6. Leaves smooth. *Pentstemon collinus*.
6. Leaves downy. *Pentstemon radicosus*.

In addition to the above *Pentstemon erianthera*, *P. fremontii*, *P. fruticosus*, *P. glaber*, *P. glaucus*, *P. gracilis*, *P. montanus*, *P. pseudoprocerus*, *P. scouleri*, *P. secundiflorus*, and *P. whippleanus* have been reported as occurring in the park.

Little bluelips (*Collinsia tenella*) is a low, somewhat spreading, annual herb, 3 to 6 inches high, with oblong or lance-shaped leaves. The lower leaves are opposite and petioled while the upper ones are sessile and usually whorled. The flowers are borne in the axils of the upper whorls of leaves, 1 to 5 in each whorl. The corolla is blue or blue and white and deeply two-lipped. Sometimes called **blue-eyed Mary**.

Mimulus langsdorffii.—This is common in wet places and often grows close to the hot springs where the hot vapors would be extremely uncomfortable to a human being. The stems vary from 8 to 30 inches high, and the opposite leaves are round or ovate, petioled, and toothed. The corolla is yellow and two-lipped and usually spotted with dark red.

Lewis monkeyflower (*Mimulus lewisii*) is usually found along mountain streams. The flowers are similar to those of the preceding species, but they are larger and rose-red or purplish.

Mimulus nanus is another species with rose-colored flowers which grows only a few inches high but often forms dense beds.

Mimulus rubellus has been reported in the park, but there is some doubt as to whether it really occurs.

Mimulus geyeri, *M. guttatus*, and **Muskplant** (*M. moschatus*) have also been reported in the park.

Fernleaf (*Pedicularis*), also called **Lousewort**.—These plants are usually easily recognized by the fernlike leaves and spikes of irregular flowers with four stamens and a two-lipped corolla. Those commonly seen in the park may be distinguished by means of the following key.



FIGURE 88.—Lewis monkeyflower. Rose-red. Photograph by Joseph S. Dixon, National Park Service.



FIGURE 87.—Monkeyflower. Yellow. Copyright, J. E. Haynes.

1. Flowers white. *Pedicularis racemosa*.
1. Flowers yellow. *Pedicularis bracteosa*.
1. Flowers purple or purplish. 2.
2. Flowers shaped like an elephant's head with ears and trunk. **Elephanthead** (*Pedicularis groenlandica*).
2. Flowers not shaped like an elephant's head. 3.
3. Calyx deeply cleft on one side. *Pedicularis ctenophora*.
3. Calyx nearly equally 5-toothed or lobed. 4.
4. Calyx-lobes about the same length as the tube. *Pedicularis cystopteridifolia*.
4. Calyx-lobes much shorter than the tubes. *Pedicularis scopulorum*.



FIGURE 88a.—Lewis monkeyflower. Rose-red. Photograph by Joseph S. Dixon, National Park Service.

or white flowers in dense, terminal spikes. The flowers are subtended by leafy bracts which are usually much larger and more conspicuous than the flowers themselves as well as more brilliantly



FIGURE 89.—Elephanthead. Red or purple. Photograph by Dr. Harvey E. Stork.

In addition to the above, *Pedicularis surrecta* has also been reported in the park.

Butter-and-eggs or Toadflax (*Linaria vulgaris*).—A plant with linear leaves and yellow flowers with the corolla spurred at the base on the lower side.

Paintbrush (*Castilleja*).—The State flower of Wyoming. The paintbrushes are herbs with alternate leaves and red, yellow, purple,



FIGURE 90.—Paintbrush. Red. Copy-right, J. E. Haynes.

colored. The paintbrushes are easily recognized, but the various species are sometimes quite difficult to distinguish. The following 18 species have been identified in the park:

Castilleja brachyantha
Castilleja confusa
Castilleja exilis
Castilleja flava
Castilleja gracillima
Castilleja lancifolia
Castilleja lauta
Castilleja linariaefolia
Castilleja longispica

Castilleja lutea
Castilleja miniata
Castilleja occidentalis
Castilleja pallescens
Castilleja pilosa
Castilleja pulchella
Castilleja rheirifolia
Castilleja suksdorfii
Castilleja villosa

Owlclover (*Orthocarpus luteus*) is quite similar to the paintbrush in some respects, but the two lips of the corolla are nearly equal in length, while in the paintbrush they are very unequal. The bracts are yellowish, and the corolla is golden yellow, and 2 or 3 times the length of the calyx. The whole plant is quite hairy.

BLADDERWORT FAMILY (UTRICULARIACEAE)

A small family of water plants with peculiar bladders on the submerged leaves. Represented here by the **Common bladderwort** (*Utricularia vulgaris*) which grows in the water of brooks and ponds. The leaves are 2 or 3 times pinnately divided into very narrow segments and usually bear numerous bladders. The flowers are yellow and irregular and are borne on erect stems, 4 to 12 inches high. Both calyx and corolla are strongly 2-lipped and there are 2 stamens and 1 pistil.

Utricularia minor has also been reported in the park.

BROOMRAPE FAMILY (OROBANCHACEAE)

A small family of plants which lack green leaves and obtain their carbohydrates by growing as parasites on the roots of other plants. Possibly represented here by a single species, the **Western ghostpipe** (*Thalesia fasciculata*), which grows attached to the roots of sagebrush, buckwheat, and perhaps other plants. It is quite hairy and somewhat sticky. The stem is short and bears scattered scales. The numerous flowers are borne on stalks that are about as long as the main stem. The flowers are yellow or purplish, the corolla being about an inch long and somewhat two-lipped at the end.

Thalesia lutea has also been reported in the park, so also has the **Broomrape** (*Orobanche ludoviciana*).

PLANTAIN FAMILY (PLANTAGINACEAE)

A small family of somewhat weedy plants with basal leaves and a spike of small, greenish flowers. The three species that have been found in the park may be distinguished in the following manner:

1. Plant woolly. Leaves linear. **Indianwheat** (*Plantago purshii*).
1. Plant not woolly. Leaves not linear. 2.
2. Leaves broad, strongly ribbed, mostly oval. **Rippleseed plantain** (*Plantago major*).
2. Leaves narrow, not strongly ribbed, mostly lance-shaped. *Plantago tweedyi*.

MADDER FAMILY (RUBIACEAE)

In the Tropics there are many shrubs that belong to the madder family, some of them with peculiar nodules on their leaves that are inhabited by nitrogen-fixing bacteria closely related to those found in the roots of members of the pea family. Our representatives of the family, however, are rather small, weak herbs with square stems and whorled leaves. The coffee plant is the most important economic member of the family.



FIGURE 91.—Northern bedstraw. White.
Copyright, J. E. Haynes.

Northern bedstraw (*Galium boreale*) is very common in the park. It grows 1 or 2 feet high and the narrow leaves are three-nerved and are arranged in whorls of 4. The numerous white flowers are very small and are constructed on a numerical plan of four.

Fragrant bedstraw (*Galium triflorum*) is much less common. Its leaves are one-nerved and an inch or more in length, and they are arranged in whorls of six.

Galium trifidum has much shorter leaves which are borne in sixes, fives, or occasionally in fours.

Twinleaf bedstraw (*Galium bifolium*) has only 2 or 4 leaves in a whorl, and when there are 4, 2 of them are much smaller. The flowers are borne singly either in the axils or terminal.

Galium vaillantii has 6 to 8 leaves to a whorl, and the flowers are produced in axillary clusters of 3 to 9 each.

Galium brandegei is slender and densely leafy with the leaves in fours, and the flowers are lateral.

HONEYSUCKLE FAMILY (CAPRIFOLIACEAE)

A rather large family which consists mostly of shrubs but contains some herbs. In all cases the leaves are opposite, the flower parts are attached above the ovary, and the petals are grown together to

form a tubular corolla. The family contains a large number of shrubs that are used for ornamental purposes and some that bear edible fruits.

Blackbead elder (*Sambucus melanocarpa*).—A branched shrub that grows 3 to 6 feet high. The opposite leaves are pinnately compound with 5 to 9 toothed leaflets. The small white flowers are borne in compound clusters that are about as broad as high. The small black fruit is berrylike and edible.

