



Seed Plants of
Wupatki and
Sunset Crater
National
Monuments

W. B. McDOUGALL

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COVER

Thistle

Cirsium pulchellum

MUSEUM OF NORTHERN ARIZONA

Bulletin 37

Seed Plants of Wupatki and Sunset Crater National Monuments

With Keys for the Identification of Species

By

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Drawings by

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TABLE OF CONTENTS

Introduction	1
The Names of Plants	1
How to Use the Key	2
Glossary	3
Key to the Seed Plants of Wupatki and Sunset Crater National Monuments	9
Families of Plants, with Keys and Descriptions of Species	14
Index to Family, Generic, and Common Names	62

INTRODUCTION

Sunset Crater National Monument is located about 15 miles north and a little east of Flagstaff, Arizona, on U.S. Highway 89. It contains somewhat more than 3,000 acres and lies mostly between 7,200 and 7,500 ft. elevation. It is occupied mostly by the ponderosa pine type of vegetation. Wupatki National Monument is located about 14 miles farther north on U.S. Highway 89 and contains about 35,000 acres extending from the highway to the Little Colorado River. Elevations vary from about 4,000 to about 5,700 ft. This monument is occupied largely by pinyon-juniper and grassland types of vegetation.

This booklet has two purposes. One is to furnish professional botanists with a complete and scientifically accurate checklist of the 268 seed plants that have been found on the two areas studied. The other is to enable anyone, whether with or without botanical training, to answer the question, "what is that plant?" To this end I have avoided technical language so far as possible. When it has been found necessary to use a technical word, it is defined in the glossary beginning on page 3. In addition, a drawing of the plant part in question is provided to show what it is like.

Most plants are quite widespread in their distribution. Therefore, although this booklet was prepared only for the plants found in Wupatki and Sunset Crater National Monuments, it will be found useful for identifying plants for many miles in all directions from these monuments. Naturally, however, the farther one gets from the areas studied the more plants will be found that are not included in the booklet.

THE NAMES OF PLANTS

In addition to a common name each plant has a scientific name which ordinarily consists of two words, a generic or genus name and a specific or species name. Thus the name of the alligator juniper is *Juniperus deppeana*, *Juniperus*, being the genus name which is applied to all junipers and *deppeana* the species name which is applied only to the alligator juniper. Other junipers have other species names. The one-seed juniper, for example, is *Juniperus monosperma*. In a few cases the name will be found to consist of three words to show that the plant is a variety of a species. *Opuntia compressa* var. *macrorhiza*, for example, indicates that this pricklypear is a variety of the species *compressa*.

Many of the plants of Arizona have never been given common names. In such cases the genus name is ordinarily used as a common name. Common names are often confusing because the same name may be used for wholly unrelated plants in different localities or the same plant may be known by several different names. The scientific name, on the other hand, is applied to only one kind of plant and it can be understood by botanists anywhere in the world even though they may be wholly unfamiliar with the English language. Some scientific names may seem like "jawbreakers" but that is only because they are unfamiliar. *Opuntia*, for example, is certainly no more difficult than chrysanthemum or hippopotamus but it may be more difficult to pronounce or remember because it is less familiar. However, if you wish you can disregard the scientific names entirely and still have just as much fun identifying plants.

HOW TO USE THE KEY

Two hundred sixty-eight different kinds of plants are described in this booklet. Obviously, if it were necessary to search through the entire lot every time we wished to learn the name of a plant, identification would be difficult. Therefore, keys have been provided to aid us in finding the correct names of the plants in which we are interested. With a little practice in the use of keys we should be able to find the name of any plant that is included in the booklet. At each step in the key there are two or more alternatives to choose from and we must decide which alternative fits the plant that we want to identify. 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 keys are to be used let us take an example. Suppose that on a bright, sunny morning in July we are loitering along the entrance road in Sunset Crater National Monument when we see a herbaceous plant about a foot high with numerous, short, linear leaves and several bright blue flowers, each about an inch across. A close examination of the flower shows that it has 5 sepals, 5 separate petals, 5 stamens, and 1 pistil with 5 styles. We note also that the ovary of the pistil is easily seen to be above the place of attachment of the sepals and petals. That is, it is superior. We are now ready to use the key.

Turning to the beginning of the key on page 9 we are at once confronted with 2 alternatives. These are "Woody plants (trees and shrubs)" and "Non-woody plants herbs." Since our plant is not at all woody we readily chose the second alternative which is followed by the number 22. This means that our next step in the key is number 22 and we can skip numbers 2 to 21. At 22 we again have 2 alternatives and since our plant has an abundance of green leaves we again choose the second alternative which takes us to 25. In a similar manner we pass to 26, 28, 29, 32, 37, 43, 50, 51, 54 where we choose the first of 3 alternatives, and 55. Our plant has blue flowers and is about a foot high as stated in the first alternative under 55. This alternative is not followed by a key number but by the name of the blue flax. If we have not made any mistake this should be the name of our plant and since the name is followed by a page number we will turn to that page and by reading the brief description we will readily decide that our plant is the blue flax.

In some cases the key will lead us to the name of the family to which our plant belongs instead of to the individual species. If there are not more than 2 or 3 species in the family we can simply read the descriptions of them and decide which is our plant. If there are more than 2 or 3 species in the family we will find a key to the species of that family. That key should be used in the same way that we have used the general key and it will lead us to the name of our plant.

GLOSSARY

- ACORN. The nutlike fruit of oak trees and shrubs.
- AKENE. A small, dry, hard, 1-seeded fruit.
- ALTERNATE. Not opposite. One in a place at different levels on the axis (Fig. 1).
- ANNUAL PLANT. A plant that completes its life cycle within one growing season.
- ANTHER. The pollen bearing part of a stamen (Fig. 2).
- AWN. A bristlelike appendage, especially on the spikelets of grasses and the akenes of composites (Fig. 3).
- AXIL. The upper angle between a leaf and a stem (Fig. 1).
- AXILLARY. Borne in an axil.
- AXIS. The central structure about which organs are borne, such as that part of a spike which bears the flowers.
- BASAL. At or very near the base of a stem.
- BEAK. A narrow projection such as occurs at the end of some akenes (Fig. 2).
- BEARDED. Bearing hairs.
- BERRY. A fleshy fruit such as a grape or a currant.
- BLADE. The expanded portion of a leaf (Fig. 1).
- BRACT. A modified and reduced leaf subtending a flower or a cluster of flowers (Fig. 2).
- BUSHY. Widely branched like a bush.
- CALYX. The outermost set of organs of a complete flower (Figs. 2,3).
- CAPSULE. A dry fruit developed from a compound ovary and thus having more than one cell. Opening at maturity (Fig. 3).
- CATKIN. A modified spike in which the flowers are all of one sex, either male or female.
- CHAFFY. Like chaff. Applied to the dry scales often found between the flowers of a composite head (Fig. 2).
- CLASPING. Embracing the stem. Applied to the bases of some sessile leaves (Fig. 1).
- COMPOSITE. A member of the composite family in which several or many flowers are together on one receptacle.
- COMPLETE FLOWER. A flower that has sepals, petals, stamens, and one or more pistils (Fig. 2).
- COMPOUND LEAF. A leaf which has the blade divided into leaflets (Fig. 1).
- CONE. The fruit of cone-bearing trees such as pines.
- COROLLA. The set of floral organs next within the calyx. Usually not green (Fig. 2).
- DISK. The central portion of the head of a composite as distinguished from the rays (Fig. 2).
- DISK FLOWER. A flower of the composite family that has a tubular corolla (Fig. 2).
- DISSECTED. Deeply cut or lobed into many fine divisions.
- ENTIRE LEAF. A leaf with the blade neither toothed nor lobed (Fig. 1).
- FEATHERY. Having fine hairs like a feather.

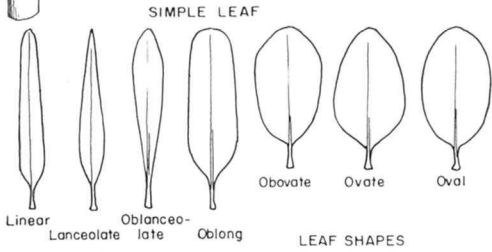
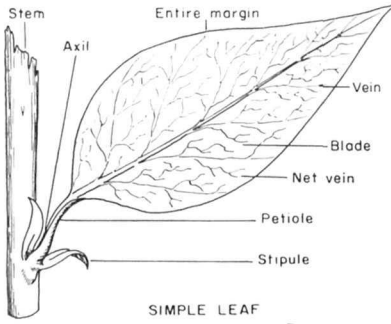


Figure 1

FEMALE FLOWER. A flower having one or more pistils but no stamens.
A pistillate flower.

FLORET. A grass flower together with its lemma and palea (Fig 3).

GLANDULAR. Bearing secreting structures, sometimes making the plant or plant part sticky.

GLUME. One of the two empty bracts at the base of a grass spikelet (Fig. 3).

HERBACEOUS PLANT. A plant with no woody stem above ground.
A herb.

IMPERFECT FLOWER. A flower that lacks either stamens or pistils.

INFERIOR OVARY. An ovary that is below the place of attachment of the sepals and petals (Fig. 2).

IRREGULAR FLOWER. A flower in which the petals are not all the same size and shape (Fig. 3).

INVOLUCRE. A circle of bracts around a flower or cluster of flowers, such as the head of a composite (Fig. 2).

KEEL. The two lowest, more or less united, petals of a flower of the pea family (Fig. 3).

LANCEOLATE. Shaped like a lance head (Fig. 1).

LEAF. One of the primary organs of a plant (Fig. 1).

LEAFLET. One of the divisions of a compound leaf (Fig. 1).

LEMMA. The lower of the two bracts enclosing the flower of a grass (Fig. 3).

LOBED LEAF. A leaf with the blade lobed (Fig. 1).

MALE FLOWER. A flower having stamens but no pistil. A staminate flower.

NERVE. An unbranched vein.

NET VEINED. The veins of a leaf arranged like a net (Fig. 1).

NODE. The place on a stem where one or more leaves are attached.

OBLANCEOLATE. Lanceolate with the narrowest part toward the attached end (Fig. 1).

OBLONG. Broader than linear but with the sides nearly parallel (Fig. 1).

OBOVATE. Shaped like the longitudinal section through an egg and attached at the small end (Fig. 1).

OPPOSITE. Arranged at the same level on opposite sides of an axis (Fig. 1).

OVAL. Broadly elliptical (Fig. 1).

OVARY. The lower part of the pistil which contains the ovules (Fig. 2).

OVATE. Shaped like the longitudinal section through an egg and attached at the large end (Fig. 1).

PALEA. The upper of the two bracts which enclose a grass flower (Fig. 3).

PALMATE. Arranged, or projecting, from a common base, like the fingers of a hand.

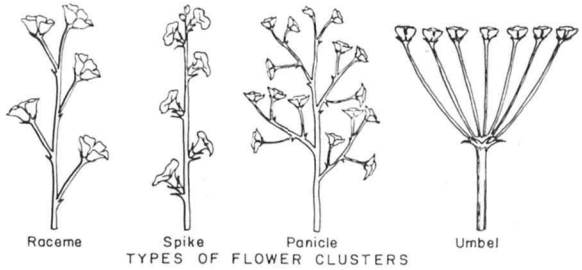
PALMATELY COMPOUND LEAF. A compound leaf with the leaflets palmate (Fig. 1).

PALMATELY LOBED LEAF. A leaf with the lobes palmate (Fig. 1).

PANICLE. A compound flower cluster with the flowers stalked (Fig. 2).

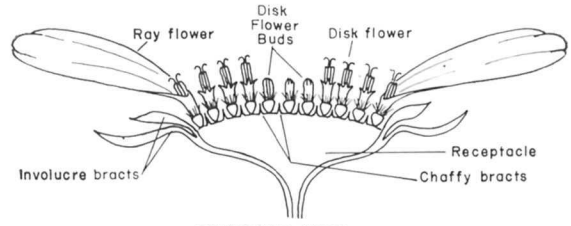
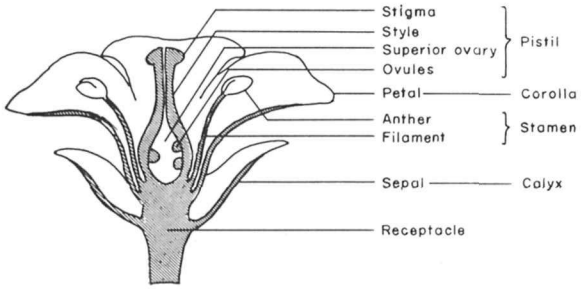
PAPPUS. The modified calyx of a composite flower (Fig. 2).

PARALLEL VEINED LEAF. A leaf with the main veins extending lengthwise of the leaf and nearly parallel (Fig. 1).

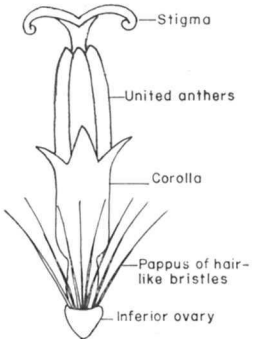


TYPES OF FLOWER CLUSTERS

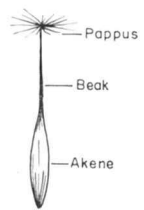
COMPLETE PERFECT REGULAR FLOWER



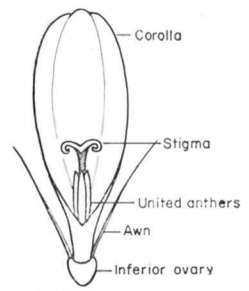
COMPOSITE HEAD



DISK FLOWER



AKENE WITH BEAK



RAY FLOWER

Figure 2

PERENNIAL PLANT. A plant that continues to live and grow through more than one growing season.

PERFECT FLOWER. A flower having both stamens and pistils (Fig. 2).

PETAL. One of the parts of a corolla (Fig. 2).

PETIOLE. The stalk part of a leaf (Fig. 1).

PINNATE. Arranged like the pinnae of a feather.

PINNATELY COMPOUND LEAF. A leaf with the leaflets pinnate (Fig. 1).

PINNATELY LOBED LEAF. A leaf with the lobes pinnate (Fig. 1).

PISTIL. The female organ of a flower (Figs. 2, 3).

PISTILLATE. Having pistils but not stamens.

RACEME. A simple flower cluster with the flowers stalked (Fig. 2).

RAY FLOWER. A composite flower with a strap-shaped corolla (Fig. 2).

RECEPTACLE. The upper end of a flower stalk upon which numerous flowers or the organs of a single flower are borne (Fig. 2).

REGULAR FLOWER. A flower having the petals, whether distinct or united, all the same size and shape (Fig. 2).

SCALE. The bract subtending the flower or fruit of a sedge (Fig. 1).

SCALLOPED. Applied to a leaf margin that is deeply wavy (Fig. 1).

SEPAL. One of the parts of a calyx (Fig. 2).

SESSILE. Without a stalk.

SHEATH. That part of a leaf which envelopes a stem (Fig. 1).

SIMPLE LEAF. A leaf that is not compound (Fig. 1).

SINUS. The cleft or indentation between two lobes.

SPIKE. A simple, elongated flower cluster with the flowers sessile (Fig. 2).

SPIKELET. A unit of a grass flower cluster, usually consisting of 2 glumes and 1 or more florets (Fig. 3).

SPUR. A hollow projection of a flower part (Fig. 3).

STAMEN. The male organ of a flower (Fig. 2, 3).

STAMINATE FLOWER. A flower having stamens but no pistil.

STERILE. Unproductive, as a flower without pistils or a stamen without an anther.

STIGMA. That part of a pistil which receives the pollen (Fig. 2).

STIPULES. Appendages at the base of the petiole of some leaves (Fig. 1).

STYLE. That portion of the pistil between the ovary and the stigma (Fig. 2).

SUBTEND. Under or supporting, as a bract or leaf subtends a flower that is borne in its axil.

SUPERIOR OVARY. An ovary that is above the place of attachment of the sepals and petals (Fig. 2).

TENDRIL. A modified stem, leaf or leaflet that serves as a climbing organ (Fig. 1).

TERMINAL. At the upper end.

TOOTHED LEAF. A leaf with teeth along the margin (Fig. 1).

UMBEL. A flat-topped flower cluster with the flower stalks all attached at the same level, like the ribs of an umbrella (Fig. 2).

WHORLED. Arranged in a circle around the stem (Fig. 1).

WING. One of the lateral petals of a pea flower. Also any expanded portion of a fruit or stem (Fig. 3).

WOODY PLANT. A plant that has a woody stem above ground.

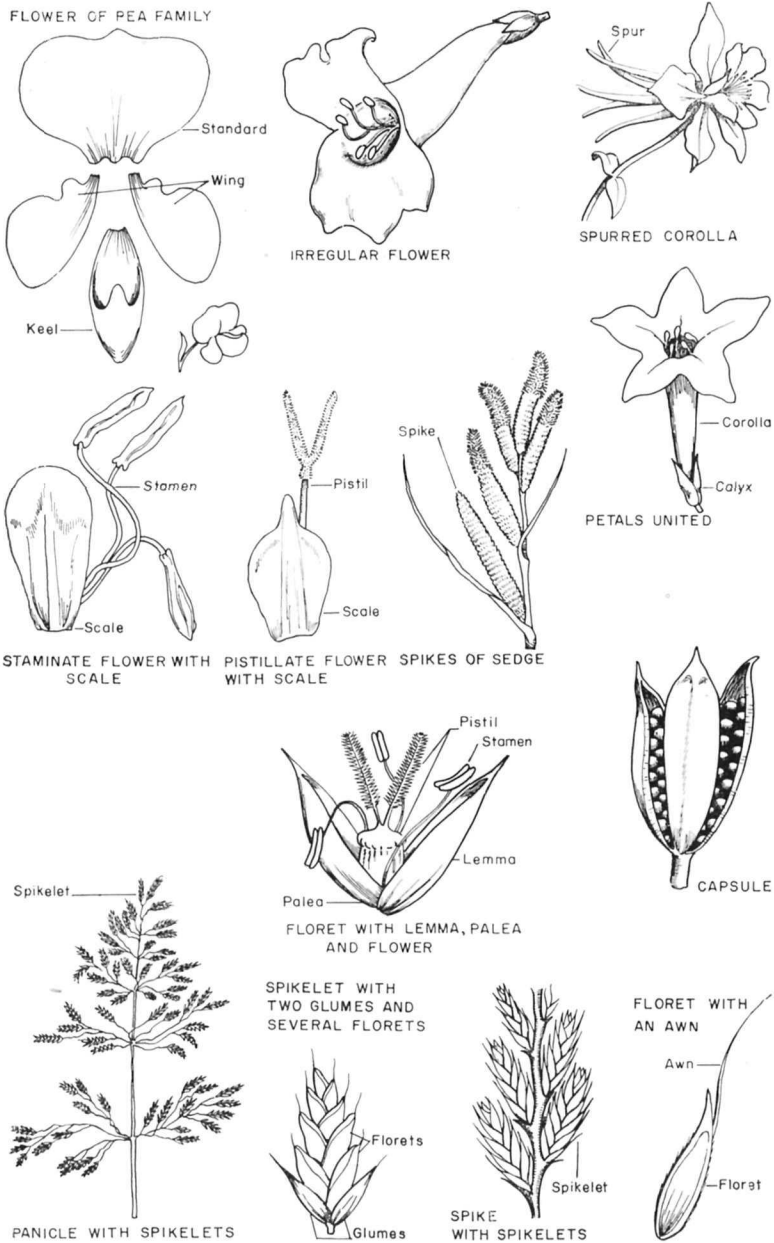


Figure 3

KEY TO THE SEED PLANTS OF WUPATKI AND SUNSET CRATER NATIONAL MONUMENTS

1. Woody plants (trees and shrubs). 2.
Non-woody plants (herbs). 22.
2. Leaves needlelike or very narrow, arranged spirally or in 2's,
3's, or 5's, never opposite or alternate.
PINE FAMILY (PINACEAE).....14
Leaves scalelike. 3.
Leaves neither needlelike nor scalelike, arranged opposite or
alternate or all basal. 6.
3. Trees or large shrubs; scales crowded and overlapping. 4.
Low or medium-sized shrubs; scales not crowded or overlapping. 5.
4. Flowers very small and numerous, conspicuous, pink to nearly
white, fruit a capsule.
TAMARIX (*Tamarix pentandra*).....39
Flowers greenish, inconspicuous; fruit a berrylike cone.
CYPRESS FAMILY (CUPRESSACEAE).....14
5. Scales alternate; plant somewhat fleshy.
LODINEBUSH (*Allenrolfea occidentalis*)25
Scales opposite or in whorls of 3; plant not fleshy.
JOINTFIR FAMILY (EPHEDRACEAE).....15
6. Leaves compound. 7.
Leaves simple. 10.
7. Leaflets spiny-toothed; plants low; flowers yellow.
CREEPING MAHONIA (*Berberis repens*)28
Leaflets not spiny-toothed. 8.
8. Leaves with 3 leaflets; petals purple; leaves and stems without
gland dots.
SKUNKBUSH (*Rhus trilobata*).....38
Leaves with more than 3 leaflets; leaves and stems with gland dots. 9.
9. Petals purple; plant low.
INDIGOBUSH (*Dalea whitingi*)35
Petals none; plant up to 3 feet high.
DUNE BROOM (*Parryella filifolia*)36
10. Flowers in heads surrounded by involucre of bracts.
COMPOSITE FAMILY (COMPOSITAE).....51
Flowers not in heads surrounded by involucre of bracts. 11.
11. Plants parasitic on the stems of juniper.
MISTLETOE (*Phoradendron juniperinum*)23
Plants not parasitic on the stems of juniper. 12.
12. Leaves all basal, parallel-veined.
YUCCA (*Yucca navajoa*).....22
Leaves not all basal, net-veined. 13.
13. Leaves opposite or clustered at the ends of the branches.
WILD-OLIVE (*Forestiera neomexicana*).....41
Leaves alternate. 14.
14. Leaves and the smaller stems woolley. 15.
Leaves and stems smooth or hairy or scaly or meally but not
woolley. 16.

KEY TO THE SEED PLANTS

15. Leaves linear, entire; flowers hidden by numerous, long, whitish hairs.
 WINTERFAT (*Eurotia lanata*).....26
 Leaves narrowly oval, more or less toothed; flowers not hidden by hairs, bright yellow to nearly white.
 WILD-BUCKWHEAT (*Eriogonum aureum*).....23
16. Leaves entire.
 GOOSEFOOT FAMILY (CHENOPODIACEAE).....24
 Leaves toothed but not lobed. 17.
 Leaves more or less lobed. 18.
17. Usually seen as trees; flowers and fruits inconspicuous.
 QUAKING ASPEN (*Populus tremuloides*).....22
 Usually seen as large shrubs or small trees; flowers white; fruits red, berrylike.
 SERVICEBERRY (*Amelanchier utahensis*).....32
18. Leaves about as broad as long, often nearly round in outline; fruit a berry. 19.
 Leaves longer than broad, not round in outline; fruit an akene. 20.
19. Stems armed with spines; berry prickly, purple when mature.
 ORANGE GOOSEBERRY (*Ribes pinetorum*).....32
 Stems without spines; berry smooth, red at maturity.
 WAX CURRANT (*Ribes cereum*).....31
20. Flowers very small and numerous; akenes without tails; leaves aromatic.
 ROCK-SPIRAEA (*Holodiscus dumosus*).....32
 Flowers $\frac{1}{2}$ to 1 inch across; akenes with feathery tails. 21.
21. Flowers with 5 small bracts alternating with the 5 sepals; petals white or pale yellow; akenes about 5.
 CLIFF-ROSE (*Cowania mexicana*).....32
 Flowers without bracts between the sepals; petals white; akenes numerous.
 APACHE PLUME (*Fallugia paradoxa*).....32
22. Plants without green leaves on mature stems. 23.
 Plants with green leaves on mature stems. 25.
23. Stems very prickly and fleshy; flowers large, not in heads.
 CACTUS FAMILY (CACTACEAE).....39
 Stems spiny but not noticeably fleshy; flowers in heads surrounded by involucre of bracts. 24.
24. Flowers pink or lilac, the corollas all strap-shaped.
 LYGODESMIA (*Lygodesmia spinosa*).....60
 Disc flowers yellow, ray flowers white.
 ASTER (*Aster spinosus*).....57
25. Plants parasitic on the stems of juniper trees.
 MISTLETOE (*Phoradendron juniperinum*).....23
 Plants not parasitic on the stems of juniper trees. 26.
26. Plants grasslike or rushlike; flowers not conspicuously colored; flowers in the axils of dry or chaffy bracts. 27.