Bunchberry elder (*Sambucus microbotrys*) has also been reported in the park.

American twinflower (*Linnaea americana*).—This plant was named in honor of the great biologist, Linnaeus, who gave us our system of classification for both plants and animals, and it is said to have been his favorite flower. It is a small trailing or creeping evergreen with round or oval, short-petioled leaves. Here and there are short, upright, leafy branches that terminate in a slender flowering stem. The stem is forked at the top into two branches, each bearing a delicate and very fragrant bell-shaped flower. The corolla is pink varying to white, somewhat hairy inside, and almost equally five-lobed. Unlike most members of the family this flower has only 4 stamens instead of 5, and 2 of them are shorter than the others.

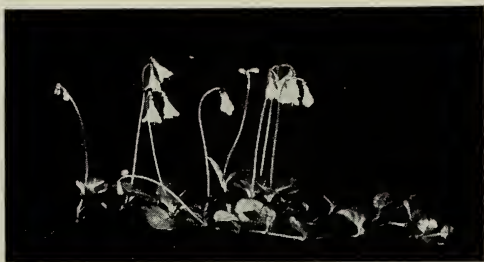


FIGURE 92.—American twinflower. Pink and white. Copyright, J. E. Haynes.

Western snowberry (*Symphoricarpus occidentalis*).—A low, branching shrub, usually not more than 3 feet high, with opposite short-petioled leaves which are rather thickish, oval, or oblong in shape, and up to 2 inches long. The small, whitish, or rose-tinged flowers are produced in short, dense clusters in the axils of the leaves. The stamens and style extend well beyond the corolla.

Symphoricarpus rotundifolius, often called **buckbrush**, is very similar, but the leaves are smaller and the corollas of the flowers are nearly twice as long. The stamens and style are included in the corolla. The fruit of both species is a white berry.

Common snowberry (*Symphoricarpus racemosus*) has small flowers like those of *Symphoricarpus occidentalis*, but the stamens and style are included in the corolla.

Whortleleaf snowberry (*Symphoricarpus vaccinoides*) has also been reported in the park.

Sweetberry honeysuckle (*Lonicera caerulea*).—A much-branched shrub, 1 to 2 feet high, with opposite, oblong, or elliptical short-

petioled leaves which are conspicuously veiny. The yellowish flowers are produced in pairs subtended by small bracts. The fruit is a blue-black sweetish berry.

Utah honeysuckle (*Lonicera utahensis*) is quite similar, but the leaves are larger and the berry is red.

Bearberry honeysuckle (*Lonicera involucrata*) is a larger plant than the other two species. It grows 2 to 7 feet high and has ovate or lance-shaped leaves which are 2 to 5 inches long. The bracts subtending the flowers are large and leaflike, and they later enlarge and form a sort of bladder enclosing the two dark purple or black berries.



FIGURE 93.—Common snowberry. White or pink. Photograph by A. R. Sweetser.



FIGURE 94.—Harebell. Blue. Copyright, J. E. Haynes.

American fly honeysuckle (*Lonicera ciliata*) has also been reported as occurring in the park.

BLUEBELL FAMILY (CAMPANULACEAE)

This is a relatively small family, but most of its members have beautiful blue flowers and many of them are used in flower gardens. They are all herbs with alternate leaves, the parts of the flower attached above the ovary, the petals united, and the five stamens free from the corolla and from one another.

Harebell (*Campanula rotundifolia*).—This is a beautiful plant and is found clear across the northern part of North America and also

in some European countries. It is often called **Bluebell of Scotland**. The slender, branching stems grow 4 to 10 inches high and are 1- to 10-flowered. The basal leaves are round or ovate, often heart-shaped at the base, long-petioled, and usually toothed. They soon wither away leaving only the stem leaves which are linear or narrowly lance-shaped and entire. The bell-shaped flowers are a beautiful shade of blue.

Campanula uniflora is found only on bare slopes at high elevations. It is 2 to 4 inches high, has thickish leaves, and usually bears only 1 flower on each stem.

MOSCHATEL FAMILY (ADOXACEAE)

A small family of herbs with compound leaves and small, greenish flowers in headlike clusters. **Moschatel** (*Adoxa moschatellina*), our only representative, has a cluster of basal leaves that are 1 to 3 times ternately compound and a single pair of opposite stem leaves which have 3 leaflets each usually 3-cleft. It occurs at high elevations.

VALERIAN FAMILY (VALERIANACEAE)

A small and relatively unimportant family of herbs with opposite leaves and small flowers with the flower parts attached above the ovary. **Tobacco-root** (*Valeriana ceratophylla*) is 3 to 8 or more inches high. The leaves are thickish and palmately veined. The basal ones are entire or nearly so, while the 1 to 3 pairs of stem leaves are pinnately divided into 3 to 7 narrow divisions. The numerous small flowers are yellowish.

Valeriana micrantha is a larger plant growing from 12 to 30 inches high, and the leaves are pinnately veined. The fruits are hairy.

Valeriana acutiloba, which blooms very early while the snow is still melting, is similar to the preceding species but the fruits are smooth.



FIGURE 95.—Tobacco-root. White. Photograph by Joseph S. Dixon, National Park Service.

COMPOSITE OR ASTER FAMILY (ASTERACEAE OR COMPOSITAE)

The composite family is a very large family. It is believed to be one of the youngest of families, that is, the most recent in its origin,

but at the same time one of the most successful. More than one-fifth of the plants described in this book belong to this family. Very many of the members of the composite family are used as ornamental plants and still larger numbers are prized as wild flowers. The family also contains many pernicious weeds, but relatively few plants that are used as food by man. Lettuce is undoubtedly the most widely used food plant belonging to this family. The great majority of the members of the family are herbs, although there are also many shrubs, and the success of the family in spreading to all parts of the earth is due largely to the remarkable adaptations for seed dissemination, mostly by wind or animals, possessed by many of its members.

The chief characteristic of the family that distinguishes it from all others is that the relatively small flowers are borne in a dense head, all on one receptacle, and are surrounded by an involucre of bracts. What we commonly call a flower of a dandelion, sunflower, aster, or chrysanthemum is not a single flower but a whole bouquet of flowers. Each of the little, yellow, petallike parts of a dandelion, for example, is an individual flower. In such a flower the ovary is inferior, that is, the other parts of the flower are attached above the ovary. At the top of the ovary is a cluster of white hairs called the pappus, which represents the calyx. In some members of the family the pappus consists of bristles, awns, scales, or teeth, and in some cases it is lacking entirely. Within and above the pappus is the yellow, strap-shaped part of the dandelion flower which is the corolla and is made up of five very narrow petals united together. In the center of the flower is a single style with two stigmas at the end, and around this are the five stamens with the filaments distinct, but the anthers united around the style. Most of the parts of such a flower are shown in plate VI.

The advantage of having a large number of flowers together on one receptacle is obvious. They can be small and still conspicuous enough to attract insects, and once an insect has been attracted it is likely to visit a number of flowers before leaving. In the aster and many other members of the family there are two kinds of flowers in each head. The outer ones are similar to those of the dandelion and are called ray flowers, while the inner ones have tubular corollas and are called disk flowers. Often the ray flowers differ in color from the disk flowers, and in some cases the ray flowers do not produce any fruits, their purpose being to attract insects, while the less conspicuous disk flowers produce the fruits. The insects, of course, visit the flowers for food, that is, for the nectar which they either use directly for food or from which they may make honey, and while obtaining this food they accidentally bring about a transfer of pollen from anthers to stigmas.

There are also some members of the composite family in which all of the flowers have tubular corollas. The members of the family, therefore, may be divided into three groups: Those whose flowers all have tubular corollas, those whose flowers all have strap-shaped corollas, and those having both tubular and strap-shaped corollas, or both ray and disk flowers. The fruits in all cases are akenes.

1. Corollas all strap-shaped. 2.
1. Corollas all tubular. 11.
1. Corollas of ray flowers strap-shaped; those of disk flowers tubular. 18.
2. Flowers 5 in each head. **Wirelettuce** (*Stephanomeria tenuifolia*)---- (p. 136)
2. Flowers more than 5 in each head. 3.
3. Flowers white. **White hawkweed** (*Hieracium albiflorum*)----- (p. 138)
3. Flowers blue or purple. 4.
3. Flowers yellow or orange. 5.
4. Flowers purple. Leaves grasslike. **Oysterplant** (*Tragopogon porrifolius*)
(p. 136)
4. Flowers blue. Leaves not grasslike. **Larkspur lettuce** (*Lactuca pulchella*)
(p. 138)
5. Leaves grasslike. **Buckbeard** (*Tragopogon pratensis*)----- (p. 136)
5. Leaves not grasslike. 6.
6. Leaves all basal. 7.
6. Leaves not all basal. 8.
7. Fruits with short spines at the end. **Dandelion** (*Taraxacum*)----- (p. 139)
7. Fruits without spines at the end. **Troximon**----- (p. 138)
8. Leaves prickly toothed. **Prickly sowthistle** (*Sonchus asper*)----- (p. 138)
8. Leaves not prickly. 9.
9. Pappus brown or brownish. **Hawkweed** (*Hieracium*)----- (p. 138)
9. Pappus white. 10.
10. Pappus of numerous soft bristles. **Hawksbeard** (*Crepis*)----- (p. 137)
10. Pappus of 15 to 20 scales each terminated by a long, soft bristle. **Grassleaf**
(*Ptilocalais nutans*)----- (p. 137)
11. Shrubs. 12.
11. Herbs. 14.
12. Pappus none. **Sagebrush** (*Artemisia*)----- (p. 133)
12. Pappus of numerous bristles. 13.
13. Involucre of 4 to 6 scales. **Tetradymia inermis**----- (p. 134)
13. Involucre of a dozen or more scales. **Rabbitbrush** (*Chrysothamnus*) - (p. 121)
14. Flowers brown. **Niggerthumb** (*Rudbeckia occidentalis*) - (p. 128)
14. Flowers purple. **Thistle** (*Cirsium*)----- (p. 136)
14. Flowers yellow or whitish. 15.
15. Pappus of several narrow scales. **Brides-bouquet** (*Chaenactis douglasii*)
(p. 131)
15. Pappus none. 16.
15. Pappus of bristles. 17.
16. Plants with odor of sage. **Wormwood** (*Artemisia*)----- (p. 133)
16. Plants without odor of sage. **Sumpweed** (*Iva axillaris*)----- (p. 128)
17. Involucre pearly white, papery. **Pearl everlasting** (*Anaphalis margaritacea*)----- (p. 128)
17. Involucre dull white. **Gnaphalium wrightii**----- (p. 128)
17. Involucral bracts with white or colored tips. **Pussytoes** (*Antennaria*) - (p. 127)
18. Leaves all or mostly basal. 19.
18. Leaves not all basal. 22.

19. Heads more than 2 inches broad. **Balsamroot** (*Balsamorhiza sagittata*) (p. 129)
19. Heads less than an inch broad. 20.
20. Rays purple. *Oreastrum haydeni*----- (p. 125)
20. Rays yellow. 21.
21. Rays 8 to 12. *Stenotus caespitosus*----- (p. 122)
21. Rays 30 to 40. *Erigeron luteus*----- (p. 126)
22. Leaves all opposite. **Arnica** (*Arnica*)----- (p. 133)
22. Lower leaves opposite, some of the upper ones alternate. 23.
22. Leaves mostly alternate. 24.
23. Fruits flat, very strongly compressed. Awns 2, persistent. *Helianthella* (p. 131)
23. Fruits rather plump, more or less rounded on the sides. Awns usually 2, deciduous. **Sunflower** (*Helianthus*)----- (p. 130)
24. Ray flowers not yellow. 25.
24. Ray flowers yellow. 31.
25. Pappus none. 26.
25. Pappus crownlike with several teeth. Heads large. Rays white. **White mule-ears** (*Wyethia helianthoides*)----- (p. 130)
25. Pappus of bristles. 27.
26. Heads small, numerous, white; plants very aromatic. **Yarrow** (*Achillea lanulosa*)----- (p. 132)
26. Heads large, rays white. **Oxeye daisy** (*Chrysanthemum leucanthemum*) (p. 132)
27. Bracts of the involucre in only 1 or 2 rows. **Fleabane** (*Erigeron*)---- (p. 126)
27. Bracts of the involucre in more than 2 rows. 28.
28. Heads about 2 inches broad. *Townsendia parryi*----- (p. 122)
28. Heads smaller. 29.
29. Rays few (8 to 16). Involucre somewhat resinous. *Machaeranthera pulverulenta*----- (p. 124)
29. Rays usually more than 16. Involucre not resinous. 30.
30. Plants dwarf. Each stem bearing a single head. *Ionactis alpina*--- (p. 125)
30. Plants not dwarf. Stems usually branching and bearing several heads. **Aster** (*Aster*)----- (p. 123)
31. Shrubs. *Macronema grindelioides*----- (p. 139)
31. Herbs. 32.
32. Involucre very gummy or sticky. 33.
32. Involucre not gummy or sticky. 34.
33. Ray flowers only 5 or fewer. **Tarweed** (*Madia glomerata*)----- (p. 131)
33. Ray flowers more than 5. **Gumplant** (*Grindelia subalpina*)----- (p. 121)
34. Pappus of scales or awns. 35.
34. Pappus, in part at least, of hairlike bristles. 38.
35. Disk flowers brownish. 36.
35. Disk flowers yellow. 37.
36. Plant 3 to 6 feet high. Disk 1 to 2 inches broad. **Common sunflower** (*Helianthus annuus*)----- (p. 130)
36. Plant 1 to 3 feet tall. Disk about half an inch broad. **Prairie sunflower** (*Helianthus scaberrimus*)----- (p. 130)
37. Plants more or less woolly. *Eriophyllum integrifolium*----- (p. 131)
37. Plants hairy but not woolly. **Gaillardia** (*Gaillardia aristata*)----- (p. 131)
37. Plants neither hairy nor woolly. **Broom snakeweed** (*Gutierrezia sarothrae*) (p. 121)
38. Pappus yellowish brown or yellowish gray. *Pyrrocoma*----- (p. 122)
38. Pappus white or whitish. 39.

39. Bracts of the involucre mostly equal and in one series. **Groundsel** (*Senecio*)----- (p. 135)
39. Bracts of the involucre unequal and in more than one series. 40.
40. Pappus double, the inner part of hairlike bristles, the outer of small scales or spines. **Golden-aster** (*Chrysopsis*)----- (p. 121)
40. Pappus wholly of hairlike bristles. 41.
41. Bracts of the involucre closely appressed. Never leaflike. **Goldenrod** (*Solidago*)----- (p. 125)
41. Outer bracts of the involucre more or less leaflike. *Aplopappus parryi* (p. 139)

Broom snakeweed (*Gutierrezia sarothrae*) is a bushy plant with numerous erect stems from a somewhat woody base, 1 or 2 feet high. The leaves are very narrow, entire, and alternate. The heads are small but quite numerous, each head containing 3 to 7 disk flowers and about the same number of ray flowers, both yellow.



FIGURE 96.—Gumplant. Yellow. Photograph by A. R. Sweetser.

Gumplant (*Grindelia subalpina*).—A biennial herb with usually two or more stems that grow 8 to 16 inches high. The basal leaves have slender petioles and are toothed, while the stem leaves are sessile but are narrowed to a petiolelike base. The heads contain both ray and disk flowers and both are yellow. The ray flowers are numerous and the head when fully expanded is 1 or 2 inches broad. The involucre is very gummy and consists of numerous narrow bracts with the tips curved back.

Golden-aster (*Chrysopsis*).—These plants resemble asters, but the ray flowers as well as the disk flowers are yellow. Both stems and leaves are hairy. Three species have been identified in the park. They are quite similar but may be distinguished in the following manner:

1. Hairs spreading and bristly. *Chrysopsis hispida*.
1. Hairs appressed, at least on the leaves. 2.
2. Leaves sessile or nearly so. *Chrysopsis depressa*.
2. Leaves, except the uppermost, with slender petioles. *Chrysopsis villosa*.