KEY TO THE SEED PLANTS

- Plants not grasslike or rushlike or, if so, then the flowers colored and conspicuous. 28.
27. Leaves in 3 rows on the stem, their lower parts forming tubes around the stem; stem solid, triangular; one bract to each flower.
 FLAT-SEDGE (*Cyperus fendlerianus*).....22
 Leaves in 2 rows on the stem, their lower parts forming sheaths around the stem but the margins not united to form tubes; two bracts to each flower, the flower between them.
 GRASS FAMILY (GRAMINEAE).....15
28. Flowers in heads surrounded by involucre of bracts (rarely solitary); ovary inferior.
 COMPOSITE FAMILY (COMPOSITAE).....51
 Flowers not in heads surrounded by involucre of bracts or, if so, then the ovary superior or the involucre calyxlike. 29.
29. Leaves parallel-veined; flower parts mostly in 3's or 6's. 30.
 Leaves net-veined; flower parts mostly in 4's or 5's. 32.
30. Leaves not all basal; flowers irregular; sepals green; petals blue.
 DAYFLOWER (*Commelina dianthifolia*).....22
 Leaves all basal; flowers regular; sepals and petals colored alike. 31.
31. Leaves often a foot long or more and $\frac{1}{4}$ inch wide, stiff; flowers large and numerous, white; sepals and petals often an inch long or more.
 YUCCA (*Yucca narajoa*).....22
 Leaves usually less than 6 inches long, very narrow, not stiff; flowers few, purple to nearly white; sepals and petals less than $\frac{1}{4}$ inch long.
 FUNNEL LILY (*Androstephium breviflorum*).....22
32. Ovary inferior or nearly so. 33.
 Ovary superior. 37.
33. Stems trailing or climbing, with tendrils; flowers large, yellow, imperfect.
 BUFFALO GOURD (*Cucurbita foetidissima*).....51
 Stems not trailing or climbing, without tendrils. 34.
34. Leaves in whorls of 4 or fewer.
 BEDSTRAW (*Galium rothrockii*).....51
 Leaves alternate or opposite, not whorled. 35.
35. Stamens fewer than 8. 36.
 Stamens. 8
 EVENING-PRIMROSE FAMILY (ONAGRACEAE).....40
 Stamens more than 8.
 LOASA FAMILY (LOASACEAE).....39
36. Corolla lacking; calyx colored like a corolla; flowers sometimes clustered within a calyxlike involucre.
 FOUR-O'CLOCK FAMILY (NYCTAGINACEAE).....27

KEY TO THE SEED PLANTS

- Corolla present; calyx green or greenish; flowers in umbels.
 PARSLEY FAMILY (UMBELLIFERAE).....41
37. Flowers irregular. 38.
 Flowers regular or nearly so. 43.
38. Flowers with a conspicuous spur at the base. 39.
 Flowers without a spur at the base. 40.
39. Flowers blue and white.
 LARKSPUR (*Delphinium scaposum*).....29
 Flowers yellow.
 GOLDEN CORYDALIS (*Corydalis aurea*).....29
40. Petals distinct or nearly so.
 PEA FAMILY (LEGUMINOSAE).....32
 Petals united. 41.
41. Ovary deeply 4-lobed; stems usually 4-sided.
 MINT FAMILY (LABIATAE).....46
 Ovary not 4-lobed. 42.
42. Fruit of 4 nutlets; stems often 4-sided.
 VERVAIN FAMILY (VERBENACEAE).....46
 Fruit a capsule; stems not 4-sided; stamens with anthers 2
 or 4.
 FIGWORT FAMILY (SCROPHULARIACEAE).....49
43. Corolla lacking (Note: when only one set of organs represent-
 ing calyx and corolla is present it is always called a calyx
 even though it may look like a corolla). 44.
 Corolla present. 50.
44. Calyx colored like a corolla, not green. 45.
 Calyx not colored like a corolla, usually green. 46.
45. Ovary appearing inferior; flowers mostly purple or red.
 FOUR-O'CLOCK FAMILY (NYCTAGINACEAE).....27
 Ovary obviously superior; flowers mostly white or yellow.
 BUCKWHEAT FAMILY (POLYGONACEAE).....23
46. Plants with milky juice.
 SPURGE FAMILY (EUPHORBIACEAE).....36
 Plants without milky juice. 47.
47. Flowers subtended by rigid, sharp-pointed bracts. 48.
 Bracts subtending flowers not noticeably rigid and sharp-
 pointed. 49.
48. Leaves very narrow, somewhat spiny-tipped.
 RUSSIAN-THISTLE (*Salsola kali* var. *tenuifolia*).....26
 Leaves broader, not spiny-tipped.
 AMARANTH FAMILY (AMARANTHACEAE).....26
49. Plants covered with star-shaped hairs.
 CROTON (*Croton texensis*).....37
 Plants without star-shaped hairs.
 GOOSEFOOT FAMILY (CHENOPODIACEAE).....24
50. Petals distinct or nearly so. 51.
 Petals united at least below. 56.

KEY TO THE SEED PLANTS

51. Leaves compound. 52.
 Leaves simple, sometimes deeply lobed. 54.
52. Leaves palmately compound, alternate; plants sometimes ill-scented.
 CAPER FAMILY (CAPPARIDACEAE).....31
 Leaves pinnately compound. 53.
53. Stamens 6, usually 2 shorter; petals 4, arranged in the form of a cross.
 MUSTARD FAMILY (CRUCIFERAE).....29
 Stamens 10 or 12; petals yellow.
 CALTROP FAMILY (ZYGOPHYLLACEAE).....36
54. Stamens with anthers 5. 55.
 Stamens with anthers 6, usually 2 shorter.
 MUSTARD FAMILY (CRUCIFERAE).....29
 Stamens with anthers 10, united in a column around the style.
 CRANESBILL (*Geranium caespitosum*).....36
55. Flowers blue; plants often a foot high or more.
 BLUE FLAX (*Linum lewisii*).....36
 Flowers white, very small; plants only a few inches high.
 SAND SPURRY (*Drymaria tenella*).....28
56. Stems trailing or twining; flowers pink or red.
 MORNING GLORY (*Ipomoea plumerae*)42
 Stems not trailing or twining. 57.
57. Ovaries 2, united only by the common style or stigma; plants with milky juice; fruit a pair of pods. 58.
 Ovary 1, simple or compound; plants without milky juice. 59.
58. Flowers in umbels; stamens united into a column.
 MILKWEED FAMILY (ASCLEPIADACEAE).....42
 Flowers not in umbels; stamens distinct.
 DOGBANE FAMILY (APOCYNACEAE).....41
59. Ovary deeply 4-lobed; fruit of 4 nutlets.
 BORAGE FAMILY (BORAGINACEAE).....44
 Ovary not 4-lobed. 60.
60. Fruit of 4 nutlets; flowers cream-colored.
 TETRACLEA (*Tetraclea coulteri*).....46
 Fruit a berry.
 NIGHTSHADE FAMILY (SOLANACEAE).....47
 Fruit a capsule. 61.
61. Styles 2, each 2-lobed.
 EVOLVULUS (*Evolvulus pilosus*).....42
 Style 1. 62.
62. Style 2-lobed.
 WATERLEAF FAMILY (HYDROPHYLLACEAE).....44
 Style 3-lobed.
 PHLOX FAMILY (POLEMONIACEAE).....42

FAMILIES OF PLANTS

With Keys and Descriptions of Species

Note: In the description of species the scientific names of plants that have been found in Wupatki National Monument are followed by (W) while those that have been found in Sunset Crater National Monument are followed by (S).

PINE FAMILY (PINACEAE)

A staminate flower in this family consists of a single stamen and nothing else and a pistillate flower consists of a single pistil in the axil of a little bract or modified leaf. The staminate and pistillate flowers are in separate clusters but on the same plant. A pistillate flower matures into the familiar cone scale with 2 seeds at its base. Most pines require 2 growing seasons to mature their cones but the cones of a douglas-fir mature in one growing season.

1. Leaves very narrowly linear, arranged spirally.
DOUGLAS-FIR (*Pseudotsuga menziesii* var. *glauca*).....14
Leaves needlelike, arranged in clusters. 2.
2. Leaves in clusters of 2.
PINYON PINE (*Pinus edulis*).....14
Leaves in clusters of 3.
PONDEROSA PINE (*Pinus ponderosa*).....14
Leaves in clusters of 5.
LIMBER PINE (*Pinus flexilis*).....14

PINYON PINE (*Pinus flexilis*) (S): A relatively small tree, usually less than 30 feet tall, with leaves 1 to 2 inches long, usually in 2's. The mature cones are 1 to 2 inches long and about as wide.

LIMBER PINE (*Pinus flexilis*) (S): A medium-sized tree, usually 30 to 45 feet tall, but the one found on Sunset Crater is much smaller; leaves in 5's, 1½ to 3 inches long; cones 3 to 10 inches long.

PONDEROSA PINE (*Pinus ponderosa*) (S): A large tree when mature, usually 45 to 125 feet tall; leaves in 3's, 3 to 10 inches long; cones 3 to 6 inches long.

DOUGLAS-FIR (*Pseudotsuga menziesii* var. *glauca*) (S): A tree 60 to 180 feet tall; leaves about an inch long; male flowers orange-red; cones 2 to 10 inches long, the bracts subtending the cone scales longer than the scales and giving the cone a unique shaggy appearance.

CYPRESS FAMILY (CUPRESSACEAE)

Our representatives of this family are junipers. They are small, cone-bearing trees and shrubs, but their little cones are so fleshy that they resemble berries and are commonly called juniper berries. Our members of the family all have scalelike leaves which are opposite and overlap like shingles.

ALLIGATOR JUNIPER (*Juniperus deppeana*) (S): A small or medium-sized tree, usually 10 to 40 feet high, with a short, stout trunk; bark checked into squares, not fibrous. A gland on the back of each leaf exudes a whit-

FAMILIES OF PLANTS

ish resin giving a characteristic, spotted appearance to the twigs. The largest berries are nearly $\frac{1}{2}$ inch in diameter and contain several seeds.

ONE-SEED JUNIPER (*Juniperus monosperma*) (W): Usually without a main trunk, the stems branching from the base, and therefore appearing like a large shrub; bark fibrous; male and female flowers on separate plants; berries juicy, about $\frac{1}{4}$ inch in diameter or less, containing only 1 seed.

UTAH JUNIPER (*Juniperus osteosperma*) (S): Usually with a main trunk, not branching from the base, and therefore appearing like a small tree; bark fibrous; male and female flowers on the same plant; largest berries nearly $\frac{1}{2}$ inch in diameter, usually containing at least 2 seeds.

JOINTFIR FAMILY (EPHEDRACEAE)

Low or medium-sized shrubs with opposite or whorled, scale-like leaves. The male and female flowers are on separate plants and the fruits resemble very small cones.

1. Leaves in whorls of 3.

JOINTFIR (*Ephedra torreyana*).....15

Leaves opposite. 2.

2. Flower clusters and fruits of female plants sessile or nearly so; stems never sticky.

JOINTFIR (*Ephedra viridis*).....15

Flower clusters and fruits of female plants definitely stalked; stems often sticky.

JOINTFIR (*Ephedra cutleri*).....15

JOINTFIR (*Ephedra cutleri*) (W): Stems usually 20 to 40 inches high, much branched, bright green, often sticky; leaves opposite, scalelike; stalks of female flower clusters and conelike fruits often $\frac{1}{4}$ to $\frac{1}{2}$ inch long.

JOINTFIR (*Ephedra torreyana*) (W): Stems 10 to 40 inches high; leaves in whorls of 3, bluish green; bracts of the conelike flower clusters also in whorls of 3.

JOINTFIR (*Ephedra viridis*) (W): Very similar to *Ephedra cutleri* and often difficult to distinguish from it, but the stems are never sticky and the female flowers are sessile or nearly so.

GRASS FAMILY (GRAMINEAE)

The flowers of grasses are wind-pollinated and are usually small and not very conspicuous. Grasses are often considered difficult to identify, but once one becomes familiar with the structure of a grass flower, or floret (Fig. 3), these plants can be identified quite readily, especially with the aid of a good lens.

1. Spikelets sessile, in groups of 3 arranged in a loose spike, the groups falling entire at maturity.

GALLETA (*Hilaria jamesii*).....20

Spikelets not in groups of 3 or, if so, then 2 of them not sessile. 2.

2. Axis of spikelets jointed below the glumes so that when the spikelets fall the glumes fall with them; spikelets in racemes 3.

FAMILIES OF PLANTS

- Axis of spikelets jointed above the glumes so that when the spikelets fall the glumes remain on the plant. 4.
3. Racemes 1 on each stalk, slender.
 LITTLE BLUESTEM (*Andropogon scoparius*).....19
 Racemes 2 or more on each stalk, stout.
 SAND BLUESTEM (*Andropogon hallii*).....18
4. Spikelets, at least those with perfect flowers, sessile in spikes. 5.
 Spikelets all definitely stalked, in open or spikelike panicles. 10.
5. Spikelets alternating on opposite sides of the axis of the spike. 6.
 Spikelets on one side of the axis of the spike or appearing so. 7.
6. Spikelets solitary at each place of attachment to the axis; awns less than $\frac{1}{4}$ inch long.
 WESTERN WHEATGRASS (*Agropyron smithii*).....18
 Spikelets 2 at each place of attachment to the axis; awns 1 to 4 inches long.
 SQUIRRELTAIL (*Sitanion hystrix*).....21
7. Spikelets not arranged like the teeth of a comb; spikes usually 20 to 50, short.
 SIDE-OATS GRAMA (*Bouteloua curtipendula*).....19
 Spikelets arranged like the teeth of a comb; spikes usually less than 10. 8.
8. Spikes usually 2, rarely 1 or 3.
 BLUE GRAMA (*Bouteloua gracilis*).....19
 Spikes usually 3 to 8. 9.
9. Stems white-woolly at the base.
 BLACK GRAMA (*Bouteloua eriopoda*).....19
 Stems not white woolly at the base.
 SIX-WEEKS GRAMA (*Bouteloua barbata*).....19
10. Spikelets 1-flowered. 11.
 Spikelets 2- to several-flowered. 29.
11. Panicle narrow, dense, spikelike. 12.
 Panicle open or rather dense but not spikelike. 14.
12. Glumes nearly equal in length.
 DEERGRASS (*Muhlenbergia rigens*).....20
 Glumes very unequal in length. 13.
13. Stems slender, usually less than 3 feet high.
 SPIKE DROPSEED (*Sporobolus contractus*).....21
 Stems stout, 3 to 6 feet high.
 GIANT DROPSEED (*Sporobolus giganteus*).....21
14. Lemmas awned. 15.
 Lemmas awnless. 26.
15. Lemmas with a 3-branched awn. 16.
 Lemmas with an unbranched awn. 20.

FAMILIES OF PLANTS

16. Panicles open, the branches spreading, without flowers near their bases; summit of lemma twisted into a long neck; glumes about equal in length. 17.
Panicles narrow and rather dense, the branches not conspicuously spreading, at least some of them with flowers near the base; summit of lemma not twisted into a neck; second glume about twice as long as the first. 18.
17. Plant forming a hemisphaerical tuft, often a foot in diameter, the stems radiating in all directions; awn branches $\frac{1}{2}$ to $\frac{3}{4}$ inch long.
HAVARD THREE-AWN (*Aristida barbata*).....19
Stems erect or somewhat spreading, 1 to 2 feet long; awn branches $\frac{1}{2}$ inch long or less.
- POVERTY THREE-AWN (*Aristida divaricata*).....19
18. Leaves not crowded near the base; lemma smooth; awn branches 2 to 3 inches long.
RED THREE-AWN (*Aristida longiseta*).....19
Leaves crowded near the base; lemma rough on the upper part; awn branches 1 to 2 inches long. 19.
19. Branches of the panicle slender, more or less curved or bent; panicle usually purplish; leaf blades up to 4 inches long.
PURPLE THREE-AWN (*Aristida purpurea*).....19
Branches of the panicle straight; leaf blades mostly less than 3 inches long.
FENDLER THREE-AWN (*Aristida fendleriana*).....19
20. Awn more than $\frac{1}{2}$ inch long, twisted at least below. 21.
Awn less than $\frac{1}{2}$ inch long, not twisted. 24.
21. Awn 4 to 7 inches long. 22.
Awn $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long. 23.
22. Upper portion of awn feathery.
NEW MEXICO FEATHERGRASS (*Stipa neomexicana*).....21
Upper portion of awn not feathery.
NEEDLE AND THREAD (*Stipa comata*).....21
23. Lower part of awn long-hairy.
DESERT NEEDLEGRASS (*Stipa speciosa*).....21
Lower part of awn not hairy.
NEEDLEGRASS (*Stipa arida*).....21
24. Glumes longer than the lemma.
INDIAN RICEGRASS (*Oryzopsis hymenoides*).....20
Glumes shorter than the lemma. 25.
25. Panicle narrow, the branches not spreading.
MOUNTAIN MUHLY (*Muhlenbergia montana*).....20
Panicle open, the branches spreading.
BUSH MUHLY (*Muhlenbergia porteri*).....20
26. Glumes nearly equal in length; lemmas more or less hairy. 27.
Glumes very unequal in length; lemmas smooth or nearly so. 28.

FAMILIES OF PLANTS

27. Plants usually more than a foot high; lemma densely hairy on the nerves.
 PINE-DROPSEED (*Blepharoneuron tricholepis*).....19
 Plants usually only a few inches high; lemma silky-hairy but not densely hairy on the nerves.
 MUHLY (*Muhlenbergia minutissima*).....20
28. Summit of the sheaths smooth or nearly so on the back and sides but usually with long, rather stiff hairs in the throat.
 ALKALI SACATON (*Sporobolus airoides*).....21
 Summit of the sheaths conspicuously hairy on the back or sides or both.
 MESA DROPSEED (*Sporobolus flexuosus*).....21
29. Lemma with 9 feathery awns.
 SPIKE PAPPUSGRASS (*Enneapogon desvauxii*).....20
 Lemma awnless or with a single awn. 30.
30. Tall, canelike plants with large, plumelike panicles.
 COMMON REED (*Phragmites communis*).....21
 Plants low or medium tall, not canelike; panicles not plume-like. 31.
31. Lemmas awned. 32.
 Lemmas awnless. 34.
32. Panicle headlike, shorter than the subtending leaves; low, creeping plants.
 FLUFFGRASS (*Tridens pulchellus*).....21
 Panicle not headlike, not subtended by leaves; plant not creeping. 33.
33. Plant perennial; usually not hairy except on the lemmas and sometimes on the leaf sheaths; awns less than $\frac{1}{4}$ inch long.
 NODDING BROME (*Bromus anomalus*).....19
 Plant annual; leaf blades and sheaths and both glumes and lemmas soft-hairy; awns about $\frac{1}{2}$ inch long.
 DOWNY CHESS (*Bromus tectorum*).....20
34. Plants with creeping runners; flowers imperfect.
 DESERT SALTGRASS (*Distichlis stricta*).....20
 Plants without runners; flowers perfect. 35.
35. Spikelets about $\frac{1}{4}$ inch long or less; much less than $\frac{1}{2}$ as wide as long; lemmas 3-nerved.
 LOVEGRASS (*Eragrostis diffusa*).....20
 Spikelets $\frac{1}{2}$ inch long or more, about $\frac{1}{2}$ as wide as long; lemmas 5-nerved or more.
 MUTTONGRASS (*Poa fendleriana*).....21
- WESTERN WHEATGRASS (*Agropyron smithii*) (S): A sod-forming grass which, when in flower or fruit, bears some resemblance to cultivated wheat. Stems 1 to nearly 3 feet high; leaf blades flat, 4 to 10 inches long; spikes 3 to 6 inches long; spikelets 6- to 10-flowered.
- SAND BLUESTEM (*Andropogon hallii*) (S) (W): Stems 2 to 6 feet tall; leaf blades 6 to 12 inches long; racemes spikelike, 2 to 4 inches long, very hairy.

FAMILIES OF PLANTS

LITTLE BLUESTEM (*Andropogon scoparius*) (S): Stems 1 to nearly 5 feet tall; leaf blades 2 to 10 inches long, flat or sometimes folded; racemes 1 to 2½ inches long, each on a long stalk, the axis very hairy giving the raceme a feathery appearance.

HAVARD THREE-AWN (*Aristida barbata*) (W): Stems 6 to 12 inches long, radiating in all directions and forming tufts as much as a foot in diameter; leaf blades closely rolled, mostly less than 4 inches long; panicle about ½ the length of the entire plant, the branches 1 to 2½ inches long and spreading; awn branches about ½ to ¾ inch long.

POVERTY THREE-AWN (*Aristida divaricata*) (S): Stems usually 1 to 2 feet long, varying from erect to nearly prostrate; leaf blades narrow, flat or loosely rolled; panicle usually as much as half the length of the stem, the branches spreading; awn branches about ½ inch long or less.

FENDLER THREE-AWN (*Aristida fendleriana*) (W): Stems 8 to 12 inches long; leaf blades short, curly, mostly clustered at the base; panicle rather narrow, the branches not wide spreading; awn branches 1 to 2 inches long.

RED THREE-AWN (*Aristida longiseta*) (W): Plant perennial, often in large bunches; stems 8 to 12 inches tall, leaf blades curved or bent, less than 6 inches long; second glume about twice as long as the first and longer than the lemma; awn branches about 2 to 3 inches long.

PURPLE THREE-AWN (*Aristida purpurea*) (W): 12 to 20 inches tall; leaf blades less than 4 inches long, very narrow, usually rolled; panicle 4 to 8 inches long, usually purplish, narrow, nodding; second glume about twice as long as the first; awn branches 1 to 2 inches long.

PINE-DROPSEED (*Blepharoneuron tricholepis*) (S): Stems slender, densely tufted, 8 to 24 inches tall; leaves near the base of the stem, mostly less than ½ the length of the stem; panicle 2 to 8 inches long, 1 to 2 inches wide, many-flowered; lemma and palea densely silky-haired.

SIX-WEEKS GRAMA (*Bouteloua barbata*) (W): Stems up to a foot long, erect or spreading, often forming mats; leaves few, less than 2 inches long; spikes 4 to 7, less than an inch long; spikelets 25 to 40 on each spike; fertile lemma densely hairy, the awn as long as the body or shorter.

SIDE-OATS GRAMA (*Bouteloua curtipendula*) (W): Stems 20 to 30 inches tall, clustered; leaf blades flat or rolled, spikes 20 to 50, about an inch long; spikelets 5 to 8 on each spike.

BLACK GRAMA (*Bouteloua eriopoda*) (W): Stems 15 to 25 inches long, slender, wiry, white-hairy, in bunches, wide spreading; leaf blades very narrow, usually bent and twisted; spikes usually 4 or 5 with 12 to 20 spikelets each.

BLUE GRAMA (*Bouteloua gracilis*) (S) (W): Stems 8 to 20 inches high, densely tufted but the tufts often close enough together to form an open sod; leaves short, narrow, often curled, mostly clustered at the base; spikes usually 2, comblike, crowded with spikelets, 1 to 2 inches long.

NODDING BROME (*Bromus anomalus*) (S): Stems 1 to 2 feet tall, slender, often somewhat hairy at the nodes; leaf sheaths more or less hairy, the blades rough but not hairy; panicle about 4 inches long or more; spikelets 5- to 10-flowered; lemmas evenly hairy on the back.