Rabbitbrush (*Chrysothamnus*).—These shrubs are common on dry hills and plains and are very conspicuous when in full bloom in the latter part of the season. They often grow along with sage-

brush and may be mistaken for it but their leaves are always brighter green in color, and the yellow flowers are much more showy.

Chrysothamnus pumilis has numerous, erect, slender branches, 4 to 12 inches high. The stems are very leafy and the bark is whitish. The leaves are linear and two-nerved.

Chrysothamnus glaucus is similar, but it grows 20 to 40 inches high, and the leaves are lance-shaped.

Chrysothamnus nauseosus differs from the other two species in having the stem and leaves covered with short white hairs.

Chrysothamnus viscidiflorus has also been reported in the park but probably includes some of the above species.

Pyrrocoma integrifolia is a perennial herb with alternate leaves and rather showy yellow heads containing both ray and disk flow-



FIGURE 97.—Rabbitbrush. Yellow. Photograph by Dr. Harvey E. Stork.

ers. It has several stems, 6 to 10 inches high, and the heads are borne in the axils of the upper leaves, 1 to 3 in each axil. The basal leaves are 3 to 6 inches long, while the stem leaves are smaller and lance-shaped or linear. The pappus is composed of rather rigid, yellowish or reddish-brown bristles.

Geyser-daisy (*Pyrrocoma uniflora*) is similar, but

each stem bears only 5 or 6 or fewer leaves and usually only one head.

Pyrrocoma lanceolata has stems that are more leafy and each stem bears 3 to 15 heads.

Stenotus caespitosus is a low, smooth herb with a number of stems branching off from a somewhat woody base. The leaves are mostly basal but there are usually 3 or 4 on each stem. They are narrowly lance-shaped or linear and three-nerved. The heads contain both ray and disk flowers and both are yellow. The pappus is composed of bristles and is white.

Stenotus acaulis is similar but more or less hairy. The genus is known as mountain-gold.

Townsendia parryi is a low herb with a short, stout basal stem and upright flowering stems 2 to 4 inches high. It blooms very early in the season. The leaves are all on the lower parts of the stems, and both stems and leaves are covered with short white hairs.



FIGURE 98.—Mountain-gold. Yellow. Copyright J. E. Haynes.

Each flowering stem bears a single large head with lavender ray flowers and yellow disk flowers.

Townsendia alpina, *T. dejecta*, *T. excarpa* and *T. florifer* have also been reported in the park.



FIGURE 99.—Townsendia. Violet or purple. Copyright, J. E. Haynes.



FIGURE 100.—Aster. Violet. Copyright, J. E. Haynes.

Aster (*Aster*).—The asters constitute a large genus some of which are rather difficult to distinguish. They are herbs with alternate leaves and heads of white, blue, or purple ray flowers and yellow disk

flowers. The bracts of the involucre are unequal and are arranged in several series. The pappus consists of numerous hairlike bristles. The following key will serve to distinguish the more common species:

1. Rays white. 2.
1. Rays blue, purple or violet. 5.
2. Leaves linear or narrowly oblong. 3.
2. Leaves broader, more or less lance-shaped. 4.
3. Stem smooth or nearly so. *Aster angustus*.
3. Stem hairy. **Wreath aster** (*Aster multiflorus*).
4. Stems stout. Leaves thin, 2 to 4 inches long. Heads rather large. **Engelmann aster** (*Aster engelmannii*).
4. Stems slender. Leaves thickish, 1 to 2 inches long. Heads smaller. *Aster elegans*.
5. Peduncles and involucre glandular. 6.
5. Peduncles and involucre not glandular. 8.
6. Leaves broadly linear. *Aster campestris*.
6. Leaves ovate to oblong or lance-shaped. 7.
7. Bracts of the involucre lance-shaped. Rays violet. *Aster conspicuus*.
7. Bracts of the involucre linear. Rays violet-purple. *Aster integrifolius*.
8. Outer bracts of the involucre as long as or longer than the inner. 9.
8. Outer bracts of the involucre shorter than the inner. 10.
9. Bracts erect. *Aster apricus*.
9. Bracts bent outward at the tip. *Aster proximus*.
10. Hairs on the branches arranged in lines. 11.
10. Hairs on the branches rather uniformly distributed. 12.
11. All of the bracts narrowly linear. *Aster caeruleus*.
11. Outer bracts broader than the inner. *Aster lacteivirens*.
12. Bracts oblanceolate, some of the outer ones blunt at the tip. *Aster adscendens*.
12. Bracts oblong to lance-shaped or linear, all sharp-pointed. 13.
13. Stem leaves oblanceolate to linear. 14.
13. Stem leaves ovate to elliptic or lance-shaped. 15.
14. Heads several to many in a panicle. **Longleaf aster** (*Aster longifolius*).
14. Heads solitary or few in a flat-topped cluster. *Aster fremontii*.
15. Stems unbranched or branched only at the top. *Aster canbyi*.
15. Stems branched from the base. *Aster meritus*.

In addition to the above *Aster andinus*, *A. commutatus*, *A. frondeus* and *A. mearnsii* have been reported as occurring in the park.

Machaeranthera pulverulenta.—The characters of this plant are very similar to those of the true asters except that when the leaves are toothed they are usually bristle-tipped, and the bracts of the involucre usually curve outward more than in any of the true asters. The plant is small, 4 to 12 inches high, and more or less hairy. The lance-shaped leaves are rather small and scattered, some of them entire and some toothed. The heads are small and the rigid bracts of the involucre are in about three rows or more. There are only 8 to 16 of the violet-purple ray flowers.

Machaeranthera coronopifolia has leaves that are pinnately lobed, and *Machaeranthera shastensis* has mostly entire leaves. Both the stems and leaves are whitish with very short hairs.

Machaeranthera viscosa has also been reported in the park.

Goldenrod (*Solidago*).—The true goldenrods are all perennial herbs with alternate leaves and rather numerous but small heads of yellow flowers, both ray and disk. The bracts of the involucre are arranged in two or more series and the pappus is composed of dull white bristles. The nine species that have been identified in the park may be distinguished in the following manner:

1. Plants smooth or nearly so. 2.
1. Plants hairy, at least on the upper parts. 7.
2. Leaf blades not triple-veined. 3.
2. Leaf blades triple-veined. 4.
3. Plants usually less than a foot high.
Heads rather large with numerous rays.
Solidago corymbosa.
3. Plants usually more than a foot high.
Heads smaller with 8 to 10 rays.
Solidago dilatata.
4. Plants usually less than 16 inches high. 5.
4. Plants usually more than 16 inches high. 6.
5. Stems tufted, often numerous. *Solidago concinna*.
5. Stems not tufted, often single. *Solidago missouriensis*.
6. Leaves broad and sharply toothed. **November goldenrod (*Solidago serotina*)**.
6. Leaves narrower and entire or only sparingly toothed. *Solidago elongata*.
7. Plants usually less than a foot high. *Solidago nana*.
7. Plants usually more than a foot high. 8.
8. Leaves entire. *Solidago pulcherrima*.
8. Leaves toothed, at least the lower ones. *Solidago canadensis*.

Oreastrum haydeni is a low plant with basal leaves and leafless flowering stems 2 to 4 inches high, each bearing a single head. The smooth, nerveless leaves vary from spatula-shaped to narrowly linear and are 1 to 3 inches long. The ray flowers are purple and quite numerous.

Ionactis alpina is another low plant, but the leaves are equally distributed along the stems instead of being basal. The clustered, rigid stems are 3 to 6 inches high, and each is terminated by a solitary



FIGURE 101.—Goldenrod. Yellow.
Copyright, J. E. Haynes.

head. The narrow, rigid leaves are entire and one-nerved, and usually less than half an inch long. The ray flowers are light violet.