FAMILIES OF PLANTS

DOWNEY CHESS (*Bromus tectorum*) (S): Stems 1 to 2 feet tall; leaf blades and sheaths soft-hairy; panicles 2 to 6 inches long, soft, often purple; spikelets nodding; glumes and lemmas soft-hairy; second glume twice as long as the first. An annual weed.

DESERT SALTGRASS (*Distichlis stricta*) (W): Stems 4 to 16 inches long or more, smooth; leaf blades rather narrow, 2 to 6 inches long, flat or rolled, the lower leaves reduced to sheaths which strongly overlap; panicles narrow, 1 to 2½ inches long, 5- to about 18-flowered; male and female flowers on separate plants.

SPIKE PAPPUSGRASS (*Enneapogon desvauxii*) (W): Stems numerous, slender, spreading, 8 to 16 inches tall, the nodes hairy; leaf blades very narrow, flat or somewhat rolled; panicle spike-like, usually 1 to 2 inches long; spikelets 3-flowered, the first flower perfect, the second smaller and sterile, the third reduced to a rudiment; glumes strongly 7-nerved, hairy, longer than the body of the lemma; lemma of the first flower 9-nerved, with feathery awns.

LOVEGRASS (*Eragrostis diffusa*) (S): Stems 1 to 2 feet high; leaf blades narrow, flat or rolled, 2 to 6 inches long, the sheaths with a hairy collar at the top; spikelets numerous, dark lead colored.

GALETA (*Hilaria jamesii*) (S) (W): Stems numerous, rigid, felty below, smoother above, 2 to 3 feet tall; leaves felty or smooth, usually woolly at the top of the sheath, the blades 1 to 2 inches long, more or less rolled; group of spikelets densely hairy at the base.

MUHLY (*Muhlenbergia minutissima*) (S): Stems slender, 3 inches to a foot tall, in small bunches but often forming large patches, smooth or nearly so; leaf blades very narrow, ½ to 4 inches long; panicle open, ½ to ¾ the entire length of the plant; spikelets very small and numerous; glumes ½ to ¾ as long as the lemma.

MOUNTAIN MUHLY (*Muhlenbergia montana*) (S): Stems in dense tufts, 6 to 24 inches tall; leaves largely basal, the blades very narrow, flat or rolled; panicle narrow but loose, 2 to 6 inches long; first glume sharp-pointed, the second broader and 3-toothed; lemma hairy on the lower half; awn ½ inch long or less.

BUSH MUHLY (*Muhlenbergia porteri*) (W): Stems numerous, wiry, 1 to 3 feet tall, mostly branching from all the nodes; leaf blades very narrow, 1 to 3 inches long, early dropping off from the sheaths; panicle 2 to 4 inches long, the wide spreading branches brittle, bearing rather few, long-stalked spikelets; lemma purple, slightly hairy and about ¼ inch long or more.

DEERGRASS (*Muhlenbergia rigens*) (S): Stems rather slender, stiffly erect, 2 to 4 feet tall, leaf blades rough, rolled, tapering into a long, slender point; panicle pale gray, slender, spike-like, 4 to 12 inches long or more; lemma somewhat hairy at the base, awnless.

INDIAN RICEGRASS (*Oryzopsis hymenoides*) (S) (W): Stems densely clustered, 1 to 2 feet tall; leaf blades slender, rolled, nearly as long as the stems; panicle loose, 3 to 6 inches long, the branches in pairs, forked, spreading; glumes longer than the lemma, pointed; lemma nearly black at maturity, densely hairy with long, white hairs; awn somewhat longer than the lemma, easily falling off.

FAMILIES OF PLANTS

COMMON REED (*Phragmites communis*) (W): Stems stout, 6 to 12 feet tall, from stout underground, creeping stems; leaf blades flat; panicle 6 to 15 inches long, rather dense; spikelets about $\frac{1}{2}$ inch long; florets partly hidden by the long hairs of the axis of the spikelet.

MUTTONGRASS (*Poa fendleriana*) (S): Stems clustered, 12 to 20 inches tall; leaf blades mostly basal, folded or rolled, firm and stiff; panicle dense, 1 to 3 inches long, pale green to purple; spikelets 4- to 6-flowered.

SQUIRRELTAIL (*Sitanion hystrix*) (S) (W): Stems clustered, erect to spreading, rather stiff, 4 to 20 inches high; leaf blades flat or rolled, 2 to 8 inches long; panicle 1 to 3 inches long or more; awns or glumes and lemmas 1 to 4 inches long, wide spreading.

ALKALI SACATON (*Sporobolus airoides*) (W): Stems in large, tough bunches, 20 to 40 inches tall; leaf blades long, flat; panicle nearly half the entire length of the stem, at maturity half as wide as long or more, the branches wide spreading; first glume about half as long as the second; second glume, lemma and palea all about equal in length.

SPIKE DROPSEED (*Sporobolus contractus*) (W): Stems 1 to 3 feet tall, in rather small clusters; leaf blades with a tuft of white hairs at the summit; leaf blades flat, or rolled when dry; panicle spike-like, up to 20 inches long; first glume usually less than $\frac{1}{2}$ as long as the second.

MESA DROPSEED (*Sporobolus flexuosus*) (W): Similar to the preceding except that the panicle is not spike-like but is open and loosely flowered, the branches often bent or curved.

GIANT DROPSEED (*Sporobolus giganteus*) (W): This species resembles the spike dropseed but it is a larger plant with stems 3 to 6 feet tall, and the panicle is usually thicker and less spike-like.

NEEDLEGRASS (*Stipa arida*) (W): Stems 15 to 30 inches tall; leaf blades 4 to 8 inches long, flat or rolled; panicle 4 to 6 inches long, narrow, compact, pale or silvery; lemma hairy on the lower half and on the margins; awn $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long, loosely twisted below.

NEEDLE AND THREAD (*Stipa comata*) (W): Stems usually 1 to 2 feet tall; leaf blades 8 to 12 inches long, flat or rolled; panicle 4 to 8 inches long, narrow; lemma sparsely hairy or nearly smooth above; awn 4 to 6 inches long, not feathery.

NEW MEXICO FEATHERGRASS (*Stipa neomexicana*) (W): Stems mostly 15 to 30 inches tall; leaf blades very narrow and usually rolled; panicle 1 to 4 inches long; spikelets pale, more or less shining; glumes about 1 to 2 inches long, tapering to a fine point; lemma about $\frac{1}{2}$ inch long; awn 5 to 7 inches long, the lower part twisted, the upper part feathery.

DESERT NEEDLEGRASS (*Stipa speciosa*) (W): Stems numerous, 1 to 2 feet tall; leaf sheaths brownish, the lower ones hairy or even felty at the base; leaf sheaths very narrow, long, rolled, mostly basal, often dropping off from the outer, older sheaths; panicle narrow, dense, 4 to 6 inches long, not extending much beyond the leaves; lemma densely short-hairy; awn $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long, densely long-hairy below the sharp bend.

FLUFFGRASS (*Tridens pulchellus*) (W): Stems slender, clustered, usually less than 6 inches high, with a cluster of short leaves at the base and another cluster at the top, the stems finally bending over and taking root at

FAMILIES OF PLANTS

the leaf cluster and producing other stems; panicle headlike, usually not longer than the blades of the leaf cluster, consisting of 1 to 5 rather large, white-woolly spikelets.

SEDGE FAMILY (CYPERACEAE)

A large family of grasslike or rushlike plants of little economic importance.

FLATSEDGE (*Cyperus fendlerianus*) (S): Stems 1 to 2 feet tall; leaves 2 or 3 on each stem; spikes 3- to 8-flowered, crowded in a 3-lobed head which is subtended by 3 leaflike bracts, these varying in length, 1 very long, 1 intermediate, and 1 short.

SPIDERWORT FAMILY (COMMELINACEAE)

A small family of herbs, the leaves alternate with sheathing bases, the flowers perfect with 3 sepals, 3 petals, and 6 stamens, often some of them sterile; fruit a 3-celled capsule.

DAYFLOWER (*Commelina dianthifolia*) (S): Stems usually about a foot high or less, leaf blades 1 to 5 inches long, linear; the main stem, and often 1 or more branches, ending in a large, folded bract which partly encloses a cluster of buds and usually 1 attractive, irregular, blue flower.

LILY FAMILY (LILIACEAE)

Mostly herbaceous plants producing regular flowers with 3 sepals, 3 petals, 6 stamens, and a 3-celled, superior ovary, the sepals and petals often colored alike.

FUNNEL LILY (*Androstephium breviflorum*) (S): Stem rather stout, 4 to 12 inches high, from a fibrous bulb; leaves narrowly linear, about as long as the stem or longer; flowers in a few-flowered umbel subtended by several small bracts; sepals and petals light purplish with darker veins; fruit a 3-lobed capsule.

YUCCA (*Yucca navahoa*) (S) (W): Appearing stemless except when in flower or fruit; leaves all basal, mostly 8 to 16 inches long and less than $\frac{1}{4}$ inch wide, rigid; flowering stem 4 to 24 inches long with flowers nearly the entire length; sepals and petals 1 to 2 inches long or more, greenish-white; fruit about $1\frac{1}{2}$ to 2 inches long.

WILLOW FAMILY (SALICACEAE)

Trees or large shrubs with alternate leaves and imperfect flowers. The male and female flowers are on separate plants, both in catkins and without sepals or petals.

QUAKING ASPEN (*Populus tremuloides*) (S): A small or medium-sized tree, up to 60 feet tall, the bark smooth, greenish-white or cream-colored; leaf blades mostly ovate, about as broad as long, rather irregularly toothed; petioles 1 to 3 inches long, flattened laterally.

WILLOW (*Salix scouleriana*) (S): A shrub or small tree, 12 to 30 feet tall; leaves very variable, mostly oblanceolate or obovate to oblong or elliptic, 1 to 3 inches long, entire or shallowly toothed.

FAMILIES OF PLANTS

MISTLETOE FAMILY (LORANTHACEAE)

Plants parasitic on trees or shrubs; leaves opposite, in ours scalelike; flowers imperfect, small and inconspicuous, the male and female flowers on separate plants.

MISTLETOE (*Phoradendron juniperinum*) (W): Parasitic on junipers; stems 4 to 12 inches long, the smaller branches somewhat 4-sided; flowers in axillary spikes.

BUCKWHEAT FAMILY (POLYGONACEAE)

Our members of this family are all wild-buckwheats. They are low shrubs or herbs with simple, entire leaves which are alternate or sometimes nearly all basal. The flowers are small, several or many in a calyxlike involucre, with 9 stamens, no corolla but with a calyx colored like a corolla.

1. Stems noticeably woody above ground. 2.
 Stems not noticeably woody above ground. 4.
2. Stems woody throughout, a low shrub; flowers yellow.
 WILD-BUCKWHEAT (*Eriogonum aureum*).....23
 Stems woody only near the base; leaves mostly on the lower part of the non-woody portion of the stem. 3.
3. Leaf blades broadly ovate, about 1 inch long or less; petioles about twice as long as the blades.
 WILD-BUCKWHEAT (*Eriogonum jonesii*).....24
 Leaf blades narrowly elliptic or almost linear; petioles very short.
 WILD-BUCKWHEAT (*Eriogonum leptocladon*).....24
4. Leaves not all near the base.
 WILD-BUCKWHEAT (*Eriogonum divarictum*).....24
 Leaves all basal or near the base. 5.
5. Stems conspicuously white-woolly. 6.
 Stems not conspicuously white-woolly; leaves white-woolly. 7.
6. Flowers in much-branched, somewhat flat-topped clusters.
 WILD-BUCKWHEAT (*Eriogonum jonesii*).....24
 Flowers in long, unbranched or few-branched racemes.
 WILD-BUCKWHEAT (*Eriogonum racemosum*).....24
7. Flowers white or pink.
 SKELETON PLANT OR WILD BUCKWHEAT (*Eriogonum deflexum*) 23
 Flowers yellowish.
 WILD-BUCKWHEAT (*Eriogonum hookeri*).....24

WILD-BUCKWHEAT (*Eriogonum aureum*) (S) (W): A low, much branched shrub, usually less than a foot high, the stems and leaves often densely white-woolly but the older bark often peeling off leaving a smooth stem, blades oblong, 1½ inches long, toothed; flowers varying from bright yellow to almost white.

SKELETON PLANT OR WILD-BUCKWHEAT (*Eriogonum deflexum*) (W): 8 to 24 inches high, smooth or nearly so; leaf blades nearly round, mostly 1 to 2 inches across, white-woolly especially below, on long petioles, involucre sessile or nearly so; flowers white.

FAMILIES OF PLANTS

WILD-BUCKWHEAT (*Eriogonum divaricatum*) (W): Stems 4 to 8 inches long, usually prostrate or nearly so, short-hairy; basal leaf blades nearly round, about $\frac{1}{2}$ inch across or less, short-hairy, the petioles longer than the blades, the stem leaves similar but smaller; involucre sessile in the leaf axils along the stems; flowers yellow.

WILD-BUCKWHEAT (*Eriogonum hookeri*) (W): Stems 6 to 20 inches tall, branched; leaf blades nearly round; $\frac{1}{2}$ to $1\frac{1}{2}$ inches across, the petioles about as long; involucre sessile, scattered along the smaller branches; flowers yellow; fruits pinkish.

WILD-BUCKWHEAT (*Eriogonum jonesii*) (W): Stems a foot high or less, branched from the base, white-woolly; leaves all basal, broadly ovate, mostly less than an inch long, white-woolly, on long petioles; flowers white or pinkish, clustered near the ends of the stems; involucre short-hairy.

WILD-BUCKWHEAT (*Eriogonum leptocladon*) (W): Stems 8 to 24 inches tall, much branched, woody at the base, white-woolly; leaves mostly on the first 2 to 4 inches above the woody portion of the stem, narrowly elliptical to almost linear, white-woolly; involucre in slender racemes at the ends of the branches; flowers white or pinkish.

WILD-BUCKWHEAT (*Eriogonum racemosum*) (S): Stems mostly 1 to 2 feet tall, unbranched or few-branched, woolly, especially on the lower part; leaves all basal, the blades 1 to 3 inches long, broadly ovate or elliptical, the petioles as long or longer; involucre sessile or nearly so in clusters in a terminal spikelike raceme.

GOOSEFOOT FAMILY (CHENOPODIACEAE)

A rather large family of herbs and shrubs with simple leaves and wind-pollinated flowers which are not showy. The pollen of many of them probably cause hay fever.

1. Woody plants (shrubs). 2.
Non-woody plants (herbs). 8.
2. Leaves reduced to very small scales; stems appearing jointed.
IODINEBUSH (*Allenrolfea occidentalis*).....25
Leaves with well developed blades; stems not appearing jointed. 3.
3. Plants woody below, herbaceous above. 4.
Plants woody throughout. 5.
4. Plants conspicuously woolly.
WINTERFAT (*Eurotia lanata*).....26
Plants not woolly, leaves fleshy.
- SEEPWEED (*Suaeda torreyana*).....26
5. Flowers not subtended by bracts.
GREASEWOOD (*Sarcobatus vermiculatus*).....26
Flowers subtended by small bracts. 6.
6. Leaves narrowly elliptical to linear, several times longer than wide; fruit 4-angled.
FOUR-WING SALTBUUSH (*Atriplex canescens*).....25
Leaves ovate to nearly round, often as wide as long; fruit not 4-winged. 7.

FAMILIES OF PLANTS

7. Plant spiny; flowers in dense axillary clusters.
 SHADSCALE (*Atriplex confertiflora*).....25
 Plant not spiny; flowers in axillary and terminal spikes.
 SALTBUUSH (*Atriplex jonesii*).....25
8. Leaves very narrow, somewhat spiny-tipped.
 RUSSIAN-THISTLE (*Salsola kali* var. *tenuifolia*).....26
 Leaves broader, not spiny-tipped. 9.
9. Calyx and sometimes the lower leaves with yellow dots.
 GOOSEFOOT (*Chenopodium incisum*).....26
 Calyx and leaves without yellow dots. 10.
10. Leaves linear, narrowly lanceolate or narrowly oblong. 11.
 Leaves broadly lanceolate or nearly triangular. 12
11. Leaves linear, entire, 1-nerved.
 GOOSEFOOT (*Chenopodium leptophyllum*).....26
 Leaves narrowly lanceolate or oblong, entire or slightly 3-lobed, the lower ones 3-nerved.
 GOOSEFOOT (*Chenopodium hians*).....26
12. Leaves about as wide as long, triangular to almost round.
 GOOSEFOOT (*Chenopodium fremontii*).....25
 Leaves evidently longer than wide, oval to ovate or broadly lanceolate.
 GOOSEFOOT (*Chenopodium album*).....25

IODINEBUSH (*Allenrolfea occidentalis*) (W): A much branched shrub, 1 to 6 feet high; leaves reduced to small scales, often dropping off early; flowers perfect, in the axils of spirally arranged bracts, forming dense, cylindrical spikes 2 to 10 inches long.

FOUR-WING SALTBUUSH (*Atriplex canescens*) (W): A shrub 1 to 8 feet tall with rather stout, gray branches; leaves sessile or nearly so, oval, elliptic or oblanceolate, less than 2 inches long; flowers imperfect, the male and female flowers usually on separate plants, crowded in dense spikes which form long, terminal panicles; fruit conspicuously 4-winged, $\frac{1}{2}$ inch long or less.

SHADSCALE (*Atriplex confertifolia*) (W): A shrub, 1 to 4 feet high, usually with spines at the ends of short branches; leaves less than an inch long, crowded, short-petioled, oval, elliptic or nearly round; male and female flowers on separate plants; fruit about $\frac{1}{4}$ inch long, not winged.

SALTBUUSH (*Atriplex jonesii*) (W): Stems mostly between 1 and 2 feet tall, branched from the base and rigidly erect; leaves mostly ovate and less than an inch long; flowers in dense axillary and terminal spikes which form a narrow panicle.

GOOSEFOOT (*Chenopodium album*) (S): Stems 1 to 4 feet tall usually smooth; leaves very variable, usually ovate or elliptic, sometimes nearly triangular, less than 2 inches long, usually more or less covered with mealy particles on the lower side; flowers in small, dense clusters in spikes which form a panicle.

GOOSEFOOT (*Chenopodium fremontii*) (W): Stems 8 to 30 inches tall, smooth or nearly so, usually branched throughout; leaves very variable in

KEY TO THE SEED PLANTS

size, triangular or nearly so, entire or nearly so except for one lobe on each side at the base, the petiole about $\frac{1}{2}$ as long as the blade; flowers in small, dense clusters in slender or stout, paniced spikes.

GOOSEFOOT (*Chenopodium hians*) (W): An ill-scented plant with stems 15 to 30 inches high, usually rather sparingly branched; leaf blades mostly 1 inch long or less, entire or nearly so, the petioles about $\frac{1}{2}$ as long as the blades; flowers in small, dense clusters in paniced spikes.

GOOSEFOOT (*Chenopodium incisum*) (S): Stem 4 to 24 inches tall, smooth or nearly so; leaves from triangular ovate to narrowly elliptic, mostly 1 to 2 inches long, the petiole shorter than the blade, the margins varying from scalloped to pinnately lobed; flowers very small, sessile in the forks of very numerous branches and at the ends of branches; the plant has a strong but not unpleasant odor and in autumn becomes bright red.

GOOSEFOOT (*Chenopodium leptophyllum*) (W): Stems 4 to 30 inches tall, simple or branched above; leaves mostly linear, entire, about an inch long or less, the petioles about $\frac{1}{2}$ as long as the blades; flowers in small clusters in paniced spikes.

WINTERFAT (*Eurotia lanata*) (W): A shrub from a few inches to 3 feet high, densely white-woolly, usually only the lower part woody but the branches stout; leaves linear or narrowly lanceolate, $1\frac{1}{2}$ inches long or less, the margins entire and often rolled; flowers imperfect, in axillary and terminal clusters.

RUSSIAN-THISTLE (*Salsola kali* var. *tenuifolia*) (S) (W): Very bushy, 1 to 2 feet high; leaves 1 to 2 inches long, narrowly linear, sharp-pointed. After maturity the plant becomes hard and spiny and, breaking off at the surface of the soil, becomes a tumbleweed.

GREASEWOOD (*Sarcobatus vermiculatus*) (W): A much branched spiny shrub, 1 to nearly 10 feet high; leaves very narrowly linear, entire, smooth or nearly so; flowers imperfect, the staminate in terminal catkins, the pistillate in the axils of leaves, solitary or in pairs. The male and female flowers may be on the same plant or different plants.

SEEPWEED (*Suaeda torreyana*) (W): A shrub, 1 to 3 feet high, usually woody only in the lower part; leaves linear, fleshy but strongly flattened, 1 inch long or less; flowers mostly perfect, solitary or clustered in the axils of the much reduced upper leaves.

AMARANTH FAMILY (AMARANTHACEAE)

Mostly weedy plants with simple, entire leaves without stipules; flowers small, mostly imperfect; fruit an akene with a loose outer coat.

PIGWEE (*Amaranthus graecizans*) (W): Stems usually prostrate, often purplish, 1 to 2 feet long; leaf blades mostly oval, less than an inch long or longer toward the ends of the branches, petioled; flowers all in axillary clusters.

PIGWEE (*Amaranthus powellii*) (S): Stems from a few inches to more than 2 feet tall, erect, branched, hairy on the upper part; leaf blades oval, mostly 1 to 2 inches long, the petioles as long or longer; flowers in rather stout, leafless spikes which may form a panicle.

FAMILIES OF PLANTS

PIGWEEED (*Amaranthus wrightii*) (W): Stems erect, less than 2 feet high, smooth or nearly so; leaves mostly oval, petioled; flowers in slender, leafy spikes.

FOUR-O'CLOCK FAMILY (NYCTAGINACEAE)

Herbaceous plants with opposite leaves; flowers subtended by bracts that sometimes form a calyx-like involucre; calyx colored like a corolla; corolla lacking. The calyx tube usually encloses the ovary so closely that the ovary appears to be inferior although it actually is superior.

1. Flowers within a calyxlike involucre. 2.
Flowers not within an involucre, the subtending bracts not united, often soon falling; flowers very small. 3.
2. Bracts of the involucre not united; flowers greenish-white, in a many-flowered, umbellike head.
SAND-VERBENA (*Abronia elliptica*).....27
Bracts of the involucre united; flowers purple or red. 3.
3. Involucres 1 to 2 inches long, usually 6- to 8-flowered.
FOUR-O'CLOCK (*Mirabilis multiflora*).....28
Involucres less than ½ inch long, usually 3-flowered. 4.
4. Stems prostrate.
ALLIONIA (*Allionia incarnata*).....27
Stems erect or nearly so.
OXYBAPHUS (*Oxybaphus linearis*).....28
5. Bracts more than ½ as long as the fruits, persistent; fruits usually 4-angled.
BOERHAAVIA (*Boerhaavia wrightii*).....28
Bracts much less than ½ as long as the fruits, soon falling; fruits 5-angled. 6.
6. Fruits with narrow, longitudinal ridges and broad, open conspicuously rough furrows.
BOERHAAVIA (*Boerhaavia torreyana*).....27
Fruits with broad ridges and narrow, nearly closed, smooth furrows.
BOERHAAVIA (*Boerhaavia coulteri*).....27

SAND-VERBENA (*Abronia elliptica*) (W): Stems 4 to 20 inches long, erect or partly so, smooth or very short-hairy and sticky; leaves oval or oblong, very variable in size; flowers many in each head.

ALLIONIA (*Allionia incarnata*) (W): Stems prostrate, 4 to 20 inches long, often very sticky; leaves less than 2 inches long, petioled, ovate or oblong, one of each pair usually smaller than the other; flowers purple, 3 in each involucre.

BOERHAAVIA (*Boerhaavia coulteri*) (W): Stems erect or nearly so, a few inches to a foot long, branched, somewhat hairy but usually not sticky; leaves elliptical to lanceolate, 1 inch long or less, somewhat hairy beneath; flowers very small, pink, in short, loose spikes.

BOERHAAVIA (*Boerhaavia torreyana*) (W): Very similar to the preceding and often difficult to distinguish from it but the stems are usually quite sticky and often partly prostrate.