Fleabane (*Erigeron*).—The fleabanes can usually be distinguished from the asters by the fact that the bracts of the involucre are in only 1 or 2 rows instead of several. Usually the ray flowers are narrower and more numerous. Nineteen species have been identified in the park, and these may be distinguished by means of the following key:

1. Rays inconspicuous and very short. 2.

1. Rays conspicuous, longer than the width of the disk. 4.

2. Plants usually more than a foot high. Stem usually purplish and solitary.

Erigeron lapiluteus.

2. Plants usually less than a foot high.

Stems usually several, green. 3.

3. Leaves narrow, at least some of them linear. *Erigeron lonchophyllus*.

3. Leaves broader, none of them linear.

Erigeron acris.

4. Plants usually more than a foot high. 5.

4. Plants usually less than a foot high. 9.

5. Ray flowers rather broad, giving the appearance of an aster. **Alaska fleabane (*Erigeron salsuginosus*).**

5. Ray flowers narrow and numerous. 6.

6. Upper stem leaves greatly reduced in size. *Erigeron asper*.

6. Upper stem leaves not much reduced in size. 7.

7. Leaves few and far apart. *Erigeron superbus*.

7. Leaves more numerous. 8.

8. Bracts of the involucre smooth. *Erigeron macranthus*.

8. Bracts of the involucre hairy. **Oregon fleabane (*Erigeron speciosus*).**

9. Rays yellow. *Erigeron luteus*.

9. Rays white. 10.

9. Rays violet or purple. 12.

10. Leaves 2 or 3 times ternate. *Erigeron compositus*.

10. Leaves simple. 11.

11. Leaves all entire, mostly linear. *Erigeron pumilis*.

11. Leaves somewhat broader, the lower ones toothed. *Erigeron ramosus*.

12. Stems mostly unbranched and bearing a single head. 13.

12. Stems branched and bearing several heads. 15.

13. Involucre woolly. *Erigeron uniflorus*.

13. Involucre not woolly. 14.

14. Stems usually less than 4 inches high. Leaves all narrow, mostly linear. *Erigeron radicans*.

14. Stems usually more than 4 inches high. Leaves somewhat broader. *Erigeron ursinus*.



FIGURE 102.—Oregon fleabane. Blue or violet. Photograph by A. R. Sweetser.

15. Leaves clasping by a heart-shaped base. *Erigeron philadelphicus*.
15. Leaves not clasping by a heart-shaped base. 16.
16. Leaves mostly linear and less than an inch long. *Erigeron divergens*.
16. Leaves broader and more than an inch long. 17.
17. Leaves 3-nerved. Rays blue or violet. *Erigeron corymbosus*.
17. Leaves 1-nerved. Rays pinkish. *Erigeron caespitosus*.

In addition to the above species *Erigeron howellii*, *E. microlonchus*, and *E. minor* have been reported as occurring in the park.

Pussytoes or Everlasting (*Antennaria*).—More or less woolly or white-hairy plants with alternate leaves and usually a number of rather small heads. There are no ray flowers, and the disk flowers are whitish so that the heads are usually not very conspicuous. They are found at all elevations but are especially abundant above timberline. Many of the species are very much alike in general appearance, but those found in the park may be distinguished by anyone wishing to do so by means of the following key :

1. Plants not spreading by leafy stolons or short runners. 2.
1. Plants spreading by leafy stolons or short runners. 3.
2. Plants more than a foot high. Bracts of the involucre somewhat woolly. *Antennaria pulcherrima*.
2. Plants 4 to 10 inches high. Bracts of the involucre nearly smooth. *Antennaria oblanceolata*.
2. Plants less than 4 inches high, forming dense tufts or mats. *Antennaria dimorpha*.
3. Leaves more than an inch long. *Antennaria racemosa*.
3. Leaves less than an inch long. 4.
4. Tips of the involucre bracts green or brown. 5.
4. Tips of the involucre bracts rose color. 7.
4. Tips of the involucre bracts white. 8.
5. Stems less than 3 inches high, very slender. *Antennaria media*.
5. Stems more than 3 inches high. 6.
6. Leaves woolly. *Antennaria reflexa*.
6. Leaves white-hairy but not woolly. *Antennaria umbrinella*.
7. Leaves nearly oblanceolate and sharp-pointed. Pink pussytoes (*Antennaria rosea*).
7. Leaves spatula-shaped, blunt-pointed. *Antennaria concinna*.
8. Stems scarcely more than 4 inches high. Leaves usually folded lengthwise. *Antennaria arida*.
8. Stems usually more than 4 inches high. Leaves not folded. 9.
9. Leaves narrowly oblanceolate. *Antennaria corymbosa*.
9. Leaves spatula-shaped. *Antennaria parvifolia*.



FIGURE 103.—Pussytoes or Everlasting. Whitish. Photograph by Joseph S. Dixon, National Park Service.

Antennaria aprica and *A. lanata* have also been reported as occurring in the park.

Pearl everlasting (*Anaphalis margaritacea*).—A white-woolly, perennial herb with small heads of yellow disk flowers but no ray flowers. It commonly grows 10 to 20 inches high with the stems in clusters and is very leafy. The leaves are lance-shaped and 2 to 4 inches long and the broader ones are indistinctly three-nerved. The heads are numerous and the involucre are pearly white.

Cudweed (*Gnaphalium wrightii*).—This is a very woolly plant that is quite common on the hot springs formations. The stems are 4 to 8 inches high and usually considerably branched. The leaves are sessile, the basal ones oblanceolate and more than an inch long, while those on the stem are smaller and vary to linear. The heads are sessile in small, close clusters at the ends of the branches. The bracts are dull white.



FIGURE 104.—Pearl everlasting. White.
Photograph by Joseph S. Dixon, National Park Service.

Gnaphalium chilense has been reported in the park.

Sumpweed (*Iva axillaris*).—A low, rather coarse herb with stems 4 to 6 inches high and thickish, entire, sessile leaves, which are oblong or nearly linear and a quarter of an inch or more long. The small heads of greenish-white flowers are borne singly in the axils of the upper leaves. There are no ray flowers and no pappus, but there are chafflike bracts between the disk flowers. The bracts of the involucre are few in number and they are grown together in such a way as to form a 4- or 5-lobed cup.

Niggerthumb (*Rudbeckia occidentalis*).—A nearly smooth, stout plant with stems 2 to 7 feet high and nearly unbranched, except at the top. The alternate leaves are ovate to lance-shaped, rather long-pointed, entire or nearly so, and 4 to 8 inches long. The upper ones are sessile with rounded or heart-shaped bases, while the lower ones have short, winged petioles. The heads are few in number but large and many-flowered. There are no ray flowers and the disk flowers are brownish and have brown, chaffy scales between them. The heads are 1 or 2 inches long. Found mostly in moist, shady places.

Balsamroot (*Balsamorhiza sagittata*).—A low plant with thick, deep roots that are said to have been used by the Indians as food. The leaves are mostly basal and the flowering stems, almost leafless, bear large, solitary heads of yellow flowers, both ray and disk. Both



FIGURE 105.—Balsamroot. Yellow. Copyright, J. E. Haynes.



FIGURE 106.—White mule-ears. White. Copyright, J. E. Haynes.

stems and leaves are more or less white-hairy, and the involucre is somewhat woolly. The blades of the basal leaves are spear-shaped, 4 to 12 inches long and 4 to 6 inches broad at the base, and the petiole

is often more than a foot long. The flowering stems become about a foot high. The ray flowers are 1 or 2 inches long.

Balsamorhiza incana is densely white-hairy all over and the leaves are pinnately lobed.



FIGURE 107.—Sunflower. Yellow. Copy-right, J. E. Haynes.

White mule-ears (*Wyethia helianthoides*).—The hairy stems of this species are 8 to 16 inches high and unbranched, and each one usually bears a single, large head with yellow disk flowers and white ray flowers. The leaves are alternate, oval or lance-shaped, entire or nearly so, 4 to 8 inches long, and most of them are narrowed into a short, margined petiole. The heads are about an inch high, and the narrow, leaflike bracts of the involucre are numerous. Each flower is partly enclosed by a chaffy bract about as long as the flower. The ray flowers are nearly 2 inches long.