FAMILIES OF PLANTS

BOERHAAVIA (*Boerhaavia wrightii*) (W): Stems erect or nearly so, often more than a foot high, the lower part short-hairy and very sticky, the upper part smooth; leaves mostly from $\frac{1}{2}$ to $1\frac{1}{2}$ inches long, usually short-hairy and sticky, the petioles nearly as long as the blades; flowers similar to those of the 2 preceding species but the subtending bracts almost always present.

FOUR-O'CLOCK (*Mirabilis multiflora*) (W): Stems 1 to 3 feet long, stout, erect or partly prostrate, forming clumps, very leafy; leaf blades 1 to 3 inches long, ovate or oblong, the petioles much shorter; involucre solitary in the leaf axils and in a terminal cluster; flowers usually 6 to 8 in each involucre, very showy, the purplish calyx up to 2 inches long or more.

OXYBAPHUS (*Oxybaphus linearis*) (S): Stems 8 inches to 2 feet tall, erect or nearly so; leaves narrowly lanceolate, short-petioled; flowers purple, numerous, usually 3 in each involucre; calyx less than $\frac{1}{2}$ inch long.

PORTULACA FAMILY (PORTULACAEAE)

Mostly small, herbaceous plants with simple, entire leaves and perfect, regular flowers; sepals 2; petals usually 5; fruit a capsule.

PORTULACA (*Portulaca mundula*) (W): Stems usually less than 4 inches long, spreading or almost prostrate; leaves less than $\frac{1}{2}$ inch long, almost cylindrical and somewhat fleshy, conspicuously hairy in the axils with long, white, kinky hairs; flowers small, axillary and terminal; petals red-purple.

PURSLANE (*Portulaca retusa*) (W): Stems prostrate or nearly so, up to a foot long or more, much branched; leaves rather fleshy and thick but flat, an inch long or less, the hairs in the axils few and inconspicuous; flowers axillary and terminal; petals yellow.

PINK FAMILY (CARYOPHYLLACEAE)

Herbaceous plants with opposite, entire leaves and perfect, regular flowers.

SAND-SPURRY (*Drymaria tenella*) (S): Stems slender, usually less than 6 inches high, branched; leaves very narrowly linear, less than $\frac{1}{2}$ inch long; flowers very small, at the ends of branches; sepals 5; petals 5, each 2-lobed, white, not longer than the sepals; stamens 5; fruit a capsule.

BARBERRY FAMILY (BERBERIDACEAE)

A small family of shrubs with compound leaves, the leaflets thick, evergreen, prickly; flowers perfect, regular, yellow; sepals, petals and stamens 6 each; fruit a few-seeded berry.

CREeping MAHONIA (*Berberis repens*) (S): A low, evergreen shrub; stems very short or almost lacking; leaves pinnately compound, each leaflet with 10 or more small, spiny teeth; flowers numerous in a raceme, yellow; berries blue-black.

FAMILIES OF PLANTS

CROWFOOT FAMILY (RANUNCULACEAE)

Mostly herbaceous plants with perfect flowers. A very variable family which contains such attractive flowers as buttercups, columbines, larkspurs, and clematis. The following is our only representative.

LARKSPUR (*Delphinium scaposum*) (S): Stems 8 to 29 inches high, erect, unbranched, smooth; leaves all basal or nearly so, 3- to 5-divided, the divisions lobed or toothed; flowers irregular, in an open 5- to 10-flowered raceme; sepals 5, blue, the upper 2 spurred at the base; petals 4, the upper 2 white or merely tinged with blue and spurred at the base, the lower 2 blue and not spurred.

POPPY FAMILY (PAPAVERACEAE)

Herbaceous plants with very diverse characters, mostly with attractive flowers.

GOLDEN CORYDALIS (*Corydalis aurea*) (S): Stems 4 to 16 inches high, profusely branched and bushy; leaves twice pinnate, the leaflets pinnately lobed; juice yellow; flowers relatively small, numerous, pale yellow, the corolla with a short spur at the base.

MUSTARD FAMILY (CRUCIFERAE)

The flowers of this family usually have 4 sepals, 4 petals arranged in the form of a cross, 6 stamens with 2 shorter than the other 4, and 1 pistil which matures into a pod. In many cases it is necessary to have mature pods as well as flowers in order to identify a species with certainty.

1. Flowers white; pods strongly flattened, wider than long, the 2 cells side by side.
SPECTACLEPOD (*Dithyrea wislizeni*).....30
Flowers purple or pinkish. 2.
Flowers yellow or yellowish. 3.
2. Leaves clasping the stem at the base.
ROCKCRESS (*Arabis fendleri*).....30
Leaves not clasping the stem at the base.
SISYMBRIUM (*Sisymbrium linearifolium*).....31
3. Pods not more than twice as long as wide. 4.
Pods more than twice as long as wide. 6.
4. Pods 2-lobed.
TWINPOD (*Physaria newberryi*).....30
Pods not 2-lobed. 5.
5. Basal leaves mostly more than an inch long, usually rolled.
BLADDERPOD (*Lesquerella intermedia*).....30
Basal leaves mostly less than an inch long; usually flat; plants dwarf.
BLADDERPOD (*Lesquerella arizonica*).....30
6. Pods long-stalked within the calyx.
DESERT PLUME (*Stanleya pinnata*).....31
Pods sessile or very short-stalked within the calyx. 7.
7. Pods more or less erect, not wide-spreading; flowers bright yellow and showy.

FAMILIES OF PLANTS

- WESTERN WALLFLOWER (*Erysimum capitatum*).....30
 Pods wide-spreading; flowers smaller, not very showy. 8.
8. Mature pods less than an inch long. 9.
 Mature pods more than an inch long. 10.
9. Pods containing 40 to 60 seeds, in 2 rows in each cell.
 TANSY MUSTARD (*Descurainia obtusa*).....30
 Pods containing 10 to 20 seeds, in 1 row in each cell.
- TANSY MUSTARD (*Descurainia pinnata*).....30
10. Lower leaves entire or merely toothed.
 STREPTANTHELLA (*Streptanthea longirostris*).....31
 Lower leaves deeply lobed or pinnately compound.
 TUMBLE MUSTARD (*Sisymbrium altissium*).....30
- ROCKCRESS (*Arabis fendleri*) (S): Stems usually single, 4 inches to 2 feet tall; basal leaves 1 to 2 inches long, toothed near the tip, those on the stem smaller, alternate, sessile, entire; flowers pinkish-purple; pods slender, 1 to 2 inches long, spreading.
- TANSY MUSTARD (*Descurainia obtusa*) (S): Stems 2 to 4 feet tall, usually branched above the base, white-hairy; leaves with lobes that are noticeably blunt or rounded at the tip; flowers very small, yellow; pods less than an inch long, containing 40 to 60 seeds.
- TANSY MUSTARD (*Descurainia pinnata*) (W): Similar to the preceding but the lobes of the leaves are usually more pointed and the pods contain only 10 to 20 seeds.
- SPECTACLEPOD (*Dithyrea wislizeni*) (W): Stems erect, 8 to 24 inches high, branched; leaves numerous, 1 to 2½ inches long, linear to lanceolate, toothed or nearly entire; flowers white or whitish; pods with the 2 nearly round cells side by side, nearly ¼ inch across.
- WESTERN WALLFLOWER (*Erysimum capitatum*) (S): Stems 8 inches to 2 feet tall; leaves entire to few-toothed or slightly lobed; flowers bright yellow; petals about ½ inch long; pods slender, 1 to 3 inches long, erect or nearly so.
- BLADDERPOD (*Lesquerella arizonica*) (W): Dwarf plants with stems often less than an inch long; leaves mostly basal, less than an inch long, linear, flat; flowers yellow, crowded at the end of the stem; pods small, oval, inflated, bearing the remaining style which is about ½ as long as the pod; stems and leaves white-hairy.
- BLADDERPOD (*Lesquerella intermedia*) (S): Stems 1 to 6 inches long; leaves clustered at the base and scattered on the stem, narrowly linear and rolled, less than 2 inches long; stems and leaves white-hairy; flowers yellow, crowded near the ends of the stems; pods small, oval, inflated, bearing the remaining style which is about as long as the pod.
- TWINPOD (*Physaria newberryi*) (S): Stems usually several, mostly 2 to 3 inches high; leaves mostly basal, the blades obovate to nearly round; stems, leaves and sepals covered with silvery, star-shaped hairs; petals narrow, yellow; pods bladderly, deeply notched between the 2 cells.
- TUMBLE MUSTARD (*Sisymbrium altissimum*) (S): Stems 1 to 4 feet high, freely branched; lower leaves deeply lobed, often nearly or quite to the

FAMILIES OF PLANTS

midrib, upper leaves smaller, less deeply lobed; flowers pale yellow; pods slender, 3 to 4 inches long.

SISYMBRIUM (*Sisymbrium linearifolium*) (S): Stems 1 to 4 feet tall; basal leaves oblanceolate, 2 to 4 inches long, toothed; stem leaves smaller, linear, entire; flowers purple, about $\frac{1}{2}$ inch long; pods slender $1\frac{1}{2}$ to 4 inches long.

DESERT PLUME (*Stanleya pinnata*) (W): Stems usually several, 1 to 5 feet tall, smooth or nearly so; lower leaves pinnately lobed, the upper entire, oblanceolate or narrower; flowers $\frac{1}{2}$ inch long or more, yellow, very showy; pods 1 to 3 inches long.

STREPTANTHELLA (*Streptanthella longirostris*) (W): Stems 8 to 24 inches long; lower leaves narrowly oblanceolate or ovate, somewhat toothed; stem leaves linear or narrowly lanceolate, entire or nearly so; flowers white to yellowish, about $\frac{1}{4}$ inch long; pods slender, 1 to 3 inches long, narrowed to a conspicuous beak.

CAPER FAMILY (CAPPARIDACEAE)

Mostly herbaceous plants with alternate, compound leaves with 3 leaflets; flowers perfect and regular, mostly in terminal racemes; sepals and petals 4; stamens 6 or more.

ROCKY MOUNTAIN BEEPLANT (*Cleome serrulata*) (S): Stems 20 inches to 3 feet high or more, branched above; leaflets lanceolate or oblong, smooth, entire or with very small teeth, 1 to 2 inches long; flowers purplish-pink, rarely white; petals $\frac{1}{2}$ inch long or less; stamens 6; fruit a slender pod, 1 to 2 inches long.

CLAMMYWEED (*Polanisia trachysperma*) (W): Branched, rather sticky plants with a disagreeable odor; stems 8 to 16 inches high; leaflets 1 to 2 inches long, oval or oblanceolate; petals yellowish-white, $\frac{1}{2}$ inch long or less; stamens 12 or more, twice as long as the petals; fruit 1 to 2 inches long.

JACKASS-CLOVER (*Wislizenia refracta*) (W): Stems 20 inches to 2 feet tall, much branched; leaflets elliptic or obovate; flowers very small and numerous, yellow; pods very small with 1 seed in each of the 2 cells.

SAXIFRAGE FAMILY (SAXIFRAGACEAE)

Herbs or shrubs with mostly simple leaves and perfect flowers. Some have very showy flowers and some have edible fruits.

WOODLAND STAR (*Lithophragma tenella*) (S): A herb with slender stems, 4 to 10 inches high, more or less glandular-hairy; leaves deeply 3-lobed, the lobes deeply cut and toothed, the blades less than an inch long and about as wide; flowers 3 to 12 on short stalks, white, the petals deeply 3- to 7-lobed.

WAX CURRANT (*Ribes cereum*) (S) (W): A much-branched shrub; usually 2 to 6 feet high, the young twigs hairy; leaves nearly round in outline, mostly about an inch wide, often glandular-hairy, 3 to 5 lobed, the lobes scalloped; flowers pinkish-white, the petals about half as long as the calyx, the entire flower $\frac{1}{4}$ inch long or more; fruit a berry about $\frac{1}{4}$ inch in diameter, red, usually smooth.

FAMILIES OF PLANTS

ORANGE GOOSEBERRY (*Ribes pinetorum*) (S): A spiny shrub, about 6 feet high; leaves about an inch across, usually 5-lobed, the lobes sharply toothed; flowers about an inch long, reddish-yellow, berries about $\frac{1}{2}$ inch in diameter, purple, very prickly.

ROSE FAMILY (ROSACEAE)

A large and variable family of trees, shrubs and herbs with alternate leaves and perfect, regular flowers, usually with numerous stamens. The family contains many edible fruits and many beautiful flowers. Our members of the family are all shrubs with white or cream-colored flowers.

1. Ovary inferior; fruit fleshy, berrylike, red.
 SERVICEBERRY (*Amelanchier utahensis*).....32
 Ovary superior; fruit dry. 2.
2. Flowers in terminal panicles; fruits without tails; leaves aromatic.
 ROCK-SPIREA (*Holodiscus dumosus*).....32
 Flowers mostly solitary at the ends of the branches; fruits with feathery tails; leaves not aromatic. 3.
3. Outer bark peeling off in flakes; bracts present between the sepals; fruits with purplish tails.
 APACHE PLUME (*Fallugia paradoxa*).....32
 Outer bark not peeling off; bracts not present between the sepals; fruits with white tails.

CLIFF-ROSE (*Cowania mexicana*).....32
 SERVICEBERRY (*Amelanchier utahensis*) (S): A shrub, 12 feet high or less; leaves alternate, 1 inch long or less, oval, ovate or nearly round, more or less toothed, especially above the middle petals $\frac{1}{4}$ to $\frac{1}{2}$ inch long, white, fruit about $\frac{1}{4}$ inch in diameter, purplish-black.

CLIFF-ROSE (*Cowania mexicana*) (W): A shrub up to 12 feet high but usually lower; leaves more or less wedge-shaped in outline, 3- to 5-lobed, the margin rolled, green and often dotted with glands above, often white-woolly beneath; flowers $\frac{1}{2}$ to nearly 1 inch across, the petals white or pale yellowish; stamens numerous; pistils about 5 or more; akenes with feathery tails 1 to 2 inches long.

APACHE PLUME (*Fallugia paradoxa*) (S) (W): A shrub, 2 to 5 feet tall; the young twigs hairy; leaves small, with 3 to 5 linear lobes, more or less hairy, less than an inch long; flowers white, showy, petals about an inch long; tails of akenes 1 to 2 inches long, usually purplish.

ROCK-SPIRAEA (*Holodiscus dumosus*) (S): A shrub, usually 2 to 4 feet high; leaves elliptic, $\frac{1}{2}$ to 2 inches long, with 3 to 6 teeth on each side, aromatic; flowers small, numerous, cream-colored; akenes hairy.

PEA FAMILY (LEGUMINOSAE)

A large and important family of both woody and herbaceous plants. All of ours have compound leaves, all but 2 have more or less irregular flowers, and all but 4 have flowers of the sweetpea type. In the sweetpea type of flower the corolla has 5 petals and is very irregular. The large uppermost petal is called the standard, the 2 lateral ones are the wings,

FAMILIES OF PLANTS

and the 2 lower ones are united along their edges to form the keel which usually encloses the stamens and pistil. In most of the sweetpea type of flowers there are 10 stamens, usually with 9 of them united and 1 free. The fruit is a pod.

1. Woody plants (shrubs). 2.
Non-woody plants (herbs). 3.
2. Plants usually less than a foot high; flowers pink or purple, irregular; twigs bearing conspicuous, orange-colored glands.
INDIGOBUSH (*Dalea whitingi*).....35
Plants usually more than a foot high; flowers yellowish, regular, corolla lacking; glands present but not orange-colored.
DUNE BROOM (*Parrystella filifolia*).....36
3. Flowers regular or nearly so, white or pinkish.
FALSE-MESQUITE (*Calliandra humilis*).....35
Flowers somewhat irregular but not of the sweetpea type, yellow. 4.
Flowers of the sweetpea type. 5.
4. Leaves once pinnately compound.
SENNA (*Cassia bauhinioides*).....35
Leaves twice pinnately compound.
RUSHPEA (*Hoffmanseggia drapanocarpa*).....35
5. Flowers yellow; leaves palmately compound or appearing so, sessile or nearly so.
DEER-VETCH (*Lotus wrightii*).....35
Flowers not yellow. 6.
6. Leaves dotted with glands. 7.
Leaves not dotted with glands. 9.
7. Flowers whitish with only the tip of the keel sometimes purple.
LEMON SCURFPEA (*Psoralea lanceolata*).....36
Flowers purple. 8.
8. Leaflets 3 to 5, very narrowly linear.
DALEA (*Dalea filiformis*).....35
Leaflets 7 to 15, obovate.
DALEA (*Dalea terminalis*).....35
9. Leaves with 3 leaflets. 10.
Leaves with more than 3 leaflets. 11.
10. Stems trailing or weakly twining; flowers purple.
WILD BEAN (*Phaseolus angustifolius*).....36
Stems not trailing or twining; flowers white.
WHITE SWEET-CLOVER (*Melilotus alba*).....35
11. Leaves palmately compound; flowers blue or purple. 12.
Leaves pinnately compound. 13.
12. Plants annual, 2 to 8 inches high; flower clusters usually less than an inch long.
LUPINE (*Lupinus kingii*).....35
Plants perennial; 1 to 3 inches tall; flower clusters 2 to 8 inches long.

FAMILIES OF PLANTS

- LUPINE (*Lupinus palmeri*).....35
13. Leaves with tendrils.
 PEA VINE (*Lathyrus leucanthus* var. *laetivirens*).....35
 Leaves without tendrils. 14.
14. Flowers white or whitish. 15.
 Flowers purple. 17.
15. Leaflets 5 to 7; pod about an inch long, straight, not much inflated
 MILKVETCH (*Astragalus lancearius*).....34
 Leaflets 11 or more. 16.
16. Pods slender, somewhat curved, not inflated; flowers often purple-tinged.
 MILKVETCH (*Astragalus recurvus*).....34
 Pods greatly inflated; flowers not purple-tinged.
 MILKVETCH (*Astragalus allochrus*).....34
17. Plant with flower cluster usually less than 6 inches high; leaflets usually more than 21.
 MILKVETCH (*Astragalus tephrodes*).....34
 Plant with flower clusters usually more than 6 inches high; leaflets usually less than 21. 18.
18. Leaves all basal or nearly so; flowering stems usually about twice as long as the leaves.
 LOCO (*Oxytropis lambertii*).....36
 Leaves not basal; flowering stems not conspicuously longer than the leaves.
 MILKVETCH (*Astragalus lentiginosus* var. *dipsysus*).....34
- MILKVETCH (*Astragalus lancearius*) (W): Stems 1 to 2 feet high, much branched; leaves 3 to 6 inches long with 11 to 19 oval or nearly linear leaflets; flowers yellowish-white, about $\frac{1}{4}$ inch long or less; pods strongly inflated, about an inch long and half as wide when fully mature.
- MILKVETCH (*Astragalus lencearius*) (W): Stems 1 to 2 feet high, somewhat rushlike and not branched; leaves mostly with 5 or 7 linear leaflets, these 1 inch long or less; flowers yellowish-white with a purple tip; pods oblong, not inflated, about an inch long and $\frac{1}{4}$ inch wide.
- MILKVETCH (*Astragalus lentiginosus* var. *diphysus*) (W): Stems 6 to 16 inches high, branched; leaves with 13 to 21 leaflets; leaflets $\frac{1}{4}$ to $\frac{1}{2}$ inch long, mostly elliptic or oval; flowers about $\frac{1}{2}$ inch long, purple; pods somewhat inflated, $\frac{1}{2}$ to 1 inch long.
- MILKVETCH (*Astragalus recurvus*) (S): Stems rather slender, usually less than a foot high; leaves with about 13 linear leaflets; flowers whitish but usually tinged with purple; pods slender, less than an inch long, somewhat curved, usually hanging downward when mature.
- MILKVETCH (*Astragalus tephrodes*) (W): Stems usually 3 to 8 inches high, branched from the base; leaves with 12 to 30 or more leaflets; leaflets oval, about $\frac{1}{2}$ inch long, soft-hairy, especially beneath; flowers in stalked racemes slightly longer than the leaves; corolla about an inch long, purple with a yellowish base; pods ovate, about $\frac{1}{2}$ inch long, somewhat inflated, smooth.

FAMILIES OF PLANTS

FALSE-MESQUITE (*Calliandra humilis*) (S): Stems usually 4 to 8 inches long; leaves twice compound, the leaflets small, numerous, crowded; stamens numerous, about $\frac{1}{2}$ inch long; pods about $1\frac{1}{4}$ inches long.

SENNA (*Cassia bauhinioides*) (W): Usually less than a foot high, branched from the base; leaves with 2 leaflets at the end of a $\frac{1}{2}$ to 1 inch long petiole; leaflets about 1 inch long, oblong and very 1-sided at the base; flowers 1 to 2 on each axillary stalk; petals yellow, about $\frac{3}{4}$ inch long; pods broadly linear, somewhat curved, about an inch long.

DALEA (*Dalea filiformis*) (W): Stems slender, usually less than a foot high; leaves with 3 to 5 leaflets, these very narrowly linear and about $\frac{1}{4}$ inch long, sometimes more; flowers purple, in spikes that are about $\frac{1}{2}$ inch long or less; calyx very hairy.

DALEA (*Dalea terminalis*) (W): Stems slender, usually 1 to 2 feet long, densely short-hairy; leaves with 7 to 15 leaflets; leaflets obovate, about $\frac{1}{4}$ inch long, hairy like the stems and dotted with glands; spikes 1 to 3 inches long, about $\frac{1}{4}$ inch wide; flowers purple.

INDIGOBUSH (*Dalea whitingi*) (W): A low, much branched shrub, usually a foot high or less; leaves with 11 to 19 leaflets; leaflets $\frac{1}{4}$ inch long or less, oblong but occasionally rolled and appearing linear; flowers purple or pinkish, in loose racemes which are 1 to 4 inches long; calyx hairy and dotted with orange glands like those of the stems.

RUSHPEA (*Hoffmanseggia drapanocarpa*) (W): Stems 6 to 16 inches high, branched from a somewhat woody base, somewhat hairy and glandular; leaves twice pinnate; leaflets less than $\frac{1}{4}$ inch long, ovate to oblong, dotted with black or orange glands beneath; flowers yellow with 10 distinct stamens; pods very small, black-dotted and with tufts of star-shaped hairs.

PEAVINE (*Lathyrus leucanthus* var. *leativirens*) (S): Stems 6 to 20 inches tall, branched; leaves with 4 to 6 leaflets, these about $\frac{1}{2}$ inch long or more; flowers about $\frac{1}{2}$ inch long, white, sometimes tinged with purple or yellow, plant resembles a vetch.

DEER-VETCH (*Lotus wrightii*) (W): Stems 8 to 16 inches high, leaves with 4 to 6 leaflets, these $\frac{1}{2}$ inch long or less, crowded and appearing palmate; flowers about $\frac{1}{2}$ inch long, usually nearly sessile; pods slender, about an inch long.

LUPINE (*Lupinus kingii*) (S): Stems 2 to 8 inches high, branched from the base, often wide-spreading, silvery-silky; leaves with about 7 leaflets; flower cluster shorter to somewhat longer than the leaves; corolla about $\frac{1}{2}$ inch long, purple or blue; pods $\frac{1}{4}$ to $\frac{1}{2}$ inch long.

LUPINE (*Lupinus palmeri*) (S): Stems 1 to 3 feet high; leaves with 5 to 10 leaflets, these 1 to 3 inches long, very hairy on both sides; racemes 2 to 8 inches long, very showy; corolla about $\frac{1}{2}$ inch long or more, blue or purple; pods about 1 inch long, 3- to 5-seeded.

WHITE SWEET-CLOVER (*Melilotus alba*) (S): Stems 2 to 6 feet tall; leaves petioled, the 3 leaflets 1 inch long or less; flowers very small, in numerous slender racemes which are 2 to 6 inches long; pods very small, 1- or 2-seeded.

FAMILIES OF PLANTS

LOCO (*Oxytropis lambertii*) (S): Stems usually 4 to 12 inches high; leaves with 7 to 17 oblong to linear leaflets, racemes many-flowered, very showy; corolla $\frac{1}{2}$ to 1 inch long; plant poisonous to livestock if eaten.

DUNE BROOM (*Parryella filifolia*) (W): A low shrub, 1 to 3 feet high; leaves 2 to 5 inches long with 11 to 45 leaflets, these 1 inch long or less; flowers yellowish-green, small, in slender racemes; corolla lacking; pods very small, 1-seeded, bearing the feathery style.

WILD BEAN (*Phaseolus angustissimus*) (S): Stems from a few inches to 3 feet long or more, trailing or climbing; leaves with 3 linear to triangular-ovate, mostly entire leaflets; flowers purple, in axillary clusters; pods similar to those of a cultivated bean.

LEMON SCURFPEA (*Psoralea lanceolata*) (S): Stems 6 to 16 inches tall, smooth or nearly so; leaves petioled, the 3 leaflets oblanceolate to narrowly linear, dotted with glands; flowers in short, axillary, spikelike racemes; pods nearly spherical with a short beak, densely dotted with glands.

GERANIUM FAMILY (GERANIACEAE)

The flowers of this family are characterized by having 5 styles united around a central column and becoming much longer in fruit.

CRANESBILL (*Geranium caespitosum*) (S): Stems 4 inches to 2 feet tall or more, usually much branched; leaves 1 to 2 inches across, usually 5-lobed; flowers purple, about an inch across; style column of fruit about an inch long.

FLAX FAMILY (LINACEAE)

Herbaceous plants with slender stems, simple, alternate, sessile leaves, and perfect, regular flowers.

BLUE FLAX (*Linum lewisii*) (S): Stems 1 to 2 feet high, sometimes branching at the base; leaves numerous, linear, entire, about $\frac{3}{4}$ inch long or less; flowers about an inch across, blue, occasionally white, with 5 petals, 5 stamens and 5 distinct styles, blooming early in the morning and falling apart before night.

CALTROP FAMILY (ZYGOPHYLLACEAE)

Herbs or shrubs with compound leaves and perfect, regular flowers, the stamens more numerous than the petals. Ours are herbs with yellow flowers.

KALLSTROEMIA (*Kallstroemia californica*) (W): Stems 4 to 15 inches long, branching from the base and wide-spreading; leaves 1 to 2 inches long with 5 to 7 pairs of leaflets, leaflets about $\frac{1}{4}$ inch long, white hairy; petals about $\frac{1}{8}$ inch long; fruit angled and rough but not spiny.

PUNCTURE WEED (*Tribulus terrestris*) (W): Very similar to kallstroemia except that the fruits are spiny and the leaflets are less hairy and therefore brighter green.

SPURGE FAMILY (EUPHORBIACEAE)

Many members of this family contain a milky juice. The flowers are imperfect and usually not conspicuous. The fruits are mostly 3-angled and 3-seeded.

FAMILIES OF PLANTS

1. Plants without milky juice; flowers in racemes, the staminate above, the pistillate below; plants clothed with either star-shaped or stinging hairs. 2.
Plants with milky juice; flowers in clusters of 1 pistillate and several staminate flowers surrounded by a calyxlike involucre, the whole appearing like a perfect flower; plants without either star-shaped or stinging hairs. 3.
2. Stems and leaves clothed with star-shaped hairs.
CROTON (*Croton texensis*).....37
Stems and leaves armed with stinging hairs.
NOSEBURN (*Tragia nepetaefolia*).....38
3. Involucres without white, petallike appendages. 4.
Involucres with white, petallike appendages. 5.
4. Leaves alternate.
SPURGE (*Euphorbia lurida*).....37
Leaves opposite.
SPURGE (*Euphorbia micromera*).....38
5. Leaves linear, not 1-sided at the base. 6.
Leaves oblong to nearly round, more or less 1-sided at the base. 7.
6. Fruits sharply 3-angled; male flowers 5 to 12 in each involucre; delicate plants with hairlike branches.
SPURGE (*Euphorbia revoluta*).....38
Fruits roundly 3-lobed; male flowers numerous in each involucre; coarser plants with stouter branches.
SPURGE (*Euphorbia parryi*).....38
7. Plants more or less erect.
SPURGE (*Euphorbia fendleri*).....37
Plants prostrate.
SPURGE (*Euphorbia albomarginata*).....37

CROTON (*Croton texensis*) (W): Stems 8 inches to 2 feet high, branched; leaves linear to lanceolate or oblong, 1 to 3 inches long; staminate flowers in small racemes, the pistillate solitary or 2 to 4 together, sometimes on separate plants but often on the same plant; fruit 3-angled, about the size of a pea.

SPURGE (*Euphorbia albomarginata*) (W): Stems 4 to 12 inches long, prostrate, smooth; leaves oblong or nearly round, less than an inch long; involucres solitary in the leaf axils, the appendages white and conspicuous; male flowers 15 to 30 in each involucre, each consisting of a single stamen; fruit 3-angled, very small.

SPURGE (*Euphorbia fendleri*) (S) (W): Very similar to the preceding except that the stems are erect or somewhat spreading but not prostrate.

SPURGE (*Euphorbia lurida*) (S): Stems about 3 to 12 inches high, branched above; stem leaves alternate, those subtending the flowers opposite or whorled, all entire and sessile, oblanceolate to broadly ovate, the lower ones very small, the largest of those higher up nearly an inch long, some purple-tipped.

FAMILIES OF PLANTS

CASHEW FAMILY (ANACARDIACEAE)

SPURGE (*Euphorbia micromera*) (W): Stems 5 to 10 inches long, prostrate; leaves ovate to oblong, about $\frac{1}{4}$ inch long or less, somewhat 1-sided at the base, entire; male flowers 2 to 5 in each involucre; fruit sharply 3-angled, smooth or nearly so.

SPURGE (*Euphorbia parryi*) (W): Stems erect or spreading, 2 to 12 inches long; leaves linear, $\frac{1}{4}$ to $\frac{1}{2}$ inch long or more; petallike appendages narrow, white, smooth, entire; male flowers 40 to 55 in each involucre; fruit very small, deeply 3-lobed.

SPURGE (*Euphorbia revoluta*) (W): Stems 1 to 8 inches high, erect, smooth; largest leaves about an inch long or less, narrowly linear, margins entire and rolled; petallike appendages sometimes not very conspicuous.

NOSEBURN (*Tragia nepetaefolia*) (W): Stems 4 to 10 inches high usually much branched; leaves triangular to lanceolate or nearly linear; stems and leaves bristly with stinging hairs; male and female flowers on the same plant, in terminal and lateral racemes.

Shrubs, small trees or woody vines with mostly alternate, simple or compound leaves and usually perfect, but very small flowers; fruit small, cherrylike but rather dry.

SKUNKBUSH (*Rhus trilobata*) (W): A shrub, 2 to 8 feet high with slender branches, rather ill-smelling; leaflets 3, about an inch long or less, all sessile or nearly so; flowers in dense spikelike racemes, yellow; fruits red with short, glandular hairs.

MALLOW FAMILY (MALVACEAE)

Flowers belonging to this family are usually readily recognized by the numerous stamens which are united to form a column around the styles.

1. Flowers solitary in the leaf axils.
INDIAN-MALLOW (*Abutilon parvulum*).....38
Flowers in axillary and terminal clusters. 2.
2. Upper leaves linear, lower ones with linear lobes.
GLOBE-MALLOW (*Sphaeralcea leptophylla*).....39
Leaves neither linear nor with linear lobes. 3.
3. Leaves deeply lobed, usually more than half way to the midrib.
GLOBE-MALLOW (*Sphaeralcea grossulariaefolia*).....39
Leaves unlobed or shallowly lobed. 4.
4. Leaf blades about as wide as long.
GLOBE-MALLOW (*Sphaeralcea parviflora*).....39
Leaf blades definitely longer than wide. 5.
5. Leaves mostly 3- to 5-lobed.
GLOBE-MALLOW (*Sphaeralcea fendleri*).....39
Leaves mostly unlobed or with a single lobe on either side at the base.
GLOBE-MALLOW (*Sphaeralcea subhastata*).....39

INDIAN-MALLOW (*Abutilon parvulum*) (W): Stems slender, 4 to 12 inches high; leaves $\frac{1}{2}$ to 2 inches long and nearly as wide, ovate to nearly triangular with a heart-shaped base, toothed, the larger ones slightly 3-

FAMILIES OF PLANTS

lobed; both stems and leaves clothed with branched hairs; flowers solitary in the leaf axils, coppery pink or red, about $\frac{1}{4}$ inch across; fruit about $\frac{1}{4}$ inch long, densely hairy with branched hairs.

GLOBE-MALLOW (*Sphaeralcea fendleri*) (S): Stems 2 to 5 feet tall; leaves quite variable, from less than an inch to more than 4 inches long, toothed or scalloped, usually more or less 3-lobed; flowers medium-sized with petals $\frac{1}{4}$ to $\frac{1}{2}$ inch long, some shades of pink, in racemes.

GLOBE-MALLOW (*Sphaeralcea grossulariaefolia*) (W): Stems several, 20 to 40 inches tall, white-hairy throughout; leaves 1 to 2 inches long, broadly ovate in outline, deeply lobed, the lobes again lobed and toothed; flowers in a very dense panicle, petals about $\frac{1}{2}$ inch long, pink or reddish.

GLOBE-MALLOW (*Sphaeralcea leptophylli*) (W): Clothed thruout with silvery scales that have short, marginal hairs; stems several to many, 1 to 2 feet tall; upper leaves linear, entire; lower leaves divided into 3 linear lobes; flowers in loose racemes, the petals $\frac{1}{4}$ to $\frac{1}{2}$ inch long, pink or red.

GLOBE-MALLOW (*Sphaeralcea leptophylla*) (W): Clothed thruout with ches tall, usually several together, clothed with short, grayish hairs; leaves 1 to 2 inches long, broadly ovate to rounded, toothed, usually 3- or 5-lobed, more or less hairy with gray, branched hairs on both sides; flowers pink or red, the petals $\frac{1}{4}$ to $\frac{1}{2}$ inch long; lower part of fruit smooth or nearly so.

GLOBE-MALLOW (*Sphaeralcea subhastata*) (W): Very similar to the preceding but the leaves usually narrower and either unlobed or with a single lobe on either side at the base, and the lower part of the fruit is usually rough.

TAMARIX FAMILY (TAMARICACEAE)

Shrubs with slender branches, scalelike leaves, and small but numerous, perfect flowers.

TAMARIX (*Tamarix pentandra*) (W): A shrub or small tree, usually 6 to 20 feet high with smooth, often purplish branches; leaves alternate, scalelike, lanceolate, pale green; flowers pink, in densely fowered racemes which are arranged in large panicles.

LOASA FAMILY (LOASACEAE)

Mostly herbaceous, rough-hairy plants with pale bark, simple but often deeply lobed, alternate leaves and perfect, regular flowers with few to many stamens and 1 pistil with an inferior ovary. The fruit is a capsule.

STICKLEAF (*Mentzelia albicaulis*) (W): Stems 4 to 16 inches high, slender, white and shining, smooth or nearly so; leaves mostly 1 to 2 inches long, varying from linear and entire to broader and deeply, pinnately lobed, very rough-hairy; flowers solitary and sessile, about $\frac{1}{2}$ inch across; petals 5, yellow; capsules narrowly cylindric, about $\frac{1}{4}$ inch long.

STICKLEAF (*Mentzelia pumila*) (S) (W): Similar to the preceding but the flowers at least twice as large and not sessile.

CACTUS FAMILY (CACTACEAE)

Plants with thick, fleshy, very prickly stems and usually no leaves. The flowers are usually large and beautiful with numerous sepals, petals and

FAMILIES OF PLANTS

stamens and a single pistil with an inferior ovary which matures into a berrylike, many-seeded fruit.

1. Stems with longitudinal ridges, not jointed.
 HEDGEHOG CACTUS (*Echinocereus fendleri*).....40
 Stems jointed. 2.

2. Joints of stem flattened and broad.
 PRICKLYPEAR (*Opuntia compressa* var. *macrorhiza*).....40
 Joints of stem cylindrical.

 CHOLLA (*Opuntia whipplei*).....40

 HEDGEHOG CACTUS (*Echinocereus fendleri*) (W): Stems usually 6 inches high or less, with about 8 to 10 longitudinal ridges; central spine in each cluster solitary, not hooked, not flattened at the base; flowers purple, borne just above a spine cluster; fruit spiny, juicy, edible.

 PRICKLYPEAR (*Opuntia compressa* var. *macrorhiza*) (S) (W): Stems usually less than 18 inches high with joints less than 6 inches long; long spines 1 to 3 in each cluster, mostly near the upper end of each joint, accompanied by barbed prickles and sometimes by shorter spines; flowers yellow, about 2 inches across; fruit fleshy.

 CHOLLA (*Opuntia whipplei*) (W): Plant usually low and creeping, often forming a dense clump; joints cylindrical, with prominent tubercles; principle spines 1 to 4 in each cluster; flowers greenish yellow; fruits 1 inch long or more, fleshy, with tubercles.

EVENING-PRIMROSE FAMILY (ONAGRACEAE)

The flowers in our members of this family have 4 sepals, 4 petals, and 8 stamens. The ovary is inferior and in one species may be several inches below the other parts of the flower.

1. Fruits nutlike; flowers white or pinkish. 2.
 Fruit a capsule; flowers in ours white, sometimes turning pink with age. 3.
2. Fruits widest at or near the middle; winged only above this point.

 GAURA (*Gaura coccinea*).....40

 Fruits widest near the base; winged almost the entire length.

 GAURA (*Gaura gracilis*).....40

3. Stigma knoblike, without linear lobes.
 EVENING-PRIMROSE (*Oenothera boothii*).....40
 Stigma with 4 linear lobes. 4.

4. Leaves all basal or nearly so; flowers turning pink with age.
 EVENING-PRIMROSE (*Oenothera caespitosa*).....41
 Leaves not all basal.

 EVENING-PRIMROSE (*Oenothera runcinata*).....41

 GAURA (*Gaura coccinea*) (S) (W): Stems 4 to 12 inches high, usually several together, more or less branched; leaves $\frac{1}{4}$ to $\frac{1}{2}$ inch long, oblong to oblanceolate, entire or toothed; flowers about $\frac{1}{4}$ inch long, white or pink; fruits 4-angled and somewhat winged in the upper half, about $\frac{1}{4}$ inch long.

 GAURA (*Gaura gracilis*) (S): Very similar to the preceding except that the fruits are 4-angled and somewhat winged nearly the full length.

 EVENING-PRIMROSE (*Oenothera boothii*) (W): Stems 4 to 16 inches

FAMILIES OF PLANTS

high, usually widely branched; leaves ovate or oblong, the blades nearly entire, 1 to 2 inches long, the petioles about 1 inch long or less; flowers in a rather dense, spikelike raceme; petals white, becoming pink in age; capsule about $\frac{1}{2}$ inch long.

EVENING-PRIMROSE (*Oenothera caespitosa*) (S): Practically stemless and quite smooth throughout; leaf blades 1 to 4 inches long, toothed or nearly entire, on winged petioles of about the same length; flowers fragrant as they open in the evening; ovary 2 to 3 inches below the other flower parts, sessile among the leaves; petals white, becoming pink with age; capsule about an inch long with rounded tubercles on the angles.

EVENING-PRIMROSE (*Oenothera runcinata*) (W): Stems 6 to 24 inches high, usually much branched; bark white, often peeling on the older parts of the stem; leaves $\frac{1}{2}$ to 3 inches long, narrow, from nearly entire to toothed or pinnately lobed with short, pointed lobes; flowers sessile in the leaf axils near the ends of the branches; ovary about an inch or more below the other flower parts; petals about $\frac{1}{4}$ inch long and nearly as wide, white, turning pink with age.

PARSLEY FAMILY (UMBELLIFERAE)

Herbaceous plants with alternate or basal leaves and small, perfect flowers with 5 petals, 5 stamens, and an inferior ovary. The calyx lobes are very small or lacking entirely and the flowers are borne in umbels. The fruit consists of 2 1-seeded parts united by their flat faces, each part having 5 ribs, 2 on the edges and 3 on the back. It is often necessary to have fruits as well as flowers in order to identify members of the family.

CYMOPTERUS (*Cymopterus bulbosus*) (W): Plant 1 to 12 inches high, leaves once or twice pinnately compound, ovate to oblong in outline, the leaflets varying from entire to pinnately lobed; flowering stems longer than the leaves; flowers very small, purplish; fruit $\frac{1}{4}$ to $\frac{1}{2}$ inch long, narrowly winged.

BISCUIT ROOT (*Lomatium macdougalii*) (S): Plant 3 to 12 inches high, leaves all basal, about 3 times compound, the divisions crowded, linear to ovate, the petioles sheathing the stem; flowers yellow, sometimes purpletinged; fruit ovate to nearly round, narrowly winged, somewhat hairy, $\frac{1}{4}$ inch long or more.

OLIVE FAMILY (OLEACEAE)

Mostly woody plants with very diverse character and habit.

WILD-OLIVE (*Forestiera neomexicana*) (W): A much branched shrub, 6 to 8 feet high; leaves opposite, usually oblong, an inch long or less, entire or with very small teeth; flowers mostly imperfect, the male and female flowers on separate plants, usually without calyx or corolla, appearing along the twigs before the leaves; fruit small, oblong or egg-shaped, cherrylike.

DOGBANE FAMILY (APOCYNACEAE)

Herbaceous plants with milky juice, simple, entire leaves and perfect, regular flowers with 5 united petals, 5 stamens, and 2 pistils. The fruit is a pair of pods.

FAMILIES OF PLANTS

AMSONIA (*Amsonia peeblesii*) (W): Stems 1 to several, usually 8 to 20 inches high, branched above; leaves alternate, linear or narrowly oblong, 1 to 4 inches long; flowers in small, terminal panicles; corolla funnel-shaped, about an inch long, the tube blue, the lobes yellowish.

MILKWEED FAMILY (ASCLEPIADACEAE)

Mostly herbs with simple leaves, milky juice, and regular, perfect flowers which are borne in umbels and are highly specialized for insect pollination. The stamens and pistils are united in a column and there is a sort of crown between the corolla and the column with hoodlike or hornlike appendages. The sepals and often the corolla lobes are turned back when the flower is in bloom. The fruit is a pod containing many seeds each provided with a tuft of hairs.

MILKWEED (*Asclepias latifolia*) (S) (W): Stems 1 to 2 feet tall, stout, smooth or nearly so; leaves 3 to 6 inches long and nearly as wide, often nearly round with a somewhat heart-shaped base, sessile or nearly so; umbels 2 to 4 in the upper leaf axils, many-flowered; corollas greenish or greenish-yellow.

POISON MILKWEED (*Asclepias subverticillata*) (W): Stems 6 to 40 inches high, branched or unbranched; leaves 1 to 2½ inches long, whorled at least on the main stem; flowers in medium-sized umbels in the upper leaf axils, white to cream-colored or purplish; pods spindle-shaped, 2 to 4 inches long.

MORNING GLORY FAMILY (CONVOLVULACEAE)

Herbaceous plants mostly with trailing or twining stems, simple leaves and perfect, regular, usually showy flowers; sepals nearly separate but the petals united; stamens 5; pistil 1 with 1 or 2 styles.

EVOLVULUS (*Evolvulus pilosus*) (W): stems not trailing, 4 to 10 inches high, several from a somewhat woody base; leaves nearly sessile, linear or oblong, mostly between ¼ and ½ inch long; flowers lavender or purple, on very short stalks in the leaf axils, between ¼ and ½ inch across.

MORNING GLORY (*Ipomoea plumerae*) (S): Stems climbing or trailing; leaves alternate, divided nearly to the base into 3 to 6 linear lobes; flowers pink or red, smaller than those of the cultivated morning glory, the tube narrow, the expanded portion about ½ inch across.

PHLOX FAMILY (POLEMONIACEAE)

Herbaceous plants with perfect, regular flowers, the petals united, stamens 5, the 1 pistil usually 3-lobed at the end of the style. In many species the flowers are very showy.

1. Leaves opposite and entire. 2.

Leaves alternate or basal, often not entire. 3.

2. Plants perennial; flowers relatively large and showy.

PHLOX (*Phlox woodhousei*).....44

Plants annual; flowers small and inconspicuous.

MICROSTERIS (*Microsteris gracilis*).....44

3. Stems with a cluster of leaves at the base, the upper leaves few and small. 4.

FAMILIES OF PLANTS

- Stems rather equally leafy throughout, without a definite cluster at the base. 6.
4. Plants glandular throughout; branches wide-spreading.
 GILIA (*Gilia leptomeria*).....43
 Plants glandular only in the upper part; branches not wide-spreading. 5.
 5. Corolla tube usually more than 3 times as long as the calyx.
 GILIA (*Gilia tenuiflora*).....43
 Corolla tube usually less than 3 times as long as the calyx.
 GILIA (*Gilia sinuata*).....43
 6. Leaves all or nearly all entire and linear.
 GILIA (*Gilia multiflora*).....43
 Leaves all or mostly pinnately lobed. 7.
 7. Flowers pink or red.
 SKYROCKET (*Gilia aggregata*).....43
 Flowers pale blue or lilac to nearly white. 8.
 8. Corolla tube usually more than 5 times as long as the calyx.
 GILIA (*Gilia longiflora*).....43
 Corolla tube usually less than 3 times as long as the calyx.
 GILIA (*Gilia gunnisoni*).....43

SKYROCKET (*Gilia aggregata*) (S): Stems 6 to 24 inches high, usually branched; leaves pinnately divided into linear lobes; flowers pink or red, 1 to 2 inches long.

GILIA (*Gilia gunnisoni*) (W): Stems 4 to 10 inches high, usually several from a tap root; often widely spreading; leaves very narrowly linear, less than 1½ inches long, entire; flowers in small, terminal, headlike clusters, very small, the corolla white; stamens extending beyond the corolla.

GILIA (*Gilia longiflora*) (W): Stems mostly 6 to 18 inches high, branched; leaves mostly 1 to 3 inches long, narrowly linear with 2 to 6 linear lobes; flowers scattered, the calyx about ¼ inch long, the corolla ¾ to 1½ inches long, pale blue or purple to nearly white.

GILIA (*Gilia leptomeria*) (W): Stems 2 to 8 inches tall, usually branched from the base; leaves mostly basal, broadly linear or oblong, pinnately lobed or toothed, the few on the stems often entire; flowers small, less than ¼ inch long, numerous, scattered, white to rose.

GILIA (*Gilia multiflora*) (W): Stems 3 to 12 inches high, usually much branched from near the base; leaves ½ inch long or less, mostly with 2 to 6 linear lobes or the upper ones linear and entire; flowers ¼ to ½ inch long, pale blue or lilac.

GILIA (*Gilia sinuata*) (W): Stems 2 inches to a foot high or more, rather sparingly branched; leaves mostly less than an inch long, narrow, toothed or pinnately lobed, mostly in a basal rosette and on the lower part of the stem; flowers rather few, blue or purple, often with the lower part of the corolla tube yellowish; corolla about ¼ inch long.

GILIA (*Gilia tenuiflora*) (W): Very similar to the preceding and often difficult to distinguish from it but the flowers are about twice as large in this species.

FAMILIES OF PLANTS

MICROSTERIS (*Microsteris gracilis*) (S): Stems 1 to 6 inches high, usually branched; leaves broadly linear or oblong, the lower ones purplish; flowers pink or white, mostly in terminal clusters, small and not conspicuous.

PHLOX (*Phlox woodhousei*) (S): Stems mostly 2 to 5 inches high, much branched from the base and often higher up as well, somewhat woody at the base; leaves linear to lanceolate, $\frac{1}{2}$ to $1\frac{1}{2}$ inches long; flowers numerous, pink, about $\frac{3}{4}$ inch long.

WATERLEAF FAMILY (HYDROPHYLLACEAE)

Our members of this family are herbs with perfect, regular flowers, 5 united petals, 5 stamens, and 1 pistil with a 2-lobed style.