Common sunflower (*Helianthus annuus*).—This is the plant from which the large, cultivated sunflower originated. The hairy stems are 3 to 6 feet tall and more or less branched, and the leaves are mostly alternate with blades broadly

ovate, 3 to 12 inches long, and toothed. The heads are large and conspicuous, the disks 1 or 2 inches broad, and the rays usually more than an inch long. The ray flowers are brownish or purple.

Helianthus nuttallii usually grows about 3 feet high and the lowermost leaves are opposite, but the others are alternate. They are lance-shaped and vary from 3 to 6 inches long. The ray flowers and the disk flowers are yellowish brown.

Prairie sunflower (*Helianthus scaberrimus*), which has very firm, thick, rough leaves, has been reported as occurring in the park.



FIGURE 108.—Sunflower. Yellow. Photograph by Dr. Harvey E. Stork.

Helianthus annuus is an annual with lower leaves mostly alternate, broadly ovate and more or less heart-shaped at the base. The other two species are perennials.

Helianthella quinquenervis.—Although *helianthella* means little sunflower, this plant is not very little. In fact, it is about as large as many of the true sunflowers. It grows 2 to 4 feet high and its lance-shaped leaves are 4 to 12 inches long and are mostly opposite. The uppermost leaves are sessile while the lowermost have long petioles. The yellow disk is about an inch across, and the pale yellow ray flowers are more than an inch long.

Helianthella uniflora is only about half as large, and the disk is purple.

Helianthella douglasii has also been reported in the park.

Tarweed (*Madia glomerata*).—A somewhat sticky and rather heavy-scented plant. The rigid stems are 8 to 20 inches high, quite hairy, and very leafy. The leaves are narrowly linear and alternate. The heads are borne in a more or less spherical cluster and are few-flowered. There are usually 2 to 5 ray flowers and about the same number of disk flowers, both yellow, but sometimes there are no ray flowers at all. The involucre is somewhat angled because of the narrow backs of the bracts, and on the receptacle there is a single row of bracts which enclose the flowers as a sort of inner involucre. The akenes are narrow and more or less angled. There is no pappus.

Eriophyllum integrifolium.—A low, woolly plant with clustered stems, 4 to 12 inches high, and alternate, spatula-shaped leaves which are either entire or 3-lobed. The heads have rather long stems and contain a relatively small number of both ray and disk flowers, both of which are yellow. The involucre is cylindrical and consists of 6 or 8 narrowly oblong bracts. The pappus consists of several scales and the akenes are narrow, more or less angled and smooth.

Brides-bouquet (*Chaenactis douglasii*).—This plant has stems 4 to 16 inches high and alternate leaves which are twice pinnately dissected into crowded, short lobes. The heads consist of white or pinkish disk flowers with no ray flowers. The entire plant is whitish with a fine, white down.

Gaillardia (*Gaillardia aristata*).—A more or less hairy plant, 20 to 30 inches high, with alternate, lance-shaped or spatula-shaped leaves which vary from entire to toothed or lobed. The heads are large and contain both ray and disk flowers both of which are yellow, although the disk flowers are apt to turn brown. The ray flowers are an inch or more long and are 3-toothed or 3-lobed at the end. The lobes of the disk flowers are tipped with sharp points which are covered with beaded hairs. The bracts of the involucre are in 2 or 3 series and are quite hairy. The pappus is conspicuous, longer than

the akenes, and consists of 5 to 10 transparent scales the midribs of which are prolonged to form awnlike tips. The akenes are covered with long hairs.

Yarrow (*Achillea lanulosa*) is common throughout the Northern Hemisphere and has a strong and characteristic odor. In fact, the plant can be recognized by its odor alone after one has become familiar with it. It grows 8 inches to 2 feet high and has alternate leaves that are twice pinnately dissected into very small and narrow divisions. The heads are relatively small and contain few ray flowers and a somewhat larger number of disk flowers, both white. The bracts of the involucre are whitish with a greenish center. The akenes are linear or oblong and there is no pappus.



FIGURE 109.—Gaillardia. Yellow. Photograph by A. R. Sweetser.



FIGURE 110.—Big sagebrush. Yellowish white. Copyright, J. E. Haynes.

Oxeye daisy (*Chrysanthemum leucanthemum*).—This is a European plant which has become naturalized in the United States and is very common in many places in the East. It is not common in the park, but is occasionally found. It is a smooth herb, 1 to 2 feet high, with toothed or pinnately lobed leaves which are spatula-shaped, but become smaller and narrower higher up on the stem. Most of

those on the stem are sessile while the basal ones are petioled. The heads are broad and flat with yellow disk flowers and white ray flowers, about an inch long. There is no pappus.

Wormwood and Sagebrush (*Artemisia*).—The various species of *Artemisia* are, in most cases, very aromatic and have alternate leaves and small, inconspicuous heads of yellow or yellowish-white disk flowers. There are no ray flowers and the disk flowers have no pappus. The bracts of the involucre are in several series. The herbaceous species are called wormwood and the woody ones are called sagebrush. The species found in the park may be distinguished by means of the following key:

1. Shrubs. 2.
1. Herbs. 4.
2. Leaves linear and entire or nearly so. **Silver sagebrush** (*Artemisia cana*).
2. Leaves cleft into 3 long, linear segments. *Artemisia trifida*.
2. Leaves 3-toothed or lobed at the apex. 3.
3. Plants dwarf, usually less than a foot high. **Low sagebrush** (*Artemisia arbuscula*).
3. Plants usually more than a foot high. **Big sagebrush** (*Artemisia tridentata*).
4. Leaves entire or the lower somewhat toothed or lobed. 5.
4. Leaves once or twice pinnately or ternately divided. 7.
5. Plant dark green and smooth. **False tarrogon** (*Artemisia aromatica*).
5. Plant white or silvery hairy. 6.
6. Heads small and numerous. **Cudweed sagebrush** (*Artemisia gnaphalodes*).
6. Heads one-fourth inch or more in diameter and few. *Artemisia paucicephala*.
7. Stems smooth or nearly so. 8.
7. Stems silky-hairy. 9.
8. Foliage with odor of sage. *Artemisia canadensis*.
8. Foliage without odor. *Artemisia biennis*.
9. Heads large, one-fourth to one-half inch broad, and few. *Artemisia scopulorum*.
9. Heads small, one-fifth of an inch or less broad. 10.
10. Plants dwarf, 2 to 5 inches high. *Artemisia pedatifida*.
10. Plants 8 to 12 inches high. **Fringed wormwood** (*Artemisia frigida*).

In addition to the above species **Sagebrush** (*Artemisia discolor*) and *A. subglabra* have also been reported as occurring in the park.

Arnica (*Arnica*).—The arnica is an herb with opposite leaves and comparatively large heads of yellow flowers. All but one species found in the park have conspicuous ray flowers. The pappus consists of rather numerous, rigid, hairlike bristles. Ten species have been identified in the park and they are distinguished as follows:

1. Heads without ray flowers. *Arnica parryi*.
1. Heads with ray flowers. 2.
2. At least some of the leaves with heart-shaped base. 3.
2. None of the leaves with heart-shaped base. 6.
3. Plants usually less than a foot high. 4.
3. Plants usually more than a foot high. 5.
4. Leaves smooth. *Arnica gracilis*.

4. Leaves more or less hairy. *Arnica pumila*.
5. Stems and leaves somewhat hairy. *Arnica cordifolia*.
5. Stems and leaves smooth or nearly so. *Arnica ventorum*.
6. Stems leafy below but nearly leafless upward. *Arnica fulgens*.
6. Stems leafy throughout. 7.
7. Plants usually growing single, not in clumps or mats. 8.
7. Plants growing in clumps or mats. 9.
8. Leaves more or less toothed. Heads rather large. *Arnica mollis*.
8. Leaves entire. Heads smaller. *Arnica foliosa*.
9. Leaves more than 2 inches long, 5 or 6 pairs on the stem. *Arnica longifolia*.
9. Leaves 1 or 2 inches long, 3 or 4 pairs on the stem. *Arnica rydbergii*.

Arnica subplumosa has also been reported in the park.