1. Flowers solitary in the leaf axils or in small, terminal clusters; stamens shorter than the corolla.

NAMA (*Nama hispida*).....44

Flowers in coiled, racemelike clusters; stamens longer than the corolla. 2.

2. At least some of the leaves with 3 or 5 leaflets.

PHACELIA (*Phacelia magellanica*).....44

Leaves merely scalloped or with broad, rounded teeth, without leaflets.

PHACELIA (*Phacelia interifolia*).....44

At least some of the leaves pinnately lobed half way to the midrib or more but without leaflets.

PHACELIA (*Phacelia crenulata*).....44

NAMA (*Nama hispida*) (W): Stems 4 to 12 inches high, branched from the base, soft-hairy throughout; leaves narrow, 3 inches long or less, tapering to the base; flowers solitary or several in small, terminal clusters, nearly sessile; corolla purple, $\frac{1}{4}$ to $\frac{1}{2}$ inch long.

PHACELIA (*Phacelia crenulata*) (W): Stems 6 to 20 inches high, glandular-hairy, moderately leafy with the portion immediately below the flower clusters nearly leafless; leaves narrowly oblong, pinnately lobed half way to the midrib or more; flowers blue or violet, in coiled racemes; stamens and pistils about twice as long as the corolla.

PHACELIA (*Phacelia integrifolia*) (S) (W): Stems 6 to 10 inches high, very leafy clear up to the flower clusters, glandular-hairy and with a rather disagreeable odor; leaves oblong or lanceolate, rather shallowly scalloped; flowers blue to whitish, about $\frac{1}{4}$ inch long or more; stamens and style much longer than the corolla.

PHACELIA (*Phacelia magellanica*) (S): Stems several, mostly unbranched except for the short flower branches, mostly 4 to 30 inches high; leaves 1 to 8 inches long with 1 to 3 pairs of lateral leaflets, often gray from the numerous shaggy, whitish hairs; racemes short and dense; corolla blue or purplish to almost white; stamens and styles nearly twice as long as the corolla.

BORAGE FAMILY (BORAGINACEAE)

Mostly herbaceous plants with simple, alternate leaves and perfect, regular flowers with a 5-lobed calyx, a 5-lobed corolla, 5 stamens, and 1 pistil. The ovary is often 4-lobed and breaks up into 4 nutlets at maturity.

FAMILIES OF PLANTS

1. Style 2-lobed; stigmas 2; flowers white or pinkish. 2.
Style not lobed; stigma 1. 3.
 2. Leaves with conspicuous bristles; flowers solitary in the leaf axils.
 COLDENIA (*Coldenia hispidissima*).....45
 Leaves without conspicuous bristles; flowers in dense clusters at the forks of the stem.
 COLDENIA (*Coldenia nuttallii*).....45
 3. Ovary not lobed, the style borne from its tip.
 HELIOTROPE (*Heliotropium curassavicum*).....45
 Ovary 4-lobed, the style borne between the lobes. 4.
 4. Fruits prickly, clinging to clothes.
 STICKSEED (*Lappula texana*).....46
 Fruits not prickly, not clinging to clothes. 5.
 5. Plants very bristly hairy; flowers small, white, not very showy. 6.
 Plants more or less hairy but not bristly; flowers yellow or orange, showy. 7.
 6. Nutlets smooth and shiny, not winged.
 CRYPTANTHA (*Cryptantha jamesii*).....45
 Nutlets rough, more or less winged.
 CRYPTANTHA (*Cryptantha pterocarya*).....45
 7. Corolla about 1 inch long, the lobes fringed or irregularly toothed.
 PUCCOON (*Lithospermum incisum*).....46
 Corolla about $\frac{1}{2}$ inch long, the lobes entire.
 PUCCOON (*Lithospermum multiflorum*).....46
- COLDENIA (*Coldenia hispidissima*) (W): Stems mostly 2 to 8 inches long, much branched from a somewhat woody base, often wide-spreading; leaves numerous, less than $\frac{1}{2}$ inch long, linear or nearly so; flowers small, white, solitary in the leaf axils.
- COLDENIA (*Coldenia nuttallii*) (W): Stems mostly 2 to 4 inches long, not woody at the base, repeatedly forked, largely prostrate; leaves petioled, the blades ovate, less than $\frac{3}{4}$ inch long; flowers pinkish, in clusters in the forks of the stem.
- CRYPTANTHA (*Cryptantha jamesii*) (S) (W): Stems 8 to 24 inches high; leaves linear or nearly so, mostly less than $\frac{1}{2}$ inch long; flowers small, white, in bristly, more or less coiled clusters; nutlets smooth and shiny, not winged.
- CRYPTANTHA (*Cryptantha pterocarya*) (W): Very similar to the preceding and often difficult to distinguish from it without examination of the nutlets. The nutlets are rough and at least 3 of them, sometimes all, are somewhat winged.
- HELIOTROPE (*Heliotropium curassavicum*) (W): Stems 4 inches to 2 feet long, much branched; leaves linear to narrowly obovate, somewhat fleshy, smooth; spikes usually in pairs, sometimes more than 2 together, slender, usually curled at the end; flowers small; corolla white with a purple eye in the throat.

FAMILIES OF PLANTS

STICKSEED (*Lappula texana*) (W): Stems 4 to 20 inches high, branched; leaves linear or nearly so; racemes with leafy bracts; entire plant very hairy; flowers very small, pale blue to nearly white; nutlets, or some of them, with the margin inflated and bearing a row of barbed prickles.

PUCCOON (*Lithospermum incisum*) (W): Stems 4 to 20 inches high, usually several, hairy; leaves linear or nearly so, $\frac{1}{2}$ to $1\frac{1}{2}$ inches long; flowers in terminal, leafy racemes; corolla $\frac{1}{2}$ to 1 inch long, yellow; nutlets white and shining.

PUCCOON (*Lithospermum multiflorum*) (S): Stems 1 to 2 feet tall, often in bunches; leaves linear or nearly so, 1 to 2 inches long; flowers in racemes; corolla yellow, $\frac{1}{4}$ to $\frac{1}{2}$ inch long; nutlets white and shining.

VERVAIN FAMILY (VERBENACEAE)

Members of this family resemble mints in often having 4-sided stems and irregular flowers but they differ from both mints and most borages in having unlobed ovaries, although the fruit usually consists of 4 nutlets.

1. Flowers yellow.

TETRACLEA (*Tetradlea coulteri*).....46
Flowers blue, pink or purple. 2.

2. Spikes long and slender after blooming.

VERVAIN (*Verbena bracteata*).....46

Spikes broad and dense.

VERVAIN (*Verbena wrightii*).....46

TETRACLEA (*Tetradlea coulteri*) (W): Stems mostly 6 to 10 inches high, much branched, often from the base, not 4-sided or only slightly so; leaves mostly ovate, tapering to a short petiole, $\frac{1}{2}$ to 1 inch long or more; flowers dull yellow, only slightly irregular; corolla nearly $\frac{1}{2}$ inch long, stamens and style longer than the corolla tube.

VERVAIN (*Verbena bracteata*) (S): Stems 4 to 20 inches long, usually several from a common base, much branched, the branches wide spreading and partly prostrate; leaves deeply pinnately lobed, the lobes toothed, hairy on both sides; spikes sessile, the bracts conspicuous, much longer than the calyx and slightly longer than the corolla; corolla light blue to purple.

VERVAIN (*Verbena wrightii*) (W): Stems 8 to 24 inches high, usually several from the same base, hairy, branched and spreading; leaves twice pinnately lobed, the lobes cut and toothed, hairy; spikes broad and short when in flower, the bracts shorter than the calyx and not conspicuous; corolla pink to purple.

MINT FAMILY (LABIATAE)

Herbs or shrubs with usually 4-sided stems, opposite leaves, irregular flowers with the petals united, either 2 or 4 stamens, a 4-sided ovary, and often a characteristic mint odor. The fruit consists of 4 small nutlets.

1. Shrubs.

ROSEMARY MINT (*Poliomintha incana*).....47

Herbs. 2.

2. Stamens 2. 3.

Stamens 4. 4.

FAMILIES OF PLANTS

3. Flowers in several dense whorls, these subtended by an involucre of conspicuous bracts.
 - BEEBALM (*Monarda pectinata*).....47
Flowers solitary or in small clusters in the leaf axils, without conspicuous bracts.
 - MOCK-PENNYROYAL (*Hedeoma nanum*).....47
4. Flowers in several dense whorls; stems densely white-woolly.
 - HOREHOUND (*Marubium vulgare*).....47
Flowers in a single, terminal, headlike cluster subtended by conspicuous bracts.
 - MONARDELLA (*Monardella odoratissima*).....47

MOCK-PENNYROYAL (*Hedeoma nanum*) (W): A low, usually much-branched herb with slender, short-hairy stems; leaves entire, short-petioled, about $\frac{1}{4}$ inch long or less, often dotted with glands on the lower surface; flowers small, light purple, the lower lip of the corolla with a white blotch, 1 to 4 in the upper leaf axils.

HOREHOUND (*Marubium vulgare*) (S) (W): Stems rather stout, 8 to 40 inches high, white-woolly; leaves ovate to broadly oval, rough, white-woolly especially on the under surface; flowers white, crowded in dense clusters in the axils of the upper leaves.

BEEBALM (*Monarda pectinata*) (S): Stems mostly 6 to 15 inches high; branched from the base; leaves oblong, the largest 1 to 2 inches long; flowers light rose, pink or whitish, in several dense clusters with conspicuous subtending bracts, these with stiff bristles on the margins.

MONARDELLA (*Monardella odoratissima*) (S): Stems usually 8 to 12 inches high from an often prostrate base, branched or unbranched; leaves lanceolate to oblong, entire or nearly so, mostly less than an inch long; flowers in a single, headlike terminal cluster subtended by purplish bracts; corolla white or rose, often dotted with purple.

ROSEMARY MINT (*Poliomintha incana*) (W): A low shrub, usually less than 2 feet high, branched from the base, the stems clothed with a thin layer of whitish, woolly hairs; leaves linear or oblong, less than an inch long, entire; flowers pale blue or purplish, in small, axillary clusters.

NIGHTSHADE FAMILY (SOLANACEAE)

Herbs or shrubs with perfect, regular flowers, the petals united. The 5 stamens are usually distinct but the anthers are often close together around the style, producing a characteristic cone-shaped structure. The fruit is a capsule or a berry.

1. Woody plants (shrubs), somewhat spiny. 2.
Non-woody plants (herbs). 3.
2. Flowers greenish; leaves $\frac{1}{2}$ to $1\frac{1}{2}$ inches long.
 - WOLFERRY (*Lycium pallidum*).....48
Flowers yellowish-white with lavender corolla lobes; leaves less than $\frac{1}{2}$ inch long, very narrow.
 - DESERT THORN (*Lycium andersoni*).....48

FAMILIES OF PLANTS

3. Flowers very large, the corolla 6 to 8 inches long, white fruit a large, spiny capsule.
 SACRED DATURA OR JIMPSONWEED (*Datura metaloides*).....48
 Flowers and fruits very much smaller. 4.
4. Flowers blue or violet.
 WHITE HORSE-NETTLE (*Solanum eleagnifolium*).....49
 Flowers not blue or violet. 5.
5. Fruit a capsule; corolla with a long, narrow tube. 6.
 Fruit a berry, corolla with a short tube. 7.
6. Leaves sessile or nearly so, the base often clasping; corolla tube hairy.
 TOBACCO (*Nicotiana trigonophylla*).....49
 Leaves with a slender petiole; corolla tube smooth or nearly so.
 TOBACCO (*Nicotiana attenuata*).....48
7. Calyx not angled in fruit, the lobes not closed over the top of the berry.
 CHAMAESARACHA (*Chamaesaracha coronopus*).....48
 Calyx angled in fruit, the lobes closed over the top of the berry. 8.
8. Some of the hairs of stems and leaves forked or star-shaped; plant not sticky.
 GROUNDCHERRY (*Physalis fendleri*).....49
 All of the hairs of stems and leaves simple; plant somewhat sticky.
 GROUNDCHERRY (*Physalis hederæfolia*).....49

CHAMAESARACHA (*Chamaesaracha coronopus*) (W): Stems 4 to 8 inches high, often with wide-spreading branches; leaves oblong to linear, sessile or nearly so, irregularly toothed or lobed or nearly entire; flowers greenish-white or tinged with purple; corolla $\frac{1}{4}$ to $\frac{1}{2}$ inch across.

SACRED DATURA OR JIMPSONWEED (*Datura metaloides*) (W): Stems 1 to 3 feet tall, branched; leaves 4 to 6 inches long, petioled; entire or few-toothed, ovate; flowers solitary in the leaf axils or in forks about an inch long; oblong or nearly spherical, very spiny.

WOLFBERRY (*Lycium pallidum*) (W): A much branched shrub, 3 to 6 feet high, spiny; leaves $\frac{1}{2}$ to $1\frac{1}{2}$ inches long, pale green, mostly oblong or oblanceolate; corolla about $\frac{1}{2}$ inch long or more, greenish or tinged with purple; stamens usually slightly longer than the corolla tube; fruit a red or reddish-blue berry.

DESERT THORN (*Lycium andersoni*) (W): A shrub up to 9 feet high but usually lower; leaves linear or nearly so, $\frac{1}{2}$ inch long or less, somewhat fleshy; corolla about $\frac{1}{2}$ inch long, slender, usually yellowish-white with lavender lobes; stamens longer than the corolla tube; berry bright red.

TOBACCO (*Nicotiana attenuata*) (W): Stems 1 to 3 feet tall, often branched, glandular-hairy; leaves narrowly ovate or lanceolate to nearly linear, pointed at both ends, petioled, 2 to 3 inches long; flowers mostly in few-flowered racemes, corollas about an inch long, white or greenish.

FAMILIES OF PLANTS

TOBACCO (*Nicotiana trigonophylla*) (W): This tobacco differs from the preceding in being more conspicuously glandular-hairy and in having shorter, broader, sessile leaves which clasp the stem at the base.

GROUNDCHERRY (*Physalis fendleri*) (W): Stems 6 inches to nearly 2 feet tall, either low and much branched or taller and branched only above; leaves heart-shaped to lanceolate, shallowly scalloped to toothed, mostly 1 to 2 inches long, some of the hairs forked or star-shaped; corolla about $\frac{1}{2}$ inch across or more, dull yellow with a brown center.

GROUNDCHERRY (*Physalis hederæfolia*) (W): Very similar to the preceding and often difficult to distinguish from it. It possesses no branched hairs and often has glandular hairs which make it sticky.

WHITE HORSE-NETTLE (*Solanum eleagnifolium*) (W): Stem from a few inches to 3 feet high, silvery-hairy, usually prickly; leaves oblong or lanceolate, 1 to 3 inches long, petioled; flowers solitary or in small clusters; corolla blue or violet, about an inch across, showy; berries yellow when mature.

FIGWORT FAMILY (SCROPHULARIACEAE)

Mostly herbaceous plants with irregular flowers which superficially resemble those of some of the mints. However, there is no mint odor and the ovary is not lobed. Also the stem is cylindrical instead of 4-sided. The fruit is a capsule.

1. Stamens with anthers 5; corolla only slightly irregular, yellow.
MULLEIN (*Verbascum thapsus*).....51
 Stamens with anthers 4; corolla very irregular, 2-lipped. 2.
2. Flowers with a fifth stamen which is sterile but about as long as the anther-bearing stamens; leaves opposite. 3.
 Flowers without a sterile stamen. 7.
3. Leaves definitely toothed, the bases grown together around the stem; flowers pink.
PINK BEARDTONGUE (*Penstemon clutei*).....50
 Leaves entire or nearly so, the bases not united around the stem. 4.
4. Corolla red or scarlet.
SCARLET BEARDTONGUE (*Penstemon barbatus*).....50
 Corolla not red or scarlet. 5.
5. Stems somewhat woody at the base; leaves very small, narrowly linear; corolla tube pink, the lobes white above.
BEARDTONGUE (*Penstemon ambiguus*).....50
 Stems entirely herbaceous; leaves broader; corolla blue, purple, violet, or lavender. 6.
6. Sterile stamen not bearded.
BEARDTONGUE (*Penstemon virgatus*).....50
 Sterile stamen conspicuously bearded.
BEARDTONGUE (*Penstemon jamesii*).....50
7. Leaves opposite; flowers solitary on stalks in the axils of upper leaves; corolla yellow. 8.
 Leaves alternate; flowers in terminal spikes with red bracts that are more conspicuous than the flowers. 9.

FAMILIES OF PLANTS

8. Plants of wet places; flowers more than an inch long.
 MONKEYFLOWER (*Mimulus guttatus*).....50
 Plants of moist or dry places; corolla less than $\frac{1}{2}$ inch long.
 MONKEYFLOWER (*Mimulus rubellus*).....50
9. Bracts subtending flowers entire or only shallowly lobed at the tip.
 PAINTBRUSH (*Castilleja integra*).....50
 Bracts subtending flowers deeply lobed.
 PAINTBRUSH (*Castilleja linariaefolia*).....50
 PAINTBRUSH (*Castilleja integra*) (S) (W): Stems 4 to 12 inches high, hairy throughout, usually several together from a woody base; leaves linear, entire or nearly so, 1 to 2 inches long; flower cluster short, the bracts conspicuous, broader than the leaves, crimson; corolla between 1 and 2 inches long, greenish or crimson on the margins.
 PAINTBRUSH (*Castilleja linariaefolia*) (W): Very similar to the preceding but the stem is often smooth or hairy only below, the deeply cleft bracts are red but usually not so conspicuous as the calyx which is also red, and the corolla is greenish-yellow.
 MONKEYFLOWER (*Mimulus guttatus*) (W): Stems 16 to 40 inches high; leaf blades oval, irregularly toothed, 3 to 4 inches long, the petioles often as long as the blades on the lower leaves but the upper ones sessile; corolla about an inch long, yellow, usually spotted with red, a palate nearly closing the throat of the tube.
 MONKEYFLOWER (*Mimulus rubellus*) (W): Stems 1 to 6 inches tall, simple or branched from the base; leaves ovate to lanceolate or linear, sessile or nearly so, the margins entire or irregularly toothed; corolla usually about $\frac{1}{4}$ inch long, yellow, sometimes with pink near the tip.
 BEARDTONGUE (*Penstemon ambiguus*) (W): Stems 5 to 20 inches high, much branched from a somewhat woody base; leaves very narrowly linear, mostly less than an inch long; flowers scattered over the entire plant; corolla white on the upper surface of the lobes but pink or lavender on the tube and the under side of the lobes; stamens shorter than the corolla tube; the sterile one not bearded.
 SCARLET BEARDTONGUE (*Penstemon barbatus*) (S) (W): Stems 1 to 3 feet tall, solitary or a few together, mostly smooth or nearly so; leaves linear to lanceolate or oblong, 1 to 5 inches long; panicle rather long and loosely flowered; corolla scarlet, about an inch long, smooth on the outside but usually with yellow, woolly hairs in the throat, strongly 2-lipped.
 PINK BEARDTONGUE (*Penstemon clutei*) (S): Stems mostly 1 to 3 feet high, usually several from a common base; leaves toothed, the lower broadly ovate, the upper with bases united around the stem forming disks 2 to 4 inches across; panicle often leafy in the lower part; corolla pink, the throat swollen to nearly $\frac{1}{4}$ inch across.
 BEARDTONGUE (*Penstemon jamesii*) (S): Stems 4 to 16 inches high, usually short-hairy below and glandular-hairy above; leaves linear to lanceolate, 1 to 4 inches long, entire to regularly toothed; panicle long and many-flowered; corolla $\frac{1}{2}$ to 1 inch long, glandular-hairy on the outside, conspicuously white-hairy within; sterile stamen longer than the corolla and conspicuously bearded.

FAMILIES OF PLANTS

BEARDTONGUE (*Penstemon virgatus*) (S): Stems usually 1 to 2 feet tall; leaves linear, 1 to 3 inches long; flowers blue or purple, about an inch long; lower lip of corolla usually bearded.

MULLEIN (*Verbascum thapsus*) (S): Stems 1 to 6 feet tall, stout; leaves 4 to 16 inches long, very woolly; flowers yellow, sessile in a stout spike that may be as much as 20 inches long.

MADDER FAMILY (RUBIACEAE)

Our only member of this family is a herb with 4-sided stems and simple, entire, whorled leaves. The flowers are very small with 4 sepals, 4 petals, 4 stamens, and 2 styles. The ovary is inferior.

BEDSTRAW (*Galium rothrockii*) (S): Stems from a few inches to nearly a foot high, somewhat short-hairy; leaves linear or narrowly oblong, about $\frac{1}{4}$ inch long, mostly 4 in each whorl; petals purplish; fruit hairy with soft, white hairs.

GOURD FAMILY (CUCURBITACEAE)

Herbaceous plants with tendrils, trailing or climbing, the leaves alternate, the flowers imperfect, but the staminate and pistillate flowers on the same plant. The ovary is inferior and the fruit is a large, modified berry.

BUFFALO GOURD (*Cucurbita foetidissima*) (W): Stems trailing or climbing, 5 to 15 feet long or more; leaves broadly ovate, somewhat heart-shaped at the base, 4 to 10 inches long; flowers large, yellow, imperfect, scattered along the stem; corolla 3 to 4 inches long; fruit 3 to 4 inches in diameter, smooth.

COMPOSITE FAMILY (COMPOSITAE)

This is the largest family of seed plants in the world. A few more than one-fifth of the seed plants on our area belong to it. It includes both woody and non-woody plants though the great majority are non-woody. The chief characteristic of the family is that in all but a few cases the flowers are in heads subtended by involucre of bracts so that what superficially looks like a single flower is really a bouquet of flowers. The structural characters that are used to identify members of this family are shown in figure 2.

1. Woody plants (shrubs). 2.
Non-woody plants (herbs), some may be slightly woody at the base. 10
2. Corollas of the ray flowers strap-shaped; those of the disk flowers tubular. 3.
Corollas all tubular; ray flowers lacking. 5.
3. Ray flowers white; plants often a foot tall or more.
ASTER (*Aster spinosus*).....57
Ray flowers yellow. 4.
4. Heads tiny; ray flower 1; disk flowers 1 or 2.
SNAKEWEED (*Gutierrezia lucida*).....59
Heads larger; ray flowers 3 to 8; disk flowers 3 to 8.
SNAKEWEED (*Gutierrezia sarothrae*).....59
5. Pappus or hairlike bristles; flowers yellow, showy; plants without odor of sage. 6.

FAMILIES OF PLANTS

Pappus none; flowers yellowish or greenish, not showy; plants often with odor of sage. 8.	
6. Heads 4-flowered; involucre of 4 bracts.	
HORSEBRUSH (<i>Tetradymia canescens</i>).....	61
Heads more than 4-flowered; involucre of more than 4 bracts. 7.	
7. Stems covered with soft matted hairs.	
RABBITBRUSH (<i>Chrysothamnus nauseosus</i>).....	57
Stems smooth or somewhat hairy but not with matted hairs.	
RABBITBRUSH (<i>Chrysothamnus viscidiflorus</i>).....	58
8. Leaves 2 or 3 times pinnately lobed into linear lobes.	
SAGEBRUSH (<i>Artemisia frigida</i>).....	56
Leaves linear, entire or palmately divided into 3 linear lobes.	
SAND SAGEBRUSH (<i>Artemisia filifolia</i>).....	56
Leaves broader, at least the lower ones 3-toothed at the tip. 9.	
9. Stems densely hairy with soft, often matted hairs.	
SAGEBRUSH (<i>Artemisia bigelovii</i>).....	56
Stems smooth or nearly so, never with matted hairs.	
BIG SAGEBRUSH (<i>Artemisia tridentata</i>).....	57
10. Corollas all strap-shaped. 11.	
Corollas all tubular. 17.	
Corollas of ray flowers strap-shaped, those of disk flowers tubular. 34.	
11. Flowers yellow. 12.	
Flowers pink or rose color. 14.	
12. Leaves entire, grasslike, somewhat clasping at the base.	
GOATSBEARD (<i>Tragopogon dubius</i>).....	61
Leaves toothed or lobed or both. 13.	
13. Stems usually more than a foot high, branched only near the top, leafy throughout.	
PRICKLY LETTUCE (<i>Lactuca seriola</i>).....	59
Stems less than a foot high, freely branched; leaves mostly basal.	
DESERT-DANDELION (<i>Malacothrix sonchoides</i>).....	60
14. Plants very spiny; pappus bristles not feathery.	
LYGODESMIA (<i>Lygodesmia spinosa</i>).....	60
Plants not spiny; pappus bristles feathery at least above. 15.	
15. Heads with 10 to 20 flowers.	
WIRE-LETTUCE (<i>Stephanomeria thurberi</i>).....	61
Heads with 3 to 9 flowers. 16.	
16. Pappus brown-tinged, the bristles feathery on the upper part but not near the base.	
WIRE-LETTUCE (<i>Stephanomeria pauciflora</i>).....	60
Pappus bright white, the bristles feathery the entire length.	
WIRE-LETTUCE (<i>Stephanomeria tenuifolia</i>).....	61
17. All of the flowers imperfect; heads not all alike. 18.	
Some or all of the flowers perfect; heads all alike. 21.	
18. Some of the heads with both male and female flowers.	
DICORIA (<i>Dicoria canescens</i>).....	58
None of the heads with both male and female flowers. 19.	