Tetradymia inermis.—A low shrub with a much branched, woody base and numerous herbaceous stems that are 3 to 6 inches long. These young stems, as well as the leaves, are clothed



FIGURE 111.—*Arnica*. Yellow. Photograph by Joseph S. Dixon, National Park Service.



FIGURE 112.—Groundsel. Yellow. Copyright, J. E. Haynes.

with dense whitish woolly hairs. The numerous leaves are narrowly oblong with tapering ends, nearly sessile, and an inch or less in length. The heads are very compact terminal clusters of 10 to 20 each with bractlike leaves between them. The heads have only 4 disk flowers and 4 bracts in the involucre. There are no ray flowers. The pappus is abundant and consists of fine, soft, whitish hairs.

The genus is commonly known as **horsebrush**.

Groundsel (*Senecio*).—The groundsels are herbaceous plants with alternate leaves and heads of yellow flowers, both ray and disk. The bracts of the involucre are in one series and all about equal in length, but sometimes there are one or two rows of outer, extra bracts at the base. The receptacle is flat and there are no chaffy bracts between the flowers. The pappus consists of an abundance of soft, white hairs. Fifteen species have been identified in the park, and these may be distinguished by means of the following key:

1. Leaves or some of them pinnate or pinnately lobed. 2.
1. Leaves not at all pinnate or pinnately lobed. 7.
2. Heads usually solitary. *Senecio subnudus*.
2. Heads several. 3.
3. Leaves fleshy-thickened. *Senecio cymbalarioides*.
3. Leaves not fleshy-thickened. 4.
4. Plants usually less than a foot high. *Senecia mutabilis*.
4. Plants usually more than a foot high. 5.
5. Rays yellow. *Senecio balsamitae*.
5. Rays orange. 6.
6. Basal leaves larger than the others. *Senecio pseudoreus*.
6. Basal leaves small and soon withering. *Senecio longipetiolatus*.
7. Stems nearly equably leafy to the top. 8.
7. Stems few-leaved or with the upper leaves reduced in size. 11.
8. At least some of the leaves triangular in shape. **Arrowleaf butterweed** (*Senecio triangularis*).
8. None of the leaves triangular in shape. 9.
9. Leaves entire or nearly so. *Senecio crassulus*.
9. Leaves toothed. 10.
10. Stems more than 2 feet high. **Serra butterweed** (*Senecio serra*).
10. Stems less than a foot high. *Senecio fremontii*.
11. Stems more than 2 feet high. *Senecio hydrophilus*.
11. Stems less than 2 feet high. 12.
12. Leaves entire or nearly so. 13.
12. Leaves toothed. 14.
13. Plant smooth or nearly so. Bracts of the involucre with conspicuous black tips. *Senecio glaucescens*.
13. Plant densely white-woolly. Bracts of the involucre without black tips. **Woolly groundsel** (*Senecio canus*).
14. Plants less than 2 feet high. *Senecio perplexus*.
14. Plants usually more than 2 feet high. *Senecio altus*.



FIGURE 113.—Arrowleaf butterweed. Yellow. Photograph by Dr. Harvey E. Stork.

Senecio hallii and *S. mediocris* have also been reported as occurring in the park.

Elk thistle (*Cirsium foliosum*).—Usually 1 to 2 feet high, somewhat white-woolly and leafy to the top. The leaves are narrowly lance-shaped, toothed, and quite prickly. The heads are nearly 2 inches high, and the pale purple corollas are all alike. They are tubular, but with long, narrow lobes as long as the tubes. This plant has historical interest in the park since its root is edible, and it is said that when Truman Everts was lost in this region for more than a month in 1870, this plant, more than anything else, served to keep him from starving.

Plains thistle (*Cirsium undulatum*) is less woolly, and the stems and leaves are much darker green in color. The heads are only about half as large as those of the elk thistle.

Cirsium tweedyi and **Canada thistle** (*C. arvense*) have also been reported in the park.

Oysterplant (*Tragopogon porrifolius*).—This is a smooth, perennial herb with alternate, grasslike leaves that clasp the stem at the base. It is commonly 20 to 30 inches high and bears large heads of violet-purple flowers that are open only in the morning. The corollas are all alike and strap-shaped and five-toothed at the end. The bracts of the involucre are in a single series and



FIGURE 114.—Elk thistle. Pale purple. Photograph by Dr. Harvey E. Stork.

more or less united at the base. The plant is an escape from cultivation.

Buckbeard (*Tragopogon pratensis*) is similar but the flowers are yellow.

Wirelettuce (*Stephanomeria tenuifolia*) is a smooth, perennial herb with several slender stems 4 to 20 inches high. The leaves are almost grasslike, and the heads are terminal. Each head consists

of five principal bracts and five rose or flesh-colored flowers with strap-shaped corollas. Open only while the sun shines.

Grassleaf (*Ptilocalais nutans*).—A smooth, perennial herb with leaves mostly at the base and heads on rather long stems, nodding when in the bud. The leaves vary from entire to pinnately lobed with long, narrow lobes. The flowering stems are 4 to 12 inches high, and the heads are 8- to 20-flowered. The flowers are yellow and have strap-shaped corollas.

Hawksbeard (*Crepis*).—Herbs with alternate or nearly all basal leaves and small or medium-sized heads of yellow flowers all with strap-shaped corollas. The principal bracts of the involucre are in one series and the pappus consists of numerous soft, white bristles.

Crepis elegans branches considerably and bears several small heads on each stem. The basal leaves are entire or nearly so and spatula-shaped while those on the stem are lance-shaped or linear.

Crepis glauca grows 8 inches to 2 feet high, is smooth and waxy throughout, and has all the leaves basal or only 1 or 2 on each stem. The leaves are 2 to 6 inches long and vary from spatula-shaped to egg-shaped and from entire to toothed or lobed. The heads are from $\frac{1}{2}$ to 1 inch broad and not very numerous.

Crepis acuminata grows 1 to 3 feet high. The lower leaves are 6 to 10 inches long, broadly lance-shaped in outline, but pinnately lobed into narrow lobes and narrowed at the base into a petiole, and at the other end into a taillike prolongation about 3 inches long. The involucre consists of 5 to 8 smooth, bright green, principal bracts and several very small, white-hairy outer ones. The heads are 5- to 10-flowered.

Crepis gracilis is very similar, but is lower and very slender, and the leaves are narrower.

Crepis occidentalis usually has several stout stems coming from a perennial root, but the whole plant is only 4 to 8 inches high. The leaves are rather thick, more or less hairy, and toothed or lobed



FIGURE 115.—Oysterplant. Violet-purple.
Photograph by A. R. Sweetser.

except near the tip. The heads are 10- to 30-flowered and the involucre consist of 8 to 24 principal bracts.

Crepis scopolorum is very similar, but has scattered bristles near the base of the stem.

Crepis runcinata has been reported in the park, but is so nearly similar to *Crepis glauca* as to be scarcely distinguishable.

Crepis subacaulis has also been reported in the park.

Hawkweed (*Hieracium*).—The plants of this genus differ from those of the genus *Crepis* primarily in not having the bracts of the involucre thickened at the base or along the midrib and in having the pappus not pure white, but often quite brown or yellowish.

White hawkweed (*Hieracium albidiflorum*) differs from the other species of the genus in having white flowers. The stems are 2 to 3 feet high and quite leafy near the base but nearly naked higher up. The lower parts of the stems and the leaves are thickly covered with yellowish, bristly hairs. The lower leaves are oblong, 4 to 6 inches long and about an inch or more wide, entire or somewhat toothed and narrowed at the base into a winged petiole. The upper leaves are narrower, varying to linear.

Hieracium gracile grows in clusters and is pale green in color. The slender stems are 8 to 16 inches high and each usually bears several heads of pale yellow flowers. The involucre are blackish-hairy at the base. The leaves are nearly all in basal clusters. They are more or less spatula-shaped, entire or nearly so, and petioled.

Hieracium scouleri.—Rather pale in color but strikingly hairy with long, crisp hairs. The stems are 1 to 2 feet high and very leafy. The leaves are lance-shaped, all sessile except the lowermost, and 2 to 6 inches long. There are rather few heads and the bracts of the involucre are narrowly lance-shaped and in 2 or 3 series, the outer ones successively shorter and all covered with long, bristly hairs.