FAMILIES OF PLANTS

19. Bracts of the staminate heads separate; fruiting involucre burlike, covered with hooked prickles.
 COCKLEBUR (*Xanthium saccharatum*).....61
 Bracts of staminate heads united; fruiting involucre nutlike. 20.
20. Pistillate heads 1-flowered, in the axils of leaves; fruits with a single row of prickles around the middle; staminate heads in terminal racemes.
 RAGWEED (*Ambrosia psilostachya*).....56
 Pistillate heads 1-to 4-flowered; fruits with prickles in more than 1 row; staminate heads as in ragweeds.
 BURWEED (*Franseria acanthicarpa*).....58
21. Plant very prickly; heads large, showy; flowers pink-purple.
 THISTLE (*Cirsium pulchellum*).....58
 Plants not very prickly. 22.
22. Pappus none. Flowers greenish or yellow. 23.
 Pappus of hairlike bristles. 28.
 Pappus of scales. 32.
23. The 5 outer flowers in each head pistillate; the others appearing perfect but not producing fruits.
 MARSH-ELDER (*Iva axillaris*).....59
 All of the flowers perfect and fertile. 24.
24. Leaves 2 or 3 times pinnately lobed into numerous small divisions.
 SAGEBRUSH (*Artemisia frigida*).....56
 Leaves entire to once pinnately lobed. 25.
25. Leaves linear, entire or a few of the lower ones 3-cleft, mostly 2 or 3 inches long, never woolly.
 FALSE TARRAGON (*Artemisia dracunculoides*).....56
 Leaves broader or else lobed or toothed, woolly at least beneath. 26.
26. Leaves entire to toothed or shallowly lobed.
 WORMWOOD (*Artemisia ludoviciana*).....56
 Leaves pinnately lobed almost to the midrib into linear lobes. 27.
27. Leaves white-hairy on both sides
 WORMWOOD (*Artemisia caruthii*).....56
 Leaves smooth and green above, white-hairy beneath.
 WORMWOOD (*Artemisia caruthii* var. *wrightii*).....56
28. Flowers yellow.
 RAYLESS-GOLDENROD (*Aplopappus*—or *Haplopappus*—
 heterophyllus)56
 Flowers whitish. 29.
29. Pappus bristles feathery.
 KUHNIA (*Kuhnia rosmarinifolia*).....59
 Pappus bristles not feathery. 30.
30. Outer flowers of each head pistillate, the inner ones perfect; pappus of more than 8 bristles.
 CONYZA (*Conyza coulteri*).....58
 All of the flowers perfect; pappus of 2 to 8 bristles. 31.
31. Leaves elliptic to nearly linear, entire or nearly so.
 BRICKELLIA (*Brickellia oblongifolia*).....57

FAMILIES OF PLANTS

- Leaves broadly ovate, about as wide as long, toothed.
- BRICKELLIA (*Brickellia californica*).....57
32. Flowers white or whitish.
- CHAENACTIS (*Chaenactis stevioides*).....57
- Flowers yellow. 33.
33. Plant very bushy, leaves broadly ovate with a long tip, toothed.
- TAPERLEAF (*Pericome caudata*).....60
- Plant not bushy; leaves mostly basal, twice pinnately lobed into linear divisions.
- HYMENOPAPPUS (*Hymenopappus lugens*).....59
34. Pappus none. 35.
- Pappus of awns or scales. 37.
- Pappus of stiff or soft bristles. 46.
35. Plant less than a foot high, much branched from the base; leaves linear, entire.
- ZINNIA (*Zinnia grandiflora*).....61
- Plants usually more than a foot high, not much branched from the base; leaves toothed or lobed, not linear. 36.
36. Leaves lanceolate, toothed but not lobed.
- CROWNBEARD (*Verbesina encelioides*).....61
- Leaves deeply lobed into many small divisions.
- YELLOW-RAGWEED (*Bahia dissecta*).....57
37. Ray flowers white or purple; pappus of several awns.
- TOWNSENDIA (*Townsendia incana*).....61
- Ray flowers yellow. 38.
38. Pappus of 1 to 2 awns which may easily drop off. 39.
- Pappus of several scales. 40.
39. Disk flowers brown or purple.
- SUNFLOWER (*Helianthus petiolaris*).....59
- Disk flowers yellow.
- CROWNBEARD (*Verbesina encelioides*).....61
40. Heads large, 1 inch across or more, solitary on sparsely leafy stems, the leaves mostly crowded near the base.
- HYMENOXYIS (*Hymenoxys bigelovii*).....59
- Heads smaller, always less than an inch across. 41
41. Disk flowers reddish-purple.
- BLANKETFLOWER (*Gaillardia pinnatifida*).....58
- Disk flowers yellow. 42.
42. Heads solitary on long, leafless stems, the leaves all basal or nearly so.
- HYMENOXYIS (*Hymenoxys acaulis*).....59
- Heads numerous; stems leafy throughout. 43.
43. Leaves mostly palmately lobed into 3 to 7 linear lobes, some of the upper ones may be entire.
- HYMENOXYIS (*Hymenoxys richardsoni*).....59
- Leaves mostly entire, some of the lower ones may be pinnately lobed or toothed. 44.
44. Ray flowers broad and showy.
- PAPERFLOWER (*Psilostrophe sparsiflora*).....60

FAMILIES OF PLANTS

- Ray flowers very small, not showy. 45.
45. Heads tiny; ray flower 1; disk flowers 1 or 2.
 SNAKEWEED (*Gutierrezia lucida*).....59
 Heads larger; ray flowers 3 to 8; disk flowers 3 to 8;
 SNAKEWEED (*Gutierrezia sarothrae*).....59
46. Ray flowers white, pink, blue, or purple, never yellow. 47.
 Ray flowers yellow. 53.
47. Stems more or less spiny, often nearly or quite leafless. 48
 Stems not spiny and not leafless. 49.
48. Ray flowers white.
 ASTER (*Aster spinosus*).....57
 Ray flowers pink or rosy.
 LYGODESMIA (*Lygodesmia spinosa*).....60
49. Bracts of the involucre in one series of equal length or nearly so. 50.
 Bracts of the involucre in several series of different lengths and overlapping like shingles. 51.
50. Ray flowers very numerous, showy, purple to nearly white.
 FLEABANE (*Erigeron divergens*).....58
 Flowers few, very short, inconspicuous, whitish.
 CONYZA (*Erigeron schiedanus*).....58
51. Ray flowers short, white; plant low.
 ASTER (*Aster arenosus*).....57
 Ray flowers longer, blue or purple; plant taller. 52.
52. Bracts of involucre with green tips that are much shorter than the whitish base, not spreading.
 ASTER (*Aster canescens*).....57
 Bracts of the involucre with green tips that are longer than the whitish base, spreading.
 ASTER (*Aster tephrodes*).....57
53. Leaves and bracts of involucre dotted with glands.
 DYSSODIA (*Dyssodia pentachaeta*).....58
 Leaves and bracts of involucre not dotted with glands. 54.
54. Bracts of involucre in several series of unequal length. 55.
 Bracts of involucre in one series of equal length, sometimes with a few small bracts at the base. 56.
55. Heads small, less than $\frac{1}{4}$ inch across, numerous, in panicles with curved branches.
 GOLDENROD (*Solidago sparsiflora*).....60
 Heads medium-sized, more than $\frac{1}{4}$ inch across, not numerous.
 GOLDEN-ASTER (*Chrysopsis foliosa*).....57
56. Leaves and stems more or less woolly. 57.
 Leaves not woolly, smooth or nearly so. 58.
57. Leaves mostly with long linear lobes, rarely entire and linear.
 GROUNDSEL (*Senecio longilobus*).....60
 Leaves pinnately lobed with short lobes which are not linear and are often toothed.
 GROUNDSEL (*Senecio uintahensis*).....60

FAMILIES OF PLANTS

58. Leaves entire and linear, rarely with a pair of linear lobes.

GROUNDSEL (*Senecio spartioides*).....60

Leaves mostly pinnately lobed into linear lobes, some of the upper ones may be entire.

GROUNDSEL (*Senecio multicapitatus*).....60

 RAGWEED (*Ambrosia psilostachya*) (W): Stems 1 to 3 feet high; at least the upper leaves opposite, pinnately lobed, the lobes usually toothed; staminate heads in terminal, spikelike racemes; pistillate heads 1 to 3 in the upper leaf axils.

 RAYLESS-GOLDENROD (*Aplopappus*—or *Haplopappus*—*heterophyllus*) (W): Stems mostly 12 to 18 inches high, stout; leaves alternate, mostly linear, 1 to 3 inches long, entire or nearly so; heads yellow, of disk flowers only, between $\frac{1}{4}$ and $\frac{1}{2}$ inch across, usually several crowded at the end of the stem; pappus of abundant, hairlike bristles.

 SAGEBRUSH (*Artemisia bigelovii*) (W): Stems a foot high or less, woody at least near the base; twigs silvery-hairy; leaves mostly 3-toothed at the tip but many of the upper ones entire, linear to wedge-shaped, silvery hairy; heads rather numerous, in a narrow, sometimes spikelike, panicle, 3-to 50-flowered.

 WORMWOOD (*Artemisia caruthii*) (S): Stems 8 to 20 inches high, white-hairy to woolly; leaves very numerous, small, finely dissected; white hairy on both sides; heads very small and numerous; usually not found on cinders.

 WORMWOOD (*Artemisia caruthii* var. *wrightii*) (S): Very similar to the preceding but the leaves smooth and green above and the plant usually larger and stouter; found on cinders.

 FALSE TARRAGON (*Artemisia dracunculoides*) (W): Stems 2 to 3 feet high or more; leaves mostly linear, entire, 2 to 3 inches long, smooth or nearly so; heads nodding in a leafy panicle, 20- to 60-flowered.

 SAND SAGEBRUSH (*Artemisia filifolia*) (W): A shrub, 1 to 5 feet tall; twigs white-hairy or slightly woolly; leaves 1 to 3 inches long, very narrowly linear or, more often, palmately divided into 3 narrowly linear lobes; heads numerous in a narrow panicle, 3- to 9-flowered.

 SAGEBRUSH (*Artemisia frigida*) (W): Stems 8 to 30 inches high, usually woody at the base and sometimes nearly throughout, branching from the base, the young twigs finely white-hairy; leaves crowded, especially at the base, dissected into small divisions, silvery-hairy but often turning brown with age; heads many in a narrow, leafy panicle, 20- to 50-flowered.

 WORMWOOD (*Artemisia ludoviciana*) (W): Stems 1 to 3 feet tall; woolly to nearly smooth; leaves very variable, from narrow and entire to broad and divided or twice divided, woolly below, smooth to somewhat woolly above; heads in a narrow open panicle, 10- to 40-flowered.

 WORMWOOD (*Artemisia pacifica*) (S): Stems 1 to 2 feet tall; several to many from a spreading base, smooth to slightly hairy, often reddish tinged; basal leaves 1 to 3 inches long, petioled, twice pinnately divided into very many narrow segments, more or less silvery-hairy; upper leaves sessile and less dissected; heads many in a narrow, leafy panicle with many branches, about 10- to 30-flowered.

FAMILIES OF PLANTS

BIG SAGEBRUSH (*Artemisia tridentata*) (W): A shrub, 4 inches to nearly 10 feet high, much branched, more or less silvery-hairy; leaves about $1\frac{1}{2}$ inches long or less, 3-to-5-toothed or lobed at the tip, the lobes sometimes again toothed or lobed, the upper leaves sometimes entire, all silky-hairy; heads few to many in spikelike or open panicles, 2- to 15-flowered.

ASTER (*Aster arenosus*) (S) (W): Stems mostly 2 to 5 inches tall, much branched from the base; leaves linear or nearly so, entire, less than $\frac{1}{2}$ inch long; the small heads of white ray flowers and yellow disk flowers solitary on the numerous branches.

ASTER (*Aster canescens*) (S) (W): Stems 4 to 16 inches high, simple or branched, usually quite hairy; leaves linear or narrowly oblong, $\frac{1}{2}$ to 3 inches long, mostly entire, sometimes with a few teeth; heads medium-sized, about $\frac{1}{2}$ inch across; ray flowers purple; disk flowers yellow.

ASTER (*Aster spinosus*) (W): Stems up to nearly 10 feet high, slender, the branches almost leafless; lower leaves linear, up to 2 inches long, upper ones much reduced or scalelike, often with spines in or above their axils; heads solitary at the ends of branches or in racemes; ray flowers white.

ASTER (*Aster tephrodes*) (W): Very similar to *Aster canescens* and sometimes considered a variety of it but the bracts of the involucre are greener and have spreading tips and the leaves are quite regularly spiny-toothed.

YELLOW-RAGWEED (*Bahia dissecta*) (S): Stems 1 to 3 feet high, branched, leaves alternate, 2 or 3 times divided into linear or oblong lobes; heads about $\frac{1}{4}$ inch across, at the ends of the numerous branches; both ray and disk flowers yellow; pappus none.

BRICKELLIA (*Brickellia californica*) (W): Stems several or numerous from a common base, branched above, 2 to 3 feet high; leaf blades broadly ovate to nearly triangular, toothed, $\frac{1}{2}$ to $2\frac{1}{2}$ inches long and nearly as wide; heads numerous on all branches 10- to 15-flowered; corollas all tubular, whitish.

BRICKELLIA (*Brickellia oblongifolia*) (W): Stems 8 to 20 inches high, often somewhat woody at the base, usually several from the same base, branched above; leaves alternate, linear to narrowly oblong, mostly entire; heads 1 to few on the slender branches, 40- to 50-flowered; flowers greenish-white; pappus of whitish bristles.

CHAENACTIS (*Chaenactis stevioides*) (W): Stems 5 to 10 inches high or more, branching at or above the base; leaves $\frac{1}{2}$ to 2 inches long, once or twice pinnately parted into linear lobes, heads about $\frac{1}{4}$ inch across; corolla whitish, all tubular but the outer ones longer than the others; pappus of 4 or 5 transparent scales.

GOLDEN-ASTER (*Chrysopsis foliosa*) (S): Stems 8 to 24 inches high, branched, hairy; 1 to 3 inches long, elliptic to oblanceolate, whitish-hairy, sessile or nearly so; heads solitary or few at the ends of the branches; ray and disk flowers yellow; pappus of short scales and longer hairlike bristles.

RABBITBRUSH (*Chrysothamhus nauseosus*) (S): A shrub varying from 6 inches to 7 feet high, the smaller twigs covered by a gray or white, felt-like matt often appearing like the bark until scraped by a blade; leaves lin-

FAMILIES OF PLANTS

ear, 1 to 2 inches long; heads numerous in terminal clusters, about 5-flowered; corollas tubular, yellow; pappus of slender, white bristles.

RABBITBRUSH (*Chrysothamnus visidiflorus*) (W): Very similar to the preceding but the twigs, which may be smooth or short-hairy, are never covered by a feltlike matt.

THISTLE (*Cirsium pulchellum*) (W): Stems 1 to 3 feet tall, more or less cobwebby; leaves oblong to lanceolate, pinnately lobed with spines at the tips of the lobes, cobwebby or nearly smooth above, woolly below; heads solitary at the ends of branches, about an inch across, showy; corollas pink-purple; outer bracts of involucre tipped with spines; pappus of abundant, feathery bristles.

CONYZA (*Conyza coulteri*) (W): Stems 1 to 3 feet tall, erect, somewhat hairy and sticky; leaves mostly oblanceolate, 1 to 2 inches long, toothed or cut into narrow, pointed lobes; heads numerous in a long panicle; bracts of involucre in one series and nearly equal in length; outer flowers of head pistillate, inner ones perfect, all with tubular corollas; pappus of hairlike bristles.

DICORIA (*Dicoria canescens*) (W): A widely branched herb, 1 to 3 feet high, white-hairy; lower leaves 1 to 2 inches long, lanceolate, toothed, upper ones smaller and broadly ovate; heads small, numerous, arranged on spikes in a loose panicle, some heads with only male flowers, others with about 2 female flowers without corollas and several male flowers with corollas; akene flat with a toothed or lobed wing on each side.

DYSSODIA (*Dyssodia pentachaeta*) (W): Stems 4 to 8 inches high, branched and spreading from the base; leaves opposite, about an inch long or less, pinnately divided into linear lobes; leaves and bracts of involucre marked by reddish glands; heads about $\frac{1}{4}$ inch across, solitary on long stalks at the ends of branches; both ray and disk flowers yellow, the rays short; bracts of involucre about equal and united at least below; pappus of 10 scales.

FLEABANE (*Erigeron divergens*) (S) (W): Stems 4 to 25 inches high branched, with short, spreading hairs; basal leaves mostly oblanceolate, entire or coarsely toothed, those on the stem linear; heads 1 to several on each branch, about $\frac{1}{2}$ inch across; ray flowers purple to white; disk flowers yellow.

CONYZA (*Erigeron schiedianus*) (S): This plant is very similar in appearance to *Conyza coulteri* and is often mistaken for it. The main distinction is that the outer, pistillate flowers of each head have corollas with a short, strap-shaped portion and are therefore properly called ray flowers.

BURWEED (*Franseria acanthicarpa*) (W): Stems 4 to 24 inches high, much branched, hairy; leaves twice pinnately lobed almost to the midrib, hairy and greenish on both sides; staminate heads in axillary and terminal spikes; pistillate heads 1-flowered; fruit with 8 to 20 spines, mostly without hooks.

BLANKETFLOWER (*Gaillardia pinnatifida*) (W): Stems 6 to 24 inches tall, often several from the same base; leaves mostly on the lower part of the stem, 1 to 3 inches long, some or all of them pinnately lobed; heads solitary at the ends of the stems, often an inch across; ray flowers yellow,

FAMILIES OF PLANTS

often with reddish-purple veins, 3-lobed at the end, occasionally lacking; disk purple at least on the corolla lobes.

Snakeweed (*Gutierrezia lucida*) (W): Stems 4 inches to 2 feet tall, much branched, woody toward the base; leaves very narrowly linear, mostly $\frac{1}{2}$ to $1\frac{1}{2}$ inches long; heads very small and numerous, usually with only 1 ray flower and 2 disk flowers, all yellow.

Snakeweed (*Gutierrezia sarothrae*) (S) (W): Very similar to the preceding but the heads slightly larger with 3 to 8 ray flowers and about the same number of disk flowers.

Sunflower (*Helianthus petiolaris*) (S) (W): Stems mostly 1 to 3 feet tall, more or less hairy; leaves petioled, 1 to 6 inches long, narrowly lanceolate to ovate, entire or with a few teeth; heads solitary at the ends of stems and branches, $2\frac{1}{2}$ inches across or less; ray flowers yellow; disk flowers purple-brown.

Hymenopappus (*Hymenopappus lugens*) (S): Stems 4 to 20 inches tall, more or less woolly; leaves mostly basal, twice pinnately dissected into linear segments, somewhat woolly; heads 1 to several on each stem; $\frac{1}{2}$ inch across or less; disk flowers only, yellow; pappus of 10 to 20 very small scales.

Hymenoxys (*Hymenoxys acaulis*) (S): Stem 2 to 20 inches high, bearing a single, large head at the top and a cluster of leaves at the base, both stems and leaves usually hairy; leaves all basal, 1 to 3 inches long, linear or nearly so, entire; heads $\frac{1}{2}$ inch across or more; both ray and disk flowers yellow; pappus of 5 to 7 scales.

Hymenoxys (*Hymenoxys bigelovii*) (S): Similar to the preceding but the heads larger, usually more than an inch across, and the leaves are scattered several inches up the stem, not all basal.

Hymenoxys (*Hymenoxys richardsoni*) (S): Stems several, 2 to 18 inches high, very leafy; leaves 1 to 6 inches long, linear and entire or divided into 3 to 7 linear lobes; heads rather numerous in flat-topped clusters, mostly less than $\frac{1}{2}$ inch across; ray and disk flowers yellow; pappus of 5 or 6 scales.

Marsh-elder (*Iva axillaris*) (W): Stems 4 to 20 inches high, simple or branched; lower leaves opposite, the upper ones alternate, about an inch long or less, sessile, mostly oblong to linear; heads solitary in the upper leaf axils, the whole appearing like a leafy raceme; male flowers 12 to 20, female flowers 5 to 8 in each head, all with short tubular corollas; pappus none.

Kuhnia (*Kuhnia rosmarinifolia*) (S): Stems 1 to 3 feet tall, short-hairy; leaves narrowly linear, mostly less than 1 inch long; heads 1 or a few at the ends of the branches, about $\frac{1}{4}$ inch across; disk flowers only, creamy white; pappus a single series of feathery bristles.

Prickly lettuce (*Lactuca seriola*) (S): Stems 1 to 3 feet tall; leaves oblong to lanceolate, either unlobed or pinnately lobed with spiny teeth and usually with a few spines on the under side of the midrib, sessile and somewhat clasping at the base; heads several or many, $\frac{1}{4}$ to $\frac{1}{2}$ inch across when in bloom; flowers 6 to 8 in each head, yellow; corollas all strap-shaped; pappus of numerous hairlike bristles.

FAMILIES OF PLANTS

LYGODESMIA (*Lygodesmia spinosa*) (W): Stems several from the same base, many times branched into stiff, spine-tipped branches, forming an almost leafless and very thorny plant, 4 to 24 inches high, with tufts of brown wool at the base; lower leaves, when present, linear, entire, up to 2 inches long; upper leaves reduced to scales; heads scattered, about 5-flowered, the corollas strap-shaped, pink; pappus of yellowish-white bristles.

DESERT-DANDELION (*Malacothrix sonchoides*) (W): Stems 2 to 10 inches high, branched from the base and wide-spreading, smooth or nearly so; leaves oblong to linear, toothed or lobed, mostly but not all basal; heads several, nearly an inch across when in bloom; corollas all strap-shaped, yellow; pappus of soft, white bristles.

TAPERLEAF (*Pericome caudata*) (W): A very bushy herb, 2 to 3 feet high and often nearly as wide; leaves opposite, triangular with long, tapering tips, petioled; heads about $\frac{1}{4}$ inch across, in large, showy clusters; corollas all tubular, pale yellow; pappus a low crown of scales and sometimes 1 or 2 awns.

PAPERFLOWER (*Psilostrophe sparsiflora*) (S) (W): Stems mostly 5 to 15 inches high, much branched; leaves obovate to nearly linear, often gradually tapering to a very narrow base; heads often clustered at the ends of branches; both ray and disk flowers yellow, the rays broad and often turned downward. The heads resemble those of a zinnia except that the disk flowers are yellow instead of red.

GROUNDSEL (*Senecio longilobus*) (S) (W): Stems 1 to 3 feet high, often several together, permanently woolly at least above, leafy to the top; leaves alternate, pinnately divided into narrowly linear lobes, the upper ones often entire and narrowly linear; heads between $\frac{1}{4}$ and $\frac{1}{2}$ inch across when in bloom; both ray and disk flowers yellow.