Hieracium cynoglossoides is similar but the leaves are nearly smooth.

Larkspur lettuce (*Lactuca pulchella*).—A smooth, more or less waxy perennial, usually 1 or 2 feet high, with numerous linear or lance-shaped leaves that vary from entire to toothed or pinnately lobed. The upper leaves are sessile and partly clasping while the lower ones often have winged petioles. The heads are medium-sized and the flowers are blue or violet, all with strap-shaped corollas.

Prickly sowthistle (*Sonchus asper*).—A coarse, smooth, rather stout herb 1 to 5 feet high with prickly-toothed leaves, the upper sessile and clasping. The flowers are all strap-shaped and yellow. The plant is not native here but has been naturalized from Europe.

Troximon.—Herbs with basal leaves and solitary heads of yellow or orange flowers resembling those of the common dandelion. The

heads, like those of the dandelion, are borne on naked stems. This is the genus *Agoseris* of most authors. The five species found in the park may be distinguished as follows:

1. Flowers orange, drying purple. 2.
1. Flowers yellow. 3.
2. Plants usually more than 8 inches high. Leaves with long, slender petioles
Troximon purpureum.
2. Plants usually less than 8 inches high. Leaves sessile or with short petioles.
Troximon aurantiacum.
3. Leaves more or less hairy. *Troximon villosum*.
3. Leaves smooth or nearly so. 4.
4. Leaves distinctly 2-ranked. *Troximon glaucum*.
4. Leaves not 2-ranked. *Troximon parviflorum*.

Dandelion (*Taraxacum officinale*).—This is the common dandelion with which everyone is familiar.

Taraxacum mexicanum is very similar but is usually smaller and the leaves are narrower and have a small terminal lobe.

Taraxacum dumetorum has leaves that are irregularly toothed and cut but not deeply lobed like those of the common dandelion.

Taraxacum scopulorum is a dwarf, alpine plant found only on the highest mountains.

Redseed dandelion (*Taraxacum erythrospermum*) has also been reported in the park.

Macronema grindelioides is a small, much-branched shrub, 4 to 8 inches high, with oblong or spatula-shaped, more or less fleshy leaves and heads of yellow disk flowers and 6 to 12 rather conspicuous ray flowers. The pappus conspicuous of numerous hairlike bristles. The plant is found on high mountain peaks.

Macronema lineare also occurs in the park. It has somewhat the habit and appearance of **rabbitbrush** but the heads contain no ray flowers.

Matricaria matricarioides has been introduced in some parts of the park.

Aplopappus parryi.—A leafy plant $\frac{1}{2}$ to $1\frac{1}{2}$ feet tall, somewhat sticky above. The upper leaves are sessile. The pale yellow flowers are in numerous heads surrounded by an involucre of about 3 moderately unequal ranks.

Aplopappus multicaulis has also been reported in the park. It is very dwarf and tufted, and bears only 3 or 4 leaves and few heads of yellow flowers.

GLOSSARY

- Akene.* A small, dry, one-seeded, indehiscent fruit.
- Alpine.* Above timberline on mountains.
- Alternate.* One leaf at each node or joint of the stem.
- Annual.* Living during one season only.
- Anther.* That part of a stamen that contains the pollen.
- Awn.* A bristlelike appendage.
- Axil.* The upper angle between the leaf and the stem.
- Axillary.* Occurring in an axil.
- Berry.* A fruit that is pulpy or juicy throughout.
- Biennial.* Living for two seasons only.
- Bladdery.* Thin and inflated.
- Bract.* Reduced leaves among or subtending flowers.
- Bulb.* A fleshy bud such as an onion.
- Bulblet.* A small bulb.
- Calyx.* The outermost set of organs of a flower, usually green.
- Capsule.* A dry fruit that opens at maturity.
- Chaff.* Small bracts on the receptacle of flowers of the composite family.
- Corolla.* The set of floral organs next within the calyx, usually not green.
- Disk.* The central region of a head of flowers, such as the sunflower, as opposed to the rays or margin.
- Dissected.* Cut deeply into many lobes or divisions.
- Divided.* Cut deeply into a few lobes or divisions.
- Downy.* Clothed with a coat of soft, short hairs.
- Drupe.* A stone fruit, such as a cherry.
- Elliptical.* Oval or oblong with the ends regularly rounded.
- Entire.* The margin not at all toothed, notched or divided.
- Fertile.* Capable of producing seeds or pollen.
- Free.* Not united with any other parts of the plant.
- Fruit.* The seed-bearing portion of a plant.
- Gland.* A secreting surface or structure.
- Herb.* A plant with no woody parts above ground.
- Herbaceous.* Of the texture, color, or appearance of an ordinary foliage leaf.
- Imperfect flower.* One that lacks either stamens or pistils.
- Involucre.* A set of bracts around a flower or cluster of flowers.
- Lanceolate.* Lance-shaped.
- Legume.* The fruit of a member of the pea family.
- Linear.* Narrow and flat like a grass leaf.
- Membranous.* With the texture of a membrane; thin and more or less translucent.
- Midrib.* The middle or main rib of a leaf.
- Nerve.* A name applied to the veins or ribs of a leaf.
- Node.* A place on a stem where a leaf is borne.
- Ob lanceolate.* Lance-shaped with the tapering end downward.
- Oblong.* Two to four times as long as broad and more or less elliptical in shape.
- Obovate.* Inversely ovate, the broad end upward.
- Opposite.* Two leaves at each node or joint of the stem.
- Oval.* Broadly elliptical.

- Ovate*. Shaped like the longitudinal section through an egg with the broad end downward.
- Ovule*. One of the bodies in the ovary that may develop into a seed.
- Palmate*. The leaflets of a compound leaf all arising from the end of the petiole, like the fingers of the hand.
- Panicle*. An open cluster of flowers like a raceme but more or less compound.
- Pappus*. The hairs, awns, or scales at the base of the corolla or the tip of the fruit in a member of the composite family.
- Pedicel*. The stalk of a flower in a cluster.
- Peduncle*. The stalk of a solitary flower or of a cluster of flowers.
- Perfect flower*. Having both stamens and pistils.
- Perennial*. Living from year to year.
- Perianth*. Calyx and corolla together, especially when they cannot be distinguished.
- Petal*. One of the parts of the corolla.
- Petiole*. The stalk part of a leaf.
- Pinnate*. Leaflets arranged along the main axis of a leaf.
- Pistil*. The seed-bearing organ of a flower.
- Puberulent*. Covered with fine and short, almost imperceptible down.
- Pubescence*. Fine and soft hairs.
- Pubescent*. With pubescence.
- Raceme*. A flower cluster with one-flowered pedicels along the axis of the cluster.
- Ray*. One of the marginal flowers in a head in the composite family.
- Receptacle*. The end of a pedicel or peduncle to which the flowers or flower parts are attached.
- Regular*. The parts of each set of organs of a flower the same size and shape.
- Rhizome*. An underground stem.
- Runner*. A slender and prostrate stem rooting at the end or at the joints.
- Sepal*. One of the parts of the calyx.
- Sessile*. Without any petiole or stalk.
- Shrub*. A small woody plant.
- Simple*. Not compound.
- Sinus*. The notch between two lobes.
- Smooth*. Without hairs or other roughness.
- Spike*. A flower cluster like a raceme but with the flowers sessile.
- Siamen*. A pollen-bearing organ.
- Sterile*. Not capable of producing fruit or pollen.
- Stigma*. The upper end of the pistil which receives the pollen.
- Stipules*. Appendages at the base of the petiole of some leaves.
- Style*. That part of a pistil between the ovary and the stigma.
- Taproot*. A stout, vertical root.
- Ternate*. In 3's.
- Umbel*. An umbrella-shaped flower cluster with a flat top.
- Veins*. The conducting strands in a leaf or other organ.
- Vine*. A trailing or climbing stem.
- Woolly*. Clothed with long, matted, soft hairs.

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