GROUNDSEL (*Senecio multicaпитatus*) (W): Very similar to the preceding but the stems smooth or nearly so, never woolly, and the heads smaller, $\frac{1}{4}$ inch across or less.

GROUNDSEL (*Senecia spartioides*) (W): Stems usually in large clumps; entire plant smooth or nearly so; leaves linear and entire, or rarely with 1 or 2 pairs of short lobes near the base. Otherwise very similar to the 2 preceding species.

GROUNDSEL (*Senecia uintahensis*) (S) (W): Stems 6 to 16 inches high, usually gray-green from the presence of whitish wool; leaves largely basal, the few on the stem reduced, mostly narrowly oblong and pinnately lobed into short, broad, mostly toothed lobes, sometimes merely toothed, woolly like the stems; heads usually many; both ray and disk flowers yellow.

GOLDENROD (*Solidago sparsiflora*) (S): Stems 1 to 2 feet high, hairy; leaves mostly lanceolate or nearly linear, rough above and hairy below, 3-nerved; heads small and numerous, mostly on one side of the curved branches of the panicle; ray flowers fewer than the disk flowers.

WIRE-LETTUCE (*Stephanomeria pauciflora*) (W): Stems mostly 8 to 24 inches high with stiff branches that extend upward; leaves linear or nearly

FAMILIES OF PLANTS

so, more or less pinnately lobed; heads solitary or few on the branches, 3- to 9-flowered; corollas all strap-shaped and pink; pappus brown-tinged, the bristles feathery above but merely rough near the base.

WIRE-LETTUCE (*Stephanomeria tenuifolia*) (W): Very similar to the preceding but the pappus bright white and the bristles feathery the full length.

WIRE-LETTUCE (*Stephanomeria thurberi*) (W): This wire-lettuce differs from the other 2 by having the heads 10-to-20-flowered. The pappus is bright white and the bristles are feathery the full length; corollas all strap-shaped and pink.

HORSEBRUSH (*Tetradymia canescens*) (W): A shrub, 8 to 36 inches high, somewhat white-hairy or woolly; leaves alternate, linear or nearly so, 1 inch long or less, often with clusters of shorter leaves in the axils, gray-hairy or woolly; heads small, 4-flowered, clustered at the ends of branches; involucre of 4 bracts; akenes silky-hairy; pappus of abundant, white bristles.

TOWNSENDIA (*Townsendia incana*) (W): Stems several from the same base, more or less spreading, 1 to 8 inches long, hairy; leaves less than 2 inches long, linear or nearly so; heads 1 to 3 on each stem, about $\frac{1}{4}$ inch across; disk flowers yellow; ray flowers white to lilac; pappus of several awns, those of the ray flowers shorter than those of the disk flowers. (The name *T. arizonica* used for many Arizona plants of this genus, seems to be only a synonym for *T. incana*.)

GOATSBEARD (*Tragopogon dubius*) (S): Stems mostly 6 to 30 inches tall, often branched; leaves alternate, grasslike, clasping at the base; heads large, solitary at the ends of the stems, about 2 inches across; bracts of the involucre longer than the corollas; corollas all strap-shaped, yellow; akenes long-beaked; pappus of feathery bristles.

CROWNBEARD (*Verbesina enceloides*) (S): Plants 1 to 3 feet tall, branched; leaves ovate to lanceolate, variously toothed, especially near the base, green above, whitish beneath, petioled; heads solitary at the ends of branches, about an inch across; both ray and disk flowers yellow, the rays about $\frac{1}{2}$ inch long and showy; pappus of disk flowers 2 slender awns, of ray flowers none.

COCKLEBUR (*Xanthium saccharatum*) (W): Stems 8 inches to 3 feet tall, often purple-dotted; leaf blades 1 to 4 inches long, ovate to heart-shaped, toothed or shallowly lobed, the petioles as long as the blades; staminate heads many-flowered, the corollas all tubular; pistillate heads burlike, forming an oval, 2-beaked body bearing hooked prickles; pappus none.

ZINNIA (*Zinnia grandiflora*) (W): Stems 4 to 8 inches high, several or many, much branched; leaves opposite, linear, entire, mostly less than an inch long; heads showy, solitary at the ends of the numerous branches, about $\frac{1}{2}$ inch across; disk flowers brick-red; ray flowers 4 to 5, yellow, about $\frac{1}{2}$ inch long, somewhat turned downward, remaining attached to the akenes and becoming papery.

INDEX TO FAMILY, GENERIC AND COMMON NAMES

A		
<p><i>Abronia</i> 27</p> <p><i>Abutilon</i> 38</p> <p><i>Agropyron</i> 16, 18</p> <p>ALKALI SACATON 18, 21</p> <p><i>Allenrolfea</i> 9, 24, 25</p> <p>ALLIGATOR JUNIPER 14</p> <p>ALLIONIA 27</p> <p><i>Allionia</i> 27</p> <p>AMARANTHACEAE 12, 26</p> <p>AMARANTH FAMILY 12, 26</p> <p><i>Amaranthus</i> 26, 27</p> <p><i>Ambrosia</i> 53, 56</p> <p><i>Amelanchier</i> 10, 32</p> <p>AMSONIA 42</p> <p><i>Amsonia</i> 42</p> <p>ANACARDIACEAE 38</p> <p><i>Andropogon</i> 16, 18, 19</p> <p><i>Androstephium</i> 11, 22</p> <p>APACHE PLUME 10, 32</p> <p><i>Aplopappus</i> 53, 56</p> <p>APOCYNACEAE 13, 41</p> <p><i>Arabis</i> 29, 30</p> <p><i>Artemisia</i> 52, 53, 56, 57</p> <p><i>Aristida</i> 17, 19</p> <p>ASCLEPIADACEAE 13, 42</p> <p><i>Asclepias</i> 42</p> <p>ASPEN 22</p> <p>ASTER 10, 51, 55, 57</p> <p><i>Aster</i> 10, 51, 55, 57</p> <p><i>Astragalus</i> 34</p> <p><i>Atriplex</i> 24, 25</p>	<p>BLADDERPOD 29, 30</p> <p>BLANKETFLOWER 54, 58</p> <p><i>Blepharoneuron</i> 18, 19</p> <p>BLUE GRAMA 16, 19</p> <p>BLUE FLAX 13, 36</p> <p>BLUESTEM 18, 19</p> <p>BOERHAAVIA 27, 28</p> <p><i>Boerhaavia</i> 27, 28</p> <p>BORAGE FAMILY 13, 44</p> <p>BORAGINACEAE 13, 44</p> <p><i>Bouteloua</i> 16, 19</p> <p>BRICKELLIA 53, 54, 57</p> <p><i>Brickellia</i> 53, 54, 57</p> <p>BROME 18, 19</p> <p><i>Bromus</i> 18, 19, 20</p> <p>BUCKWHEAT FAMILY 12, 23</p> <p>BUFFALO GOURD 11, 51</p> <p>BURWEED 53, 58</p> <p>BUSH MUHLY 17, 20</p>	
B		C
<p><i>Bahia</i> 54, 57</p> <p>BARBERRY FAMILY 28</p> <p>BEAN 33, 36</p> <p>BEARDTONGUE 49, 50, 51</p> <p>BEDSTRAW 11, 51</p> <p>BEEBALM 47</p> <p>BEEPLANT 31</p> <p>BERBERIDACEAE 28</p> <p><i>Berberis</i> 9, 28</p> <p>BIG SAGEBRUSH 52, 57</p> <p>BISCUIT ROOT 41</p> <p>BLACK GRAMA 16, 19</p>	<p>CACTACEAE 10, 39</p> <p>CACTUS FAMILY 10, 39</p> <p><i>Calliandra</i> 33, 35</p> <p>CALTROP FAMILY 13, 36</p> <p>CAPER FAMILY 13, 31</p> <p>CAPPARIDAECEAE 13, 31</p> <p>CARYOPHYLLACEAE 28</p> <p>CASHEW FAMILY 38</p> <p><i>Cassia</i> 33, 35</p> <p><i>Castilleja</i> 50</p> <p>CHAENACTIS 54, 57</p> <p><i>Chaenactis</i> 54, 57</p> <p>CHAMAESARACHA 48</p> <p><i>Chamaesaracha</i> 48</p> <p>CHENOPODIACEAE 10, 12, 24</p> <p><i>Chenopodium</i> 25, 26</p> <p>CHESS 18, 20</p> <p>CHOLLA 40</p> <p><i>Chrysopsis</i> 55, 57</p> <p><i>Chrysothamnus</i> 52, 57, 58</p> <p><i>Cirsium</i> Cover, 53, 58</p> <p>CLAMMY WEED 31</p> <p><i>Cleome</i> 31</p> <p>CLIFF-ROSE 10, 32</p> <p>COCKLEBUR 53, 61</p> <p><i>Coldenia</i> 45</p>	

INDEX TO FAMILY, GENERIC AND COMMON NAMES

<i>Commelina</i>	11, 22
<i>Commelinaceae</i>	22
COMMON REED	18, 21
COMPOSITAE	9, 11, 51
COMPOSITE FAMILY	9, 11, 51
CONVULVULACEAE	42
CONYZA	53, 55, 58
<i>Conyza</i>	53, 55, 58
CORYDALIS	12, 29
COWANIA	10, 32
CRANESBILL	13, 36
CREeping MAHONIA	9, 28
CROTON	12, 37
<i>Croton</i>	12, 37
CROWFOOT FAMILY	29
CROWNBEARD	54, 61
CRUCIFERAE	13, 29
CRYPTANTHA	45
<i>Cryptantha</i>	45
<i>Cucurbita</i>	11, 51
CUCURBITACEAE	51
CUPRESSACEAE	9, 14
CURRENT	10, 31
CYMOPTERIS	41
<i>Cymopteris</i>	41
CYPERACEAE	22
<i>Cyperus</i>	11, 22
CYPRESS FAMILY	9, 14

D

DALEA	33, 35
<i>Dalea</i>	9, 33, 35
<i>Datura</i>	48
DAYFLOWER	11, 22
DEERGRASS	16, 20
DEER-VETCH	33, 35
<i>Delphinium</i>	12, 29
<i>Descurainia</i>	30
DESERT-DANDELION	52, 60
DESERT NEEDLEGRASS	17, 21
DESERT PLUME	29, 31
DESERT SALTGRASS	18, 20
DESERT THORN	47, 48
DICORIA	52, 58
<i>Dicoria</i>	52, 58
<i>Distichlis</i>	18, 20
<i>Dithyrea</i>	29, 30

DOGBANE FAMILY	13, 41
DOUGLASS-FIR	14
DOWNY CHESS	18, 20
DROPSSEED	18, 19
<i>Drymaria</i>	13, 28
DUNE BROOM	9, 33, 36
DYSSODIA	55, 58
<i>Dyssodia</i>	55, 58

E

<i>Echinocereus</i>	40
<i>Enneapogon</i>	18, 20
<i>Ephedra</i>	15
EPHEDRACEAE	9, 15
<i>Eragrostis</i>	18, 20
<i>Erigeron</i>	55, 58
<i>Eriogonum</i>	10, 23, 24
<i>Erysimum</i>	30
<i>Euphorbia</i>	37, 38
EUPHORBIACEAE	12, 36
<i>Eurotia</i>	10, 24, 26
EVENING-PRIMROSE	40, 41
EVENING-PRIMROSE FAMILY	11, 40
EVOLUVUS	13, 42
<i>Evolvus</i>	13, 42

F

<i>Fallugia</i>	10
FALSE-MESQUITE	33, 35
FALSE TARRAGON	53, 56
FEATHERGRASS	17, 21
FENDLER THREE-AWN	17, 19
FIGWORT FAMILY	12, 49
FLAT-SEDGE	11, 22
FLAX	13, 36
FLAX FAMILY	36
FLEABANE	55, 58
FLUFFGRASS	18, 21
<i>Forestiera</i>	9, 41
FOUR-O'CLOCK	27, 28
FOUR-O'CLOCK FAMILY	11, 12, 27
FOUR-WING SALTBUSH	24, 25
<i>Franseria</i>	53, 58
FUNNEL LILY	11, 22

G

GAILLARDIA	54, 58
------------------	--------

INDEX TO FAMILY, GENERIC AND COMMON NAMES

<i>Galium</i>	11, 51
GALLETA	15, 20
GAURA	40
<i>Gaura</i>	40
GERANIACEAE	36
<i>Geranium</i>	13, 36
GERANIUM FAMILY	36
GIANT DROPSEED	16, 21
GILIA	43
<i>Gilia</i>	43
GLOBE-MALLOW	38, 39
GOATSBEAR	52, 61
GOLDEN-ASTER	55, 57
GOLDEN CORYDALIS	12, 29
GOLDENROD	55, 60
GOOSEBERRY	10, 32
GOOSEFOOT	25, 26
GOOSEFOOT FAMILY	10, 12, 24
GOURD	11, 51
GOURD FAMILY	51
GRAMA	16, 19
GRAMINEAE	11, 15
GRASS FAMILY	11, 15
GREASEWOOD	24, 26
GROUNDCHERRY	48, 49
GROUNDSEL	55, 56, 60
<i>Gutierrezia</i>	51, 55, 59

H

<i>Haplopappus</i>	53, 56
HAVARD THREE-AWN	17, 19
<i>Hedeoma</i>	47
HEDGEHOG CACTUS	40
<i>Helianthus</i>	54, 59
HELIOTROPE	45
<i>Heliotropium</i>	45
<i>Hilaria</i>	15, 20
<i>Hoffmanseggia</i>	33, 35
<i>Holodiscus</i>	10, 32
HOREHOUND	47
HORSE BRUSH	52, 61
HORSE-NETTLE	48, 49
HYDROPHYLLACEAE	13, 44
HYMENOPAPPUS	54, 59
<i>Hymenopappus</i>	54, 59
HYMENOXYS	54, 59

I

INDIAN-MALLOW	38
INDIAN RICEGRASS	17, 20
INDIGOBUSH	9, 33, 35
IODINEBUSH	9, 24, 25
<i>Ipomoea</i>	13, 42
<i>Iva</i>	53, 59

J

JACKASS-CLOVER	31
JIMPSONWEED	48
JOINTFIR	15
JOINTFIR FAMILY	9, 15
JUNIPER	14, 15
<i>Juniperus</i>	14

K

KALLSTROEMIA	36
<i>Kallstroemia</i>	36
KUHNSIA	53, 59
<i>Kuhnia</i>	53, 59

L

LABIATAE	12, 46
<i>Lactuca</i>	52, 59
<i>Lappula</i>	45, 46
LARKSPUR	12, 29
<i>Lathyrus</i>	34, 35
LEGUMINOSAE	12, 32
LEMON SCURFPEA	33, 36
<i>Lesquerella</i>	29, 30
LETTUCE	52, 60, 61
LILIACEAE	22
LILY	11, 22
LILY FAMILY	22
LIMBER PINE	14
LINACEAE	36
<i>Linum</i>	13, 36
<i>Lithophragma</i>	31
<i>Lithospermum</i>	45, 46
LITTLE BLUESTEM	16, 19
LOASACEAE	11, 39
LOASA FAMILY	11, 39
LOCO	34, 36
<i>Lomatium</i>	41

INDEX TO FAMILY, GENERIC AND COMMON NAMES

LORANTHACEAE	23	<i>Nama</i>	44
<i>Lotus</i>	33, 35	NEEDLE AND THREAD	17, 21
LOVEGRASS	18, 20	NEEDLEGRASS	17, 21
LUPINE	33, 34, 35	NEW MEXICO FEATHERGRASS	17, 21
<i>Lupinus</i>	33, 34, 35	<i>Nicotiana</i>	48, 49
<i>Lycium</i>	47, 48	NIGHTSHADE FAMILY	13, 47
LYGODESMIA	10, 52, 55, 60	NODDING BROME	18, 19
<i>Lygodesmia</i>	10, 52, 55, 60	NOSEBURN	37, 38
M		NYCTAGINACEAE	11, 12
MADDER FAMILY	51		
MAHONIA	9, 28	O	
<i>Malacothrix</i>	52, 60	<i>Oenothera</i>	40, 41
MALLOW FAMILY	38	OLEACEAE	41
MALVACEAE	38	OLIVE FAMILY	41
MARSH-ELDER	53, 59	ONAGRACEAE	11, 40
<i>Marubium</i>	47	ONE-SEED JUNIPER	15
<i>Melilotus</i>	33	<i>Opuntia</i>	40
<i>Mentzelia</i>	39	ORANGE GOOSEBERRY	10, 32
MESA DROPSEED	18, 21	<i>Oryzopsis</i>	17, 20
MICROSTERIS	42, 44	OXYBAPHUS	27, 28
<i>Microsteris</i>	42, 44	<i>Oxybaphus</i>	27, 28
MILKWEED	42	<i>Oxytropis</i>	34, 36
MILKWEED FAMILY	13, 42		
MILKVETCH	34	P	
<i>Mimulus</i>	50	PAINTBRUSH	50
MINT	46, 47	PAPAVERACEAE	29
MINT FAMILY	12, 46	PAPERFLOWER	54, 60
<i>Mirabilis</i>	27, 28	PAPPUSGRASS	18, 20
MOCK-PENNYROYAL	47	<i>Parryella</i>	9, 33, 36
<i>Monarda</i>	47	PARSLEY FAMILY	12, 41
MONARDELLA	47	PEA FAMILY	12, 32
<i>Monardella</i>	47	PEAVINE	34, 35
MONKEYFLOWER	50	<i>Penstemon</i>	49, 50, 51
MORNING GLORY	13, 42	<i>Pericome</i>	54, 60
MORNING GLORY FAMILY	42	<i>Phacelia</i>	44
MOUNTAIN MUHLY	17, 20	<i>Phacelia</i>	44
MISTLETOE	9, 10, 23	<i>Phaseolus</i>	33, 36
MISTLETOE FAMILY	23	PHLOX	42, 44
<i>Muhlenbergia</i>	16, 17, 18, 20	<i>Phlox</i>	42, 44
MUHLY	18, 20	PHLOX FAMILY	13, 42
MULLEIN	49, 51	<i>Phoradendron</i>	9, 10, 23
MUSTARD	30	<i>Phragmites</i>	18, 21
MUSTARD FAMILY	13, 29	<i>Physalis</i>	48, 49
MUTTONGRASS	18, 21	<i>Physaria</i>	29, 30
N			
NAMA	44		

INDEX TO FAMILY, GENERIC AND COMMON NAMES

PIGWEEED26, 27	ROCKCRESS29, 30
PINACEAE9, 14	ROCK-SPIRAEA10, 32
PINE14	ROCKY MOUNTAIN BEEPLANT ... 31
PINE-DROPSEED18, 19	ROSACEAE32
PINE FAMILY9, 14	ROSE FAMILY32
PINK FAMILY28	ROSEMARY MINT46, 47
PINK BEARDTONGUE49, 50	RUBIACEAE51
<i>Pinus</i>14	RUSHPEA33, 35
PINYON PINE14	RUSSIAN-THISTLE12, 25, 26
<i>Poa</i>18, 21	
POISON MILKWEED42	S
<i>Polanisia</i>31	SACATON18, 21
POLEMONIACEAE13, 42	SACRED DATURA48
<i>Poliomintha</i>46, 47	SAGEBRUSH52, 53, 56
POLYGONACEAE12, 23	SALICACEAE22
PONDEROSA PINE14	<i>Salix</i>22
<i>Populus</i>10, 22	<i>Salsola</i>12, 25, 26
POPPY FAMILY29	SALTBUSH25
PORTULACA28	SAND BLUESTEM16, 18
<i>Portulaca</i>28	SAND SAGEBRUSH52, 56
PORTULACACEAE28	SAND SPURRY13, 28
PORTULACA FAMILY28	SAND-VERBENA27
POVERTY THREE-AWN17, 19	<i>Sarcobatus</i>24, 26
PRICKLY-LETTUCE52, 59	SAXIFRAGACEAE31
PRICKLYPEAR40	SAXIFRAGE FAMILY31
<i>Pseudotsuga</i>14	SCARLET BEARDTONGUE49, 50
<i>Ptilostrophe</i>54, 60	SCROPHULARIACEAE12, 49
<i>Psoralea</i>33, 36	SCURFPEA33, 36
PUCCOON45, 46	SEDGE FAMILY22
PUNCTURE WEED36	SEEPWEED24, 26
PURPLE THREE-AWN17, 19	<i>Senecio</i>55, 56, 60
PURSLANE28	SENNA33, 35
<i>Physaria</i>29	SERVICEBERRY10, 32
Q	SHADSCALE25
QUAKING ASPEN10, 22	SIDE-OATS GRAMA16, 19
R	SISYBRIUM29, 31
RABBITBRUSH52, 57, 58	<i>Sisymbrium</i>29, 30, 31
RAGWEED53, 56	<i>Sitanion</i>16, 21
RANUNCULACEAE29	SIX-WEEKS GRAMA16, 19
RAYLESS-GOLDENROD53, 56	SKELETON PLANT23
RED THREE-AWN17, 19	SKUNKBUSH9, 38
REED18, 21	SKYROCKET43
<i>Rhus</i>9, 38	SLAKEWEED51, 55, 59
<i>Ribes</i>10, 31, 32	SOLANACEAE13, 47
RICEGRASS17, 20	<i>Solanum</i>48, 49
	<i>Solidago</i>55, 60
	SPECTACLEPOD29, 30

INDEX TO FAMILY, GENERIC AND COMMON NAMES

Sphaeralcea38, 39
SPIDERWORT FAMILY **22**
 SPIKE DROPSEED16, 21
 SPIKE PAPPUSGRASS18, 20
Sporobolus16, 18, 21
 SPURGE37, 38
SPURGE FAMILY **12, 36**
 SPURRY13, 28
 SQUIRRELTAIL16, 21
Stanleya29, 31
Stephanomeria52, 60, 61
 STICKLEAF39
 STICKSEED45, 46
Stipa17, 21
 STREPTANTHELLA30, 31
Streptanthella30, 31
Suaeda24, 26
 SUNFLOWER54, 59
 SWEET-CLOVER33, 35

T

TAMARIACACEAE **39**
 TAMARIX9, 39
TAMARIX FAMILY **39**
 TANSY MUSTARD30
 TAPERLEAF54, 60
 TETRACLEA13, 46
Tetradlea13, 46
Tetradymia52, 61
 THISTLECover, 53, 58
 THREE-AWN17, 19
 TOBACCO48, 49
 TOWNSENDIA54, 61
Townsendia54, 61
Tragia37, 38
Tragopogon52, 61
Tribulus36
Tridens18, 21
 TUMBLE MUSTARD30
 TWINPOD29, 30

U

UMBELLIFERAE12, 41
 UTAH JUNIPER15

V

Verbascum49, 51
Verbena46
VERBENACEAE12, 46
Verbesina54, 61
 VERVAIN46
VERVAIN FAMILY **12, 46**

W

WALLFLOWER30
WATERLEAF FAMILY **13, 44**
 WAX CURRANT10, 31
 WESTERN WALLFLOWER30
 WESTERN WHEATGRASS16, 18
 WHEATGRASS16, 18
 WHITE HORSE-NETTLE48, 49
 WHITE SWEET-CLOVER33, 35
 WILD BEAN33, 36
 WILD-BUCKWHEAT10, 23, 24
 WILD-OLIVE9, 41
 WILLOW22
WILLOW FAMILY **22**
 WINTERFAT10, 24, 26
 WIRE-LETTUCE52, 60, 61
Wislizenia31
 WOLFBERRY47, 48
 WOODLAND STAR31
 WORMWOOD53, 56

X

Xanthium53, 61

Y

YELLOW-RAGWEED54, 57
 YUCCA9, 11, 22
Yucca9, 11, 22

Z

ZINNIA54, 61
Zinnia54, 61
ZYGOPHYLLACEAE13, 36

McDougal Seed Plants of Wupatki and Sunset Crater M.N.A. Bulletin 37

